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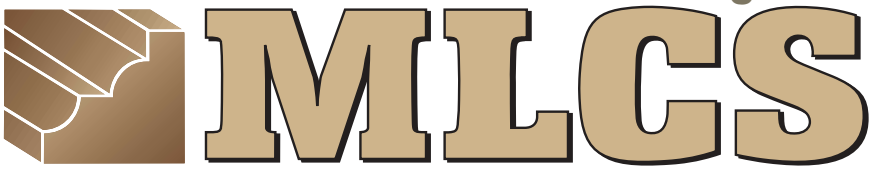

Technical Manual

Seventh Edition, Copyright 2005

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MLCS maintains a complete woodshop staffed with experienced woodworkers to answer all of your questions. All of our bits and products are tested and used in the shop, creating all the projects and samples pictured in the MLCS woodworking products catalog. This Manual is written from hands-on experience, to help you safely and successfully complete your woodworking project. Please read and follow the instructions for each bit, as well as the general guidelines and tips for routing. You can also call us and speak to one of our woodworkers if you need additional help. **Enjoy your woodworking!**

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General Guidelines, Tips, and Safety:

- Always use your safety glasses, hearing and dust protection.
- Read and understand the instructions for both the machinery and cutters before starting to work.
- Use safety devices such as pushblocks, featherboards or bit guards/blade guards where appropriate.
- As a general rule of safety, keep your fingers and hands at least one hand-length from any cutting blade.
- When using the router, pay particular attention to the condition of the collet. Frequently, bit breakage and poor performance can be directly attributed to a worn or damaged router collet.
- Always inspect a router bit before use. Check for chips in the carbide, frozen bearings, worn shaft, and be sure set screws and nuts are tight in bit assemblies.
- Always change bits or make adjustments with the router unplugged.
- Make sure the bit shaft is set at least 3/4" into the collet, but not bottomed out in the collet. The end of the shank should be about 1/16" up from the bottom of the collet.
- Two light passes cut more smoothly and easily than one heavy pass. Proper bit RPM is important, especially with larger, heavier bits. In general, burning of the wood or excessive vibration can be corrected with a slower rpm and a lighter cutting pass.
- Use a variable speed router or speed control to reduce the speeds when cutting large diameter bits, as follows: 1/4" to 2" D-- 18,000 RPM; 2-1/8" to 2-1/2" D-- 16,000 RPM; 2-5/8" to 3-1/2" D-- 12,000 RPM. Bits with a carbide height greater than 1-1/2" should also be run at 16,000 RPM or less and it is EXTREMELY IMPORTANT to make multiple passes with these router bits.
- Be aware that some cleaning solvents can dissolve the lubricating oil in bit bearings. Either remove the bearing or re-oil it after cleaning a bit.
- Failure to follow all safety instructions and warnings can result in serious bodily injury.
- In no event shall we be liable for death, injuries to persons or property arising from use of our products.
- Defects from misuse, abuse, negligence, or alterations are not covered by the warranty. Our liability is limited to replacement or refund of the product.

Rails & Stiles

All varieties

MLCS is proud to offer an extensive variety of bits to make rail and stile frames for doors. These frames use "cope and stick" joints at the corners, which give a strong tongue and groove joint and a mitered moulding look on the inside detail. A groove or rabbet is also created at the same time to hold a raised, flat, or glass panel.

Router: A reliable quality router will cost over $120 and be worth every penny. MLCS carries bit sets for either 1/4" or 1/2" collets. The 1/2" collet is more versatile, because it accepts a wider variety of bits including the larger 3 1/2" Raised Panel cutters. 1-1/2 to 2 HP is powerful enough for most work. In all cases, we strongly recommend being able to slow the speed of the router, either with **the MLCS #9000 Router Speed Control** or one that is built into your router. This will enable you to better control the workpiece and minimize burning on the more resinous woods such as cherry or maple. Speed control is especially important on less expensive routers, as bits can vibrate excessively at full speed. Finally, the router should be table-mounted. A sturdy, flat router table and a solid squared fence are important for producing quality doors. Routing rails and stiles freehand is **NOT** recommended.

Choosing Your Materials

Rails and Stiles: Wood for your rails and stiles should be straight-grained and knot free. Ends and edges should be square to the face of the wood. Consistent thickness throughout will save you hours of sanding later.

Raised Panels: Wood should be selected and glued up to best highlight a "cathedral" or "book-matched" grain pattern. For 3/4" thick stock, you may need to undercut the back of the panel to produce a 1/4" tenon. Choose a material for the panels. Solid wood is traditional, and must float free in the frame to allow for expansion. Solid wood panels must be "raised," using one of a variety of MLCS Raised Panel bits.

