



Shopsmith[®] Mark V Home Workshop System

MARK V Model 520

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:



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



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.

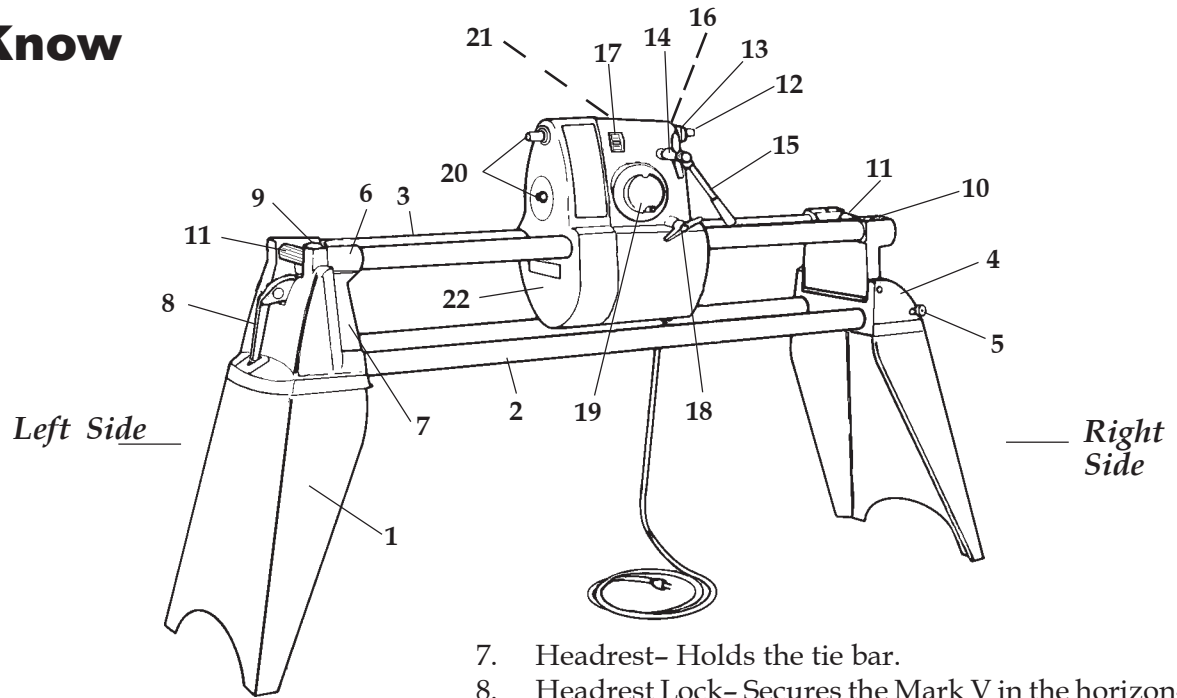
Safety Rules for the Shopsmith Mark V

- 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

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 that 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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Terms to Know



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

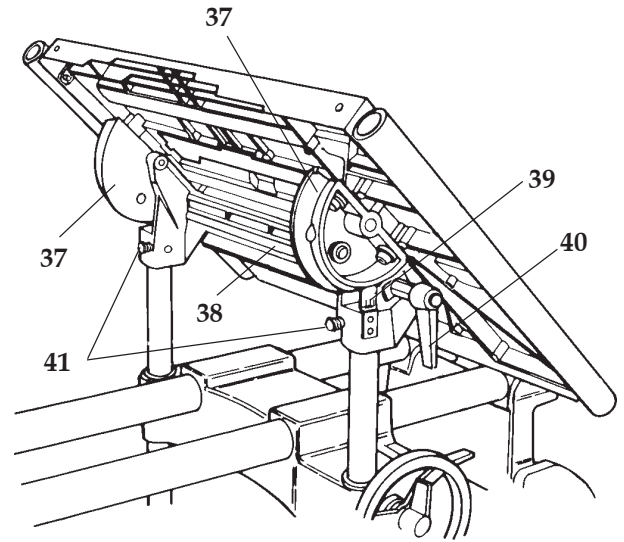
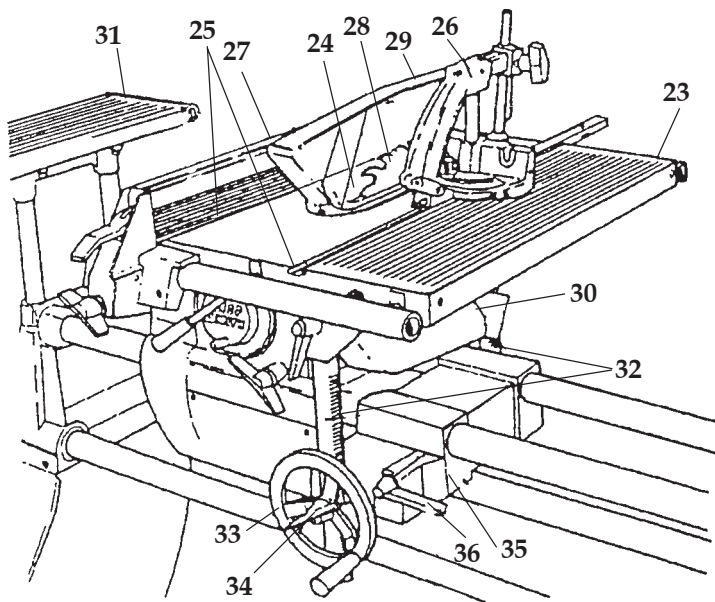
Basically, the Mark V is a rigid bench that holds the headstock and the worktable system. The upper part of this bench can be positioned horizontally or vertically. The headstock and the worktable slide independently and are positioned along the upper tubes.

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

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

1. Legs -- Support the way tubes and bench tubes.
2. Bench Tubes - Hold the Mark V rigid.
3. Way Tubes - Allow the headstock 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, Scroll Saw, Strip Sander and Planer).
10. Base Mount- Holds the extension table and lathe tailstock.
11. Accessory Mount Locks- Secure the extension table, Major Accessories, and the lathe tailstock.
12. Main Spindle- Mounts the saw blades, sanding discs, and other accessories.
13. Quill- Extends and retracts up to 4-1/4".
14. Quill Lock- Secures the quill.
15. Quill Feed Lever- Extends the quill and main spindle out from the headstock.
16. Quill Feed Stop- (hidden from view) Stops the quill at predetermined distances out from the headstock.
17. Power Switch- Turns the Mark V on and off. Has a removable safety key to prevent unauthorized use of the Mark V.
18. Headstock Lock- Secures the headstock on the way tubes.
19. Speed Dial- controls the speed of the main and auxiliary spindles. ONLY turn the speed dial when the Mark V is running. Otherwise, you will damage the speed changing mechanism. Then turn the speed dial to "Slow" after every operation, then turn off the Mark V.
20. Auxiliary Spindles- The upper spindle powers the Bandsaw, Belt Sander, Strip Sander and Thickness Planer. The lower spindle powers the Jointer and Scroll Saw.
21. Logo Cover- (hidden from view) Allows access to the wiring and speed changer mechanism.
22. Belt Cover- Allows access to the belts and sheaves.



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 saw blade is use for both crosscutting and ripping.
29. Upper Saw Guard- Provides a physical barrier between you and the part of the blade above the table. An anti-kickback mechanism helps control kickbacks.
30. Lower Saw Guard- Protects you from the part of the blade or cutter below the table. The saw guard has a dust chute. The lower saw guard is also used with the sanding disc.
31. Extension Table- Mounts in either 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 Crank- Turns the pinions in the carriage which raise and lower the table.
34. Table Height Lock- Secures the table at any height.
35. Carriage- Slides along the way tubes and holds the table support tubes and the lathe tool rest.
36. Carriage Lock- Secures the carriage on the way tubes.
37. Trunnions- Allows the table to tilt up to 90° left and 45° right.
38. Table Tie Bar- Supports the table support tubes and the trunnions.
39. Table Tilt Indicator- This vernier scale indicates the table angle.
40. Table Tilt Lock- Secures the table at any angle, up to 90° left and 45° right.
41. Table Stops- When properly adjusted, these bolts stop the table at 90° left, 45° right and 0°. (Note: the two 90° table stop bolts are shown.)

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

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

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

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

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

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

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

Coupling Kit– Connects the Major Accessories to the headstock.

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

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

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

Specifications

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

Capacities

The work capacity of the Mark V depends on these five modes:

- **Table Saw**

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

- **Disc Sander**

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

- **Drill Press**

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

- **Horizontal Boring Machine**

The Mark V uses the same drill chuck used in the drill press mode. The table can be lowered 2-3/8" below the chuck, enabling you to bore the center of boards up to 4-3/4" thick. The width and length of boards that you can bore is limited only by what you can safely handle.

- **Lathe**

As a lathe, the Mark V 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 steel tubes. The two upper tubes, or way tubes, can be locked in either a horizontal or vertical position.

Headstock

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 5,200 rpm. The lower auxiliary spindle turns 1.6 times faster than the other two, or between 1,120 rpm and 8,320 rpm.

Worktable

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

Overall Dimensions of the Mark V

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 of Mark V

Tools Needed:

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

SAFETY

WARNING

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

1. Complete **ALL** of the following procedures—and then recheck them at regular intervals. You **MUST** use an accurate combination square for alignment and adjustment. To check that your square is accurate, select a board with at least one straight and true edge. Place the square against the good edge and draw a line across the width. Flop the square over and hold it against the same edge and draw another line next to the first one. If the lines are parallel, your square is accurate.
2. All the parts and accessories which support or guide the stock **MUST** be aligned **parallel with or perpendicular to** the main spindle's plane of rotation. During the following alignment procedures the saw blade (provided in the accessories box) will represent the main spindle's plane of rotation.

