



Shopsmith[®] Mark V Home Workshop System

MARK V Model 500

Summary Manual

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 V.

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

SAFETY

Safety First

The Shopsmith Mark V 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 IMPORATNT 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.

Eye Protection

- Always wear eye protection when you use power equipment. Use goggles, safety glasses or a face shield to protect your eyes.

Ear Protection

- Prolonged exposure to high noise levels from high speed power equipment can damage your hearing.

NOTE

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

Sawdust and Chips

NOTE

Shopsmith Mark V'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:

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 V 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.

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.

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.

Electrical Requirements

- Pay particular attention to the connection between your power equipment and your power source. Before you plug in your Mark V, 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.

Circuit

- The Mark V 115-volt motor is rated at 1-1/8 hp. It develops more than 1-1/2 hp in use and "pulls" 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 V at "Slow" speed setting to prevent blowing fuses and tripping the circuit breaker.
- If you need to run a new circuit to operate the Mark V, 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.

Extension Cords

- If you use an extension cord to plug in your Mark V, 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:

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.

Shopsmith Safety Kit

WARNING

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

- These safety 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.
- 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.
- 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.
- 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.

Safety Rules for the Shopsmith Mark V

- Read, understand and follow the Mark V 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 V, 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 Mark V and wait until all cutters, blades or discs come to a complete stop before removing stock and scraps.
- Turn off and unplug the Mark V before making adjustments, changing modes or performing maintenance.
- Make sure the switch is in the "off" position before plugging or unplugging the Mark V.
- Secure the headstock lock, carriage lock, table height lock, table tilt lock and quill lock (if quill is used), before turning on the Mark V.
- Make sure accessories, safety devices and fixtures are properly adjusted and secured before turning on the Mark V. Also, check the arbor set screw periodically.
- Remove adjusting keys and wrenches from the Mark V 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 V 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 V 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.
- 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 V. **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 V and accessories sharpened.
- Keep all hand tools and power tools cleaned and maintained.
- Do not use the Mark V 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

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- 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.
 - 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.
 - Make your workshop "child-proof." Unplug equipment, use padlocks and master switches, and remove switch keys.
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General Information

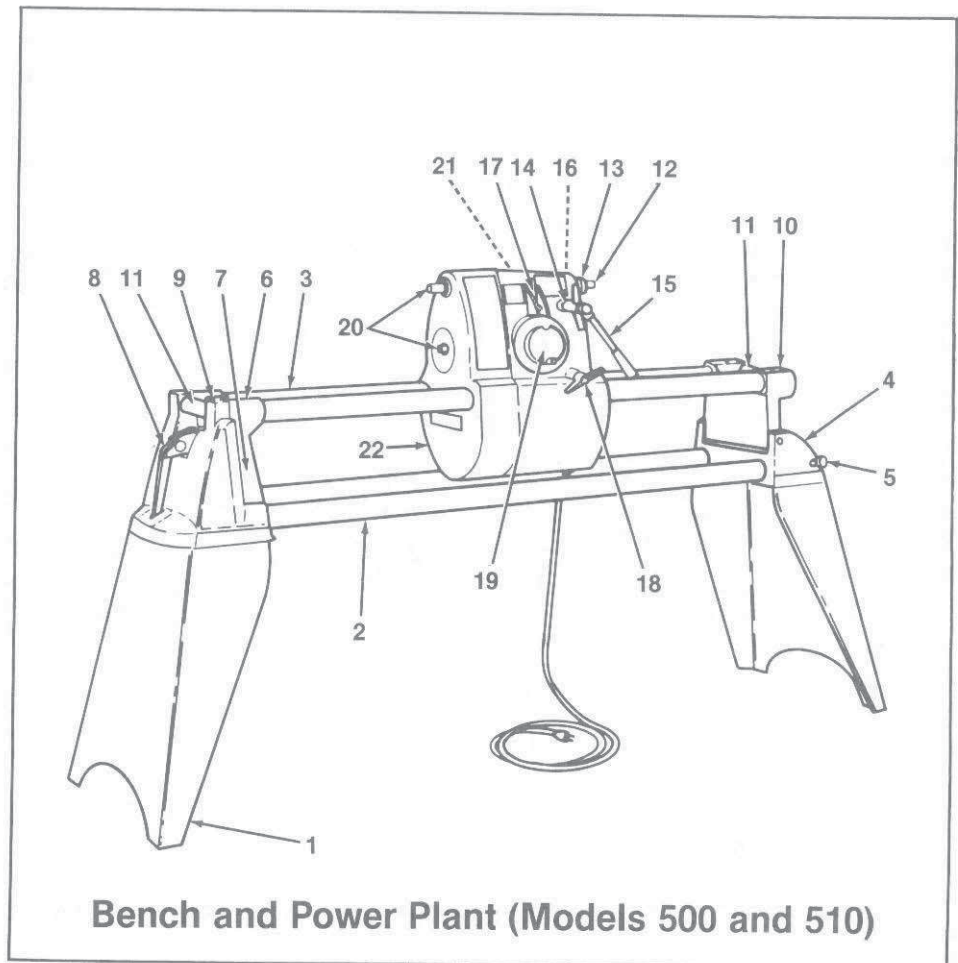
Nomenclature

The Shopsmith Mark V will perform all the functions of a table saw, disc sander, drill press, horizontal boring machine, and wood lathe.

Basically, the Mark V is a rigid bench that holds the power plant and the worktable system. The upper part of this bench can be positioned horizontally or vertically. The power plant and the worktable slide independently and are positioned along the upper tubes. You can mount accessories to the power plant 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, power plant, worktable, and accessories** combine to make a unique, capable and versatile woodworking system.

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

1. **Legs**—Support the tubes.
2. **Bench Tubes**—Hold the Mark V rigid.
3. **Way Tubes**—Allow the power plant and carriage to slide.
4. **Base**—Allows the way tubes to pivot to either a horizontal or vertical position.
5. **Base Lock**—Secures the Mark V in the vertical position.
6. **Way Tube Tie Bar**—Holds the free end of the way tubes.
7. **Headrest**—Holds the tie bar.
8. **Headrest Lock**—Secures the Mark V in the horizontal position.
9. **Power Mount**—Holds the extension table and the major accessories (Shopsmith Bandsaw, Jointer, Belt Sander, Jigsaw, and Scroll Saw).
10. **Base Mount**—Holds the extension table and lathe tailstock.

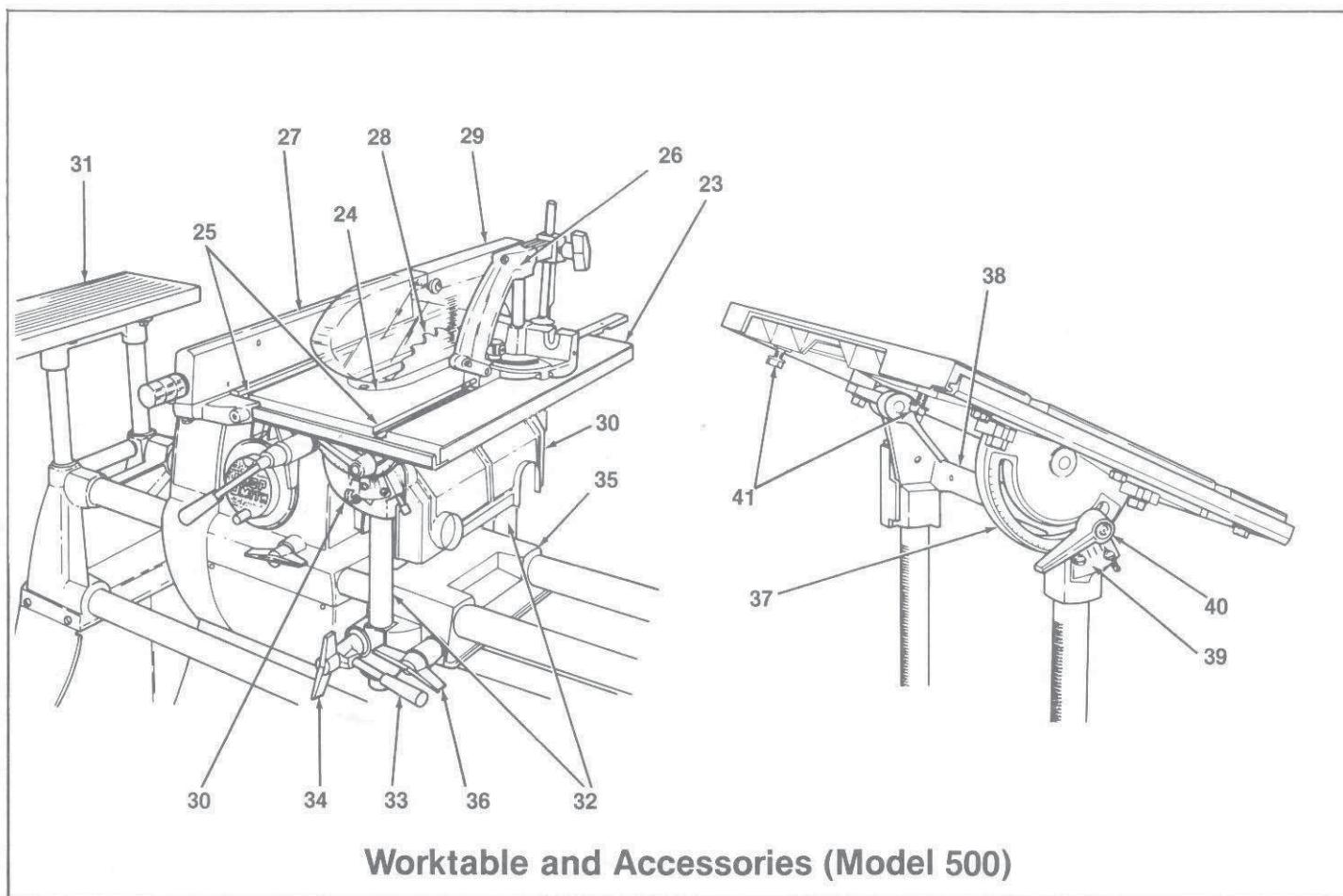


Bench and Power Plant (Models 500 and 510)

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 power plant.
16. **Quill Feed Stop**—Stops the quill at predetermined distances out from the power plant.
17. **Power Switch**—Turns the Mark V on and off.

18. **Power Plant Lock**—Secures the power plant on the way tubes.
19. **Speed Dial**—Controls the speed of the main and auxiliary spindles.
20. **Auxiliary Spindles**—The upper spindle powers the bandsaw, belt sander, jigsaw, and thickness planer. The lower spindle, powers the jointer and scroll saw.
21. **Nameplate**—Allows access to the wiring and speed changer mechanism.
22. **Belt Cover**—Allows access to the belts and sheaves.

General Information



Worktable and Accessories (Model 500)

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. 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.

28. 10" Saw Blade—Mounts to the 1-1/4" arbor which then mounts to the main spindle. This all-purpose blade is used 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 prevent kickbacks and the saw kerf from closing up and binding the blade.

30. Lower Saw Guard and Tie Bar Shield—Protect you from the part of the blade or cutter below the table. The saw guard has a dust chute. On Model 510 the guard accepts the sanding disc.

31. Extension Table—Mounts in either the power mount or the base mount to provide extra support for the stock.

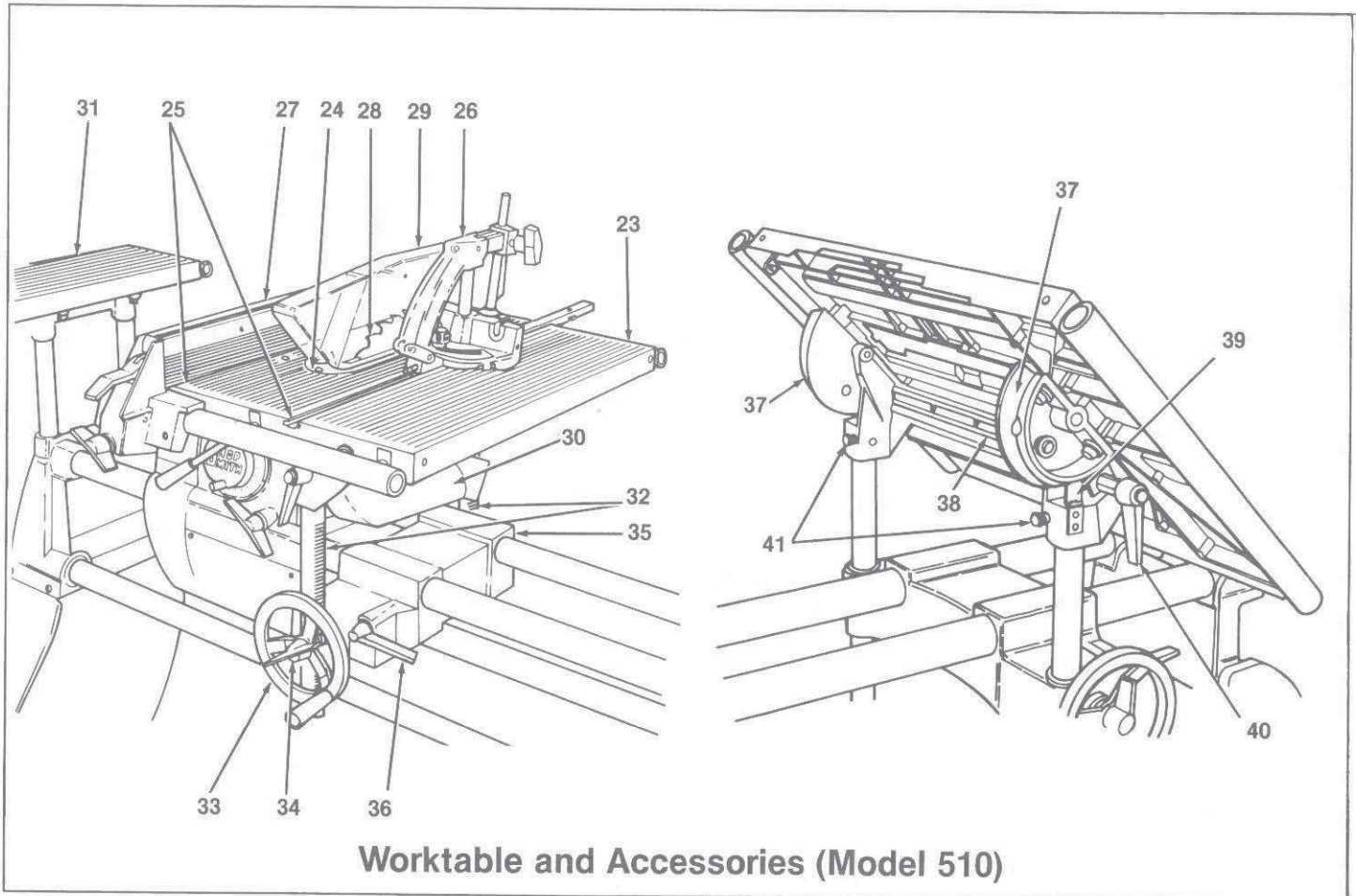
32. Table Support Tubes—Support the table above the bench. Each tube has racks that mesh with pinions in the carriage to raise and lower the table.

33. Table Height Handle (Model 500), Table Height Crank (Model 510)—Turns the pinions in the carriage, that 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.

General Information



Worktable and Accessories (Model 510)

36. Carriage Lock—Secures the carriage on the way tubes.

37. Trunnion—Allows the table to tilt up to 90° left and 45° right. Model 500 has one trunnion; Model 510 has two.

38. Table Tie Bar—Supports the table support tubes and the trunnion.

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'.

The following accessories come with the Mark V, but are not shown on the illustrations. Refer to the PARTS LIST 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 bits in the chuck.

Lathe Tool Rest—Mounts in the carriage to support and guide lathe chisels. On Model 510 the tool rest arm has two mounting positions.

Lathe Drive Center—Mounts to the main spindle and turns the stock when spindle 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.

Coupling Kit—Connects the Major Accessories to the power plant.

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

Goggles—Protect your eyes, wear eye protection during all operations.

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

General Information

Specifications

The specifications of the Shopsmith Mark V will give you an idea of its capabilities:

Capacities—The work capacity of the Mark V depends on the mode:

- As a **table saw**, 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".

- As a **disc sander**, 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.

- As a **drill press**, uses a chuck that will accept drill bits with shanks 5/64"-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".

- As a **horizontal boring machine**, uses the same drill chuck as it does 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.

- As a **lathe**, 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.

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

Power Plant—The Mark V is powered by a 1-1/8 hp motor. This turns three spindles—one main spindle and two auxiliary spindles. All three spindles revolve on permanently-lubricated, sealed ball bearings.

Speed—A system of variable-diameter pulleys makes it possible to adjust the speed of the main and upper auxiliary spindle from 700 RPM to 5200 RPM. The lower auxiliary spindle turns 1.6 times faster than the other two, or between 1120 RPM and 8320 RPM.

Worktable (Model 500)—The table is made from die-cast aluminum, 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 6" above it with the work angle set at '0'. The work surface is 14" (side to side) x 18-3/8" (front to back).

Worktable (Model 510)—The table is made from 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 work surface is 17-1/2" (side to side) x 22" (front to back).

Overall Dimensions (Model 500)—Overall, the Mark V is 71" long, 19" wide, and 46-1/2" high in the table saw mode or 76-1/4" high in the drill press mode.

Overall Dimensions (Model 510)—Overall, the Mark V 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 mode.

Alignment and Adjustment (Model 500)

Alignment and Adjustment

WARNING

Turn off and unplug the Mark V before performing any ALIGNMENT AND ADJUSTMENT procedure.

During Initial Setup, complete ALL of these procedures—and then re-check 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.

All the parts and accessories that support or guide the stock **MUST** be aligned either parallel with or perpendicular to the main spindle's plane of rotation. **During alignment and adjustment the sanding disc will represent the main spindle's plane of rotation.**

1. Prepare the sanding disc. In order for the sanding disc to accurately represent the main spindle's plane of rotation, you must first locate and mark the disc high spot. **Avoid** this high spot when performing the alignment and adjustment procedures.