For Painted Doors: MDF (Medium Density Fiberboard) is an excellent alternative to solid wood if you are painting your raised panel doors. It comes in large sheets, machines well, and will be less expensive than solid wood.

Using Flat Panels: 1/4" Plywood Panels in your rail and stile frame look nice in certain applications, and open up the possibility of a veneered panel.

Choosing a Bit or Bit Set

All styles make equally good cuts and joints. There are a variety of profiles and styles from which to choose. The rail and stile bits make a 3/8" wide profile, or a 3/8" deep rabbet in the case of the glass door bits. All the grooves for panels are 1/4" thick x 3/8" deep. (EXCEPTION: French Provincial Bit **#8849** is 3/16" thick). The Window Sash **(#8893, 8894**) and Miniature **(#6548, 8848**) cut a 1/4" deep profile and joint.

Reversible Rail & Stile: The slot cutter, profile cutter, and bearing are assembled on a shaft in two different arrangements to produce the end cope and profile/groove cuts.

Matched Rail and Stile: Two separate bits make the required two cuts. No re-assembly needed.

Matched Miniature Rail and Stile: Two separate bits make the required cuts. Again, no re-assembly needed.

Stacked Rail & Stile: Two profile cutters, a slot cutter and a bearing stacked on a single shaft make both cuts by raising and lowering the entire assembly in the router table. (Available in 1/2" shank only)

Matched Entry Rail & Stile: A two bit set that cuts the profile detail on both sides of the wood with a slot between them. Use with 1-3/8" Stock for interior doors and 1-3/4" stock for exterior doors. (Available in 1/2" shank only)

Glass Door Reversible Rail & Stile: Same as the Reversible Rail and Stile, but with two slot cutters to produce a rabbet instead of a groove.

Window Sash/ Miniature Rail & Stile: Both bits work the same as the standard reversible bit, except these cut 1/4" deep instead of 3/8", and leave a rabbet for the glass. These are the best choice to make divided lite doors and mullions as they cut a narrower profile.

Shaper: Shaper versions of the bits work exactly the same as their router bit counterparts, but have three wing cutters and run at a slower speed.

Rails & Stiles

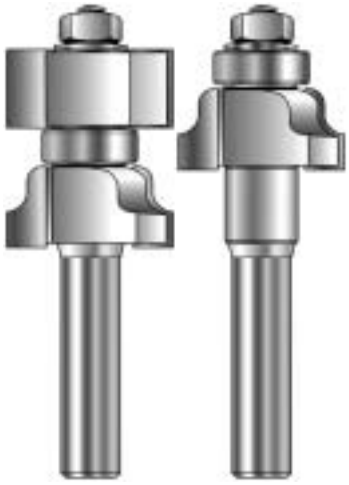
Reversible R & S

Matched R & S

Stacked R & S

Matched Entry R & S

Glass Door Reversible Rail & Stile



Window Sash Set

Rail and Stile Shaper

Parts Preparation

Prepare enough wood for all of your rails and stiles, plus some test pieces. Decide how the door will sit in the opening: Flush, 3/8" Overlay, or Full Overlay (*Fig. 1*). The width of the parts depends on the design of the door. About 2 – 2 1/2" is average.

RAILS: The rails (horizontal pieces) determine the width of the door and should be cut to exact length. Determine the rail width based on the width of the opening, the width of the stiles, and remember to add 3/8" on each side for the joint overlap. The ends of rails are known as tongue or "end cope" cuts.

STILES: The stiles (vertical pieces) can be left a little long to be trimmed after the door is assembled.