NOTE

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

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

ADJUST THE HEADREST LOCK

1. To check the headrest lock, grasp the way tubes near the tie bar and pull up, as demonstrated by the right hand in Figure B-44.

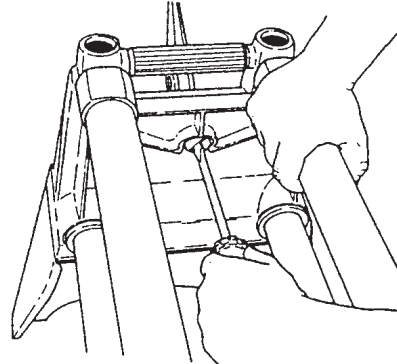


Figure B-44

2. If there is "give" in the lock, unlock the handle and use a medium Phillips screwdriver to turn the lock shaft **clockwise**, as done by the left hand in Figure B-44. If the lock is difficult to operate, the shaft is too tight. To loosen, unlock the handle and turn the shaft **counterclockwise**.

ADJUST THE CARRIAGE LOCK

3. If the carriage lock handle does not lock into the horizontal position or the carriage moves out of position, the lock needs adjusting. To adjust the lock, use a 1/2" socket with an extension and ratchet handle to tighten or loosen the nut located at the back of the carriage assembly, as shown in Figure B-45.

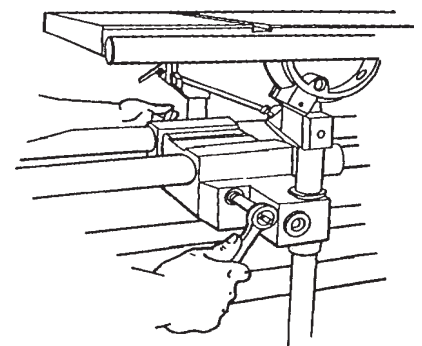


Figure B-45

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

WARNING

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

SET THE WORKTABLE'S 90° LEFT STOP

WARNING

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

- Unlock the carriage and headstock. Move the headstock to the middle of the way tubes. Then move the carriage between the headstock and base mount (right side).
- Tighten the headstock and carriage locks. Place the Mark V in the vertical position by loosening the headrest handle, firmly grasping the way tubes near the headrest end, and lifting the tubes into the 90° position, as demonstrated in Figure B-46.

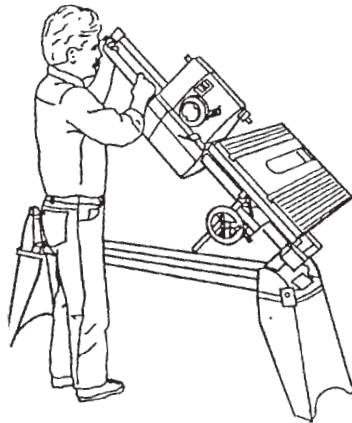


Figure B-46

- See Figure B-47. Use your fingers to screw in the base lock. Note the base lock is slightly off center to the countersink found in the bench base, as shown in Figure B-48. This offset allows the base lock to more firmly hold the base in place.

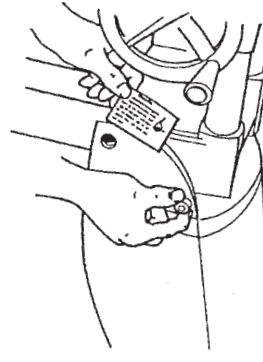
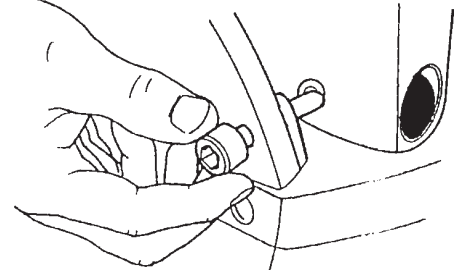


Figure B-47

Figure B-48



- Move the worktable into the 90° position by loosening the table tilt lock, as seen in Figure B-49, then putting the worktable in the horizontal 90° position, as shown in Figure B-50. Retighten the table tilt lock only enough to allow movement with firm pressure.

Figure B-49

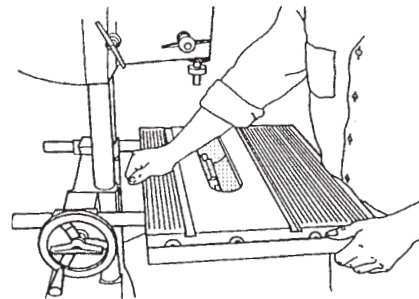
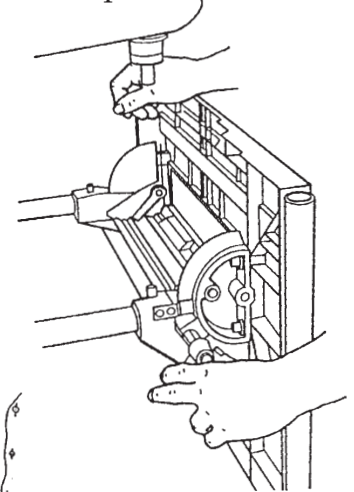


Figure B-50

- Use a 5/32" Allen wrench to remove the table insert, as demonstrated in Figure B-51.

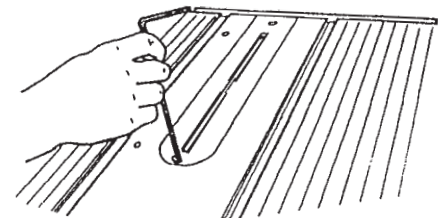


Figure B-51

10. To install the drill chuck, mount the chuck on the spindle and align the chuck's set screw with the spindle knob's set screw, as shown in Figure B-52. This allows the chuck's set screw to set on the flat part of the spindle. Use a 5/32" Allen wrench to securely tighten the drill chuck's set screw.

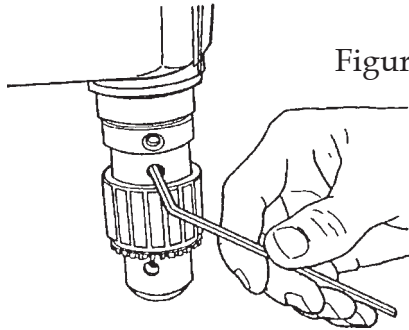


Figure B-52

13. Set the combination square against the bit and table, as shown in Figure B-55. The square should contact the bit along its entire length. When the table is exactly perpendicular to the drill bit, lock the table, as seen in Figure B-56.

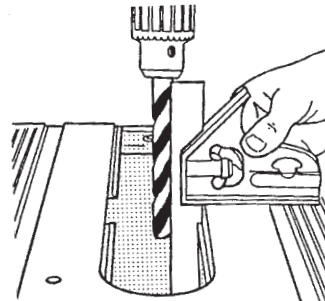


Figure B-55

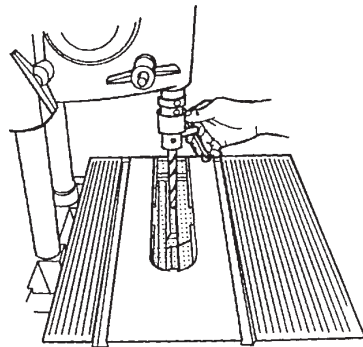
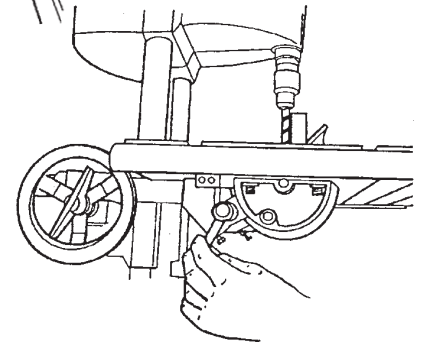


Figure B-53

Figure B-56



11. Install a 3/8" to 1/2" straight drill bit in the drill chuck and use the chuck key to lock it place. See Figure B-53.

NOTE

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

12. With the drill bit above the table opening, use the quill feed to extend the bit 1/2" into the table opening, as in Figure B-54.

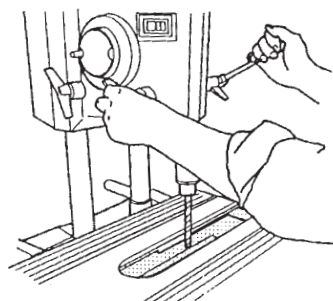


Figure B-54

14. Both 90° stops (shown in Figs. B-57 and B-58) should contact the underside of the table. If they don't, use a 1/2" wrench to adjust the stops.

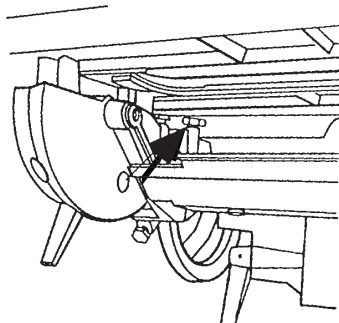
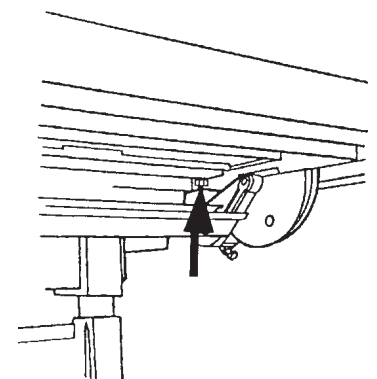


Figure B-57

Figure B-58



15. Recheck the setting by loosening the tilt lock, moving the table, and then repeating Steps 13 and 14. (Rechecking the settings is very important!)