NOTE

If your disc has the Velcro® system, use a saw blade instead of the disc. Follow the procedures just as you would for the disc. Do not position the square against the blade tips. This would result in improper alignment.

a. Clean the disc surface thoroughly with mineral spirits or turpentine. (If sandpaper is mounted, remove it.)

b. With the Mark V in the horizontal position, mount the sanding disc on the main spindle. Loosen the table tilt lock and position the table at '0'. Tighten the table tilt lock. Position the table 1" away from the disc. Adjust the table height so that half the disc is above the table surface.

c. Place the 5/32" Allen wrench on the table so that the long end contacts the outside edge of the disc. Hold the wrench down on the table with your right hand. As the disc turns, the high spot will gently push the wrench to the right. After 2-3 revolutions the wrench will position itself to touch the high spot only. (See Figure 1.)

NOTE

If the disc pulls away from the wrench more than 1/32" at any point, do not use the disc for checking alignment. Use a saw blade or another disc.

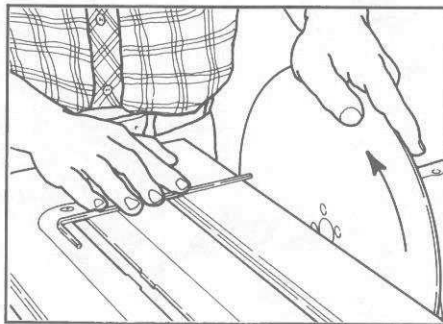


Figure 1. Finding the disc high spot.

d. Mark the high spot with an 'X' using a light-colored grease pencil. Draw a line from the high spot through the center to the opposite side. (See Figure 2.) Remove the disc from the spindle and set it aside.

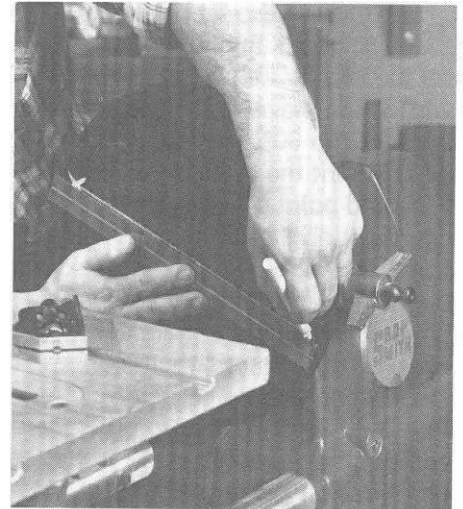


Figure 2. Marking the high spot.

2. Adjust the headrest lock. To check the headrest lock, grasp the way tubes near the way tube tie bar and pull up. If there is 'give' in the lock, unlock the handle and turn the shaft **clockwise** with a screwdriver. (See Figure 3.) If the lock is difficult to operate, the shaft is too tight. To loosen, unlock the handle and turn the shaft **counterclockwise**.

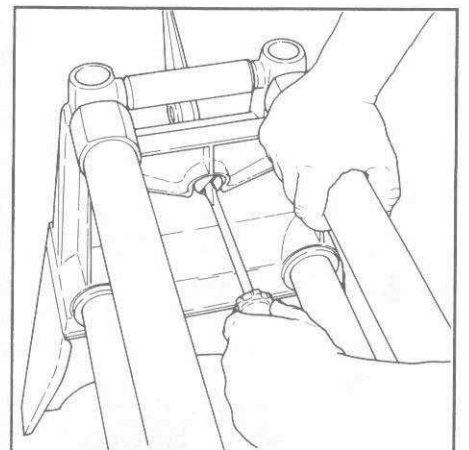


Figure 3. Adjusting the headrest lock.

3. Set the worktable positive stops. Stop bolts in the table and screws in the trunnion work with a plunger to act as positive stops to help you quickly adjust the table to **90° left**, **45° right** and **'0'**.

Alignment and Adjustment (Model 500)

a. Remove the table insert.

b. To check the **90° left stops**, set the Mark V in the vertical position and loosen the table tilt lock. Position the table to 90° and lock the tilt lock. Mount the drill chuck and a 1/2" brad-point bit on the main spindle. Position the bit above the table opening. Use the quill feed to extend the bit 1/2" into the table opening. Set a combination square against the bit. The square should contact the bit along its entire length. (See Figure 4.) Also, both stop bolts must contact their support tubes. If they don't, adjust the stops.

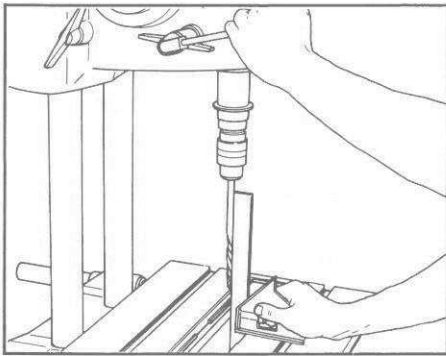


Figure 4. Checking the 90° left stops.

To **adjust** the 90° left stops, loosen the table tilt lock and tilt the table so that you can reach the stop bolts. Back out or turn in the two stops as needed. (See Figure 5.)

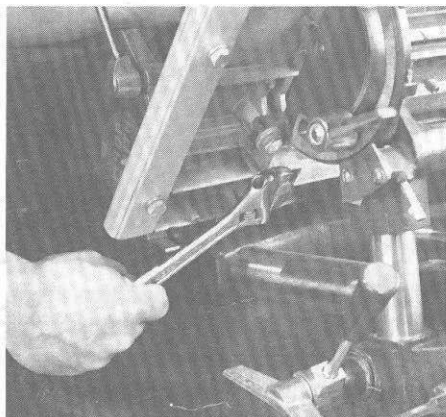


Figure 5. Back out or turn in the two stops as needed.

NOTE

The bolts will seem hard to turn. This is normal for prevailing torque type bolts.

Tilt the table back so that the stops contact their support tubes. Then recheck that the square contacts the entire length of the bit. Repeat the procedure until **both** stops contact their support tubes and the square contacts the entire length of the bit. Then remove the chuck and bit, and set the Mark V in the horizontal position.

c. To check the **45° right stop**, mount the sanding disc and position the marked line horizontal. Then loosen the tilt lock and tilt the table past the 45° right setting. Depress the plunger and tilt the table back toward that angle until the stop hits the plunger. Tighten the tilt lock, then check the angle. (See Figure 6.) If the angle is not 45°, the stop needs adjusting.

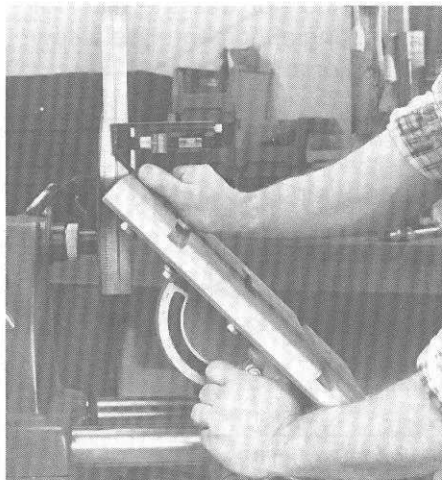


Figure 6. Checking the 45° right stop.

To **adjust** the 45° right stop, set the table to 45° right. Use a combination square to set the tilt of the table to precisely 45° right.

With a small blade screwdriver, back the 45° right stop out 2-3 turns.

(See Figure 7.) Depress the plunger under the table tilt indicator up towards the front trunnion, and hold it there with your finger. Slowly turn the 45° stop in until you feel it just touch the plunger. When you've finished, check that the 45° stop will stop the table tilt precisely at 45°.

NOTE

If you're using a drafting triangle to check the 45° right stop, you'll have to use a saw blade instead of the sanding disc. Position the table **over** the blade. When you make your measurement, be sure the triangle doesn't contact the set teeth of the blade.

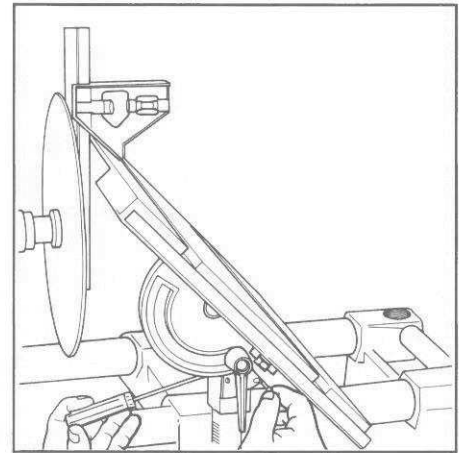


Figure 7. Adjusting the 45° right stop.

d. To check the **'0'** stop, position the line on the sanding disc so that it's horizontal. Loosen the table tilt lock and tilt the table past the '0' setting to the right. Depress the plunger and tilt the table back toward '0' until the stop hits the plunger. Tighten the tilt lock.

Place the base of your square on the table surface, with the scale resting against the disc. Check that the square is flush against both the table and disc. (See Figure 8.) If it's not, the stop needs adjusting.

Alignment and Adjustment (Model 500)

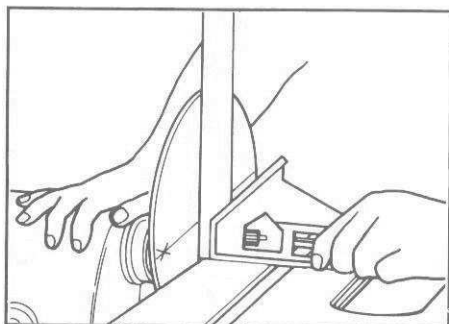


Figure 8. Checking the '0' stop.

To **adjust** the '0' table stop, set the table exactly perpendicular to the disc. With a small blade screwdriver, back the '0' stop out 2-3 turns. Depress the plunger under the table tilt indicator up towards the front trunnion, and hold it there with your finger. Slowly turn the '0' stop in until you feel it just touch the plunger. (See Figure 9.)



Figure 9. Adjusting the '0' stop.

Then check that the square is flush against both the table and the disc. If it's not, repeat the procedure.

4. Set the table tilt indicator.

Loosen the table tilt lock and position the table to the '0' stop. Secure the table tilt lock and check that the '0' mark on the indicator aligns with the '0' mark on the trunnion. If the marks are not aligned, reset the indicator. To reset, use a blade screwdriver to loosen the two screws

that hold the indicator to the tie bar. Then position the indicator to point to '0' on the trunnion. Tighten the screws. (See Figure 10.)

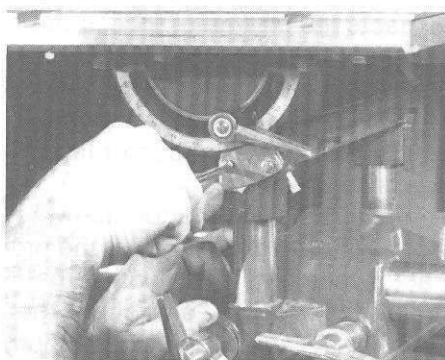


Figure 10. Setting the table tilt indicator.

5. Install the table insert in the table recess and start the screws. With a 5/32" Allen wrench, tighten the **rear** screw. 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 and slowly turning the **front** screw until it draws the front of the insert flush with the worktable surface. (See Figure 11.) Then repeat for the rear screw.

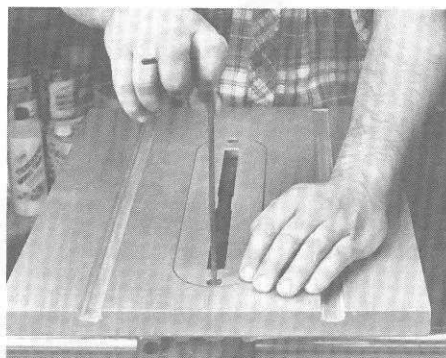


Figure 11. Installing the table insert.

6. Align the miter gauge slots.

The miter gauge slots must be parallel to the main spindle's plane of rotation.

a. To check the miter gauge slots, mount the sanding disc and position the marked line vertical. Using the

quill feed, extend the sanding disc until it touches the table. (See Figure 12.) The sides of the table are machined parallel with the miter gauge slots. If the sanding disc butts up flush against the left side of the table, the miter gauge slots are parallel to the main spindle's plane of rotation. If the disc contacts the table at just one point—front or back—the miter gauge slots need aligning.



Figure 12. Checking the miter gauge slots.

b. To align the slots, loosen the four bolts that hold the table to the trunnions at least 1/2 revolution. (See Figure 13.) Carefully shift the table in one direction or the other until the side of the table butts flush against the disc. Then tighten the bolts in rotation, 1/4 turn each, until all four are secure. Recheck the alignment of the miter gauge slots by extending the disc again.

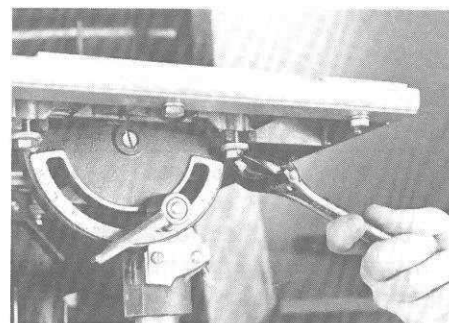


Figure 13. Loosen all four bolts.

Alignment and Adjustment (Model 500)

7. Adjust the miter gauge. The miter gauge needs three adjustments. The **glides** must be adjusted to keep the gauge from wobbling on the table. The **protractor face** must be positioned perpendicular to the main spindle's plane of rotation. And the **three positive stops** must be adjusted so that you can quickly set the gauge at 90°, 45° left and 45° right.

a. To check the **glides**, place the miter gauge in either slot. Grasp the gauge and see if it rocks front-to-back or side-to-side. Also, slide it back and forth in the slot to check if the protractor scrapes against the table. If the miter gauge rocks, or scrapes the table, adjust the glides.

To **adjust** the glides, remove the miter gauge from the slot and turn it over. With a medium blade screwdriver, screw the glides in or back them out (See Figure 14) so that the glides hold the protractor 1/64"-1/32" off the worktable and the miter gauge doesn't rock in the slots.

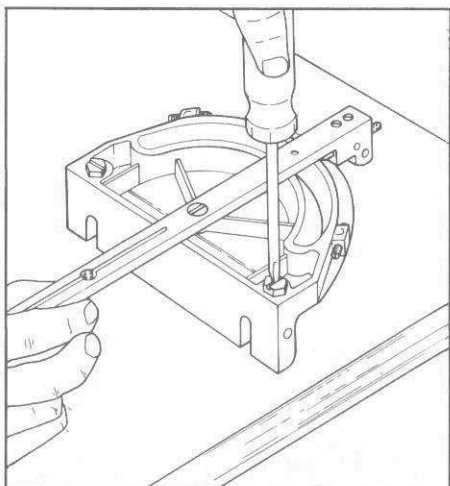


Figure 14. Adjusting the glides.

b. To check the **protractor face**, remove the safety grip from the miter gauge (if installed). The line drawn on the disc should be vertical. Mount the miter gauge in the left

slot, and position the angle at 90°. Place the base of a combination square against the sanding disc and slide the miter gauge forward or backward so that the straightedge contacts the protractor face. If the square rests flush against both the disc and the protractor face, the protractor is perpendicular to the disc. If it's not the protractor face needs adjusting.

To **adjust** the protractor face, loosen the lock knob, adjust the protractor face until it is flush with the straightedge. Then tighten the knob. (See Figure 15.) With a medium blade screwdriver, loosen the indicator and set it to 90°. Lock the indicator. (See Figure 16.)



Figure 15. Adjusting the protractor face.

c. To check the **positive stops**, depress the plunger and move the gauge past the 90° setting to the right then back until the stop hits the plunger. To check the 45° stops, loosen the lock knob, push in the plunger and adjust the scale to the desired stop. Tighten the knob, then use a combination square to check that the miter gauge is at the desired angle. If not, adjust the stops.

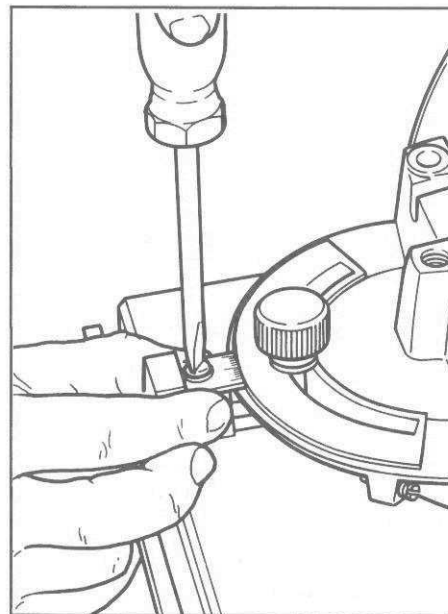


Figure 16. Setting the indicator to 90°.

Adjust the 90° stop first. Align the miter gauge at 90° and back the 90° stop out 2-3 turns. Depress the plunger, then turn the stop in until you feel it touch the plunger. (See Figure 17.) Check to see that the miter gauge stops at 90°.

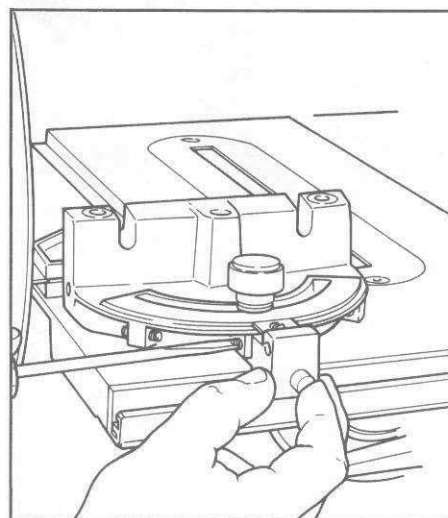


Figure 17. Adjusting the 90° stop.

Adjust the 45° left and 45° right stops in a similar manner. Use a combination square to set the gauge

Alignment and Adjustment (Model 500)

to 45° left, then 45° right. Depress the plunger, adjust the appropriate stop, then check.

8. Align the rip fence. For most woodworking operations, the rip fence must be parallel with the miter gauge slots.

a. To **check** the alignment of the rip fence, mount the rip fence on the table, near either miter gauge slot. (See Figure 18.) Make sure that the two setscrews in either side of the rip fence base are backed out so that they don't contact the table bar. Position the rip fence so that one side of the fence is flush with the edge of a miter gauge slot and tighten the lock knob. If the rip fence locks down parallel to the miter gauge slot, then it is also parallel to the main spindle's plane of rotation. If it's not, the rip fence needs aligning.

