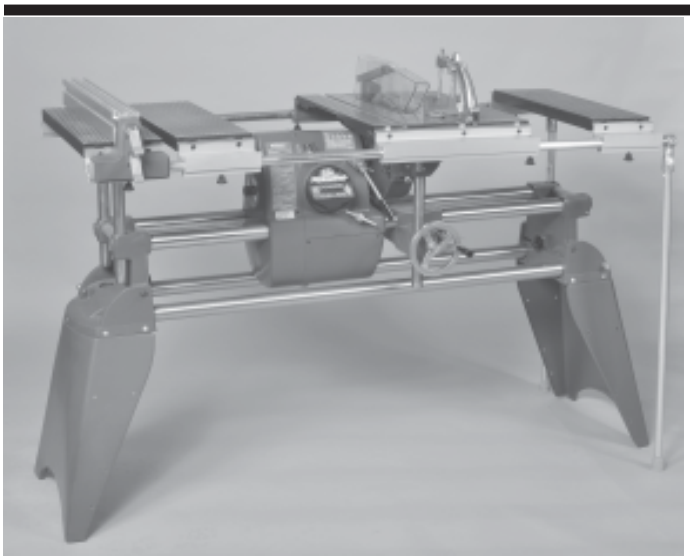
Shopsmith PowerPro® Mark 7
Home Workshop System



MARK 7

Designed and Built in Dayton, Ohio.

WARNING

Read the **SAFETY** information in the Introduction section and complete the **ASSEMBLY AND ALIGNMENT** procedures before operating the Shopsmith Mark 7.

Use only Shopsmith parts and accessories on your Mark 7. Using non-Shopsmith parts may create a hazardous condition and will void your warranty.

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522812 Rev. A 09/10

Welcome to Shopsmith!

Congratulations on your new Shopsmith Mark 7 Woodworking System. It is built to deliver years of reliable service as well as help you expand your workshop capabilities. The Mark 7's quality, accuracy and versatility allows you to perform tasks and do projects you would not have before considered.

How to Use this Owner's Manual

First, read this introductory section, paying special attention to the SAFETY rules. Go through the Parts Explosion, then read the section on Assembly and Alignment. Read the Operations and the Maintenance & Troubleshooting sections. This will give you a better idea about what the Mark 7 can do for you and how it works.

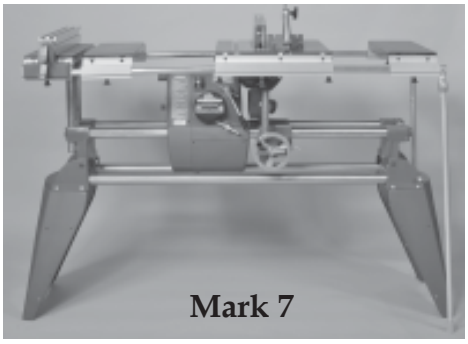
Finally, return to this section and reread the SAFETY rules. Then go to and do the Assembly and Alignment instructions before you perform any operations.

Keep this Owner's Manual handy for future reference, and keep other Shopsmith Owner's Manuals in the back of the binder.

SECTIONS

You should have noticed by now that this owner's manual has five major tabbed sections and ten minor:

- **Safety**
- **PowerPro Mark 7 with Pro Fence System**
- **Assembly and Alignment with Mode Setups**
- **Operations**
- **Maintenance & Troubleshooting**
- **Bandsaw**
- **Jointer**
- **Dust Collector**
- **Beltsander**
- **Strip Sander**
- **Scroll Saw**
- **Planer**
- **Lathe Duplicator**
- **Power Station**
- **Accessories**



Mark 7

Summary of Manual, by section:

The **Safety** section gives you safety instructions and what each safety device is used for.

The **Terms/Parts Explosion** section of your **Mark 7** contains information on:

- **Terms to Know**
- **Parts Lists and Exploded views**

The **Assembly/Alignment** section of your **Mark 7** contains information on:

- **Assembly**
- **Alignment**
- **Setting Up the Seven Basic Modes**

The **Operations** section tells you how to operate your **Mark 7**, using each of the seven modes–table sawing, disc sanding, vertical drilling, horizontal boring, lathe turning, over-table routing and under-table shaping.

The **Maintenance and Troubleshooting** section gives you maintenance and troubleshooting ideas for many issues.

The last tabbed sections are ones that you fill up with other Shopsmith manuals and product literature. As you acquire other accessories and tools, simply pop open this three ring binder and insert the new product literature behind its appropriate index tab. This way you always know where to look for product information. (We have also included an information sheet on some of these products for your information)

History of the Mark V

The concept of a multipurpose tool– a single machine that does the job of many– is probably as old as woodworking. In just the last two centuries, the United States Patent Office has issued dozens of patents for ingenious machines in one end and they'd spit furniture out the other.

Patent No. 511,618 for a "Woodworking Machine", issued to Stephen Hurteau in 1893, is typical of these inventions, as illustrated in Figure A. According to Hurteau, "My invention has reference to a combination wood working machine and consists of a strong frame on to which is arranged a lathe, circular saw, planer, jig saw, bans saw, auger, shaper, etc..., and is arranged in solid and compact form, its object being to provide a machine capable of performing the functions of several others, thereby saving expense on first cost."

But Hurteau's "Woodworking Machine"– and many others like it– was a pipe dream. Only a few of the more practical multipurpose tool designs were ever built and marketed. Most of these were massive commercial-duty machines for furniture manufacturers, mill operators, and other professional woodworkers. They usually incorporated a circular saw, jointer, molder or shaper, and horizontal boring machine arranges around a single powerful motor. A woodworker could preset each of these components, then walk around the tool, machining one board after another to precisely the same dimensions and shape.

On the other end of the scale, the "Red Jacket" was a compact multipurpose bench tool for the home handyman, sold in the 1930's. It's power plant was an ordinary electric hand drill that could either be detached or mounted in a stand. When mounted, the drill powered a small circular saw, disc sander, and lathe.

However, none of these early multipurpose tools achieved any lasting success. Most machines were either too expensive or their capacities too limited to interest the average craftsman. It wasn't until Dr. Hans Goldschmidt introduced his "Shopsmith"– a five-in-one machine, similar to the present Mark V– that a multipurpose woodworking tool became accepted and commonplace.

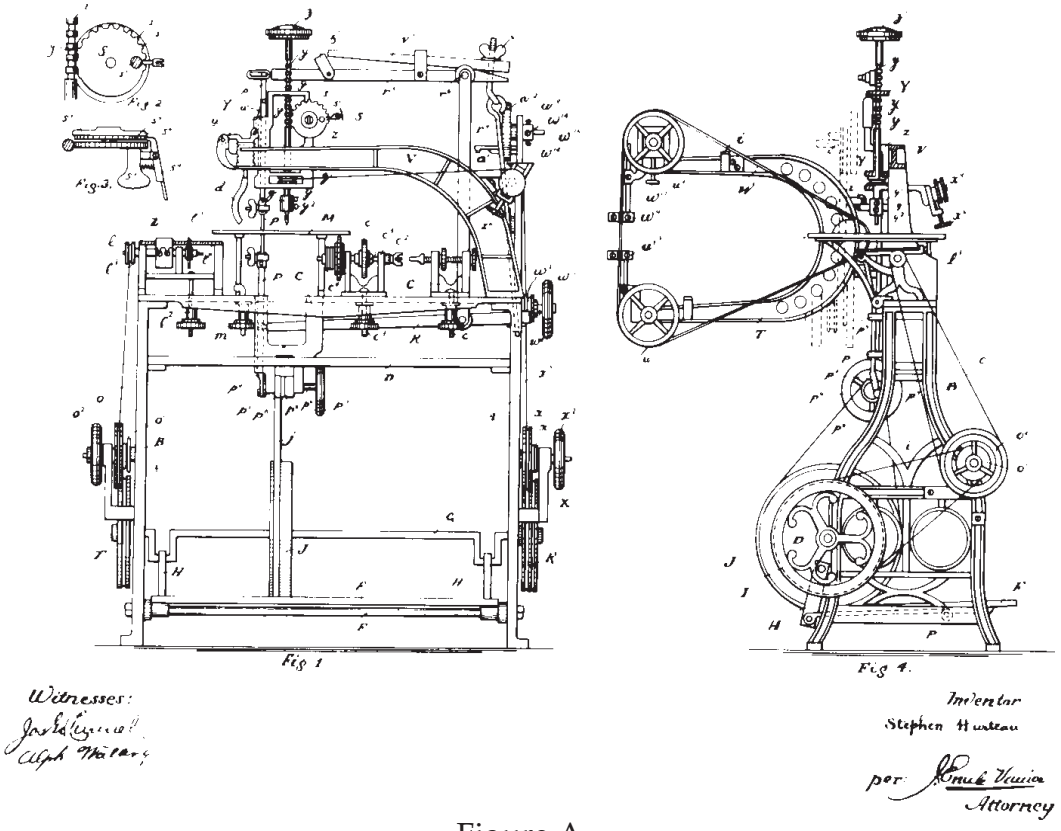


Figure A

Hans Goldschmidt came to the United States in 1937, fleeing Nazi Germany. Once in America, he became a woodworker out of necessity. Like so many folks in the Depression, he couldn't find a job, even though he had a doctorate in Administrative Engineering from the University of Berlin. So he scraped together enough money to buy some woodworking tools and made handicrafts– napkin holders, trays, and coasters.

After World War II, he became a foreman in a woodworking shop. All his life he had dreamed of being an inventor, and it was here that he got his chance. "The basis of being an inventor is recognizing a need," Dr. Goldschmidt said in a later interview. "Then try to invent something that fills that need."

The need that Dr. Goldschmidt recognized was for a simple machine to perform a multitude of woodworking tasks. Watching the workers use the power tools in the shop, he saw much duplication– too many motors, pulleys, arbors. He also noticed a growing market for power tools, since so many soldiers had learned to use machinery during the war. It was the right time, he decided, to introduce an affordable, capable multipurpose tool.

"I listed the most important woodworking tools and came up with a saw, sander, lathe, drill press, bandsaw, and jigsaw," recalled Dr. Goldschmidt, telling how he had designed his machine. "Then I analyzed what all these had in common. They all have a motor in common, for one thing. They all have a turning spindle that cuts. They all have a table or work holding device. Then I eliminated those tools that didn't fit well, which were the jigsaw and the bandsaw. And finally ended up with the saw, the sander, the drill press, and the lathe."

Goldschmidt envisioned, then sketched his machine. From his drawings, he built a half-scale model in his spare bedroom. Later he assembled a full scale model from salvaged hardware and spare parts. When tested, his invention worked just as he had hoped: It had the capacity to perform most common woodworking operations, yet it was simple enough to be manufactured and sold at a reasonable cost.

The inventor and several of his friends formed the Magna Engineering Company. They began making multipurpose tools at a lumberyard in Berkeley, California, building the first machines by hand. Montgomery Ward was Magna's first big customer, ordering 250 "Shopsmith Model 10ER's" for the west coast stores for Christmas, 1947. (The name "Shopsmith" was suggested to Dr. Goldschmidt and his partners at a party, along with what now would be considered a chauvinistic title, the "Mixmister".) Response was so enthusiastic that the department store chain made it a stock item nationwide.

This success of the "10ER" encouraged Dr. Goldschmidt to refine his original design In the 1950's, Magna introduced several new multipurpose tools. The Shopsmith Mark II was a scaled down, economy version for the woodworker on a tight budget. The Shopsmith Mark VII incorporated a lot of extras, including way tubes that tilted in both directions and a built-in shop vacuum. But the most versatile, durable and popular model was by far the Shopsmith Mark V. For this line of successful multipurpose tools– in particular, the Mark V– Goldschmidt achieved recognition as an inventor in Time Magazine, The Saturday Evening Post, Popular Science, the Harvard Business Review, and other publications. Later, he went on to invent many other products.

The Mark II and the Mark VII were only available briefly, but thousands of Shopsmith Mark V's were manufactured until the early 1960's. Then a variety of changes within the company and with the buying public caused production to cease. In 1971, John Folkerth visited an old plant in search of spare parts. He not only found the parts, but molds, dies, jigs– everything needed to make new Mark V's. The owners were willing to sell and John jumped at the opportunity. By 1973, the Shopsmith Mark V was back on the market, manufactured by a new company– Shopsmith, Inc. The company changed hands in July of 2009 and redesigned the headstock and the base unit. RLFSHOP, LLC introduced the *Shopsmith PowerPro*® Headstock and the Mark 7 in August of 2010.

WARNING WARNING WARNING WARNING

SAFETY

Safety First

The Shopsmith Mark 7 has many built-in safety features. But, the effectiveness of these features depends on you. To protect yourself from injury:

KNOWING YOU CAN BE HURT IS MORE IMPORTANT THAN THE MOST EFFICIENTLY DESIGNED GUARD ON A TOOL.

THIS MACHINERY MAY CAUSE SERIOUS INJURY IF THE SAFETY RULES ARE NOT STUDIED AND FOLLOWED.

READ, UNDERSTAND AND FOLLOW ALL THE INFORMATION IN THIS OWNER'S MANUAL.

The meanings of **WARNINGS, CAUTIONS, AND NOTES** are:

WARNING

A **WARNING** is given when failure to follow the directions could result in injury, loss of limb, or life.

CAUTION

A CAUTION is given when failure to follow the directions could result in temporary or permanent damage to the equipment.

NOTE

A NOTE is used to highlight an important procedure, practice or condition.

NOTE

It is important to provide adequate lighting in your shop area.

Eye Protection

- Always wear eye protection when you use power equipment. Use goggles, safety glasses or a face shield to protect your eyes.
- Goggles completely surround and protect your eyes. Be sure your goggles fit closely, but comfortably.
- Safety glasses don't fog as easily as goggles and can be worn all the time. Regular eyeglasses normally have only impact resistant lenses. They are not safety glasses.
- A face shield protects your entire face. And you can flip it up out of the way when you don't need it. A face shield can be used with regular glasses.

Ear Protection

CAUTION

Use only tools made in conformity to EN-847-1.

The average noise level is 86 db. Hearing protection recommended.

- Prolonged exposure to high noise levels from high speed power equipment can damage your hearing.
- Hearing protectors screen out noise that can damage your ears. Wear hearing protection when you are exposed to high intensity power equipment noise.

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Sawdust and Chips

NOTE

Shopsmith Mark 7's are fitted to use with Dust Collection equipment. We recommend the Shopsmith DC3300 Dust Collection System.

- Sawdust and chips can be fire hazards and breathing sawdust can be a health hazard. Sawdust may cause you physical discomfort, especially if you have emphysema, asthma, or an allergic reaction. The sawdust from some woods can also be toxic. When sawing or sanding:
  - Attach a dust collector or shop vacuum to the dust chute in the lower saw guard.
  - Wear a close-fitting dust mask if a significant amount of dust is released into the air. Clear or replace the filters in the mask regularly.
  - Open a window or use a fan to ventilate your shop.

Saw Guards

- Most shop accidents happen on the table saw. For this reason, **always keep the upper and lower saw guards in place whenever you operate the Mark 7 in the table saw mode.** The ONLY exception to this rule is when you need to saw part way through stock– such as when cutting a rabbet or groove, or when using the dado or molder accessory. Then you must remove the upper saw guard. Whenever you remove the upper saw guard, ***KEEP*** the lower saw guard in place and work with extreme caution.
- The saw guards provide a physical barrier between you and the blade, no matter what height or angle you adjust the worktable.
- The lower saw guard has a spring loaded side that automatically adjusts to the height or angle you adjust the worktable.
- The upper saw guard is clear so that you can see the blade. There's a removable plastic insert in front of the blade. This can be easily cleaned or replaced so that you can keep your line of sight clear.
- The lower saw guard has a sliding side for easy accessory attachment and dust collection efficiency.
- The upper saw guard has a riving knife that is positioned 1/8" from the blade regardless of stock thickness. The riving knife has anti-kickback cams that capture the stock in the event of a kickback.
- The riving knife mounts in the lower saw guard. The lower saw guard mounts to the quill. This allows you to adjust the blade without having to go back and align the riving knife with the blade.

Table Saw Kickback

- Table saw accidents are often associated with kickback. Kickback is the ejection of the stock from the saw back toward the operator. Kickback causes loss of control and your hand could be thrown into the blade or you could be hit by flying stock. Never stand directly in the line of rotation of a moving blade. This lessens your chances of being hit by flying stock, if a kickback occurs. Kickback is caused by:
- The kerf of the stock closing up and **pinching** the rear of the saw blade.
- The stock **wedging** between the rip fence and the rear of the saw blade.

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- The stock **binding** against the sides of the blade as it passes through the stock.

To Prevent Kickback:

- Always keep the upper and lower saw guards in place. An anti-kickback mechanism on the guards helps prevent the stock from binding the bade and the stock from being thrown back toward the operator. Make sure the riving knife is aligned properly with the blade.
- Never cut stock freehand. Always use a push stick, push block, fence straddler, feather board, fixture, rip fence or miter gauge to guide and support the stock.
- Never reach over the blade while the machine is running. You could slip or twist the stock, causing a kickback. Use a rear support table or a roller stand to help support the stock and turn off the machine before removing stock or scraps.
- Keep blades sharp, properly set and free of pitch. Well maintained blades minimize the likelihood of kickback.
- Avoid cutting wet or pitchy wood.
- The anti-kickback mechanism is not effective when 8" diameter blades are used.
- When **cross cutting**, always use the miter gauge and hold the stock firmly against the protractor.
- When **cross cutting**, never use the miter gauge with the rip fence unless you mount a stoop block to the rip fence to prevent the stock from binding between the rip fence, miter gauge and blade.
- When **ripping**, always use the rip fence to guide and support stock.
- Make sure the rip fence is parallel to the blade. If the rip fence closes in toward the rear of the blade, the rip fence will tend to wedge the stock against the blade.
- When **cross beveling**, always place the miter gauge on the downward side of the worktable.
- When **rip beveling**, always mount the rip fence on the downward side of the worktable.
- Always cut with the smooth, hard surface of the stock against the worktable. Anti-kickback mechanisms may not be effective when cutting smooth, hard surfaces.

Router/Shaper Guarding

- Most shop accidents happen to woodworkers who fail to follow instructions, or fail to use guards and safety devices. Although proper use of guards and safety devices often require additional set-up, the protection for you and your family is well worth the effort..

Electrical Requirements

- Pay particular attention to the connection between your power equipment and your power source. Before you plug in your Mark 7, check the voltage and the amperage of the circuit you will be using. The wall receptacle and wires in the circuit must be rated for at least 15 amps.
- The rating of the components in the circuit wires and receptacles must be high enough to handle the load (in amps) of that motor, plus any other tools or appliances you may have plugged into the same circuit and running at the same time.

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Circuitry

- The Mark 7 PowerPro Headstock can operate on both 120 and 240 volts. The internal computer will adapt top the current in use. To change between currents, refer to Page E-2.

Mark 7 Utlizing a 115 Volt current

- The Mark 7 DVR motor, when operating with 10/115 volts is rated at 1-3/4 hp. It can "pull" up to 13-14 amps when running under a heavy load. The headstock motor runs on standard U.S. house current– 120 volts, 60 hz. The wire size (gauge) in the circuit you use must be rated for at least 15 amps. Using wire and receptacles rated to handle 20 or 25 amps will give you an even bigger safety margin.

Fuses

- We recommend you install circuit breakers or fuses which are time-delayed. Fusetron T-15 fuses are recommended. **Do not use fuses or circuit breakers larger than 15 amps.** When you first turn on the machine, the motor pulls high amperage to get up to running speed. A time delay fuse or circuit breaker won't blow during this initial surge. Always start the Mark 7 at "Slow" speed setting to prevent blowing fuses and tripping the circuit breaker.

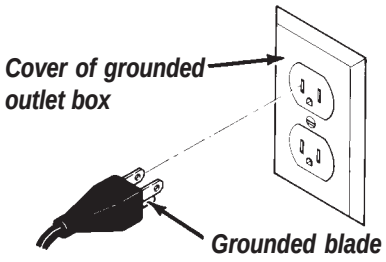

Figure A-1

- If you need to run a new circuit to operate the Mark 7, be sure that the wire and receptacle you use is rated to handle the amperage of the headstock motor, and is at least 15 amps.

Grounding

- The circuit you see should be properly grounded.

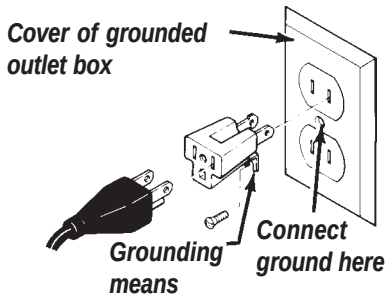

Figure A-2

- The Mark 7 plug has three prongs, as shown in Figure A-1. The receptacle should have three corresponding holes. Do not modify the plug. If it will not fit the receptacle, have the proper receptacle installed.

- If you have a two-hole receptacle, use a **temporary** adapter to plug in the Mark 7, as illustrated in Figure A-2. The grounding lug or wire on the adaptor **MUST** be connected to a permanent ground such as a grounded outlet box. The temporary adapter should be used only **until** a properly grounded outlet can be installed. **(Adapters are not allowed in Canada.)**

- If you are unsure as to whether your outlet box is grounded, ask a licensed electrician.

Extension Cords

- If you use an extension cord to plug in your Mark 7, be sure it is a three-conductor cord with a grounding plug and receptacle.

- The wire gauge must be thick enough to prevent loss of power and overheating– the longer the cord, the thicker the wire should be. Use the chart to determine the American Wire Gauge wire size required:

WARNING WARNING WARNING WARNING

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Cord Length	Minimum Wire Size
25 ft.	14 AWG
50 ft.	12 AWG
100 ft.	10 AWG

- Before using an extension cord, inspect it for loose wires or damage insulation. **Replace damaged cords immediately.**

- Do not let the connection between the power cord and an extension cord lie on a damp or wet surface.

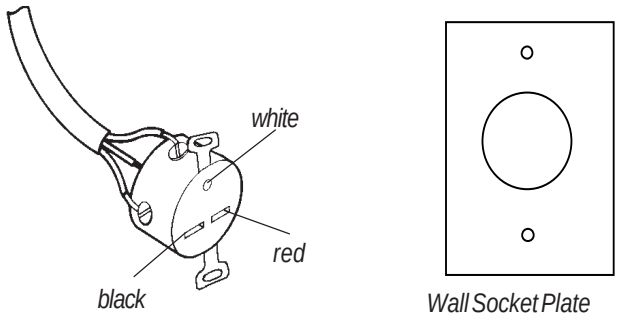
Mark 7 Utilizing a 240-Volt Current

- When misused, 220/240 volts is more dangerous than the United States household voltage of 120 volts. Have a qualified electrician install the 15 amp 240 -volt circuit, with 10 amp fuses. Have your electrician recommend a compatible plug for the power cord. This will assure the circuit's safety and compatibility to the Mark 7. THE GREEN CONDUCTOR OF THE POWER CORD MUST BE CONNECTED TO THE GROUND PRONG OF THE ATTACHMENT PLUG.

- The DVR motor will operate satisfactorily on 220 to 260 volts and 50 or 60hz (cycles). This makes the 240-volt motor usable in the United States where 220/240 volt, 60 hz (cycles) current is used and in many foreign countries where the standard supply is 220/240 volts, 50 hz (cycles). No attachment plug is supplied because of the wide variety of plugs in use.

- The plug and the outlet **must** be matched to the ampere rating of the Mark 7 (6 to 8 amps loaded). **Do not** use the Mark 7 on any circuit with wires and plugs rated higher than 15 amps and 250 volts. We recommend that you use no higher than 10-amp fuses on this circuit.

WIRES IN WALL SOCKET



WIRES IN MARK V 220/240 PLUG

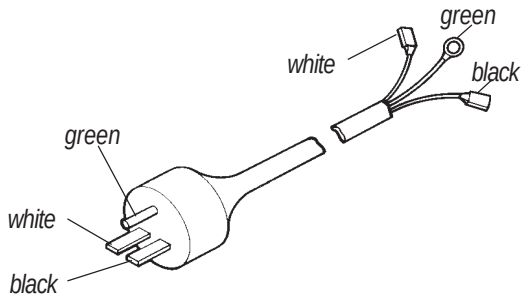


Figure A-3

- Figure A-3 diagrams the wiring for the 220/240 volt plugs. They should be connected as follows:

Wires in Wall Socket		220/240 Mark 7 Plug
WHITE	connects to-	GREEN
BLACK	connects to-	BLACK
RED	connects to-	WHITE

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Shopsmith Safety Kit

WARNING

DO NOT TRY TO MAINTAIN OR REPAIR YOUR PUSH BLOCKS, PUSH STICKS, FENCE STRADDLERS, OR FEATHER BOARDS. WORN OR VISUALLY DEFECTIVE SAFETY EQUIPMENT NEEDS TO BE REPLACED IMMEDIATELY.

- Four important safety devices are included with your Mark 7:
  - Push stick
  - Push block
  - Fence straddler
  - Feather board.

- These devices are designed to hold or maneuver stock close to moving blades, cutters and discs. They give you better control over the stock which helps achieve a more accurate cut. Depending on the operation, use one or more safety devices. Choose the device that gives you the most control and keeps your hands out of danger.

- Use a push stick to guide stock 1-1/2" to 5" wide. Place the foot on top of the stock and hook the heel over the back edge. See Figure A-4.

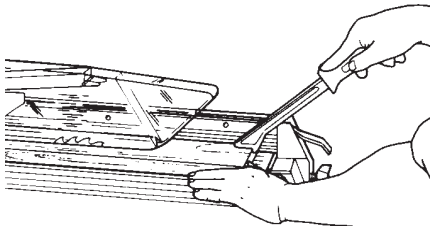

Figure A-4

- Use the push block to hold down and guide stock over 5" wide. As you press down, forward, and to the side, the rubber pad grips the wood. The handle is tilted to help keep your hands away from the blade, cutter or disc, as illustrated in Figure A-5.

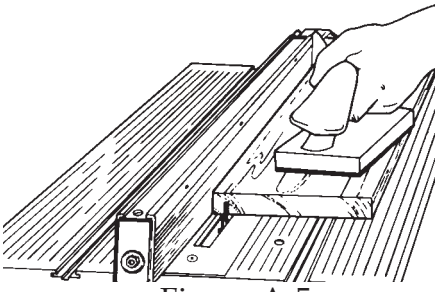

Figure A-5

- Use the fence straddler to hold down and push stock narrower than 1-1/2" past a blade or cutter. The body rides on the rip fence, while the heel hooks over the back edge of the stock. To change the height of the heel, loosen the locking knob. To reverse the heel, rotate the side 180°. Keep the locking knob secure. See Figure A-6.

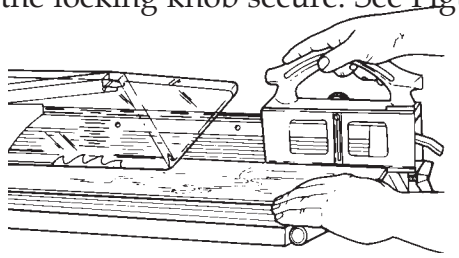

Figure A-6

- Use the feather board to press stock against the rip fence. Mount the feather board in either table slot. The fingers must be angled in the same direction that you feed the stock– use the arrow on top of the feather board as a guide. Position the fingers so they press against the stock just before it gets to the blade or cutter, then tighten the locking knobs. See Figure A-7. To reverse the direction of the fingers, remove the mounting bar, turn the feather board over, then replace the mounting bar.

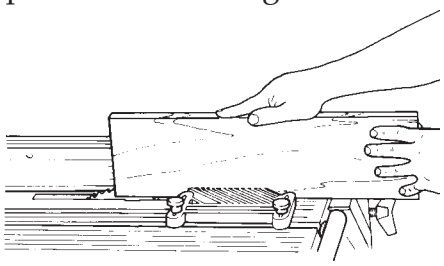

Figure A-7

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Safety Rules for the Shopsmith Mark 7

- Read, understand and follow the Mark 7 Owner's Manual and the manual for every power tool you use.
- Additional warnings, cautions and instructions and operating techniques are provided in the Shopsmith book, Power Tool Woodworking for Everyone. (A copy is included with your new Mark 7, and is also available from Shopsmith.)
- Keep your hands, fingers and other parts of your body at least 3" away from any moving blade, cutter or disc.
- Wear proper eye and ear protection. Also, wear a dust mask.
- Ground all equipment (unless double insulated.)
- Use clamps, fixtures or the miter gauge to secure stock. When appropriate, use a push stick, push block, fence straddler, feather board, miter gauge with safety grip or other safety devices to maneuver stock past a moving blade, cutter or disc.
- Keep all guards in place and in working order. Most injuries occur on unguarded power equipment.
- Never stand directly in the line of rotation of a moving blade, cutter, disc. If a kickback occurs, you could be hit by the stock or injured by contacting a moving blade, cutter or disc.
- Do not wear loose clothing, ties, gloves, or jewelry. Roll sleeves up above your elbows, wear non-slip footwear, and tuck long hair under a hat.
- Never operate power equipment if you are fatigued, taking medication, or under the influence of alcohol or drugs.
- Do not work with stock that is too small or too large to handle safely, or that has loose knots or other defects.
- Plan the operation and safety precautions before you begin.
- Turn off the main power switch on the Mark 7 and wait until all cutters, blades or discs come to a complete stop before removing stock and scraps.
- Turn off and unplug the Mark 7 before making adjustments, changing modes or performing maintenance.
- Make sure the main power switch is in the "off" position before plugging or unplugging the Mark 7.
- Secure the headstock lock, carriage lock, table height lock, table tilt lock and quill lock (if quill is used), before turning on the Mark 7.
- Make sure accessories, safety devices and fixtures are properly adjusted and secured before turning on the Mark 7. Also, check the arbor set screw periodically.
- Remove adjusting keys and wrenches from the Mark 7 before turning it on.
- Never exceed the maximum recommended speed for the operation. When using "combination" setups (such as table saw– jointer), never exceed the maximum speed for the slowest accessory.
- Never try to stop the Mark 7 or accessory by grabbing the stock, any part of the machine, or by forcing material against a cutter, blade or disc.
- Never leave the Mark 7 running unattended. Turn off the power. Don't leave until the machine comes to a complete stop.
- Do not overreach or hurry. Keep proper footing and balance at all times.
- Never reach under the worktable while the machine is running.

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- Never use a carbide-tipped blade or cutter to machine second-hand lumber. You could be hit by pieces of metal.
- Repair or replace damaged parts before further use. If a strange noise or vibration develops, turn off and unplug the machine. Correct the problem.
- Use only recommended Shopsmith parts and accessories on your Mark 7. **NEVER** use non-Shopsmith replacement parts or accessories. Use only tools made in conformity to EN-847-1. They are not designed like Shopsmith parts. Using non-Shopsmith parts may create a hazardous condition and will void your warranty.
- Keep all tools, cutters and blades for the Mark 7 and accessories sharpened.
- Keep all hand tools and power tools cleaned and maintained.
- Do not use the Mark 7 or an accessory to do a job for which it was not designed.
- Never mount an accessory on an auxiliary spindle unless it is designed to operate there. Consult the accessory's manual for the proper spindle on which to mount the accessory.
- Make sure the machine rests firmly on the floor when in use– not up on the retractable casters.
- Do not force the stock. Always feed stock against the rotation of the blade, cutter or disc. Let the blade, cutter or disc get up to full speed before you feed the stock.
- Make sure the stock rests firmly against the worktable, miter gauge, and/or rip fence.
- Do not use warped or twisted stock.
- Whenever you extend the quill, do not let go of the quill lever unless you first secure the quill feed lock.
- Do not work with long boards or sheet materials by yourself, unless you use a large rear support table or roller stands. Never try to work with boards the are too large for you to handle safely. It is best to have a helper.
- Never stand or lean on the machine. You could fall on it or it could tip over.
- Keep work areas well lit, clean and free from clutter.
- Make sure the Mark 7 casters are fully retracted before you begin operations.
- Do not use power equipment in damp, wet or explosive atmospheres.
- Keep visitors a safe distance from power equipment, and make them wear eye and ear protection.
- "Child-Proof" your workshop by using the program locking mechanism on the PowerPro Headstock and unplugging the equipment.

Table Saw Mode

- Always keep the upper and lower saw guards in place. The ONLY exception is when you saw part way through stock– such as when cutting a rabbet or groove, or when you use the dado or molder accessory. Then you must remove the upper saw guard. However, always keep the lower saw guard in place and work with extreme caution. Use safety devices to move the stock past the unguarded blade. NEVER place your hands over the blade even if the blade is covered by the stock.
- The saw blade should never protrude more than 1/4" above the stock.

To prevent kickback:

- Never make freehand cuts.
- Never reach over the saw blade while the machine is running.
- Keep blades sharp, properly set and free of pitch.

WARNING WARNING WARNING WARNING

WARNING WARNING WARNING WARNING

- Avoid cutting wet or pitchy wood.
- When cross cutting, always use the miter gauge with the safety grip.
- If you use the rip fence with the miter gauge, always clamp a stop block to the rip fence.
- When ripping, always use the rip fence and make sure that it is parallel to the blade.
- When beveling, always mount the rip fence or the miter gauge on the downward side of the worktable.
- Always cut with the smooth, hard surface of the stock against the worktable.
- Make sure that the riving knife on the saw guard system is properly aligned with the saw blade.
- Do not rip large sheets of plywood or similar materials by yourself. Get at least one helper.
- Use only 10" saw blades with the Mark 7. The only exceptions are Shopsmith-recommended molding heads and dado blades.
- Always use the proper table insert for the operation.
- Always install the upper saw guard so that the riving knife is very close (1/8") to the saw blade.
- Never place the miter gauge in the left side of the worktable when the worktable is set to 45°. The saw blade could cut into the miter gauge.
- Never operate the table saw at higher than recommended speeds.

Disc Sander Mode

- Maintain a 1/16" maximum clearance between the worktable and the disc. The one exception is when you use the quill to advance the disc. Then maintain a 1/2" maximum clearance.
- Always use a table to support the stock. Never sand freehand.
- When using the quill feed to advance the disc, back up the stock with the rip fence. If the stock is too long to back up, clamp the stock to the worktable. Also, attach the quill feed lever to the side of the headstock where it can be reached without reaching over the disc.
- Do not turn on the power with the stock laying on the worktable or already in contact with the disc.
- Always sand on the downward motion-side of the disc.
- Do not sand the end grain of stock wider than 5-1/2". The rotation of the disc may lift the stock off the table.
- Never operate the disc sander at a higher than recommended speed.

Vertical Drill Press and Horizontal Boring Modes

- Keep your hands away from the bit when you advance the quill.
- NEVER leave the key in the chuck. Remove the key from the chuck IMMEDIATELY after securing the bit.
- Never wear jewelry, gloves, ties, loose clothing or clothing with longs sleeves. Keep long hair tucked under a hat. Jewelry, gloves, ties, clothing and hair could become entangled in the bit.
- Position the worktable at mid-chest level whenever possible.
- Use the rip fence as a backstop and hold the stock firmly against both the worktable and the fence. If you can't use the rip fence, use the miter gauge or clamp the stock to the worktable.

WARNING WARNING WARNING WARNING

WARNING WARNING WARNING WARNING

- Use only accessories and bits designed to be mounted in power drills.
- Never drill or bore metal freehand. Always clamp the metal to the worktable and back-up stock, or the rip fence and back-up stock.
- Never use the drill at a higher than recommended speed.

Lathe Mode

- When turning glued up stock, make sure glue joints are strong. Glue the stock and leave it clamped for at least 24 hours prior to turning.
- Never wear jewelry, gloves, ties, loose clothing or clothing with long sleeves. Keep long hair tucked under a hat. Jewelry, gloves, ties, clothing and hair could become entangled in the stock.
- Do not turn stock with splits, loose knots, or other defects that could cause the stock to break, splinter, or come loose when turning.
- Cut stock that is larger than 3" x 3" into an octagon. This removes excess stock and makes turning safer and easier.
- When mounting stock between the centers, the spurs of the drive center and the cup of the cup center must penetrate at least 1/16" into the stock. Do not use a center if the point is damaged. The stock could be thrown from the lathe.
- Wax or soap the end of the stock that mounts to the cup center. This lubrication helps keep the cup center from wearing into the stock and causing the stock to loosen on the lathe.
- When mounting stock to a faceplate, use #12 x 1-1/4" long screws. The screws must penetrate at least 3/4" into the stock. If the screws are being driven into the end grain, the screws must penetrate at least 2" into the stock. Use #12 x 2-1/2" long wood screws before mounting, to minimize imbalance by cutting the stock round.
- Position the tool rest no more than 1/4" from the stock. Maintain this distance while turning. Before turning on the machine, rotate the stock by hand to make sure it clears the tool rest. Never turn without the tool rest.
- During turning, periodically turn off the machine and check to make sure the stock remains securely mounted.
- Do not lean across or reach underneath the lathe while it is running.
- Do not touch the rotating stock while the tool rest is mounted.
- Round all stock at speeds recommended in the speed chart of the PowerPro Control Panel.
- Feed the tool ever slowly into the stock. Hold the tool firmly in both hands and against the tool rest.
- Never try to stop the lathe by grabbing the stock or any part of the machine.
- Do not part the stock completely or turn the spindle down to such a small diameter that it snaps.
- Always remove the tool rest before sanding the turned stock on the lathe.
- When turning heavy stock, use the center post position on the tool rest arm.
- Balance and round all heavy stock at very slow speed. Then turn the heavy stock at speeds recommended in the speed chart of the PowerPro Headstock. There is a risk that heavy stock can be thrown from the lathe, so do not place yourself in the plane of the heavy stock's rotation.
- Never use the lathe at a higher than recommended speed.

WARNING WARNING WARNING WARNING

WARNING WARNING WARNING WARNING

Router and Shaper Modes

- Always give your worktable extra support by attaching telescoping legs.
- Do not shape or rout second-hand lumber. You could be seriously injured if you hit a nail, screw, or other foreign object. There could be kickback which also could cause serious injury.
- Never exceed recommended operating speeds. Do not use the Mark 7 with the Shopsmith Speed Increaser.
- Turn off and Unplug the Mark 7 before mounting shaper cutters or router bits, or making other adjustments.
- Always mount the appropriate guard assembly for over or under-table operations beginning.
- Do not work with stock that is less than 8" long, or too large to handle safely; that is warped, bowed or cupped; or that has loose knots or other defects.
- The maximum depth-of-cut per pass is 1/8" unless otherwise specified.
- Avoid taking deep cuts with a straight or non-piloted router bits. With the exception of single-pass dovetail cuts, limit the depth of cut to 1/4" for each pass when using straight or non-piloted router bits up to 1/2" in diameter. When using router bits over 1/2" in diameter, limit the depth of cut to 1/8" per pass.
- Never use router bits or specialty bits larger than 2-1/8" in diameter, which have an exposed cutting edge of more than 2-1/2".
- The maximum diameter of a shaper or router cutter must not exceed 2-1/8".
- The maximum height a shaper or router cutter can be is 2-1/2" above the surface of the table.
- Make sure that the PowerPro headstock, quill, worktable. carriage, height and tilt locks and arbor are all locked or tightened before operating the Mark 7.
- Before plugging in the Mark 7 to begin operating the machine as a router or shaper, hand-rotate the spindle to assure yourself that the cutter clears the insert, shaper fence, featherboards and the guard assembly.
- Listen for chatter or signs of looseness at start-up. If you hear, see or suspect problems, turn off the power and unplug the machine. Correct any problems before proceeding.
- Always use featherboards when shaping or routing stock less than 3" wide.
- To pin shape or pin rout, use only cutters with pilots or rub collars.
- When pin shaping or routing, always use at least one push block to help control the workpiece.
- Internal routing or shaping of the edge of a hole (or small opening less than 6" in diameter) in any shape should not be attempted.
- Never "freehand" shape or rout. Always use pins with piloted router bits or rub collars with shaper cutters.
- Never attempt pin routing or pin shaping when removing the entire edge of the workpiece.
- Try to feed the workpiece so that the cutter is cutting in the same direction as the wood grain, though this is not always possible.
- Always feed the workpiece against the rotation of the cutter. Otherwise, a kickback will occur.
- Illustrated in Figure 4 is operating in Shaper mode with the PowerPro headstock in Reverse Mode. While operating the headstock in forward mode, all feed direction and cutter rotation will be opposite.

WARNING WARNING WARNING WARNING

- Feeding the workpiece too fast and/or exceeding the maximum recommended 1/8" depth-of-cut could result in "stalling" the motor or belt slippage.

- Make sure the cutting edge of the shaper cutter faces toward the direction of the workpiece feed. This is right to left in Reverse Mode or left to right in Forward Mode.

- Feed the workpiece at a slow, steady rate. Use extra care in shaping or routing workpieces with figured grain or knots, as these may cause kickbacks.

- Use a push stick to feed workpieces up to 3" wide. When it is necessary to push a narrow workpiece underneath the circular shield, use a long piece of scrap wood to feed the workpiece into the cutter, and use a featherboard to hold the workpiece in against the shaper fence.

- Always use a fence (like the Shopsmith Shaper Fence) or table insert pins and rub collars to guide and support the workpiece. Failure to do so could result in bodily injury.

- Always use a shaper fence when removing the entire edge of the workpiece.

- Always use a fence (such as the Shopsmith Shaper Fence) when using router bits or shaper cutters without pilots or rub collars.

How to Use This Section of the Mark 7

This section contains the information you will need to assemble and align your Mark 7. Before you proceed, however, you must read the **Introduction** and **Safety** sections located in the first part of this manual.

After you have read the **Introduction** and **Safety** sections, get familiar with the various terms listed in the **Terms to Know**, starting on page B-2. These terms will be used throughout this manual and the text, **Power Tool Woodworking for Everyone**. Then become familiar with the **Specifications** for your Mark 7, found on page B-4.

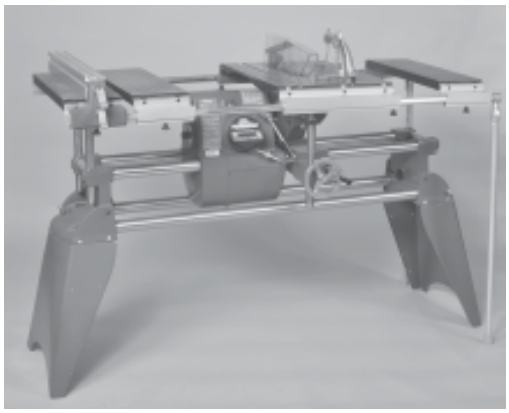
Starting on page B-6, you will find both the **Parts Lists and Exploded Views** of the Mark 7 and standard accessories . Notice the Reference Numbers. The **Assembly** and **Alignment** instructions have reference numbers in parentheses so you can better identify which part is being used and how it fits with the other parts.

NOTE

The floating extension table, connector tubes and telescoping legs which come with the Mark 7 have their own parts list and instructions. Refer to that product literature for safety, assembly, alignment and operation information.

After you have looked over the Parts Lists and Exploded Views, you are ready to assemble and align the Mark 7. We strongly recommend that you do the steps in order. If you have a problem in assembling or aligning your Mark 7, contact Customer Service, and we will be glad to help. The telephone number for our Customer Services Department is 800/762-7555.

After you have assembled and aligned your Mark 7, go through the various **Mode Setups** and get familiar with what each one requires for safe and



efficient operation. When you have read the **Introduction** and **Safety** sections and are familiar with the **Terms to Know**, **Parts Lists**, **Exploded Views**, plus have completed the **Assembly and Alignment** procedures, go to the tabbed **Operations** section for more specific information on each of the mode setups and capabilities.

The tables of the Mark 7 come pre-aligned from the factory. It is a good practice to check the alignment prior to using your Mark 7.

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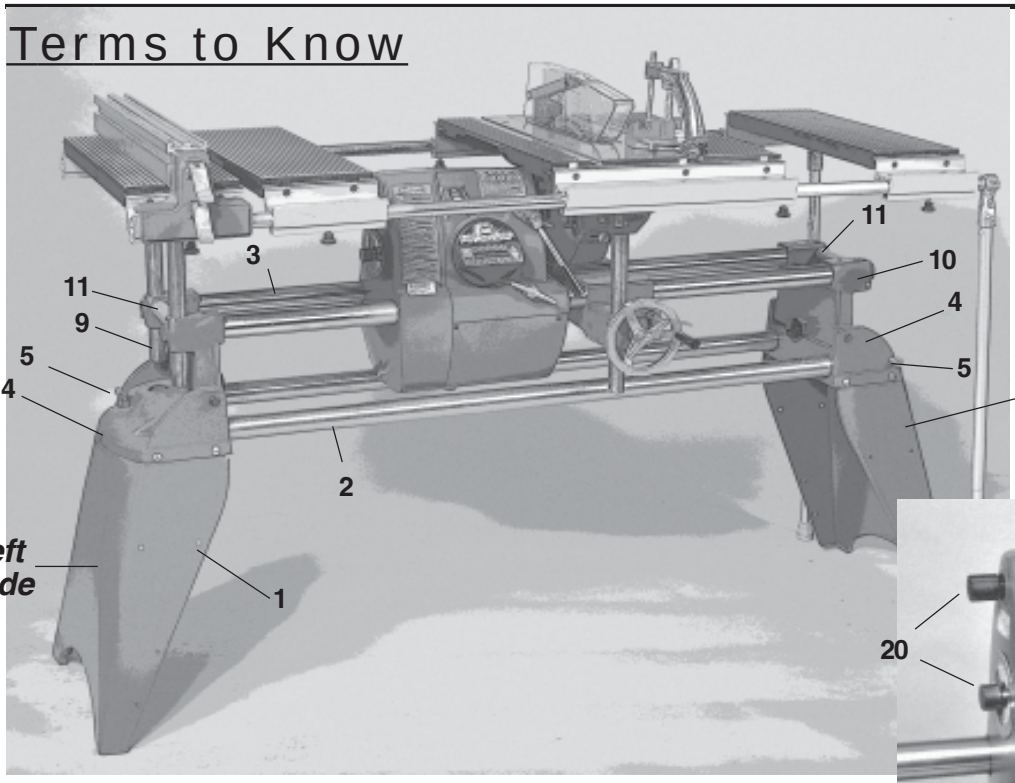
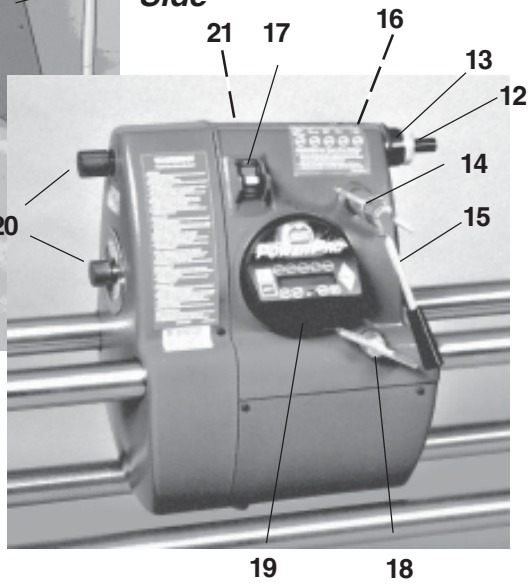
Terms to Know





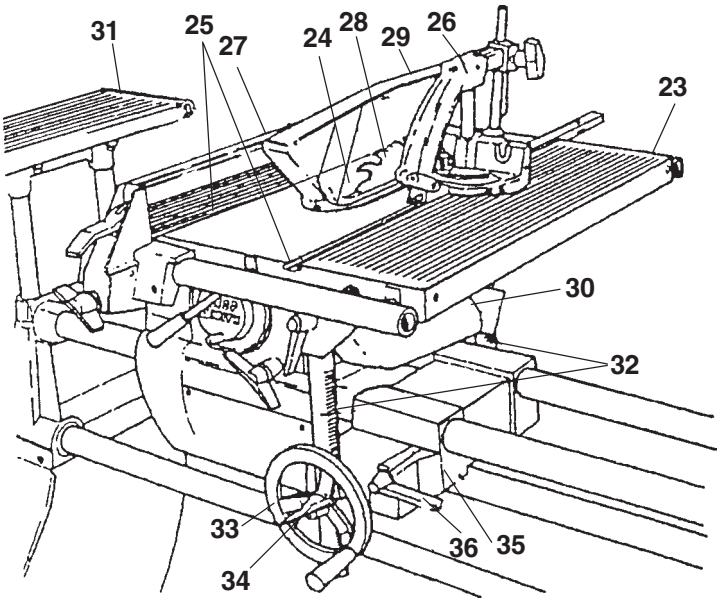
The Shopsmith Mark 7 will perform all the functions of a table saw, disc sander, drill press, horizontal boring machine, wood lathe, overtable router, and under-table shaper.