SET THE WORKTABLE'S 0° STOP

16. Remove the drill bit and drill chuck from the spindle.
17. Loosen the base lock. Firmly grasp the way tubes and lower the headstock into the horizontal position, then engage the head rest.
18. Loosen the table tilt lock and place the table in the horizontal "0" position. Retighten the table tilt lock only enough to allow movement with firm pressure.
19. Mount the saw blade on the arbor:
 - a. Remove the arbor nut by turning it clockwise, as seen in Figure B-59a. Hold the arbor with the threaded part pointing to the left.

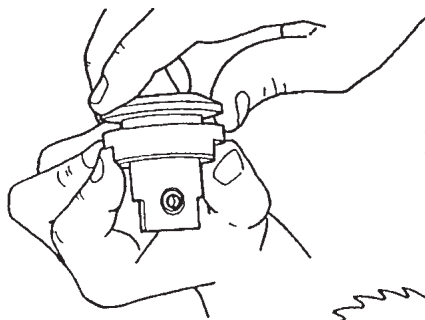


Figure B-59a

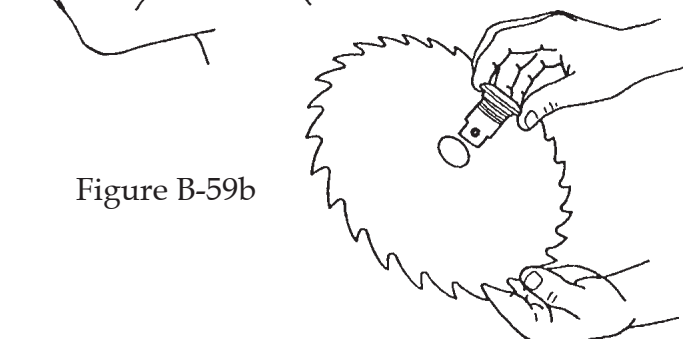


Figure B-59b

- b. Hold the blade with the teeth pointing toward you, as shown in Figure B-59b, then insert the arbor through the hole. Replace the nut and finger tighten it, as in Figure B-59c.

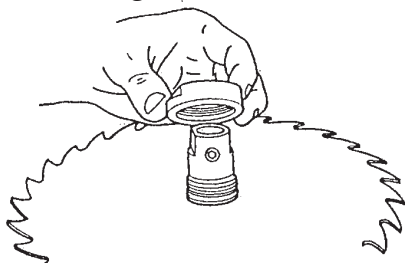


Figure B-59c

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

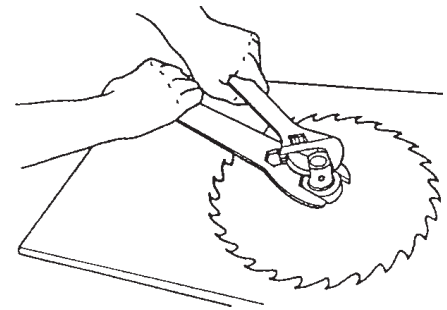


Figure B-59d

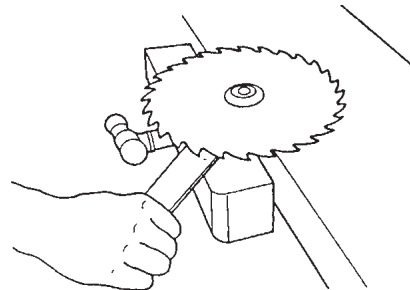


Figure B-59e

- d. Hold the arbor with an adjustable wrench and tighten the arbor nut with the arbor wrench, as demonstrated in Figure B-59d. Another way to tighten the arbor nut is to clamp the arbor in a bench vise, as illustrated in Figure B-59e, and tighten the nut with the arbor wrench.

NOTE

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

20. Mount the saw blade on the spindle and align the arbor set screw with the spindle knob's set screw, then use a 5/32" Allen wrench to tighten the arbor set screw, as seen in Figure B-60.

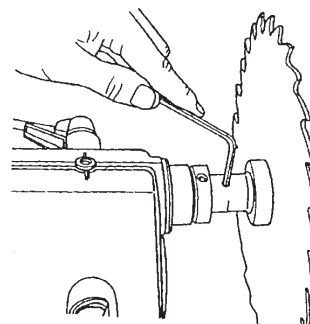
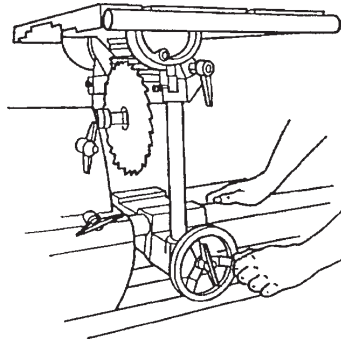


Figure B-60

21. Reinstall the table insert in the worktable.
22. Raise the worktable so that it clears the top of the saw blade.
23. Loosen the carriage lock and slide the carriage so the saw blade is directly beneath the slot in the table insert. See Figure B-61.

Figure B-61



24. Lower the worktable (but not all the way down) so the saw blade comes through the slot. Lock the table height, as seen in Figure B-62.

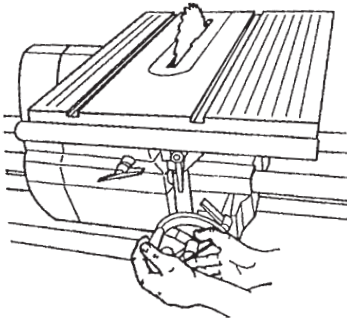
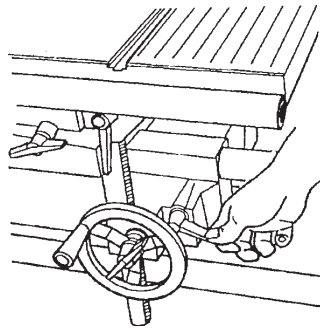


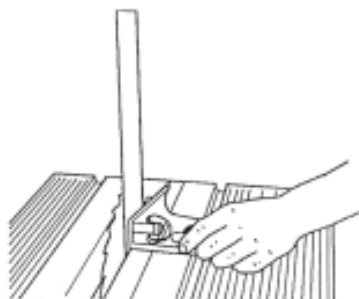
Figure B-62

Figure B-63



25. Tighten the carriage lock, as shown in Figure B-63.
26. Place the combination square against both the saw blade and worktable, as seen in Figure B-64. Make sure the square's blade does **not** touch a saw tooth and **does** rest in a gullet between teeth.
27. If the worktable is not exactly perpendicular to the saw blade, adjust the worktable so it is perpendicular to the saw blade, then tighten the tilt lock.

Figure B-64



28. To adjust the 0° stop, simultaneously depress the table stop pin and use a 1/2" wrench to adjust the stop bolt. The stop bolt should just contact the side of the stop pin. Once the stop bolt is adjusted, the stop pin will "lock" back when the tilt lock is tightened. See Figure B-65.

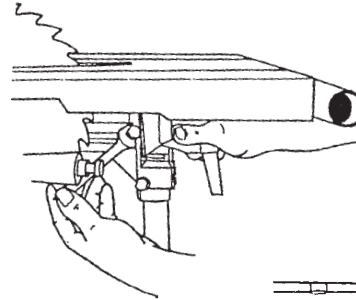
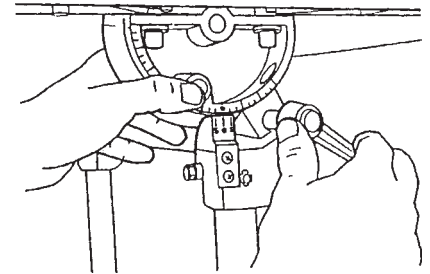


Figure B-65

Figure B-66



29. Loosen the tilt lock, move the worktable, then depress the 0° stop pin until the stop bolt contacts it. Tighten the tilt lock, and recheck the setting by repeating Steps 26 through 28. See Figure B-66. (It is very important to recheck the setting!)

ADJUST THE TABLE TILT INDICATOR

30. Tighten the table tilt lock and check that the "0" mark on the indicator aligns with the "0" mark on the trunnion.
31. To adjust the scale, use a medium Phillips screwdriver to loosen the two screws which hold the indicator to the tie bar. See Figure B-67. Then while holding the indicator in position so the "0"s are aligned, retighten the screws.

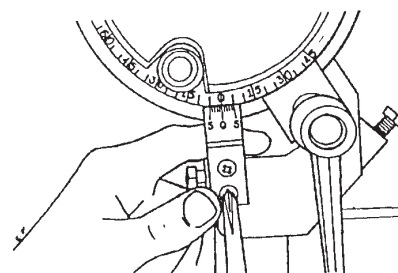


Figure B-67

ADJUST THE WORKTABLE'S 45° STOPS

32. Loosen the table height lock and raise the table until it clears the saw blade. Tighten the height lock.
33. Loosen the tilt lock and tilt the worktable to the right until it makes contact with the two 45° stop bolts.
34. Tighten the tilt lock only enough to allow movement with firm pressure.
35. Loosen the quill feed (shown in Figure B-68) and extend the quill so the saw blade is centered beneath the slot in the table insert. When it is centered, lock the quill feed.