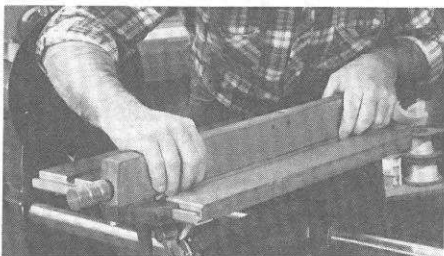


Figure 18. Checking the alignment of the rip fence.

b. To **align** the rip fence, loosen the two bolts that hold the rip fence to its base **without** loosening the lock knob. (See Figure 19.) When the bolts are loose, loosen the knob approximately 1/8 turn, align the fence parallel with the miter gauge slot, and tighten the knob. Be sure that the fence has remained parallel to the slot, then carefully tighten the bolts.

c. Check the alignment by loosening and tightening the knob several times to see if the rip fence remains parallel to the miter gauge slot.

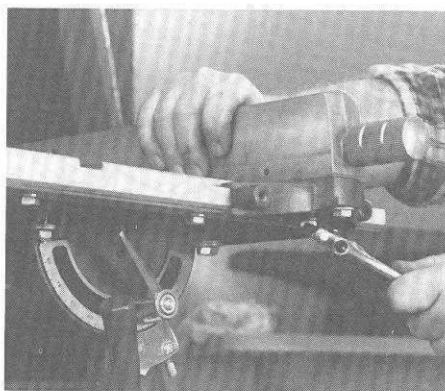


Figure 19. Loosen the two bolts that hold the fence to its base.

9. Align the extension table. The extension table bar must be parallel to and in line with the bar on the worktable. Also, the surface of the extension table must be even with the surface of the worktable.

a. To **check** the alignment of the extension table, mount the extension table in the base mount. Loosen the carriage lock and slide the carriage to the right until the tables touch. Tighten the carriage lock.

b. Using a straightedge to guide you, adjust the height of the worktable so that its front surface is even with the front surface of the extension table. (See Figure 20.) Move the straightedge to the back of the extension table and check that the rear extension table surface is even with the worktable surface. If it's not, shim and adjust the extension table.

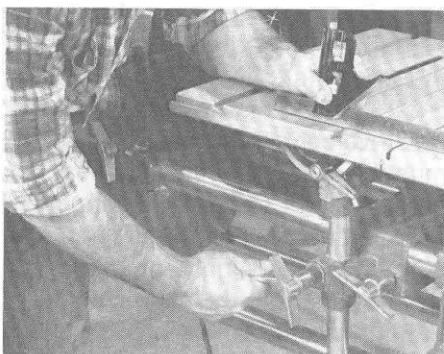


Figure 20. Checking the alignment of the extension table.

c. To **shim** and adjust the extension table, loosen (1-1/2 - 2 turns) all four of the bolts that hold the extension table to its base. (See Figure 21.) Then remove the two bolts on the **low** side of the extension table.

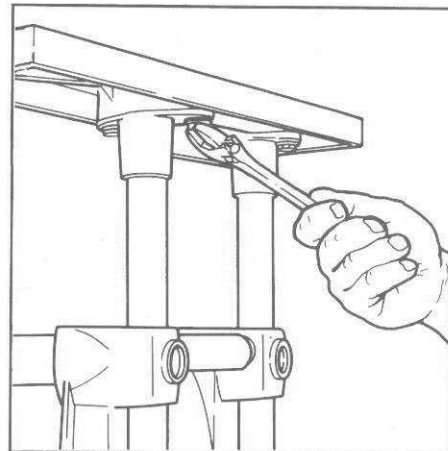


Figure 21. Loosen all four bolts.

Place enough shims in between the extension table and the base to raise the low side level with the surface of the worktable.

NOTE

The shim kit contains two sizes of shims. You'll use a combination of thicknesses to align the extension table with the worktable.

Replace and tighten all four bolts. Check your work—when the extension table is properly shimmed, you should be able to adjust the height of the worktable so that **both** the front and back of the extension table are even with the worktable surface.

d. To check that the extension table bar is lined up with the bar on the worktable, lay a straightedge across both bars. (See Figure 22.) The straightedge should rest flush against the extension table bar and the worktable bar. If it doesn't, adjust the extension table bar.

Alignment and Adjustment (Model 500)

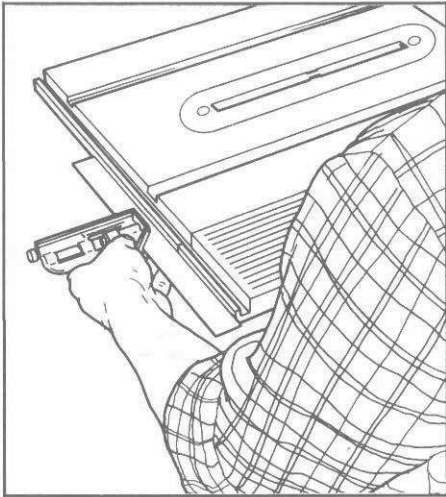


Figure 22. Checking that the extension table bar is lined up with the bar on the worktable.

e. To **adjust** the extension table bar, loosen the two bolts that hold the bar to the extension table. Use a straightedge to align the extension table bar with the bar on the worktable. Retighten the two bolts. Check the alignment with a straightedge.

10. Align the extension table on the left side of the power plant. To check the alignment, mount the extension table in the power mount. Loosen the locks and slide the power plant and worktable to the left. Tighten the locks. Lay a straightedge across the front surfaces of the tables. Adjust the extension table height so its surface is even with the worktable surface. Move the straightedge to the rear of the tables. If there is a gap between the worktable and the straightedge, the setscrew in the headrest needs adjusting.

To determine how much to adjust the setscrew, loosen the locks and slide the power plant and the worktable to the right. Loosen the headrest lock and raise the way tubes enough to place a washer on the rear pad of the headrest between the headrest and the way tube tie bar. (See Figure 23.)

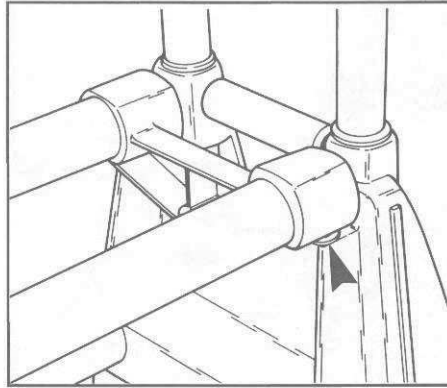


Figure 23. Place a washer on the rear pad.

NOTE

Any washer will do; the thickness is not critical. The washer will only be used to gauge how much the setscrew needs to be raised or lowered.

Lower the way tubes and lock the headrest lock. Move the power plant and worktable to the left and check the alignment of the tables. If the tables are not even add more washers or use thinner ones, whichever is needed. Repeat until the table surfaces are even. Adjust the setscrew in the headrest until it is the same height above the headrest pad as the thickness of the washers. By adjusting the setscrew you align the way tubes at the left end of the Mark V. This will make the extension table and worktable surfaces even. Check. If they are not even, repeat the procedure. Then remove the washer(s).

11. Align the lathe centers. Both the drive center and the cup center must be directly in-line with each other in order to properly support a spindle turning. (See Figure 24.)

To **check** the alignment, mount the drive center onto the main spindle. Mount the cup center into the tailstock and mount the tailstock into the base mount. Tighten the acces-

sory mount locks. Loosen the power plant lock and move the power plant to the right. Tighten the power plant lock. Using the quill, extend the drive center toward the cup center so the centers almost meet. Secure the quill lock. If the points of the centers are not directly in-line with each other, determine whether you need to adjust the centers top-to-bottom, front-to-back or both.

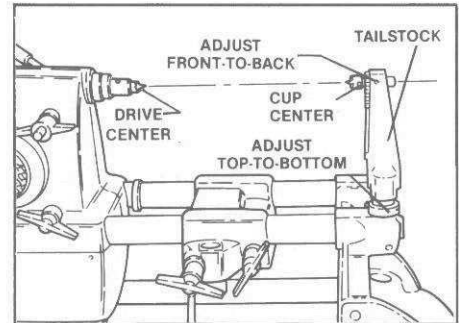


Figure 24. Aligning the lathe centers.

To **adjust** the centers **front-to-back** loosen the setscrew that locks the eccentric mount in the tailstock. Rotate the eccentric mount as needed to line up the cup center with the drive center, then tighten the setscrew.

To **adjust** the centers **top-to-bottom** loosen the accessory mount lock that holds the tailstock in the base mount. Then loosen the tailstock stop collars. Position the tailstock in the base mount so that the centers line up top-to-bottom, then tighten the accessory mount lock. Press the stop collars down firmly against the base mount and secure the collars.

Changing Modes

Setting up the Five Basic Modes

The Mark V converts to five modes—table saw, disc sander, drill press, horizontal boring, and lathe.

NOTE

These **Changing Modes** procedures assume that there is nothing mounted to any spindle and all alignments and adjustments have been completed.

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

1. **Turn the speed dial to 'Slow,' turn off and unplug the Mark V before you break down one mode and set up another.** Always have the speed dial set to 'Slow.' It is dangerous for both you and your electrical circuit to start accessories at high speed (i.e., the sanding disc can blow fuses at table saw speed and the lathe will throw stock at rout-shape speed).

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

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 1.) 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 V.** With a clockwise sweep of your hand, check each of these locks in succession: Table tilt lock, carriage lock, table height lock, power plant lock, and quill lock. (See Figure 2.) The carriage lock handle **must** be secured in the horizontal position (Model 510 only). 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.

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

4. **Set the Mark V to run at the proper speed.** After you turn on the Mark V, but before you begin working, set the correct speed for the operation. 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.

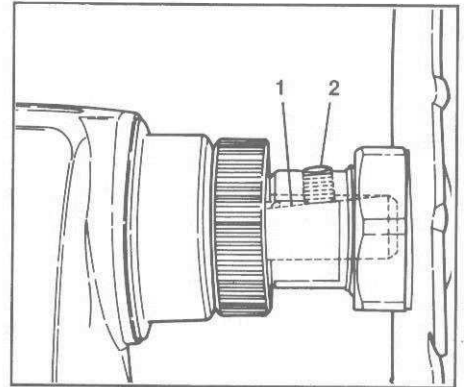


Figure 1. The main spindle has a **reverse taper (1)** to keep accessories secured. To mount an accessory, push it onto the spindle all the way. Then tighten the setscrew (2) against the flat of the spindle.

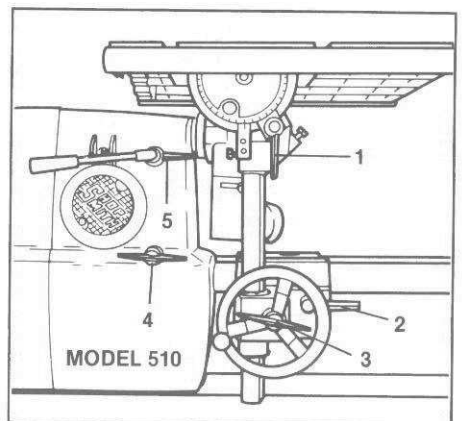
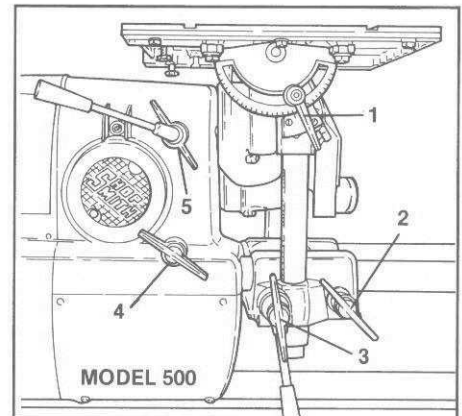


Figure 2. Before turning on the Mark V, go through a five-point check. Make a clockwise sweep with your hand, checking the **table tilt lock (1), carriage lock (2), table height lock (3), power plant lock (4), and quill lock (5).**

Changing Modes

Worktable

When you change modes, you'll spend most of your time rearranging the worktable.

To change the height of the worktable (Models 510 and 500), simply loosen the table height lock and turn the table height crank (Model 510) or table height handle (Model 500). On Model 500, when the table is tilted to the left, the handle may hit the table. To compensate, momentarily tighten the table height lock and loosen the table height handle by partially unscrewing it from its hub. Turn the handle to a new position, tighten it, and unloosen the table height lock.

To change the table tilt (Model 510), 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.

To change the table tilt (Model 500), loosen the table tilt lock and tilt the table to the right or left. The front trunnion has two positive stops to help you quickly adjust the tilt to '0' or 45° right. To use these stops, loosen the tilt lock, push in the plunger on the bottom right of the front trunnion, and tilt the table until you feel the proper stop hit the plunger.

To determine table tilt angle (Models 510 and 500), use the trunnion scale and the vernier indicator. If the desired angle is divisible by 5, align the angle on the trunnion with '0' on the indicator. To set an

angle that's 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's smaller than 17° but divisible by 5 is 15°. Next, subtract the smaller angle from the desired angle, $15^\circ - 17^\circ = 2^\circ$. Tilt the table so that the 15° mark on the trunnion goes 2° past the '0' mark on the indicator. (See Figure 3.)

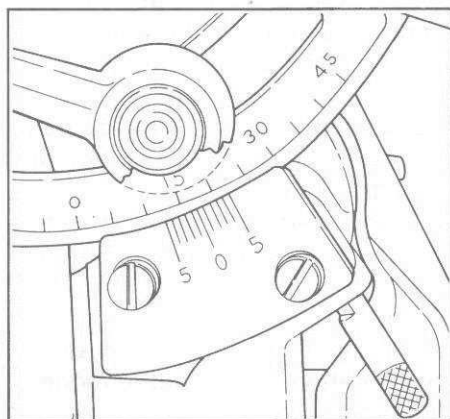


Figure 3. To tilt the table at an odd angle, use the small vernier indicator scale. As shown, the table is tilted at 17°.

To dismantle the worktable (Model 510), 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 4.) To dismantle the worktable (Model 500), loosen the table height lock and pull the table straight up.

To remount the worktable (Model 510), loosen the table height lock and place the support tubes in the carriage. Be sure the racks face to the right. 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 rock the table. This will position the support tubes at exactly the same height and get the racks

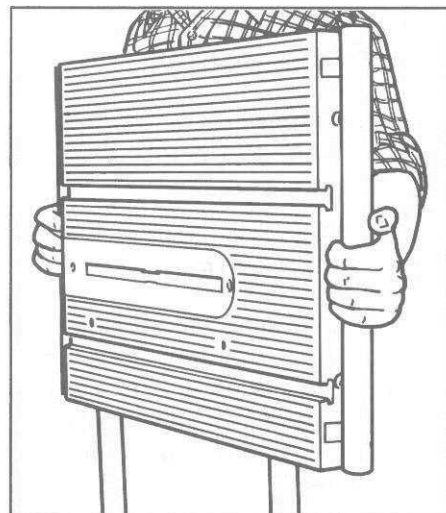


Figure 4. To remove the worktable, tilt the table 90° left and lock. Loosen the table height lock and pull the table straight up.

started properly in the pinions. Lower the table, loosen the tilt lock, set desired position and secure the tilt lock.

To remount the worktable (Model 500), loosen the table height lock and place the support tubes in the carriage. Be sure the racks face to the left. 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 handle **counterclockwise** 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.

Accessories

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

Miter Gauge (Models 510 and 500)—The miter gauge mounts in the worktable slots. The protractor 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,

Changing Modes

push in the plunger and turn the protractor until the stop hits the plunger. (See Figure 5.)

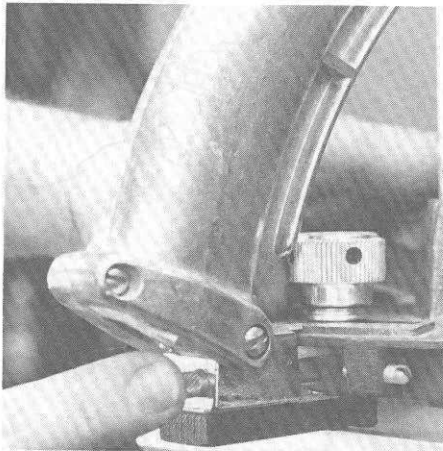


Figure 5. To use the positive stops, loosen the lock knob, push in the plunger, and turn the protractor until the stop hits the plunger.

Spin the knob tight and insert the 5/32" Allen wrench in one of the holes in the knob to tighten it an extra 1/4 turn. (See Figure 6.)

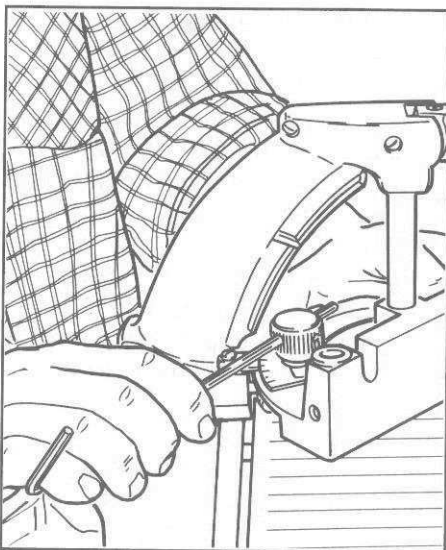


Figure 6. Tightening the lock knob an extra 1/4 turn.

The miter gauge slides or locks in the slots. To lock the gauge, put a piece of paper under the bar and mount the bar in a slot. Then turn the taper screw clockwise until

the gauge is secure in the slot. (See Figure 7.)

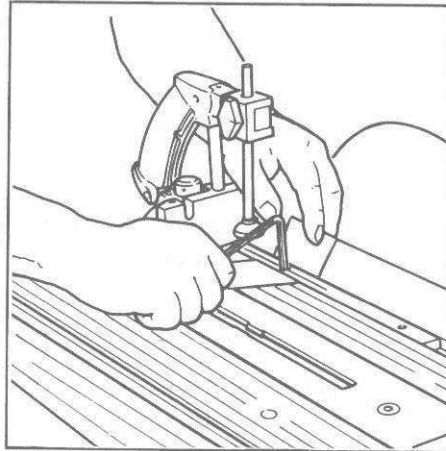


Figure 7. Turn the taper screw in the middle of the bar clockwise until the miter gauge is secure in the slot.

