Biscuit Joiner

WARNING
Read the Safety section and complete the Assembly and Setup procedures before performing any Biscuit Joiner operations.

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Introduction

The Shopsmith Biscuit Joiner has been designed to mount on the Shopsmith Mark V Models 500 and 510 and offers an excellent alternative to dowelling and other forms of joinery.

Simply stated, the Biscuit Joiner is an easy-to-use tool that has been designed to cut semi-elliptical slots in either hard or soft woods. Once cut, these slots will accept special football-shaped wooden biscuits that swell substantially when glued into position, as seen in Fig. 1, thus forming joints that are stronger than those made with dowels.

![Biscuit](image)

Fig. 1

Because of the shape of the biscuits, the location of the slots is far less critical than would be required with dowels. As a result, the Biscuit Joiner is also faster than a conventional dowelling process.

How the Biscuit Joiner Works

The blade of the Biscuit Joiner rotates inside a protective housing and is plunged into the workpiece by pressing the stock firmly against the spring-loaded guide. When pressed against the face of the guide, the stock is held in position by two sharp, protruding pins and abrasive guide strips.

By adjusting two setscrews, you can regulate travel of the guide— and control the depth-of-cut for a given size of biscuit. The engraved centerline on the guide face helps you accurately position each cut.

Safety

The meanings of WARNINGS, CAUTIONS and NOTES are:

**WARNING**

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

**CAUTION**

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

**NOTE**

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

Safety Rules for the Biscuit Joiner

**WARNING**

- Read, understand and follow all the information in this manual and the Instruction Manual for the Mark V on which the Biscuit Joiner will be mounted.
- Wear safety goggles, safety glasses with side shields, or a full face shield.
- Always connect a dust collection system to the Biscuit Joiner dust chute. Also, wear a dust mask.
- Tuck long hair under a hat or tie it up. Do not wear ties, gloves, jewelry or loose clothing. Roll sleeves up above your elbows. Wear non-slip footwear.
- Do not stand directly to the left of the Biscuit Joiner (as you are facing it in the operator's position), in line with the workpiece being fed. In the event of a kickback, you could be hit.
- Move the workpiece slowly into the blade. Never force it. Feeding stock too rapidly could cause kickbacks.
- Always set the Mark V speed dial to "T" for biscuit joining operations.
- Never operate the Biscuit Joiner without the housing and guard in position.

- Never use the Biscuit Joiner for jobs it is not intended to perform, such as sawing, grooving, etc.

- Before mounting the Biscuit Joiner on the Shopsmith Mark V, turn on the Mark V and set the speed dial to "SLOW". Then turn off and unplug the machine before proceeding.

- When mounting the Biscuit Joiner to the Mark V, be certain all setscrews and capscrews are tightened securely before turning on the machine.

- Be certain the blade is mounted in the Biscuit Joiner with the teeth pointing in the direction of the arrows on top of the housing. Installing the blade backwards could result in possible kickbacks and injury.

- Always be certain the pins are sharp and protrude from the guide before beginning operations. Failure to do this could result in the workpiece being grabbed and thrown by the rotating blade.

- Whenever possible, use a push block in your right hand to help feed the stock into the blade.

- Minimum stock size for edge-grain biscuit joining: 2" wide x 6-1/2" long x 3/8" thick. You must use one or two push blocks.

- Minimum stock size for end-grain biscuit joining: 2" wide x 6" long x 3/8" thick. You must use the miter gauge.

- Always use your miter gauge as a guide for end grain biscuit joining operations.

- Listen for chatter and signs of looseness at startup. If you hear, see or suspect problems, turn off the power and unplug the machine immediately. Correct any problems before proceeding.

- Always keep the blade clean and sharp.

- Never attempt to remove debris from the dust chute while the Mark V is running. Always turn off and unplug the Mark V first.

- Do not allow anyone to stand directly in front of the opening of the dust chute.

- Use only Shopsmith blades and parts with your Biscuit Joiner. Using non-Shopsmith blades and parts will create a hazardous condition and will void your warranty.

**Terms to Know**
### PARTS LIST

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Assembly and Setup

The Biscuit Joiner comes to you fully assembled. Before attaching the unit to your Mark V, be sure to remove the cardboard packing materials that have been provided for protection during shipping. Be careful not to cut yourself on the protruding pins. The numbers in parentheses refer to the Parts List and Exploded View.