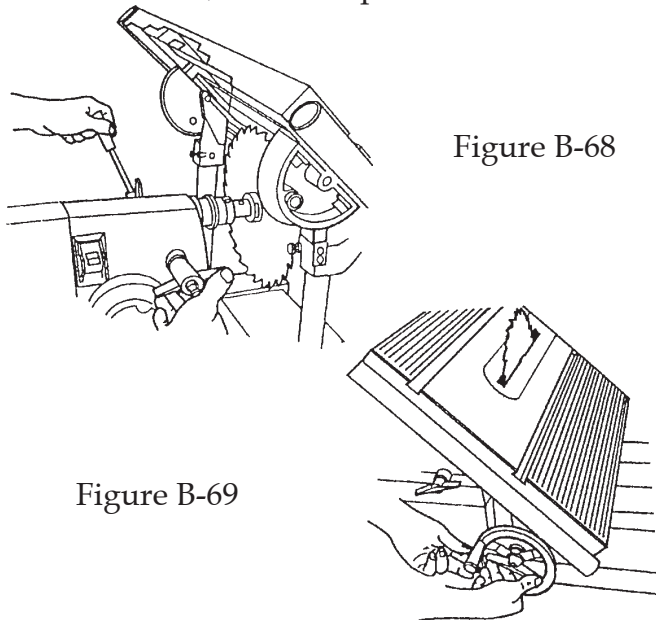


Figure B-68

Figure B-69

36. Lower the worktable so the saw blade extends through the slot. See Figure B-69. Lock the table height.
37. Remove the blade from the combination square and place the square against the saw blade and the worktable, as shown in Figure B-70. Make sure the combination square doesn't rest on the table insert.

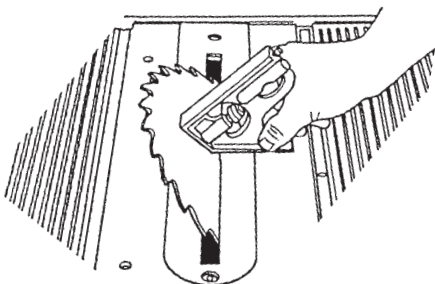


Figure B-70

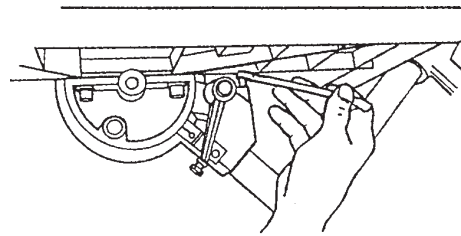


Figure B-71

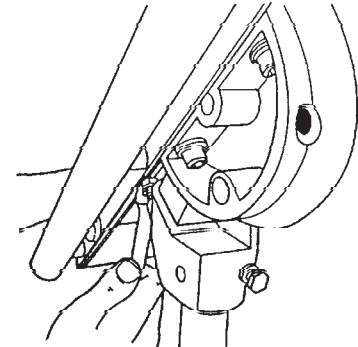


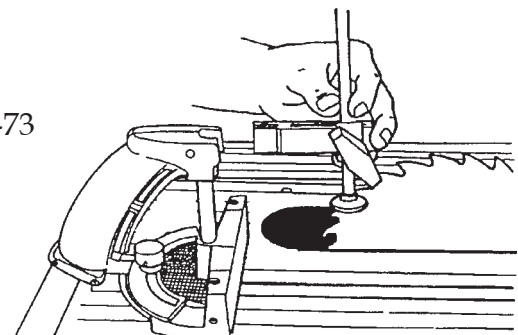
Figure B-72

38. If the worktable is not exactly 45° to the saw blade, adjust the worktable so it is.
39. Tighten the tilt lock, then use a 1/2" wrench to adjust the 45° stop on the front side of the worktable (shown in Figure B-71) and the back side of the worktable (shown in Figure B-72). The stops should just contact the underside of the table.
40. Loosen the tilt lock and move the table. To recheck the 45° stops, repeat Steps 35 through 39. (It is very important to recheck the setting!)

ALIGN THE MITER GAUGE SLOTS

41. Return the worktable to the horizontal "0" stop and tighten the tilt lock. The carriage lock and headstock lock should also be tightened. Remove the table insert.
42. Place the miter gauge in the right miter gauge slot, and use a 5/32" Allen wrench to remove the quick clamp from the safety grip, as shown in Figure B-73.

Figure B-73



43. Insert the long 5/32" Allen wrench through the miter gauge. Borrow a set screw from the lathe tool rest and use the short 5/32" Allen wrench to install it in either top miter gauge hole, as seen in Figure B-74. Place the tip of the long wrench against the front side of the saw blade and tighten the set screw.

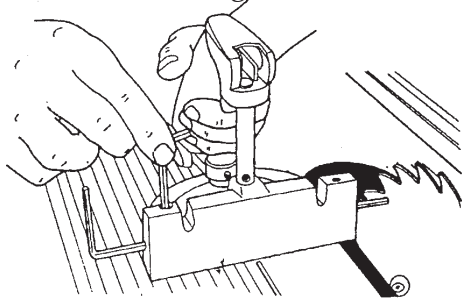


Figure B-74

44. Move the miter gauge from front to back along the saw blade, as shown in Figs. B-75 and B-76. If it hangs up on the blade or a gap develops, the miter gauge slots need to be aligned. Make sure the Allen wrench does not contact a saw blade tooth, because the tooth "set" will cause misalignment.

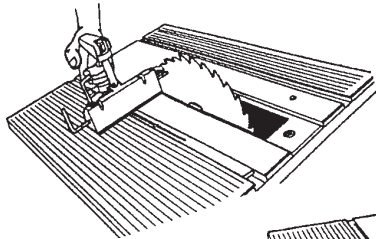


Figure B-75

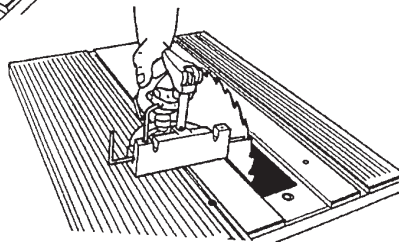


Figure B-76

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

- a. Tilt the table to 45° and tighten the tilt lock.
- b. Use a 5/16" Allen wrench to loosen all four bolts (147) which hold the worktable to the trunnions, as pointed out in Figure B-77. Loosen the bolts only enough to allow movement with firm pressure. See Figure B-78.

NOTE

If you find it difficult to loosen the bolts, consider using a T-handle Allen wrench, or use a boxed wrench for extra torque. Another alternative is to use the hanging hole in an adjustable wrench, as demonstrated in Figure B-78a.

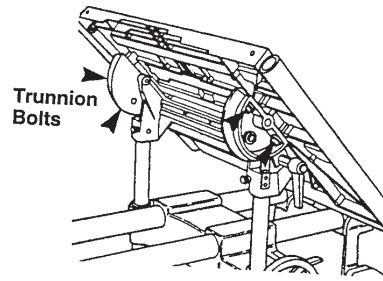


Figure B-77

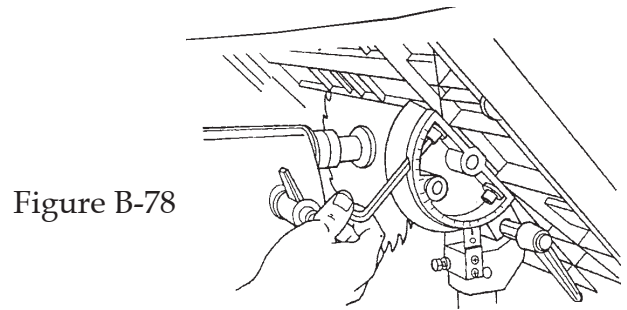


Figure B-78

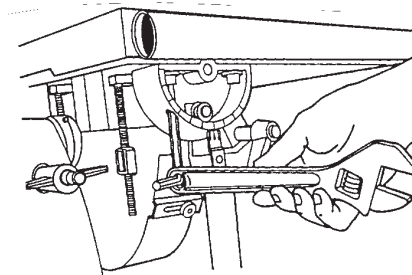


Figure B-78a

- c. Position the worktable back to the horizontal "0" and tighten the tilt lock.
- c. Position the worktable back to the horizontal "0" and tighten the tilt lock.
- d. Adjust the worktable, then again move the miter gauge and wrench along the face of the saw blade until the wrench tip consistently contacts the entire blade surface.
- e. When the miter gauge slot is aligned, use the 5/16" Allen wrench to retighten the two trunnion bolts which are closer to the headstock. Then loosen the table tilt lock, tilt the worktable to 45°, **and retighten the table tilt lock.** Use the 5/16" Allen wrench to retighten the other two trunnion bolts.
- f. Loosen the table tilt lock and move the table, then return it to the horizontal "0" position. Recheck the slot alignment. If it is off, repeat Steps d and e.

NOTE

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

INSTALL THE TABLE INSERT IN THE WORKTABLE

46. Place the table insert in the worktable recess. Use a 5/32" Allen wrench to start both screws.
47. First tighten the rear screw. Then the front of the insert will be sprung slightly above the table. Level the insert by placing your hand on the front of the insert, as in Figure B-79, and slowly turning the front screw until it draws the front of the insert flush with the worktable surface.