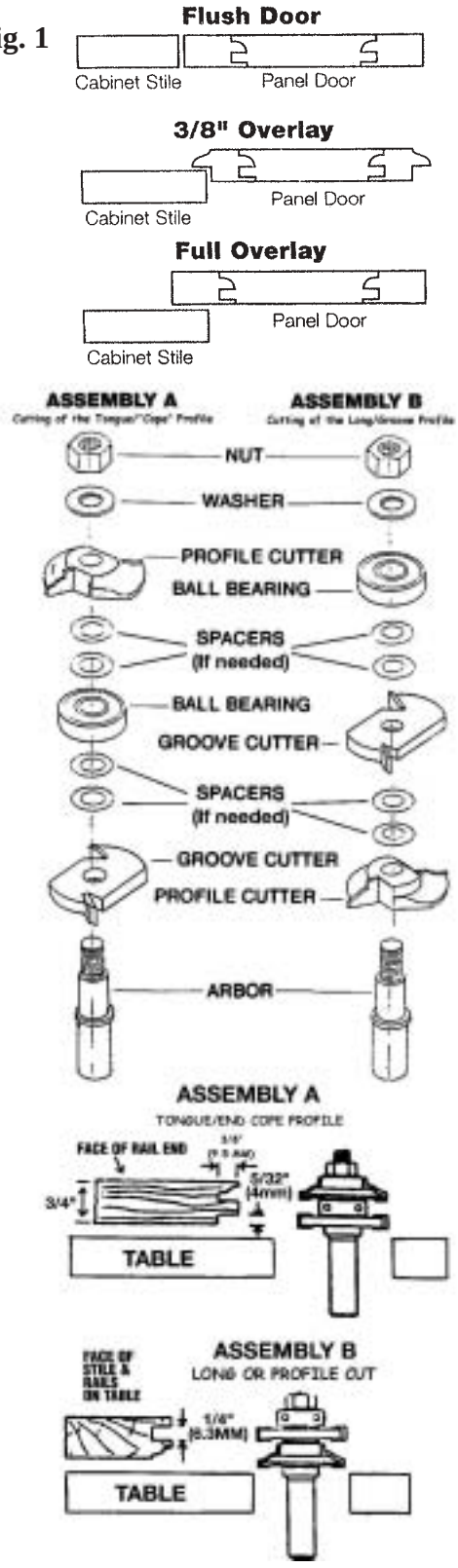
PANELS: Select and glue up solid wood panels at this time. Panel pieces should not be cut to exact size until the door frames can be dry-assembled for an exact measurement. The panel should be slightly smaller so it will "float" in the groove.

MAKING YOUR DOORS

Reversible Rail & Stile: Start with the bit assembled in the tongue/"end cope" arrangement (*Assembly A*). You will find thin copper spacers with the bit--put them aside for the moment. Set the bit into the router table and adjust the height so that you get a complete cut on your stock. The exact measurement isn't critical. Set your router fence flush to the bearing. Select a test piece and feed the end through the bit, using your miter gauge or a "push block sled." Keep the piece square and look for a clean even cut. **IMPORTANT: When using 1/4" shank bits, always make 2 to 3 passes ending at the bearing.**

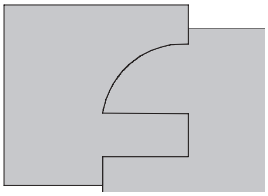
Now re-arrange the bit into the "long" or profile cut (*Assembly B*). **Be careful--it is possible to assemble the cutters backwards.** The flat side of the carbide should face into the cut. Do not change the fence; it is already set to the bearing. Adjust the height of the bit to match the previously-cut piece; then run second test piece**. If the fit is good, no shims are needed.** If the fit is too loose, go back to the first cut, add two shims above or below the bearing in the stack, and cut another tongue/"end cope" test piece. The shims can only widen the tongue on this end cope. Determine how many shims are needed (0-4) and note this for future reference. Finally, be careful not to over-tighten the top nut, as this will destroy the shims.

Fig. 1



The bit height adjustment will correct a "step" at the joint (***Figure 6A***), assuming that your wood is of equal thickness. Set up and run all of one side of the joint (and maybe an extra or two); then run all of the other side. All of the rails and stiles for an entire kitchen can be cut in an hour or so.

Figure 6A



Rail and Stile Pointers and Problem Solvers

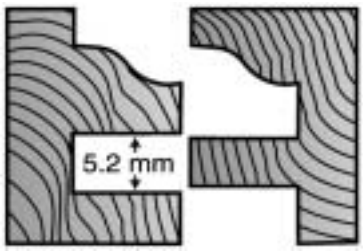
Tongue and Groove too tight or loose: On the rail end cope cut, add shims above or below the bearing to make the tenon thicker, thus tightening the joint. Remove shims to loosen.

Misaligned Corners: 1) One wood piece may be thicker than the other. 2) Bit height is not correct. Double-check for accuracy.

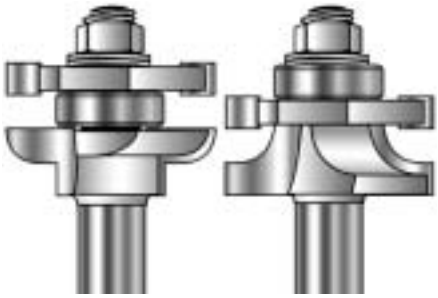
Joint Doesn't "Match" Gaps Top or Bottom: Your wood end may be out of square with face. Check to see if you are cutting full depth of bit to bearing or your router is not square to the table.