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. (See Figure 8.)

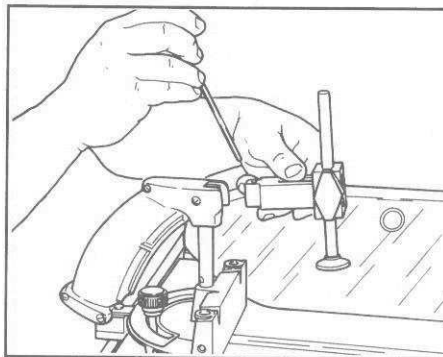


Figure 8. If you need to perform an operation where the quick clamp would just be in the way, remove it by loosening the setscrew at the back of the lock guide.

The miter gauge protractor has two slots, so that you can attach a miter gauge extension. (See Figure 9.)

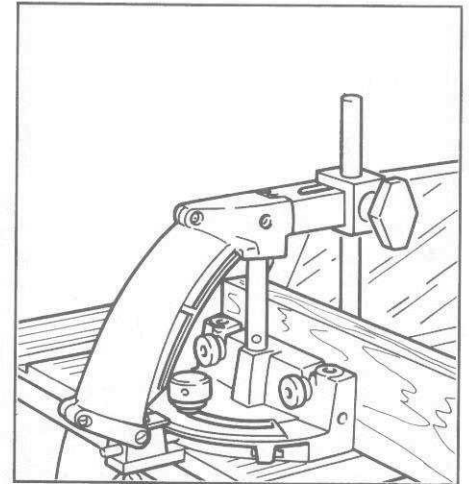


Figure 9. The miter gauge protractor has two slots, so that you can attach a miter gauge extension.

Rip Fence (Model 510)—As you tighten the knob on the base assembly, the infeed clamp pulls the rip fence so that its base rests flush against the front table tubes and is automatically aligned to the blade or disc. The handle locks the fence to the outfeed table tubes.

You can also mount the fence at a slight angle to the sanding disc for edge sanding. By turning the setscrew in the right side of the base assembly so that the screw presses against the table tube, you can offset the fence up to 1/8" right. When you want to realign the fence, be sure to back the setscrew out so that it no longer touches the table tube. If you need to offset the fence to the left, just mount the fence on the table with its base assembly on the outfeed end of the table.

There are three holes in the side of the fence so that you can mount auxiliary fences or special jigs. The slot in the top mounts the mortising hold-down.

Rip Fence (Model 500)—As you tighten the locking handle, the back lock pulls the rip fence so that its base rests flush against the table mounting bar and is automatically aligned to the blade or disc. The

Changing Modes

back lock should press against the bottom edge of the table, **not** hook under it. (See Figure 10.)

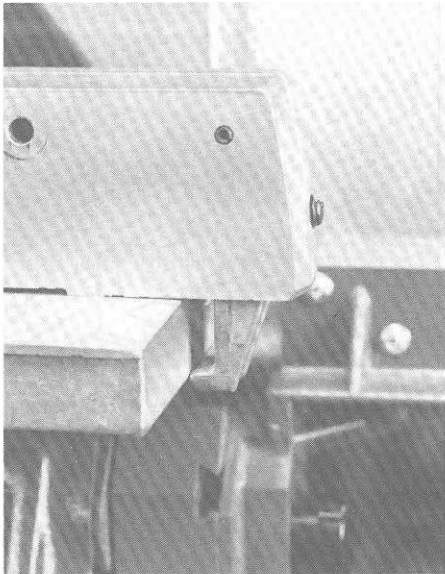


Figure 10. The back lock should press against the bottom edge of the table, **not** hook under it.

You can also mount the fence at a slight angle to the sanding disc for edge sanding. By turning one of the two setscrews in the base so that the screw presses against the table bar, you can offset the fence up to 1/8" right or left. When you want to realign the fence, be sure to back the setscrew out so that it no longer touches the table bar.

There are three holes in the side of the fence so that you can mount auxiliary fences or special jigs. The hole in the top mounts the mortising hold-down.

Extension Table (Models 510 and 500)—The extension table mounts in the base and power mounts. If you frequently perform operations where you need support on **both** ends of the Mark V, you can order an additional extension table.

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.

Table Saw Mode

(Model 510)

1. Turn the speed dial to 'Slow,' then turn off and unplug the Mark V.
2. Position the power plant 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 up against the stop collar on the quill. Align the ridge on the power plant with the slot in the collar. Tighten the screw on the collar. (See Figure 11.) Loosen the two knobs and slide the guard cover to the right.

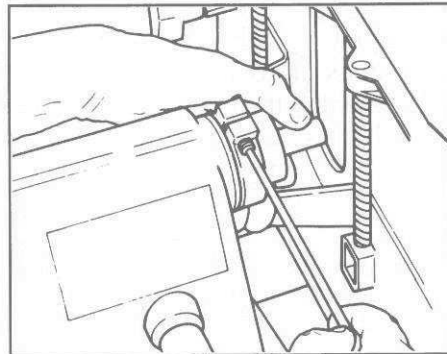


Figure 11. Mounting the lower saw guard.

4. Mount the saw blade on the arbor. Remove 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. Then replace the nut and fingertighten.

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. (See Figure 12.)

5. 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.

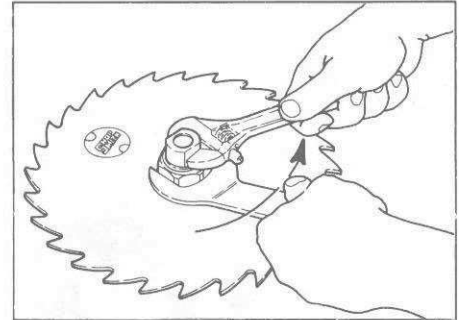


Figure 12. To tighten the saw blade on the arbor, keep the arbor from turning with an adjustable wrench, and turn the arbor nut counter-clockwise with the arbor wrench.

CAUTION

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

6. Raise the worktable as high as it will go. Slide the carriage toward the power plant until it butts up 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.**

Slide the guard cover to the right until it hits the tie bar. **Tighten the knobs.** (See Figure 13.)

7. 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 guard. (See Figure 14.) **Tighten the guard lock knob.**

WARNING

Always secure the guard lock knob even when the upper saw guard isn't being used.

8. Check all locks. The table tilt, carriage, table height, power plant and quill locks should be secure.

Changing Modes

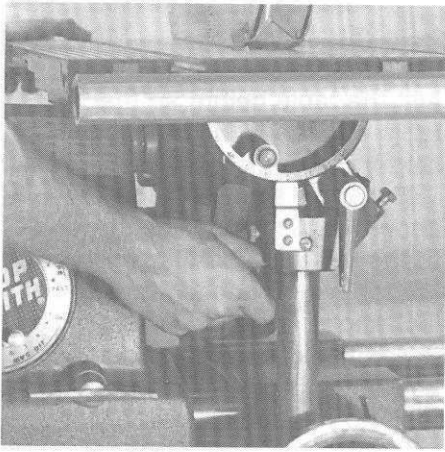


Figure 13. Slide the right side of the lower guard to the right until it hits the tie bar. Tighten knobs.

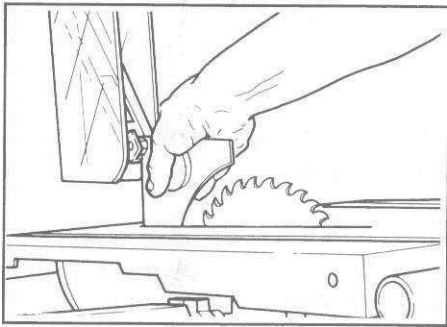


Figure 14. Raise the guard up and grasp the top of the riving knife.

Table Saw Mode (Model 500)

1. Turn the speed dial to 'Slow,' then turn off and unplug the Mark V.
2. Position the power plant so that you can reach the main spindle. Tighten the quill lock.
3. Mount the lower saw guard on the quill so that the collar on the saw guard butts up against the stop collar on the quill. With a 5/32" Allen wrench, tighten the two screws on the collar. (See Figure 15.) Tighten each screw equally.
4. Mount the saw blade on the arbor. Remove 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. Then replace the nut and fingertighten.

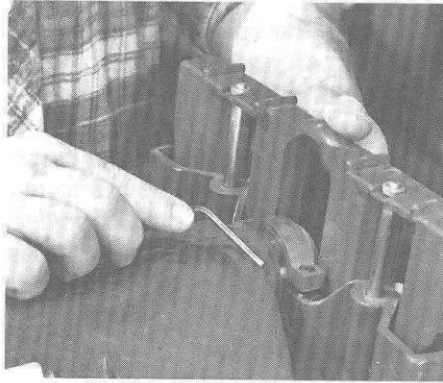


Figure 15. Place the lower saw guard on the quill, then tighten the Allen screws on either side of the saw guard collar.

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. (See Figure 16.)

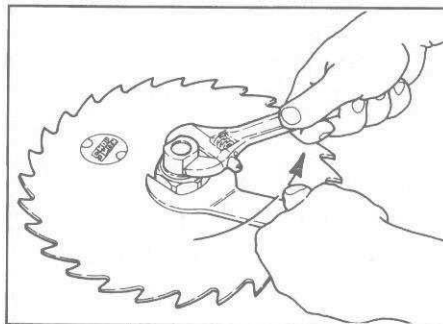


Figure 16. To tighten the saw blade on the arbor, keep the arbor from turning with an adjustable wrench, and turn the arbor nut counterclockwise with the arbor wrench.

5. Mount the saw blade on the main spindle. Tighten the setscrew against the flat of the spindle.
6. Mount the tie bar shield. (See Figure 17.) Attach the tie bar shield (1) to the table tie bar (2) by slipping it over two thumbscrews (3), then turning the thumbscrews tight.
7. Raise the worktable as high as it will go. Slide the carriage toward the power plant until it butts up against the rubber spacer. Lower the worktable so that the blade

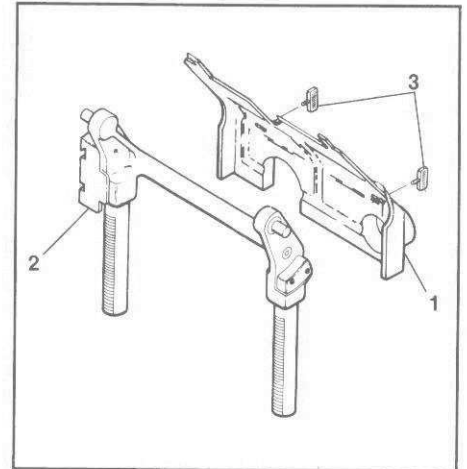


Figure 17. Mount the shield underneath the worktable.

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.** Set the table to the '0' position.

8. **Install the upper saw guard.** Slide the upper saw guard into the slots in the mounting block from left to right.

Raise the upper guard and lay a straightedge on the worktable so that it touches the blade and the splitter. Move the upper saw guard to the right or left, as needed, so the straightedge rests flush against both the blade and the splitter. (See Figure 18.) Then tighten the

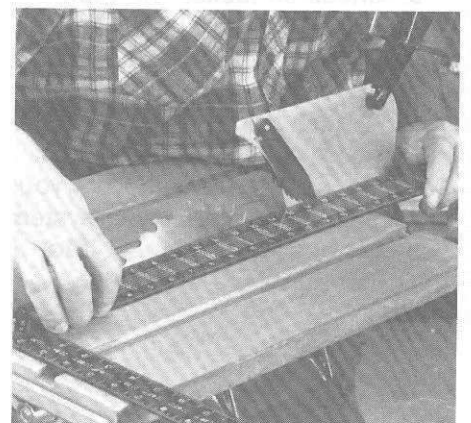


Figure 18. Using a straightedge, move the upper saw guard to the right or left until the splitter is directly in line with the saw blade.

Changing Modes

locking knob. The splitter **must** be aligned every time you mount the upper guard or adjust the saw blade using the quill.

NOTE

After you've aligned the splitter, you can make a simple template to help simplify this task in the future. (See Figure 19.) Rip part way up the middle, about 14" or until the back of the stock just clears the back of the splitter. Turn off the machine, wait for the blade to stop and then remove the stock. Use the template to align the splitter each time you mount the upper guard or to adjust the blade position using the quill.

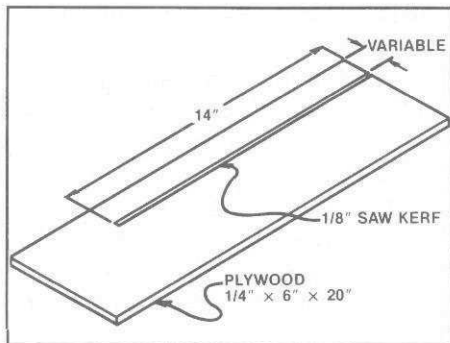


Figure 19. Make a template to quickly align the splitter with the blade.

9. Check all locks. The table tilt, carriage, table height, power plant and quill locks should be secure.

10. Attach the two elbows to the outer guard and the tie bar shield. Then connect the hoses from your dust collection system. If your system has only one hose, connect it to the outer guard elbow.

Disc Sander Mode (Model 510)

1. Turn the speed dial to 'Slow,' then turn off and unplug the Mark V.

2. Mount the sandpaper on the sanding disc. If you are mounting sandpaper for the first time, clean the disc with mineral spirits 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 mineral spirits. To make it easier to remove the sandpaper, heat the sanding disc in an oven (150° max.).

3. Position the power plant 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.**

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 20.)



Figure 20. Move the guard cover towards the disc until it is approximately 1" away. Tighten both knobs.

6. 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.**

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

Disc Sander Mode (Model 500)

1. Turn the speed dial to 'Slow,' then turn off and unplug the Mark V.

2. Mount the sandpaper on the sanding disc. If you are mounting sandpaper for the first time, clean the disc with mineral spirits 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 mineral spirits. To make it easier to remove the sandpaper, heat the sanding disc in an oven (150° max.).

3. Position the power plant so that you can reach the main spindle.

4. Mount the sanding disc all the way onto the main spindle. Tighten the setscrew against the flat of the spindle.

Changing Modes

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

NOTE

The tie bar shield acts as a positive stop when you want to sand with the table set at '0'. If you wish to sand with the table tilted, remove the tie bar shield.

6. **Check all locks.** The table tilt, carriage, table height, power plant and quill (if not used) locks should be secure.

Vertical Drill Press Mode (Models 510 and 500)

1. Turn the speed dial to 'Slow,' then turn off and unplug the Mark V.

2. **Position the power plant 10" away from the power mount, and the carriage 20" away from the base mount. Tighten the power plant and carriage locks.**

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

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

5. **Loosen the headrest lock.** Grasp the way tubes with both hands, one hand to the left of the power plant and the other to the right, then raise the machine into the vertical position. **Tighten the base lock,** while rocking the way tubes front-to-back. This helps to take the play out of the base pivot and keeps the Mark V from wobbling. The

base lock does **not** fit dead center in the hole, but off to one side. (See Figure 21.)

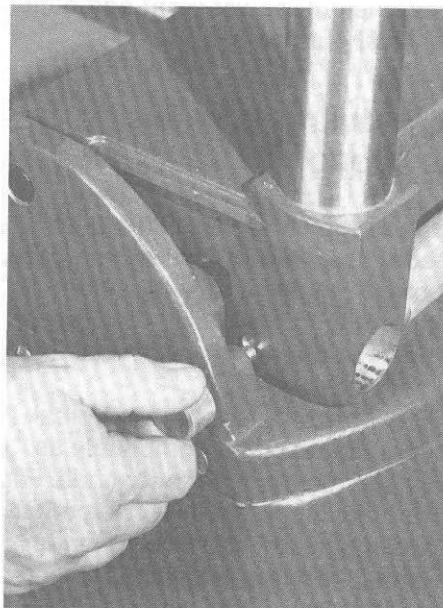


Figure 21. The base lock does **not** fit dead center into its hole, but off to one side. This arrangement is safer and more secure.

6. **Move the quill feed handle to the back of the power plant if you desire.**

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

WARNING

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

8. **Check all locks.** The table tilt, carriage, table height, power plant and quill (if not used) locks should be secure.

WARNING

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

Horizontal Boring Mode (Models 510 and 500)

1. Turn the speed dial to 'Slow,' then turn off and unplug the Mark V.

2. **Position the power plant 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. (If you have a Model 500 and want to tilt the table to the left, you must remove the tie bar shield from underneath the table.)

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

WARNING

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

6. **Check all locks.** The table tilt, carriage, table height, power plant and quill (if not used) locks should be secure.

Lathe Mode (Models 510 and 500)

1. Turn the speed dial to 'Slow,' then turn off and unplug the Mark V.

2. **Dismount the worktable.** If Model 510, tilt the table 90° left and lock. Loosen table height lock and pull the table straight up. If Model 500, loosen the table height lock and pull the table straight up.

3. **Position the power plant so that you can reach the main spindle.**

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

Changing Modes

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** and tighten the accessory mount lock.

NOTE

When you get ready to break down the lathe mode, you'll probably find the cup center is 'stuck' in the tailstock. If this is the case, remove the tailstock from the machine. Lay it over the edge of a workbench so the eccentric mount is supported by the table and the center is hanging free. 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.

7. **Mount the cup center in the tailstock** with the point toward the power plant.

8. **Check all locks.** The carriage, table height, power plant and quill locks should be secure.

Borrowing from Mode to Mode

One of the most useful features about the Mark V 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 insure that your stock is cut, sanded, and bored **precisely** the same. It also saves you setup time.

Table Sawing

Safety

WARNING

Before performing table sawing operations:

- Read the SAFETY section, especially the rules for the table saw mode.
- Complete ALL the INITIAL SETUP and ALIGNMENT AND ADJUSTMENT procedures.
- Set up the table saw mode according to CHANGING MODES.
- Secure locks.
- Set the proper speed.

Table Sawing Speeds

Before you begin any table saw operation, set the Mark V to run at the correct speed. 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 "Table Sawing Speed Chart."