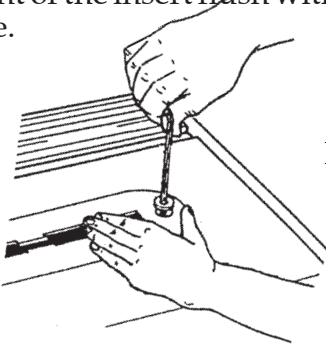


Figure B-79

ADJUST THE MITER GAUGE GLIDES

48. Place the miter gauge in the worktable's miter gauge slot. See Figure B-80.

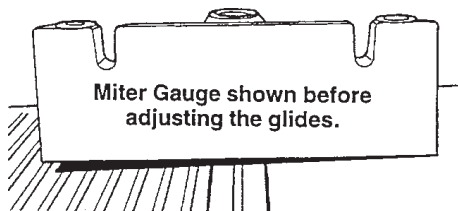


Figure B-80

49. Check to see if the miter gauge wobbles side-to-side. Also, slide it back and forth in the slot to check if the miter gauge scrapes against the table. If the miter gauge rocks or scrapes the table, adjust the glides.
50. If the glides need to be adjusted, do the following:
 - a. Remove the miter gauge from the slot and turn it over.
 - b. Use a medium screwdriver to screw the glides in or out, as illustrated in Figure B-81, so that the glides hold the miter gauge 1/64" to 1/32" off the worktable and the miter gauge does not rock in the slots.
 - c. Return the miter gauge to the slot and recheck and re-adjust it, if needed.

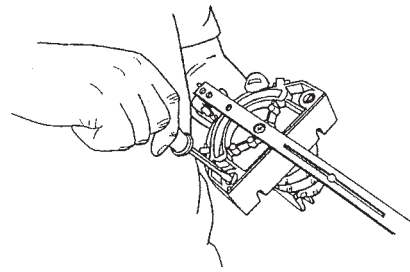


Figure B-81

ADJUST THE MITER GAUGE FACE

51. Remove the safety grip from the miter gauge. Make sure you keep the small, thin washer.
52. Put the miter gauge in the right slot and place the combination square against the saw blade and miter gauge face, as seen in Figure B-82.

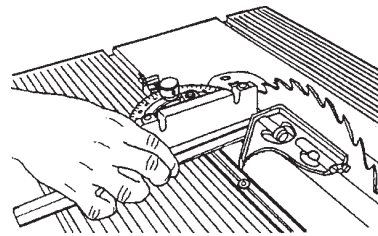


Figure B-82

53. If the miter gauge face is not perpendicular to the saw blade, do the following:
 - a. Use a long Allen wrench to loosen the lock knob (268) and adjust the miter gauge so it is perpendicular to the saw blade, then tighten the lock knob. See Figure B-83.

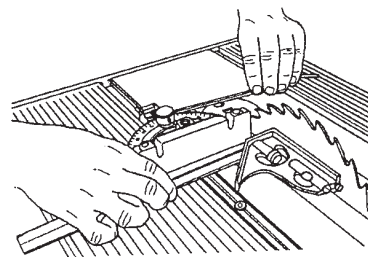
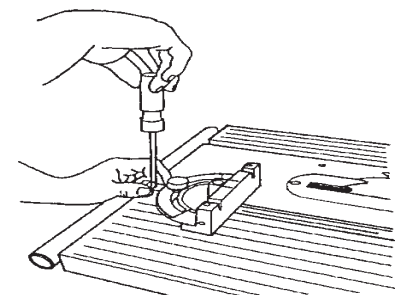


Figure B-83

Figure B-84



- b. Use a medium screwdriver, loosen the screw (273) which holds the indicator plate (275), and set its "0" to the miter gauge's "90". Tighten the screw. See Figure B-84.

ADJUST THE 90° POSITIVE STOP

- 54 Use a small screwdriver to back out the 90° stop screw 2 to 3 turns, as shown in Figure B-85.

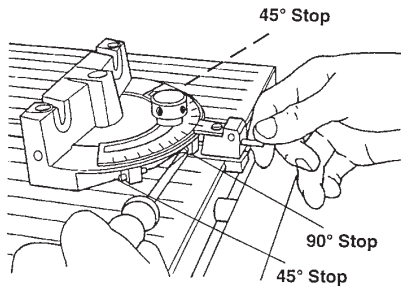


Figure B-85

55. Depress the plunger, then turn the stop screw until you feel it touch the plunger.
56. To re-check the stop setting, repeat Steps 52 through 55.

ADJUST BOTH 45° STOPS

57. Loosen the lock knob and pull out the plunger. Then, at the same time, rotate the miter gauge and push in the plunger until it hits the 45° stop (there is one on each side of the 90° stop).
58. Use a combination square to set the miter gauge face at 45° to the saw blade. If the 45° stop needs adjustment, use a medium screwdriver to back out the 45° screw 2 to 3 turns.
59. Depress the plunger, then turn the stop screw until you feel it touch the plunger.
60. To recheck the stop setting, repeat Steps 54 through 59.
61. To adjust the other 45° stop, repeat Steps 57 through 60.

REMOVE THE SAW BLADE

62. Loosen the table height lock and raise the table so that it clears the saw blade, then tighten the lock. Unlock the carriage lock and move the worktable to the right.
63. Use the 5/32" Allen wrench to loosen the arbor set screw. Remove the saw blade.
64. Unlock the table height lock and lower the table to a comfortable working height. Tighten the lock.

ALIGN THE PRO FENCE PARALLEL WITH THE WORKTABLE

55. Place the miter gauge in the left slot of the worktable on the infeed side. Place the Pro Fence on the right side of the saw table.
56. Insert the long 5/32" Allen wrench through the miter gauge and secure it using the short 5/32" Allen wrench and a set screw borrowed from the tool rest.
57. Move the fence toward the Allen wrench until it just touches it.
58. Lock the lower fence lock handle first, then lock the upper fence lock handle to secure both ends of the pro fence.
59. Slide the miter gauge back and forth in the slot. The tip of the Allen wrench should keep in slight contact with the fence. Watch that you don't scratch the fence.
60. If the allen wrench pulls away from or binds against the fence, the fence needs aligning. If so, do the following:
 - Using the short 5/32" short Allen wrench, loosen the four button head cap screws (3), located on the top of the fence, slightly. They should be just tight enough to require firm pressure to align the fence.
 - Raise the upper fence lock handle only to unlock the rear of the fence.
 - Adjust the rear end of the fence so that it just touches the allen wrench as the miter gauge slides along the fence.
 - When alignment is reached, lock the upper fence lock handle. Slide the miter gauge back and forth to double check your alignment. Using the short 5/32" Allen wrench, tighten the four button head cap screws (3) completely.

ALIGN THE EXTENSION TABLE**NOTE**

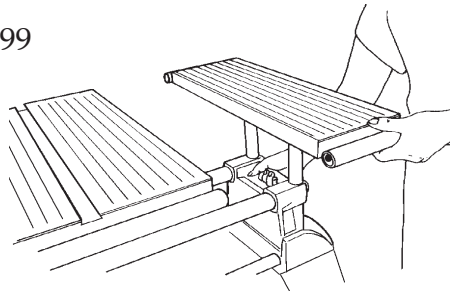
These instructions are for aligning the extension table on the right side of the headstock. You can also follow these same procedures to align it to the left side of the headstock.

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

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

61. Mount the extension table in the Mark V's accessory base mount (on the right side) at a comfortable height, as shown in Figure B-99. Use a 1/2" wrench to loosen the bottom nuts holding the table base to the table approximately 1/4" from the table. This will allow you room for later adjustment.

Figure B-99



62. The worktable should already be mounted in the carriage mount. Move the worktable next to the extension table and adjust it to about 1/4" above the extension table, as seen in Figure B-100.

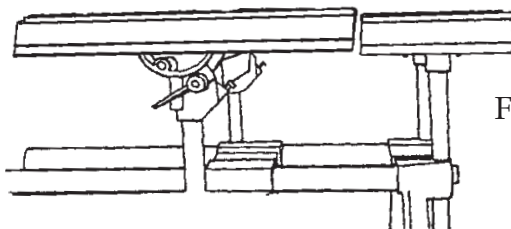


Figure B-100

MOUNT THE SAW GUARD

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

64. Fit the lower saw guard's clamp on the spindle quill. Line up the arbor set screw with the spindle knob's set screw (where the spindle flat is located). Use a 5/32" Allen wrench to tighten the arbor set screw, as shown in Figure B-106.

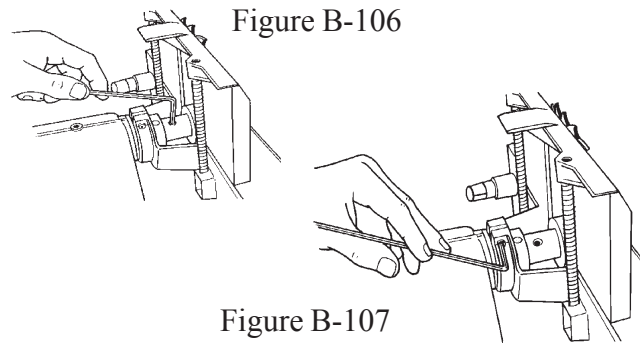


Figure B-107

65. Use the 5/32" Allen wrench to tighten the socket head screw on the saw guard collar, as seen in Figure B-107.

INSTALL THE RIVING KNIFE

66. Loosen the guard lock knob and insert the upper saw guard's riving knife between the guard and the lock plate, as demonstrated in Figure B-108.