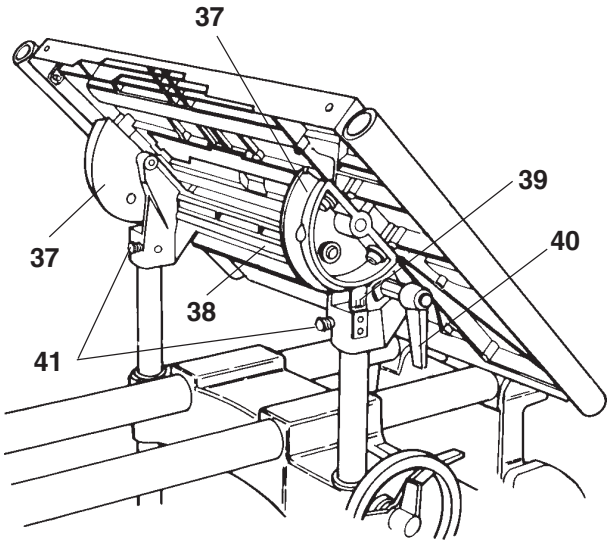
Basically, the Mark 7 is a rigid bench that holds the headstock and the worktable system. The upper part of this bench can be positioned horizontally or vertically. The headstock and the worktable slide independently and are positioned along the upper tubes.

You can mount accessories to the headstock and operate them at different speeds. The worktable can be positioned over, under or beside these accessories to hold stock at various angles. In this way, the bench, headstock, worktable, and accessories combine to make a unique, capable and versatile woodworking system.

Before you proceed, familiarize yourself with the Mark 7's basic parts:

1. Legs -- Support the way tubes and bench tubes.
2. Bench Tubes – Hold the Mark 7 rigid.
3. Way Tubes – Allow the headstock and carriage to slide.
4. Base (left and right) – Allows the way tubes to pivot to either a horizontal or vertical position.
5. Base Lock (left and right)– Secures the Mark 7 in the vertical position.
9. Power Base Mount (left)– Holds the extension table and the major accessories (Shopsmith Bandsaw, Jointer, Belt Sander, Scroll Saw, and Strip Sander).
10. Base Mount (right)– Holds the extension table, planer, and lathe tailstock.
11. Accessory Mount Locks– Secure the extension table, Major Accessories, and the lathe tailstock.
12. Main Spindle– Mounts the saw blades, sanding discs, and other accessories.
13. Quill– Extends and retracts up to 4-1/4".
14. Quill Lock– Secures the quill.
15. Quill Feed Lever– Extends the quill and main spindle out from the headstock.
16. Quill Feed Stop–Stops the quill at predetermined distances out from the headstock-not shown.
17. Power Switch– Turns the Mark 7 operating system on and off. Has a removable safety key to prevent unauthorized use of the Mark 7.
18. Headstock Lock– Secures the headstock on the way tubes.
19. PowerPro Controller - Controls the Mark 7 operating system. Turns on and controls the speed





and direction of the main and auxiliary spindles. Has a built in speed chart to determine proper operating speeds. Has a programmable lock to prevent unauthorized use.

20. Auxiliary Spindles– The upper spindle powers the Bandsaw, Belt Sander, and Strip Sander. The lower spindle powers the Jointer and Scroll Saw.
21. Logo Cover– (hidden from view) Allows access to inside of headstock, used mainly for cleaning.
22. Belt Cover– Allows access to the belts and pulleys.
23. Worktable – Holds the stock and provides a working surface.
24. Table Insert– Used for sawing, sanding, drilling and boring. It can be replaced with inserts for dadoing, molding, drum sanding and shaping.
25. Miter Gauge Slots– Guide and secure the miter gauge.
26. Miter Gauge with Safety Grip– Holds stock firmly at various angles. It slides freely or locks in the miter gauge slots.
27. Pro Style Rip Fence– Mounts to the table and is used as a guide, support or stop. It automatically aligns itself parallel to the blade. Holes in the fence are used to mount fixtures and fence extensions. Includes an adjustable scale to quickly set-up and align distance between the operating tool and the rip fence.
28. 10" Saw Blade– Mounts to the 1-1/4" arbor which then mounts to the main spindle. This saw blade is use for both crosscutting and ripping.
29. Upper Saw Guard– Provides a physical barrier between you and the part of the blade above the table. An anti-kickback mechanism helps control kickbacks.
30. Lower Saw Guard– Protects you from the part of the blade or cutter below the table. The saw guard has a dust chute. The lower saw guard is also used with the sanding disc.
31. Extension Table– Mounts in either base mount to provide extra support for the stock.
32. Table Support Tubes– Support the table above the bench. Each tube has racks that mesh with pinions in the carriage to raise and lower the table. Can be reversed for under table operations.
33. Table Height Crank– Turns the pinions in the carriage which raise and lower the table.
34. Table Height Lock– Secures the table at any height.
35. Carriage– Slides along the way tubes and holds the table support tubes and the lathe tool rest.
36. Carriage Lock– Secures the carriage on the way tubes.
37. Trunnions– Allows the table to tilt up to 90° left and 45° right.
38. Table Tie Bar– Supports the table support tubes and the trunnions.
39. Table Tilt Indicator– This vernier scale indicates the table angle.
40. Table Tilt Lock– Secures the table at any angle, up to 90° left and 45° right.
41. Table Stops– When properly adjusted, these bolts stop the table at 90° left, 45° right and 0°. (Note: the two 90° table stop bolts are shown.)

The following accessories come with the Mark 7, but are not shown on the illustrations. Refer to the PARTS LISTS to identify them.

Sanding Disc– Mounts to the main spindle and is used for disc sanding.

Drill Chuck and Key– Mounts to the main spindle. The key locks the bit in the chuck.

Router Chuck- Mounts to the main spindle. Accepts router bits with 1/2" Shank.

Router Shield Assembly-See through shield clamps around quill adjacent to the main spindle for over -table operations. Provides a physical barrier between you and the router bit.

Router/Shaper Table Insert - Mounts to main worktable. Allows for arbors to work above or below table line.

Lathe Tool Rest Assembly– Mounts in the carriage to support and guide lathe chisels. It has two mounting positions.

Lathe Drive Center– Mounts to the main spindle and turns the stock when the spindle is turning.

Lathe Cup Center– Mounts in the tailstock and supports stock when spindle turning.

Tailstock– Mounts in the base mount and holds the cup center in line with the drive center.

Shaper Arbor with Collars-Mounts to the main spindle. Accepts 1/2" bored shaper cutters.

Shaper Shield Assembly-See through shield mounts to the table miter slots or rip fence for under-table operations. Provides a dust chute to attach dust collection. Provides a physical barrier between you and the shaper cutter.

Pro Table System Rip Scale-Provides an adjustable scale to quickly setup and align distance between the operating tool and the rip fence.

Coupling Kit– Connects the Major Accessories to the headstock.

Safety Kit– Includes a push stick, push block, feather board and fence straddler. Used to help guide and hold stock safely during operations.

Goggles– For protection of your eyes. To be worn during all operations.

Arbor Wrench and Allen Wrenches– Used for alignment, adjustment and to mount accessories.

Specifications

The specifications of the Shopsmith Mark 7 will give you an idea of its capabilities—

Capacities

The work capacity of the Mark 7 depends on these seven modes:

• Table Saw

As a table saw, the Mark 7 accepts 10" saw blades. The maximum depth of cut at 0° is 3-1/4". With the table tilted at 45°, the maximum depth of cut is 2-3/8".

• Disc Sander

As a disc sander, the Mark 7 mounts a 12" diameter sanding disc, giving you 113 square inches of sanding surface. The size of stock that you can sand is limited only by what you can safely handle.

• Drill Press

As a drill press, the Mark 7 used a chuck that accepts drill bits with shanks 5/64" to 1/2" in diameter. The throat capacity is 8-1/4", enabling you to drill the center of a 16-1/2" circle. With a 5-1/2" long bit mounted in the chuck, the maximum distance from the bit to the table is 22". If you remove the table, the maximum distance from the bit to the floor is 54".

• Horizontal Boring Machine

The Mark 7 uses the same drill chuck used in the drill press mode. The table can be lowered

2-3/8" below the chuck, enabling you to bore the center of boards up to 4-3/4" thick. The width and length of boards that you can bore is limited only by what you can safely handle.

• *Lathe*

As a lathe, the Mark 7 handles both spindle and faceplate turning. The swing over the way tubes is 16-1/2", and the maximum distance between centers is 34". The tool rest and arm will pivot a full 360°, and can be locked in place in any position between the centers.

• *Router*

As a router, the Mark 7 can be operated as either an over-table router or under-table router. Available router chucks accept both 1/2" and 1/4" shank bits. Engineered to withstand the side thrusts necessary for routing operations.

• *Shaper*

As a shaper, the Mark 7 can be operated as either an over-table or under-table sahping system. Standard shaper arbor with collars accepts 1/2" bored cutters. Can be operated in both forward and reverse (with cutters reversed) modes creating more profiles with cutters. Maximum cutter diameter is 2-1/8".

Bench

The Mark 7 is mounted on two steel legs and is held rigid by four steel tubes. The two upper tubes, or way tubes, can be locked in either a horizontal or vertical position.

Headstock

The Mark 7 is powered by a DVR Motor System which controls the Mark 7 operating system. Turns on and controls the speed and direction of the main and auxiliary spindles. All three spindles revolve on permanently-lubricated, sealed ball bearings.The system has a built in speed chart to determine proper operating speeds. Has a programmable lock to prevent unauthorized use.

Speed

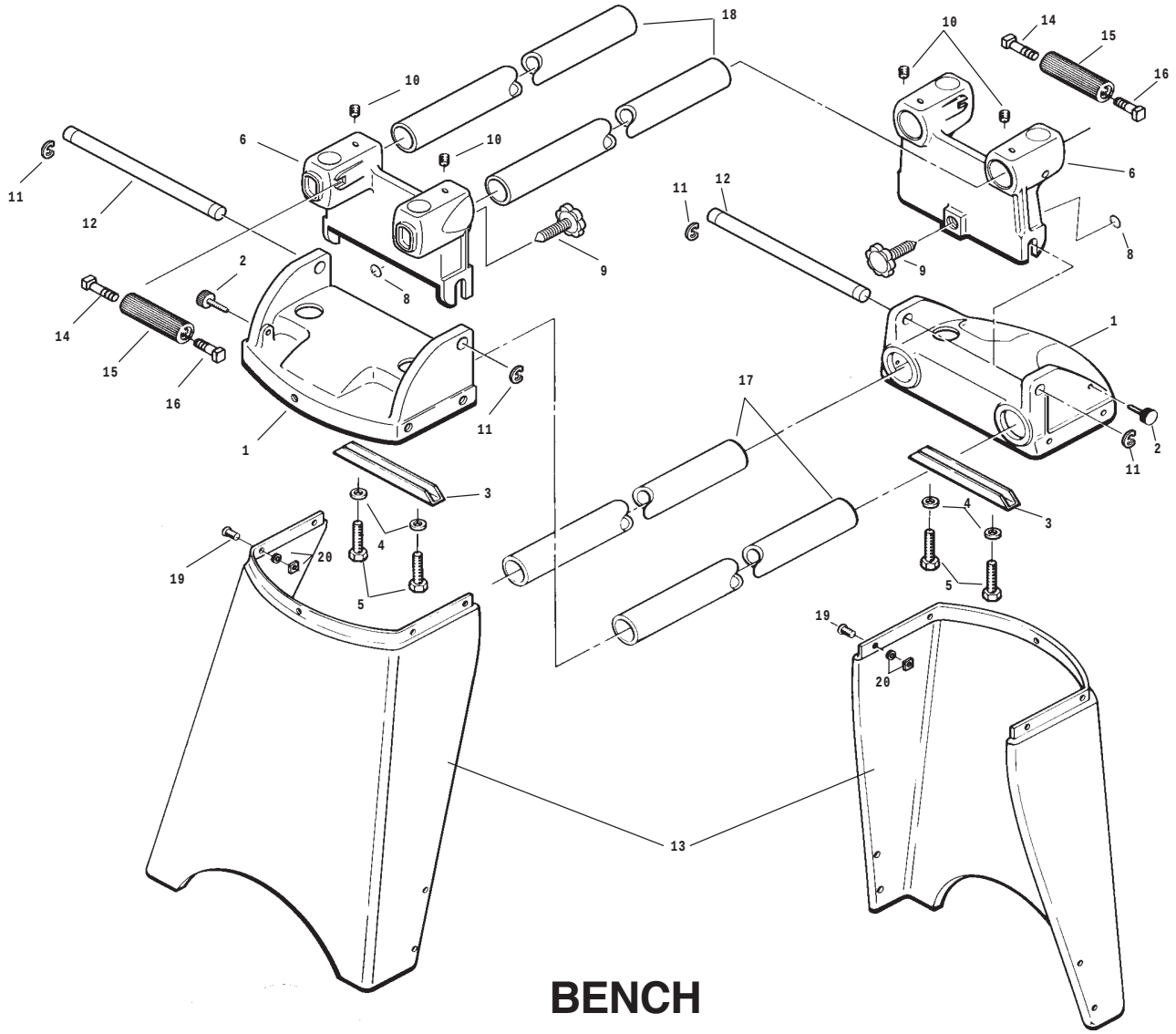
A DVR Motor system makes it possible to adjust the speed of the main and upper auxiliary spindle from 250 rpm to 10,000 rpm. The lower auxiliary spindle turns 1.6 times faster than the other two, or between 400 rpm and 16,000 rpm.

Worktable

The Mark 7 worktable is made of die-cast aluminum grooved and machined smooth. It can be tilted from 90° left to 45° right, and raised from 2-3/8" below the center of the main spindle to 8-1/4" above it with the work angle set at 0°. The worktable can be reversed for under-table operations.

Overall Dimensions of the Mark 7

Overall, the Mark 7 is 71" long, 25-1/2" wide, and 46-1/2" high in the table saw mode, or 76-1/4" high in the drill press and shaper mode.

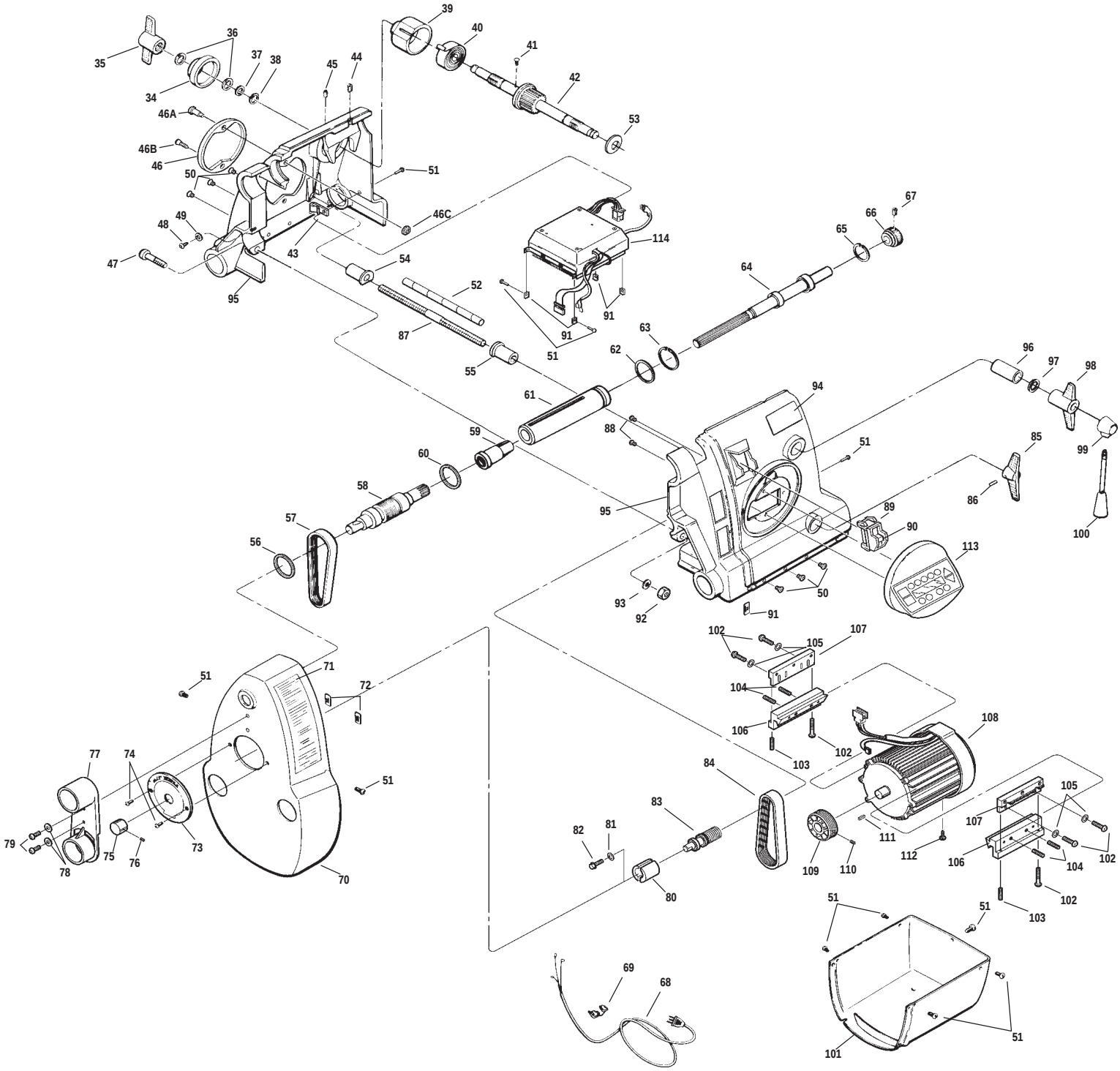


BENCH

Ref. No.	Part No.	Description	Qty.
—		**Bench Assembly (incl. 1-17, 19-20)**	
—		**. Base Assembly (incl. 1-5)**	
1	518379	. . Base	2
2	504293	. . Arm Lock Knob	2
3	504146	. . Tube Lock Bar	2
4	120382	. . Washer	4
5	138245	. . Hex Bolt	4
—		**. Base Arm Assembly (incl. 6-12)**	
6	52281501	. . Base Arm	2
7	not used		
8	522814	. . Base Arm Knob	2
9	522813	. . Base Arm O-Ring	2
10	502051	. . Cup Point Setscrew	4
11	517642	. . Retaining Ring	4
12	522816	. . Base Arm Pin	2
13	50416201	. Leg	2
—	**501286**	**. Accessory Mount Lock Assembly (incl. 14-16)**	
14	501293*	. . Left-Hand Stud	2
15	514659*	. . Sleeve and Insert Assembly	2
16	501290*	. . Right-Hand Stud	2
17	504163	. Bench Tube	2
18	501193	Way Tube	2
—	**522063**	**. Hardware Pack (incl. 19-20)**	
19	518114	. . Truss Head Screw	10
20	515294	. . Keps Nut	10

* Not available as a service part.

Shopsmith PowerPro® HEADSTOCK

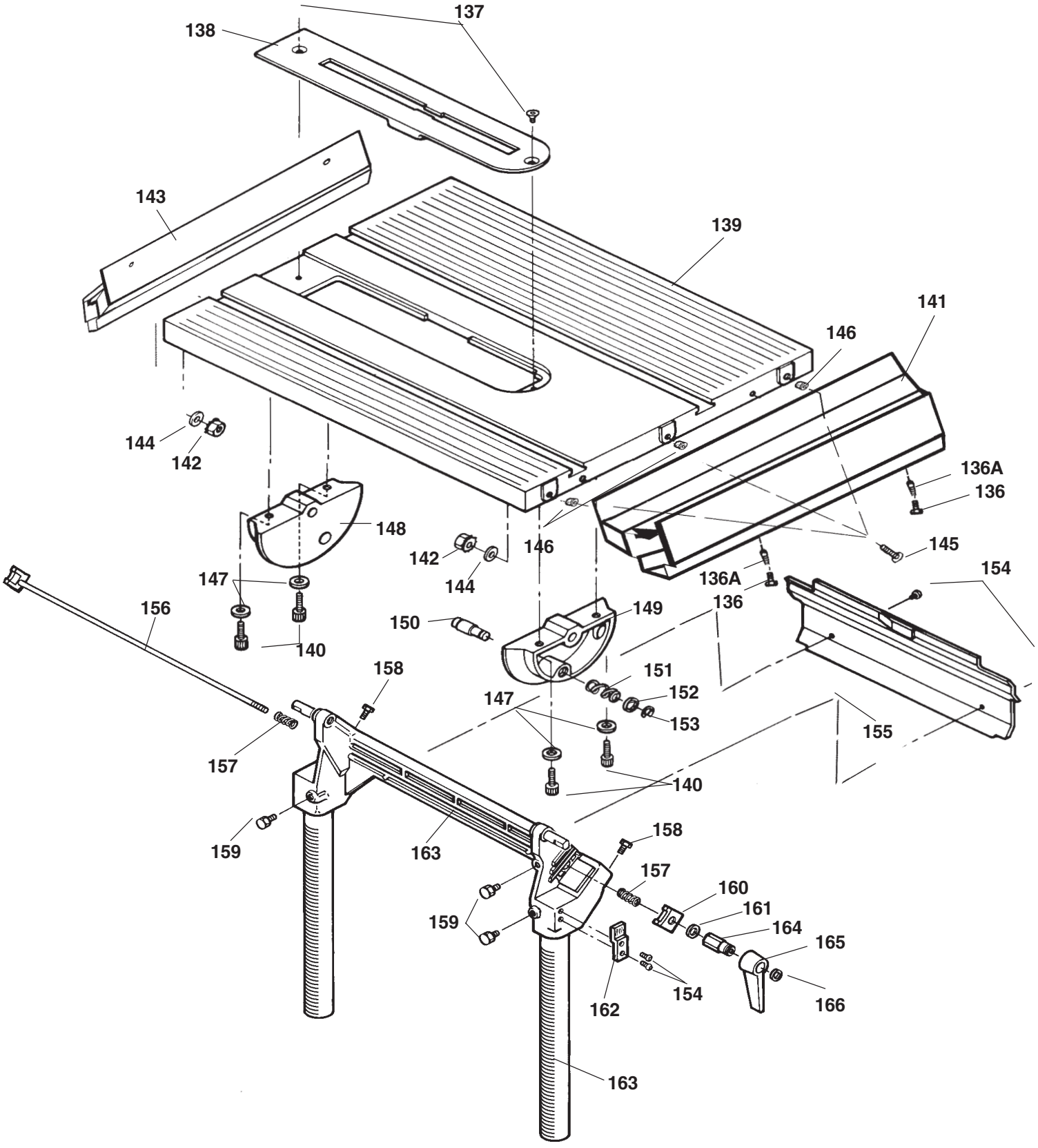


Ref. No.	Part No.	Description	Qty.
—	**556176**	**PowerPro Headstock Asmy (incl. 34-114)**	
—	**504171**	**. Quill Feed Assembly (incl. 34-42)**	
34	5013149	. . Feed Stop	1
35	5041729	. . Feed Stop Handle	1
36	501311	. . Serrated Washer	2
37	501627	. . Washer	1
38	501626	. . Retaining Ring	1
—	**521875**	**. Quill Spring Housing Asmy (incl. 39-40)**	
39	501310*	. . Spring Housing	1
40	501315*	. . Quill Spring	1

Ref. No.	Part No.	Description	Qty.
41	145378	. . Drive Screw	1
42	501312	. . Quill Feed Pinion	1
43	514779	. Wire Retaining Clip	1
44	501634	. Setscrew	1
45	513056	. Allen Setscrew	1
46	51372304	. Logo Cover	1
46A	516531	. Pivot Pin	1
46B	449613	. Screw, Phllips Head, 8-32 x 3/8"	1
46C	516536	. Push Nut	1
47	516895	. Machine Screw, 5/16 x 1-3/4"	1

Ref. No.	Part No.	Description	Qty.
48	448027	. Pan Head Screw	1
49	501630	. Washer	1
50	522659	. M6-1 x 10 SFHC Screw	6
51	513608	. Pan Head Screws	11
52	5216709	. Spirol Loom Wrap (.5208)	1
53	501317	. Spherical Washer	1
54	504234	. Right-Hand Wedge Lock	1
55	504235	. Left-Hand Wedge Lock	1
56	501299	. Retaining Ring	1
57	521681	. Poly V-Belt	1
58	518145	. Drive Sleeve Assembly (incl. 58)	1
59	514083	. . Drive and Ring Assembly	1
60	501621	. Retaining Ring	1
—	**518210**	**. Quill Assembly (incl. 61-67)**	
61	518208*	. . Quill Housing	1
62	501307	. . Quill Bumper Ring	1
63	501624	. . Retaining Ring	1
64	518207*	. . Spindle Assembly	1
65	518209*	. . Retaining Ring	1
66	518204*	. . Spindle Knob	1
67	102581	. . Allen Setscrew	1
68	513126	. Power Cord	1
69	513740	. Strain Relief	1
—	**522795**	**. Belt Cover Assembly** (incl. 70-74 and 77-79)	
70	50423801	. . Belt Cover	1
71	522654	. . Warning Label	1
72	445124	. Spring Flat Nut	2
73	514471	. Vent Plate	1
74	132696	. Roundhead Machine Screw	2
75	503738	. Hub (incl. 76)	1
76	222458	. . Set Screw	1
—	**522398**	**. Shaft Guard w/Hardware (Incl. 77-79)**	
77	521889	. . Shaft Guard	1
78	120392	. . Flat Washer	2
79	516027	. . 1/4-20x5/8 Button Head Screw	2
—	**515616**	**. Eccentric Bushing Asm. (Incl. 80-82)**	
80	5041909*	. . Eccentric Bushing Mach.	1
81	501616	. . Washer	1
82	515615	. . Screw, #6-32 x 3/8" Hex Washer Hd.	1
83	522612	. Idler Shaft Assembly	1
84	522610	. Poly-V Belt (Large)	1
—	513014	. Headstock Lock Asm. (incl.85-87)	
85	5042369*	. . Headstock Lock	1
86	455862*	. . Rollpin	1
87	504233*	. . Rod	1
88	517328	. Hex Wshr Hd. Mach Srw #8-32 x 3/8",	2
—	**-**	**. PowerPro Switch Serv Pack (Incl 89-90)**	
89	522560	. . Locking Toggle Switch Asm.	1
90	522561	. . Switch Key	1
91	501656	. Tinnerman Clip	10
92	102634	. Hex Nut	1
93	120379	. Washer	1
94	522654	. Speed Chart Label	1
95	522817*	. Headstock Casting	1
96	501318	. Quill Feed Sleeve	1
97	501631	. Washer	1
98	5041769	. Quill Lock Handle	1
—	**513682**	**. Lever and Hub Asm. (incl. 99-100)**	
99	5041739	. . Quill Feed Hub	1
100	513017	. . Quill Feed Handle	1
101	52281001	. Motor Pan	1
—	**522794**	**. PowerPro Motor Control Assembly (Incl 102-114, 50)**	
102	522660	. . M6 x 1 x 35 SBHC Screw	6
103	522662	. . M8 x 1.25 x 25 Flat Point Set Screw	2
104	522663	. . M8 x 1.25 x 30 Oval Point Set Screw	4
105	522661	. . M6 x 13 x 1.5 Narrow Plain Washer	4
106	522618	. . Motor Mount, Inner Rear	2
107	522621	. . Motor Mount, Outer	2
108	**522624**	**. . Motor Assembly**	1
109	522611	. . . Motor Pulley	1
110	522635	. . . Motor Pulley Set Screw	1
111	522636	. . . Motor Key	1
112	522671	. . . #10 Ground Screw	1
113	**522646**	**. . Control Panel Assembly**	1
114	**522638**	**. . Power Supply Assembly**	1

* Not available as a service part.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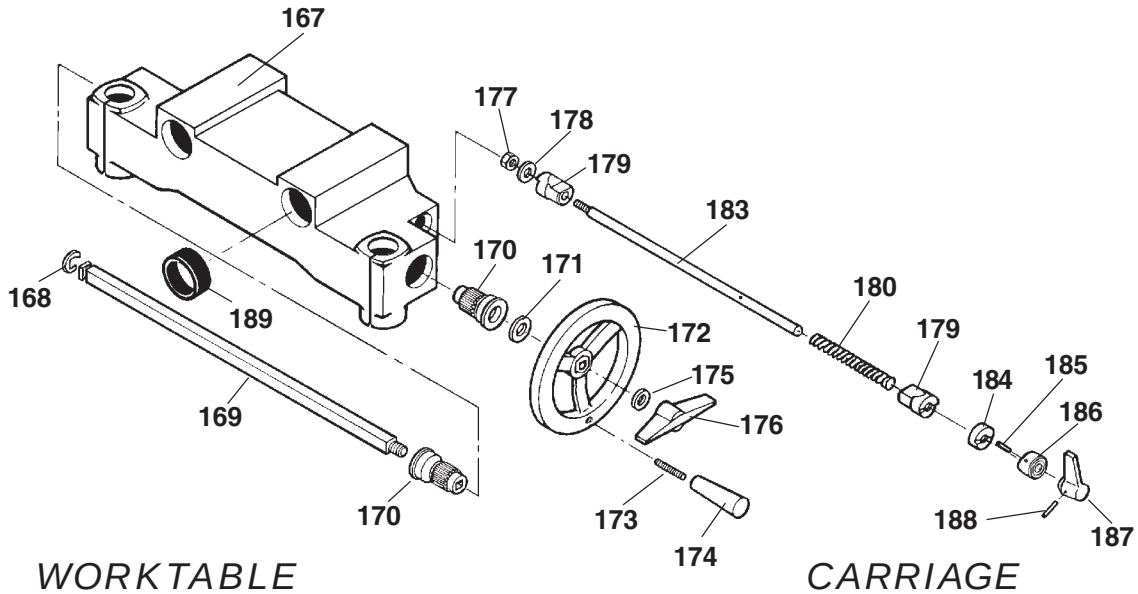


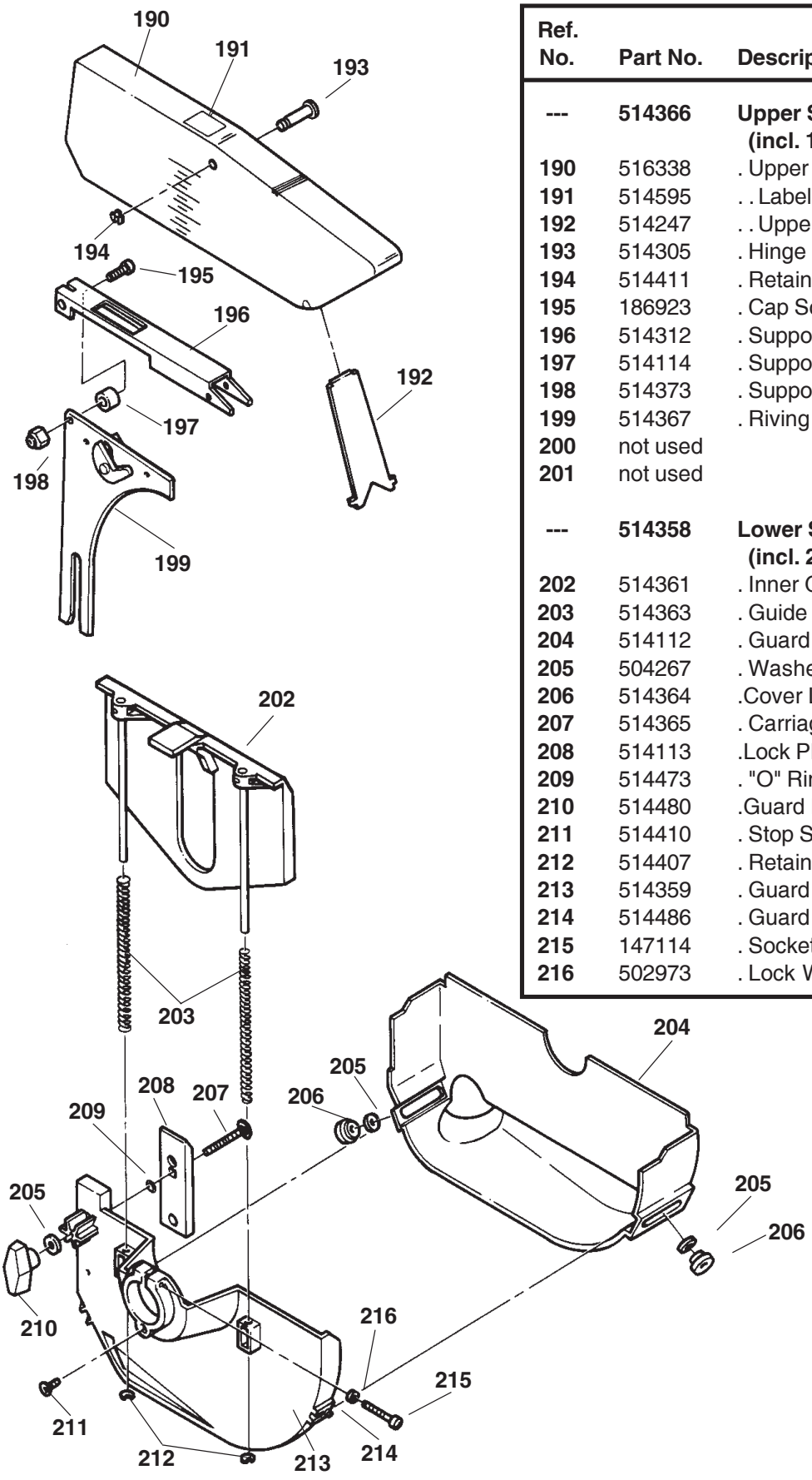
WORKTABLE *CARRIAGE*

Ref. No.	Part No.	Item Description	Qty
—	**518421**	**Table Assembly (Incl. 136-166)**	
136	515859	. Knob	4
136A	518462	. Spring	4
137	501637	. Hex Socket Head Screw	2
138	51410004	. Table Insert (Center Saw)	1
139	51409702	. Table (Incl. 98)	1
140	514351	. . Taptite Screw	4
141	518488	. Front Rail Assembly	1
142	515294	. Keps Nut	6
143	518490	. Rear Rail Assembly	1
144	120392	. Flat Washer	6
145	518460	. Flat Head Screw	6
146	518403	. Table Spacer	6
147	501633	. Washer	4
148	514620	. Rear Trunnion	1
—	**514339**	**. Front Trunnion Assy (Incl. 149-153)**	
149	514130	. . Front Trunnion	1
150	514340	. . Table Stop Pin	1
151	514341	. . Compression Spring	1
152	514466	. . Washer	1
153	514342	. . Retaining Ring	1
154	517829	. . Button Head Socket Screw	2
154A	514040	. . 10-24 x 5/16" Phil Pan Screw	2
155	514115	. Tie Bar Guard	1
156	514634	. Rod and Shoe Assembly	1
157	514353	. Shoe Spring	2
158	518372	. Table Stop Bolt	2
159	514350	. Table Stop Bolt	3
160	514104	. Front Clamp Shoe	1
161	120393	. Washer	1
162	514311	. Indicator Plate	1
163	522797	. Table Bar and Tube	1
—	**514448**	**. Tbl Lock Handle Assy (Incl. 164-166)**	
164	514447	. . Table Lock Nut	1
165	5042559	. . Table Tilt Lock	1
166	502680	. . Retaining Ring	1

Ref. No.	Part No.	Description	Qty.
—	**514328**	**Carriage Assembly (incl. 167-188)**	
167	514209	. Carriage	1
168	504259	. Retaining Washer	1
169	514329	. Pinion Shaft	1
170	514211	. Table Elevating Pinion	2
171	120396	. Washer	1
—	**514330**	**. Table Height Crank Assembly (incl. 172-174)**	
172	514334	. . Crank and Insert	1
173	513418	. . Handle Shaft	1
174	513417	. . Crank Handle	1
175	120388	. Washer	1
176	5042629	. Table Height Lock	1
—	**514335**	**. Carriage Lock Asm. (incl. 177-188)**	
177	443334	. . Flexloc Nut	1
178	514237	. . Washer	1
179	514095	. . Wedge Lock	2
180	515271	. . Spring	1
181	not used		
182	not used		
183	514336	. . Shaft	1
184	514526	. . Cam	1
185	514527	. . Rollpin	1
186	514096	. . Cam Wedge	1
187	514126	. . Carriage Lock Handle	1
188	455734	. . Rollpin	1
189	516667	Carriage Stop Ring	1

To order service parts or supplies, please call our Customer Service Department Toll Free @ 1-800-762-7555. Or visit us at our website www.shopsmith.com

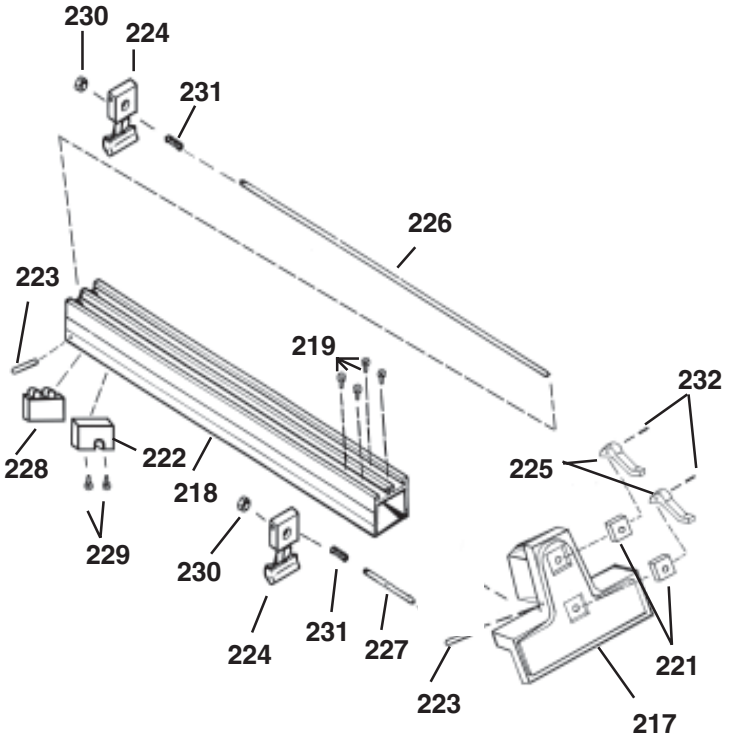
UPPER AND LOWER SAW GUARDS



Ref. No.	Part No.	Description	Qty.
---	**514366**	**Upper Saw Guard Assembly (incl. 190-199)**	
190	516338	. Upper guard and Insert	1
191	514595	. . Label	1
192	514247	. . Upper Guard Insert	1
193	514305	. Hinge Pin	1
194	514411	. Retaining Ring	1
195	186923	. Cap Screw	1
196	514312	. Support Link	1
197	514114	. Support Link Spacer	1
198	514373	. Support Link Hub	1
199	514367	. Riving Knife Assembly	1
200	not used		
201	not used		
---	**514358**	**Lower Saw Guard Assembly (incl. 202-216)**	
202	514361	. Inner Guard Assembly	1
203	514363	. Guide Rod Spring	2
204	514112	. Guard Cover	1
205	504267	. Washer	3
206	514364	.Cover Lock Knob	2
207	514365	. Carriage Bolt	1
208	514113	.Lock Plate	1
209	514473	. "O" Ring	1
210	514480	.Guard Lock Knob	1
211	514410	. Stop Screw	1
212	514407	. Retaining Ring	2
213	514359	. Guard and Pin Assembly	1
214	514486	. Guard Stud	2
215	147114	. Socket Head Screw	1
216	502973	. Lock Washer	1

PRO FENCE

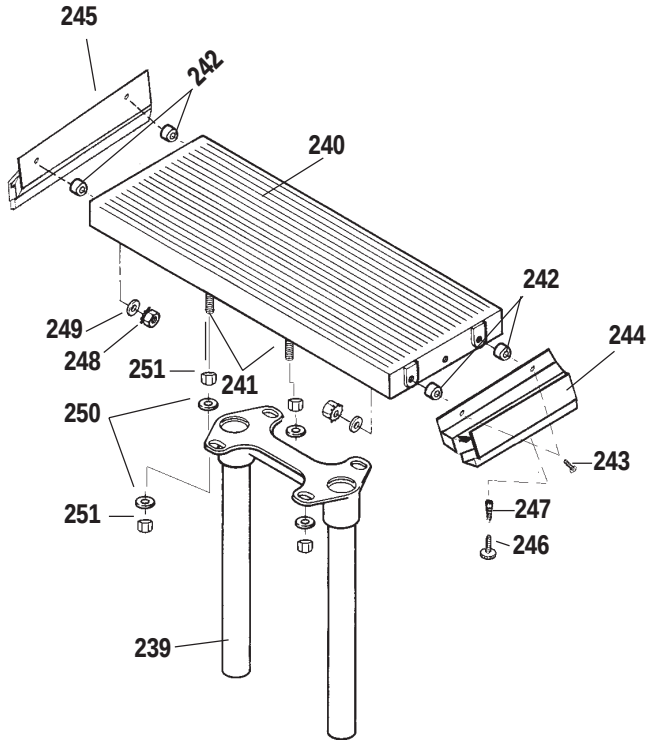
Ref. No.	Part No.	Item Description	Qty.
—	518418	**Pro Fence Assembly** (Incl. 1-17)	
217	518419	. Fence Base	1
218	518400	. Fence Extrusion	1
219	517829	. Screw 1/4-20x1/2 Button Hd	4
220	518404	. Front Pad (not shown)	4
221	514317	. Plate-wear	2
222	518420	. Spring Block	1
223	518405	. Locking Bar Rod	2
224	518407	. Locking Bar	2
225	521578	. Locking Handle	2
226	518410	. Rod-Long	1
227	518409	. Rod-Short	1
228	518423	. Rear Pad	1
229	518461	. Screw #10-24 Flat Hd	2
230	518459	. Lock Nut	2
231	518416	. Spring	2
232	514527	. Rollpin	2
233	not used		
234	not used		
235	not used		
236	not used		
237	not used		
238	not used		

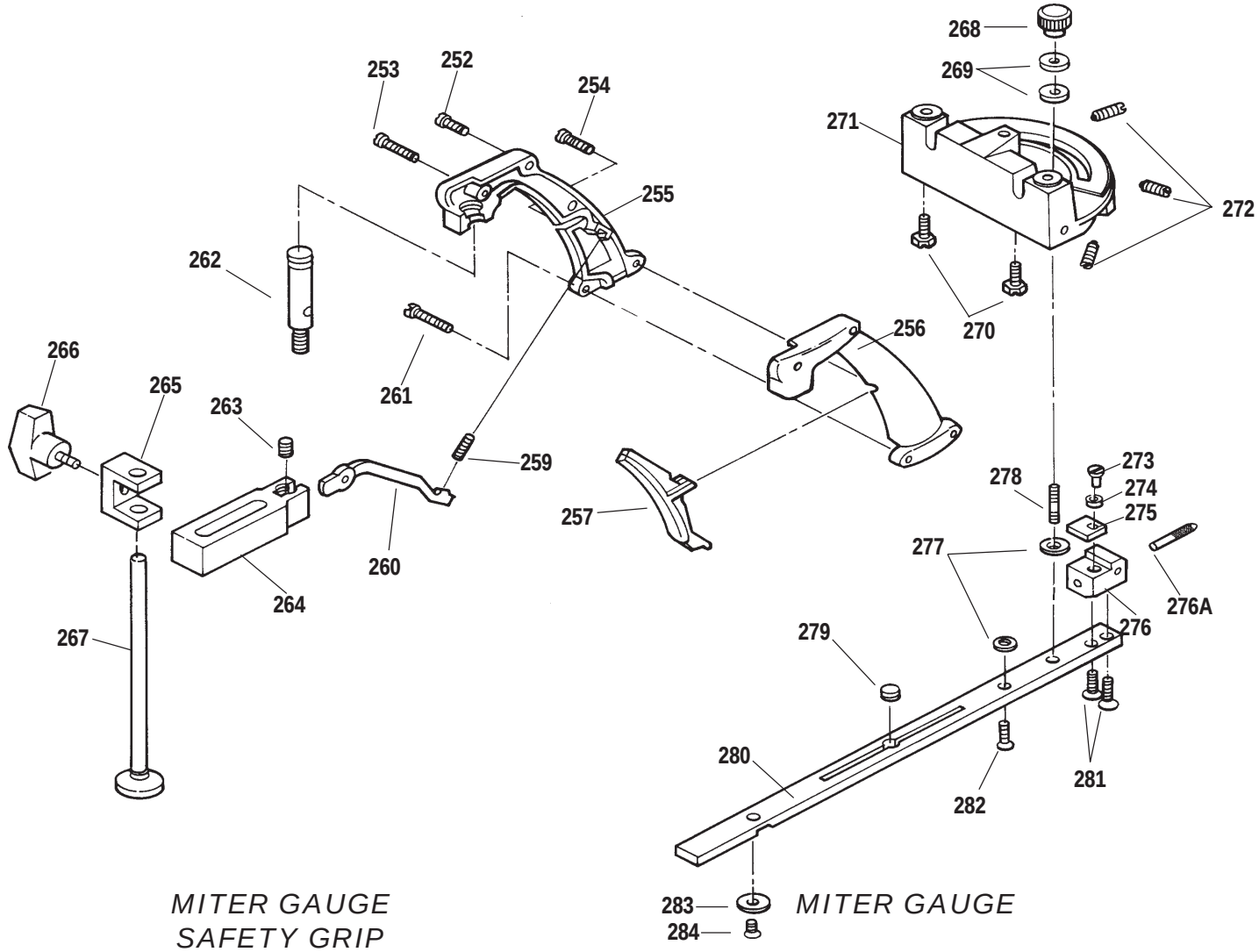


FLOATING TABLES (2) AND EXTENSION TABLE (1)

Ref. No.	Part No.	Item Description	Qty.
—	**521652**	**Floating Table (Incl. 240,242-249)**	
—	**521653**	**Ext Table & Base Assy (Incl. 239-251)**	
239	504273	. Extension Table Base	1
—	**516014**	**. Extension Table with Studs (Incl. 240-241)**	
—	**521655**	**. Ext Tbl Assy (Incl. 240-249)**	
240	514107	. . Extension Table	3
241*	515969	. . Table Stud Assembly	4
242	518403	. . Table Spacer	12
243	518460	. . Flat Head Screw	12
244	518489	. . Front Rail Asm. Ext Table	3
245	518491	. . Rear Rail Asm. Ext Table	3
246	515859	. . Knob	6
247	518462	. . Spring	6
248	515294	. . Keps Nut	12
249	120392	. . Flat Washer	12
250	120394	. . Washer	8
251	120377	. . Hex Nut	8

* Not available as a service part.