Crosscutting

General Crosscutting—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.

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

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

Squeeze the safety grip, lower the guard and turn on the Mark V. Let the saw come up to speed, then guide the stock past the blade. Use your free hand to help keep the stock against the miter gauge face. (See Figure 1.)

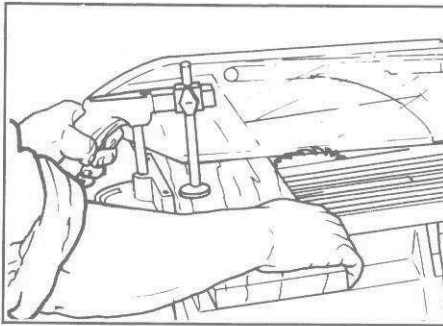


Figure 1. General crosscutting.

NOTE

When crosscutting 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.

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.

When you've finished the cut, turn off the Mark V. Let the blade come to a complete stop, then remove the stock from the miter gauge and brush away scraps.

Crosscutting Long Stock—Mount an extension table in the power or base mount. 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 2.)

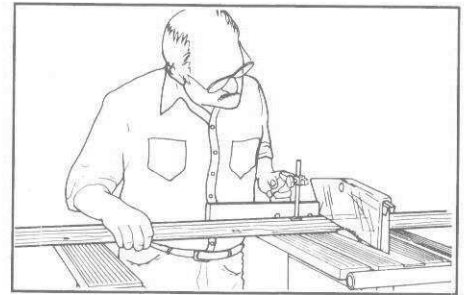


Figure 2. Crosscutting long stock.

Crosscutting Duplicate Lengths

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

To cut long lengths, mount the extension table on either side of the power plant, 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 duplicate lengths 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.

Table Sawing Speed Chart

For 115 and 230 v., 60 Hz. Domestic and Canadian motors*

Operation	Hardwood	Softwood
General Sawing	R (3500 RPM)	R (3500 RPM)
Heavy Rippling	O (2800 RPM)	P (3000 RPM)
Trim Cuts	S (3800 RPM)	S (3800 RPM)

*For 230 v., 50/60 Hz. motor, see page 52B.

Table Sawing

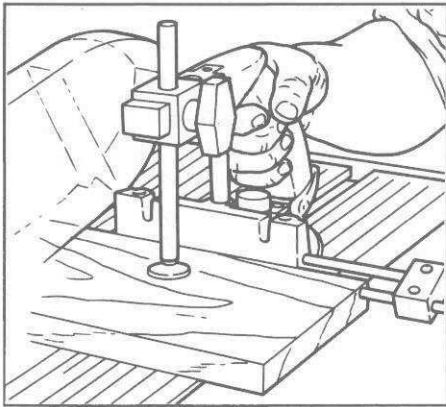


Figure 3. Crosscutting duplicate short lengths using a miter gauge stop-rod.

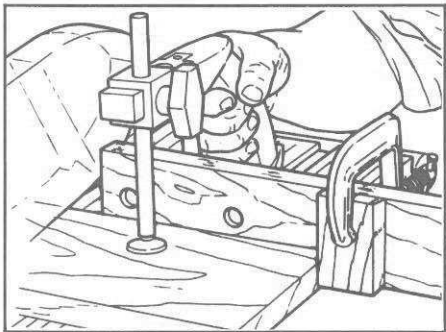


Figure 4. Crosscutting duplicate short lengths using a miter gauge extension.

Move the power plant 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 5.)

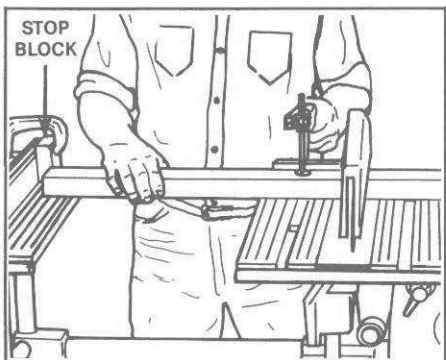


Figure 5. Crosscutting duplicate long lengths.

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

General Ripping—Mount the rip fence to the worktable. Raise the upper guard and move the fence the desired distance away from the saw blade, then lock it. Use the quill feed to make fine adjustments. (See Figure 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's set **toward** the fence) at both the front and back of the machine.

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.

Lower the guard, turn the machine on and let it come up to 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 7.)

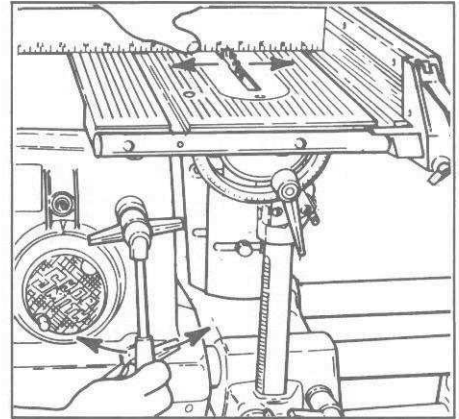


Figure 6. Positioning the rip fence.

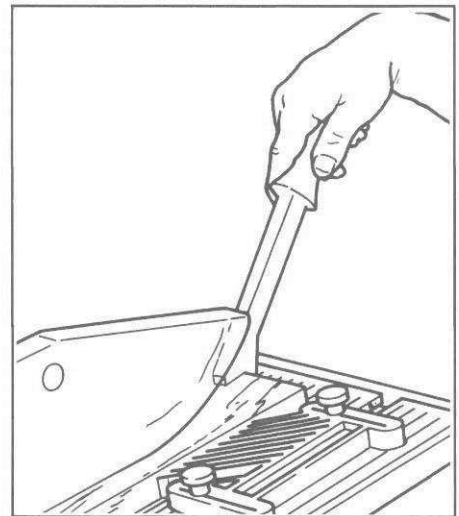


Figure 7. Using a push stick to finish a cut.

Ripping Long Stock—Position roller stand(s) 1'-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). (See Figure 8.)

Ripping Narrow Stock—When ripping stock less than 1-1/2" wide, use the fence straddler to finish the cut. (See Figure 9.)

Table Sawing

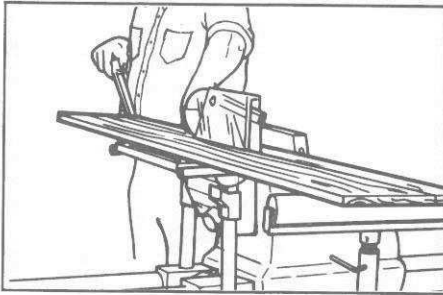


Figure 8. Ripping long stock.

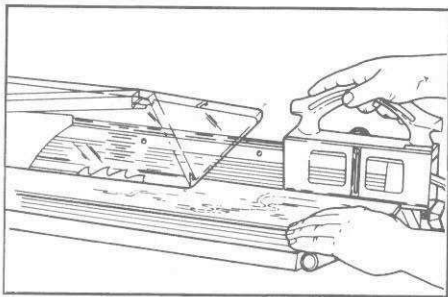


Figure 9. Ripping narrow stock.

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—To rip stock 8-3/4"–10-3/4" wide (Model 510) or 5-1/2"–8-1/2" wide (Model 500), you'll have to mount the rip fence so it straddles the extension table and the worktable.

To rip wider stock or sheet materials, mount the extension table on either side of the power plant and mount the rip fence on the extension table. Move the power

plant and the carriage until the blade is the desired distance away from the rip fence. Use the quill feed to make fine adjustments.

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 10.)

WARNING

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

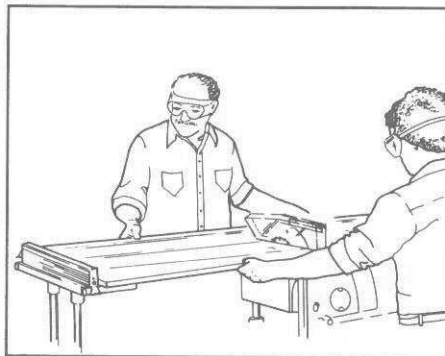


Figure 10. Ripping sheet materials.

Angles

Cutting a Miter—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.

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 11.)

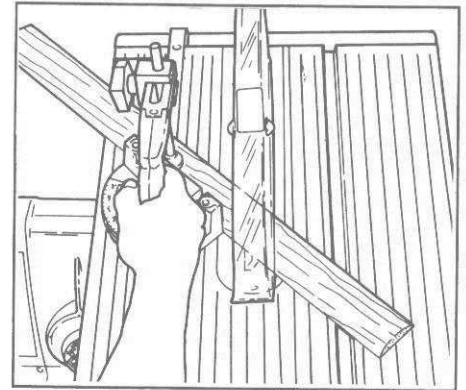


Figure 11. Cutting a miter.

Cutting a Bevel—Slide the carriage and the power plant 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 12.) If you're ripping a bevel, mount the rip fence on the down side of the table. (See Figure 13.)

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.

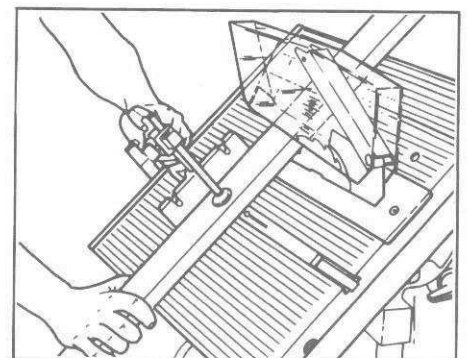


Figure 12. Crosscutting a bevel.

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

Table Sawing

the ripping face closer to the blade for narrower cuts.

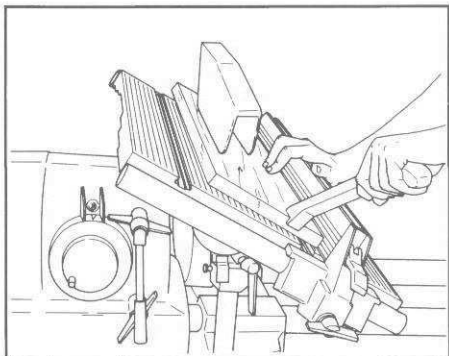


Figure 13. Ripping a bevel.

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 14.) If you have the extension table kit (Model 510 only), mount the rip fence on the floating table.

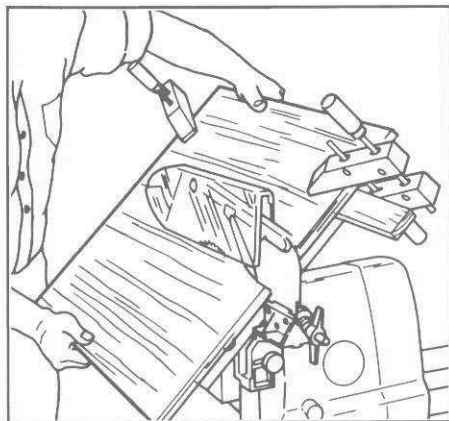


Figure 14. Bevel ripping wide stock.

Cutting a Compound Miter—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 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—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.

Rabbet cuts require two passes. Cut the surface of the stock first. (See Figure 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 16.)

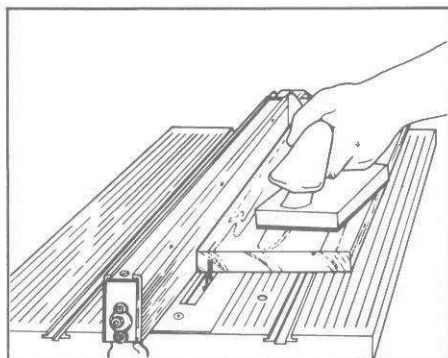


Figure 15. Cutting a rabbet—first pass.

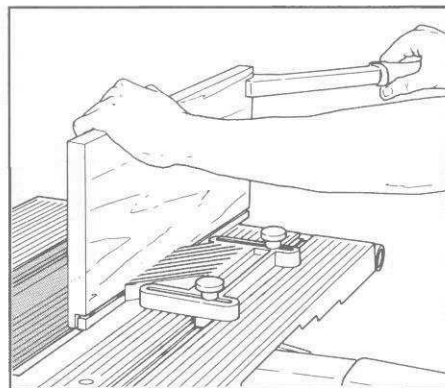


Figure 16. Cutting a rabbet—second pass.

Cutting a Dado—Remove the upper saw guard and adjust the height of the table.

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.

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 17.)

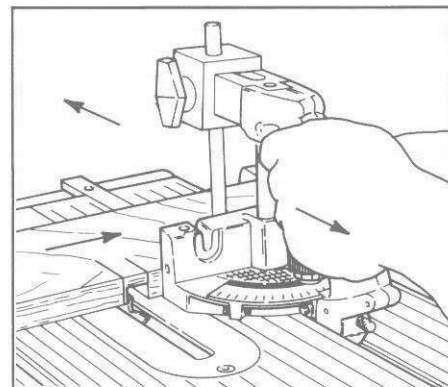


Figure 17. Cutting a dado.

Disc Sanding

Safety

WARNING

Before performing disc sanding operations:

- Read the SAFETY section, especially the rules for the disc sander mode.
- Complete ALL the INITIAL SETUP and ALIGNMENT AND ADJUSTMENT procedures.
- Set up the disc sander mode according to CHANGING MODES.
- Secure locks.
- Set the proper speed.

Disc Sanding Speeds

Before you begin any disc sanding operation, set the Mark V to run at the correct speed. 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 "Disc Sanding Speed Chart."

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 (Model 510 only) or next to the table.

End-Grain Sanding

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. Turn on the Mark V.

NOTE

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

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 a few seconds, back it off, then feed it forward again. (See Figure 1.)

If you're using the quill feed, advance the disc until it contacts the stock. Hold it there a few seconds, back it off, and feed it forward again. (See Figure 2.)

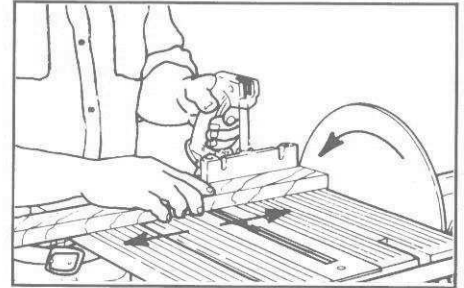


Figure 1. End-grain sanding using the miter gauge.

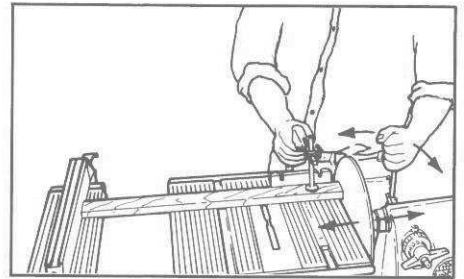


Figure 2. End-grain sanding using the quill feed.

Sanding to Length

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.

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.**

Disc Sanding Speed Chart

For 115 and 230 v., 60 hz. Domestic and Canadian motors*

Grit	Hardwood	Softwood
Coarse (60#)	D (1050 RPM)	E (1150 RPM)
Medium (80#)	F (1300 RPM)	G (1450 RPM)
Fine (100#)	G (1450 RPM)	H (1600 RPM)
Grinding or Sharpening Metal Tools—Slow (700 RPM)		

*For 230 v., 50/60 Hz. motor, see page 52B.

Disc Sanding

Squeeze the safety grip with one hand and turn on the Mark V. 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 3.) Repeat this procedure as needed with the other boards you need to sand. When finished, they will all be **exactly** the same length.

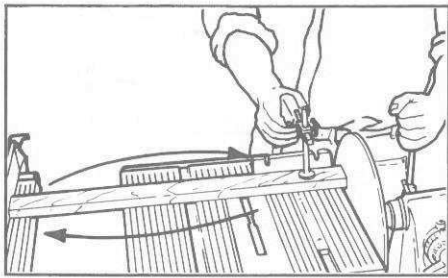


Figure 3. Sanding to length.

Edge Sanding

Move the carriage so that the table edge is no farther than $1/16''$ away from the disc.

Mount the rip fence on the table, but don't lock it yet. With a $5/32''$ Allen wrench, adjust the setscrew(s) in the base to offset the fence. (See Figure 4.) When properly adjusted, the rip fence should be $1/32''$ - $1/16''$ closer to the disc at the front of the table than at the back.

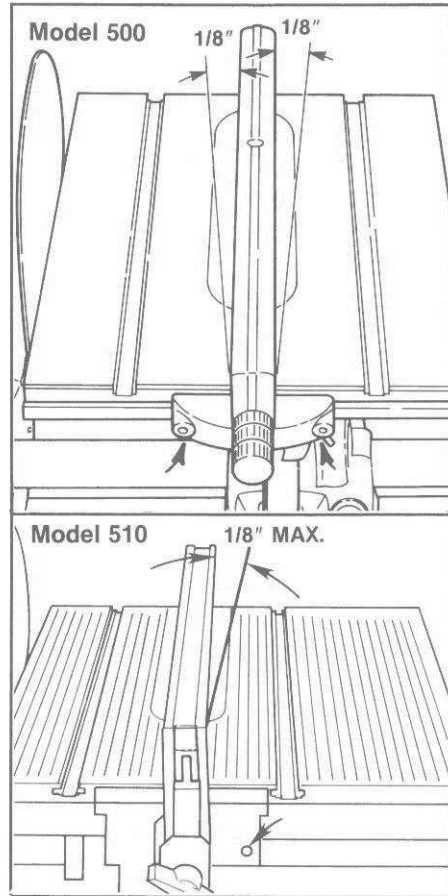


Figure 4. Offsetting the fence for edge sanding.

Position the rip fence so that the edge of the stock just touches the downward side of the disc. Make fine adjustments with the quill feed.

Turn on the machine, and feed the stock slowly from the **back** of the table toward the front. (See Figure 5.)

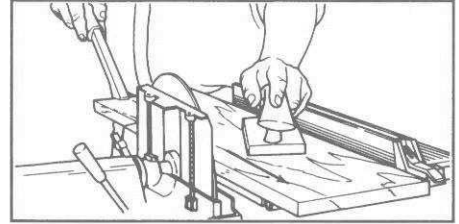


Figure 5. Edge sanding.

Sanding Bevels, Chamfers and Miters

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.