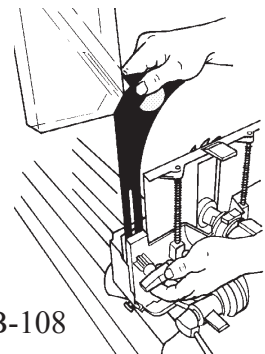


Figure B-108

67. Make sure the riving knife is fully seated between the guard and the lock plate, as in Figure B-109. The curved portion of the riving knife should be very close to the saw blade teeth (about 1/8"), as illustrated in Figure B-110. Tighten the guard lock knob. Look to see if the riving knife is centered with the saw blade, as shown in Figure B-111.

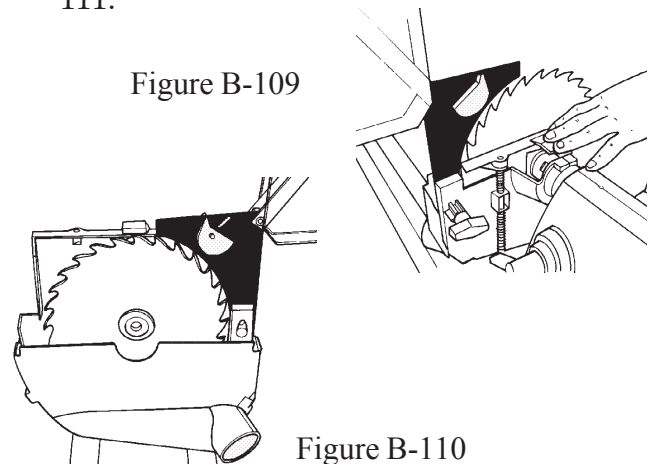


Figure B-110

Figure B-111

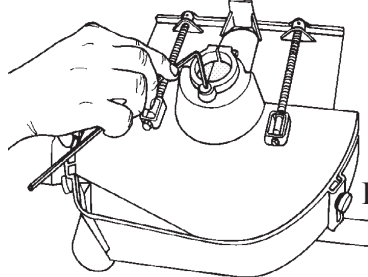
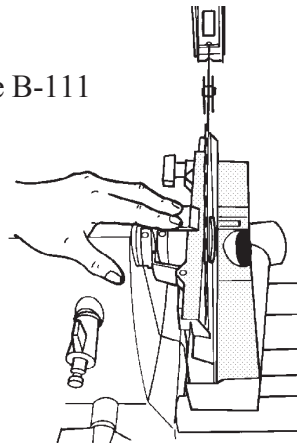


Figure B-112

68. If the riving knife is not centered with the saw blade, follow these steps:
 - a. Notice which way the riving knife is not centered with the saw blade.
 - b. Unclamp and remove the upper saw guard, then remove the saw blade and lower saw guard.
 - c. Use a 5/32" Allen wrench to adjust the stop screw located below the lower saw guard's collar, as seen in Figure B-112.
 - If the riving knife is to the **left** of the saw blade, back out the stop screw (counter-clockwise).
 - If the riving knife is to the **right** of the saw blade, screw in the stop screw (clockwise).
 - d. Re-install the saw blade, lower saw guard and riving knife. **MAKE SURE** the riving knife is still centered on the saw blade.

ALIGN THE LATHE CENTERS

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

Figure B-113

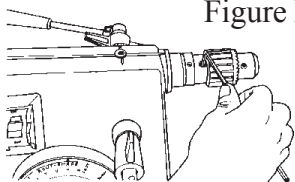
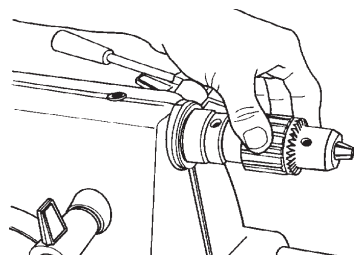


Figure B-114



60. Mount the drill chuck on the spindle, as shown in Figure B-113. Completely close the chuck jaws, as in Figure B-114.

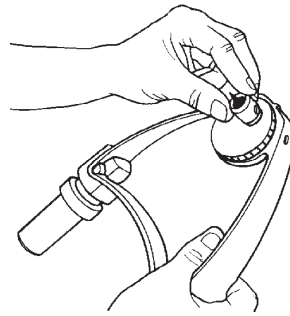


Figure B-115

61. Mount the cup center into the tailstock's adjustable center, as seen in Figure B-115, then mount the tailstock into the base mount (right side). Tighten the mount lock.

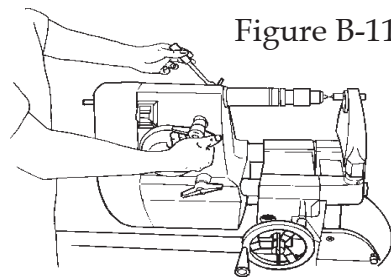
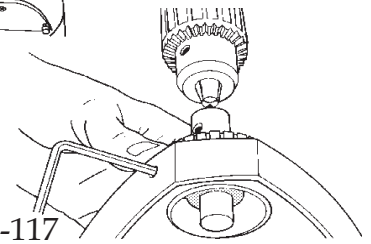


Figure B-116

62. Loosen the quill lock. Extend the quill (seen in Figure B-116), so the drill chuck almost touches the cup center point and the center point could fit into the chuck jaws.

63. If the center point does not "fit" into the chuck jaws, determine whether you need to adjust the cup center point horizontally and/or vertically. Then do the following:
 - a. To adjust the cup center point **horizontally**, loosen the set screw that locks the adjustable center, as seen in Figure B-117. Rotate the adjustable center as needed to line up the cup center with the drill chuck, then tighten the set screw.
 - b. To adjust the cup center point **vertically**, loosen the mount lock, then loosen the tailstock stop collars. Raise or lower the tailstock in the base mount until the cup center point vertically lines up with the drill chuck, then tighten the mount lock. Press the stop collars down firmly against the base mount and tighten the collar set screws.

Figure B-117



Mode Setups

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

NOTE

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

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

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

1. **Turn the speed dial to "Slow," then 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 lather will throw stock at rout-shape speed).
2. **Make sure that accessories are properly mounted on the main spindle.** The flat on the main spindle is ground with a "reverse taper" to keep accessories secured.
 - a. To properly mount an accessory, push it onto the main spindle **all the way**. Then use a 5/32" Allen wrench to tighten the setscrew against the flat of the spindle. (See Figure B-119.) To make sure the accessory is securely mounted, rock the accessory back and forth slightly as you tighten the set-

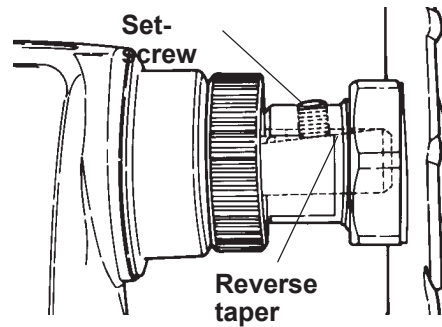


Figure B-119

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.



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, headstock lock, and quill lock. See Figure B-120. The carriage lock handle must be secured in the horizontal position. The quill lock should be loose in the drilling and boring modes, and for some sanding operations. In the lathe mode, this procedure becomes a four-point check, since the table has been removed.

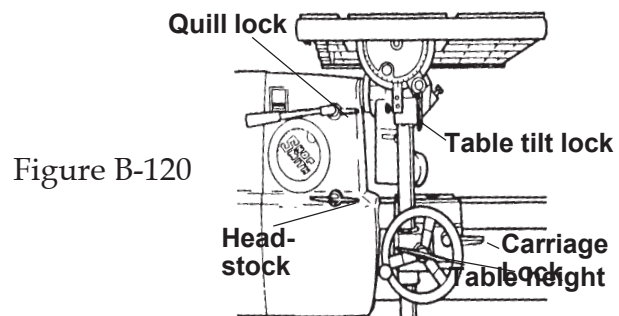


Figure B-120

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.



DO NOT turn speed dial without machine running.

4. After you turn on the Mark V, but before you begin working, set the correct speed for the operations. This is important! It's unsafe to run the latter 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.

Setting Up the Table Saw Mode

1. Turn the speed dial to "Slow", then turn off and unplug the Mark V.
2. Position the headstock so that you can reach the main spindle. Tighten the quill lock.
3. Mount the lower saw guard on the quill so that the stop screw below the collar butts against the stop collar on the quill. Align the ridge on the headstock with the slot in the collar. Tighten the screw on the collar. See Figure B-128. Loosen the two knobs and slide the guard cover to the right.

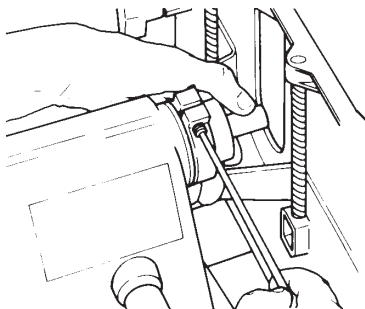


Figure B-128

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. Replace the nut and finger tighten.
5. Place the blade and arbor on your workbench with the nut pointing up. Hold the arbor with an adjustable wrench and tighten the arbor nut with the arbor wrench.
6. Mount the saw blade on the main spindle. Tighten the setscrew against the flat of the

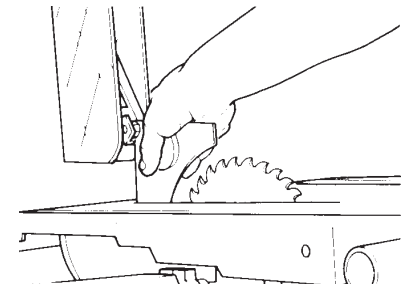
spindle. Slide the guard cover in toward the blade.