MITER GAUGE SAFETY GRIP

MITER GAUGE

Ref. No.	Part No.	Item Description	Qty
—	**514375**	**Safety Grip Assembly** (Incl. 252-267)	
252	450213	. Tapping Screw	1
253	450219	. Tapping Screw	1
254	450217	. Tapping Screw	1
255	5014699*	. Right Grip	1
256	5014689*	. Left Grip	1
257	5014659*	. Trigger	1
258	**not used**		
259	501467	. Lever Spring	1
260	501464	. Lever Lock	1
261	132066	. Machine Screw	1
262	501466	. Grip Stud	1
—	**555125**	**. Quick Clamp Assy (Incl. 263-267)**	
263	222458	. Set screw	1
264*	514250	. . Lock Guide	1
265	514252	. . Lock Clamp	1
266	514310	. . Grip Knob	1
267	514464	. . Rod and Shoe Assembly	1

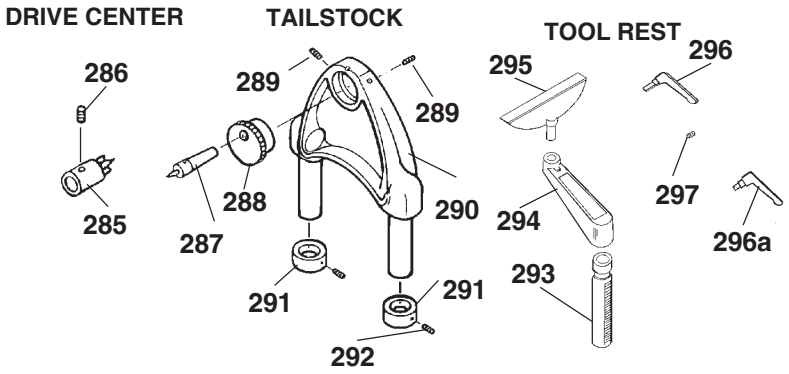
Ref. No.	Part No.	Item Description	Qty
—	**514374**	**Miter Gauge Assembly** (Incl. 268-284)	
268	504268	. Lock Knob	1
269	120392	. Washer	2
270	514566	. Glide	2
271	507367	. Protractor	1
272	501407	. Headless Stop Screw	3
273	436691	. Pan Head Machine Screw	1
274	501616	. Washer	1
275	501409	. Vernier Plate	1
276	514424	. Indicator Mount & Plunger Assy (Incl. 276A)	1
276A	514307*	. . Miter Stop Plunger	1
277	504267	. Special Washer	2
278	504266	. Miter Stud	1
279	501401	. Taper Screw	1
280	518104	. Miter Gauge Bar	1
281	501635	. Machine Screw	2
282	501639	. Nylock Machine Screw	1
283	514376	. Washer	1
284	514377	. Screw	1

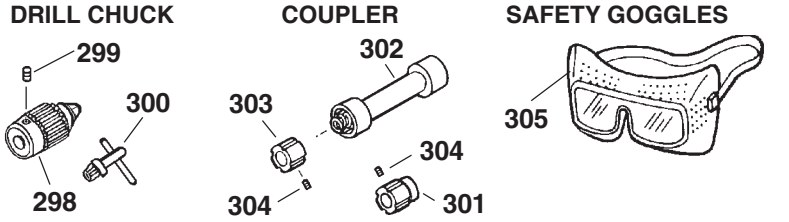
* Not available as a service part.

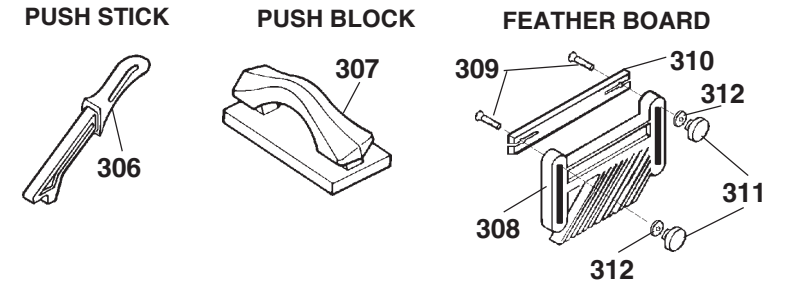
MISCELLANEOUS ACCESSORIES

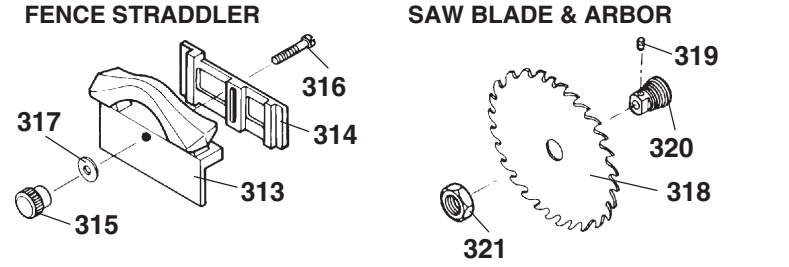
Ref. No.	Part No.	Description	Qty.
285	**505715**	**Drive Center (Incl. 286)**	1
286	222458	. Setscrew, 1/4" long	1
287	**505716**	**Cup Center**	1
—	**504276**	**Tailstock Asm. (Incl. 288-292)**	
288	5014379	. Eccentric Mount	1
289	102581	. Setscrew, 3/8" long	2
290	501438	. Tailstock & Tube Asm. (504277)	1
291	501439	. Tube Collar	2
292	222458	. Setscrew, 1/4" long	2
—	**514398**	**Tool Rest Asm. (Incl. 293-297)**	
293	514416	. Post	1
294	514264	. Arm w/ Warning Label	1
295	503749	. Tool Rest	1
296	521689*	. Long Handle	1
296a	521688*	. Short Handle	1
297	102585	. Setscrew, 7/8" long	1
—	**505633**	**Chuck & Key (Incl. 298-300)**	
298	**501420**	**. 1/2" Chuck (Incl. 299)**	1
299	222460	. . Setscrew, 3/8" long	1
300	**501419**	**. Chuck Key**	1
—	**514468**	**Hub and Coupling Assembly (Incl. 301-302)**	
301	503570	. Spindle Hub (Incl. 304)	1
302	503574	. Power Coupling Assembly	1
303	503738	. Idler Hub (Incl. 304, also pictured in Headstock Parts Explosion)	1
304	222458	. . Setscrew, 1/4"	2
305	**513456**	**Safety Goggles**	1
306	**518221**	**Push Stick**	1
307	**518220**	**Push Block**	1
—	**518215**	**Feather Board Assembly (Incl. 308-312)**	
308	518216*	. Feather Board	1
309	513705	. Tapered Pin	2
310	513707	. Expansion Bar	1
311	513713	. Knob	2
312	513864	. Washer	2
—	**521107**	**Fence Straddler Assembly (Incl. 313-317)**	
313	521106*	. Straddler Block	1
314	513706	. Slide Rail	1
315	513713	. Knob	1
316	521418	. Machine Screw	1
317	513864	. Washer	1
318	**555958**	**10" Carbide Tip Saw Blade**	1
—	**555130**	**1-1/4" Saw Arbor (Incl. 319-321)**	
319	222458	. Setscrew, 1/4" long	1
320	514400	. Arbor	1
321	514401*	. Arbor Nut	1
322	**505841**	**Medium Grit Sandpaper Disc**	1
—	**555143**	**Sanding Disc Asm (incl. 323-326)**	
323	513144*	. Plate	1
324	514493*	. Hub	1

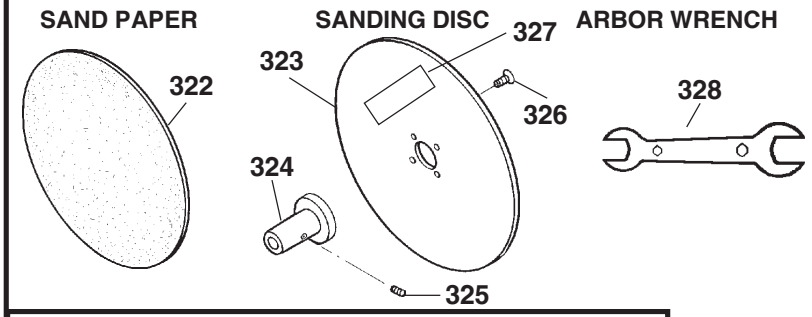
* Not available as a service part.



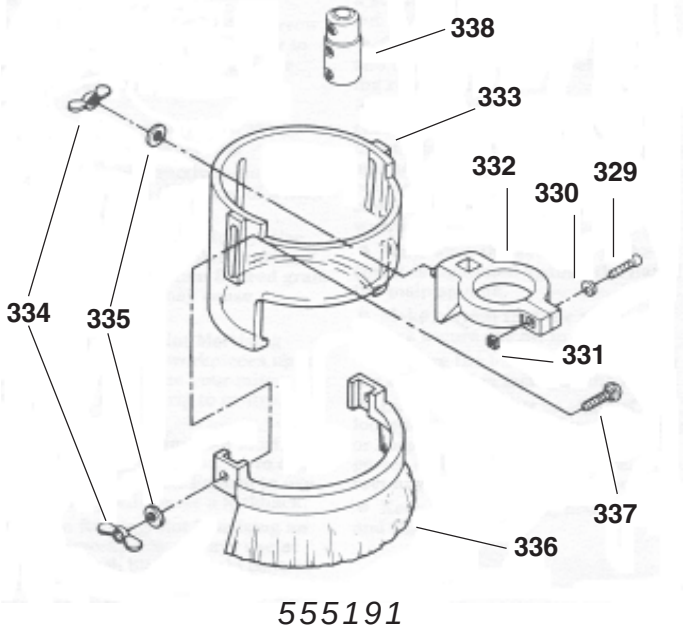






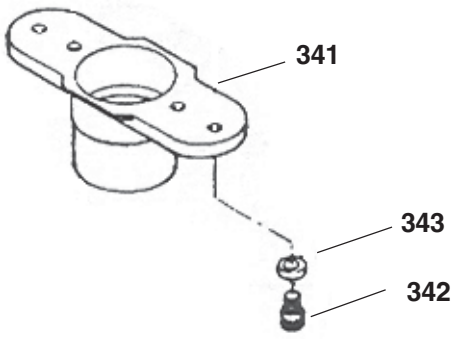


Ref. No.	Part No.	Description	Qty.
325	222460	. Flat Point Setscrew, 3/8" lg.	1
326	513153	. Hex Socket Flat Screw	4
327	513923*	. Label, Warning	1
328	**515979**	**Arbor Wrench**	1
—	**845620**	**Mark 7 Owner's Manual**	1
—	**505717**	**"Self-Study Guide"**	1
—	**555069**	**Power Tool** Woodworking for Everyone ...	1



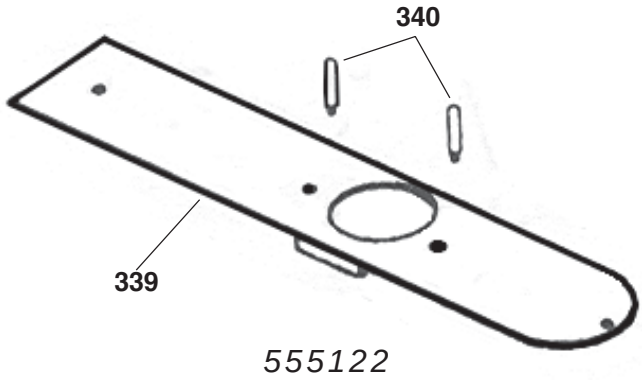
555191

Ref. No.	Part No.	Description	Qty.
—	555191	**1/2" Router Chuck w/Shield**	
329	274165	. Socket Head Cap Screw	1
330	513633	. Plain Washer	1
331	120619	. Square Nut	1
332	514501	. Mounting, Bracket	1
333	514630	. Circular Shield	1
334	514494	. Wing Nut	3
335	514537	. Washer	3
336	514564	. Brush	1
337	126315	. Carriage Bolt	2
338	514631	. 1/2" Router Chuck	1



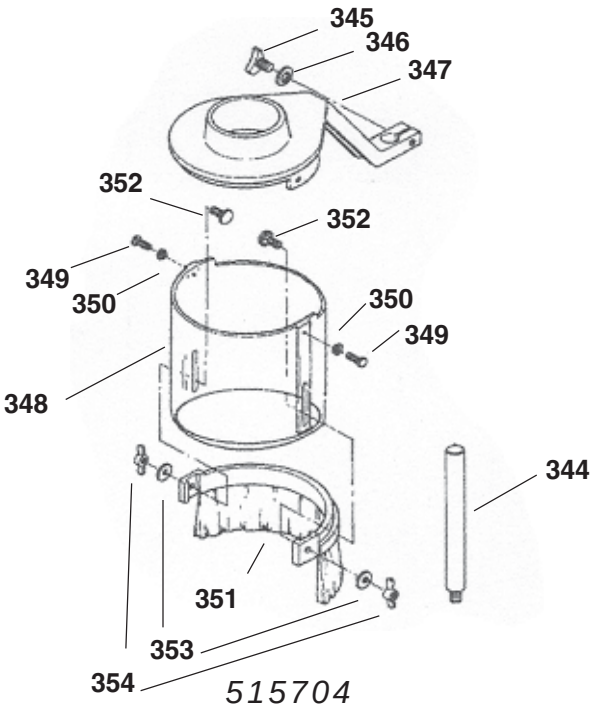
VACUUM ATTACHMENT

Ref. No.	Part No.	Description	Qty.
341	514499	Vacuum Attachment (no elbow)	1
342	515433	Socket Head Cap Screw	2
343	515434	Special Washer, 3/8"	2



555122

Ref. No.	Part No.	Description	Qty.
—	555122	**Shaper Insert (Incl.**	
339	50411604	. Insert	1
340	501551	. Pins	2



515704

Ref. No.	Part No.	Description	Qty.
—	515704	**Support and Guard Asmy.**	
344	514487	. Rod Hold Down	1
345	515503	. Knob	1
346	513865	. Flat Washer, 3*16"	1
347	514453	. Support	1
348	515668	. Shield	1
349	448027	. Self-tapping Screw	2
350	515126	. External Tooth Lock Washer	2
351	514564	. Brush Assembly	1
352	126315	. Carriage Bolt	2
353	514537	. Washer	2
354	514494	. Wing Nut	2
355	514490	. Washer (not shown)	1
356	514491	. T-Nut (not shown)	1
357	555117	Spindle Arbor (not shown)	1

NOTES

When you need replacement parts, order either the individual parts or the entire assembly (some parts must be purchased as an assembly). Call Customer Service @ 1/800-762-7555 or e-mail customerservice@ shopsmith.com.

Unpacking your Mark 7

Tools Needed:

- 7/16" wrench (or adjustable wrench)
- Large straightblade screwdriver
- Paste floor or paste furniture wax
- Rag
- Denatured alcohol

SAFETY

WARNING

- **Turn off and unplug the Mark 7 before performing any Assembly and Alignment procedure.**

UNPACK THE MARK 7

Note

- **Refer to the Parts Lists and Exploded Views to identify parts.**
- **Save the shipping carton in case you have to return the Mark 7.**

1. Make sure you clear a flat, well-lighted area, and place the Mark 7 Base Unit box flat on the floor.

2. Remove the band strapping from around the box. Lift off the top of the box and set it aside.

3. Move the large and small accessories box aside. Also, remove the blocking box.

4. From the large accessory box, remove the legs with hardware attached.

INSTALL THE LEGS

5. Double check to see that the headstock is locked, the extension table mount is locked, the worktable height lock is secure, and the carriage is locked.

6. Place a piece of cardboard, rug, heavy paper, or the outer carton the width and length of the Mark 7 on the floor directly behind the Mark.

7. With a helper on one end of the Mark 7 and you on the other, turn over the Mark 7 onto the cardboard. See Figure C-1. The extension table and the worktable will support the machine. Take care not to scratch the table tops.

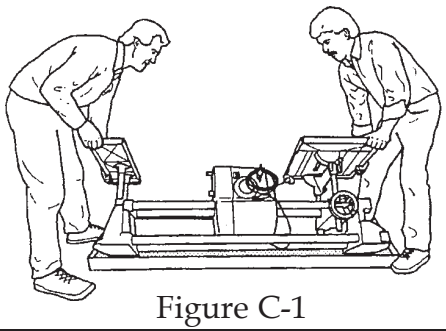


Figure C-1

8. Place the "lip" of a leg (30) inside the Mark 7 base, as shown in Figure C-2.

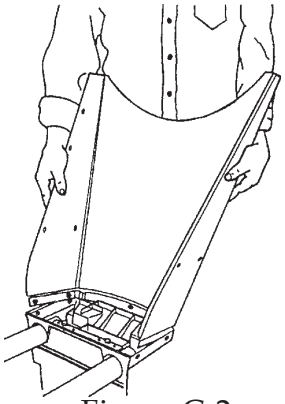


Figure C-2

9. Insert a screw (31) through a hole in the base and leg. Use a star washer (32) and nut (33) to attach the screw, as seen in Figure C-3. Finger tighten.

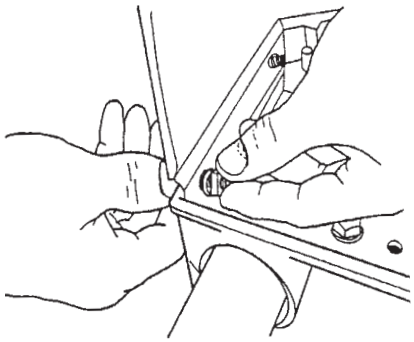


Figure C-3

10. Do the same for the remaining four holes in the leg. After all five screws are attached, use a medium screwdriver and a 7/16" wrench to tighten only enough to allow movement with firm pressure. See Figure C-4.

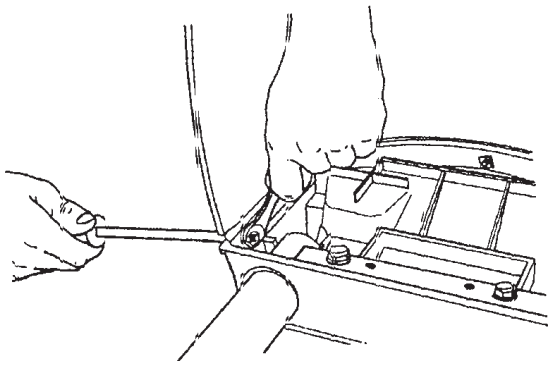


Figure C-4

11. Follow Steps 8 through 10 for installing the other leg.

NOTE

Recheck the legs periodically, because moving the Mark 7 around the workshop could possibly cause the leg nuts (33) to loosen and become misaligned.

Also, if you have purchased the optional retractable casters, install them now.

12. With a helper, turn the Mark 7 right side up, as seen in Figure C-5. Figure C-6 shows the Mark 7 upright.

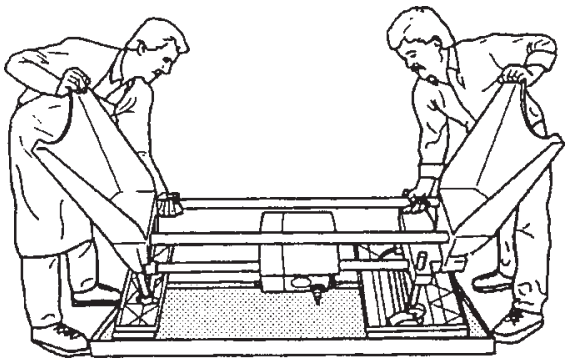


Figure C-5

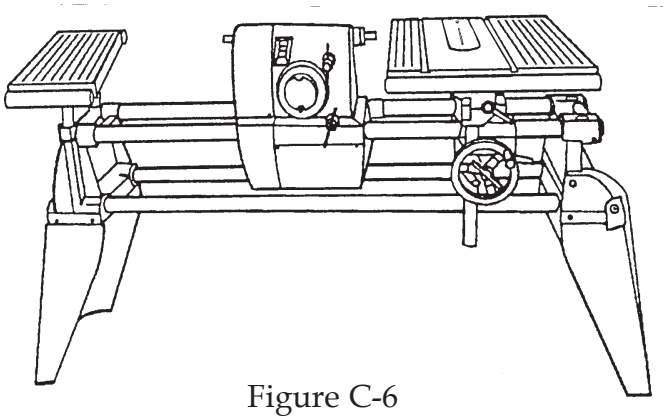


Figure C-6

13. With the machine setting upright securely tighten all ten screws and nuts that hold the legs to the headrest and bench.

CLEAN AND WAX

CAUTION

Use paste floor or paste furniture wax. They protect and lubricate. Do not use car wax or spray furniture wax.

14. Use a rag and denatured alcohol to clean the Mark 7, tables, tubes and accessories. If you find any burrs, remove them with a fine file.

15. Use a clean, dry rag and furniture paste wax to wax and buff:

- the worktable (shown in Figure C-7) and extension table surfaces
- way tubes
- rip fence
- miter gauge bar
- quill
- mounting holes in the power and base mounts

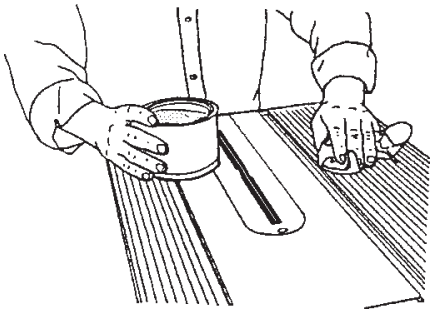


Figure C-7

a. Do not wax the trunnions (148, 149) on the worktable. When you wax and buff the quill (59) do not leave any wax in the racks. If you do, the wax will mix with sawdust and impede the movement of parts.

16. After you apply wax to the mounting holes in the Power base mount (left) and base mount (right), wrap a rag around a scrap of wood and buff out the wax thoroughly. See Figure C-8.

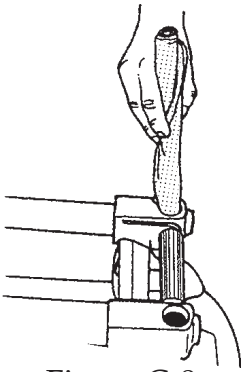


Figure C-8

NOTE

YOUR NEW MARK 7 HAS BEEN ASSEMBLED AND ALIGNED AT OUR FACTORY. YOU SHOULD NOT NEED TO PERFORM ANY ALIGNMENT PROCEDURES ON YOUR NEW MACHINE, UNLESS YOU EXPERIENCE DIFFICULTY WITH THE BLADE OR BIT BURNING THE WOOD, INACCURATE CUTS, OR KICKBACK.

NOTES

NOTES

Alignment of Mark 7

NOTE

YOUR NEW MARK 7 HAS BEEN ASSEMBLED AND ALIGNED AT OUR FACTORY. YOU SHOULD NOT NEED TO PERFORM ANY ALIGNMENT PROCEDURES ON YOUR NEW MACHINE, UNLESS YOU EXPERIENCE DIFFICULTY WITH THE BLADE OR BIT BURNING THE WOOD, INACCURATE CUTS, OR KICKBACK.

Tools Needed:

- ☐ 3/16" Allen wrench
- ☐ 5/32" Allen wrench, long handle (provided)
- ☐ 5/32" Allen wrench, short handle (provided)
- ☐ 5/16" Allen wrench (provided)
- ☐ 9/16" wrench
- ☐ Arbor wrench (provided)
- ☐ 1/2" wrench
- ☐ Adjustable wrench (optional)
- ☐ 1/2" socket/ratchet wrench w/short extension
- ☐ 3/8" to 1/2" drill bit
- ☐ Small and Medium Straightblade screwdriver
- ☐ Medium Phillips screwdriver
- ☐ High quality combination square

SAFETY

WARNING

Make sure the speed dial is set to "Slow", then turn off and unplug the Mark 7 before performing any ALIGNMENT procedure.

1. Complete **ALL** of the following procedures–and then recheck them at regular intervals. You **MUST** use an accurate combination square for alignment and adjustment. To check that your square is accurate, select a board with at least one straight and true edge. Place the square against the good edge and draw a line across the width. Flop the square over and hold it against the same edge and draw another line next to the first one. If the lines are parallel, your square is accurate.

2. All the parts and accessories which support or guide the stock **MUST** be aligned **parallel with** or **perpendicular to** the main spindle's plane of rotation. During the following alignment procedures the saw blade (provided in the accessories box) will represent the main spindle's plane of rotation.

NOTE

If you have installed casters (optional) on your Mark 7, make sure they are retracted and the legs on the Mark 7 sit firmly on a level floor. Do this now.

Also, remember that your Mark 7 could possibly go out of alignment if it is moved to an area with varying floor levelness. Remember to recheck alignment and make needed adjustments after moving your Mark 7, if needed.

ADJUST THE CARRIAGE LOCK

1. If the carriage lock handle (187) does not lock into the horizontal position or the carriage moves out of position, the lock needs adjusting. To adjust the lock, use a 1/2" socket with an extension and ratchet handle to tighten or loosen the nut located at the back of the carriage assembly, as shown in Figure C-8.

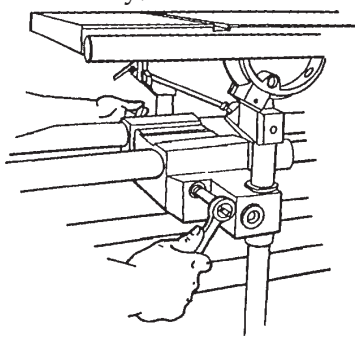


Figure C-8

2. When the carriage lock handle locks into the horizontal position and the carriage no longer moves when the handle is in the horizontal position, tighten the nut a final 1/4 turn.

WARNING

The carriage lock handle MUST lock into the horizontal position, otherwise the carriage lock may vibrate loose.

SET THE WORKTABLE'S 90° LEFT STOP

WARNING

Always make sure the Mark 7 headstock and carriage are locked and all casters are raised off the floor before lifting the Mark 7 into the vertical drill press position.

3. Unlock the carriage and headstock. Move the headstock to the middle of the way tubes. Then move the carriage between the headstock and base mount (right side).

4. Tighten the headstock and carriage locks. Place the Mark 7 in the vertical position by loosening the Power Base Mount knob (9), firmly grasping the way tubes (20) near the power base mount end, and lifting the tubes into the 90° position, as demonstrated in Figure C-9.

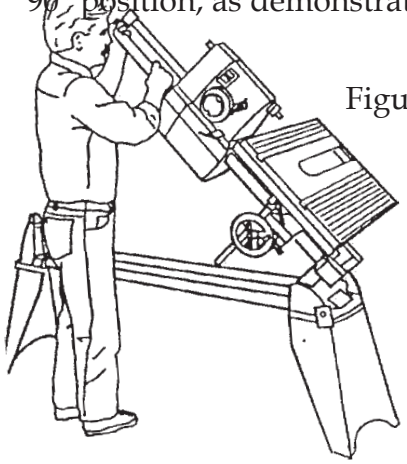


Figure C-9

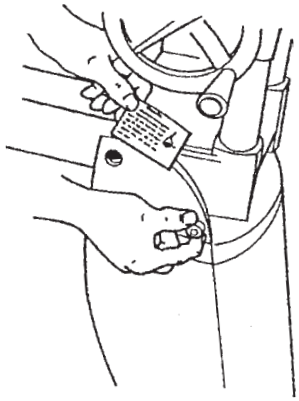


Figure C-10

5. See Figure C-10. Use your fingers to screw in the base lock (2). Note the base lock is slightly off center to the countersink found in the bench base, as shown in Figure C-11. This offset allows the base lock to more firmly hold the base in place.

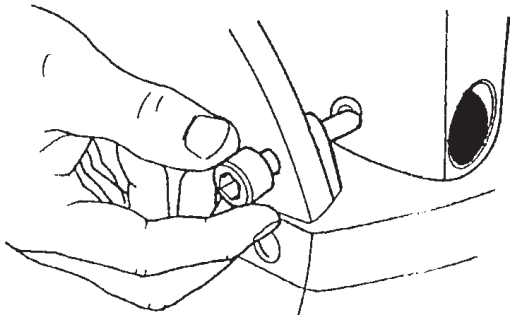


Figure C-11

6. Move the worktable into the 90° position by loosening the table tilt lock (165), as seen in Figure C-12, then putting the worktable in the horizontal 90° position, see Figure C-13. Retighten the table tilt lock only enough to allow movement with firm pressure.

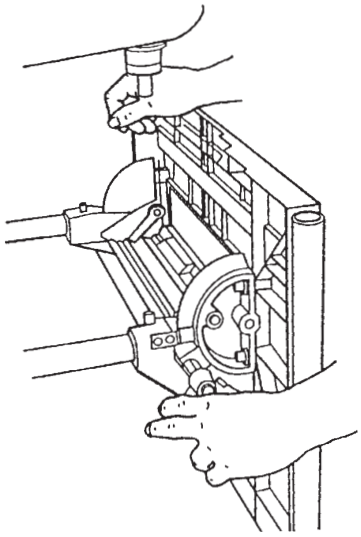


Figure C-12

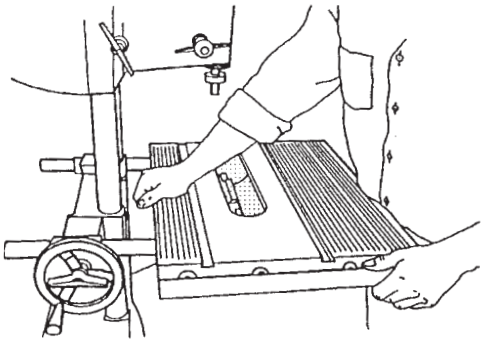


Figure C-13

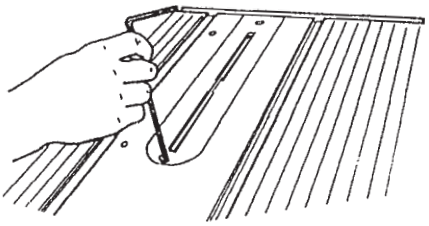


Figure C-14

7. Use a 5/32" Allen wrench to remove the table insert, as demonstrated in Figure C-14.

8. To install the drill chuck, mount the chuck on the spindle and align the chuck's set screw with the spindle knob's set screw, as shown in Figure C-15. This allows the chuck's set screw to set on the flat part of the spindle. Use a 5/32" Allen wrench to securely tighten the drill chuck's set screw.

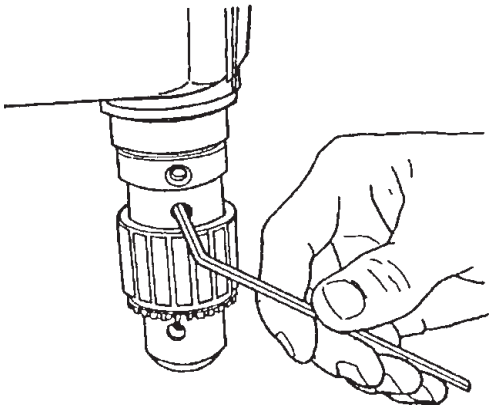


Figure C-15

9. Install a 3/8" to 1/2" straight drill bit in the drill chuck and use the chuck key to lock it place. See Figure C-16.

NOTE

Check the straightness of the drill bit by rolling it on a flat surface. You can also hand-rotate the drill chuck while holding the combination square against the drill bit and the table. If the bit is not straight DO NOT use it for these alignment instructions.

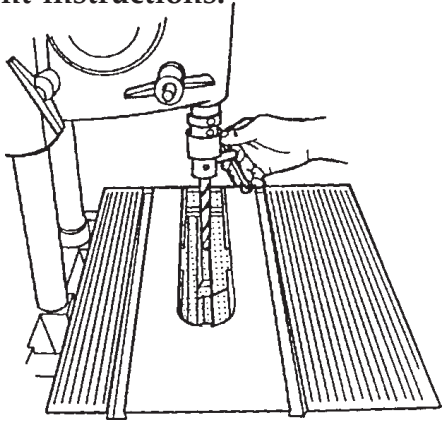


Figure C-16

10. With the drill bit above the table opening, use the quill feed to extend the bit 1/2" into the table opening, as in Figure C-17.

11. Set the combination square against the bit and table, as shown in Figure C-18. The square should contact the bit along its entire length.

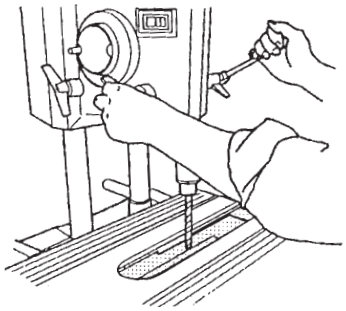


Figure C-17

When the table is exactly perpendicular to the drill bit, lock the table, as seen in Figure C-19.

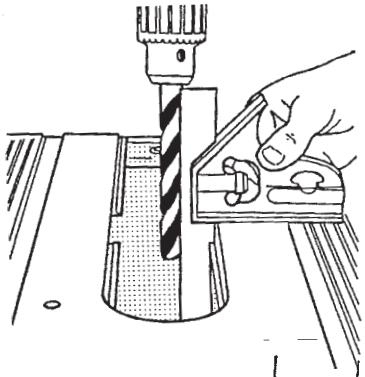


Figure C-18

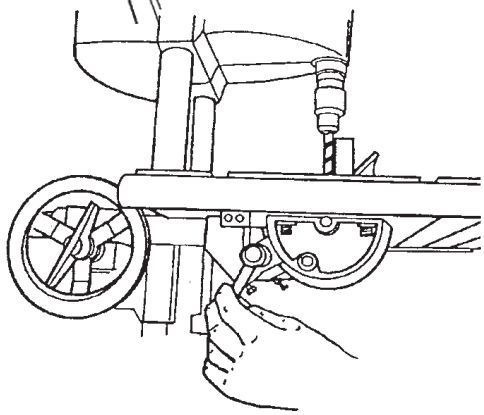


Figure C-19

12. Both 90° stops (shown in Figs. C-20 and C-21) should contact the underside of the table. If they don't, use a 1/2" wrench to adjust the stops.

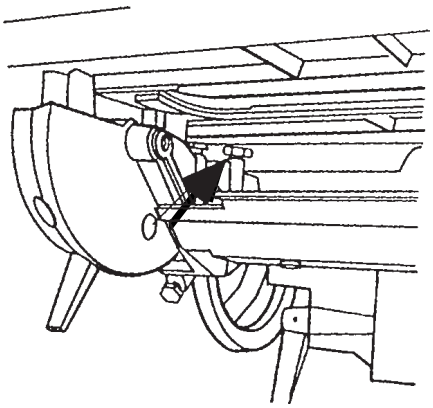


Figure C-20

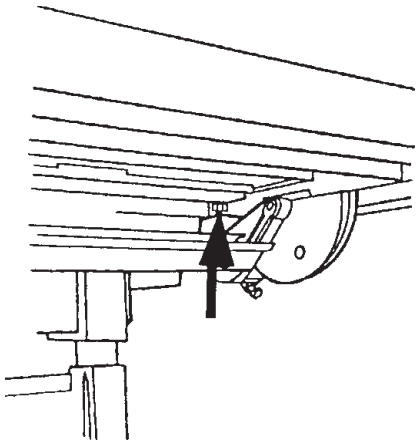


Figure C-21

13. Recheck the setting by loosening the tilt lock, moving the table, and then repeating Steps 11 and 12. (Rechecking the settings is very important!)

SET THE WORKTABLE'S 0° STOP

14. Remove the drill bit and drill chuck from the spindle.

15. Loosen the base lock (2). Firmly grasp the way tubes and lower the headstock into the horizontal position, then engage the power mount knob.

16. Loosen the table tilt lock and place the table in the horizontal "0" position. Retighten the table tilt lock only enough to allow movement with firm pressure.

17. Mount the saw blade on the arbor:

a. Remove the arbor nut by turning it clockwise, as seen in Figure C-22. Hold the arbor with the threaded part pointing to the left.

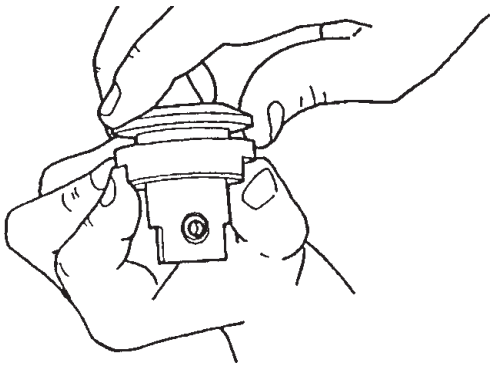


Figure C-22

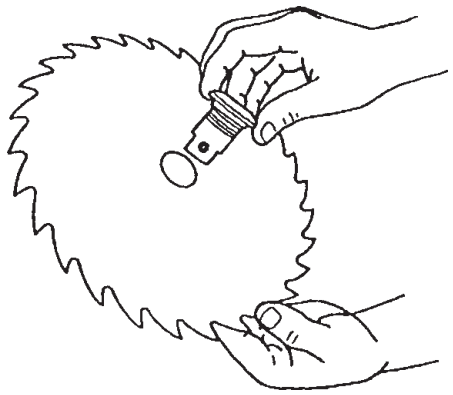


Figure C-23

b. Hold the blade with the teeth pointing toward you, as shown in Figure C-23, then insert the arbor through the hole. Replace the nut and finger tighten it, as shown in Figure C-24.

Figure C-24

c. Place the blade and arbor on your workbench with the nut pointing up.

d. Hold the arbor with an adjustable wrench and tighten the arbor nut with the arbor wrench, as demonstrated in Figure C-25. Another way to tighten the arbor nut is to clamp the arbor in a bench vise, as illustrated in Figure C-26, and tighten the nut with the arbor wrench.

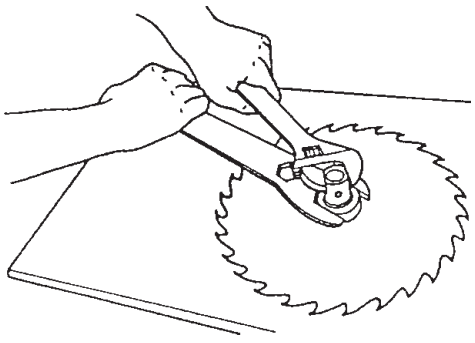


Figure C-25

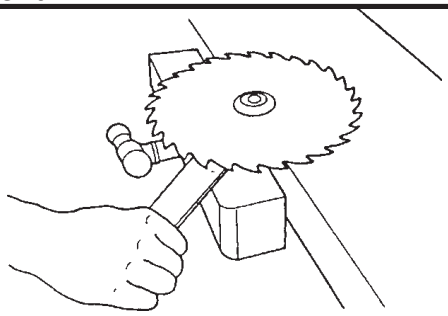


Figure C-26

NOTE

The only time the saw blade is used without the upper or lower saw guards is during alignment and only after the Mark 7 is turned off and unplugged.

18. Mount the saw blade on the spindle and align the arbor set screw with the spindle knob's set screw, then use a 5/32" Allen wrench to tighten the arbor set screw, as seen in Figure C-27.

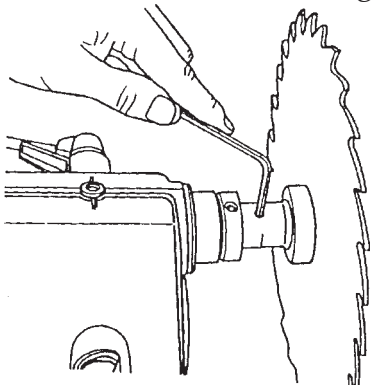


Figure C-27

19. Reinstall the table insert (138) in the worktable.

20. Raise the worktable so that it clears the top of the saw blade.

21. Loosen the carriage lock and slide the carriage so the saw blade is directly beneath the slot in the table insert. See Figure C-28.

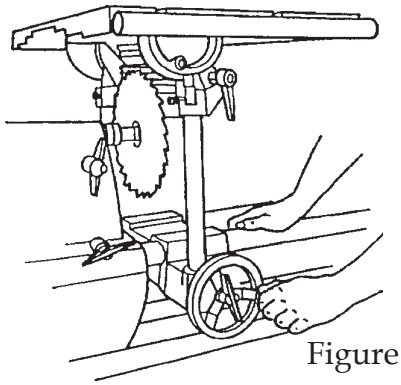


Figure C-28

22. Lower the worktable (but not all the way down) so the saw blade comes through the slot. Lock the table height, as seen in Figure C-29.

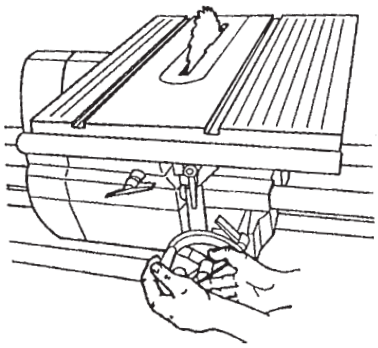


Figure C-29

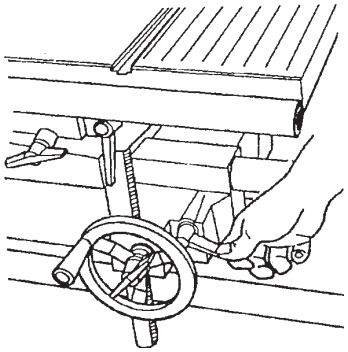


Figure C-30

23. Tighten the carriage lock, as shown in Figure C-30.

24. Place the combination square against both the saw blade and worktable, see Figure C-31. Make sure the square's blade does **not** touch a saw tooth and **does** rest in a gullet between teeth.

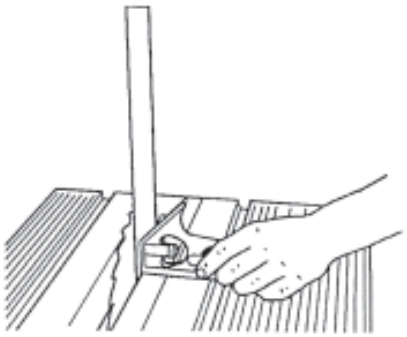


Figure C-31

25. If the worktable is not exactly perpendicular to the saw blade, adjust the worktable so it is perpendicular to the saw blade, then tighten the tilt lock.

26. To adjust the 0° stop, simultaneously depress the table stop pin and use a 1/2" wrench to adjust the stop bolt. The stop bolt should just contact the side of the stop pin. Once the stop bolt is adjusted, the stop pin will "lock" back when the tilt lock is tightened, as shown in Figure C-32.

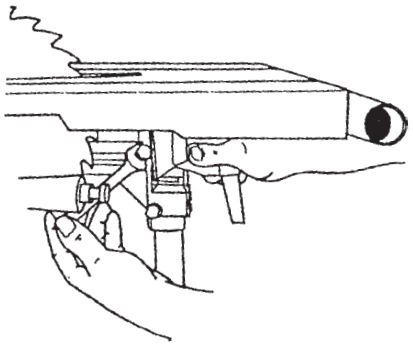
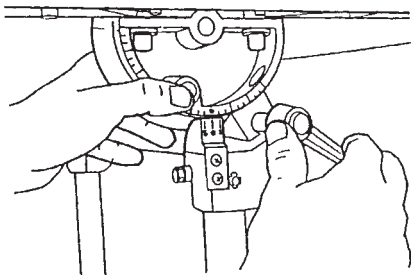


Figure C-32

27. Loosen the tilt lock, move the worktable, then depress the 0° stop pin until the stop bolt contacts it. Tighten the tilt lock, and recheck the setting by repeating Steps 24 through 26. See Figure C-33. (It is very important to recheck the setting!)

Figure C-33

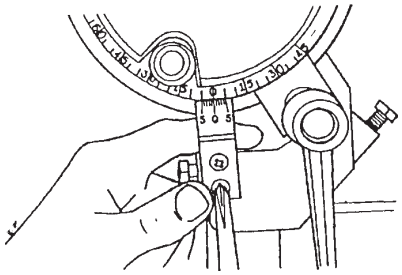


ADJUST THE TABLE TILT INDICATOR

28. Tighten the table tilt lock and check that the "0" mark on the indicator aligns with the "0" mark on the trunnion ((149).

29. To adjust the scale, use a medium Phillips screwdriver to loosen the two screws which hold the indicator to the tie bar. As seen in See Figure C-34. Then while holding the indicator in position so the "0"s are aligned, retighten the screws.

Figure C-34



ADJUST THE WORKTABLE'S 45° STOPS

30. Loosen the table height lock and raise the table until it clears the saw blade. Tighten the height lock.

31. Loosen the tilt lock and tilt the worktable to the right until it makes contact with the two 45° stop bolts (158).

32. Tighten the tilt lock only enough to allow movement with firm pressure.

33. Loosen the quill feed (shown in Figure C-35) and extend the quill so the saw blade is centered beneath the slot in the table insert. When it is centered, lock the quill feed.

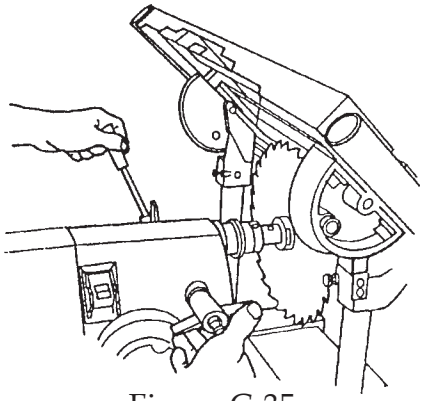


Figure C-35

34. Lower the worktable so the saw blade extends through the slot. See Figure C-36. Lock the table height.

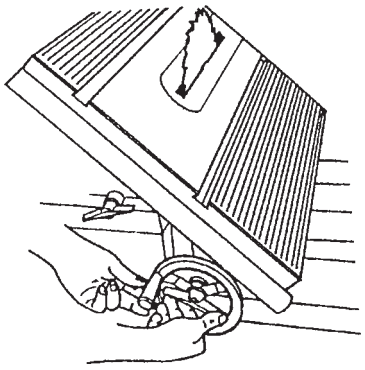


Figure C-36

35. Remove the blade from the combination square and place the square against the saw blade and the worktable, as shown in Figure C-37. Make sure the combination square doesn't rest on the table insert.