Tools Required:

• 5/32" Allen wrench
• Medium-size Phillips screwdriver

**WARNING**

Turn on the Mark V and set the speed dial to "SLOW". Then turn off and unplug the Mark V before mounting the Biscuit Joiner to the quill and spindle. Also, be careful not to cut yourself on the protruding pins.

**ATTACH THE ABRASIVE GUIDE STRIPS**

1. Set the Biscuit Joiner on a flat, clean work surface. Clean the face of the guide with denatured alcohol and a clean cloth.

2. Separate the left and right abrasive guide strips. Peel off the backing from the right guide strip.

3. Align the inside edge of the guide strip with the guide's center line and the top edge with the top of the guide, as illustrated in Fig. 2. Do not cover the center line. Starting with the edge nearest the guide's center line, press the guide strip on the face of the guide.

4. Repeat Step 3 for the left abrasive guide strip.

**PREPARE THE MARK V AND BISCUIT JOINER**

5. Set up the Mark V in the vertical position. (Refer to your Mark V Instruction Manual.)

6. Remove four screws (17) and the guard (16) using a Phillips-head screwdriver. See Fig. 3.

7. Remove the arbor and blade assembly from the main housing.

8. Mount the arbor in a vise and use your 5/32" Allen wrench to be sure the cap screw (12) is securely tightened (100 in.-lb.), as seen in Fig. 4.
9. Re-install the arbor and blade assembly in the housing. Make sure the blade teeth are pointing in the direction of the arrows on top of the main housing (1).

10. Re-attach the guard (16) and tighten all four screws (17) securely.

ATTACH THE BISCUIT JOINER TO THE MARK V

11. Holding the Biscuit Joiner in the palm of your hand, turn the blade and arbor so the arbor setscrew (8) is aligned with the vertical slot just below the housing collar capscrew (6), as in Fig. 5.

12. Install the arbor (9) all the way up onto the Mark V spindle and tighten the arbor setscrew (8) securely onto the flat of the spindle with your 5/32" Allen wrench.

13. Extend the quill approximately 1" and secure the quill lock. Slide the main housing (1) all the way up onto the Mark V quill collar until it rests firmly against the quill stop ring.

14. Align the spring-loaded guide (13) of the Biscuit Joiner so it is parallel with the miter gauge slots in your Mark V worktable. Use a 5/32" Allen wrench to tighten the housing collar capscrew (6) securely, as seen in Fig. 6.

NOTE

No blade-to-housing alignment is required since the Biscuit Joiner aligns itself, when the arbor and housing are installed all the way to the stops on the quill collar and spindle.

PREPARE THE MARK V FOR OPERATION

15. Adjust the Mark V worktable's **vertical** position. With the quill fully retracted, position the worktable surface approximately 2" below the bottom of the Biscuit Joiner.

16. Adjust the Mark V worktable’s **horizontal** position. Position the worktable so the Biscuit Joiner guide is just in front of the table insert slot, as shown in Fig. 7.

17. Attach your dust collection system to the dust chute of the Biscuit Joiner.
Operations

Perform these steps every time you start a job for the Biscuit Joiner:

1. Select the proper-sized biscuit for the job.  
Note that biscuits are available in three sizes, as shown in Fig. 8 (slightly smaller than actual size), each designed for a particular job (all biscuits are 5/32" thick).

   **#0 biscuits** are 1-3/4" long x 5/8" wide and are used for joining smaller workpieces and edge-to-edge applications where high stress is not anticipated. These are also useful for joining narrow framework end-to-edge.

   **#10 biscuits** are 2-1/8" long x 3/4" wide and are recommended for general purpose joinery on all types of projects.

   **#20 biscuits** are 2-3/8" long x 1" wide and are recommended for use on larger projects and those that will be under the greatest stress, such as reinforcing end grain-to-end grain joints.

2. Set the depth-of-cut to match the size biscuit you will be using. You will note that each of the two guide rods on the guide and rod assembly (13) has three grooves near where they attach to the guide, as illustrated in Fig. 9. The adjustment is made by turning the two depth stop setscrews (15) so they limit the travel of the guide. With the Mark V unplugged, loosen the two depth stop setscrews (15) so that the bottoms are recessed into the guide. Press the guide in until the desired groove is in line with the face of the housing boss. The first groove is the groove closest to the boss. Tighten both depth stop setscrews (15) until they touch the face of the housing arbor. See Fig. 10.