Remove the upper guard, raise the table and remove the saw blade from the lower guard. Mount a sanding disc in the guard, then readjust 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 you cut it.

NOTE (Model 510)

When sanding angles, position the disc through the insert. For general sanding, use the sawing insert. For small or precision stock, use the sanding insert.

Vertical Drilling

Safety

WARNING

Before performing vertical drilling operations:

- Read the **SAFETY** section, especially the rules for the drill press mode.
- Complete **ALL** the **INITIAL SETUP** and **ALIGNMENT AND ADJUSTMENT** procedures.
- Set up the drill press mode according to **CHANGING MODES**.
- Remove the key from the chuck.
- Secure locks.
- Set the proper speed.

Vertical Drilling Speeds

Before you begin any vertical drilling operation, set the Mark V to run at the correct speed. 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 "Vertical Drilling Speed Chart." This chart is intended as a general guide when using **brad-point bits** and **twist bits**. If you use other bits, follow the manufacturers recommendations.

Vertical Drilling Speed Chart

For 115 and 230 v., 60 Hz. Domestic and Canadian motors*

Size of Hole	Hardwood	Softwood
1/4" and less	H (1600 RPM)	I (1750 RPM)
1/4" to 1/2"	F (1300 RPM)	G (1450 RPM)
1/2" to 3/4"	D (1050 RPM)	E (1150 RPM)
3/4" to 1"	B (850 RPM)	C (950 RPM)
Over 1"	Slow (700 RPM)	A (750 RPM)
Drilling metals (twist bits only)—Slow (700 RPM)		

*For 230 v., 50/60 Hz. motor, see page 52B.

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—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).

Clamp a scrap of wood on the table to keep the bit from drilling into the table and the stock from splintering where the bit exits. This scrap should be wider than the stock.

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 1.)

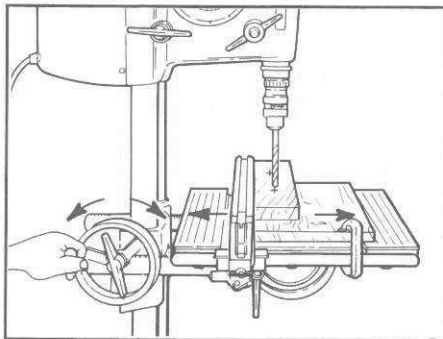


Figure 1. Positioning the stock.

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 bit is 1/4"-1/2" above the stock, and tighten the lock.

Remove the stock and extend the quill so that the cutting flutes of the bit touch the scrap wood. Set the depth control to 1/8" and tighten the depth control lock. (See Figure 2.) Then let the quill retract. Position the stock under the bit. Hold it against the table and rip fence. Extend the quill with the machine off to check where the bit will drill.

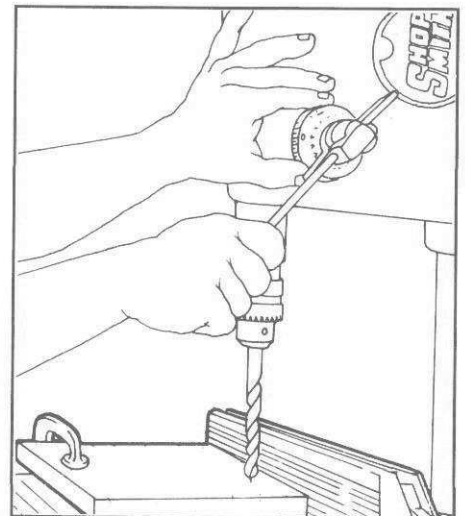


Figure 2. Setting the depth control.

Turn on the Mark V and feed the bit into the stock slowly. (See Figure 3.) When drilling deep holes, 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.

Drilling Part Way—Same as "Drilling Through" except extend the quill until the cutting flutes of the bit just touch the stock. Set and lock the depth control. (See Figure 4.)

Vertical Drilling

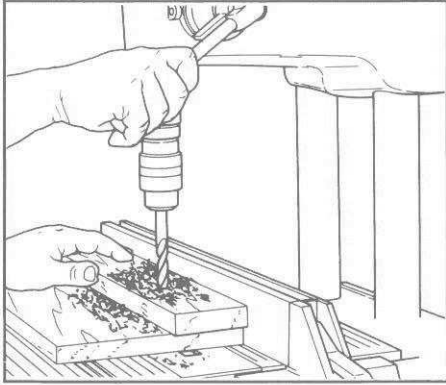


Figure 3. Drilling through.

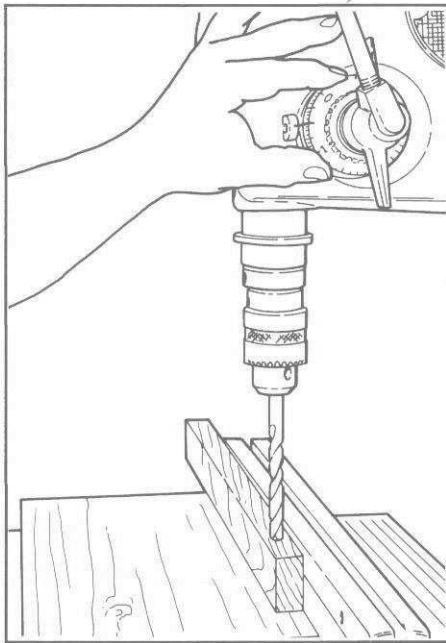


Figure 4. Setting the depth control.

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.

Avoid Tear-Out—rough, splintery edges where the drill exits the stock—by moving the scrap block every time you drill a new hole, so 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.

With the Mark V turned off, extend the quill until the pilot of the 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.

Drill the holes you need, letting the depth control stop the quill. Turn off the Mark V 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 drilling 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.

Drilling at an Angle

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 5.)

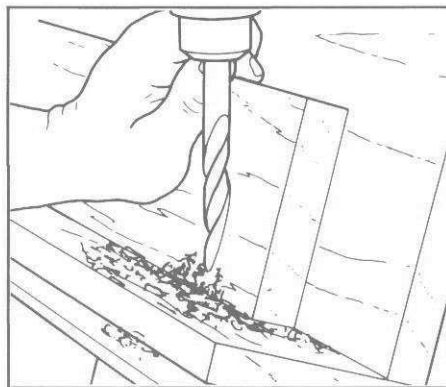


Figure 5. Drilling at an angle.

Drilling Round Stock

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

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 6.)

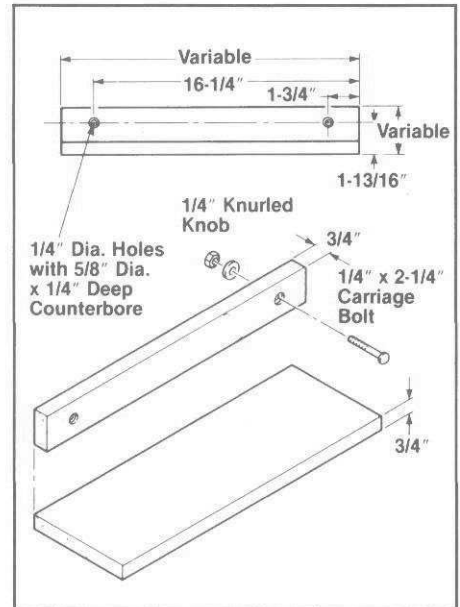


Figure 6. Making a V-support.

Extend the quill so that the bit just touches the 'V.' With the table height crank, move the table so that the pilot of the bit points to the bottom of the 'V.' (See Figure 7.) Lock the table. Place the stock in the 'V' and set the depth control. Drill the hole, holding the stock down firmly. (See Figure 8.)

Drilling Duplicates

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 Figure 9.)

To set up for this, first be sure that all your stock is sawn and sanded exactly the same dimen-

Vertical Drilling

sions. 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.

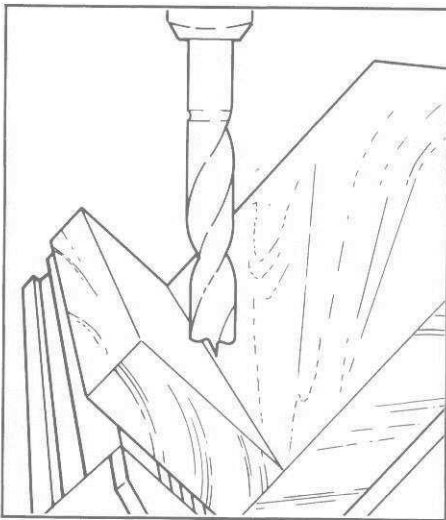


Figure 7. Positioning the bit.

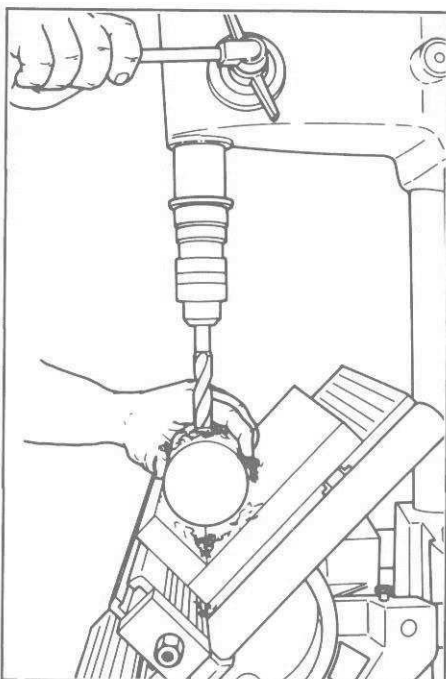


Figure 8. Drilling round stock.

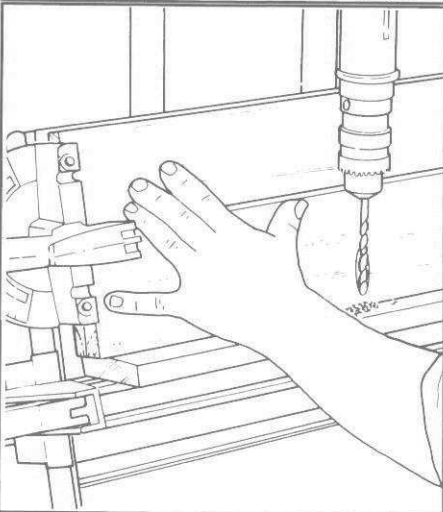
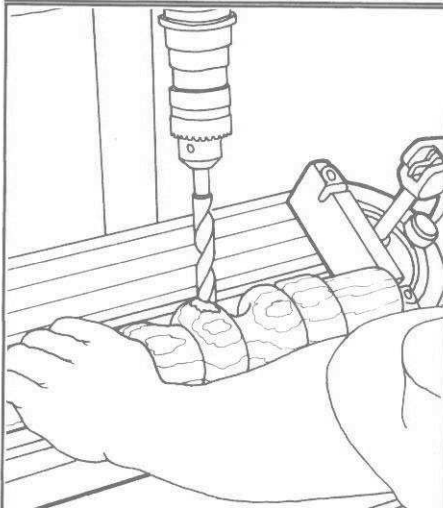
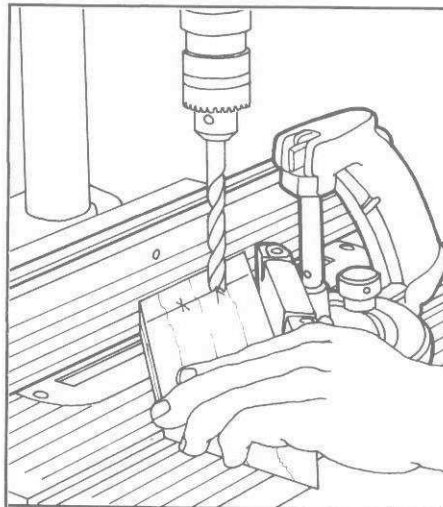


Figure 9. Three examples of configuring the rip fence and the miter gauge to drill duplicate holes.

Drilling Plastic

When drilling plastic, work at 'Slow' speed. The larger the hole, the slower the speed should be. If you go too fast, the bit will heat up and melt the plastic.

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

Drilling Metal

When drilling metal, clamp it to the worktable or rip fence and work at 'Slow' speed. 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.

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

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

After you drill metal, be sure to wipe off the Mark V. 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 power plant.

Horizontal Boring

Safety

WARNING

Before performing horizontal boring operations:

- Read the SAFETY section, especially the rules for the horizontal boring mode.
- Complete ALL the INITIAL SETUP and ALIGNMENT AND ADJUSTMENT procedures.
- Set up the horizontal boring mode according to CHANGING MODES.
- Remove the key from the chuck.
- Secure locks.
- Set the proper speed.

Horizontal Boring Speeds

Before you begin any horizontal boring operation, set the Mark V to run at the correct speed. 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 Chart."

Horizontal Boring Speed Chart

For 115 and 230 v., 60 Hz. Domestic and Canadian motors*

Size of Hole	Hardwood	Softwood
1/4" and less	H (1600 RPM)	I (1750 RPM)
1/4" to 1/2"	F (1300 RPM)	G (1450 RPM)
1/2" to 3/4"	D (1050 RPM)	E (1150 RPM)
3/4" to 1"	B (850 RPM)	C (950 RPM)
Over 1"	Slow (700 RPM)	A (750 RPM)
Boring metals (twist bits only)—Slow (700 RPM)		

*For 230 v., 50/60 Hz. motor, see page 52B.

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—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.)

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.

Mark the holes on the stock, and lay it against the scrap. Adjust the rip fence to position the hole where you want it. Make fine adjustments with the table height crank. (See Figure 1.) Clamp the stock to the table.

Extend the quill so that the cutting flutes of the bit touch the **scrap wood**. Set the depth control to 1/8" 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.

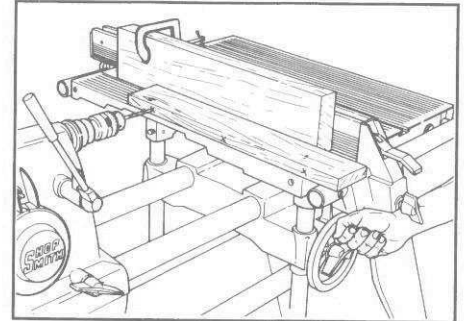


Figure 1. Positioning the stock.

Turn on the Mark V and feed the bit into the stock. (See Figure 2). 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.

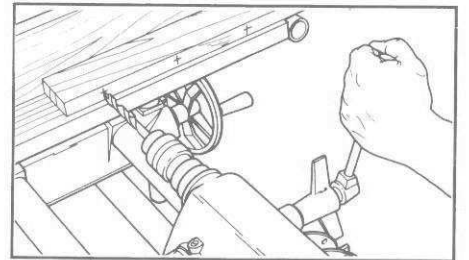


Figure 2. Boring through.

Boring Part Way—Similar to boring through except, extend the quill until the cutting flutes of the bit just touch the **stock**. Set the depth control and lock it. The depth control will stop the quill when the bit reaches the proper depth.

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.

Horizontal Boring

Avoid Tear-Out—rough, splintery edges where the drill exits the stock—by moving the scrap block every time you drill a new hole, so 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.

With the Mark V turned off, extend the quill until the pilot of the 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.

Bore the holes you need, letting the depth control stop the quill. Turn off the Mark V 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

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 3.) Set the speed dial to 'Slow' 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.

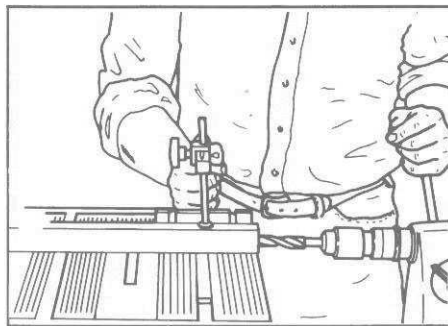


Figure 3. Boring end grain.

Boring at an Angle

Mount the rip fence on the table to use as a backstop. Tilt the table toward the power plant and clamp the stock to the table. (See Figure 4.)

If the angle is acute and you're boring through the stock, place scrap wood on the table and the rip fence.

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 5.)

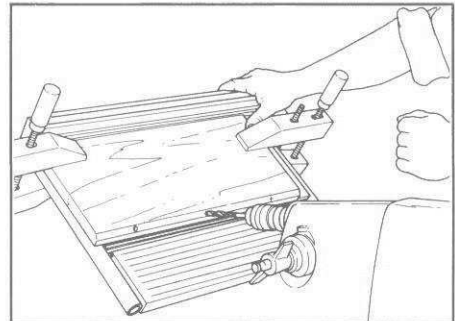


Figure 4. Boring at an angle using the rip fence.

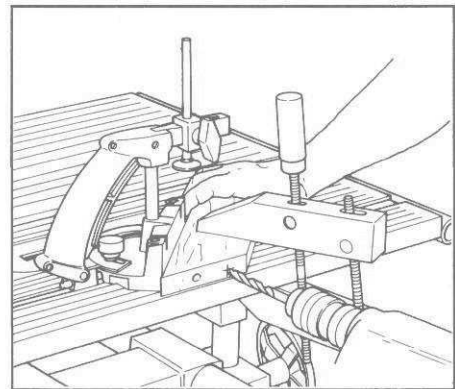


Figure 5. Boring at an angle using the miter gauge.

Lathe Turning

Safety

WARNING

Before performing lathe turning operations:

- Read the **SAFETY** section, especially the rules for the lathe mode.
- Complete **ALL** the **INITIAL SETUP** and **ALIGNMENT** and **ADJUSTMENT** procedures.
- Set up the lathe mode according to **CHANGING MODES**.
- Secure locks.
- Set the proper speed.

Lathe Turning Speeds

Before you begin any lathe turning operation, set the Mark V to run at the correct speed. 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."

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 is using the cutting edge of the tool to scrape the stock. (See Figure 1.) 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 is using the cutting edge of the tool to pare away the stock. (See Figure 1.) Position the tool rest $1/4"$ - $1/2"$ below the top of the stock, and feed the chisel at an angle.