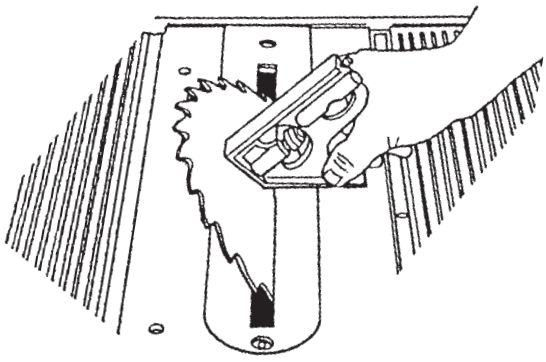


Figure C-37

36. If the worktable is not exactly 45° to the saw blade, adjust the worktable so it is.

37. Tighten the tilt lock, then use a 1/2" wrench to adjust the 45° stop on the front side of the worktable (shown in Figure C-38) and the back side of the worktable (as shown in Figure C-39). The stops should just contact the underside of the table.

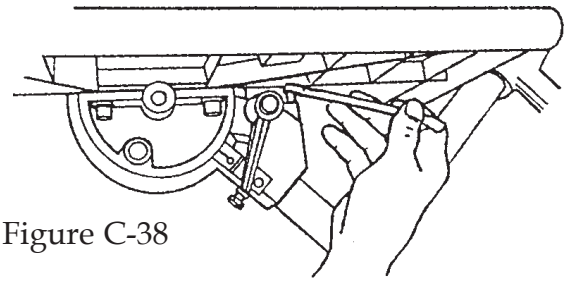


Figure C-38

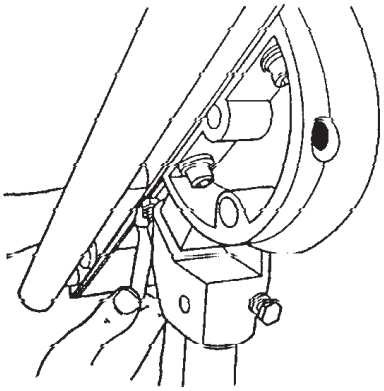


Figure C-39

38. Loosen the tilt lock and move the table. To recheck the 45° stops, repeat Steps 33 through 37. (It is very important to recheck the setting!)

ALIGN THE MITER GAUGE SLOTS

39. Return the worktable to the horizontal "0" stop and tighten the tilt lock. The carriage lock and headstock lock should also be tightened. Remove the table insert.

40. Place the miter gauge in the right miter gauge slot, and use a 5/32" Allen wrench to remove the quick clamp from the safety grip, as shown in Figure C-40.

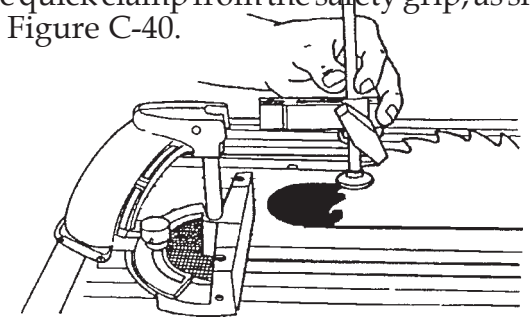


Figure C-40

41. Insert the long 5/32" Allen wrench through the miter gauge. Borrow a set screw from the lathe tool rest and use the short 5/32" Allen wrench to install it in either top miter gauge hole, as seen in Figure C-41. Place the tip of the long wrench against the front side of the saw blade and tighten the set screw.

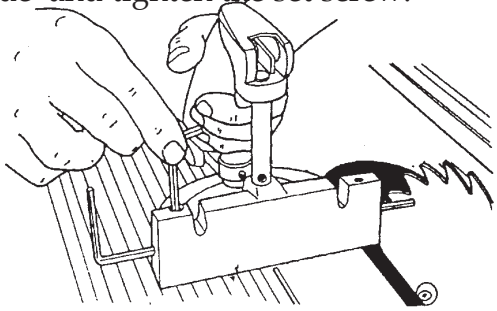
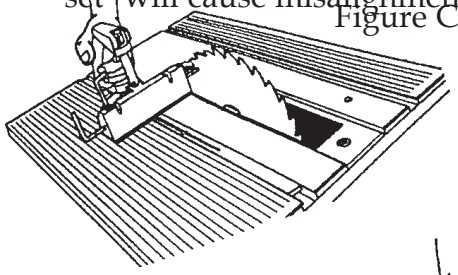


Figure C-41

42. Move the miter gauge from front to back along the saw blade, as shown in Figures C-42 and C-43. If it hangs up on the blade or a gap develops, the miter gauge slots need to be aligned. Make sure the Allen wrench does not contact a saw blade tooth, because the tooth "set" will cause misalignment.

Figure C-42



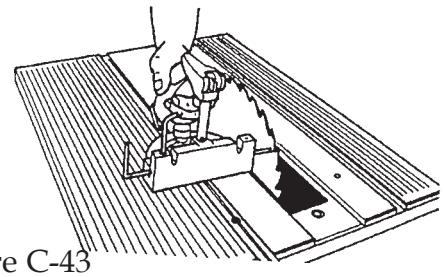


Figure C-43

43. If the miter slots need to be aligned, do the following:

a. Tilt the table to 45° and tighten the tilt lock.

b. Use a 5/16" Allen wrench to loosen all four bolts (147) which hold the worktable to the trunnions, as pointed out in Figure C-44. Loosen the bolts only enough to allow movement with firm pressure. See Figure C-45.

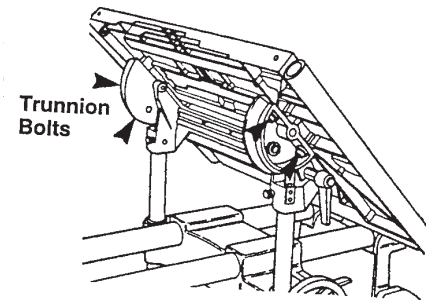


Figure C-44

NOTE

If you find it difficult to loosen the bolts, consider using a T-handle Allen wrench, or use a boxed wrench for extra torque. Another alternative is to use the hanging hole in an adjustable wrench, as demonstrated in Figure C-46.

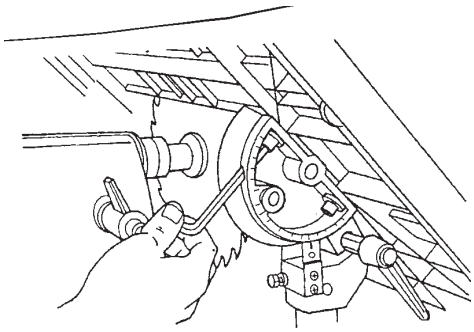


Figure C-45

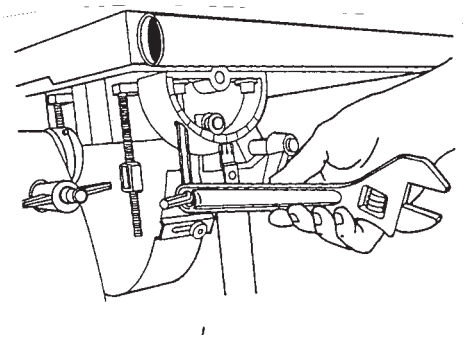


Figure C-46

c. Position the worktable back to the horizontal "0" and tighten the tilt lock.

c. Position the worktable back to the horizontal "0" and tighten the tilt lock.

d. Adjust the worktable, then again move the miter gauge and wrench along the face of the saw blade until the wrench tip consistently contacts the entire blade surface.

e. When the miter gauge slot is aligned, use the 5/16" Allen wrench to retighten the two trunnion bolts which are closer to the headstock. Then loosen the table tilt lock, tilt the worktable to 45°, **and retighten the table tilt lock.** Use the 5/16" Allen wrench to retighten the other two trunnion bolts.

f. Loosen the table tilt lock and move the table, then return it to the horizontal "0" position. Recheck the slot alignment. If it is off, repeat Steps **d** and **e**.

NOTE

Tighten the bolts only after the table tilt lock is secured. Otherwise the worktable will bow or bind the next time the table tilt lock is tightened.

INSTALL THE TABLE INSERT IN THE WORKTABLE

44. Place the table insert in the worktable recess. Use a 5/32" Allen wrench to start both screws.

45. First tighten the rear screw. Then the front of the insert will be sprung slightly above the table. Level the insert by placing your hand on the front of the insert, as in Figure C-47, and slowly turning the front screw until it draws the front of the insert flush with the worktable surface.

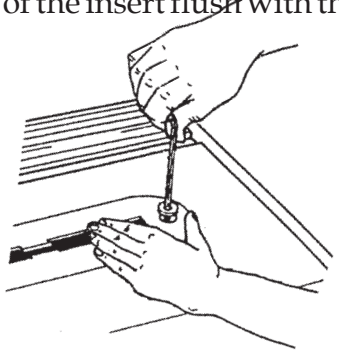


Figure C-47

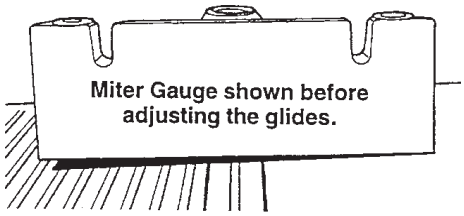


Figure C-48

ADJUST THE MITER GAUGE GLIDES

46. Place the miter gauge in the worktable's miter gauge slot. See Figure C-48.

47. Check to see if the miter gauge wobbles side-to-side. Also, slide it back and forth in the slot to check if the miter gauge scrapes against the table. If the miter gauge rocks or scrapes the table, adjust the glides.

48. If the glides need to be adjusted, do the following:

a. Remove the miter gauge from the slot and turn it over.

b. Use a medium screwdriver to screw the glides in or out, as shown in Figure C-49, so that the glides hold the miter gauge 1/64" to 1/32" off the worktable and the miter gauge does not rock in the slots.

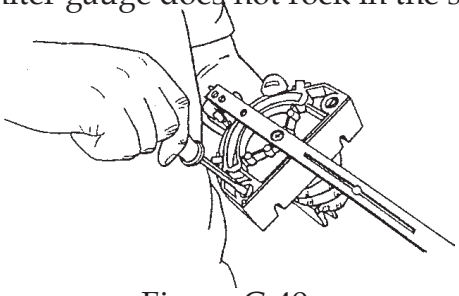


Figure C-49

c. Return the miter gauge to the slot and recheck and readjust it, if needed.

ADJUST THE MITER GAUGE FACE

49. Remove the safety grip from the miter gauge. Make sure you keep the small, thin washer.

50. Put the miter gauge in the right slot and place the combination square against the saw blade and miter gauge face, as seen in Figure C-50.

51. If the miter gauge face is not perpendicular to the saw blade, do the following:

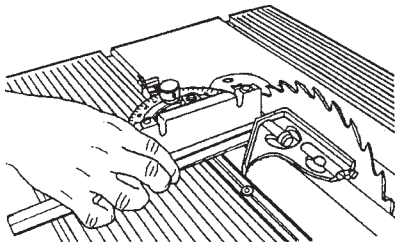


Figure C-50

a. Use a long Allen wrench to loosen the lock knob (268) and adjust the miter gauge so it is perpendicular to the saw blade, then tighten the lock knob. See Figure C-51.

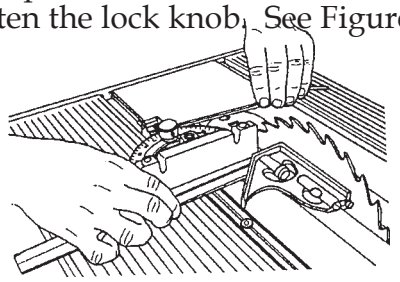


Figure C-51

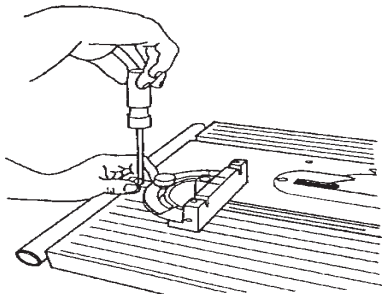


Figure C-52

b. Use a medium screwdriver, loosen the screw (273) which holds the indicator plate (275), and set its "0" to the miter gauge's "90". Tighten the screw. See Figure C-52.

ADJUST THE 90° POSITIVE STOP

52 Use a small screwdriver to back out the 90° stop screw 2 to 3 turns, see Figure C-53.

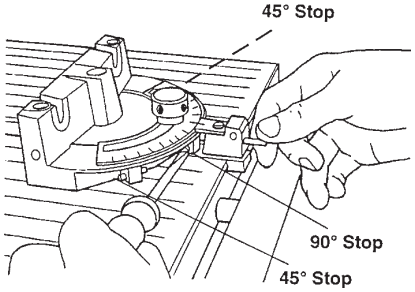


Figure C-53

53. Depress the plunger, then turn the stop screw until you feel it touch the plunger.

54. To recheck the stop setting, repeat Steps 50 through 53.

ADJUST BOTH 45° STOPS

55. Loosen the lock knob (268) and pull out the plunger. Then, at the same time, rotate the miter gauge and push in the plunger until it hits the 45° stop (there is one on each side of the 90° stop).

56. Use a combination square to set the miter gauge face at 45° to the saw blade. If the 45° stop needs adjustment, use a medium screwdriver to back out the 45° screw 2 to 3 turns.

57. Depress the plunger, then turn the stop screw until you feel it touch the plunger.

58. To recheck the stop setting, repeat Steps 52 through 57.

59. To adjust the other 45° stop, repeat Steps 55 through 58.

REMOVE THE SAW BLADE

60. Loosen the table height lock and raise the table so that it clears the saw blade, then tighten the lock. Unlock the carriage lock and move the worktable to the right.

61. Use the 5/32" Allen wrench to loosen the arbor set screw. Remove the saw blade. See Figure C-54.

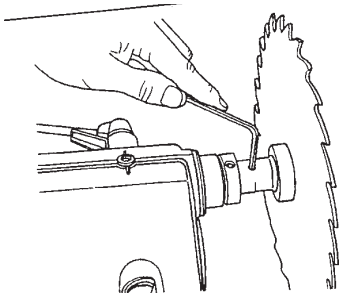


Figure C-54

62. Unlock the table height lock and lower the table to a comfortable working height. Tighten the lock.

ALIGN THE RIP FENCE

63. Place the miter gauge in the left slot of the worktable on the infeed side. Place the Rip Fence on the right side of the saw table.

64. Insert the long 5/32" Allen wrench through the miter gauge and secure it using the short 5/32" Allen wrench and a set screw borrowed from the tool rest.

65. Move the fence toward the Allen wrench until it just touches it.

66. Lock the lower fence lock handle first, then lock the upper fence lock handle to secure both ends of the fence.

67. Slide the miter gauge back and forth in the slot. The tip of the Allen wrench should keep in slight contact with the fence. Watch that you don't scratch the fence.

68. If the Allen wrench pulls away from or binds against the fence, the fence needs aligning. If so, do the following:

a. Using the short 5/32” short Allen wrench, loosen the four button head cap screws, located on the top of the fence, slightly. They should be just tight enough to require firm pressure to align the fence.

b. Raise the upper fence lock handle only to unlock the rear of the fence.

c. Adjust the rear end of the fence so that it just touches the Allen wrench as the miter gauge slides along the fence.

d. When alignment is reached, lock the upper fence lock handle. Slide the miter gauge back and forth to double check your alignment. Using the short 5/32” Allen wrench, tighten the four button head cap screws completely.

ALIGN THE EXTENSION TABLE

NOTE

These instructions are for aligning the extension table on the right side of the headstock. You

can also follow these same procedures to align it to the left side of the headstock.

For most projects, align the extension table on the right side, since it can usually be used when placed on the left side. However, once the extension table is aligned on the right side, it cannot be transferred to the left side and still maintain precise alignment.

If you wish precise alignment on the left side, repeat the following instructions– but place the extension table on the left side in the headstock.

69. Mount the extension table in the Mark 7's accessory base mount (on the right side) at a comfortable height, as shown in Figure C-55. Use a 1/2" wrench to loosen the bottom nuts holding the table base to the table approximately 1/4" from the table. This will allow you room for later adjustment.

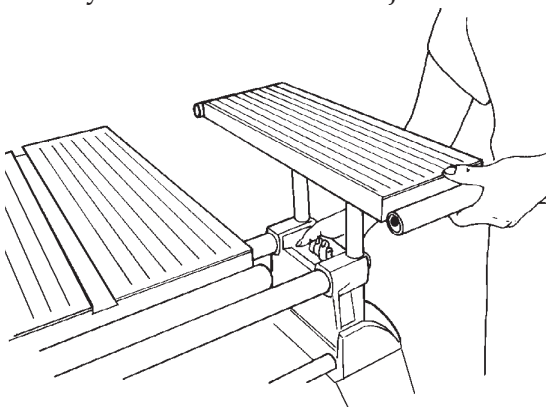


Figure C-55

70. The worktable should already be mounted in the carriage mount. Move the worktable next to the extension table and adjust it to about 1/4" above the extension table, as seen in Figure C-56.

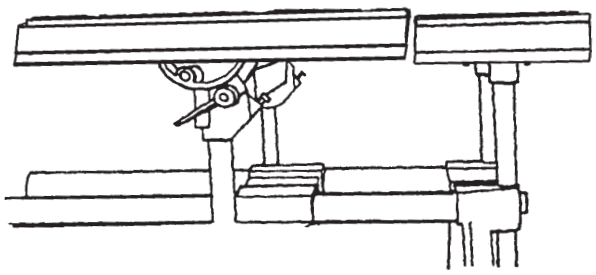


Figure C-56

71. Hold a straightedge against the **infeed edge** of both the worktable and extension table tubes, as in Figure C-57. Line up the extension table's infeed edge with the worktable's infeed edge. The elongated holes in the extension table's base permit you to slide the extension table forward and backward.

72. Hold a straightedge on the **infeed top surface** of both the worktable and the extension table, as shown in Figure C-58. As needed, adjust the top nuts located on the infeed side of the extension table, in order for the straightedge to be level across both the worktable and the extension table infeed sides. See Figure C-59.

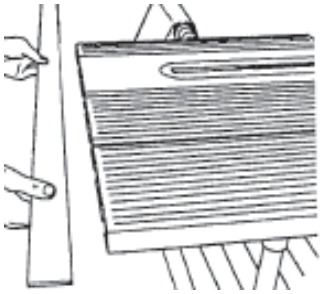


Figure C-57

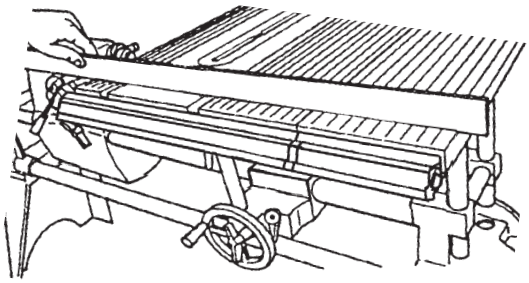


Figure C-58

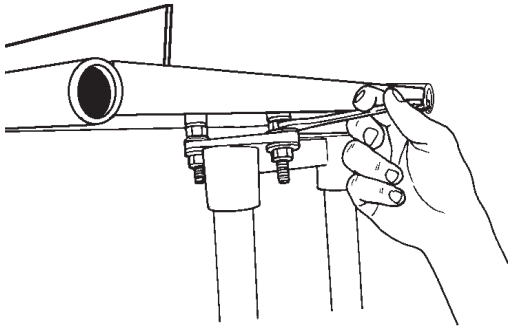


Figure C-59

73. Hold the straightedge on the **outfeed top surface** of both the worktable and the extension table, as seen in Figure C-60. As needed, adjust the top nuts located on the outfeed side of the extension table, in order for the straightedge to be level across both the worktable and the extension table outfeed sides.

74. Double check the levelness at the infeed and outfeed sides of the table surfaces. All four top nuts (those nearest the table) used in leveling the extension table should be touching the base.

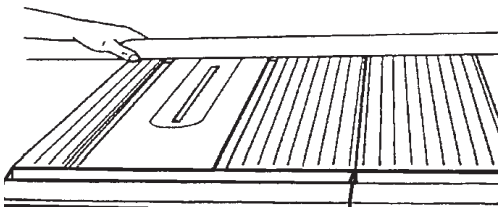


Figure C-60

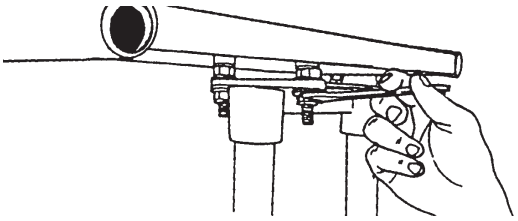


Figure C-61

75. When the tables are aligned on three sides– **infeed side edge** (along the table tubes, as in Figure C-57), **infeed top surface** (as in Figure C-58), and **outfeed top surface** (as in Figure C-60) – securely tighten the bottom nut on each of the four studs, as seen in Figure C-61.

CAUTION

DO NOT overtighten the nuts. Tighten the nuts until they bottom out, then no more than 1/8 additional turn. Overtightening the nuts will stretch and damage the threads.

NOTE

If you move the Mark 7 to another location– especially one with an uneven floor– remember to recheck the extension table alignment.

ALIGN THE EXTENSION TABLE RAILS (EXTRUSIONS)

76. Place the straightedge along the infeed-side tops of both the worktable and extension table tubes, as shown in Figure C-62.

77. If the extension table's tube is not aligned with the worktable's tube, use a 7/16" wrench to slightly loosen both keps nuts (248) attaching the tube to the extension table. Make the needed adjustments, then retighten the nuts. See Figure C-63.

78. Repeat Steps 85 and 86 for the extension table's tube located on the outfeed-side.

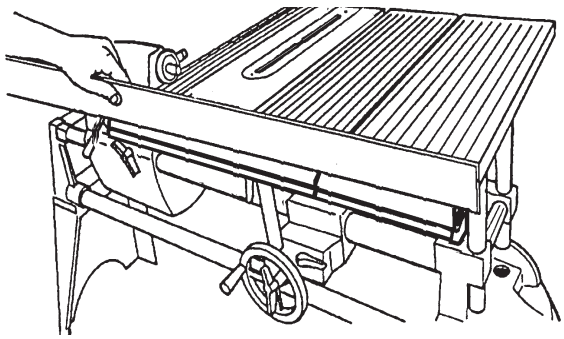


Figure C-62

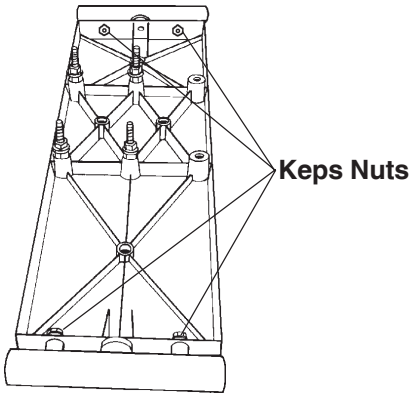


Figure C-63

MOUNT THE SAW GUARD

79. Loosen the accessory mount lock and remove the extension table. Loosen the table height lock and remove the worktable. Place the saw blade and arbor in the lower saw guard cover (204).

80. Fit the lower saw guard's clamp on the spindle quill (59). Line up the arbor set screw with the spindle knob's set screw (where the spindle flat is located). Use a 5/32" Allen wrench to tighten the arbor set screw, as shown in Figure C-64.

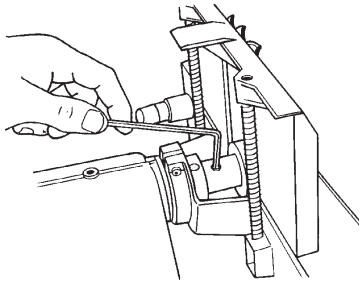


Figure C-64

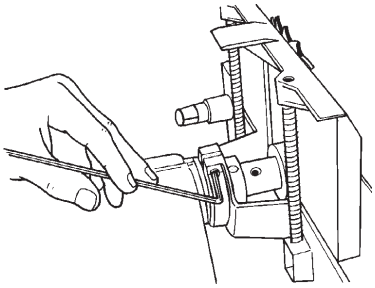


Figure C-65

81. Use the 5/32" Allen wrench to tighten the socket head screw (215) on the saw guard collar, as seen in Figure C-65.

INSTALL THE RIVING KNIFE

82. Loosen the guard lock knob (210) and insert the upper saw guard's riving knife (199) between the guard (213) and the lock plate (208), as demonstrated in Figure C-66.

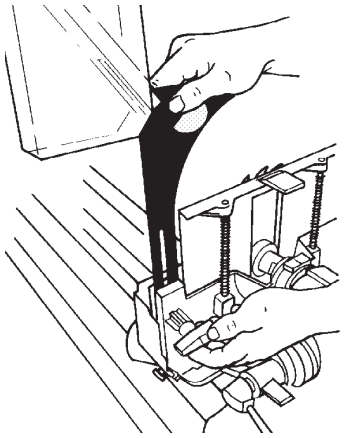


Figure C-66

83. Make sure the riving knife is fully seated between the guard and the lock plate, as in Figure C-67. The curved portion of the riving knife should be very close to the saw blade teeth (about 1/8"), as illustrated in Figure C-68. Tighten the guard lock knob (210). Look to see if the riving knife is centered with the saw blade, as shown in Figure C-69.

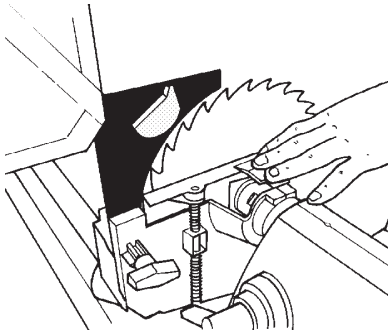


Figure C-67

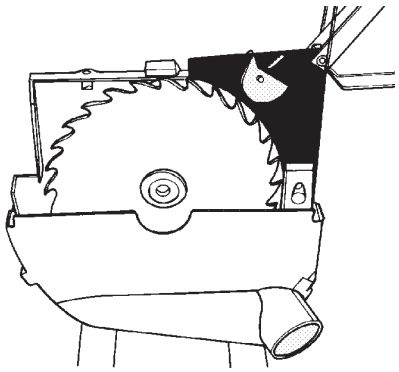


Figure C-68

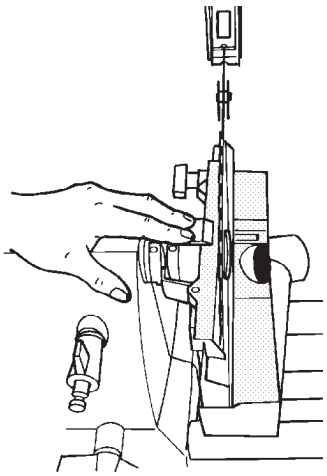


Figure C-69

84. If the riving knife is not centered with the saw blade, follow these steps:

a. Notice which way the riving knife is not centered with the saw blade.

b. Unclamp and remove the upper saw guard, then remove the saw blade and lower saw guard.

c. Use a 5/32" Allen wrench to adjust the stop screw (211) located below the lower saw guard's collar, as shown in Figure C-70.

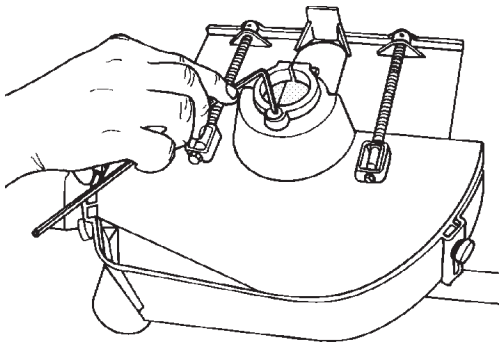


Figure C-70

• If the riving knife is to the **left** of the saw blade, back out the stop screw (counterclockwise).

• If the riving knife is to the **right** of the saw blade, screw in the stop screw (clockwise).

d. Re-install the saw blade, lower saw guard and riving knife, according to Steps 88 through 92. If the riving knife is still not centered on the saw blade, repeat this Step 93.

ALIGN THE LATHE CENTERS

85. Remove the saw guards and the saw blade, then loosen the carriage and headstock locks. Move the headstock and carriage all the way to the right and lock them in place.

86. Mount the drill chuck on the spindle, as shown in Figure C-71. Completely close the chuck jaws, as in Figure C-72.

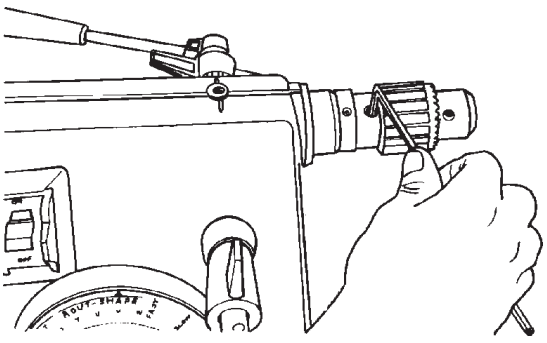


Figure C-71

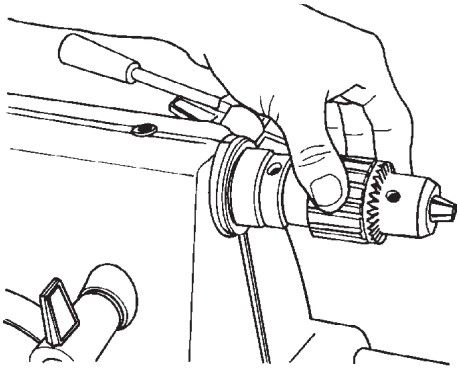


Figure C-72

87. Mount the cup center into the tailstock's adjustable center, as seen in Figure C-73, then mount the tailstock into the base mount (right side). Tighten the mount lock.

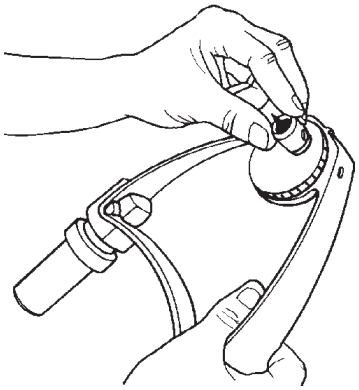


Figure C-73

88. Loosen the quill lock. Extend the quill (seen in Figure C-74), so the drill chuck almost touches the cup center point and the center point could fit into the chuck jaws.

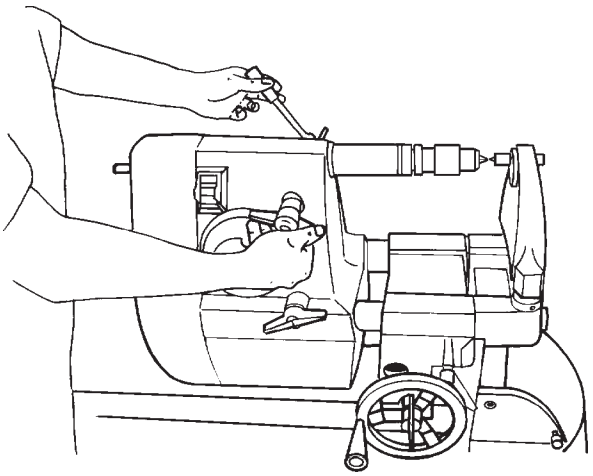


Figure C-74

89. If the center point does not "fit" into the chuck jaws, determine whether you need to adjust the cup center point horizontally and/or vertically. Then do the following:

a. To adjust the cup center point **horizontally**, loosen the set screw that locks the adjustable center, see Figure C-75. Rotate the adjustable center as needed to line up the cup center with the drill chuck, then tighten the set screw.

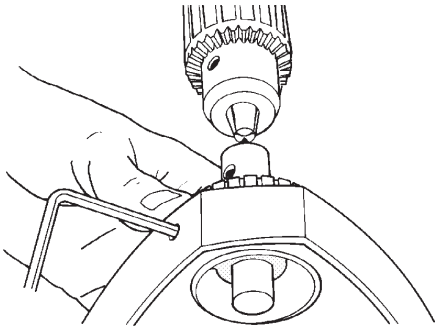


Figure C-75

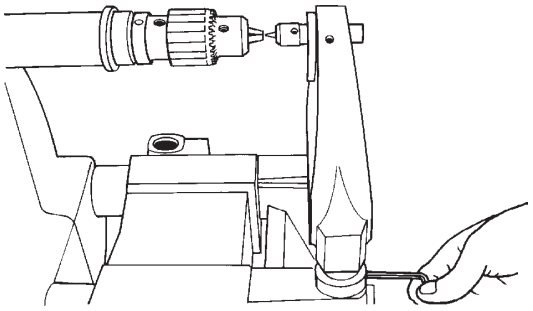


Figure C-76

b. To adjust the cup center point **vertically**, loosen the mount lock, then loosen the tailstock stop collars. Raise or lower the tailstock in the base mount until the cup center point vertically lines up with the drill chuck, then tighten the mount lock. Press the stop collars down firmly against the base mount and tighten the collar set screws, as shown in Figure C-76.

NOTES

Mode Setups

The Mark 7 Model converts to seven modes–table saw, disc sander, drill press, horizontal boring, lathe, over-table router and under-table shaper.

NOTE

These Mode Setup procedures assume that there is nothing mounted to any spindle and all alignments and adjustments have been completed.

One of the most useful features about the Mark 7 is that you can "borrow" angles and setups from one mode to the other. This greatly improves the accuracy of your woodworking.

To "borrow" a setup, don't break down the machine completely as you change from mode to mode. For example, if you need to cut a miter, sand it smooth, and then bore for dowels, keep the table and the miter gauge in the same position as you move from table sawing to disc sanding to horizontal boring. This will ensure that your stock is cut, sanded, and bored precisely the same. It also saves you setup time.

As you change from one mode to another, keep these four safety rules in mind:

1. **Turn off and unplug the Mark 7 before you break down one mode and set up another.** It is dangerous for you to start accessories at a speed higher than recommended by the built-in speed chart. Be sure to consult speed chart before beginning and operation.

2. **Make sure that accessories are properly mounted on the main spindle.** The flat on the main spindle is ground with a "reverse taper" to keep accessories secured.

   a. To properly mount an accessory, push it onto the main spindle **all the way**. Then use a 5/32" Allen wrench to tighten the setscrew against the flat of the spindle. (See Figure C-77.) To make sure the accessory is securely mounted, rock the accessory back and forth slightly as you tighten the setscrew and then again after it is tight, while keeping the spindle from turning. If the accessory seems to loosen, tighten the setscrew again until you've removed any "play."

3. Check all locks before turning on the machine. To properly secure a lock, spin it until it stops, then tighten it an extra 1/4 turn.

CAUTION

Be careful not to overtighten locks. Overtightening locks may damage the way tubes, table support tubes, or other parts of the machine.

To be sure all locks are as they should be, make a five-point check before you turn on the Mark 7. With a clockwise sweep of your hand, check each of these locks in succession: table tilt lock, carriage lock, table height lock, headstock lock, and quill lock. See Figure C-78. The carriage lock handle must be secured in the horizontal position. The quill lock should be loose in the drilling and boring modes, and for some sanding operations. In the lathe mode, this procedure becomes a four-point check, since the table has been removed.

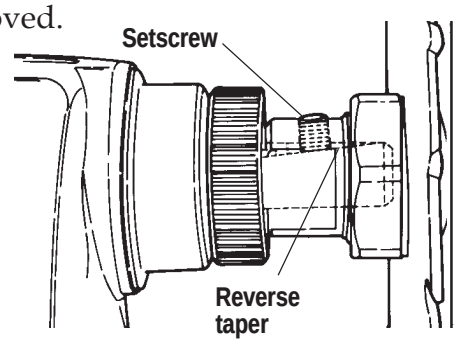


Figure C-77

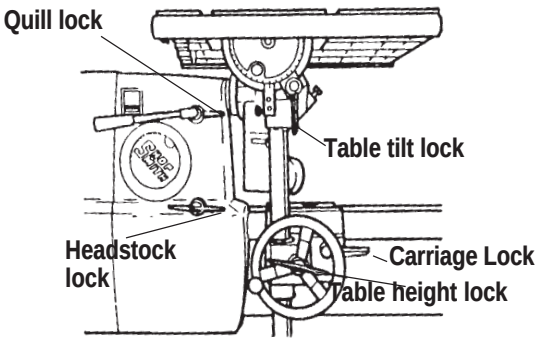


Figure C-78

When changing from a horizontal to a vertical position, secure the base lock. When changing from vertical to horizontal, secure the power mount and base mount knobs. If you're mounting accessories in the power mount or base mount, secure the mount locks.

4. **After you power on the Mark 7, but before you begin working, set the correct speed for the operations.** This is important! It's unsafe to run the lathe at table sawing speeds, and time-consuming to run the table saw at lathe speeds. To find the proper speeds, refer to the "Speed Charts" in the Operations section.

The worktable and other accessories are often used in more than one mode:

Worktable

1. When you change modes, you will spend most of your time rearranging the worktable.

   a. To change the height of the worktable, simply loosen the table height lock and turn the table height crank. Retighten table height lock.

   b. To change the table tilt, loosen the table tilt lock and tilt the table to the right or left. The table tilt mechanism has positive stops to help you quickly adjust the table to 0°, 45° right and 90° left. To use the 0° stop, loosen the tilt lock, push in the table stop pin on the front left of the front trunnion and tilt the table until the stop pin hits the stop. To use the 45° right and 90° left stops, loosen the tilt lock and tilt the table to 45° right or 90° left.

   c. To determine the table tilt angle, use the trunnion and the vernier scale. If the desired angle is divisible by 5, align the angle on the trunnion with 0° on the scale. To set an angle that is not divisible by 5, first find the nearest angle that is divisible by 5 and is smaller than the desired angle. For example, if you want to tilt the table to 17°, the nearest angle that is smaller than 17° but divisible by 5 is 15°. Next, subtract the smaller angle from the desired angle, 15° – 17° = 2°. Tilt the table so that the 15° mark on the trunnion goes 2° past the 0° mark on the scale. See Figure C-79.

   d. To dismount the worktable, raise the table above the blade and slide the carriage to the right. Tilt the table 90° left and lock. Loosen the table height lock and pull the table straight up. See Figure C-80.

   e. To remount the worktable, loosen the table height lock and place the support tubes in the carriage. For most operations, the trunnion (see figure C-79 should be facing the front of the Mark 7. For under-table operations such as the shaper, the trunnion should be facing the back of the Mark 7. Gently rock the table front-to-back until the racks engage the pinions and the tubes drop smoothly into the holes. Sometimes it helps to slowly turn the table height crank clockwise while you

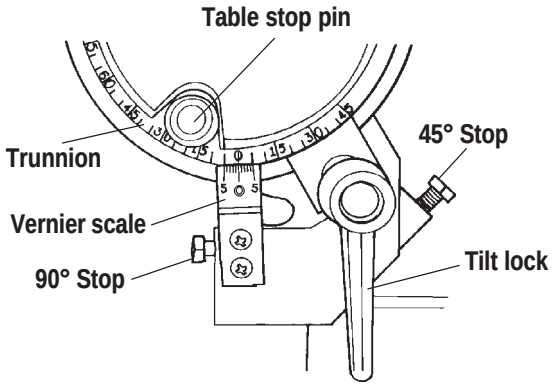


Figure C-79

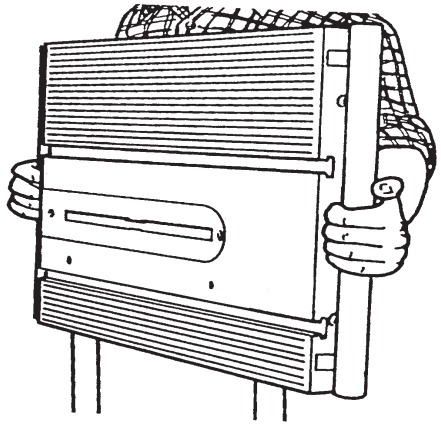


Figure C-80

rock the table. This will position the support tubes at exactly the same height and get the racks started properly in the pinions. Lower the table, loosen the tilt lock, set the desired position and secure the tilt lock.

f. To change the worktable, for under-table operations, such as the shaper, dismount the worktable as described in paragraph d. Turn the worktable 1800 and remount the worktable as described in paragraph e.

Accessories

The miter gauge, rip fence and extension table are designed to be used in more than one mode.

Miter Gauge

1. The miter gauge mounts in the worktable slots. The face of the miter gauge angles from 30° right to 30° left (a 120° swing) and has three positive stops— 90°, 45° right, and 45° left. To use the stops, loosen the lock knob, push in the plunger and turn the miter gauge until the stop hits the plunger. See Figure C-81.

2. When the miter gauge is in the desired position, spin the knob tight and insert the long 5/32" Allen wrench in one of the holes in the knob to tighten it an extra 1/4 turn. See Figure C-82

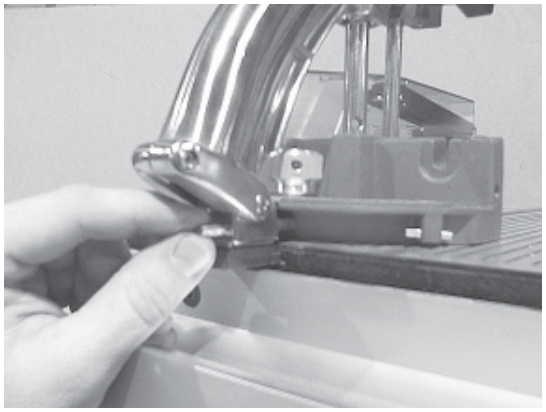


Figure C-81

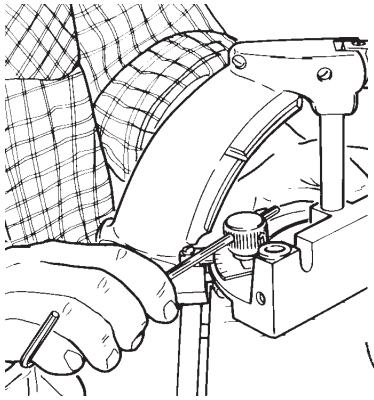


Figure C-82

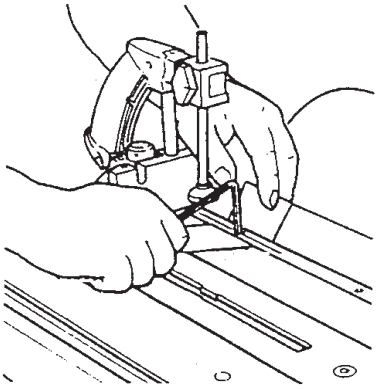


Figure C-83

3. The miter gauge slides or locks in the slots. To lock the miter gauge bar in the slot, put a piece of paper under the bar and mount the bar in a slot. Then turn the tapered screw located in the middle of the bar clockwise until the miter gauge is secure in the slot, see Figure C-83.

4. The miter gauge has a special safety grip and quick clamp that helps hold stock securely in the miter gauge. The quick clamp can be adjusted to accommodate any size stock up to 4-1/4" thick simply by loosening the knob and raising or lowering the rod and shoe assembly. If you need to perform an operation where the quick clamp would be in the way, you can remove it by loosening the setscrew at the top, near the back of the arm. As shown in Figure C-85.

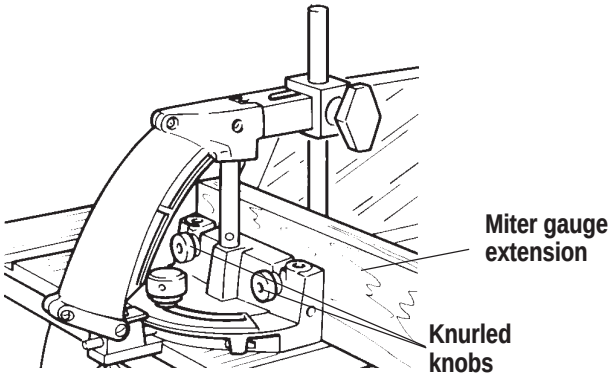


Figure C-85

5. The miter gauge has two slots, so that you can attach a miter gauge extension. As shown in Figure C-84.

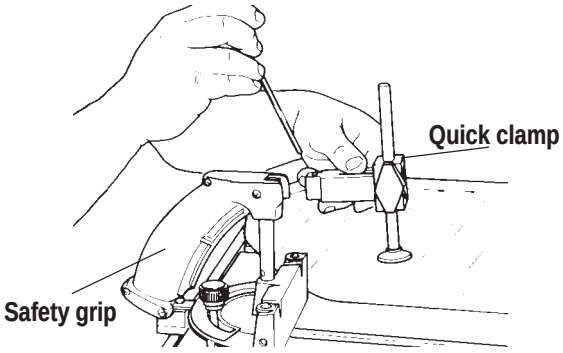


Figure C-84

Rip Fence

1. As you lock the lower handle on the rip fence's base assembly, the infeed clamp pulls the fence so that its base rests flush against the table rails (extrusions) and is automatically aligned to the blade or disc. The upper handle locks the fence to the outfeed table rails (extrusions).

2. There are t-tracks on the side and top of the fence so that you can mount auxiliary fences or special jigs. The slot in the top also mounts the mortising hold down.

Extension Table

1. The extension table mounts in the base and power mounts (the left and right sides of the headstock). If you frequently perform operations where you need support on both ends of the Mark 7, you can order an additional extension table or use the telescopic legs and connector tubes.

2. To adjust the height of the extension table, first be sure the worktable height is set properly. Then lay a long, straight board across both tables. Raise or lower the extension table to where the board rests flush against both tables. For alignment instructions, see Alignment in this section.

Setting Up the Table Saw Mode

1. Turn off and unplug the Mark 7.

2. Position the headstock so that you can reach the main spindle. Tighten the quill lock.

3. Mount the lower saw guard on the quill so that the stop screw below the collar butts against the stop collar on the quill. Align the ridge on the headstock with the slot in the collar. Tighten the screw on the collar. See Figure C-85. Loosen the two knobs and slide the guard cover to the right.

4. Mount the saw blade on the arbor. Remove

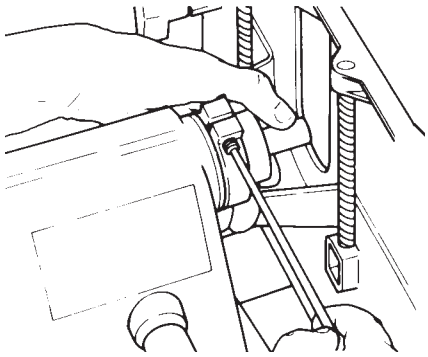


Figure C-85

the arbor nut by turning it clockwise. Hold the arbor with the threaded part pointing to the left. Mount the blade with the teeth pointing toward you. Replace the nut and finger tighten.

5. Place the blade and arbor on your workbench with the nut pointing up. Hold the arbor with an adjustable wrench and tighten the arbor nut with the arbor wrench. Also see Step 17 on page C-8 in this section.