   - When the first groove touches the housing boss, the unit is set for **#0 biscuits**.

   - When the center groove touches the housing boss, it is set for **#10 biscuits**.

   - When the third groove touches the housing boss, it is set for **#20 biscuits**.

Be sure to adjust both setscrews so they match to produce the best cut.
3. Set the two pins (14) and lock them firmly in position with setscrews (8). The points should protrude beyond the guide about 1/32" when working hardwoods and about 1/16" for soft woods. See Fig. 11.

**WARNING**

It is important that these pins penetrate and hold your workpiece during operations. If your workpiece is too small to be engaged by the pins, hold and guide your workpiece during operations with the miter gauge, rip fence or other device to prevent possible kickback and injury.

4. Adjust the height of the Biscuit Joiner. Extend the Mark V quill 1" to 2". Place the stock against the guide so that the blade is visible. Adjust the quill until the blade is set midway between the top and bottom surfaces of the workpiece, as seen in Fig. 12. The quill must be extended from 1" to 2" to allow for clearance for the dust collector's hose.

It is not necessary that the slots be cut in the exact center of your workpieces, only that they are located in exactly the same position on both pieces of stock that are to be glued together. See Fig. 13.

**CAUTION**

The arbor of the Biscuit Joiner extends below the bottom surface. Be sure to allow sufficient clearance between the Biscuit Joiner and worktable surface in order to prevent damage to the worktable.

**WARNING**

Never attempt to use the Biscuit Joiner on stock less than 3/8" thick.

If you're working with thicker stock (over 1") and extreme strength of the joint is important, you may want to use two (or more) biscuits at each joint, as seen in Fig. 14.

5. Mark the centerlines on your matching pieces of stock. Let's begin by practicing with an edge-to-edge joint, such as you would use when joining two pieces of stock together for a tabletop. First, place the two pieces of stock together, good surfaces facing down. Then mark the two centerlines across the surfaces, as shown in Fig. 15.
Different types of joints call for different centerline marking techniques. See Fig. 16 for some examples.

**Examples of Centerline Marking Techniques**

- T-Shelf
- Edge-to-Face
- Mitered
- End Butt
- T-Frame
- L-Frame
- Leg and Rail

![Fig. 17](image_url)

**WARNING**
Always use your miter gauge as a guide and/or stop when working with stock (6-1/2" or smaller) that will not engage on the two pins.

**Mitered Cuts**

1. **Position the Biscuit Joiner.** Loosen the housing collar capscrew (6) and rotate the housing (1) so the face of the guide is at a 90° angle (perpendicular) to the miter gauge slots. Tighten the capscrew firmly.

2. Position the worktable so the miter gauge slot is under the joiner.

3. **Follow Steps 1 through 6 of the Operations section.** The quill must be extended 3".

4. **Set your miter gauge at 45° (or to match the angle you’ll be joining).** Place your stock in position against the miter gauge with the centerlines aligned. Adjust the safety grip to hold your stock firmly during the cut, as seen in Fig. 18.

![Fig. 18](image_url)

6. **Turn on the Mark V and set the speed dial to "T".** In some cases (such as when working with very hard woods), you may want to slow the Mark V down to "Q" speed. Experiment on some scrap at different speeds to determine what's best for the stock you’re using. Then turn off the Mark V.

7. **Make your cuts.** Let’s begin with our two edge-to-edge practice pieces:

   a. Check all adjustments and be certain all setscrews, etc. are tightened.

   b. Turn on the Mark V.

   c. Guiding the stock with your left hand, align the drawn centerline on the stock with the engraved centerline on the guide.

   d. Using a push block in your right hand, press the stock against the spring-loaded guide and into the blade slowly until the guide reaches the end of its travel... then retract the stock., as seen Fig. 17. Repeat this procedure for each cut on both pieces of stock. When the cuts are complete, turn the speed dial to "SLOW" and turn off the Mark V.
5. **Make the cuts.** Move your miter gauge and the stock into the cut together... then retract.

**NOTE**
Do not slide the stock across the face of the miter gauge and into the Biscuit Joiner guide, as this will produce an inaccurate cut.

**Working With Large Stock**

1. **Position the joiner housing.** Loosen the housing collar capscrew (6) and rotate the housing so the guide is at a 30° to 50° angle to the miter gauge slots. See Fig. 19. This angled technique will help provide additional table support for larger workpieces. Tighten the capscrew firmly.