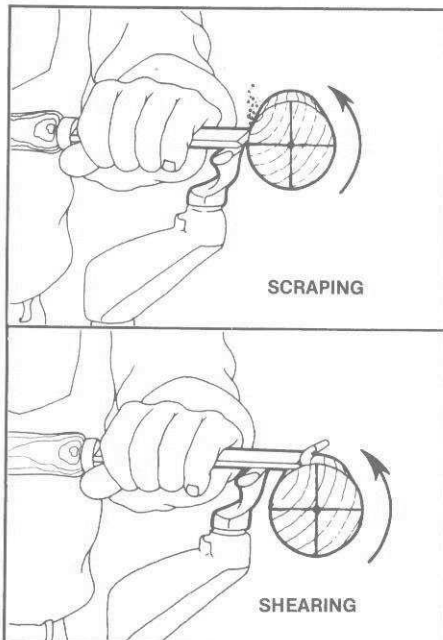


Figure 1. Turning Techniques.

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—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.

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 V or a saw horse. The ends of the string should be looped around the nails. (See Figure 2.) 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.

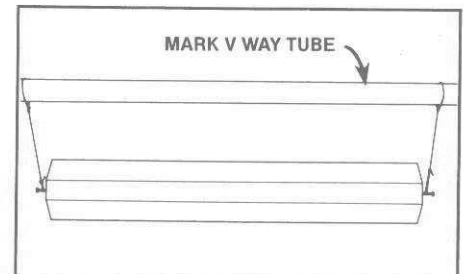


Figure 2. Checking the balance.

Spindle Turning

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

Lathe Turning Speed Chart

For 115 and 230 v., 60 Hz. Domestic and Canadian motors*

Size of Stock	Rounding	Shaping	Sanding
Up to 2" dia.	C (950 RPM)	F (1300 RPM)	K (2050 RPM)
2" to 4" dia.	B (850 RPM)	E (1150 RPM)	J (1900 RPM)
4" to 6" dia.	A (750 RPM)	D (1050 RPM)	H (1600 RPM)
Over 6" dia.	Slow (700 RPM)	A (750 RPM)	B (850 RPM)

*For 230 v., 50/60 Hz. motor, see page 52B.

Lathe Turning

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. x 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. (See Figure 3.)

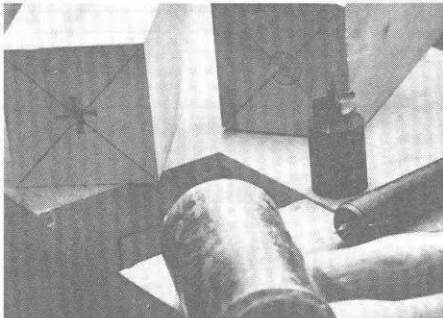


Figure 3. Preparing the stock.

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 power plant so that the centers are about 1" farther apart than the length of the stock, then lock the power plant.

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 4.)

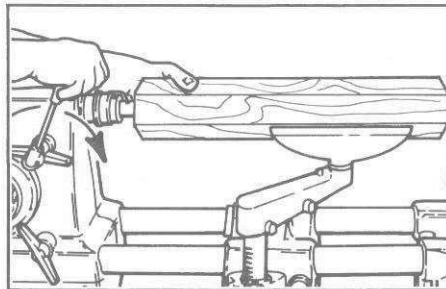


Figure 4. Mounting the stock.

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 V 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 5.) Then turn off the Mark V.

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 6.) Use calipers to check the diameters.

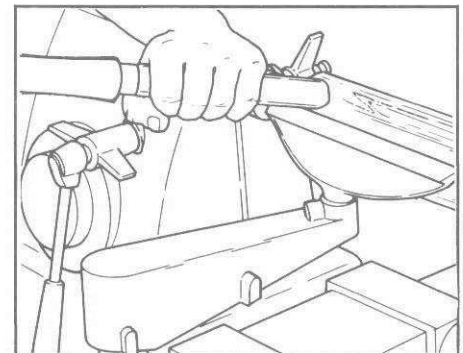


Figure 5. Rounding.

Lathe Turning

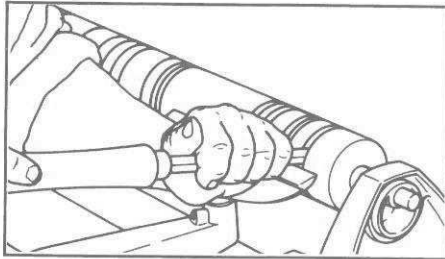


Figure 6. Sizing.

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.

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 7.)

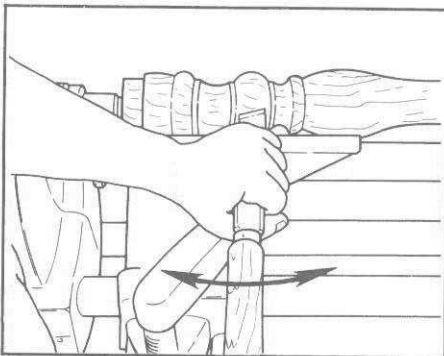


Figure 7. Cutting the beads.

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 8.)

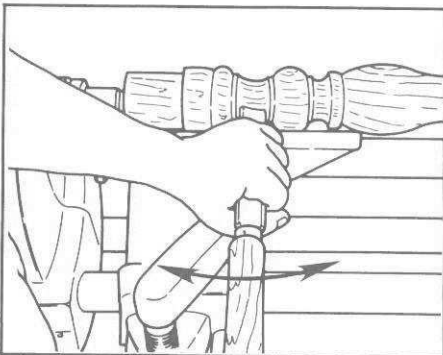


Figure 8. Cutting the coves.

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 increase the speed slightly.

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 9.)

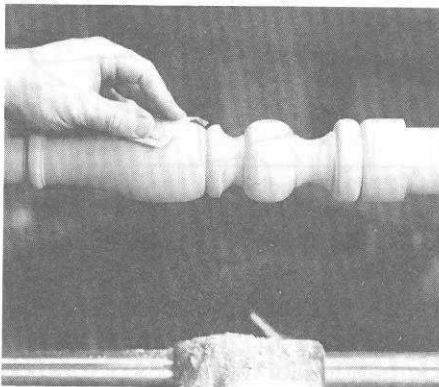


Figure 9. Sanding.

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 10.) 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.

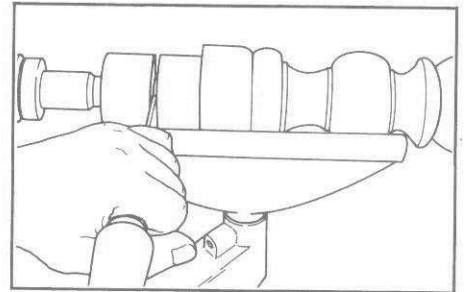


Figure 10. Parting.

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.

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.

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

Lathe Turning

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 11.)

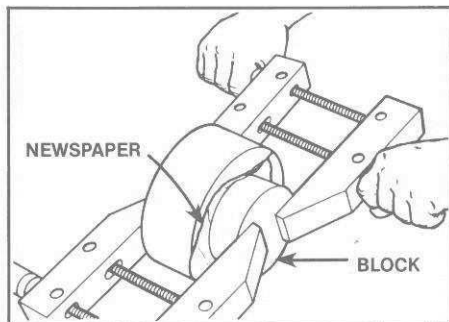


Figure 11. Preparing the stock.

b. Mount the turning stock to the faceplate with three #12 × 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.

WARNING

If the screws are being driven into end grain, the screws must sink into the block at least 2". Use #12 × 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 (Model 510) mount the tool rest in the center position.

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 12.) If the wood grain is perpendicular to the axis of rotation, do not shear.

WARNING

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

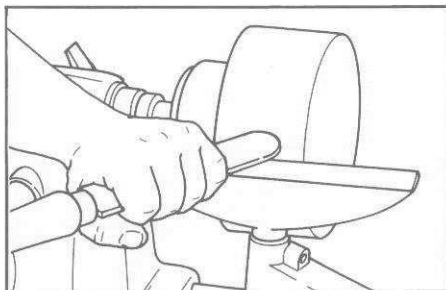


Figure 12. Rounding.

3. Shaping the outside—Make the beads and coves in the same manner as for spindle shaping. (See Figure 13.) If the wood grain is perpendicular to the axis of rotation, do not shear.

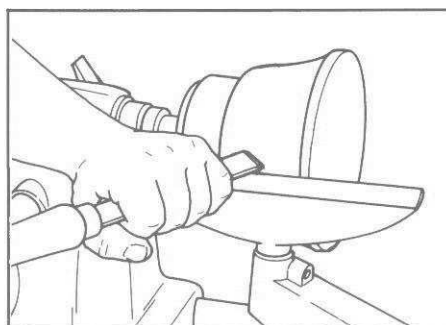


Figure 13. Shaping the outside.

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.

Scraping is the only way to shape the inside. Turn on the machine, and feed a roundnose chisel against the **downward** side of the stock. (See Figure 14.) As you work, periodically check the **inside** diameter with inside calipers.

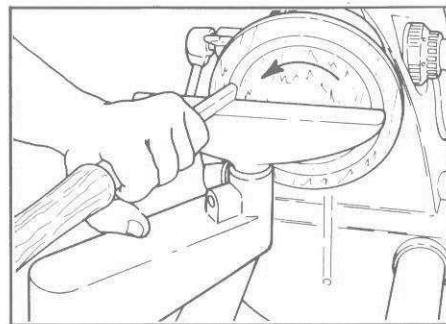


Figure 14. Shaping the inside.

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

Remove the feathers either by wetting the wood or by dismantling 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.

Preparation

WARNING

Turn off and unplug the Mark V 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 power plant lock. Finally, move the power plant, worktable and carriage as far to the right as it will go.

Cleaning

As you work, sawdust will accumulate on and in your Mark V. This residue can affect its performance. To prevent problems, clean your Mark V thoroughly inside and out once every 5 hours of running time.

Blowing Out the Power Plant—

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 90°. Replace the screw.

Working through the openings, completely blow out all the sawdust from the inside of the power plant. Use an air compressor, or reverse the airflow on your shop vacuum.

Cleaning the Table—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—With a small, stiff brush, reach in through the nameplate opening and brush off the teeth on the portion of the quill inside the power plant. (See Figure 1.) Then extend the quill out from the power plant as far as it will go and brush off the outside teeth.

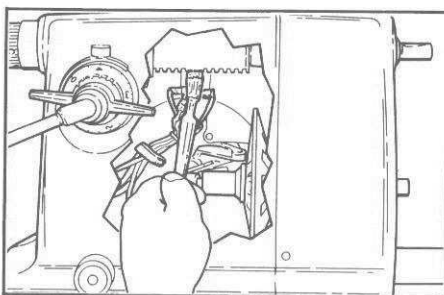


Figure 1. Cleaning the quill.

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—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, table support tubes, or any other part, clean it off with mineral spirits.

When your Mark V 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.

Lubricating

All the bearings are shielded and permanently lubricated so they do not need lubrication. However, there are several other parts that require lubrication.

To lubricate your Mark V, first clean the machine thoroughly, as described in "Cleaning". But don't reinstall the belt cover or nameplate. Then follow these procedures:

Lubricating the Sheaves—Every 25 hours of running time, lubricate the control sheave assembly and floating sheave with a good quality 30 wt. non-detergent oil. When you lubricate the sheaves, apply the oil sparingly (1-2 drops only). If you use too much, the excess oil will mix with sawdust and impede moving parts.

NOTE

Do not use penetrating oils or oils in aerosol cans. They tend to gum up at low temperatures.

To lubricate the sheaves, first plug in the Mark V, turn it on and run the speed dial up to the highest speed. **Then turn the machine off and unplug it.**

Lubricate the **control sheave assembly** first. While looking through the nameplate opening, turn the main spindle by hand until you locate the hole in the sleeve of the control sheave. Reach inside the power plant with your oil can and apply 1-2 drops of oil in the hole. (See Figure 2.)

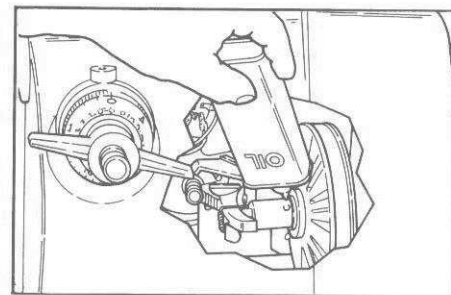


Figure 2. Lubricating the control sheave assembly.

To lubricate the **floating sheave**, rotate the main spindle by hand until you find the hole in its sleeve. (This hole may be difficult to find because it is behind the third coil of the spring that fits over the sleeve.) When you find the hole, spread the coils of the spring over the hole

Maintenance

with a large blade screwdriver. Then apply 1-2 drops of oil in the hole. (See Figure 3.)

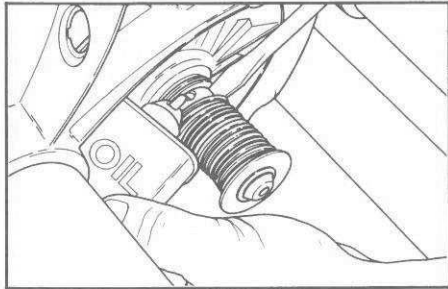


Figure 3. Lubricating the floating sheave.

When you've lubricated both sheaves, replace the nameplate and the belt cover. Mount the sanding disc to the main spindle. Turn the disc by hand. Then, slowly turn the speed control to "Slow." Do not force the speed control handle. You could ruin the speed control mechanism. Run through the complete speed range several times to help spread the oil out over the sleeves and shafts.

Lubricating the Locks—Every 50 hours of running time, apply powdered graphite to the threads of the power plant lock, carriage lock, and rip fence lock rod.

First inspect the threaded rods of the power plant lock (inside the power plant), the carriage lock (underneath the carriage), and the rip fence lock rod (inside the rip fence). Brush off or wipe off any foreign materials.

To lubricate the **power plant lock**, loosen the lock as far as possible. Then reach inside the nameplate opening and apply a small amount of powdered graphite to the points where the threaded rod screws into the wedge locks. (See Figure 4.) Replace the nameplate and secure the power plant lock.

To lubricate the **carriage lock** (Model 500 only), loosen it completely and slide the carriage all the

way to the right. Secure the power plant lock, raise the machine to the vertical position and lock it in place. Then apply powdered graphite to the points where the threaded rod screws into the wedge locks. (See Figure 5.) Lower the Mark V back into the horizontal position and secure the carriage lock.

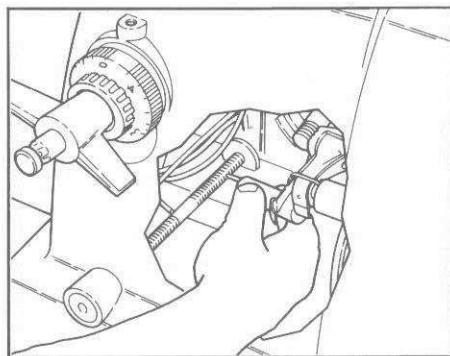


Figure 4. Lubricating the power plant lock.

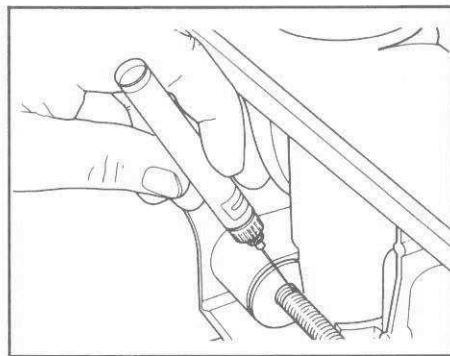


Figure 5. Lubricating the carriage lock (Model 500 only).

To lubricate the **rip fence lock rod** (Model 500 only), remove the rip fence from the table. Tighten the locking handle as far as it will go, and turn it over so that you can see the long rod that runs through the casting. Apply graphite to the threads near the handle that holds the rip fence to the table. (See Figure 6.)

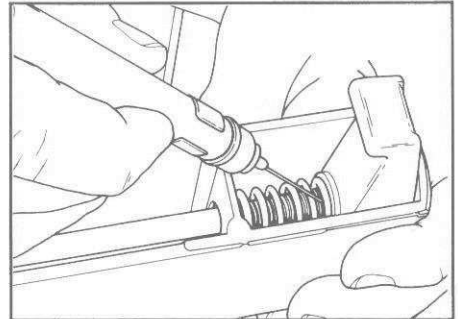


Figure 6. Lubricating the rip fence lock rod (Model 500 only).

Waxing

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 (Model 510)
- Quill
- Rip fence (both sides)
- Miter gauge bar
- Extension table surface, support tubes, and table bar (Model 500) or table tubes (Model 510)
- Mounting holes in the power mount, base mount and carriage.

CAUTION

Use paste floor or furniture wax. Do not use car wax or spray furniture polish. The Mark V needs wax for both protection and lubrication. Car wax offers good protection for metal, but it's extremely hard and has little value as a lubricant. Furniture polish isn't hard enough. Paste floor or furniture wax protects and lubricates.

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.

Some of the parts that need waxing require special care:

Way Tubes—Don't slide the power plant and/or carriage over new wax before you buff it out. Otherwise, wax may accumulate inside the power plant or carriage and impede movement.

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 7.)

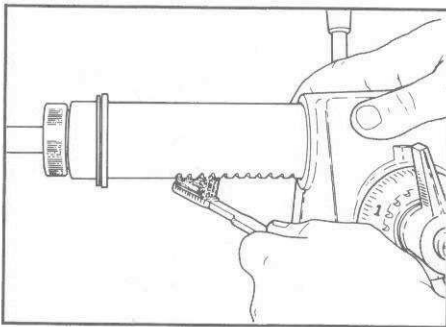


Figure 7. Removing wax from the racks.

Table Support Tubes—After waxing, brush tubes to remove all residue from the racks.

Mounting Holes—Wrap a rag around a dowel to apply wax inside these holes. Use the same technique to buff it out.

Checking Belt Tension

Every 10 hours of running time, check the tension of the poly V-belt. You may also need to check the tension on this belt if the drive train seems to be 'slipping' or the top of the power plant gets too hot when you're working.

To check the belt tension, remove the belt cover. With your fingers, push in on the poly V-belt. (See Figure 8.) If you can push the belt in more than 1/8" when applying

heavy pressure, the belt needs to be tensioned.

To adjust the tension, loosen the bolt that holds the idler shaft eccentric bushing in the power plant casting. (See Figure 9.) Insert a blade screwdriver in the slot of the eccentric bushing and turn the bushing clockwise in the casting until it stops. (See Figure 10.) With your finger, test the tension to see that you've taken the 'slack' out of the belt. Retighten the bolt.