6. Mount the saw blade on the main spindle. Tighten the setscrew against the flat of the spindle. Slide the guard cover in toward the blade.

CAUTION

Always move the guard cover in toward the blade before lowering the worktable. Otherwise, you will damage the guard.

7. Raise the worktable as high as it will go. Slide the carriage toward the headstock until it butts against the rubber spacer. Lower the worktable so that the blade protrudes 1/4" higher than the thickness of the stock. The blade should be centered in the table insert. Secure the table height and carriage locks.

8. Install the upper saw guard. Grasp the top of the riving knife, with the guard up, and slide the guard through the table insert into the lower saw guard. See Figure C-86. Tighten the guard lock knob.

WARNING

When the riving knife is properly installed, it will be 1/8" from the saw blade. If the clearance is greater than 1/8", the riving knife needs to be checked. It should not be binding against the back of the table insert.

Also, always secure the guard lock knob even when the upper saw guard is not being used.

9. Check all locks. The table tilt lock, carriage lock, table height lock, headstock lock and quill lock should all be securely tightened.

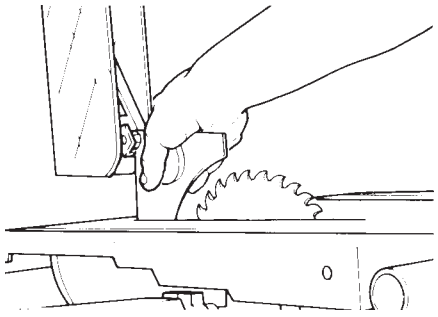


Figure C-86

Setting Up the Disc Sander Mode

1. Turn off and unplug the Mark 7.

2. Mount the sandpaper on the sanding disc. If you are mounting sandpaper for the first time, clean the disc with denatured alcohol and a clean rag to remove the protective oil. Otherwise the sandpaper will not stick. Press the sandpaper firmly on the disc and smooth it from the center toward the edge.

NOTE

To remove worn-out paper, peel it off the disc. Then clean the disc with denatured alcohol. To make it easier to remove the sandpaper, heat the sanding disc in an oven at a maximum temperature of 150° (in a conventional oven).

3. Position the headstock so that you can reach the main spindle.

4. Mount the lower saw guard on the main spindle and open it up by loosening the cover lock knobs and sliding the cover to the right. Tighten the guard lock knob.

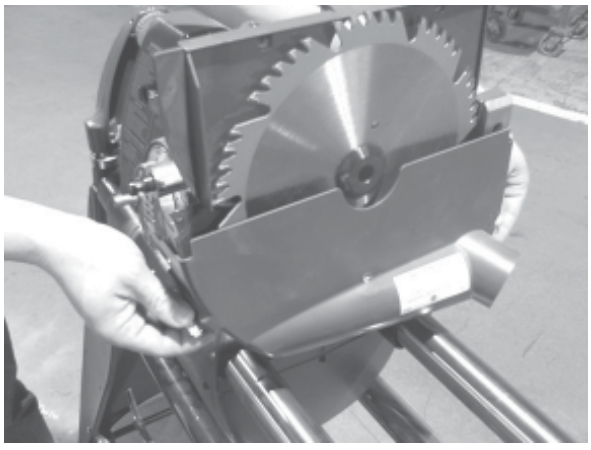


Figure C-87

5. Mount the sanding disc all the way onto the main spindle. Tighten the setscrew against the flat of the spindle. Move the guard cover towards the disc until it is 1" away. Tighten the two knobs. See Figure C-87

6. On the work table, install the disc sander table insert (555116).

7. Position the table 1/16" away from the disc 1/2" away if you are going to use the quill feed. Adjust the table height so that the table surface is slightly above the center of the disc.

--For angle sanding, raise the table above the disc and slide the table to the left until the disc aligns with the table slot. Loosen the cover lock knobs and slide the guard cover toward the disc as far as possible. Lower the table over the disc. Tilt the table to the desired angle while extending the quill. Slide the guard cover to the right until it hits the tie bar. Secure the lock knobs.

8. Check all locks. The table tilt lock, carriage lock, table height lock, headstock lock and quill lock (if not used) should be securely tightened.

WARNING

Do not attempt to move the headstock when the machine is in the vertical position; the headstock could fall on you.

Setting Up the Vertical Drill Press Mode

1. Turn off and unplug the Mark 7.

2. Position the headstock 10" away from the power mount (left side), and the carriage 20" away from the base mount. Tighten the headstock and carriage locks. **DO NOT OVER TIGHTEN.**

3. Position the worktable surface just above the top of the headstock. Tighten the table height lock. Then loosen the tilt lock and tilt the table to the left 90°. Tighten the tilt lock.

5. Mount the drill chuck all the way onto the main spindle. Tighten the setscrew against the flat of the spindle.

6. Loosen the power base mount lock. Grasp the way tubes with both hands, closest to the power base mount, then raise the machine into the vertical position. Tighten the base lock, rock the way tubes side-to-side. Re-tighten if possible. This helps to take the play out of the base pivot and keeps the Mark 7 from wobbling.

NOTE

The base lock does not fit dead center in the hole, but off to one side, as shown in FigureC-88.

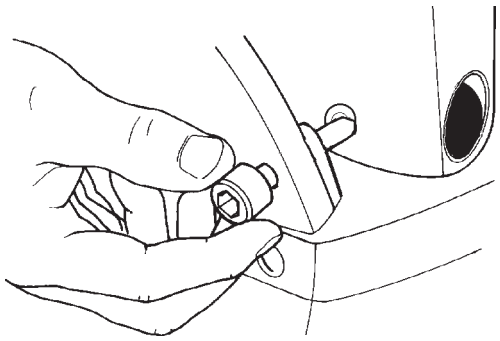


Figure C-88

7. Move the quill feed handle to the back of the headstock if you desire.

8. Mount a drill bit in the chuck and tighten with the chuck key.

9. Mount drill guard on quill and tighten.

WARNING

Never leave the key in the chuck. Remove the key immediately after securing the bit.

Also, do not attempt to move the headstock when the machine is in the vertical position; the headstock could fall on you.

9. Check all locks. The table tilt, carriage, table height, headstock and quill (if not used) locks should be secure.

Setting Up the Horizontal Boring Mode

1. Turn off and unplug the Mark 7.

2. Position the headstock so that you can reach the main spindle.

3. Mount the drill chuck all the way onto the main spindle. Tighten the setscrew against the flat of the spindle.

4. Position the worktable edge 4" away from the drill chuck. Adjust the table height so that the table is below the drill chuck.

5. Mount a drill bit in the chuck and tighten with the chuck key.

6. Mount drill guard onto quill and tighten setscrew.

WARNING

Never leave the key in the chuck. Remove the key immediately after securing the bit.

7. Check all locks. The table tilt lock, carriage lock, table height lock, headstock lock, and quill lock (if not used) should all be securely tightened.

Setting Up the Lathe Mode

1. Turn off and unplug the Mark 7.

2. Dismount the worktable. Tilt the table to the left 90° and lock it. Loosen the table height lock and pull the table straight up.

3. Position the headstock so that you can reach the main spindle.

4. Mount the tool rest in the carriage so the rack engages the pinion.

5. Mount the drive center all the way onto the main spindle. Tighten the setscrew against the flat of the spindle.

6. Mount the tailstock in the base mount (right side) and tighten the power mount (left side) lock.

NOTE

When you get ready to break down the lathe mode, you will probably find the cup center is "stuck" in the tailstock. If this is the case:

a. Remove the tailstock from the machine.

b. Lay it over the edge of a workbench so the eccentric mount is supported by the table and the center is hanging free.

c. Tap the back side of the center with a nylon or rawhide mallet to pop it loose. Do not use a metal hammer. Hold the center with your free hand so the center does not fall to the floor. Be careful of the sharp point in the center pin.

7. Mount the cup center in the tailstock with the point toward the headstock.

8. Check all locks. The carriage lock, table height lock, headstock lock, and quill lock should all be securely tightened.

Setting Up the Over-Table Router Mode

1. Turn off and unplug Mark 7.

2. Move the Headstock approximately 18" from the Power Base Mount on the left hand side of the machine.

3. If using dust collection with router operation, follow instructions a-e below. Otherwise, move on to instruction f.

   a. Position the worktable surface just above the top of the Headstock. Tighten the table height lock.

   b. Move the carriage at least 10" away from the headstock.

   c. Loosen the tilt lock under the worktable and tilt the table to the left 90^0. Tighten the tilt lock.

   d. Using your 5/32" Allen wrench, remove the Tie Bar Guard (155) that is attached to the Tie Bar underneath the worktable.

e. Loosen the tilt lock and return the worktable back to the horizontal position. Secure the tilt lock.

f. If the dust collection chute is not attached to the bottom of the Shaper/ Router Table Insert, attach at this time.

WARNING

When returning from the Router mode to the other operations using the worktable, be sure to replace the Tie Bar Guard to the Tie Bar located under the Worktable.

4. Using your 5/32" Allen wrench, remove the Saw Table Insert (138) and replace it with the Shaper/Router Table Insert (see figure C-89).

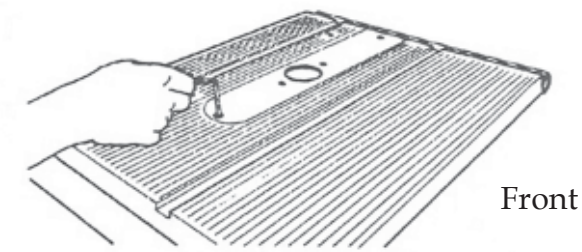


Figure C-89

5. If the Shaper Starter Pins are attached to the Shaper/Router Insert, remove using a flathead screwdriver.

NOTE

If using the Over-Table Router mode for decorative cuts, leave the Shaper Starter Pins in place.

6. Loosen the tilt lock under the worktable and tilt the table to the left 90^0. Tighten the tilt lock.

7. Mount the Router Chuck Arbor (514631) on the main spindle. Tighten the setscrew against the flat of the spindle.

NOTE

There are three setscrews on the Router Chuck Arbor. The one on the far left is used to secure the arbor on the main spindle.

8. Check and secure if necessary, the headstock lock, the carriage lock the table height lock and the worktable tilt lock.

9. Loosen the locking knob on the power base mount on the left hand side of the way tubes. Grasp the way tubes with both hands close to the power base mount, then raise the machine into the vertical position. Tighten the base lock on the front side of the Mark 7, then rock the way tubes side-to-side. Retighten if possible. This helps take the play out of the base pivot and keeps the Mark 7 from wobbling.

10. Insert a Router Bit into the Router Chuck Arbor tighten both set screws.

11. Loosen the quill feed lock and the table height lock. With one hand, turn the quill feed to lower the router chuck arbor down to the hole in the shaper/router table insert. At the same time, with the other hand, move the worktable in and out by turning the table height crank. Adjust the worktable so that the router chuck arbor is centered in the shaper/router table insert. When centered, secure the table height lock.

12. Mount the Router Shield on the quill so the collar on the Router Shield butts up against the stop collar on the quill. Tighten the setscrew on the collar of the guard to secure in place.

13. Attach the rip fence to the worktable on the side closest to the way tubes (behind the router bit). Position the rip fence so that the workpiece will be in alignment with the desired cutting path of the router bit.

NOTE

The worktable can be moved in or out for fine adjustment of the cutting path by turning the table height crank. Be sure to keep the router bit within the hole of the shaper/router insert if cutting on the worktable side edge of the workpiece.

14. Lower the Router Bit by turning the quill feed to the desired depth-of-cut. Secure the quill feed at the position using the quill lock.

15. Loosen the wing nut on the front of the Router Shield and lower the shield so that the bottom on the shield is approximately

1/8" above the workpiece. Secure the wing nut. Loosen the wing nuts on both sides of the shield and lower the brush assembly so that it is about 1/8" above the workpiece or worktable/fence, whichever is appropriate.

16. If using the quill feed as a plunge router, set the Feed Stop gauge (34) at 0 and secure the stop handle. Remember that the desired depth-of-cut was set and secured in step 14. Loosen the quill feed lock. The quill feed should now plunge to the desired depth-of-cut.

WARNING

Be sure to use a Featherboard to hold the workpiece against the rip fence while using as a plunge router.

Setting Up the Under-Table Shaper Mode

1. Turn off and unplug the Mark 7.

2. Using your 5/32" Allen wrench, remove the Saw Table Insert (138) and replace it with the Shaper/Router Table Insert (see figure C-89).

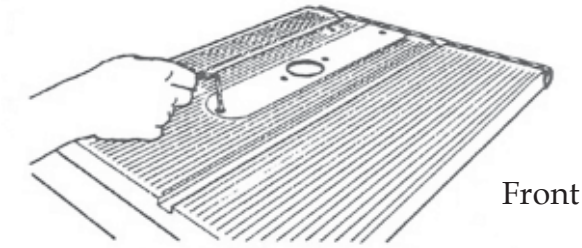


Figure C-89

NOTE

If dust collection chute is attached to the bottom of the Shaper/Router Insert, remove prior attaching the insert to the worktable.

3. Screw the Shaper Guide Pins into the Shaper/Router Table insert. Tighten slightly with a flat-head screw driver.

4. Slide the Headstock all the way to the left on the way tubes so that the Headstock is up against the Power Base Mount. Tighten the headstock lock.

5. Mount the Shaper Arbor (555117) on the main spindle. Tighten the setscrew against the flat of the spindle.

6. Position the worktable surface just above the top of the Headstock. Tighten the table height lock. Then loosen the tilt lock and tilt the table to the left 90°. Tighten the tilt lock.

7. Using your 5/32" Allen wrench, remove the Tie Bar Guard (155) that is attached to the Tie Bar underneath the worktable.

8. Dismount the worktable by loosening the table height lock and pulling the worktable straight up, as shown in figure C-90.

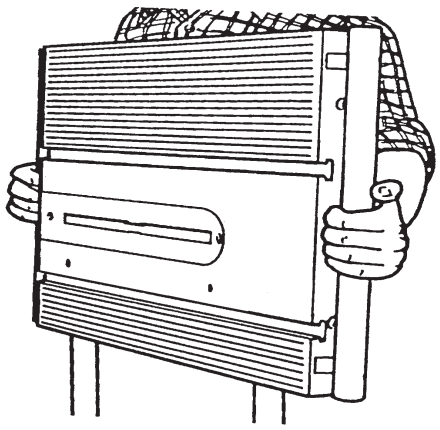


Figure C-90

9. Turn the worktable 180° so that the surface of the worktable faces the opposite direction and remount into the carriage. To remount the worktable, loosen the table height lock and place the support tubes in the carriage. Gently rock the worktable front-to-back until the racks engage the pinions and the tubes drop smoothly into the holes. Sometimes it helps to slowly turn the table height crank clockwise while you rock the table. This will position the support tubes at exactly the same height and get the racks started properly in the pinions. Lower the table all the way in and tighten the table height lock.

10. Slide the carriage toward the headstock until it butts up against the rubber spacer next to the headstock. Secure the carriage lock.

11. Check and secure if necessary, the headstock lock, the carriage lock, the table height lock and the worktable tilt lock.

12. Loosen the locking knob on the base mount on the right hand side of the way tubes (xxx). Grasp the way tubes with both hands close to the base mount, then raise the machine into the vertical position. Tighten the base lock on the back side of the Mark 7, then rock the way tubes side-to-side. Retighten if possible. This helps take the play out of the base pivot and keeps the Mark 7 from wobbling.

13. Loosen the quill feed lock and the table height lock. With one hand, turn the quill feed to raise the shaper arbor up through the hole in the shaper/router table insert. At the same time, with the other hand, move the worktable in and out by turning the table height crank. Adjust the worktable so that the shaper arbor is centered in the shaper/router table insert. When centered, secure the table height lock and secure the quill lock (with the quill extended so that the shaper arbor is above the worktable.

14. Using a 11/16" wrench, remove the hex nut and rub collars on the end of the shaper arbor. First place a rub collar back on the arbor. Then put the cutter on the arbor. Make sure to position the cutter with the cutting edge facing the direction appropriate for the direction the work piece will be fed into the cutter. See the instructions on page A-12 for rotation information.

15. Install another rub collar onto the arbor. Then place the tongue washer on the arbor with its "tongue" in the arbor's slot. Finally, thread the hex back on the arbor as shown in figure C-91.

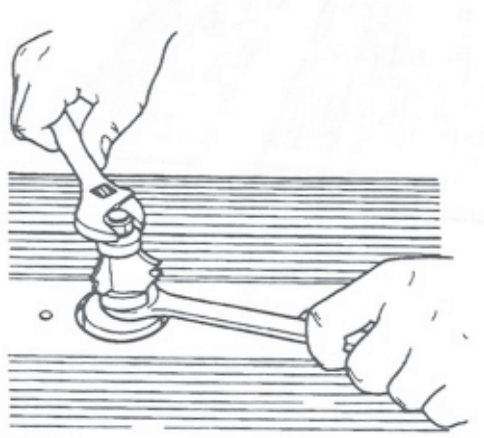


Figure C-91

WARNING

Always use a rub collar under all shaper cutters. Also, be sure the tongue washer is correctly installed and directly under the top hex nut, and that the nut is tight.

16. Adjust the height of the cutter to the desired profile by loosening the quill feed lock and rotating the quill feed handle. Be sure to secure the quill feed lock when completed.

17. Attach the Shaper Guard Assembly to the worktable by sliding the T-Nut attached to the post into the T-Slot (Miter Gauge slot) on the worktable closest to the carriage. The T-Nut should be slid in from the outfeed side of the cutter/worktable and positioned so that the guard shield fits over both pins on the Shaper Table Insert. Lower the guard shield so that the bottom is 1/8th inch above the workpiece. Lower the Brush Assembly so that is 1/8th inch above either the workpiece or the worktable, whichever is appropriate.

18. To add dust collection, attach a 2½ inch hose to the top of the shaper guard assembly.

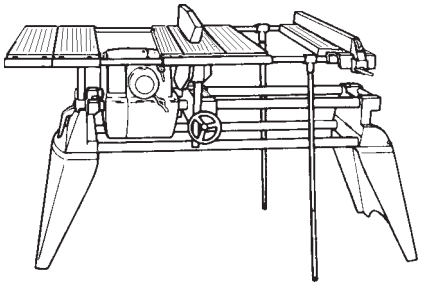
WARNING

When returning from the Shaper mode to other operations using the worktable, be sure to replace the Tie Bar Guard to the Tie Bar located under the Worktable.

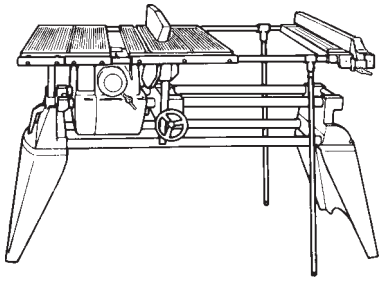
Optional Setups with Floating Extension Tables, Connector Tubes and Telescoping Legs

The following illustrations are examples of various setups, using both standard and optional floating extension tables, connector tubes and telescoping legs. You should consider these setups for efficiency, ease of use, and safety.

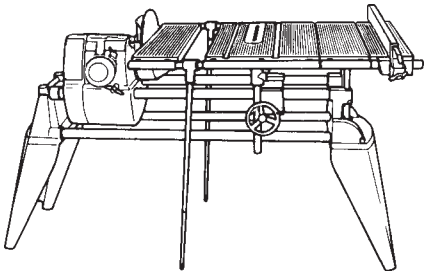
The standard extension table kit with the Model 520 – one floating extension table, two connector tubes and two telescoping legs. Safety, setup and other information is found in the instructions packed with the extension table kit.



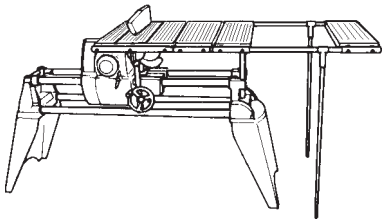
2 Floating Tables
4 Connector Tubes
2 Telescoping Legs



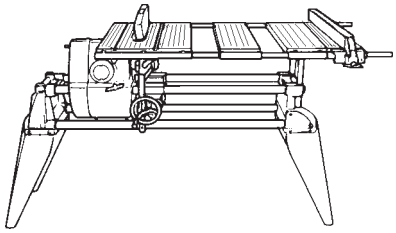
2 Floating Tables
4 Connector Tubes
2 Telescoping Legs



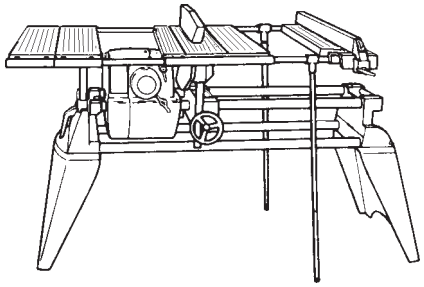
2 Floating Tables
4 Connector Tubes
2 Telescoping Legs



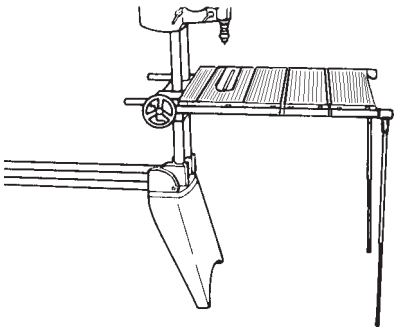
2 Floating Tables
4 Connector Tubes
2 Telescoping Legs



2 Floating Tables
4 Connector Tubes



2 Floating Tables
4 Connector Tubes
2 Telescoping Legs



2 Floating Tables
2 Connector Tubes
2 Telescoping Legs

Table of Contents

Shopsmith PowerPro® Headstock Operations (Use Instructions)

Operating your new *Shopsmith PowerPro*® Headstock

Your new ***Shopsmith PowerPro®*** Headstock features a touch pad control panel that is simple to understand and easy to use. From the moment you first turn your new PowerPro Headstock on, to the moment you turn it off, you will quickly discover that its intuitive design will become second nature to you.

CAUTION

NEVER depress the Control Panel keypads with a sharp object such as a pencil, pen, or <u>even</u> a <u>finger-nail</u>, as doing so will damage the keypads and void the Warranty. Use only the soft PAD of your finger or thumb to depress the keypads.

A review of the keypads and their functions:

The ON Pad is used to start the DVR Motor in your PowerPro Headstock.

<u>NOTE</u>

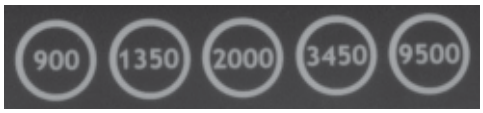
The PowerPro keypad will not be activated until your machine's Main Power Switch is flipped to the ON position.

The OFF Pad is used to stop the Motor in your PowerPro Headstock.

<u>NOTE</u>

The OFF Pad also serves as a Reset when you wish to exit the Speed Chart function or erase error messages.

PRESET SPEED PADS



The Preset Speed Pads are used with the motor turned off. Use these pads to move quickly to a base speed for the general woodworking operations listed below.

900 RPM Drilling & Turning

1350 RPM Disc Sanding, Strip Sanding & Belt Sanding

2000 RPM Scroll Sawing

NOTE: Must then press **CONFIRM** to start.

3450 RPM Sawing & Jointing

NOTE: Must then press **CONFIRM** to start.

9500 RPM Routing & Shaping

NOTE: Must then press **CONFIRM** to start.

UP RPM is used to increase the speed in as little as 1 RPM increments. Holding the pad down will increase the motor speed throughout its full speed range. Increases may be made either before the motor is started or after it is running.

DOWN RPM is used to decrease the speed in as little as 1 RPM increments. Holding the pad down will decrease the motor speed throughout its full speed range. Decreases may be made either before the motor is started or after it is running.

UP/DOWN RPM is also used in the speed chart mode to scroll between operation choices.

FWD / REV is used with the motor turned off. Use this pad to change the rotational direction of the spindle from Forward (main spindle turning toward you) to Reverse (main spindle turning away from you) and back again. The direction of rotation, either Forward or Reverse will always be shown on the Control Panel screen.

NOTE

You will have to press Confirm every time you select Reverse. FWD / REV is also used to move back to previous levels within the Speed Chart.

CONFIRM is used when prompted to do so on the Control Panel screen.

NOTE

You will press CONFIRM for any speed above 1500 RPM.

You will press CONFIRM to start the motor in reverse each time you use it.

You will press CONFIRM after selecting chart each time you move to the next level in the Speed Chart.

You will press CONFIRM to set or unset the lockout code.

CHART is used to access the internal Speed Chart in the Control Panel. Use the speed chart to find and set the correct speed for a specific operation and tool.

NOTE

The Chart function must be used when the motor is off

- Press the CHART Pad to activate. Press the CONFIRM Pad to select a setting.
- Use the UP RPM or DOWN RPM Pads to scroll through the various operations or machines – then press CONFIRM to make the selection.
- Use the UP RPM or DOWN RPM Pads to scroll through the listing of diameters for available bits, cutters, blades or turning stock. The FWD / REV Pad can be used to return to a previous level. Then press CONFIRM to select an option.
- Use the UP RPM or DOWN RPM Pads to scroll through the listing of material choices. The FWD / REV Pad can be used to return to a previous level. Then press CONFIRM to select an option.
- Use the UP RPM or DOWN RPM Pads to scroll through the listing of recommended bits, cutters and blades for the above material choice. The FWD / REV Pad can be used to return to a previous level. Then press CONFIRM to select an option.
- When you have made your final selection, the selected speed and direction will appear, along with Ready to Run, on the Control Panel display.
- At this point, press ON to start the machine at the displayed speed.
- If the displayed speed exceeds 1500 RPM, you will be asked to press CONFIRM and the machine will start.
- If Reverse direction is to be used for the operation, you will be asked to CONFIRM and the machine will start.

LOCK is used to secure the Machine from unauthorized use. Once locked, you will need to enter a four-digit password to unlock and use your machine.

- Your machine comes to you, pre-programmed with an unlocked code ("0000").
- If you have no reason to LOCK your machine, you do not need to do anything with the LOCK feature. However, if you wish to use the LOCK feature, you will need follow the instructions listed below to set a new four digit password and then enter this password each time you turn on the Main Power Switch. The machine will not operate until the passwod is properly entered.
- Of course, you always have the option of turning off the LOCK feature at any time by simply returning the machine to the unlocked code ("0000"). You can do this at any time, as long as you remember the replacement password that you have set.

SETTING, ENTERING OR CHANGING A PASSWORD

Follow the steps outlined below whenever you wish to set a new password, enter a password to operate your machine, change a password or re-set the password to the default factory unlocked code.

- Press the LOCK pad and hold it while you press the 900 speed pad, then release both. You will see Enter Password New "0000" in the Control Panel display window. If you see System Locked at this point, you released the 900 speed pad before pressing LOCK, and you must press OFF to reset.

- Next, use the preset speed pads to enter your new password:

    - Press the 900 pad to select your chosen thousands digit.
    - Press the 1350 pad to select your chosen hundreds digit.
    - Press the 2000 pad to select your chosen tens digit.
    - Press the 3450 pad to select your chosen ones digit.

- The digits will change each time the speed pads are depressed. Continue pressing a speed pad until the desired digit is displayed, then stop pressing that pad. Repeat this process for each of the four speed pads until your desired four-digit password is displayed, then press the CONFIRM pad. You will see Saved on the control display, then Ready To Run.

- Turn off the Main Power Switch and your machine will be secured

- To use your machine once your new password has been set, turn on the Main Power Switch. You will see all of the normal warnings, then be asked to Enter Password "0000".

- At this point, use the preset speed pads to enter your password, just as you did to SET the password in the step above. The "0000" will change to the numbers you set. When you see the correct password in the display, press the CONFIRM pad.

- If the password that you entered is correct, you will see Accept momentarily, followed by Ready To Run. If the password you entered is incorrect, you will see Enter Password "0000" in the display window. Repeat the password entry process until the correct password is entered.

Using your new Shopsmith PowerPro® Headstock

Turn on the Main Power Switch. Your old On/Off switch is now the Main Power Switch. From this point on, you will use this Switch only to power-up or shut down the Machine electronics or to turn off the machine in an emergency.

- Each time you turn on the Main Power Switch, you will first see a quick series of warning messages, followed by 500 RPM, Ready To Run, indicating that the machine is ready to go.

- To power-down the machine, simply turn off the Main Power Switch. There will be a ten-second delay, during which nothing will seem to happen. If you should accidentally turn the Main Power Switch off during this period, you can turn it back on and continue to operate your PowerPro Headstock as if you had not turned off this switch.

- Once the control panel readout begins to blink, the machine is shutting down. When the panel goes dark, the machine will be completely shut down.

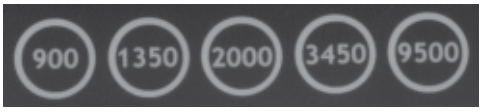
NOTE

If your PowerPro Headstock is operating and you loose power, your headstock will turn off. If you leave the main power switch on , when the power is returned the electronics will automatically come back on. However, the spindle will notturn on unless the ON pad is pushed.

Getting Started

Decide which woodworking operation you wish to perform and mount the appropriate accessories. Select one of the following:

1. Press the ON pad to start the machine at 500 RPM. Be sure that the item mounted on the machine is rated for 500 RPM or more. You may then increase or decrease your speed from this point by depressing either the UP RPM or DOWN RPM keypad.



2. With the headstock off, press one of the five Preset Speed Pads on the Control Panel. The display will then show the speed you selected and the words Ready to Run. Press the ON pad and off you go, *EXCEPT*:

2a. If you press one of the high speed Pads (over 1500 RPM), you will be required to press the CONFIRM Pad after you press the ON Pad. The machine WILL then start after you press CONFIRM.

2b. If you press the FWD / REV Pad to reverse the motor direction.

- You will be required to press the CONFIRM Pad after you press the ON Pad every time you start in reverse direction.

NOTE

After reversing the motor, each time you restart the machine, it will start again in reverse direction, until you press the FWD / REV pad again.

Once the Main Power Switch is turned off, the machine will re-set to Forward direction when powered-up.

When you choose a speed greater than 1500 RPM AND the reverse direction, you will be asked to press the CONFIRM Pad twice; Once for the high speed, and Once again for the reverse direction. The machine will start when you press the CONFIRM Pad the second time.

START-UP SAFETY CAUTIONS

Whenever you press the CONFIRM Pad, the machine will always start immediately at the speed you set and/ or in reverse direction. *BE PREPARED FOR THIS START-UP.*

REMEMBER...

- You always have the option of increasing or decreasing the 500 RPM start-up speed by depressing the UP RPM or DOWN RPM Pad, then the ON Pad to start at a different speed. If this speed exceeds 1500 RPM, you will also have to press the CONFIRM Pad before the machine will start and that it will start immediately, so *BE PREPARED FOR THIS START-UP.*

- You always have the option of

using the CHART Pad to access the internal Speed Chart for help in selecting the proper speed for a specific operation.

- You can set a speed, then press

the FWD / REV Pad to reverse the direction of the Motor. You will have to then press CONFIRM to start the Motor in reverse direction.

ONCE AGAIN...

Whenever you press the CONFIRM Pad, the

machine will always start immediately at the speed you set and/or in reverse direction. *BE PREPARED FOR THIS START-UP.*

NOTE

If you have further questions or need additional assistance, please contact Customer Service: Toll-free 1-800-762-7555. Or visit our website: www.shopsmith.com

NOTES

Table Sawing Operations

NOTE

The Speed Chart for the Mark 7 is programmed into the control panel of the PowerPro headstock. Refer to Page D-2 of this manual for operating instructions. If your operation is not listed in the speed chart, refer to the Manufacturer's recommendations.

Safety

WARNING

Before performing table sawing operations:

- Read and understand, and follow the SAFETY section, especially for the table saw mode.
- Complete ALL the Assembly and Alignment procedures.
- Set up the table saw mode according to the instructions found in your Mark 7 Model's Set-up and Alignment section.
- Secure locks.

Table Sawing Speeds

NOTE

The speeds designated on the speed charts are suggested speeds.

Before you begin any table saw operation, know the correct speed at which to set the speed dial. The correct speed is determined by the operation and the type of stock you're sawing. To determine the right speed for the job, refer to the chart programmed into the PowerPro Headstock.

Crosscutting

General Crosscutting

1. Place the miter gauge in the slot on the same side of the saw blade where you'll be standing. Position the miter gauge square to the blade.

2. Mark the board where you want to cut it. Set the stock against the protractor face. Adjust the stock so the blade cuts on the waste side of the line. Adjust the quick clamp to the thickness of the stock.

3. Set the stock against the miter gauge face, so that the blade cuts on the waste side of the line.

4. Squeeze the safety grip and turn on the Mark 7. Set to the correct speed, then guide the stock past the blade. Use your free hand to help keep the stock against the miter gauge face. See Figure D-1.

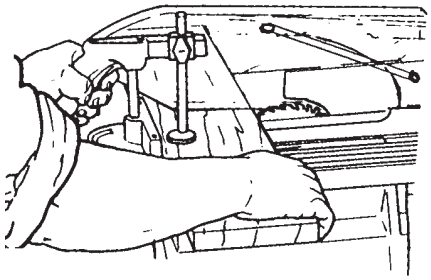


Figure D-1

NOTE

When crosscutting stock resulting in narrow scrap, move the blade close to the table insert on the scrap side of the blade. This will help keep small pieces of stock from falling through the insert.

5. Don't feed the stock any faster than the saw will cut. If the machine bogs down, slow your feed rate and let the saw get back up to running speed.

6. When you've finished the cut, turn off the On/Off Button on the control panel board and turn off the Mark 7. Let the blade come to a complete stop, then remove the stock from the miter gauge and brush away scraps.

WARNING

Always let the blade come to a complete stop before removing stock or scrap. Also, if you need to actually touch the blade, make sure the Mark 7 is turned off and unplugged.

Crosscutting Long Stock

7. Mount an extension table in the power or base mount located at either end of the Mark 7. Use a miter gauge extension to help keep the stock square to the blade. Start by cutting long stock in the middle. This gets it down to a manageable length. See Figure D- 2.

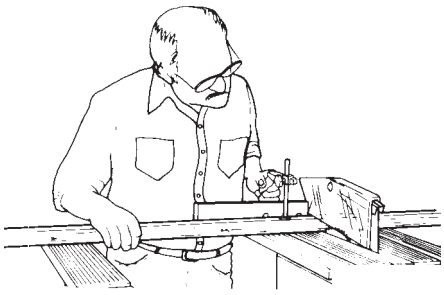


Figure D-2

Crosscutting Duplicate Lengths

8. To cut short lengths, use a miter gauge stop rod. See Figure D-3. Or clamp a stop block to a miter gauge extension. See Figure D-4.

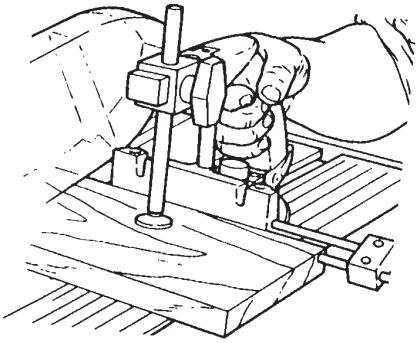


Figure D-3

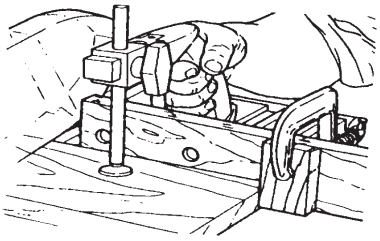


Figure D-4

9. To cut long lengths, mount the extension table on either side of the headstock, then mount the rip fence on the extension table. Clamp a stop block to the rip fence. Position the stop block ahead of the blade.

WARNING

Never use the rip fence for crosscutting unless you clamp a stop block to it. If the stock contacts the rip fence as it passes the saw blade, the stock will bind and be kicked back.

10. Move the headstock and carriage so that the saw blade is the proper distance from the stop block. Make fine adjustments with the quill feed. Then butt the stock against the stop block and clamp the stock with the safety grip. See Figure D-5.

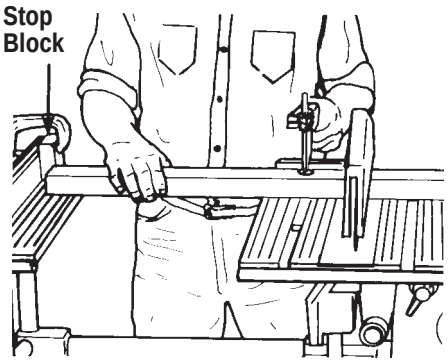


Figure D-5

Ripping

WARNING

When ripping, make sure the rip fence is parallel to the blade and that the edge of the stock against the fence is straight. Otherwise you're likely to get a kickback.

Also, never reach over or around the blade to catch your stock, even with the upper saw guard in place. A kickback can drag your hand back under the guard and into the blade.

General Ripping

1. Mount the rip fence to the worktable. Move the fence the desired distance away from the saw blade, then lock it. Use the quill feed to make fine adjustments. See Figure D-6.

NOTE

When properly aligned, the rip fence automatically sets itself parallel to the blade. However, on critical setups, it's wise to check this. Measure the distance from the rip fence to the tip of a saw tooth (that is set toward the fence) at both the front and back of the machine.

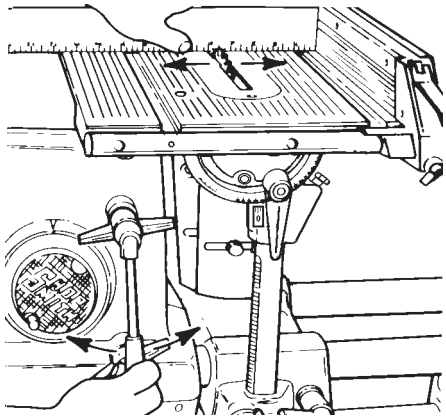


Figure D-6

2. Mount a feather board in front of the blade to help hold the stock against the fence.

WARNING

Always mount the feather board in front of the blade. Otherwise you could create a kickback.

3. Turn the machine on and set the correct speed. Feed the stock into the blade while keeping it pressed firmly against the fence. Use a push stick or push block to finish the cut. See Figure D-7.

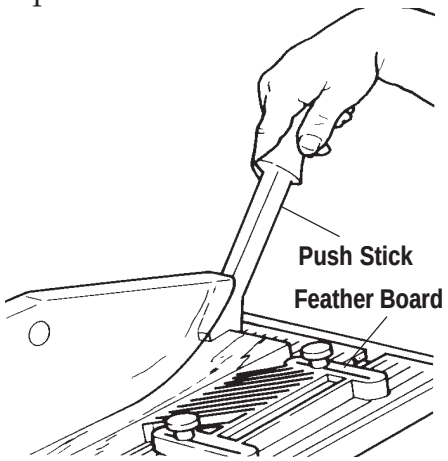


Figure D-7

Ripping Long Stock

4. Position roller stand(s) 1' to 4' out from the back and/or front of the table. Adjust the stand(s) so the stock rests flush on the table, then lock the roller stand(s). You can also use it as a support table. See Figure D-8.

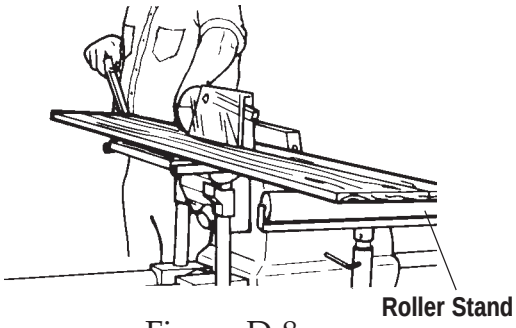


Figure D-8

Ripping Narrow Stock

5. When ripping stock less than 1-1/2" wide, use the fence straddler to finish the cut. See Figure D-9.

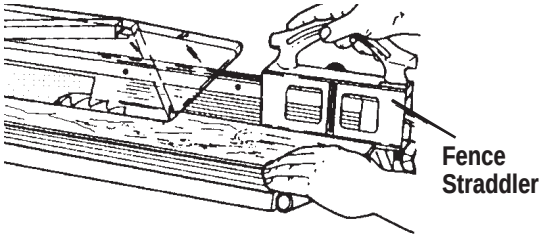


Figure D-9

WARNING

Always use a push stick or fence straddler when ripping narrow stock. Keep your fingers out of the danger zone.

6. When ripping extremely narrow stock, clamp a spacer (no higher than the thickness of the stock) to the side of the rip fence so that the fence doesn't interfere with the saw guard. Use a piece of narrow stock to complete the cut.

NOTE

When ripping narrow stock, move the blade close to the table insert on the side of the blade where the stock is being cut. This will help keep small pieces of stock from falling through the insert.

Ripping Wide Stock

WARNING

DO NOT rip large sheets of plywood or similar materials by yourself. Use roller stands and get at least one helper.

7. To rip stock 8-3/4" to 10-3/4" wide (Mark 7) , you'll have to mount the rip fence so it straddles the extension table and the worktable.

8. To rip wider stock or sheet materials, mount the extension table on either side of the headstock and mount the rip fence on the extension table. Move the headstock and the carriage until the blade is the desired distance away from the rip fence. Use the quill feed to make fine adjustments.

9. Feed the stock as you would normally. If the stock you're cutting is extremely large — such as a sheet of plywood — get some help. See Figure D-10.

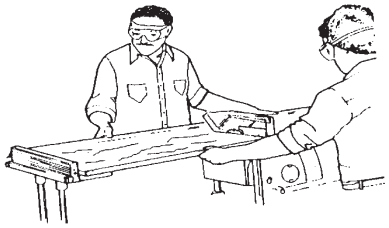


Figure D-10

Angles

Cutting a Miter

1. Set the miter gauge at the desired angle, and secure the lock knob. Place the miter gauge in one of the slots so that the protractor face is angled toward the blade.

2. Mark the stock where you want to cut it. (It's easiest to measure from the outside corners of the miter.) Clamp the stock in the miter gauge and line it up with the blade. From this point on, the procedure is similar to crosscutting. See Figure D-11.

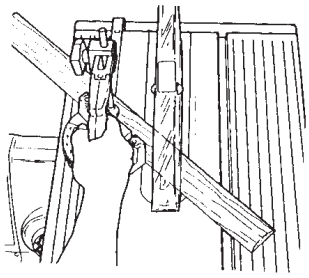


Figure D-11

Cutting a Bevel

WARNING

Mount the miter gauge or the rip fence on the down side of the table. This will provide better support for the stock, help eliminate kickbacks, and keep your hands out of danger. When cutting a bevel, mounting the miter gauge on the up side of the blade could result in the protractor casting coming in contact with the saw blade.

3. Slide the carriage and the headstock all the way to the right and set the table at the desired angle. If you're crosscutting a bevel, mount the miter gauge on the down side of the table. See Figure D-12. If you're ripping a bevel, mount the rip fence on the down side of the table. See Figure D-13.

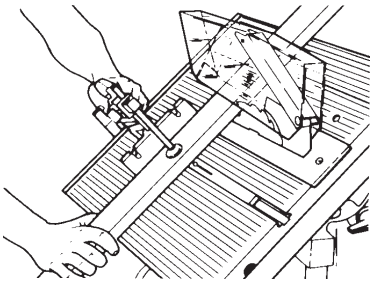


Figure D-12

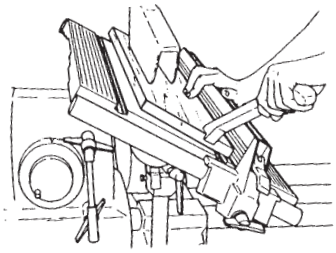


Figure D-13

4. When ripping a bevel in stock narrower than 1-1/2" wide, you'll need to mount an appropriately thick piece of stock to the rip fence.

This fence extension will position the ripping face closer to the blade for narrower cuts.

5. When ripping a bevel in wide stock, you may not be able to mount the rip fence on the extension table. In this case, clamp a long, straight board to the underside of the stock and rest this board over the upper edge of the table. When properly positioned, the board will guide the stock. See Figure D-14. Mount the rip fence on the floating table.

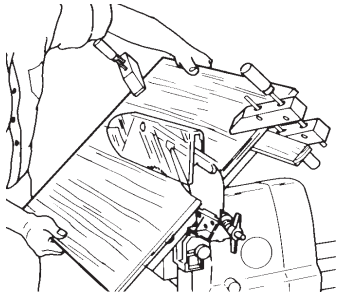


Figure D-14

Cutting a Compound Miter

6. To cut a compound miter, adjust both the table and the miter gauge to their desired angles.

Rabbets and Dadoes

WARNING

Rabbets and dadoes are made with the upper saw guard removed. Whenever you remove the upper saw guard, keep the lower guard in place and make sure the lock knob is secured. Always use a push stick, push block, or other safety equipment to help keep your hands out of danger. NEVER put hands over the blade even if the blade is covered by the stock.

Cutting a Rabbet

1. Remove the upper saw guard, adjust the table height, and mount the rip fence to the table the desired distance away from the blade. Make fine adjustments with the quill feed.

2. Rabbet cuts require two passes. Cut the surface of the stock first. See Figure D-15. Then reposition the fence if necessary and turn the stock on edge. Make the second cut so that the waste is on the opposite side of the blade from the rip fence. Use a fence extension or feather board to support the stock. See Figure D-16.

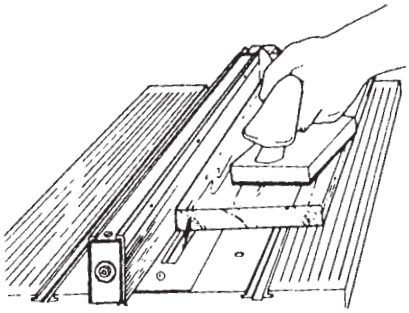


Figure D-15

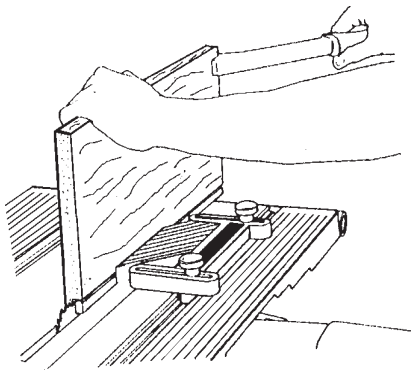


Figure D-16

Cutting a Dado

3. Remove the upper saw guard and adjust the height of the table.

WARNING

Make sure the next step is done with the machine turned offf.

4. To determine where to start and stop cutting, first find the right and left sides of the dado. Mark the dado on the stock and place it in the miter gauge. Grip stock in the safety grip and move it up to the blade. With a pencil, mark the right and left sides of the kerf on the worktable surface. These marks will serve as a temporary guide.

5. Line up the right side of the dado with the right kerf mark and make your first pass. Move the stock to the right the width of one kerf and make another pass. Continue until

the left side of the dado lines up with the left kerf mark, then make your last pass over the blade. See Figure D-17.