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

7. Raise the worktable as high as it will go. Slide the carriage toward the headstock until it butts against the rubber spacer. Lower the worktable so that the blade protrudes 1/4" higher than the thickness of the stock. The blade should be centered in the table insert. Secure the table height and carriage locks.
8. Install the upper saw guard. Grasp the top of the riving knife, with the guard up, and slide the guard through the table insert into the lower saw guard. See Figure B-129. Tighten the guard lock knob.

Figure B-129



WARNING

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

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

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

Setting Up the Disc Sander Mode

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 denatured alcohol and a clean rag to remove the protective oil. Otherwise the sandpaper will not stick. Press the sandpaper firmly on the disc and smooth it from the center toward the edge.

NOTE

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

3. Position the headstock so that you can reach the main spindle.
4. Mount the lower saw guard on the main spindle and open it up by loosening the cover lock knobs and sliding the cover to the right. Tighten the guard lock knob.
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.
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.
7. Check all locks. The table tilt lock, carriage lock, table height lock, headstock lock and quill lock (if not used) should be securely tightened.

WARNING

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

Setting Up the Vertical Drill Press Mode

1. Turn the speed dial to "Slow", then turn off and unplug the Mark V.
2. Position the headstock 10" away from the headrest (right side), and the carriage 20"

away from the base mount. Tighten the headstock and carriage locks. **DO NOT OVER TIGHTEN.**

3. Position the worktable surface just above the top of the headstock. Tighten the table height lock. Then loosen the tilt lock and tilt the table to the left 90°. Tighten the tilt lock.
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 headstock and the other to the right, then raise the machine into the vertical position. Tighten the base lock, rock the way tubes side-to-side. Retighten if possible. This helps to take the play out of the base pivot and keeps the Mark V from wobbling.

NOTE

The base lock does not fit dead center in the hole, but off to one side, as shown in Figure B-131.

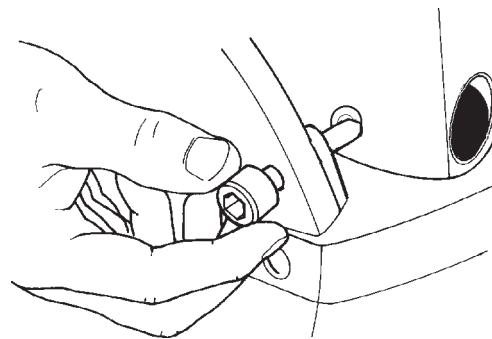


Figure B-131

6. Move the quill feed handle to the back of the headstock 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.

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

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

Setting Up the Horizontal Boring Mode

1. Turn the speed dial to "Slow", then turn off and unplug the Mark V.
2. Position the headstock so that you can reach the main spindle.
3. Mount the drill chuck all the way onto the main spindle. Tighten the setscrew against the flat of the spindle.
4. Position the worktable edge 4" away from the drill chuck. Adjust the table height so that the table is below the drill chuck.
5. Mount a drill bit in the chuck and tighten with the chuck key.

WARNING

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

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

Setting Up the Lathe Mode

1. Turn the speed dial to "Slow", then turn off and unplug the Mark V.
2. Dismount the worktable. Tilt the table to the left 90° and lock it. Loosen the table height lock and pull the table straight up.
3. Position the headstock so that you can reach the main spindle.
4. Mount the tool rest in the carriage so the rack engages the pinion.
5. Mount the drive center all the way onto the main spindle. Tighten the setscrew against the flat of the spindle.
6. Mount the tailstock in the base mount (right side) and tighten the accessory mount (left side) lock.

NOTE

When you get ready to break down the lathe mode,

you will probably find the cup center is "stuck" in the tailstock. If this is the case:

- a. Remove the tailstock from the machine.
 - b. Lay it over the edge of a workbench so the eccentric mount is supported by the table and the center is hanging free.
 - c. Tap the back side of the center with a nylon or rawhide mallet to pop it loose. Do not use a metal hammer. Hold the center with your free hand so the center does not fall to the floor. Be careful of the sharp point in the center pin.
7. Mount the cup center in the tailstock with the point toward the headstock.
 8. Check all locks. The carriage lock, table height lock, headstock lock, and quill lock should all be securely tightened.

Table Sawing Operations

TABLE SAWING SPEED CHART

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

Safety

WARNING

Before performing table sawing operations:

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

Table Sawing Speeds

NOTE

The speeds designated on the speed charts are suggested speeds.

Before you begin any table saw operation, know the correct speed at which to set the speed dial. The correct speed is determined by the operation and the type of stock you're sawing. To determine the right speed for the job, refer to the Table Sawing Speed Chart.

NOTE

Adjust the speed dial only when motor is running.

Crosscutting

General Crosscutting

1. Place the miter gauge in the slot on the same side of the saw blade where you'll be standing. Position the miter gauge square to the blade.
2. Mark the board where you want to cut it. Set the stock against the protractor face. Adjust

the stock so the blade cuts on the waste side of the line. Adjust the quick clamp to the thickness of the stock.

3. Set the stock against the miter gauge face, so that the blade cuts on the waste side of the line.
4. Squeeze the safety grip and turn on the Mark V. Set to the correct speed, then guide the stock past the blade. Use your free hand to help keep the stock against the miter gauge face. See Figure C-1.

NOTE

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

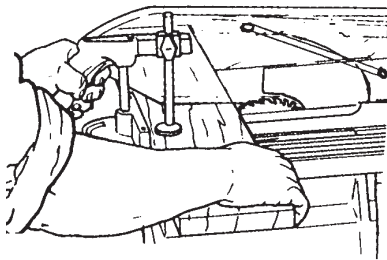


Figure C-1

5. Don't feed the stock any faster than the saw will cut. If the machine bogs down, slow your feed rate and let the saw get back up to running speed.
6. When you've finished the cut, turn the speed dial to "Slow" and 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.

WARNING

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

Ripping

WARNING

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

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

General Ripping

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

NOTE

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

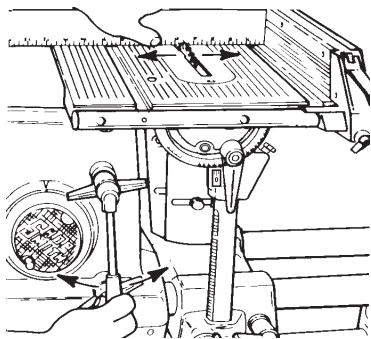


Figure C-6

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

WARNING

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

3. Turn the machine on and set the correct speed. Feed the stock into the blade while keeping it

pressed firmly against the fence. Use a push stick or push block to finish the cut. See Figure C-7.

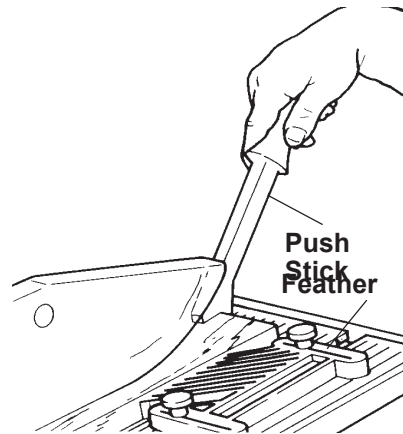


Figure C-7

Disc Sanding Operations

DISC SANDING SPEED CHART

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)

Safety

WARNING

Before performing disc sanding operations:

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

Disc Sanding Speeds

NOTE

The above mentioned speeds are recommended speeds.

Before you begin any disc sanding operation, know the correct speed at which to set the speed dial. The correct speed is determined by the operation and the type of material you're 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 or next to the table.

End-Grain Sanding

1. Mount the miter gauge in the left slot and position it so that it will guide the stock against the downward side of the disc. Then lock the gauge in the slot. Turn on and set the Mark V speed.

NOTE

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

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

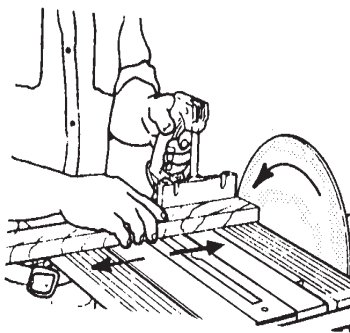


Figure C-18

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

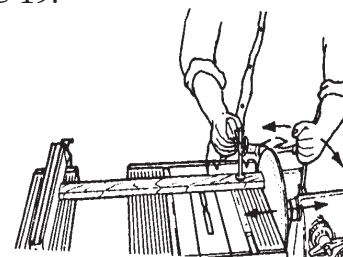


Figure C-19

Vertical Drilling Operations

VERTICAL DRILLING SPEED CHART

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)

Safety

WARNING

Before performing vertical drilling operations:

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

Vertical Drilling Speeds

NOTE

The above referenced speeds are suggested speeds.

Before you begin any vertical drilling operation, know the correct speed at which to set the speed dial. The correct speed is determined by the operation and the type of material you're drilling. To determine the right speed for the job, refer to the **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.