Burning: Decrease router speed and feed work faster. Check the rail and stile bits to make sure the cutter is not reversed.

Matched Sets, Stacked, Entry and Shaper bits are all adjusted for fit and height exactly the same way.



Plywood Panel Conversion Kit #296

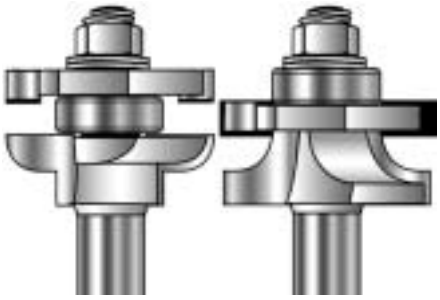


Matched Rail and Stile
(Original Configuration)

PLYWOOD PANEL CONVERSION KIT (#296):

Item #296 comes with two slot cutters allowing the user to quickly convert a matched Rail & Stile set from standard 1/4" joints to 5.2 mm in order to use European plywood for panels.

When changing bits for 5.2 mm use, one slot cutter has 5.2 mm teeth and one has 1/4" teeth. The 1/4" slot cutter **MUST** be installed on the Tongue or "End Cope" cutter. This will produce a 5.2 mm tongue. The 5.2 mm slot cutter is installed on the Rail and Stile bit to produce a 5.2 mm groove allowing the user to fit a 5.2 mm or European plywood panel in place of the standard 1/4" panel.



Matched Rail and Stile Set with
Plywood Conversion Kit #296

Making Rail and Stiles with Rabbets

There are times when you need a rabbet instead of a groove in your door frame. Always do this for glass doors to allow for replacement. Stained glass, pictures, fabric panels, and many other materials are best installed in a rabbet, from behind, in a door frame. (*Figure 7A*)

Create a rabbet in a normal door frame by assembling the frame empty, running a 3/8" rabbeting bit around the back, then cleaning out the rounded corners with a corner chisel (**MLCS Item #9541**). If you need rabbeted frames regularly, choose one of the MLCS glass door assemblies, or a Window Sash bit. Use these bits just like the reversible styles, except install the spacer provided when making the end cope. (*Fig. 7B*)

Panels:

Dry assemble your Rail and Stile frames with clamps. Check the outside dimensions now. All MLCS bits make a 3/8" deep groove, but none of the panels should bottom out in the groove.

Remember! Size the solid wood panels to allow for expansion and contraction with the seasons. A 10" wide panel can move as much as 1/4" over the course of the year! Leaving 1/8" on each side for seasonal expansion is fine. Depending on the style of bit and thickness of wood, you may need to undercut the back of the panel to bring the tongue to 1/4" thick or make the panel flush to the frame. Check your dimensions **twice** and cut the panels to size.

Always run larger raised panel bits in a router table at a reduced speed (*See page 2 for recommended speeds*). Take light cuts by raising the bit or adjusting the fence (**WARNING: Do not attempt to raise the bit or adjust the fence when using bits with an undercutter**). 3 or 4 light passes will give the smoothest results. Some router tables do not have a large enough table opening for these large panel bits. Solve this by using a "false top" with a larger opening fastened down to the original table (*Fig. 7C*). This tip works for small fence openings too. **Note: When using the Raised Panel bit with undercutter, the " thick panel will be about 1/8" proud (not flush) of the " thick rail and stiles.**

For a professional look, sand and finish the panel completely before assembly in the frame. Then, glue up the rail and stile frame, make any final size adjustments, and add the outside edge detail.