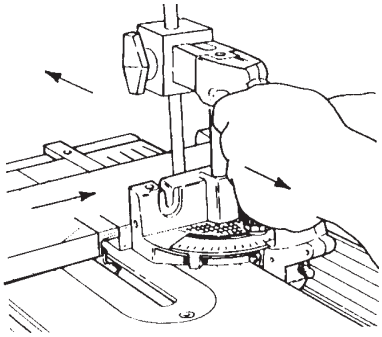


Figure D-17

Disc Sanding Operations

NOTE

The Speed Chart for the Mark 7 is programmed into the control panel of the PowerPro headstock. Refer to Page D-2 of this manual for operating instructions. If your operation is not listed in the speed chart, refer to the Manufacturer's recommendations.

Safety

WARNING

Before performing disc sanding operations:

- READ, UNDERSTAND, and FOLLOW the SAFETY section, especially for the disc sander mode.
- Complete ALL the Assembly and Alignment procedures.
- Secure locks.

Disc Sanding Speeds

NOTE

The Speed Chart for the Mark 7 is programmed into the control panel of the PowerPro headstock. Refer toPage D-2 of this manual for operating instructions. If your operation is not listed in the speed chart, refer to the Manufacturer's recommendations.

Before you begin any disc sanding operation, know the correct speed at which to set the control panel. The correct speed is determined by the operation and the type of material you're sanding. To determine the right speed for the job, refer to the Internal Speed Chart for Disc Sanding.

General Sanding

Position the carriage so that the table is no farther than 1/16" away from the disc (if you're not using the quill feed), or 1/2" (if you are using the quill feed). Maintain these clearances during sanding. Position the table surface near the center of the disc. Maintain these clearances during sanding. Always sand on the downward motion side of the disc with the disc either through the insert or next to the table.

End-Grain Sanding

1. Mount the miter gauge in the left slot and position it so that it will guide the stock against the downward side of the disc. Then lock the gauge in the slot. Use the speed chart to determine the proper speed and select prior to turning on the Mark 7.

NOTE

When end-grain sanding, set the speed a little slower than you would for other types of sanding. End grains "burn" easily.

2. If you're feeding the stock into the disc, place the stock against the miter gauge and feed it toward the disc until it contacts the abrasive. Hold it there for a few seconds, back it off, then feed it forward again. See Figure D-18.

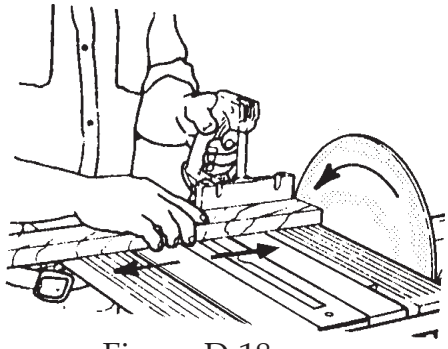


Figure D-18

`3. If you're using the quill feed, advance the disc until it contacts the stock. Hold it there for a few seconds, back it off, and feed it forward again. See Figure D-19.

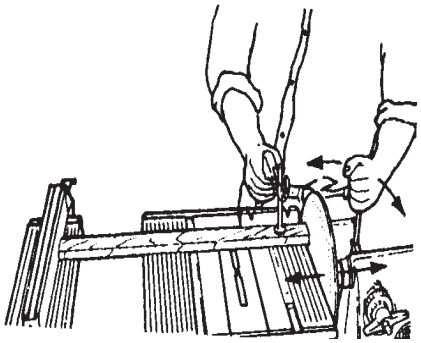


Figure D-19

Sanding to Length

1. Mount the rip fence to the table or the extension table to use as a backstop. Position the backstop so it holds the end of the stock about 1/2" away from the sanding disc when the quill is completely retracted.

2. Adjust the quick clamp to the thickness of the stock. Mount and lock the miter gauge in the left slot. Set the depth control. Position the stock against the miter gauge and the rip fence, so that it overhangs the table slightly. Be sure the stock doesn't contact the sanding disc.

3. Squeeze the safety grip with one hand, then turn on and adjust the Mark 7 speed.Feed the disc forward with the quill until it just contacts the stock. Back it off, then advance it again. Don't extend the quill all the way at this time, just sand until the end is smooth. Then, turn the stock and sand the other end. This time, advance the disc until the depth control stops it. See Figure D-20. Repeat this procedure as needed with the other boards you need to sand. When finished, they will all be exactly the same length.

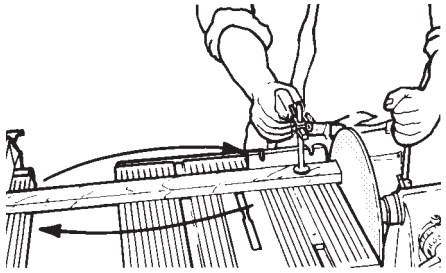


Figure D-20

Sanding Bevels, Chamfers and Miters

1. After sawing a miter, bevel or chamfer, don't change the table tilt or the miter gauge angle. Instead, use these angles for the sanding setup.

2. Remove the upper saw guard, raise the table and remove the saw blade from the lower guard. Mount a sanding disc in the guard, then re-adjust the table height and position for sanding. Clamp the stock in the miter gauge or guide it against the rip fence, and sand it at the same angle that you cut it.

NOTE

When sanding angles, position the disc through the insert.

Vertical Drilling Operations

NOTE

The Speed Chart for the Mark 7 is programmed into the control panel of the PowerPro headstock. Refer to Page D-2 of this manual for operating instructions. If your operation is not listed in the speed chart, refer to the Manufacturer's recommendations.

Safety

WARNING

Before performing vertical drilling operations:

- Read the SAFETY section, especially for the drill press mode.
- Complete ALL the Assembly and Alignment procedures.
- Set up the drill press mode according to the instructions found in section C of your Manual.
- Remove the key from the chuck.
- Secure locks.

Vertical Drilling Speeds

NOTE

The Speed Chart for the Mark 7 is programmed into the control panel of the PowerPro headstock. Refer toPage D-2 of this manual for operating instructions. If your operation is not listed in the speed chart, refer to the Manufacturer's recommendations.

Before you begin any vertical drilling operation, know the correct speed at which to set the speed dial. The correct speed is determined by the operation and the type of material you're drilling. To determine the right speed for the job, refer to the **Drilling Speed Chart** programmed into the Mark 7 Control Panel. This chart is intended as a general guide when using **most popular drill bits.** If you use other bits, follow the manufacturers recommendations.

General Drilling

There are two basic types of holes: holes that you drill completely through the stock, and holes that only go part way through the stock.

Drilling Through

1. Mount the rip fence on the table to use as a backstop. (If there's no room for the rip fence, use the miter gauge).
2. Clamp a scrap of wood on the table to keep the drill bit from drilling into the table and the stock from splintering where the drill bit exits. This scrap should be wider than the stock.
3. Mark the holes on the stock, and lay it on top of the scrap. Adjust the rip fence to position the hole where you want it. Make fine adjustments with the table height crank. See Figure D-23.

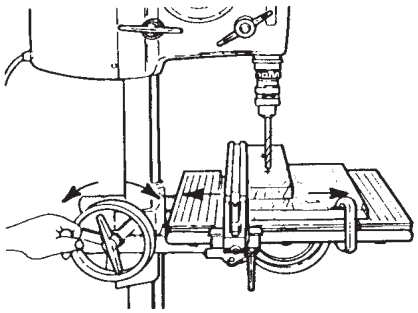


Figure D-23

4. To position the table assembly on the way tubes, hold the carriage so that it won't drop against the base mount, then loosen the carriage lock. Adjust the table height so that the tip of the drill bit is 1/4"-1/2" above the stock, and tighten the lock.

5. Remove the stock and extend the quill so that the cutting flutes of the drill bit touch the scrap wood. Set the depth control to 1/8" and tighten the depth control lock. See Figure D-24. Then let the quill retract. Position the stock under the drill bit. Hold it against the table and rip fence. Extend the quill with the machine off to check where the drill bit will drill.

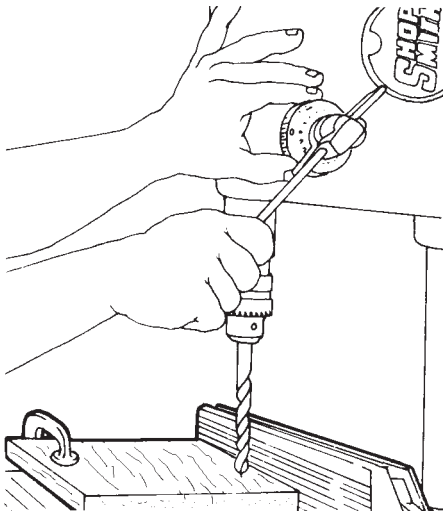


Figure D-24

6. Adjust the speed, turn on the Mark 7, and feed the drill bit into the stock slowly. See Figure D-25. When drilling deep holes, retract the drill bit now and then to clear chips from the hole. When you feel the depth control stop the quill, retract the drill bit. Turn off the machine. Let it come to a stop, then remove the stock.

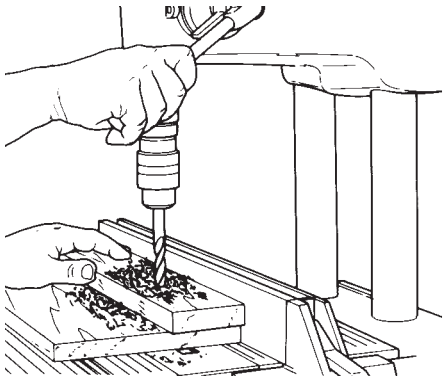


Figure D-25

Drilling Part Way

1. Same as "Drilling Through" except extend the quill until the cutting flutes of the drill bit just touch the stock. Then set and lock the depth control. See Figure D-26.

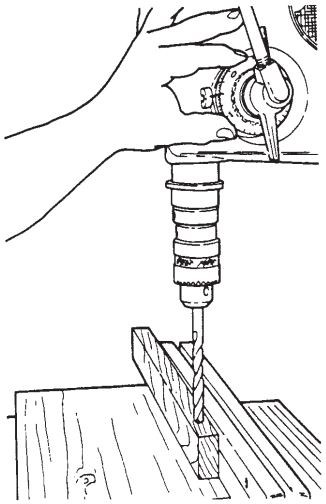


Figure D-26

2. Then drill the holes you need. The depth control will stop the quill when the drill bit reaches the proper depth in the stock. All the holes you drill at any one depth control setting will be exactly the same depth.

Avoiding Tear-Out

1. Prevent rough, splintery edges where the drill exits the stock by moving the scrap block every time you drill a new hole– this way there's always a firm surface to back up the stock. Or, if you're using brad-point drill bits, you can use the depth control to avoid tear-out.

2. With the Mark 7 turned off, extend the quill until the pilot of the brad point drill bit touches the scrap wood. Lock the quill. Set the depth control to "0" and lock it in place. Unlock the quill and let it retract.

3. Drill the holes you need, letting the depth control stop the quill. Turn off the Mark 7, and turn the stock over. There will be a tiny pinhole where the pilot started to come through the stock. Use this pinhole to line up the drill bit, then finish drilling the hole from the other side. Since brad-point drill bits have spurs that cut the wood grain smoothly when they enter the wood, there will be no tear-out on either side of the stock.

Drilling at an Angle

1. Mount the rip fence on the downside of the table, then tilt the table. This will give the stock maximum support. If the angle is acute, place scrap blocks on the table and rip fence. See Figure D-27.

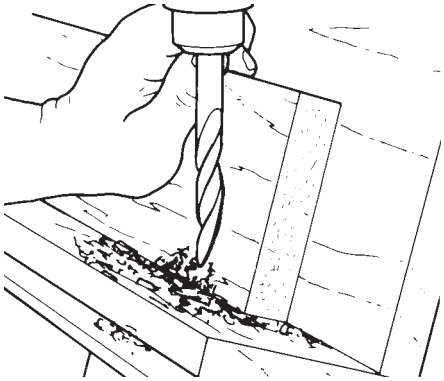


Figure D-27

Drilling Round Stock

WARNING

Make sure that the stock is held securely.

1. Position the rip fence in the middle of the table and tilt the table at 45 degrees. This will create a 'V' to cradle the stock.

2. If you're going to drill through the stock, protect the table and the rip fence with scrap wood. If you perform this operation often, you may want to make a V-support by gluing two scrap boards together, then bolt one side of the support to the rip fence. See Figure D-28.

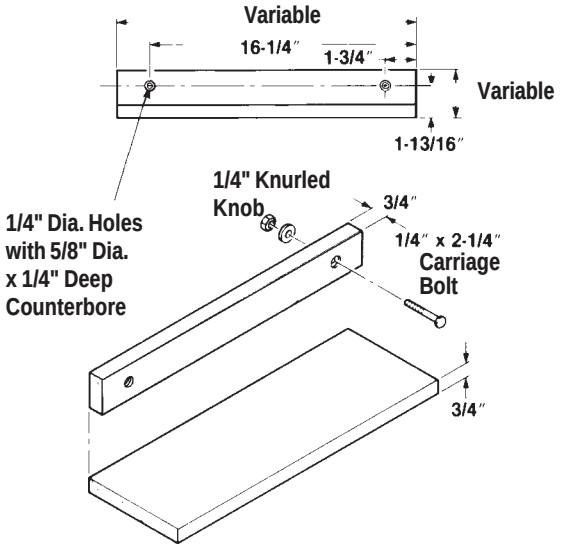


Figure D-28

3. Extend the quill so that the drill bit just touches the 'V.' With the table height crank, move the table so that the pilot of the drill bit points to the bottom of the "V." See Figure D-29. Lock the table. Place the stock in the "V" and set the depth control. Drill the hole, holding the stock down firmly. See Figure D-30.

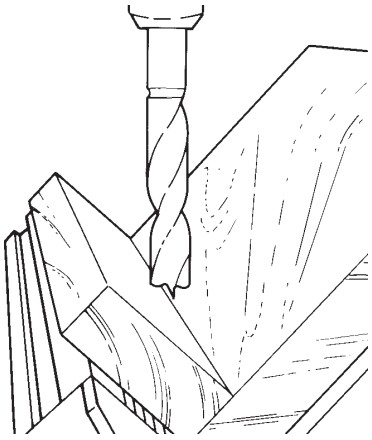


Figure D-29

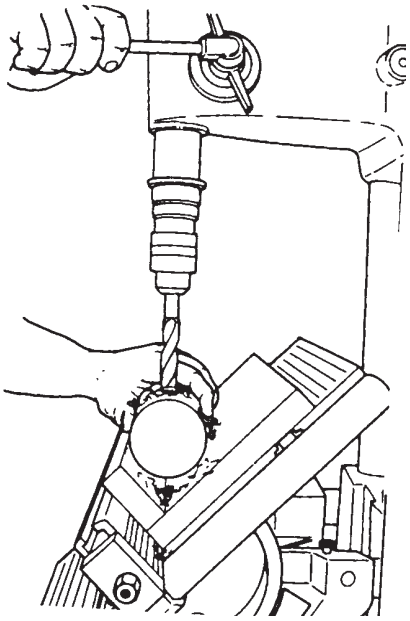


Figure D-30

Drilling Duplicates

WARNING

Make sure that the stock is held securely.

1. The rip fence and the miter gauge can be locked on the table in a variety of different configurations to drill duplicate holes in duplicate pieces of stock. See Figs. D-31 through D-33.

2. To set up for this, first be sure that all your stock is sawn and sanded exactly the same dimensions. Mark the position of the hole you want to drill on one piece of stock, then set the rip fence and the miter gauge to hold the stock while you drill. Tilt the table and set the miter gauge angle. Once the setup is properly adjusted, you can drill duplicate holes in all the stock.

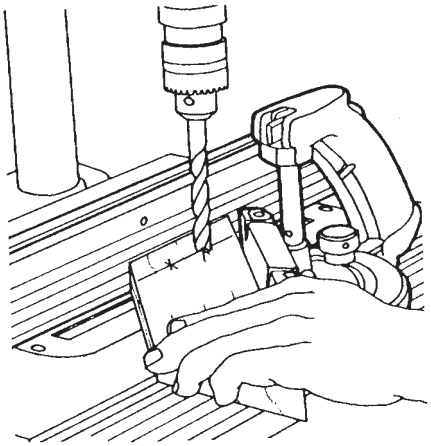


Figure D-31

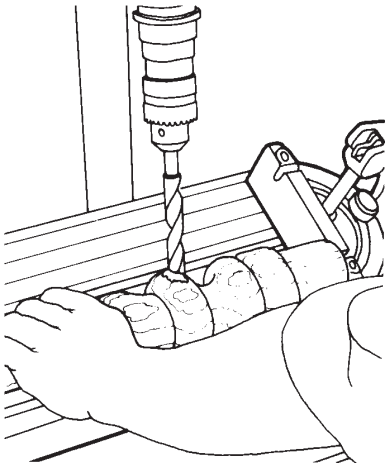


Figure D-32

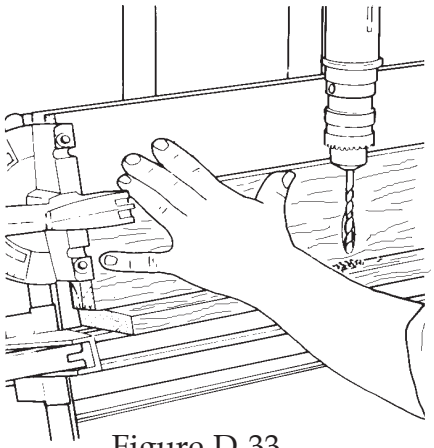


Figure D-33

Drilling Plastic

1. When drilling plastic, work at the recommended speed listed in the internal speed chart. The larger the hole, the slower the speed should be. If you go too fast, the drill bit will heat up and melt the plastic.

2. Don't use brad-point drill bits; you may dull them. You can use a twist drill bit, but you risk splintering certain types of plastic. The best drill bit is a special **plastic-drilling bit.**

Drilling Metal

1. When drilling metal, clamp it to the worktable or rip fence and work at the recommended speed listed in the internal speed chart. Use a sharp, high-quality **twist-bit.**

WARNING

Never drill metal freehand. Always clamp the metal to the worktable and the back-up stock, or the rip fence and the back-up stock.

2. Feed the drill bit very slowly into the metal and apply plenty of oil to the tip of the drill bit. This will keep the drill bit from dulling quickly.

3. If the drill bit catches, back it out quickly; then feed it more slowly with less pressure. If the drill bit stalls completely and the quill won't retract, quickly turn off the Mark 7. Back the drill bit out of the hole, turning it counterclockwise by hand. Once the drill bit is free, turn on the machine and feed the drill bit slowly back into the metal. Once the drill bit goes through the metal, turn off the Mark 7 and let it come to a complete stop before you unclamp the metal.

4. After you drill metal, be sure to wipe off the Mark 7. The excess oil from the operation could mix with sawdust and impede the movement of parts. Also, metal shavings could scratch the tubes or get inside the headstock.

Horizontal Boring Operations

NOTE

The Speed Chart for the Mark 7 is programmed into the control panel of the PowerPro headstock. Refer to Page D-2 of this manual for operating instructions. If your operation is not listed in the speed chart, refer to the Manufacturer's recommendations.

Safety

WARNING

Before performing horizontal boring operations:

- Read the SAFETY section, especially for the horizontal boring mode.
- Complete ALL the Assembly and Alignment procedures.
- Set up the horizontal boring mode according to the instructions found in your Mark 7 Model's section.
- Remove the key from the chuck.
- Secure locks.

Horizontal Boring Speeds

Before you begin any horizontal boring operation, know the correct speed at which to set the speed dial. The correct speed is determined by the operation and the type of material you're boring. To determine the right speed for the job, refer to the Horizontal Boring Speed programmed into the Mark 7 Control Panel.

General Boring

There are two basic types of holes: holes that you bore through the stock, and holes that only go part way through the stock.

Boring Through

1. Mount the rip fence on the table to use as a backstop. (If there's no room for the rip fence, use the miter gauge.)
2. Clamp a scrap of wood on the fence to keep the bit from boring into the fence and the stock from splintering where the bit exits. This scrap should be taller than the fence.
3. Mark the holes on the stock, and lay it against the scrap. Make fine adjustments with the table height crank. See Figure D-34. Clamp the stock to the table.

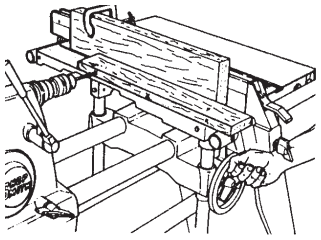


Figure D-34

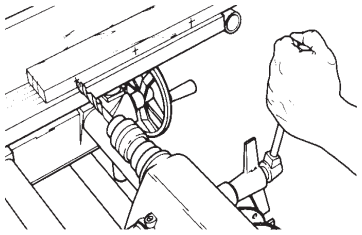


Figure D-35

4. Extend the quill so that the cutting flutes of the bit touch the scrap wood. Set the depth control to 1/8" beyond and tighten the depth control lock. Then let the quill retract. Position the stock in front of the bit and hold it against the table and rip fence. Extend the quill with the machine off to check where the bit will drill.
5. Set the speed, turn on the Mark 7, and feed the bit into the stock. See Figure D-35. When boring deep holes, it will be necessary to retract the bit now and then to clear chips from the hole. When you feel the depth control stop the quill, retract the bit. Turn off the machine. Let it come to a stop, then remove the stock.

Boring Part Way

1. This operation is similar to boring through, except you should extend the quill until the cutting flutes of the bit just touch the stock. Then set the depth control and lock it. The depth control will stop the quill when the bit reaches the proper depth.

2. All the holes you bore at any one depth control setting will be exactly the same depth. When you need to bore a number of holes all at the same height, such as when doweling stock edge-to-edge, hold the stock down with equal pressure at each hole.

Avoiding Tear-Out

1. Prevent rough, splintery edges where the drill exits the stock— by moving the scrap block every time you drill a new hole– this way there's always a firm surface to back up the stock. Or, if you're using brad-point bits, you can use the depth control to avoid tear-out.

2. With the Mark 7 turned off, extend the quill until the pilot of the brad point bit touches the scrap wood. Lock the quill. Set the depth control to "0" (zero) and lock it in place. Unlock the quill and let it retract.

3. Bore the holes you need, letting the depth control stop the quill. Turn off the Mark 7 and turn the stock over. There will be a tiny pinhole where the pilot started to come through the stock. Use this pinhole to line up the bit, then finish boring the hole from the other side. Since brad-point bits have spurs that cut the wood grain smoothly when they enter the wood, there will be no tear-out on either side of the stock.

Boring End Grain

1. Use the miter gauge to align the stock with the bit and adjust the safety grip to the thickness of the stock. If the stock is less than 30" long, mount the rip fence on either the worktable or extension table and use it as a backstop. If the stock is more than 30" long and you have to work without a backstop, clamp the stock to the table to keep it from slipping. Adjust the table height and depth control as desired. See Figure D-36.

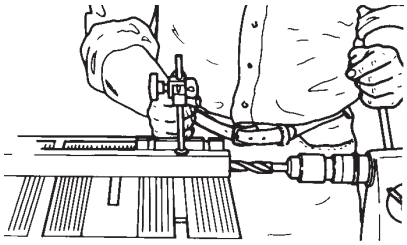


Figure D-36

2. Set the speed in accordance with the speed chart programmed into the internal control panel and begin boring. As you feed the quill, don't be alarmed if it takes more pressure than usual. End grain is hard to cut.

Boring at an Angle

1. Mount the rip fence on the table to use as a backstop. Tilt the table toward the headstock and clamp the stock to the table. See Figure D-37. If the angle is acute and you're boring through the stock, place scrap wood on the table and the rip fence.

2. You can also use the miter gauge as a backstop. Be sure to clamp the stock to the table. Otherwise the bit will push the stock out of alignment. See Figure D-38.

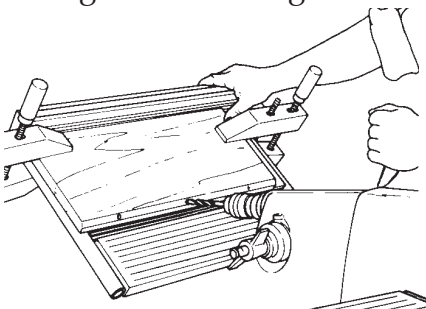


Figure D-37

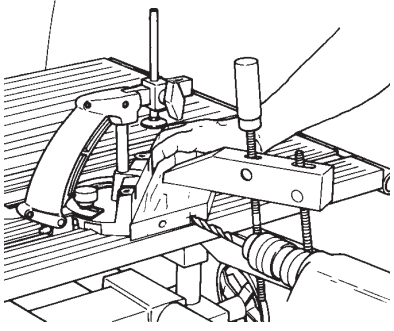


Figure D-38

Lathe Turning Operations

NOTE

The Speed Chart for the Mark 7 is programmed into the control panel of the PowerPro headstock. Refer to Page D-2 of this manual for operating instructions. If your operation is not listed in the speed chart, refer to the Manufacturer's recommendations.

Safety

WARNING

Before performing lathe turning operations:

- Read the SAFETY section, especially for the lathe mode.
- Complete ALL the Assembly and Alignment procedures.
- Secure locks.

Lathe Turning Speeds

NOTE

The Speed Chart for the Mark 7 is programmed into the control panel of the PowerPro headstock. Refer to Page D-2 of this manual for operating instructions. If your operation is not listed in the speed chart, refer to the Manufacturer's recommendations.

Before you begin any lathe turning operation, know the correct speed at which to set the speed dial. The speed is determined by the operation and the type of material you're turning. To determine the speed for the job, refer to the Lathe Turning Speed Chart programmed into the Mark 7 Control Panel.

Turning Know-How

Spindle Turning

This type of turning is done with stock mounted between the drive and cup centers.

Faceplate Turning

This type of turning is done with stock mounted to a faceplate.

Scraping

This technique uses the cutting edge of the tool to scrape the stock. See Figure D-39. Position the tool rest just below the axis of rotation of the stock so the chisel cuts on center. Slowly feed the chisel toward the stock. The chisel should point directly at the center of the stock.

Shearing

This technique uses the cutting edge of the tool to pare away the stock. See Figure D-40. Position the tool rest 1/4"-1/2" below the top of the stock, and feed the chisel at an angle.

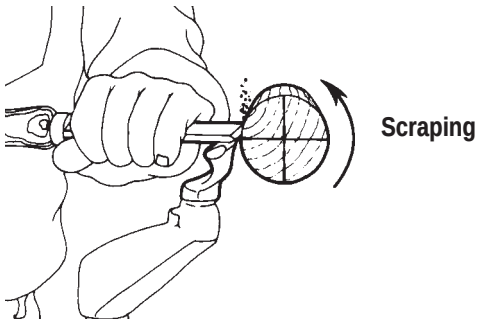


Figure D-39

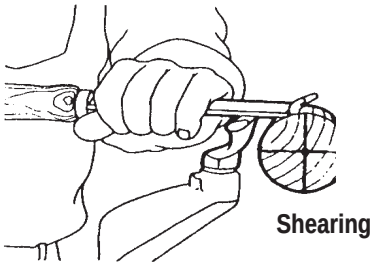


Figure D-40

Lathe Tools

Gouges round the stock and make coves; roundnose chisels make coves; skew chisels make beads and cut cylinders; parting tools size and part.

Balance

1. This is extremely important when turning glued-up stock, long stock and stock more than 3" in diameter. Check the balance of your spindle and faceplate stock after you've marked the centers.

2. To do this, drive a standard 8-penny nail straight into each center. Use suitable string to hang the stock in a level position from the front bench tube of the Mark 7 or a saw horse. The ends of the string should be looped around the nails. See Figure D-41. Gravity will pull the heavy side down. Use a jointer, bandsaw or hand plane to remove no more than 1/32" at a time from the heavy side until the stock remains stationary when rotated to three positions 90 degrees apart.

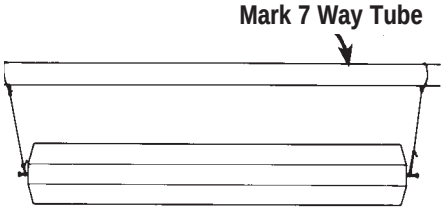


Figure D-41

Spindle Turning

Follow these steps for spindle turning operations:

1. **Mounting** - This is an extremely important operation.

NOTE

Improperly mounted stock is dangerous and difficult to turn.

WARNING

- Make sure the workpiece is not cracked or split.

- When turning glued up stock, make sure the glue joints are strong. Glue the stock and leave it clamped for at least 24 hours prior to turning.

- Cut stock that's more than 3" square into an octagon. This removes excess stock which makes turning safer and easier.

a. With a straightedge, draw two diagonal lines corner-to-corner on each end of the stock to find the center.

b. Position the points of the drive and cup centers at the center marks and hit the centers sharply with a nylon or rawhide mallet. Do not use a metal hammer.

-- If you're using a live center, avoid damaging the live center bearing by using the cup center for this procedure. The hole left by the cup center will accommodate the live center.

-- To help seat the centers when working with hardwood, drill 1/8" dia. by 1/2" deep holes in both ends of the stock, and/or saw diagonal kerfs 1/8" deep.

-- When properly seated, the drive center will leave a hole and four slots and the cup center will leave a hole and a small circle 1/16"-1/8" deep. .

WARNING

The spurs of the drive center and the cup of the cup center must penetrate at least 1/16" into the stock. Do not use a drive center, cup center or live center if the point is damaged. The stock could be thrown from the lathe.

c. Cut stock larger than 3" square into an octagon using the bandsaw.

d. Mount the drive center on the main spindle and the cup center in the tailstock. Mount the tailstock in the base mount. Position the headstock so that the centers are about 1" farther apart than the length of the stock, then lock the headstock.

WARNING

Wax or soap the end of the stock that mounts to the cup center. This lubrication helps keep the center from wearing into the stock and causing the stock to loosen on the lathe.

e. Hold the end of the stock against the cup center, then extend the quill and mount the other end on the drive center. Press hard against the quill feed lever, then lock the quill. See Figure D-43.

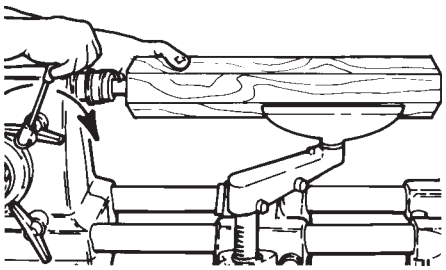


Figure D-43

f. Adjust the height of the tool rest and align it parallel to the stock and not more than 1/4" away.

g. Turn the stock by hand to make sure it clears the tool rest. Make sure speed is set at "Slow". Then turn on the machine briefly to test that the stock rotates smoothly. If the stock vibrates significantly, the center holes must be relocated and/or the stock balanced.

2. **Rounding** -- This turns the stock down to a rough cylinder.

WARNING

During turning, periodically turn off the Mark 7 and readjust the tool rest to maintain a 1/4" distance between the tool rest and the stock. Also, adjust the quill to keep the stock secure between the centers.

a. Lay a gouge on the right end of the tool rest with the cup facing up and tilted slightly toward the left. Angle the handle slightly toward the right end of the tool rest so that the bevel is almost parallel to the stock.

b. Gently feed the cutting edge toward the stock until the tip just touches the stock. Then draw it slowly and steadily along the tool rest, removing a little bit of stock.

c. Turn the gouge so the cup still faces up, but slightly toward the right. Angle the handle to the left.

d. Feed the gouge into the stock and draw it back along the tool rest. Repeat this procedure until the stock is completely round. See Figure D-44. Turn off the Mark 7.

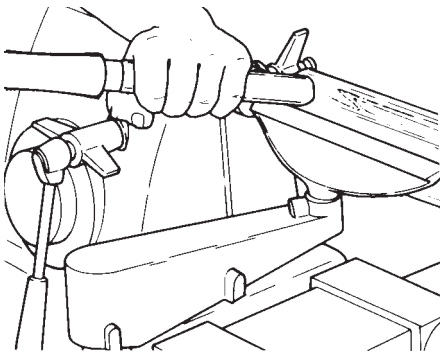


Figure D-44

3. **Sizing** -- this marks the approximate diameters of the shapes.

a. Use a pencil to mark the beads and coves.

b. Turn on the machine and increase the speed slightly. With a parting tool, cut grooves in the stock. See Figure D-45. Use calipers to check the diameters.

4. **Shaping** -- This forms the beads and coves in your design. Turn the large diameters first to avoid weakening the stock for the rest of the turning.

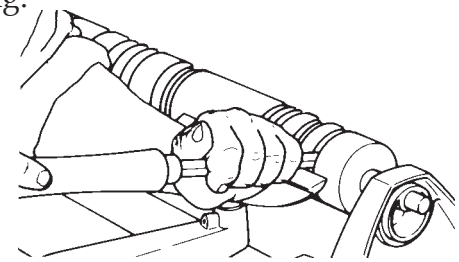


Figure D-45

a. Cut the beads first. Feed the edge of a skew chisel slowly into the stock, then move the handle of the skew from side to side as needed to shape the beads. See Figure D-46.

b. Cut the coves. Feed a gouge slowly into the stock, then move the handle of the tool from side to side to shape the cove. See Figure D-47.

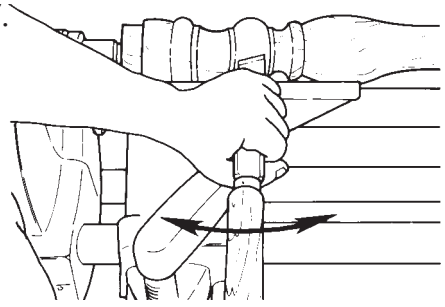


Figure D-46

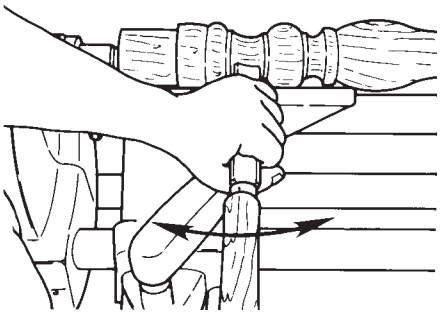


Figure D-47

5. **Sanding** -- It's much easier to sand a turning on the lathe than it is to remove it and hand sand it.

WARNING

Always remove the tool rest before sanding the turning on the lathe.

a. Remove the tool rest and set the speed in accordance with the speed chart programmed into the Mark 7 Control Panel.

b. Start with medium sandpaper. Double the sandpaper over several times to protect your fingers. Begin to sand by holding the sandpaper lightly against the stock. Work your way through progressively finer grits. See Figure D-48.

c. Sanding causes feathers on the stock. To remove these: Wet the stock with a damp rag, wait a few minutes for the water to raise the grain and evaporate, then final sand with a very fine grit. Or, dismount the spindle, turn it end for end, remount it, then final sand.

6. **Parting** -- Use a parting tool, turned on its edge to scrape away stock from the ends of the spindle. See Figure D-49. Always leave 1/8 the thickness of the diameter. For example: if the diameter is 2", leave 1/4"; if 3", leave 3/8"; if 4", leave 1/2". Remove the spindle from the lathe and cut off the waste stock.

WARNING

DO NOT part the turning completely or turn it down to such a small diameter that it snaps on the lathe.

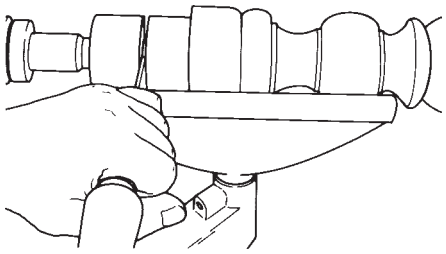


Figure D-49

Faceplate Turning

1. **Mounting** -- This is an extremely important operation. Improperly mounted stock is dangerous and difficult to turn.

WARNING

- Make sure the stock is not cracked or split.
- When turning glued up stock, make sure the glue joints are strong. Glue the stock and leave it clamped for at least 24 hours prior to turning.
- Cut the stock round using a bandsaw, or cut off the corners using a bandsaw or table saw. This removes excess stock which makes turning safer and easier.
- Large, heavy stock should be turned only at very low speeds (as programmed in the Mark 7 Control Panel), AND with the extra support of the tailstock, as seen in Figure D-49a.

a. Find the center of the stock by drawing diagonal lines from corner to corner. Then use a compass to mark the outside diameter of your turning. Cut the stock round.

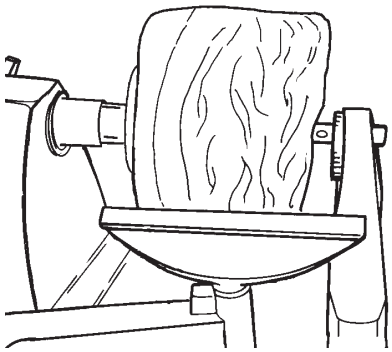


Figure D-49a

-- If you don't want screw holes in the bottom of your finished turning, mount the stock to a block of wood. Select a block at least 1" thick and about the same diameter as the faceplate. Find the center of this block, then glue the block to the stock, center to center. Put a piece of newspaper in between the block and the stock when you glue them up. Leave clamped at least 24 hours. See Figure D-50.

b. Mount the turning stock to the faceplate with three #12-by-1 1/4" wood screws. The screws must sink into the block at least 3/4". For large, bulky turnings use longer screws and a thicker block.

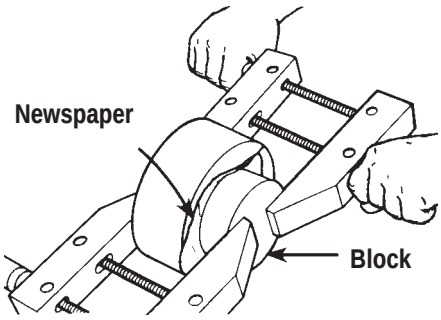


Figure D-50

WARNING

If the screws are being driven into end grain, the screws must sink into the block at least 2". Use #12-by-2 1/2" long wood screws.

c. Mount the faceplate on the main spindle. Tighten the setscrew against the flat of the spindle.

d. Turn the outside first. Adjust the height of the tool rest and align it parallel to the stock and not more than 1/4" away. When turning heavy stock mount the tool rest in the center position. Support the stock with both the main spindle and the tailstock, as shown in Figure D-49a.

e. Turn the stock by hand to make sure it clears the tool rest. Then turn on the machine briefly to test that the stock rotates smoothly, with no excessive vibration.

2. Rounding -- Round the outside, using a roundnose or gouge, just as you would for spindle rounding. See Figure D-51. If the wood grain is perpendicular to the axis of rotation, do not shear.

WARNING

During turning, periodically turn off the Mark 7 and readjust the tool rest to maintain a 1/4" distance between the tool rest and the stock.

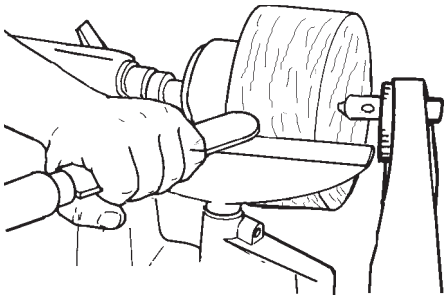


Figure D-51

3. Shaping the outside -- Make the beads and coves in the same manner as for spindle shaping. See Figure D-52. If the wood grain is perpendicular to the axis of rotation, do not shear.

4. Shaping the inside -- Position the tool rest not more than 1/4" from the stock and adjust the height so that it's about 1/4" below the center of the stock.

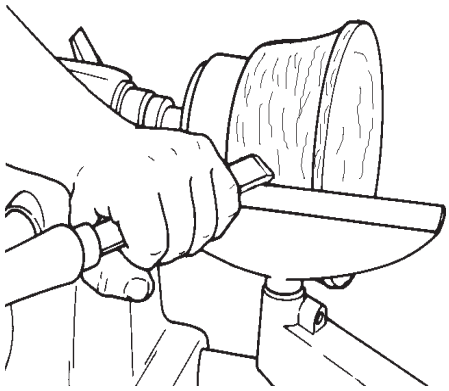


Figure D-52

a. Scraping is one way to shape the inside. Turn on the machine, set the speed, and feed a roundnose chisel against the downward side of the stock. See Figure D-53. As you work, periodically check the inside diameter with inside calipers.

5. Sanding -- Sand the turning as you would a spindle. (Refer to "Spindle Turning" Step 5.) Remove the tool rest.

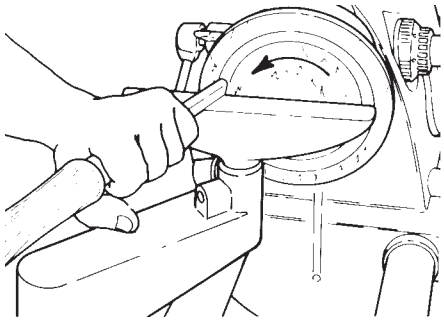


Figure D-53

a. Remove the feathers either by wetting the wood or by dismounting the faceplate from the main spindle and remounting it on the upper auxiliary spindle.

6. Parting -- Dismount the faceplate from the main spindle and unscrew the faceplate. If a block was glued to the stock, clamp the block in a vise and place a chisel between the block and the turning. Hit the chisel with a mallet, driving it between the block and the turning. Sand the remains of the newspaper and any excess glue off the turning.

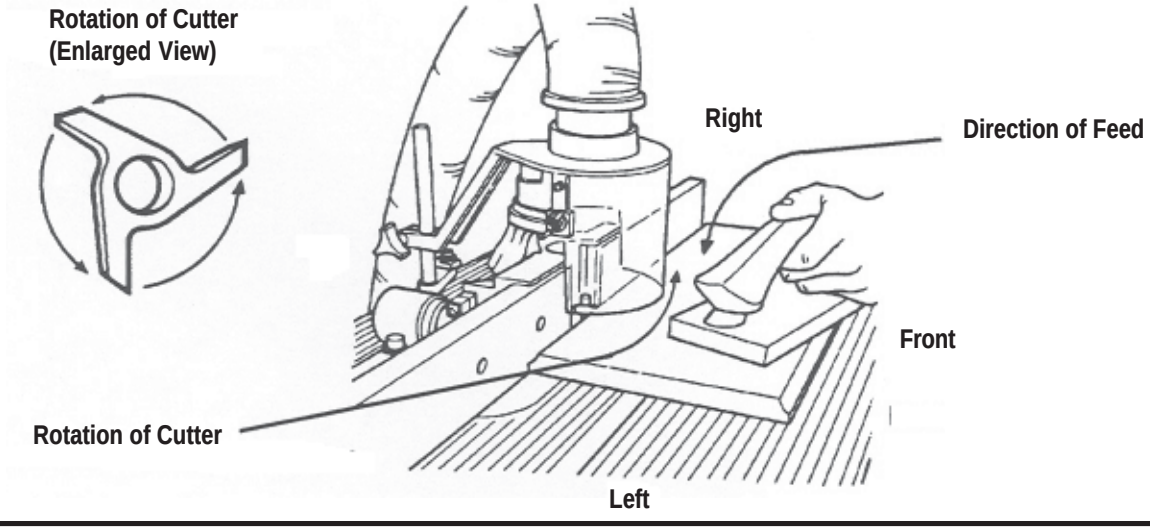
Under-Table Shaping Operations

WARNING

- Internal routing or shaping of the edge of a hole (or small opening less than 6" in diameter) in any shape should not be attempted.
- Never "freehand" shape or route. Always use pins with piloted router bits or rub collars with shaper cutters.
- Never attempt pin routing or pin shaping when removing the entire edge of the workpiece.
- Try to free the workpiece so that the cutter is cutting in the same direction as the wood grain, though this is not always possible.
- Always feed the workpiece against the rotation of the cutter. Otherwise, a kickback will occur.
- Feeding the workpiece too fast and/or exceeding the maximum recommended 1/8" depth-of-cut could result in "stalling" the motor or belt slippage.
- Make sure the cutting edge of the shaper cutter faces toward the direction of the workpiece feed. For forward direction, this is right to left, in reverse mode.

WARNING

- Feed the workpiece at a slow, steady rate. Use extra care in shaping or routing workpieces with figured grain or knots, as these may cause kickbacks.
- Use a push stick to feed workpieces up to 3" wide. When it is necessary to push a narrow workpiece underneath the circular shield, use a long piece of scrap wood to feed the workpiece into the cutter and use a feather board to hold the workpiece in against the shaper fence.
- Always use a fence (like the Shopsmith Shaper Fence) or table insert pins and rub collars to guide and support the workpiece. Failure to do so could result in bodily injury.
- Always use a shaper fence when removing the entire edge of the workpiece.
- Always use a fence (such as the Shopsmith Shaper Fence) when using router bits or shaper cutters without pilots or rub collars.



NOTE

The Speed Chart for the Mark 7 is programmed into the control panel of the PowerPro headstock. Refer to page D-2 of this manual for operating instructions. If your operation is not listed in the speed chart, refer to the Manufacturer's recommendations.

Safety

WARNING

Before performing Under-Table Shaping operations:

- Read the SAFETY section, especially for the Under-Table Shaping mode.
- Complete ALL the Assembly and Alignment procedures.
- Secure locks.

Operations

Several things affect the quality of cut made by the Mark 7 including cutter sharpness, cutter speed, cutter diameter, cutter length and profile, feed rate and wood hardness. To get the most from you Mark 7, you must consider all these elements every time you use it. Also, you should carefully choose wood stock with straight grain and free of knots.

There are several ways you can best use the Mark 7 for Under Table Shaping. Go to the section which best describes the activity you wish to perform:

- *Shaping and Routing*, using the Optional Shopsmith Shaper Fence.
- *Pin Shaping and Pin Routing*
- *Routing with Specialty Bits*, which remove the entire edge for decorative edges or jointing use the Optional Shopsmith Shaper Fence.

Shaping and Routing

You can use pins which thread into the shaper table insert, or a shaper fence when you use the Mark 7 for shaping or routing. However, we strongly recommend using the Optional Shopsmith Shaper Fence whenever possible, since it offers the most support for the workpiece and it provides more efficient dust collection. And you must always use a shaper fence when you remove the entire edge of the workpiece.

Some customers may already own a Shaper fence. If you do not own one, you should buy the Shopsmith Shaper Fence (part number 555144) before operating the Mark 7 as a shaper. The following instructions and illustrations show use of the Shaper Fence. Unless you will be pin shaping or pin routing irregular stock with piloted bits, we recommend the Fence.

Shaper Cutters

If you are not using Shopsmith Shaper Cutters, make sure that the cutters you use are rated for 12,000 rpm. Shaper cutters can cut many different profiles. A glue joint shaper cutter, for example, is designed to cut the full profile of the workpiece. A combination cutter such as the bead and quarter round, is designed to cut a profile on part of the workpiece edge. This partial cut may constitute the entire operation, or it may be just part of a profile which is produced by several passes with the same cutter or in combination with other cutters

WARNING

Never use shaper bits larger than 2-1/8" diameter, and which have an exposed cutting edge of 2-1/2".

A variety of shapes are possible by changing cutter height, depth of cut, worktable height and sequence of passes. Shaper rub collars control the lateral depth of cut when pin shaping. Since the collars turn with the cutter, they tend to score the wood. This can be minimized by bearing against the collars with light contact and by keeping

collars clean and free of nicks and burrs.