![Fig. 19](image)

Be sure to angle the Biscuit Joiner so the table height crank on the Mark V Model 510 doesn’t interfere with the stock.

If you need even more support for very large stock, use the Mark V Extension Table System (Model 510) or a roller stand, or move your Mark V near your workbench and lower the table and power plant to match the height of the bench.

2. **Make the cuts. Follow Steps 1 through 7 of the Operations section.**

**Making Surface Cuts**

**NOTE**
Use only the #0 biscuit for surface joinery.

1. **Set up the Mark V in the horizontal position.** Mount a second extension table on the Model 500 and mount the Extension Table System on the Model 510.

2. **Attach the Biscuit Joiner to the Mark V spindle and quill collar,** as described in **Assembly and Setup.** Before tightening the housing around the Mark V quill collar, slide the worktable up to within 1/8” of the joiner and lock it into position.

3. **Position the Biscuit Joiner.** Rotate the joiner housing so the guide is parallel with the Mark V worktable. Securely tighten capscrew (6).

4. **Adjust the Mark V worktable.** By now the Biscuit Joiner should be attached firmly to the quill collar, the quill lock secured and the guide adjusted for the proper-sized biscuit. So depress the spring-loaded guide and hold it in the depressed position. Lower the worktable and lock it firmly so the surface is flush with the retracted guide, as shown in Fig. 20.

![Fig. 20](image)

5. **Set the two steel points as described in Step 3, page 11 of the Operations section.**

6. **Make the cuts.** If your cut is to be near the end of your workpiece, merely line up the centerline on the stock and the centerline on the guide. Turn on the Mark V and use a push block to press your workpiece down onto the blade.

**WARNING**
NEVER position your hand on the stock directly over the blade when forming biscuit slots in the surfaces of workpieces. ALWAYS use a push block.
If your cut is to be made at a location where it will be impossible for you to match the centerlines, you may have to use the Mark V rip fence and miter gauge as guides to ensure accurate positioning of the biscuit slots, as in Fig. 21.

Important Tips for Biscuit Joinery

- Whenever possible, use a push block in your right hand to help feed the stock into the blade.

- As with other woodworking operations, make it a practice to measure twice and cut once.

- When a project requires many duplicate cuts, use the miter gauge or rip fence to ensure the accuracy of all cuts and make your work go faster.

- For added strength, use double- or triple-stacked biscuits on thicker stock or projects that will be under a great deal of stress.

- To improve the efficiency of dust collection, remove the guard occasionally and clean out any built-up residue. After cleaning it, spray a dry lubricant on the inside of the housing to minimize resin buildup. Do not use oils or other "wet" lubricants for this purpose.

- Remember that biscuits swell up quickly once they come in contact with water-based glue. Therefore, don't place glue on the biscuits until you're ready to use them or they won't fit into the slots you've cut.

- Always use a dust collection system or shop vacuum to keep your workplace clean and your joiner operating at maximum efficiency.

WARNING

Failure of the pins or abrasive guide strips to grip workpieces firmly during operations could result in the stock being grabbed and thrown, resulting in possible injury.
Maintenance

To ensure the maximum life of your Biscuit Joiner’s blade, you should periodically remove, clean and sharpen it.

Blade Removal

To remove the blade, begin by removing the Biscuit Joiner from the Mark V. Next remove the four screws (17) that hold the guard (16) in position. Grip the flats of the arbor (9) firmly with a wrench or vise and remove the arbor capscrew (12), as shown in Fig. 23.

![Fig. 23](image)

WARNING

When replacing the blade on the arbor, be sure to note the direction of rotation indicated by the arrow on top of the Biscuit Joiner housing. Installing the blade backwards will result in damage to the tool and/or injury.

Blade Cleaning

Heavy buildups of pitch or resin on the blade can impede performance. To eliminate such buildups, remove the blade from the Biscuit Joiner and spray it with conventional oven cleaner. Reinstall the blade, reversing the procedures you used to remove it.

WARNING

Perform this operation in a location with adequate ventilation.

Blade Sharpening

The blade on your Biscuit Joiner is of a carbide-tipped design and should seldom require sharpening. If you use the tool frequently and notice a reduction in performance (such as uneven or shaggy cuts), the blade may need to be sharpened. Before you make this determination, clean the blade to see if this restores its performance.