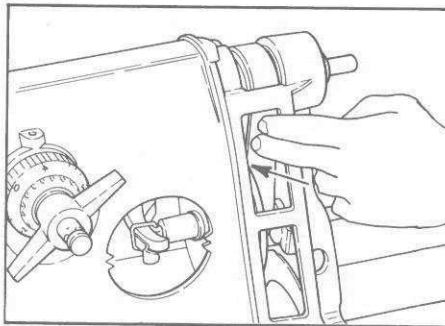


Figure 8. Checking belt tension.

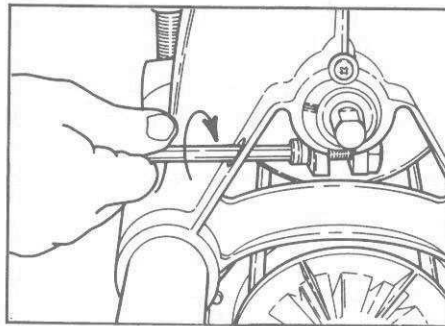


Figure 9. Adjusting belt tension.

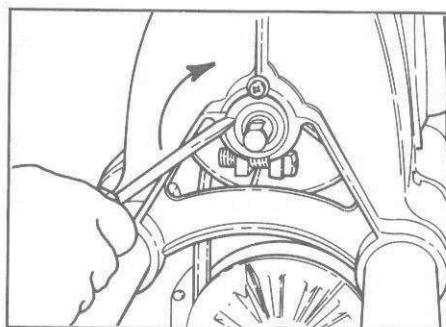


Figure 10. Turning the eccentric bushing.

NOTE

If the poly V-belt seems tight but it still slips, **don't** increase the belt tension—this will just stretch the belt out of shape. Instead, apply a little 'belt dressing' to the inside of the belt to increase its traction.

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—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 be easily removed, cleaned, and reinstalled. Dissolve the impacted sawdust with mineral spirits.

CAUTION

DO NOT use lacquer thinner to clean the saw guards. This solvent dissolves the plastic parts, distorting them or making them cloudy.

Every 10 hours of running time wax and buff the splitter 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 to the rods. **Do not use oil** on these parts.

Sanding Disc—As you work, sawdust, wood oils, glues and other materials will 'load up' on sandpaper.

Maintenance

As needed, hold an abrasive cleaner against the disc while the Mark V 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—Every 10 hours of running time, apply a small amount of powdered graphite to the inside of the drill chuck to keep it operating smoothly.

Saw Blades, Lathe Chisels and Drill Bits—These cutters will become dull with use. Sharpen as needed. A sharp cutter performs better and is safer.

Storing

In normal use, regular cleaning, lubrication, and waxing will prevent the ferrous parts of the Mark V 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 V before using it again.

Tensioning the Quill Feed

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 V.

1. Remove the quill. On top of the power plant, between the quill lock

Maintenance Schedule

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 percent 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 V. Average out the time you spend in your shop to determine the proper maintenance intervals for your machine. But the 50-hour procedure should be performed **at least** once a year.

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 V. (Refer to "Cleaning".)
- Wax the Mark V. (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 headrest and carriage locks, worktable stops, table tilt indicator, miter gauge slots, miter gauge, rip fence, extension table and lathe centers. (Refer to the **Alignment and Adjustment** section.)
- Check the tension on the Poly V-belt. (Refer to "Checking Belt Tension".)

Every 25 hours of running time

- Lubricate the sheaves. (Refer to "Lubricating".)

Every 50 hours of running time

- Repeat the preceding steps.
- Lubricate the power plant lock, carriage lock (Model 500), and the rip fence lock rod (Model 500). (Refer to "Lubricating".)

CAUTION

Do not tighten the quill lock. This will damage parts.

2. 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 power plant from the speed dial side). This will restore the tension to its original factory setting.

3. Install the quill assembly, by simply reversing the procedure you used to remove it. Turn the main

and quill feed stop, there is a set-screw that keeps the quill from advancing all the way out of the power plant. If your machine has never been worked on before, this screw is covered with gray putty. Dig out the putty with a penknife, and back out the setscrew 2 full turns.

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 power plant. When you've removed the quill assembly, set quill feed stop at 4-1/4". Tighten stop lock.

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 power plant. Tighten this setscrew until it 'bottoms out' in the groove, then back it out 1/16 turn.

Adjusting the High Speed Setting

The Mark V comes with the speeds preset. The low speed setting is automatic and does not require adjustment. However, if you need to adjust the high speed setting, follow this procedure:

NOTE

A tachometer (available at a tool rental) is helpful to make the high speed adjustment.

WARNING

Since some steps of this procedure are performed with the Mark V plugged in and/or running, keep your hands and other parts of your body away from moving and/or electrified parts of the machine. Also, do not stand in-line with moving parts.

1. Remove the belt cover. Slide the power plant and carriage to the right along the way tubes as far as they will go. Secure the power plant and carriage locks, then remove the two screws holding the belt cover to the power plant. Slide the belt cover off the power plant and to the left along the way tubes, out of the way.

2. Plug in and turn on the machine. Turn the speed dial toward 'Fast' until the tachometer

reaches 5200 rpm or until the top of the drive belt is 1/8"-1/16" below the outside diameter of the lower sheaves, or the high speed stop is engaged. Use a grease pencil to mark the location of the access hole in the speed control handle on the power plant casting. Then turn the speed control handle part of a revolution toward 'Slow' until the access hole in the side of the speed control handle is facing up.

3. Turn off and unplug the Mark V.

4. Remove the speed control handle. With the access hole in the side of the speed control handle facing up, insert a 3/32" Allen wrench in the hole and loosen the setscrew holding the handle to the worm control shaft. (See Figure 11.) Pull the handle free of the shaft.

5. Loosen the jam nut. Hold the setscrew with a 1/8" Allen wrench and loosen the jam nut with a 7/16" open end wrench. (See Figure 12.)

6. Plug in and turn on the Mark V. Turn the shaft by hand (or with padded pliers) until the recess lines up with the mark on the power plant.

7. Adjust the setscrew. With the jam nut loose, turn the setscrew until it contacts the control arm quadrant.

8. Turn off and unplug the Mark V.

9. Lock the jam nut. Make sure that the control arm quadrant is engaged against the setscrew and

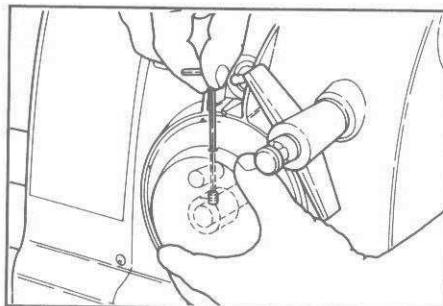


Figure 11. To remove the speed control handle, loosen the setscrew.

the drive belt is 1/8"-1/16" below the outside diameter of the lower sheaves. Then hold the setscrew with a 1/8" Allen wrench and tighten the jam nut with a 7/16" open end wrench.

10. Install the speed control handle. If after the setscrew was adjusted, the recess in the shaft is not facing up, pull the motor sheaves apart and push the drive belt up inside the power plant. This will loosen the drive belt in the upper sheaves. This will allow you to easily rotate the worm control shaft so that the recess in the shaft is facing up. This setting will be less than 'Fast' and the speed dial needs to be adjusted accordingly. Replace the control handle on the worm control shaft so that the setscrew lines up with the depression in the shaft, then tighten the setscrew.

11. Mount the sanding disc on the main spindle. Turn the disc by hand and gently turn the speed dial from 'Fast' to 'Slow.'

12. Plug in and turn on the Mark V. Turn the speed control handle until the access hole returns to the position marked at 'Fast.' If the speed control handle comes up against the high speed stop before the access hole reaches the mark, the high speed stop is set at too low of a speed. If the access hole continues past the mark before coming up against the high speed stop, the high speed stop is set at too high of a speed.

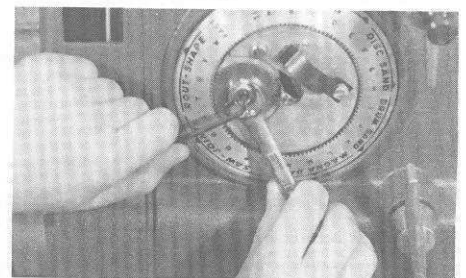


Figure 12. Hold the setscrew and loosen the jam nut.

Maintenance

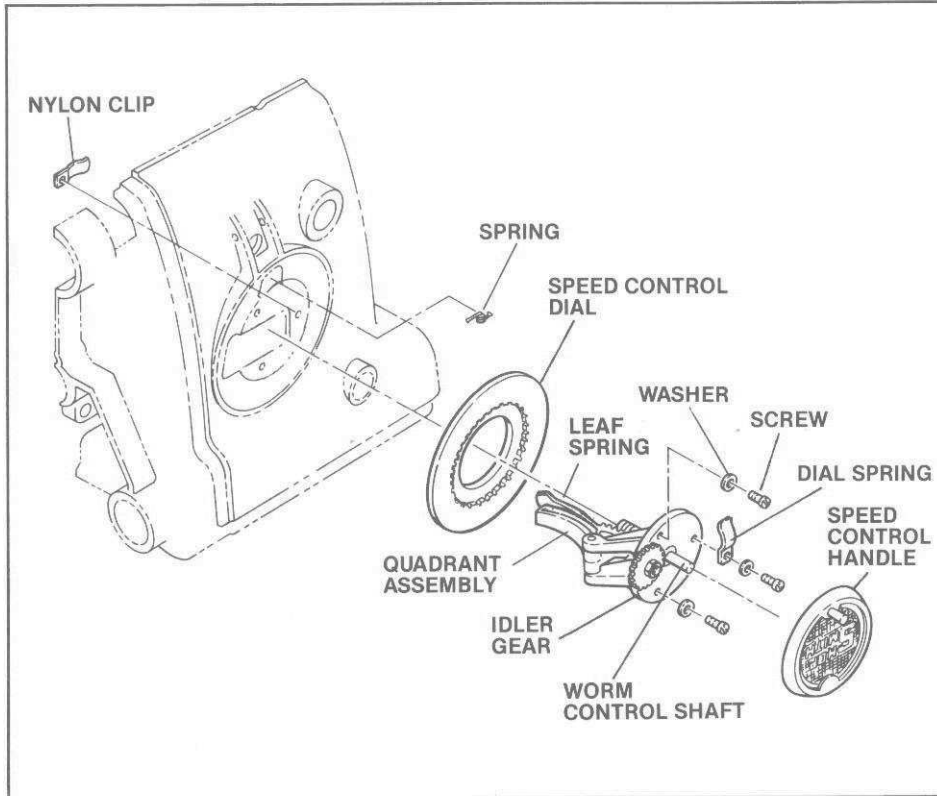


Figure 13. Speed changing mechanism.

13. Repeat Steps 3 through 12 until the high speed stop is set at 5200 rpm. Run the machine through the speed ranges. Check to see that the speed dial stops at 'Slow' and 'Fast.'

CAUTION

The Mark V runs at a maximum speed of 5200 rpm. Do not exceed 5200 rpm.

14. Install the belt cover.

Cleaning the Speed Changer

Fine sawdust can accumulate on various parts of the speed changing mechanism and interfere with its operation, even if you blow out the power plant regularly. If the speed

dial becomes hard to turn and lubricating the motor shaft and idler shaft does not relieve the problem, clean the speed changing mechanism according to the following procedure. (See Figure 13 and the **Parts List** to identify parts.)

1. Set the speed dial to 'Fast,' with the Mark V running. Observe where the opening is for access to the setscrew on the speed control handle. This opening must be facing straight up. Turn the speed dial until this position is achieved. Note what letter is closest to the arrow on the power plant.

NOTE

When the speed control handle is reinstalled, this same position must be located so that the speed dial is in calibration with the speed control handle.

WARNING

Turn off and unplug the Mark V.

2. Detach the speed changer from the sheaves. With a blade screwdriver, pry off the nameplate. Look inside the power plant through the nameplate opening. On the end of the upper floating sheave is a retaining loop hooked over a leaf spring. The leaf spring is attached to the quadrant assembly. Depress the leaf spring and swing the retaining loop toward you, off the spring.

3. Remove the speed control handle. With the access hole in the side of the speed control handle facing up, insert a 3/32" Allen wrench in the hole and loosen the setscrew holding the handle to the worm control shaft. (See Figure 14.) Pull the handle free of the shaft.

4. Remove the speed dial and speed changer. Remove the three screws and washers that hold the speed dial and speed changer in the power plant. The screw toward the right also holds a dial spring on the outside and a nylon clip in-

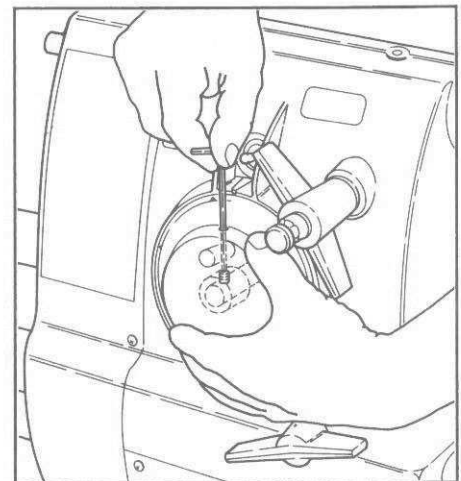


Figure 14. To remove the speed control handle, loosen the setscrew.

side the power plant. To keep from losing the clip, reach inside the power plant through the nameplate opening and hold it while loosening the screw. (See Figure 15.) When you've removed all three screws, pull the speed dial and the speed changer out of the power plant. (See Figure 16.)

Do not remove the spring behind the dial. This spring keeps the speed dial from rattling when the machine is running.

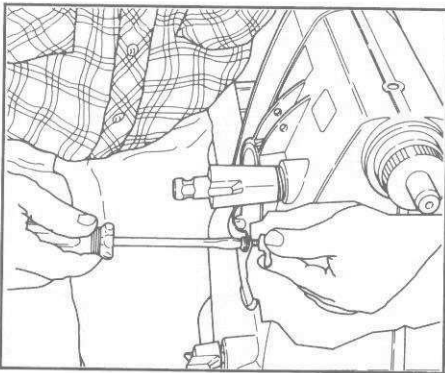


Figure 15. Reach inside the power plant through the nameplate opening and hold the clip while loosening the screw.

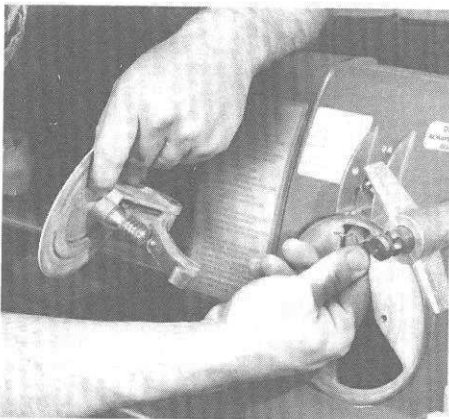


Figure 16. When all three screws are removed, pull the speed dial and speed changer out of the power plant. Do not remove the spring behind the dial.

5. Clean the speed changing mechanism. To clean the speed changer, thoroughly scrub the idler gear and the interlocking teeth of the speed control dial on the front of the assembly with a small, stiff

brush (toothbrush) soaked in mineral spirits or turpentine. Then turn the worm control shaft until the quadrant assembly swings free of the worm control shaft. Scrub the shaft and quadrant teeth until they are free of grease and sawdust.

Wipe all parts dry with a clean rag. Put a tiny dab of cup grease or 'furnace bearing' grease on the worm control shaft and rack of the quadrant assembly. Then re-engage the shaft and the quadrant assembly. Turn the shaft clockwise until it stops, so parts will remain calibrated.

6. Install the speed changer and speed control dial. Install the speed control dial and speed changer, taking care not to turn the worm control shaft. Fasten the speed changer in the power plant with the two screws on the left, then install the screw on the right, along with the dial spring on the outside. (See Figure 17.) The dial spring helps keep the speed control handle from turning when the machine is running. The end of the spring should rest between two small bumps on the speed changer.

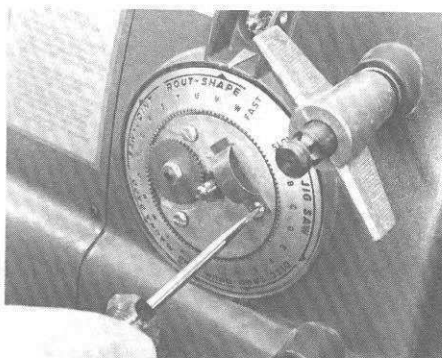


Figure 17. The far right screw that holds the speed changer in the power plant also holds the dial spring to the speed changer.

After you start the right hand screw, reach inside the power plant and hold the nylon clip in place. The clip should thread itself onto the screw as you tighten it. When all

screws have been tightened, **secure the wiring inside the power plant behind the nylon clip.** (See Figure 18.) Hook the retaining loop on the end of the sheave over the quadrant assembly and replace the nameplate.

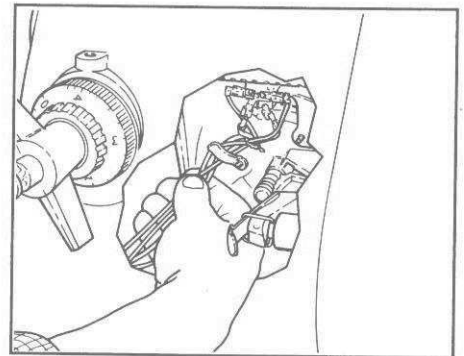


Figure 18. Secure the wiring that runs between the motor and the power switch behind the nylon clip.

7. Install the speed control handle on the worm control shaft so that the setscrew lines up with the depression in the shaft, then tighten the setscrew.

8. Mount the sanding disc. Spin the disc by hand while turning the speed dial to 'Slow.'

9. Plug in and turn on the Mark V. Run machine through its range. Check to see that the dial stops at 'Slow' and 'Fast.' Additional adjustment may be necessary to calibrate the dial to the handle.

10. Replace the belt cover.