You should sharpen the shaper cutters before you use them. Sharp cutter can determine the quality and efficiency of a cut. Figure D-54 shows a shaper cutter being sharpened on an oil stone. For more information on how to sharpen shaper cutters, see the "Sharpening" Chapter in the Shopsmith book, Power Tool Woodworking for Everyone, 4th edition.

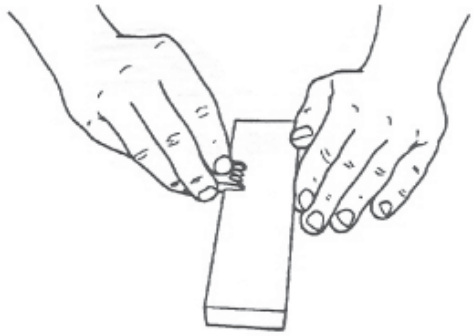


Figure D-54

A 1/2" shaper spindle (555117) with rub collars is included with the Mark 7. You may also purchase the optional Ball Bearing Shaper Spindle (order part number 555472). This spindle has ball bearings in the collars which permit the collars to roll with the workpiece and assure a smooth, burn-free result. This means there is much less tendency for the workpiece surface to be marred as the workpiece presses against the collars during the shaping operations.

To assemble the collars and cutters on the Shaper Spindle.

NOTE

Follow the instructions for setting up in the Under-table Shaper Mode in Section C of this manual.

Router Bits and Specialty Bits

You can use most 1/2" Shank router bits with the Mark 7 using the Shaper Fence, but you can use only piloted router bits for pin routing. You can also use any 1/4" shank router bit by inserting the router bit's shank into the optional 1/4" Router Chuck (order Part Number 514632).

WARNING

Never use router bits or specialty bits larger than 2-1/8" diameter, or which have an exposed cutting edge of 2-1/2" or longer.

Also, before you proceed, make sure that:

- Mark V is unplugged.
- Shaper Insert (dust chute removed) is installed.
- All Assembly and Alignment steps have been performed.

FOR SHAPING OR ROUTING USING A SHAPER FENCE, go to section directly below.

FOR PIN SHAPING OR PIN ROUTING, go to Page D-30.

FOR USING RAISED PANEL BITS USING A SHAPER FENCE, go to Page D-32.

Under-Table Shaping or Routing Using a Shaper Fence

Install a Shaper Fence

1. Install a shaper fence on the worktable according to the instructions which came with it. The Mark 7 shaper fence is being installed in Figure D-55, and it is being secured under the worktable by a square nut in Figure D-56.

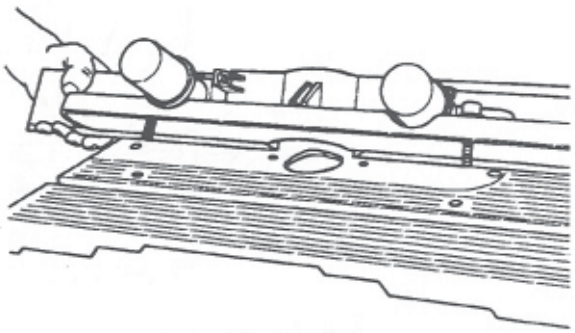


Figure D-55

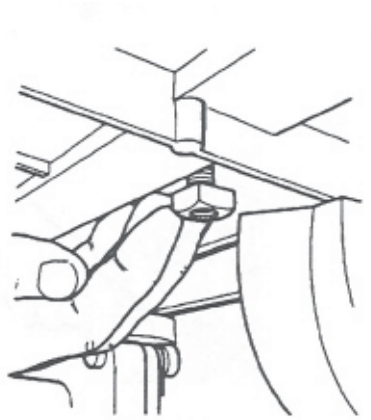


Figure D-56

2. Use a straightedge to set the fence boards parallel with each other, as shown in Figure D-57.

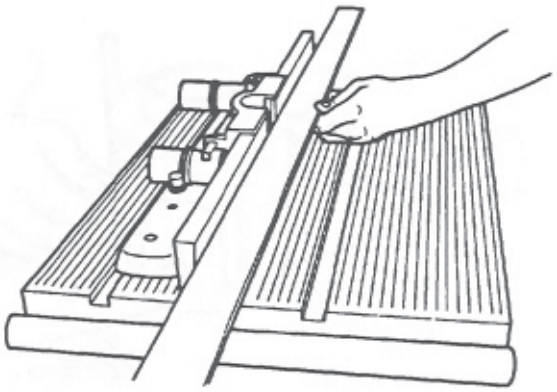


Figure D-57

NOTE

If the fence boards will not set parallel with each other, a slight onetime shimming will be necessary. Before you shim, the back of the shaper fence must be securely attached to the worktable.

CAUTION

To shim, loosen the slotted screws holding the boards to the fence brackets. Insert pieces of masking tape between the back, bottom side of the boards and the face of the brackets. Stick the tape to the brackets. Then tighten the screws and check that the boards are parallel. Repeat, if necessary.

3. After the fence boards are parallel with each other, tighten the shaper fence's socket head cap screws, as shown in Figure D-58.

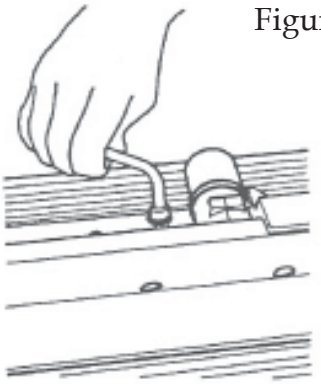


Figure D-58

4. Adjust the fence boards side to side by loosening the slotted screws which hold the boards to the fence brackets. The cutter should not touch the boards ends. A 1/8" clearance is sufficient. Tighten the screws.

5. If you are edge shaping or routing and part of the edge remains uncut, you must adjust both the infeed and outfeed boards in line with each other, and to the depth of cut you want. Do this by using 5/32" Allen wrench to loosen the cap screws which hold the rear fence guard to the fence assembly. Then turn the knobs in the back of the shaper fence. Each click of a knob is 1/64".

6. When the shaper fence is adjusted for the proper depth of cut, securely tighten the cap screws on the back of the shaper fence.

CAUTION

If you are removing the entire edge of the workpiece, the infeed and outfeed fences must be offset in order to support the workpiece before and after cut.

INSTALL THE GUARD ASSEMBLY

7. Place the guard assembly's base clamp to the right rear edge of the worktable and tighten the knob on the bottom of the clamp with a 9/16" wrench, as shown in Figure D-59.

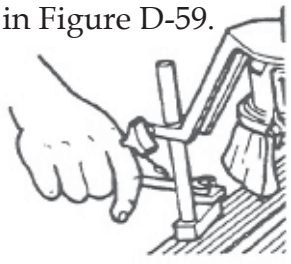


Figure D-59

8. Lower guard shield in place of 1/8" from the top of the workpiece and centered over the cutter. See Figure D-60

Figure D-60

9. Tighten the three-lobed knob on the guard support.

10. Attach the Dust Collector hose to the top opening of the guard.

11. Attach one or more feather boards, if possible.

12. Attach the telescoping legs to the worktable.

MAKE THE CUT

NOTE

Determine whether the Mark 7 needs to be operating in Forward or Reverse Mode based up the direction of the cutter.

13. Adjust the speed in accordance with the speed chart and turn on the Mark 7.

14. Position the workpiece on the proper side of the worktable, as shown in Figure D-61.

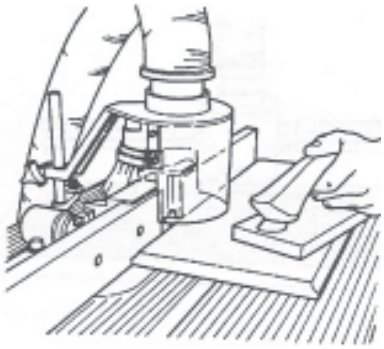


Figure D-61

NOTE

If you are removing the entire edge of the workpiece, run a 12" long piece of scrap wood approximately 4" through the cutter. Turn off the Mark 7, then adjust the outfeed fence outward to meet the finished edge of the workpiece.

WARNING

Avoid taking deep cuts with straight or non-piloted router bits. With the exception of single-pass dovetail cuts, limit the depth of cut to 1/4" for each pass when using straight or not-piloted router bits up to 1/2" diameter. When using shaper or router bits over 1/2" diameter, limit the depth of cut to 1/8" per pass.

Make cuts in more than one pass by adjusting the fence until the final depth is reached. Cuts made with the grain of the wood are always smoother and easier than cuts made against or across the grain. For this reason cross-grain and against-the-grain cuts should always be made slowly. When shaping is required on all four edges of a workpiece, make the end-grain cuts first so any splintering is removed by the edge-grain pass. When it is necessary to push a narrow workpiece under the guard, use a long piece of scrap wood and a feather board to hold the workpiece against a fence.

Whenever possible, make the pass with the cutter under the workpiece. This allows the workpiece itself to act as an added guard. Keep fingers away from the cutting area and hook your fingers over the edges of the workpiece to guard against slipping. Figure D-62 demonstrates a door panel bit cutting under the workpiece.

NOTE

The illustrations show the spindle turning counterclockwise with the direction on the control panel on forward. If the cutters are situated so that the spindle needs to operate in the reverse direction, the feed directions need to be opposite of that shown in the illustration.

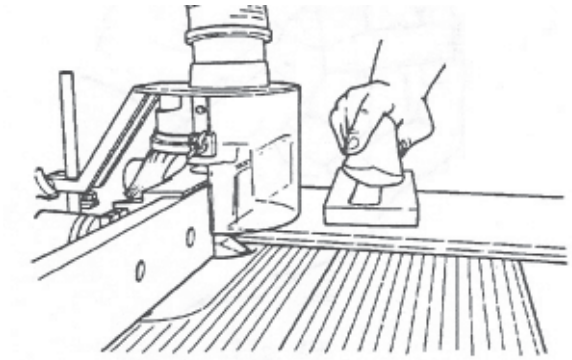


Figure D-62

Using Feather Boards with a Shaper Fence

Feather boards help hold a workpiece in the proper position to the cutter and prevent the workpiece from kicking back. Shopsmith recommends using as many feather boards as feasible to support the workpiece horizontally and vertically. Here are instructions for making a feather board holder to be attached to the top of each side of the shaper fence. Figure D-63 illustrates two feather board holders already installed on the shaper fence.

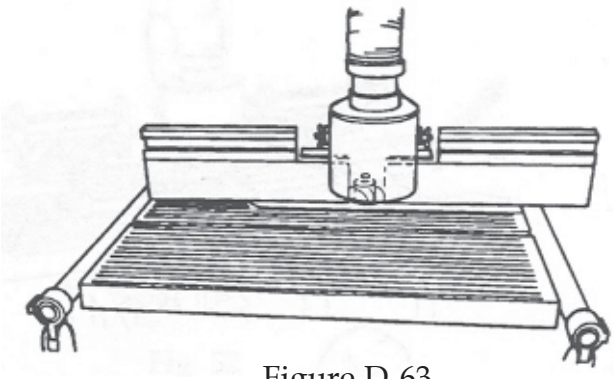


Figure D-63

Make a Feather Board Holder

Tools Needed:

- Electric Drill (or Mark 7 in drill press mode)
- 5/32" drill bit with countersink
- Light mallet or hammer
- Six slotted (or Phillips head wood screw) #6, 2-1/2" long
- Medium slotted screwdriver (or Phillips screwdriver)

1. Each feather boards holder should be hardwood, and should measure about 2" wide x 3/4" think x 9" long. *You may want to work with 18" long stock, then cut in half.)

2. Cut a groove 3/4" wide x 1/4" deep down the middle for the entire length, as in Figure D-64. Place the cut toward the "top" side of the workpiece.

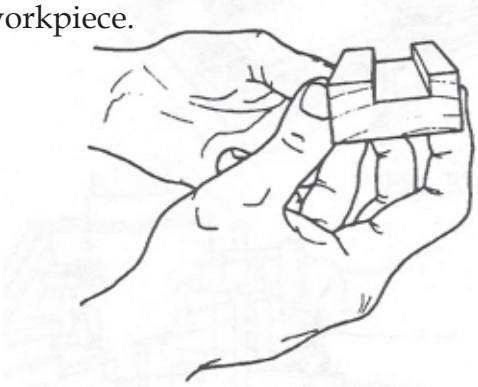


Figure D-64

3. Use the electric drill and a 5/32" bit to drill three holes through the width of each workpiece, as in Figure D-65. Countersink each hole deep enough for the head of the wood screws you will be using. Make sure you don't drill into the groove.

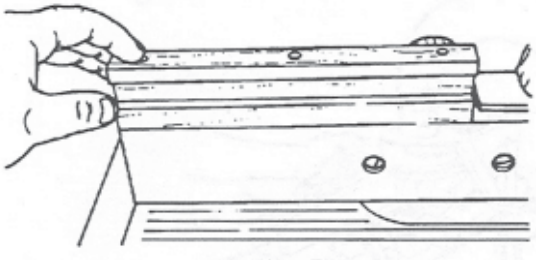


Figure D-65

4. Put a screw in each hole so the screw point is flush with the bottom of the workpiece.

5. Place the feather board holder on top of each fence and line it up with the end of the fence board. See Figure D-65.

6. Lightly tap each screw head so that it punches a mark on the top of the shaper fence. Remove the feather board holder.

7. Use the 5/32" drill bit to drill 1/2" deep holes at each punch mark in the top of the shaper fence.

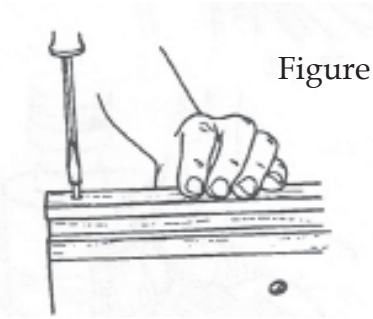


Figure D-66

8. Attach each feather board holder to the shaper fence, see Figure D-66.

Each feather board holder can accommodate one feather board. If you use a feather board on the infeed side, it is usually best to use one on the outfeed side, also. Figure D-67shows four feather boards used for shaping a thin, narrow workpiece. Also notice the use of a push stick.

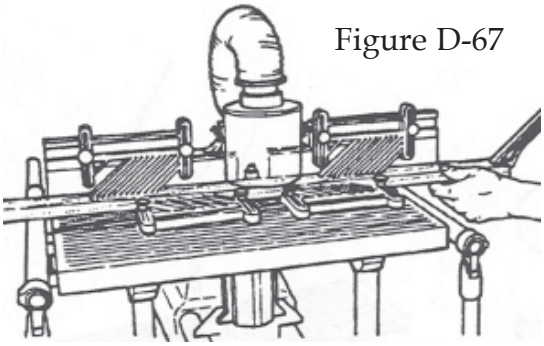


Figure D-67

Figure D-68

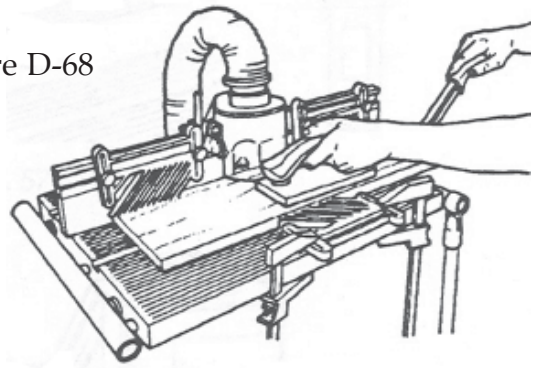


Figure D-68 illustrates two feather boards mounted on a feather board holder. Since the workpiece is too wide to install a feather board in the miter gauge channel of the worktable, notice how the horizontal feather boards is clamped to the worktable. When you want to use feather boards for horizontal pressure on the workpiece, remove the channel guide from the feather boards and clamp the feather board to the front of the worktable.

Using the Miter Gauge with the Shaper Fence

The miter gauge gives stability and support to end cuts when shaping or routing. Not in Figure D-69 that the dust shield is adjusted to clear both the top of the miter gauge and the handle. It is worth the effort to readjust the dust shield because the miter gauge gives the board extra support and stability during the cut.

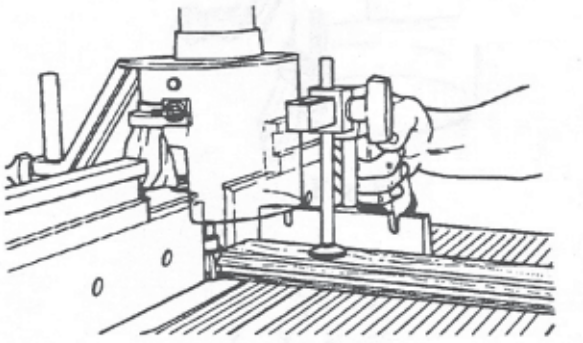


Figure D-69

Using a Extra Dust Collection Hose

Even though the dust shield is efficient, some operations could benefit from using an extra dust collection hose. The Shopsmith DC3300 Dust Collector experiences very little decrease in efficiency when one or tow more hoses are added, so you should consider the setups shown in Figure D-69 and D-70. Figure D-70 illustrates an elbow brush clamped to the worktable behind the shaper fence. This second hose is able to collect dust thrown from the rotation of the cutter.

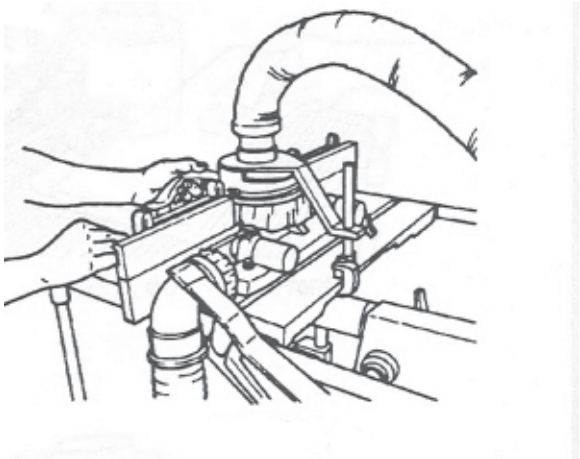


Figure D-70

Figure D-71 shows the utility pickup clamped to the guard support of the standard shield during pin shaping or pin routing operations. The second hose also collects the dust thrown from the rotation of the cutter.

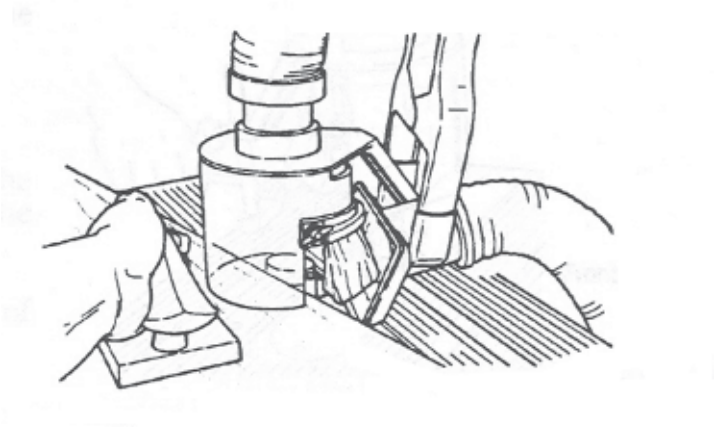


Figure D-71

Pin Shaping and Pin Routing

(Using piloted router bits only)

Install the Pins in the Shaper Table Insert

1. Screw in both pins which came with the shaper table insert, and securely tighten them with a medium blade screwdriver, see Figure D-72.

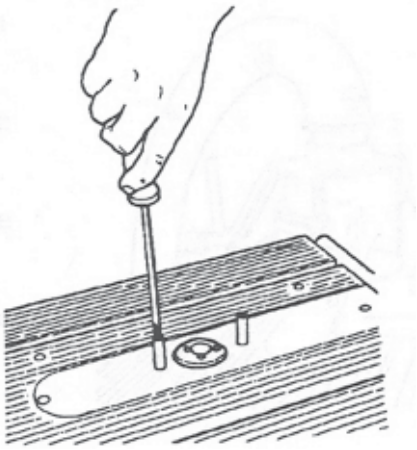


Figure D-72

Install the Cutter

2. Install the cutter:

   a. **IF YOU** will be using a shaper cutter, assemble the shaper spindle according to the section on "Shaper Cutters" on page __, then proceed with Step 4 below.

   b. **IF YOU** will be using a 1/2" shank piloted router bit, insert the bit's shank in the 1/2" router chuck and securely tighten one setscrew, then tighten the other one. Then proceed to Step 3 below.

   c. **IF YOU** want to use a 1/4" shank piloted router bit, insert the bit's shank into the optional 1/4" router chuck (514632) and securely tighten one setscrew, then tighten the other one. Then proceed with Step 3 below.

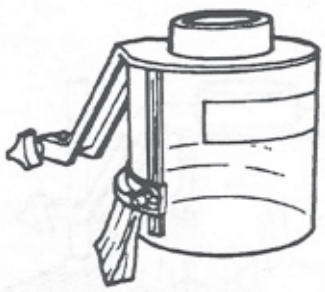


Figure D-73

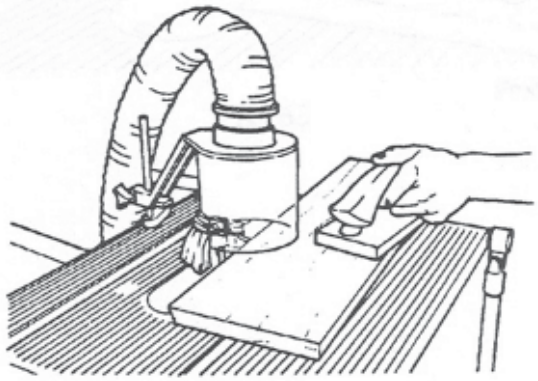


Figure D-74

   d. **IF YOU** want to use the optional full length dust shield for pin shaping or pin routing, shown in figures D-73 and D-74, follow the assembly instructions which came with it and use it in place of the standard dust shield illustrated in this manual. Then proceed to Step 3 below.

3. Turn the table height crank in or out to adjust the worktable and center the cutter under the hole in the shaper table insert. Lock the worktable height crank.

4. Lower the worktable and adjust it according to the height where you wish the cutter to contact the workpiece.

Install the Guard Assembly

5. Place the guard assembly's t-nut into the rear miter slot on the outfeed side of the worktable and tighten the t-nut by turning the post.

6. Lower the guard shield to 1/8" above the top of the workpiece and centered over the cutter.

7. Tighten the three -lobed knob on the support shield.

8. Lower the brush as far as possible, and tighten the two wing nuts.

9. Attach a dust collector hose t o the opening in the top of the guard, as shown in Figure D-75.

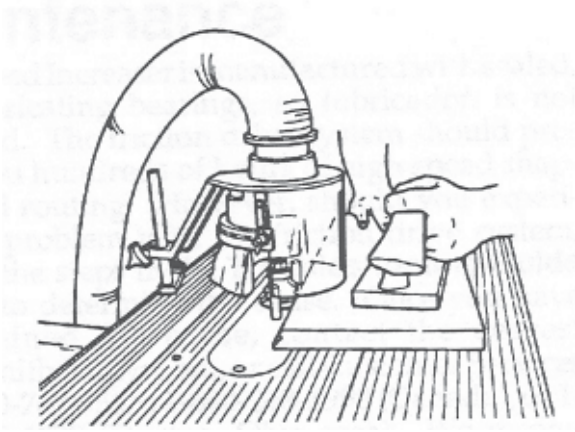


Figure D-75

Make the Cut

10. Make sure that the headstock, quill, worktable, and carriage are all locked and or tightened.

11. Plug in and turn on the Mark 7. Program the speed in accordance with the speed chart built into the PowerPro Headstock.

12. Position the workpiece on the right side of the worktable, as in Figure D-76.

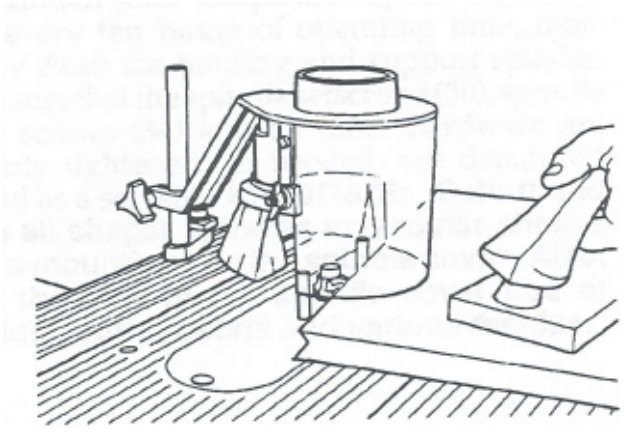


Figure D-76

WARNING

- Feed the workpiece against the rotation of the cutter, right to left in front of the cutter, when the PowerPro Headstock is operating in the forward direction. Otherwise, a kickback can occur.

- Make deep cuts in more than one pass. Avoid taking deep cuts with straight or non-piloted router bits. With the exception of single-pass dovetail cuts, limit the depth of cut to 1/4" for each pass when using straight or non-piloted router bits up to 1/2" diameter. When using shaper or router bits over 1/2" diameter, limit the depth of cut to 1/8" per pass.

- Never pin shape or pin rout without the use of the right starter pin. Always mount the left pin whenever possible.

- Using a push block, hold the workpiece firmly against the right pin and feed the workpiece slowly into the cutter.

- Internal pin shaping, i.e. the shaping of the edge of a hole or small opening (less than 6" in diameter) in any shape, should not be attempted.

Cuts made with the grain of the wood are always smoother and easier than cuts made against or across the grain. For this reason, cross-grain and against-the-grain cuts should always be made slowly. When shaping or routing is required on all four edges of a workpiece, make the end-grain cuts first so any splintering is removed by the edge-grain pass. When it is necessary to push a narrow workpiece under the guard, use at least one push block.

Whenever possible, make the pass with the cutter under the workpiece. This allows the workpiece itself to act as an added guard. Keep your fingers away from cutting area and have them hooked over the outer edges of the workpiece to guard against slipping.

Using Raised Panel Bits

Using raised panel bits and other large, specialty router bits with the Mark 7 ensures the best rpm setting for the bit. Many router bit manufacturers state that large diameter bits are safest and perform best at lower router speeds like the 10,000 rpm operating speed of the Mark 7.

Raised panel bits, illustrated in Figure D-77, and other large, specialty router bits require the use of the drum sander insert in the worktable instead of the shaper table insert. Following the instructions in the section, "Shaping and Routing Using the Shaper Fence," except you must install the drum sanding insert in the worktable instead of the shaper table insert.

Some specialty bits may be wide enough to touch the wooden fence closest to the cutter. Use a bench chisel or sander to remove part of the wooden fence which will touch the cutter.

WARNING

Never use router bits or specialty bits larger than 2-1/8" diameter, or which have an exposed cutting edge of 2-1/2" or longer.

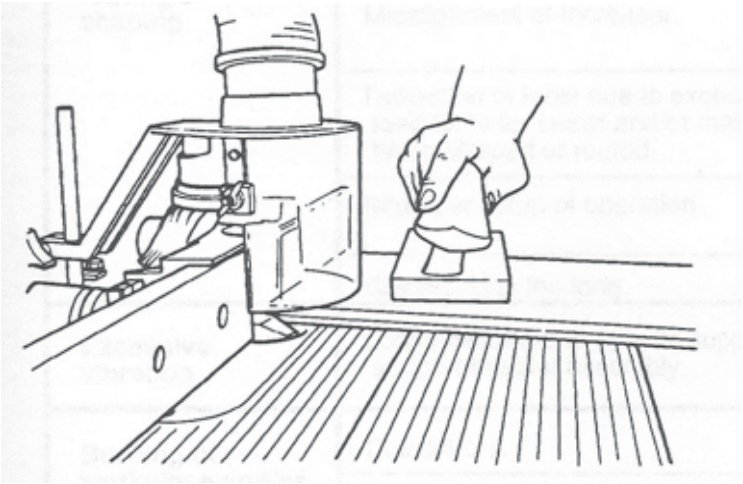


Figure D-77

NOTES

Over-Table Routing Operations

WARNING

WARNING

SAFETY RULSE FOR ROUTING/SLOT MORTISING:

- READ, UNDERSTAND AND FOLLOW all the information in this manual and the Owners Manual for the Mark 7 on which the Routing/Slot Mortising accessories will be mounted.
- Wear safety goggles, safety glasses with side shields, or a full face shield.
- Wear hearing protectors and a dust mask.
- Tuck long hair under a hat or tie it up. Do not wear ties, gloves, jewelry or loose clothing. Roll sleeves up above your elbows. Wear non-slip footwear.
- Always mount the circular shield and brush assembly in the Mark 7 quill before performing Routing/Slot Mortising operations.
- Always run the router at 'FAST' speed.
- Avoid taking deep cuts. With the exception of single-pass dovetail cuts, limit depth of cut to ¼" for each pass when using bits up to ½" diameter. When using bits over ½" diameter, limit depth of cut to 1/8".
- Never freehand rout. Always use the rip fence or miter gauge when using bits without pilots, and a starter pin when using bits with pilots.
- Always feed workpiece against the rotation of the bit. Otherwise a kickback will occur.
- Use a push stick to feed a narrow workpiece. When it is necessary to push a workpiece underneath the shield, use a long piece of scrap wood.
- Cut with the grain when straight-line Routing/Slot Mortising.
- Do not stand directly in-line with the workpiece. In the event of a kickback you could be hit.
- Feed the workpiece slowly. Use extra care in Routing/Slot Mortising workpieces that contain figured grain or knots, as these may cause kickbacks.
- When Routing/Slot Mortising across the grain of workpieces up to 10" wide, always use your miter gauge with safety grip to control the workpiece.
- When stop Routing/Slot Mortising, always use stop block(s) to control the length of cut. Failure to use stop block(s) will cause a kickback.
- When Routing/Slot Mortising an oversize workpiece, always use at least one push block to help control the workpiece. Hold the workpiece firmly against the rip fence.
- When edge Routing/Slot Mortising with a piloted bit, always use either a starter pin or a fence to start the cut and/or guide the workpiece.
- Turn off and unplug the Mark 7 before mounting router bits.
- Use only Shopsmith parts and accessories on your Shopsmith equipment. Mounting non-Shopsmith parts and accessories on your Shopsmith equipment will create a hazardous condition and will void your warranty.
- Make sure the setscrew in the chuck is tightened against the flat of the main spindle.
- Make certain that the two lock-screws secure the bit in the chuck.
- Listen for chatter or signs of looseness at start-up. If you hear, see or suspect problems, turn off the power and unplug the machine. Correct any problem before proceeding.
- Keep the bits clean, maintained and sharp.

ASSEMBLY and SETUP

Before any routing/slot mortising operations can be performed, you must put together the circular shield and brush assembly and set up the Mark 7 properly.

TOOLS REQUIRED:

- Medium blade screwdriver
- 5/32" Allen wrench

WARNING

Turn off and unplug the Mark 7 during the Assembly and Setup procedure.

1. Assemble the circular shield and brush.

   a. Place the cap screw through the washer and mounting bracket. Secure the cap screw with the nut.

   b. Place the mounting bracket into the vertical slot on the circular shield. Make sure the threaded bolt and the guide pin (located just below the threaded bolt) go through the vertical slot. Secure the shield with the washer and wing nut.

   c. Find the mounting "grooves" on the brush, and slide them (from top down) onto their matching "notches" located on the circular shield, then insert a carriage bolt through each side of the shield, with the bolt head inside the shield and the threads pointing outward. Secure the bolts with washers and wing nuts.

2. Set up the Mark 7 into the vertical position. (Refer to section C of this manual).

3. Attach the circular shield and brush assembly to the Mark 7 quill.

   a. Using a 5/32" Allen wrench, loosen the screw (3) on the mounting bracket. Slide the mounting bracket assembly as far up the quill as possible. It should fit up against the quill's collar. When in place, tighten the screw (See Figure D-78)

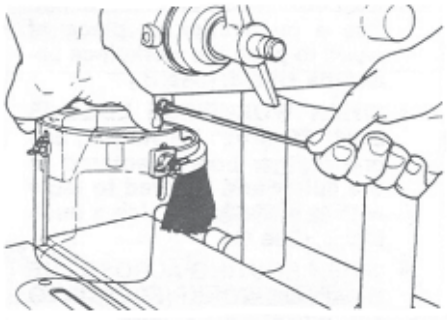


Figure D-78

4. Insert a router bit into the router bit chuck and tighten both bits setscrews. (Make sure you use the appropriate chuck with your choice of router bit.)

   a. Rotate the MARK 7 quill until the flat side of the shaft faces the brush assembly.

   b. Mount the router bit chuck onto the quill shaft with the chuck's setscrew over the flat side of the shaft.

   c. Securely tighten the chuck's setscrew over the flat side of the shaft. (You may need to raise the circular shield in order to get your Allen wrench to the setscrew.)

5. If the rip fence is necessary for the function you are doing, mount the rip fence on the worktable. Position the fence so that it supports the workpiece behind the bit.

6. Position the circular shield and brush assembly. Set the depth of cut you will be making. Loosen the front wing nut (8) and lower the shield until it is 1/8" from the top of the workpiece. Tighten the wing nut. You will note that the brush acts as a rear guard and is lowered to the top of the workpiece and/or the rip fence.

7. Position the workpiece according to the following illustrations in figure D-79:

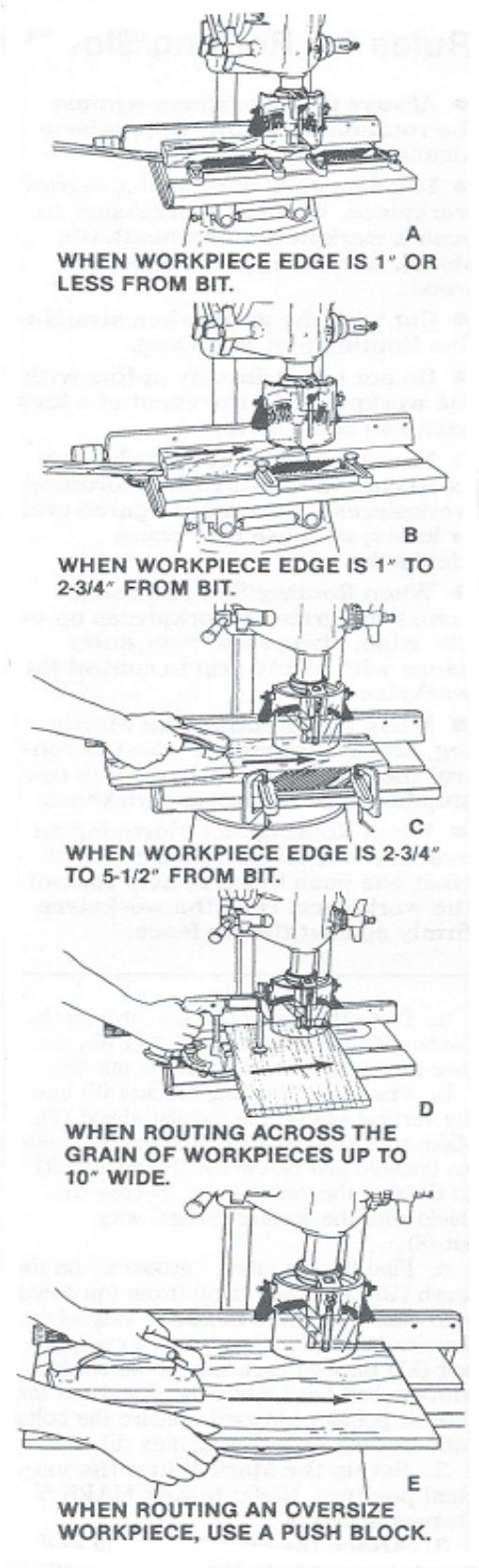


Figure D-79

WARNING

- WHEN WORKPIECE EDGE IS 1" OR LESS FROM BIT, use on feather board on the infeed side and an additional feather board on the outfeed side, both secured in the table slot. Use a push stick or when it's necessary to push workpiece underneath the shield use a piece of wood. (See A.)
- WHEN WORKPIECE EDGE IS 1" TO 2 ¾" FROM BIT, use two feather boards as above or use one feather board centered to the cutter, secured in table slot. Use a push stick or piece of wood to push the workpiece under the shield (See B.)
- WHEN WORKPIECE EDGE IS 2-3/4" TO 5-1/2" FROM BIT, use one feather board centered to the cutter and secured to table with two C-clamps. Use a push block (See C.)
- WHEN ROUTING ACROSS THE GRAIN OF WORKPIECES UP TO 10" WIDE, use a miter gauge and safety grip. Workpiece must extend 5-1/2" away from bit. (See D.)
- WHEN ROUTING AN OVERSIZE WORKPIECE, use a push block (See E.)

GENERAL ROUTING

Feed the work against the router bit's direction of rotation. Because the operations described in this section use the rip fence or an auxiliary facing behind the bit, the feed is always from left to right. The cutting action of the bit tends to keep the work against the fence. If you feed from the opposite side, the bit will try to move the work away from the fence.

The width of each cut depends on the size of the route bit being used. The depth of each cut is set by lowering the quill and locking it in position. Turn off the machine to make dept-of-cut adjustments. Routing/Slot Mortising cuts should be made with the speed dial set at 'FAST' and with reasonable feed pressure so the bit can do its job without choking or burning. Do not form deep cuts in a single pass (dovetail cuts are an exception). Deep cust are easier to make and will be smoother if you get to full depth of cut by making several passes.

The depth of single pass cuts should be limited as follows:

- ¼" maximum depth of cut for bits up to ½" diameter.
- 1/8" maximum depth of cut for bits over ½" diameter.
- Less than the above limits when routing extremely hard wood.

Router cuts made with the grain are smoother than against the grain cuts. If you can't work with the grain, feed the stock slower than normal and use less depth of cut for best results.

When making cross grain cuts, some chipping will occur where the bit cuts through, so allow for it by making the cut on an extra-wide piece. Then remove the chipped edge using the table saw or jointer.

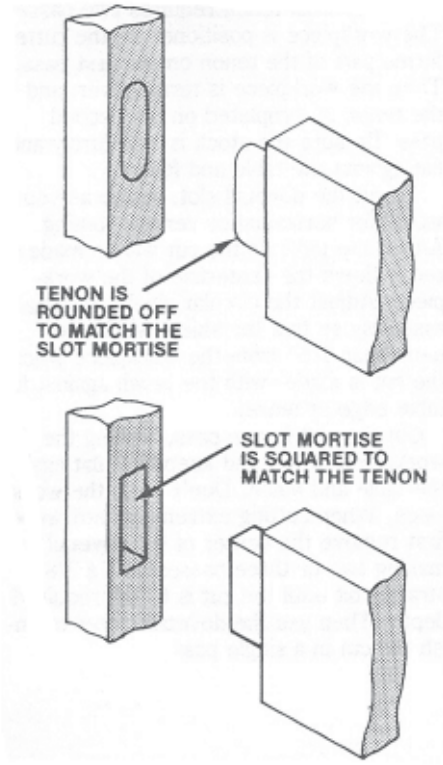


Figure D-80

SLOT MORTISING

Mortise and Tenon joints are used in furniture construction, casework, and other projects. Mortises, in particular, can be made several ways. Good, clean slot mortises (mortises with rounded ends and enclosed on all four sides) can be created with the router bits on your Mark 7.

Tenons are usually cut on the table saw using the Tenon Master Jig (555479). Any tenon made on the table saw, however, will have square ends. So in order to match up a slot mortise with a square tenon, you need to slightly round off the tenon ends with a rasp or bench chisel. If you prefer to have a square mortise to match a square tenon, you need to square up the slot mortise ends, again using a bench chisel. See figure D-80 showing both ways.

One way to make a mortise is to use two stop blocks (see the section on Stop Cuts), one to stop the workpiece at each end of the mortise. To control the length of the mortise, clamp stop blocks to the rip fence. If your workpiece is too long for this, then you will need to clamp stop blocks on the rip fence extension. If you are cutting an open mortise (where the cut extends through the end of the workpiece), you will only use one stop block. After you have clamped on the appropriate stop blocks, set the depth of cut on the Mark 7 quill, plunge the router bit to a proper depth for a pass, then lock the quill. Route the mortise in multiple passes until you reach the desired depth of the mortise.

Another way to cut a slot mortise is to preset the depth you want for the mortise, then plunge the route bit into the workpiece, much as you would a drill bit. Make a series of intersecting plunge holes to the end of the mortise. After making the last plunge cut lock down the Mark 7 quill, then clean out the mortise with the router bit. Make sure you do not accidentally press the bit against the ends of the mortise, because it may lengthen it. If you do wish to lengthen the mortise, do it by plunging the route bit as described above.

How deep can you make a mortise? For a ¼" router bit, go no deeper than ¾" into the wood, a 3/8" bit should go no deeper than 1-3/8", and a ½" bit should go no deeper than 1-1/8". The width of a mortise depends on the size of the router bit you are using.

For open ended or "through" mortises, you can progressively route to the full depth of your bit on one die of the workpiece, then turn the workpiece over and repeat the process on the other side. This way you can use a ¼" router bit on stock up to ½", a 3/8" bit on stock up to 2-3/4", and a ½" bit on workpieces up to 2-1/4".

If you need deeper mortises, you must use a brad-point drill bit to drill out the mortise. You may need to clean up the mortise by using a bench chisel.

RABBETS

Rabbets are two-sided cuts made in front of the fence, utilizing only part of the full diameter of the bit.

When cutting rabbets, make and use auxiliary facing. (See Figures D-81 AND D-82).

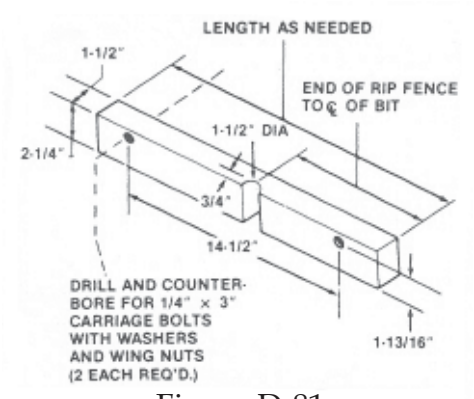


Figure D-81

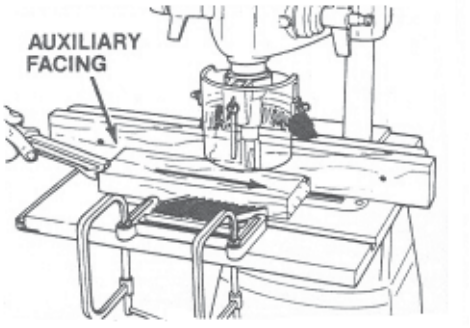


Figure D-82

The relief area allows adjustments so the bit can project beyond the bearing surface of the facing. The depth of cut is controlled by quill extension; width of cut is controlled by how much the bit projects. If you need a wider cut, move the table or reposition the fence and make another pass.

When working with a workpiece that extends beyond the rip fence, use an auxiliary facing that's longer than the fence permitting the use of stop blocks to make stop rabbets.

When cutting an end rabbet, if the size of you stock permits, always use the miter gauge and safety grip to feed the workpiece.

DECORATIVE EDGING

Cutting decorative edges is similar to making rabbets. Some bits have a pilot on the bottom to control lateral depth of cut. If the bit does not have a pilot, straight-line edging must be done using the rip fence and the auxiliary facing. Use feather boards when the work dimensions permit. When cross grain routing, always use the miter gauge with safety grip to feed the workpiece when dimensions permit.

STOP CUTS

Mark the workpiece where the stop cut begins and ends. Clamp stop blocks to the rip fence to control the beginning and end of the cut. A long auxiliary facing may be necessary.

Extend the quill to penetrate the workpiece and lock it. Then move the workpiece until it contacts the stop block. Some stop cuts are quite deep, so repeat passes will be necessary. The width of the slot depends on the size of the router bit.

If the cut starts at the edge of the stock and stops in the center, only one stop block is needed. Cut only when feeding left to right. (See Figure D-83)

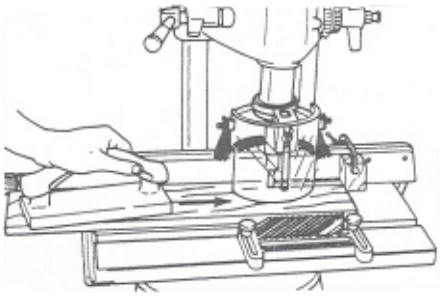


Figure D-83

HORIZONTAL ROUTING

The main advantage of horizontal routing is that more usable table area is provided together with better load support for larger and heavier workpieces.

Put the Mark 7 in the horizontal position. Adjust the circular shield as required by the work to be performed, with the brush moved up to the table from the underside. Feed the workpiece against the rotation of the cutter Keep your hands at least 3" from the bit.

When making cuts with the grain, lower the table below the bit. Bolt a high wooden auxiliary fence to the rip fence (bolts recessed) and clamp the feather board to it to bear against and guide the workpiece. (See Figure D-84)

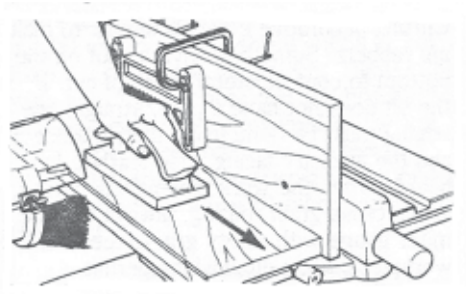


Figure D-84

Use a push block to feed the workpiece from back to front, because the bottom of the bit is doing the cutting.

When making cuts across the grain, use the miter gauge and safety grip and feed from back to front. (See Figure D-85)

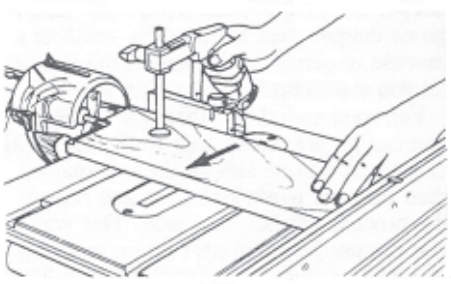


Figure D-85

CAUTION

When using the miter gauge in the left slot, position the table so that the miter gauge clears the bit.

SINGLE DOVETAILS

A dovetail is one of the strongest joints because it will resist a pulling strain in every direction but the one from which the tenons are inserted. The same cutter is used to form the dovetail slot and the tenon.

The dovetail tenon requires two passes. The workpiece is positioned so the cutter forms part of the tenon on the first pass. Then the workpiece is turned over, and the tenon is completed on the second pass. Be sure the stock is held firmly and flat against the table and fence.

To cut the dovetail slot, set up as you would for horizontal or vertical routing. Adjust the table so the cut will be made directly down the center line of the workpiece. Adjust the circular shield will be no more than 1/8" form the workpiece when the cut is made, with the brush against the table edge or fence.