General Drilling

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

Drilling Through

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

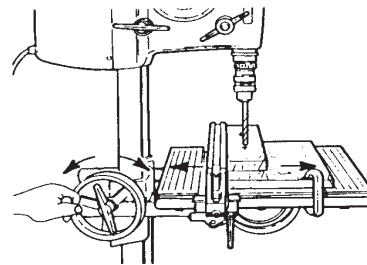


Figure C-23

4. To position the table assembly on the way tubes, hold the carriage so that it won't drop against the base mount, then loosen the carriage lock. Adjust the table height so that the tip of the drill bit is 1/4"-1/2" above the stock, and tighten the lock.
5. Remove the stock and extend the quill so that the cutting flutes of the drill bit touch the scrap wood. Set the depth control to 1/8" and tighten the depth control lock. See Figure C-24. Then let the quill retract. Position the stock under the drill bit. Hold it against the table and rip fence. Extend the quill with the machine off to check where the drill bit will drill.
6. Turn on the Mark V, adjust the speed, and feed the drill bit into the stock slowly. See Figure C-25. When drilling deep holes, retract the drill bit now and then to clear chips from

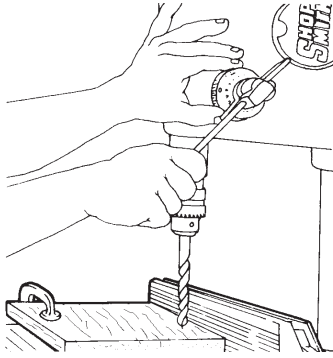


Figure C-24

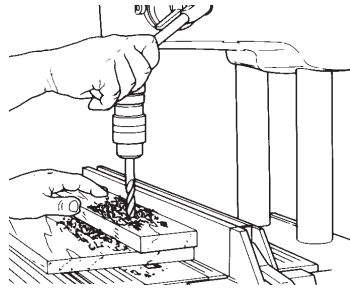


Figure C-25

the hole. When you feel the depth control stop the quill, retract the drill bit. Turn the speed dial to "Slow" and turn off the machine. Let it come to a stop, then remove the stock.

Drilling Part Way

1. Same as "Drilling Through" except extend the quill until the cutting flutes of the drill bit just touch the stock. Then set and lock the depth control. See Figure C-26.
2. Then drill the holes you need. The depth control will stop the quill when the drill bit reaches the proper depth in the stock. All the holes you drill at any one depth control setting will be exactly the same depth.

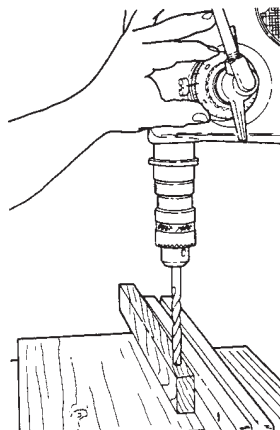


Figure C-26

Horizontal Boring Operations

HORIZONTAL BORING SPEED CHART

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 drill bits only) – Slow (700 rpm)

Safety

WARNING

Before performing horizontal boring operations:

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

Horizontal Boring Speeds

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

General Boring

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

Boring Through

1. Mount the rip fence on the table to use as a backstop.
2. Clamp a scrap of wood on the fence to keep the bit from boring into the fence and the stock from splintering where the bit exits. This scrap should be taller than the fence.
3. Mark the holes on the stock, and lay it against the scrap. Make fine adjustments with the table height crank. See Figure C-34.

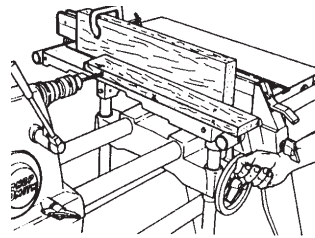


Figure C-34

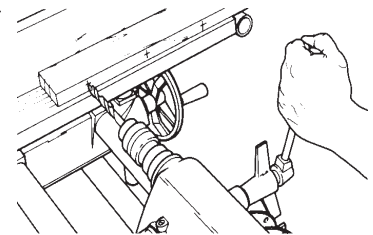


Figure C-35

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

Boring Part Way

1. This operation is similar to boring through, except you should extend the quill until the cutting flutes of the bit just touch the stock. Then set the depth control and lock it. The depth control will stop the quill when the bit reaches the proper depth.
2. All the holes you bore at any one depth control setting will be exactly the same depth. When you need to bore a number of holes all at the same height, hold the stock down with equal pressure at each hole.

Lathe Turning Operations

LATHE TURNING SPEED CHART

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 (750 rpm)	A (750 rpm)	B (850 rpm)

Safety

* Large heavy stock requires slower speeds.

WARNING

Before performing lathe turning operations:

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

Lathe Turning Speeds

NOTE

The speeds in the speed chart are only suggested speeds.

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

Turning Know-How

Spindle Turning

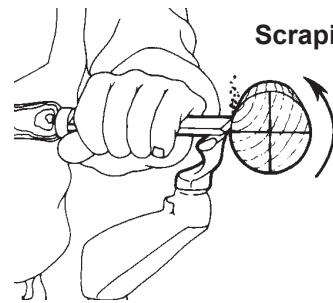
This type of turning is done with stock mounted between the drive and cup centers.

Faceplate Turning

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

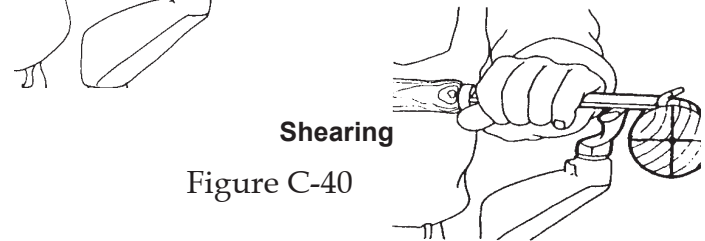
Scraping

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



Scraping

Figure C-39



Shearing

Figure C-40

Shearing

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

Lathe Tools

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

Balance

1. This is extremely important when turning glued-up stock, long stock and stock more than 3" in diameter. Check the balance of your spindle and faceplate stock after you've marked the centers.
2. To do this, drive a standard 8-penny nail straight into each center. Use suitable string to hang the stock in a level position from the front bench tube of the Mark V or a saw horse. The ends of the string should be looped around the nails. 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.

Maintenance and Troubleshooting

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

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

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

MAINTENANCE SCHEDULE

As needed	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Clean the Mark V. Refer to Cleaning. • Wax the Mark V. Refer to Waxing.
Every 10 hours of running time	<ul style="list-style-type: none"> • 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 instructions for your Mark V model.
Every 25 hours of running time, or once a year (if not used)	<ul style="list-style-type: none"> • Lubricate the sheaves. Refer to Lubricating.
Every 50 hours of running time or once a year (if not used)	<ul style="list-style-type: none"> • Repeat the preceding steps. • Lubricate the headstock lock. Refer to Lubricating.

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 headstock lock. Finally, move the worktable and carriage as far to the right as it will go.

Cleaning

As you work, sawdust will accumulate on and in your Mark 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 or monthly.

Blowing Out the Headstock

1. With a medium Phillips screwdriver, remove the two screws that hold the belt cover. Then slide the belt cover back along the way tubes toward the left. Open the access hole by removing the bottom screw and turning the nameplate 180°.
2. Working through the openings, completely blow out all the sawdust from the inside of the headstock. Use an air compressor. Replace the screw.

Cleaning the Table

1. 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

1. With a small, stiff brush, reach in through the nameplate opening and brush off the teeth on the portion of the quill inside the headstock, as demonstrated in Figure SM-1. Then extend the quill out from the headstock as far as it will go and brush off the outside teeth.
2. 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.

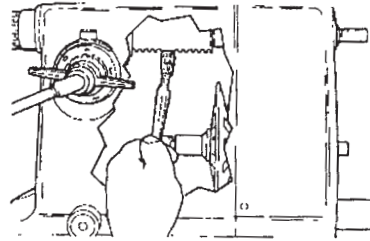


Figure SM-1

Brushing Off

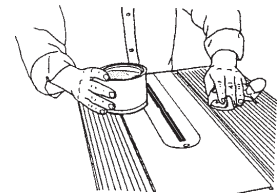
1. Give the entire machine a good going over with a soft brush to remove any remaining sawdust or dirt. If you find any grease or grime on the way tubes, or any other part, clean it off with mineral spirits.
2. When your Mark V is clean, wax and buff all parts (refer to Waxing), replace the table in the carriage, reinstall the table insert and belt cover, and reposition the nameplate.

CLEAN AND WAX

CAUTION

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

1. Use a rag and denatured alcohol to clean the Mark V, tables, tubes and accessories. If you find any burrs, remove them with a fine file.
2. Use a clean, dry rag and furniture paste wax to wax and buff:
 - the worktable & extension table surfaces
 - way tubes
 - rip fence
 - miter gauge bar
 - quill
 - mounting holes in the power and base
 - a. Do not wax the trunnions on the worktable. When you wax and buff the quill do not leave any wax in the racks. If you do, the wax will mix with sawdust and impede the movement of parts.



3. After you apply wax to the mounting holes in the head rest (left) and base arm (right), wrap a rag around a scrap of wood and buff out the wax thoroughly. See Figure SM-2.

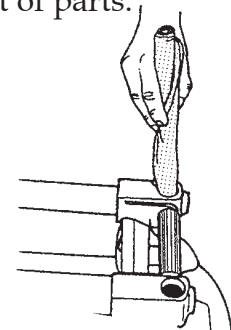


Figure SM-2