Cut the slot in one pass, feeding the workpiece slowly and keeping it flat against the table and fence. Don't force the workpiece. When cutting extremely hard wood, first remove the center of the dovetail by making two to three passes with a 3/8" straight bit until the cut is to the required depth. Then use the dovetail cutter to finish the cut in a single pass.

NOTES

Maintenance and Troubleshooting

This section of the Mark 7 Owner's Manual contains maintenance information and a troubleshooting guide. It should cover topics and answer most questions you may have for normal maintenance and problem solving. Follow the maintenance schedule below for as long as you own your Mark 7. Regular maintenance is essential for any tool and machine to perform at its best.

The maintenance intervals shown here are based on normal operation. If you work the machine unusually hard, you'll need to maintain it more often.

To estimate "running time", use this rule of thumb: The average woodworker will use his power tools only 20% of the total time spent in the shop– at the most. If you work in your shop for 25 hours, you've probably logged 4-6 hours on your Mark 7. Average the time you spend in your shop to determine the proper maintenance interval for your machine. But the 50-hour procedure should be performed at least once a year.

WARNING

Never operate power equipment that is not working properly. Turn off and unplug the machine before making adjustments or performing maintenance or repair procedures.

Do not attempt any repair which is designated as a "factory job." Doing so may void your warranty.

Use only Shopsmith recommended parts and accessories on your Mark 7.

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Figure 50

Figure 51

Change Over to 240V (if desired)

- You can easily convert your *PowerPro* Headstock from a 120-Volt machine to a 240-Volt machine. You will then be able to use your Headstock on any 240-Volt circuit, either 60-cycle or 50-cycle current, here in the U.S.A. or anywhere else in the world. The electronics inside the *PowerPro* Headstock will automatically sense the change and adapt to the electrical circuit. This change will also increase the motor from 1-3/4 HP to 2 HP.

- To convert your *PowerPro* Headstock from a 120-Volt to a 240-Volt machine, simply change the plug on the machine's power cord to the appropriate 240-Volt plug. In the U.S.A. use a standard 15-Amp, 250-Volt plug shown in figure 51. For 240-Volt, 50-Hz plugs overseas, consult a qualified electrician in that country for the proper plug selection. If at any time in the future, you need to operate your machine on a 120-Volt circuit, change the plug back to a 120-Volt plug.

CAUTION

- **The 240-volt circuit in your home used to power the *PowerPro* Headstock must be installed by a qualified electrician.**

- **If at any time you are uncomfortable with changing the plug on your Power Cord, the procedures below or you are unsure of the proper procedures or plug to use, consult a qualified electrician before you attempt to change the plug on the end of the Power Cord.**

Follow the steps below to change the plug on the end of the Power Cord.

· Cut the old plug from the end of the Power Cord.

· Feed the wires through the new 240-Volt Plug.

· Following the instructions with the new 240-Volt plug, strip the insulation and wires of the Power Cord to the proper length.

· Connect the black wire of the Power Cord to the dark, or gold colored terminal in the plug that connects to a flat pin of the plug.

· Connect the white wire of the Power cord to the light, or silver colored terminal in the plug that connects to the other flat pin of the plug.

· Connect the green with yellow striped wire of the Power Cord to the green terminal in the plug that connects to the round pin of the plug.

· Assemble the inner and outer halves of the new 240-Volt plug using the screws provided.

· Clamp the plug to the Power Cord by tightening the screws provided on the cord clamp on the back end of the plug.

Maintenance and Troubleshooting

This section of the Mark 7 Owner's Manual contains maintenance information and a troubleshooting guide. It should cover topics and answer most questions you may have for normal maintenance and problem solving. Follow the maintenance schedule below for as long as you own your Mark 7. Regular maintenance is essential for any tool and machine to perform at its best.

The maintenance intervals shown here are based on normal operation. If you work the machine unusually hard, you'll need to maintain it more often.

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MAINTENANCE SCHEDULE

As needed	• Clean the saw guards and sanding disc. Refer to **Maintaining Accessories.** • Sharpen saw blades, drill bits and lathe chisels.
Every 5 hours of running time	• Clean the Mark 7. Refer to **Cleaning.** • Wax the Mark 7. Refer to **Waxing.**
Every 10 hours of running time	• Repeat the preceding steps. • Lubricate the drive shaft and idler shaft. • Check the action on the anti-kickback system and the lower guard, wax the splitter on the lower guard and lubricate the chuck. Refer to **Maintaining Accessories.** • Check the alignment and adjustment of the power base mounts, carriage locks, worktable stops, table tilt indicator, miter gauge slots, miter gauge, rip fence, extension table and lathe centers. Refer to the **Alignment** instructions in this manual.

Preparation

WARNING

Turn off and unplug the Mark 7 BEFORE you begin any maintenance procedure.

Before you begin a maintenance procedure, remove the blades, bits or any other accessories that are mounted on the machine. Set the machine in the horizontal position and secure the headstock lock. Finally, move the worktable and carriage as far to the right as it will go.

Cleaning

As you work, sawdust will accumulate on and in your Mark 7. This residue can affect its performance. To prevent problems, clean your Mark 7 thoroughly inside and out once every 5 hours of running time or monthly.

Blowing Out the Headstock

1. With a medium Phillips screwdriver, remove the two screws that hold the belt cover. Then slide the belt cover back along the way tubes toward the left. Open the access hole by removing the bottom screw and turning the nameplate 180°.

2. Working through the openings, completely blow out all the sawdust from the inside of the headstock. Use an air compressor. Replace the screw.

Cleaning the Table

3. Clean the miter gauge slots with a clean rag and mineral spirits. With a 5/32" Allen wrench, remove the two screws that secure the table insert. Using a small stick, scrape out any sawdust that has accumulated under the insert.

Cleaning the Racks

4. Extend the quill as far as it will go, lock it in place. With a small stiff brush, brush off hte teeth on the bottom of the quill, as demonstrated in Figure E-1.

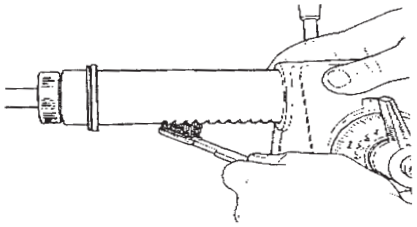

Figure E-1

5. To clean the table rack, remove the table from the carriage. Brush the sawdust from between the teeth on the table support tubes and the pinions in the carriage.

Brushing Off

6. Give the entire machine a good going over with a soft brush to remove any remaining sawdust or dirt. If you find any grease or grime on the way tubes, or any other part, clean it off with mineral spirits.

7. When your Mark 7 is clean, wax and buff all parts (refer to Waxing), replace the table in the carriage, reinstall the table insert and belt cover, and reposition the nameplate.

Waxing

CAUTION

Use paste floor or furniture wax. Do not use car wax or spray furniture polish. The Mark 7 needs wax for both protection and lubrication. Car wax offers good protection for metal, but it is extremely hard and has little value as a lubricant. Furniture polish isn't hard enough. Paste floor or furniture wax protects and lubricates.

Every 5 hours of running time, wax and buff the following parts:

- Bench and way tubes

- Worktable surface, miter gauge slots, table support tubes, and the table tubes
- Quill
- Rip fence (both sides)
- Miter gauge bar
- Extension table surface, support tubes, and table tubes
- Mounting holes in the power mount, base mount and carriage.

8. Apply the wax sparingly and buff it thoroughly. If you apply too much wax or don't buff it out, the wax will mix with sawdust, impede moving parts, and leave residue on the wood.

9. Some of the parts that need waxing require special care:

   a. **Way Tubes** - Don't slide the headstock and/or carriage over new wax before you buff it out. Otherwise, wax may accumulate inside the headstock or carriage and impede movement.

   b. **Quill** - Extend the quill as far as it will go, lock it in place, then wax. After waxing, brush the rack with a stiff brush to remove all the residue between the teeth, see Figure E-2.

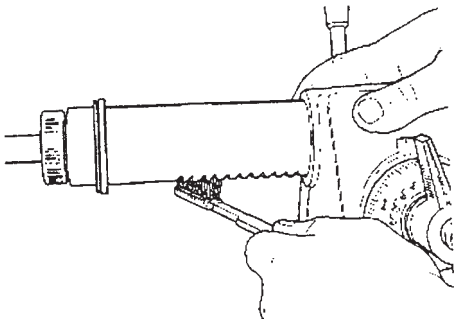

Figure E-2

   c. **Table Support Tubes** - After waxing, brush tubes to remove all residue from the racks.

   d. **Mounting Holes** - Wrap a rag around a dowel to apply wax inside these holes. Use the same technique to buff it out.

Motor Belt Tensioning

CAUTION

Belt Tension and Balancing has been preset at the Factory, DO NOT DO adjustment unless you have an issue with belt slippage or wear.

Tool Required:

- 5/32" Allen Wrench

Procedure:

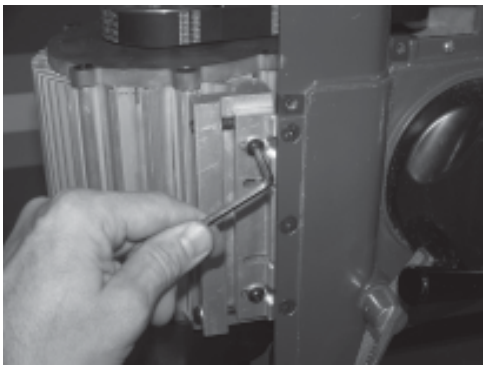

Figure E-3

10. Loosen the two Tension Locking, button head screws (522660) in each Motor Mount Assembly, on both sides of the Motor. Loosening these screws will allow you to reduce or increase the tension on the Poly-V Motor Drive Belt (522610). See Figure E-3.

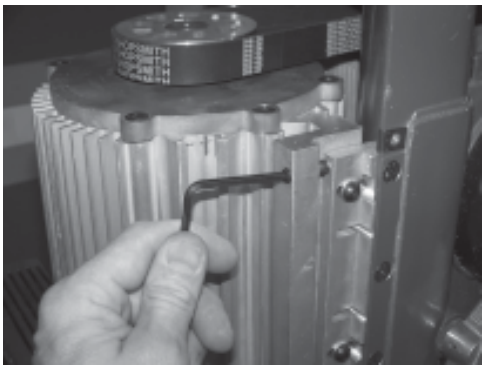

Figure E-4

11. To change the tension on the Poly-V Motor Drive Belt, turn the Tensioning Setscrew (522662) found at the end of each motor mount, closest to the Motor Pulley. Make changes in this Tensioning Setscrew in no more than half-turn increments. See Figure E-4

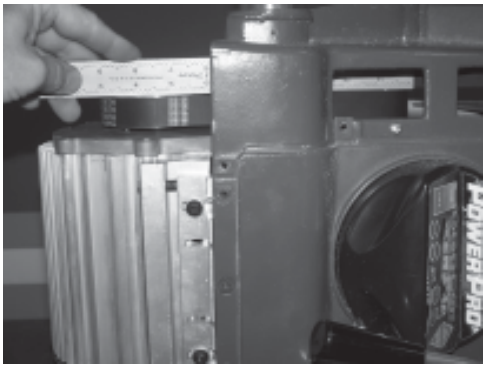

Figure E-5

12. Place a 12" long straightedge on the pulley to check that the face of the Motor Pulley is still aligned with the center of the Poly-V Pulley on the Idler Shaft. See Figure E-5.

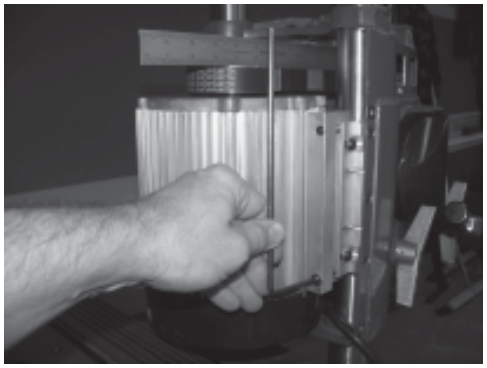

Figure E-6

13. Rotate both Belt Alignment, button head screws (522660). This will align the Motor Pulley face, with the straightedge, with the center of the Poly-V Pulley on the Idler Shaft. These button head screws are found on the opposite end of the motor mount assembly from the Tensioning Setscrews, as shown in Figure E-6.

14. When the pulley is aligned, tighten the two Tension Locking, button head screws (522660) in each Motor Mount Assembly, on both sides of the Motor that were loosened in step 22 above.

Balancing the Belt Tension

Once you have tensioned the belt, you will need to balance the belt. This next step balances the belt tension between the upper and lower Poly-V belts. This step is critical for Idler Shaft Bearing life. When you follow the steps below the bearings will run smooth, relatively cool and quiet.

To balance the belt tension you will be running your new Power Pro Headstock at five different speeds, progressively running it faster and faster.

WARNING

♦ Following the procedures below, require you to work on the machine while it is running, without the belt cover or the motor pan in place. You will be working around exposed moving belts and shafts. Be careful you do not allow a tool, loose clothing or body part to slip out of position and into these moving parts.

- Plug in the headstock and turn on the main power switch. You will hear a couple of clicks and some music from inside the Headstock. You will see a series of warning messages go across the screen of the Control Panel. When you read "500 RPM Ready to Run" on the screen, you are ready to begin.
- Make sure all is clear of the pulleys, belts and shafts on the left end of the Headstock. Press the "ON" button on the Control Panel. The Headstock will come to life at 500 rpm. Listen for any rattling or scraping noises. Turn off the headstock.

CAUTION

The Headstock should run smooth and quiet at this point. If it does not run smooth and quiet, turn off the Headstock, unplug the motor, investigate and fix the problem and start over.

- Press the 900 r.p.m. button and then press "ON" to run the Headstock at 900 rpm. The Headstock will run at 900 rpm. Listen for any rattling or scraping noises. Turn off the headstock.
- Press the 1350 r.p.m. button and then press "ON" to run the Headstock at 1350 rpm. The Headstock will run at 1350 rpm. Listen for any rattling or scraping noises. Turn off the headstock.
- Press the 2000 r.p.m. button and then press "ON". The control Panel will ask you to ??? CONFIRM ??? to run the Headstock at 2000 rpm. When you press the CONFIRM button the motor will start. Be prepared for this.

NOTE

You must press CONFIRM pad to run the PowerPro Headstock at any speed over 1500 rpm.

The Headstock will run at 1350 rpm. Listen for any rattling or scraping noises. Turn off the headstock.

- If all seems OK with the drive system in the Headstock then it's time to balance the belt tension between the two Poly-V belts. This is done with the machine running at 3450 rpm. Prepare the tools you will need and have them ready.
- "A" and "B" Headstocks with Bearing Keepers:
  - Medium Flat Slot Screwdriver
  - 1/2" and 9/16" open end wrenches
  - "B" and "C" Headstocks without Bearing Keepers:
  - Medium Flat Slot Screwdriver
  - 1/2" open end wrench
  - 1/4" Allen wrench
- Loosen (but do not remove) the bolt and nut holding the eccentric around the Idler Shaft.
- Press the 3450 r.p.m. button and then press "ON". Press the CONFIRM button to start and run the Headstock at 3450 rpm. .
- With the machine running at 3450 rpm., place the blade of the screwdriver in the slot in the eccentric. With a little force, you should be able to rotate the eccentric ten to fifteen degrees. Listen to the noise of the Headstock. As you turn the eccentric, you will hear it get louder and quieter. You will also feel the eccentric become difficult to rotate at both ends and easier to turn in the middle of the rotation.
- Position the slot in the eccentric at the point where the machine runs quietest. This should also be where the eccentric is the easiest to turn.
- Tighten the bolt and nut that holds the eccentric in the Headstock casting. If the noise increases when you tighten this hardware, stop and adjust the position of the slot in the eccentric to a position where the machine runs quietest. Continue to tighten this hardware. Turn OFF your motor and turn OFF the main power switch to your machine.

ONLY snug this bolt and nut. DO NOT over tighten this hardware. Tightening this hardware too tight will break the cast ears around the eccentric and ruin your Headstock casting. It only has to hold the eccentric and idler shaft in position. To test that it is tight enough, with the machine OFF, push on the end of the idler shaft with your hand. If it does not slide in the casting it is tight enough.

NOTE

If you push on the Poly-V belts from the side after balancing the tension, the upper belt will feel tighter than the lower belt. This is caused by the different lengths of the two belts, not different belt tensions. If you have followed the steps above, the belt tension is balanced.

Maintaining Accessories

In addition to maintaining the basic machine and the parts you use in more than one mode (such as the miter gauge or rip fence), you must maintain the individual accessories for each separate mode– saw guards, sanding discs, drill bits, etc...

Saw Guard System

15. As needed, brush off and blow away the sawdust that accumulates in the saw guards. The upper saw guard has a plastic insert toward the front, where most of the sawdust builds up. This can easily be removed, cleaned, and reinstalled. Dissolve the impacted sawdust with mineral spirits.

DO NOT use lacquer thinner to clean the saw guards. This solvent dissolves the plastic parts, distorting them or making them cloudy.

16. Every 10 hours of running time, wax and

buff the riving knife on the upper saw guard. Check that the anti-kickback system and the spring-loaded lower saw guard operate smoothly. If either of these seems stiff, apply powdered graphite or a dry lube product to the rods. Do not use oil on these parts.

Sanding Disc

17. As you work, sawdust, wood oils, glues and other materials will "load up" on sandpaper. As needed, hold an abrasive cleaner against the disc while the Mark 7 is running at low speed. The soft rubber reaches in between the grit and digs out the impacted materials without stripping the abrasive off the sandpaper.

Drill Chuck

18. Every 10 hours of running time, apply a small amount of powdered graphite or a dry lube product to the inside of the drill chuck to keep it operating smoothly.

Saw Blades, Lathe Chisels and Drill Bits

19. These cutters will become dull with use. Sharpen as needed. A sharp cutter performs better and is safer.

Storing

20.. In normal use, regular cleaning, lubrication, and waxing will prevent the ferrous parts of the Mark 7 from rusting. However, if the machine is to be stored for an extended period or under unusually humid or corrosive conditions, spray the way tubes, saw blades, drill chuck and bits, and any other ferrous parts and accessories with a rust-inhibiting light oil. Remove this oil with mineral spirits and re-wax the Mark 7 before using it again.

Tensioning the Quill Feed

21. The quill feed should be tensioned so that the quill retracts easily and smoothly, but not so tight that the spring binds when the quill is fully extended. If you should need to adjust or restore the tension on the quill, follow this procedure:

WARNING

- Turn off and unplug the Mark 7 before performing the following procedures.
- Do not prematurely release control of the quill feed lever during removal and/or installation of the quill. Attached to the quill is a tight, "loaded" spring. If the quill feed lever is released before the spring has "unloaded" its tension, the quill could cause injury.

a. Remove the quill. On top of the headstock, between the quill lock and quill feed stop, there is a setscrew that keeps the quill from advancing all the way out of the headstock. If your machine has never been worked on before, this screw is covered with gray lead. Dig out the lead system with a pen knife, and back out the setscrew 2 full turns.

b. Advance the quill until you feel the rack disengage from the quill feed pinion. Do not let go of the quill feed lever. Continue to hold onto the lever and pull the quill assembly out of the headstock. When you have removed the quill assembly, set the quill feed stop at 4-1/4". Tighten the stop lock.

CAUTION

Do not tighten the quill lock. This will damage parts.

c. Adjust the tension. With your hand holding the quill feed lever, release the quill feed stop lock and slowly let the lever unwind. When the tension has been relieved, rewind the lever 3

full turns clockwise (as you look at the headstock from the speed dial side). This will restore the tension to its original factory setting.

d. Install the quill assembly, by simply reversing the procedure you used to remove it. Turn the main spindle until it slips into the drive and ring assembly. Also, the groove in the top of the quill must line up with the setscrew in the top of the headstock. Tighten this setscrew until it "bottoms out" in the groove, then back it out 1/16" turn.

The drive hub which is installed on the intermediate shaft is used to power Major Accessories. It also serves as a heat sink, reducing temperature caused by friction in the bearing seal on the intermediate shaft.

DO NOT remove the drive hub unless you require service of internal components. If service is done on the internal components, be sure to replace the drive hub after service is completed.

NOTES

Correcting Problems with the Troubleshooting Guide

Power tool problems usually have simple solutions — under normal use, you should rarely have to service your Mark 7. Most problems can be corrected by maintenance, alignment, adjustment, or a change in work habits. For instructions on maintenance, consult the Maintenance Section of this manual. To help diagnose and remedy any problem that may arise when using your Shopsmith Mark 7, use this Troubleshooting Guide.

How to Use the Troubleshooting Guide–

1. Consider where the origin of the problem may be.

2. Refer to the Table of Contents below and go to the appropriate page.

3. Once you have identified the possible cause, follow the solution prescribed.

WARNING

Never operate power equipment that is not working properly. Turn off and unplug the machine before making adjustments or performing maintenance or repair procedures.

Do not attempt any repair which is designated as a "factory job." Doing so may void your warranty.

Use only Shopsmith recommended parts and accessories on your Mark 7.

Troubleshooting Table of Contents

Problem	Possible Cause	Solution
Quill and Main Spindle	Main spindle bent.	Replace Quill Assy.
Excessive play in main spindle.	Spindle collar improperly seated.	Loosen setscrew in collar. Pull out on spindle while pushing in on collar and tighten setscrew.
	Drive and ring assembly worn.	Replace drive and ring assembly.
	Bearing worn.	Replace quill or main spindle assembly
Quill sticks or binds when extended.	Foreign material in rack.	Clean and wax quill.
	Setscrew that rides in groove on top of quill too tight.	Loosen setscrew.
	Burrs on quill or in headstock.	Remove burrs with fine file.
	Not enough tension on quill spring.	Tension spring.
Quill will not lock in position.	Washer under quill lock missing, broken or assembled improperly.	Replace or assemble washer properly.
Quill clicks when extended and will not retract.	Quill spring broken or disconnected.	Replace or reconnect spring and retension.
	Screw that holds end of spring broken.	Replace screw and tension spring.
	Setscrew holding spring housing in headstock loose.	Align notch in housing with setscrew, then tighten and tension setscrew.(Do not overtighten).
Quill cannot be extended.	Setscrew in top of headstock too tight.	Loosen setscrew 1/8 turn.
	Quill lock secured.	Loosen quill lock.
	Foreign material in rack.	Clean and wax quill.

Problem	Possible Cause	Solution
Main spindle heats up.	Bearing worn.	Replace quill.
Main spindle wobbles.	Main spindle bent.	Replace quill.
Worktable and Carriage		
Table hard to raise and lower.	Racks and pinions clogged with foreign materials.	Clean racks and pinions. Wax and buff table support tubes.
	Table height lock secured.	Loosen lock.
	Pinion gears damaged.	Replace pinions.
	Burrs on table extrusions or in carriage holes.	Remove burrs with fine file.
	Table extrusions damaged.	Replace extrusions. **(Factory job)**
	Front and back table post racks not in alignment with each other.	Turn table height adjusting handle to raise table while lifting tie bar assembly. Once posts are free of carriage, adjust table until racks engage pinions simultaneously. Lower table into carriage.
Table miter slots seem to give two different cuts.	Miter gauge protractor face not flat.	Replace protractor.
	Square used to align miter gauge not square.	Use precision square.
	Miter gauge glides not adjusted.	Adjust glides.
	Table warped.	Replace table.
	Table improperly aligned.	Align table.
Table wobbles.	Tilt lock loose.	Secure tilt lock.
	Trunnion bolts loose.	Tighten bolts.

Problem	Possible Cause	Solution
	Carriage lock loose.	Secure carriage lock.
Table won't fit in carriage.	Racks and pinions clogged with foreign materials.	Clean racks and pinions. Wax and buff table support tubes.
	Table height lock secured.	Loosen lock.
	Tie bar assembly bent.	Push table support tubes together or spread them apart slightly. If this doesn't work, replace tie bar assembly.
Table insert not flush with table (too low).	Wood catches.	Place a peice of masking tape underneath until it is even with table.
Table insert not flush with table (too high).	Sawdust under insert.	Remove insert and clean.
Table won't tilt to drill press position.	Tilt lock secured.	Loosen tilt lock.
	Impacted sawdust in trunnions.	Clean trunnions **(Do not Wax)**.
	Table trunnion bolts not properly located, causing binding.	Loosen trunnion bolts and re-align.
Carriage shifts on way tubes after being locked in position.	Carriage lock handle improperly adjusted.	Tighten nut on back of carriage lock handle shaft.
Table won't lower to boring position.	Impacted sawdust on support tube racks or pinions.	Clean racks and/or pinions.
Carriage lock sticks.	Foreign material in mechanism. Lock too tight.	Clean carriage lock mechanism. Only tighten 1/4 turn past 'snug.'
Table will not lock at desired height.	Table height lock not secure.	Secure lock.

Problem	Possible Cause	Solution
Way Tubes and Locks Way tubes are dented and/or locks make a popping sound when released.	Headstock and carriage locks too tight.	Only tighten 1/4 turn past 'snug.'
Carriage and headstock hard to slide on way tubes.	Way tubes need waxing.	Wax and buff way tubes.
Carriage and headstock hard to slide on way tubes (cont'.).	Too much wax on way tubes.	Buff wax thoroughly.
	Way tubes dented.	Turn way tubes 1/4 turn. If dents are too deep, file with fine file or replace way tubes.
	Way tubes scored.	Clean and resurface tubes with wet/dry sandpaper and oil. also clean inside surfaces of ounting holes in power plant.
	Way tubes corroded.	Clean way tubes with steel wool, wax and buff.
Carriage and headstock won't move apart.	Carriage and/or headstock locks too tight. Way tubes in a bind.	Loosen locks.
Way tubes corroded.	Mark 7 not maintained often enough.	Clean way tubes with steel wool, wax and buff.
Way tube tie bar loose on Power Base Mount or Base Mount..	Power Base Mount lock handle not secure.	Secure lock.
Mark 7 won't tilt to vertical position.	Extension table in base mount.	Remove extension table.
	Base lock turned in too far.	Unscrew base lock.
	Screws in underside of bar loose.	Tighten screws.

Problem	Possible Cause	Solution
Miter Gauge		
Miter gauge binds in slots.	Taper screw in bar turned in too far.	Back out taper screw.
	Miter gauge bar bent.	Replace bar.
	Table warped.	Replace table.
	Burrs in table slots or bar.	Remove burrs with fine file.
	Foreign material in table slot.	Clean, wax and buff table slots.
Miter gauge rocks side to side.	Glides improperly adjusted.	Adjust glides.
Wood teeters on miter gauge protractor.	Protractor face warped.	Replace protractor.
Miter gauge does not cut indicated angle.	Angle stops inaccurately set.	Reset stops.
	Tool used to set angle not accurate.	Use precision tool.
	Scale improperly adjusted.	Adjust scale.
	Protractor face warped.	Replace protractor.
	Wood not being held firmly against miter gauge.	Hold wood firmly. Use safety grip, whenever possible.
Safety grip makes marks on wood.	Too much hand grip pressure.	Use less pressure.
	Burr on shoe.	Remove burr with fine file.
Extension Table		
Extension table not level with worktable.	Extension table offset slightly or not properly aligned.	Use the jam nuts to adjust the table up or down as needed.
Extension table difficult to mount.	Accessory mount (headrest) handle blocking holes.	Loosen handle.

Problem	Possible Cause	Solution
Extension table difficult to mount (cont.').	Tubes dirty.	Clean, wax and buff tubes.
	Burrs in holes or on tubes.	Remove burrs with fine file.
	Tubes are bent or pinched.	Replace base assembly.
	Tubes are bowed in or out.	Push support tubes together or spread them apart slightly. If this doesn't work, replace base assembly.
Saw Blades Saw blade wobbles.	Saw blade improperly mounted on arbor.	Mount saw blade properly.
	Saw blade not secure on arbor.	Tighten blade on arbor.
	Arbor not secure on spindle.	Tighten arbor on spindle.
	Main spindle bent.	Replace quill.
	Bearing worn.	Replace bearing. **(Factory job)**
	Drive and ring assembly worn.	Replace drive and ring assembly.
	Foreign material between arbor and blade.	Remove blade from arbor and clean.
	Blade warped.	Slight warps are normal and will straighten as machine reaches cutting speed. If warped more than 1/16", replace blade.
Saw blade loads up with pitch or resin.	Saw blade dull.	Touch up or sharpen blade.
	Normal buildup due to certain woods.	Clean blade with saw pitch remover or resin remover.
	Rip fence improperly aligned.	Align rip fence.
	Table out of alignment.	Align table.

Problem	Possible Cause	Solution
Saw blade loads up with pitch or resin (cont.')	Blade mounted backwards.	Mount blade correctly.
	Wrong blade for job.	Use proper blade.
	Wrong saw speed.	Use proper speed.
Upper and Lower Saw Guards Wood hits or binds on splitter.	Splitter or riving knife improperly aligned.	Align splitter or knife.
	Splitter or riving knife bent.	Bend splitter or knife slightly. If this doesn't work, replace splitter or knife.
Upper guard hits blade.	Guard improperly aligned.	Align guard.
Upper guard hard to mount.	Splitter fastening system not secure.	Secure fastening system.
	Foreign material in mounting slots.	Clean slots with mineral spirits or turpentine. **Do not use lacquer thinner.**
Upper guard cloudy.	Impacted sawdust on guard.	Remove insert and clean with mineral spirits or turpentine. **Do not use lacquer thinner.**
Left side of lower guard binds or sticks.	Rods need lubrication.	Apply dry lube product to rods.
	Foreign material in guard.	Clean guard.
Sanding Disc Disc wobbles.	Disc not secure on spindle.	Tighten setscrew in hub.
	Drive and ring assembly worn.	Replace drive and ring assembly.
	Disc warped.	Replace disc.

Problem	Possible Cause	Solution
Disc wobbles (cont.')	Spindle collar loose.	Remove disc, hold outward pressure on spindle to take up slack, push collar in toward quill housing and lock setscrew. Or, add shims between outer quill bearing and retaining ring.
Sandpaper won't stick to disc.	Disc dirty.	Clean disc with denatured alcohol.
	Adhesive worn out.	Replace sandpaper.
Sandpaper tears or wears out quickly.	Too much pressure and/or sanding in one spot.	Use light, even pressure. Keep wood moving.
	Sandpaper wet, then dried.	Replace sandpaper.
	Sandpaper loaded with sawdust.	Clean sandpaper with cleaning stick.
Sandpaper loads with sawdust.	Wood wet, oily, glued or painted.	Clean sandpaper with cleaning stick.
	Sanding in one spot.	Keep wood moving.
	Too much pressure.	Use light, even pressure.
Drill Chuck Chuck hard to tighten or loosen.	Chuck sticking.	Apply dry lube product.
	Chuck corroded.	Replace chuck.
	Internal gears broken.	Replace chuck.
Chuck wobbles.	Chuck loose on spindle.	Tighten setscrew in chuck.
	Chuck defective.	Replace chuck.
	Main spindle bent.	Replace quill.

Problem	Possible Cause	Solution
Lathe Accessories Drive center tears wood	Drive center not driven far enough into wood.	Drive center spurs must penetrate 1/16" into workpiece.
	Spindle not held tightly between centers.	Apply more pressure with quill feed.
Small dents or nicks in tool rest.	Normal wear from chisels.	File or grind tool rest flat again. Also file sharp corners off shanks of chisels to keep this from happening again.
Tool rest tube difficult to mount.	Tube and/or pinions dirty.	Clean tube and pinions.
Tool rest turns when working	Table height lock is loose.	Secure lock.
	Setscrew in arm loose.	Tighten setscrew.
	Tool rest mounting pin (where arm and tool rest join) worn by setscrew.	Replace tool rest.
Table Sawing Cut not square or not at the indicated angle.	Table improperly aligned with main spindle.	Align table.
	Rip fence not parallel to blade.	Align rip fence and/or table.
	Miter gauge improperly adjusted.	Adjust miter gauge.
	Protractor face warped.	Replace protractor.
	Table and/or blade shifts.	Secure all locks.
	Work shifts as you cut.	Hold the work firmly against the table, rip fence and/or miter gauge.
	Square not square.	Use precision square.

Problem	Possible Cause	Solution
Wood binds when cutting.	Work shifts as you cut.	Hold the work firmly against the table, rip fence and/or miter gauge.
	Wrong blade for job.	Use proper blade.
	Table improperly aligned with main spindle.	Align table.
	Rip fence not parallel to blade.	Align rip fence and/or table.
	Rip fence extrusion bowed.	Replace rip fence extrusion.
	Splitter ad/or riving knife not aligned with blade.	Align splitter and/or riving knife.
	Table and/or blade shifts.	Secure all locks.
	Wood improperly seasoned.	Use only dry, seasoned wood.
Wood stops or sticks during cut.	Mounting screws in table insert tightened improperly.	Tighten screws properly.
	Splitter not aligned with blade.	Align splitter.
	Saw blade prone.	Make sure wood is clear of saw blade.
	Table needs wax.	Wax and buff table.
Wood burns.	Blade dull and/or dirty.	Touch up or sharpen and/or clean blade.
	Table improperly aligned with main spindle.	Align table.
	Rip fence improperly aligned.	Align rip fence and/or table.
	Blade mounted backwards.	Mount blade correctly.
	Wrong blade for job.	Use proper blade.
	Table and/or blade shifts.	Secure all locks.
	Wrong saw speed.	Use proper speed.

Problem	Possible Cause	Solution
Black marks appear on wood.	Table and/or rip fence need wax.	Wax and buff table and rip fence.
Cut edge is rippled or uneven.	Work shifts as you cut.	Hold the work firmly against the table, rip fence, and/or miter gauge.
	Table and/or blade and/or fence shifts.	Secure all locks.
	Blade not secure on arbor.	Tighten blade on arbor.
	Arbor not secure on spindle.	Tighten arbor on spindle.
	Foreign material between arbor and blade.	Remove blade from arbor and clean.
	Blade warped.	Replace blade.
.	Set of the teeth on blade worn or incorrect.	Reset teeth at professional saw shop.
	Feed rate too fast.	Feed work slower.
	Table improperly aligned with main spindle.	Align table.
	Rip fence improperly aligned.	Align rip fence and/or table.
	Wrong blade for job.	Use proper blade.
	Wrong saw speed.	Use proper speed.
Wood hard to cut.	Blade dull.	Touch up or sharpen blade.
	Table and/or blade shifts.	Secure all locks.
	Table improperly aligned with main spindle.	Align table.
	Rip fence improperly aligned.	Align rip fence.
	Feed rate too fast.	Feed work slower.
	Blade mounted backwards.	Mount blade correctly.

Problem	Possible Cause	Solution
Wood hard to cut (cont.')	Wrong blade for job.	Use proper blade.
	Wrong saw speed.	Use proper speed.
	Very hard wood.	Take your time; don't force work.
	Wood improperly seasoned.	Use only dry, seasoned wood.
Disc Sanding Wood burns.	Sandpaper worn.	Replace sandpaper.
	Too much pressure and/or sanding in one spot.	Use light, even pressure. Keep wood moving.
	Sandpaper loaded with sawdust.	Clean sandpaper with cleaning stick.
	Speed too high.	Reduce speed.
	Grit too fine.	Use coarser grit.
Wood lifts from table or 'chatters'.	Sanding on upward motion side of disc.	Sand on downward motion side only.
	Work improperly held.	Hold work firmly on table.
	Table too far from disc.	Move table closer to disc.
	Center of sanding disc above table.	Set table height just above center of disc.
	Disc warped.	Replace disc.
Work jams between disc and worktable.	Table too far from disc.	Move table closer to disc.
Angle on sanded edge not as indicated.	Table not square to disc.	Align table.
	Table and/or disc shifts.	Secure all locks.
	Tool used to set angle not accurate.	Use precision tool.

Problem	Possible Cause	Solution
Angle on sanded edge not as indicated (cont.')	Miter gauge improperly set.	Adjust miter gauge.
	Work improperly held.	Hold work firmly on table.
	Protractor face warped.	Replace protractor.
Sanded surface rippled or scored.	Grit too coarse.	Use finer grit.
	Disc warped.	Replace disc.
	Work improperly held.	Hold work firmly on table.
	Trying to remove too much stock.	Reduce pressure.
	Table and/or disc shifts.	Secure all locks.
	Sanding in one spot.	Keep work moving.
Raised area on sanded surface.	Center of sanding disc above table and sanding in one spot.	Set table height just above center of disc and keep work moving.
	Sandpaper worn.	Replace sandpaper.
Wood difficult to sand.	Sandpaper loaded with sawdust.	Clean sandpaper with cleaning stick.
	Speed too low.	Increase speed.
	Grit too fine.	Use coarser grit.
	Wood very hard.	Use slightly slower speed.
Drilling and Boring Bit wanders from hole center.	Bit dull.	Sharpen bit.
	Bit improperly mounted in chuck.	Secure bit properly.
	Quill bearing worn.	Replace Quill Assembly.

Problem	Possible Cause	Solution
Bit wanders from hole center (cont.')	Bit bent.	Replace bit.
	Chuck loose on spindle.	Tighten setscrew in chuck.
	Main spindle bent.	Replace Quill Assembly.
	Cutting too fast.	Reduce pressure.
Entrance of hole ragged.	Bit dull.	Sharpen bit.
	Wrong bit for job.	Use proper bit.
	Wrong drilling speed.	Use proper speed.
Exit of hole ragged.	Work improperly backed up.	Back up work with scrap wood.
	Bit dull.	Sharpen bit.
	Wrong type of bit.	Use proper bit.
	Wrong drilling speed.	Use proper speed.
	Normal for some materials.	Drill hole part way through, turn work over and finish hole from other side.
Sides of hole ragged.	Bit dull.	Sharpen bit.
	Wrong bit for job.	Use proper bit.
	Wrong drilling speed.	Use proper speed.
Hole not at indicated angle.	Table improperly aligned with main spindle.	Align table.
	Miter gauge improperly adjusted.	Adjust miter gauge.
Hole too deep or too shallow.	Feed stop improperly set.	Set feed stop.
	Feed stop not secured.	Tighten feed stop handle.
	Feed stop broken.	Replace feed stop.
	Rip fence or miter gauge slipped.	Secure rip fence and/or miter gauge.

Problem	Possible Cause	Solution
Hole too deep or too shallow (cont.')	Feed stop improperly assembled.	Assemble feed stop properly.
	Chuck loose on spindle.	Tighten setscrew in chuck.
	Carriage, table, or power plant not locked.	Secure all locks.
	Drill bit loose in chuck	Secure drill bit in chuck.
Hole too big.	Wrong size bit.	Use correct size bit.
	Stock not secured.	Clamp stock.
	Bit bent.	Replace bit.
	Main spindle bent.	Replace Quill Assembly.
Lathe Turning Wood chips and splinters.	Dull chisels.	Sharpen chisels.
	Chisels forced to work or held at wrong angle.	Press chisels against work lightly. Change angle immediately if wood chips.
	Chisels improperly held.	Hold chisel shanks firmly against tool rest with one hand. Use other hand to guide handles.
	Knots and burls in wood.	Use very light pressure and sharp chisel.
	Wood grain not parallel to axis of rotation.	Mount work so grain is parallel to axis, if possible. If not possible, use very light pressure.
Spindles have a slight taper.	Center improperly aligned.	Align centers.
Wood burns.	Dull chisels.	Sharpen chisels.
	Speed too high.	Reduce speed.

Problem	Possible Cause	Solution
Wood burns (cont.')	Cup center not lubricated.	Apply wax to wood where it mounts to cup center.
Work scored.	Chisels chipped or nicked.	Grind and sharpen chisels.
	Chisels improperly held.	Hold chisel shanks firmly against tool rest with one hand. Use other hand to guide handles.
Machine vibrates.	Wood mounted off center.	Mount wood correctly.
	Speed too high.	Reduce speed.
	Wood wet on one side.	Use wood that is properly dried.
	Wood bowed.	Use straight pieces of wood.
Wood stops turning but machine runs.	Wood not mounted securely.	Increase pressure with quill feed. Be sure spurs of drive center are engaged properly.
	Chisels forced into the wood.	Press chisels against work lightly.
	Spurs on drive center worn.	Replace drive center.
Wood loose between centers.	Wood not mounted securely.	Increase pressure with quill feed. Be sure spurs of drive center are engaged.
	Pins in centers broken or missing.	Replace pins.
Spindle breaks.	Chisels forced into work.	Press chisels against work lightly.
	Quill feed too tight.	Reduce pressure between centers, but be sure drive and cup spurs penetrate 1/16" into stock.
	Defect in wood.	Use straight, clear wood.

Problem	Possible Cause	Solution
Laminated stock comes apart on lathe.	Glue not dried.	Allow glue to dry 24 hours.
	Poor glued joints.	Be sure joints fit together cleanly. Spread glue evenly.
	Wood not glued long grain to long grain.	Glue will not hold properly unless long grain is bonded to long grain.
	Speed too high.	Reduce speed.
Wood hard to turn.	Dull chisels.	Sharpen chisels.
	Speed too high or too low.	Set correct speed.
	Wood grain not parallel to axis of rotation.	Mount work so grain is parallel to axis, if possible.
	Very hard wood.	Take your time.
Under Table Shaping.		
Motor Stalls	Belt in Mark 7 Headstock has broken.	Replace belt. Refer to Owner's Manual.
	Belt Slippage due to wear in Mark 7 Headstock	Contact Customer Service.
	Excessive work load caused by dull or improper cutters.	Sharpen cutters and/or select proper cutters.
	Too deep of cut.	Adjust depth-of-cut to no more than 1/8".
	Feed rate too fast.	Slow feed rate.
	Cutter Diameter too large.	Use smaller diameter cutter.
Innaccurate routing or shaping	Deflection of table due to excessive feed force for cutter and/or material.	Select proper feed rate for cutter and material during operations.
	Improper setup of operation.	Use proper setup. Refer to the Owner's Manual.

Problem	Possible Cause	Solution
Innaccurate routing or shaping (cont.')	Cutting edge too long.	Use shorter cutter.
Excessive vibration	Loose hardware on spindle.	Properly tighten hardware.
Burning of Workpiece and/or cutter	Dull Cutters.	Properly sharpen cutters.
	Improper feed rate of workpiece.	Select proper feed rate for workpiece.
Over Table Routing		
Quality of Cut is Poor	Depth-of-cut excessive.	Reduce depth-of-cut for each pass.
	Feed rate too fast.	Feed workpiece into bit at slower rate.
	Router bit dull.	Sharpen or replace bit.
Walls of Cut "Stepped"	Table and bit not perpendicular.	Realign table (see Alignment Section).
Motor Over Heats	Over working motor.	Stop and allow motor to cool.
	Taking too heavy of cut.	Reduce depth-of-cut.
	Feeding stock to rapidly.	Slow feed rate.

TROUBLESHOOTING

Most Common PowerPro Control Panel Error Messages

"SRM Not Rotate"

Definition: The Controller has experienced a 'failure-to-start'.

Possible reasons:

a. Workpiece is jammed in a cutter, stalling the machine.

b. Wire connection between the control board and motor is loose.

c. Electronics sensor or components damaged on the control board.

Possible solutions:

a. Turn off the Main Power Switch. Clear whatever caused the machine to stall.

b. Check connection of the large, white plug between Power Supply and Motor. If these wires are cut, this must be repaired or replaced at the Factory only. Call Customer Service for shipping information.

c. Electronics are repaired or replaced at the Factory only. Call Customer Service for shipping information.

"RPS State Error 0"

Definition: None of the receivers are sensing infrared light from emitters.

Possible reasons:

a. Light path is blocked by dust or dirt.

b. Signal cable is broken or has a poor connection.

c. Sensors or electronic components are damaged.

Possible solutions:

a. Remove Belt Cover and Motor Pan. Used compressed air to blow dust out from under Cowling where 5-wire connection is made.

b. Check connection of the small, white, 5-pin plug between Power Supply and Motor. If these wires are cut, they must be repaired or replaced at the Factory only. Call Customer Service for shipping information.

c. Electronics are repaired or replaced at the Factory only. Call Customer Service for shipping information.

"RPS State Error 1"

Definition: All receivers are sensing infrared light from the emitters simultaneously.

Possible reasons:

a. The Motor Fan with Position Disc inside has slid out of position and no longer is engaged with sensor.

b. Signal cable is broken or there is a poor connection.

c. Sensors or other electronic components are damaged.

Possible solutions:

a. Position the Mark 7 in Drill Press Position. .Reposition the Motor Fan with Position Disc.

1. Remove Belt Cover and Motor Pan from Headstock.

2. Use a 5/32" Allen Wrench to remove 4 of 6 motor mounting screws, leaving one screw on each side of the Motor, closest to the Pulley.

3. Pivot motor to gain access to the back of the Motor and Motor Cowling.

4. Use a medium Phillips screwdriver to remove the 3-screws that hold the black-plastic Cowling to the motor.

5. Slide the Fan with Reader Plate toward the motor. Position the Fan's edge 1/32" from the components on the green circuit board.

6. Use a 2.5mm Allen wrench to securely tighten the setscrew on the Fan and Reader Plate.

7. Reassemble your machine in the reverse order of disassembly.

b. Check connection of the small, white, 5-pin plug between Power Supply and Motor. If these wires are cut, they must be repaired or replaced at the Factory only. Call Customer Service for shipping information.

c. Electronics are repaired or replaced at the Factory only. Call Customer Service for shipping information.

"Low Voltage"

Definition: Voltage is less than the minimum voltage required.

Possible reasons:

a. Electrolytic capacitor failure or PFC components failure.

b. Control Board or Motor are overheated

c. Line voltage has dropped below minimum required.

Possible solutions:

a. Electronics are repaired or replaced at the Factory only. Call Customer Service for shipping information.

b. Remove Belt Cover and Motor Pan. Allow machine to cool for 30-minutes to cool either Motor or Control Board.

c. This machine should be plugged into a dedicated electrical circuit. Consult a qualified electrician for an inspection of your house wiring.

"PFC Fault"

Definition: PFC fault signal is activated for a minimum of 5-seconds.

Possible reasons:

a. PFC module overheated.

b. PFC module damaged.

Possible solutions:

a. Remove Belt Cover and Motor Pan. Allow machine to cool for 30-minutes to cool the PFC module.

b. Electronics are repaired or replaced at the Factory only. Call Customer Service for shipping information.

"Hardware Fault"

Definition: Faulty signal from IGBT driver or over voltage on the DC bus capacitors was detected.

Possible reasons:

a. IGBT driver damaged.

b. Power inverter damaged.

c. Electrolytic capacitor failure.

Possible solutions:

a. IGBT Driver is replaced at the Factory only.
Call Customer Service for shipping information.

b. Power inverter is replaced at the Factory only.
Call Customer Service for shipping information.

c. Electrolytic capacitor is replaced at the Factory only.
Call Customer Service for shipping information.

"Not Connected"

Definition: Communication between the control board and interface board is lost.

Possible reasons:

a. 10-pin ribbon cable is loose or broken down.

b. Component failure on the control board.

Possible solutions:

a. Check connection of the 10-pin cable. Unplug then re-plug cable, turn off main power switch and wait 1-minute, and then restart.

b. Electronics are repaired or replaced at the Factory only.
Call Customer Service for shipping information.