Figure 7A

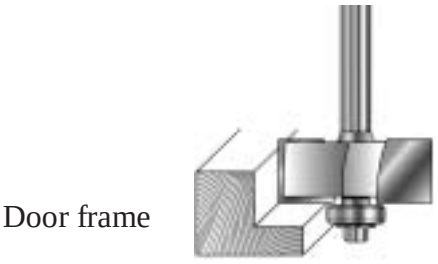


Figure7B

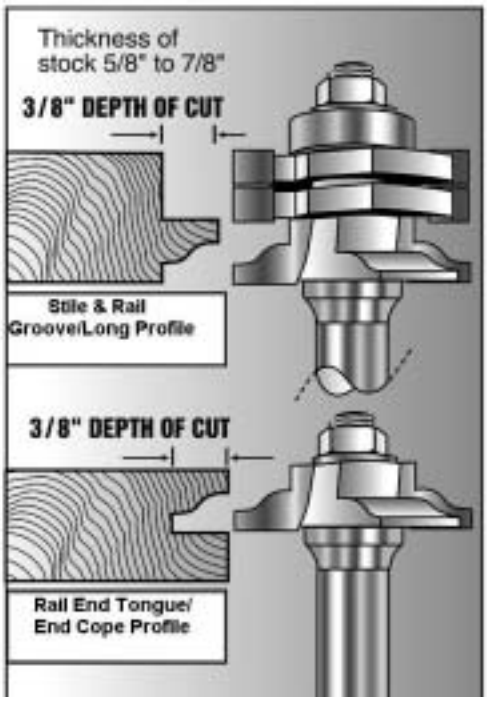
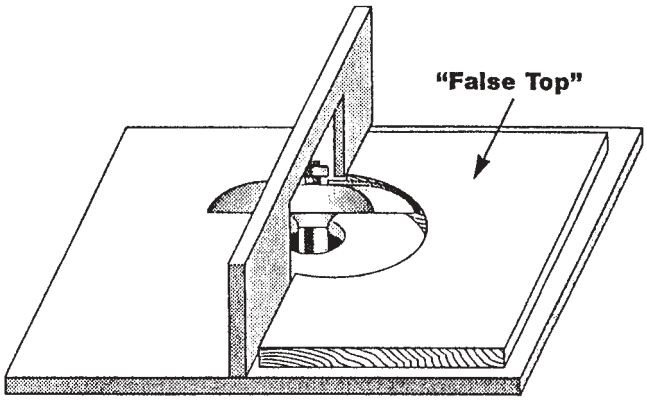


Figure 7C



Rails and Stiles for Entry Doors

Item #8840, #8841

IMPORTANT POINTS

- Always use a router table and fence. These cutters should **NOT** be used freehand.
- Cutters should **ALWAYS** be run at a **REDUCED SPEED**. Use the **MLCS #9000 Speed Control** or a variable speed router.
- Check the top nut when you first receive your cutters and periodically with use. The nut should be very snug, but not overtightened. This will destroy the adjustment shims.
- Use Push Blocks (**MLCS #9138, 9139, 9140**) and a mitre gauge or sled to feed your rails and stiles. **NEVER** use fingers to feed narrow stock!
- A 1-1/2 HP **PROFESSIONAL QUALITY** router will cut the profile in one pass. You can make the cut in 2 passes in difficult wood by adjusting the fence.

DESIGN AND CONSTRUCTION

- The cope and stick corner created by the bits is not strong enough by itself for a full-sized door. Our favorite method for reinforcing the corners is to assemble the door, then drill through the outside stiles and add screws or dowels into the rails.
- Glass panels can be made by assembling the door then routing out the profile on one side with a 3/8" Rabbeting Bit. Clean up the corners with a chisel, then make a small piece of moulding to hold the glass in place.
- Panels for the door can be made using any of the MLCS Raised Panel bits. They can be "raised" on one or both sides. Depending on the profile you select, you may have to adjust the thickness of the panel stock so you end up with a 1/4" tongue to fit the frame groove. You can also use a 1/4" thick veneer plywood for flat panels.

Windows & Mullions

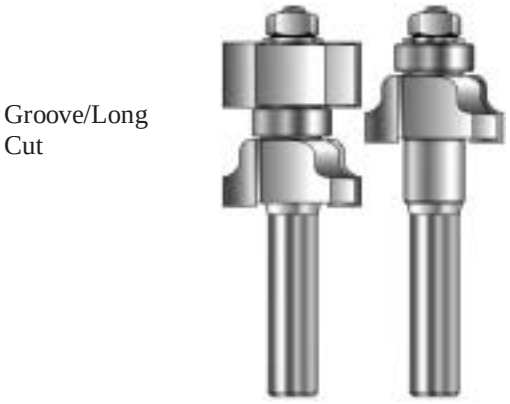
The MLCS Window Sash and Miniature Rail & Stile Bits will make replacements for the common "double hung sash" windows, unusual size windows, and the "mirror window," which is a popular interior design element. It is not practical to make the full through mortise and tenon corner joint found on the original windows in the home shop. Instead, a cope and stick is cut with the bits. Then the joint is strengthened with dowels, biscuits, or screws. The bits will also make mullions as true divided lites or as a decorative grill over the glass.

Decide on the thickness of stock for the window. Use **#8893** or set #**8894** for 7/8" – 1 1/2" thick stock and the #**6548** or #**8848** for 1/2" – 3/4" stock. Prepare enough material for all the rails and stiles that you need, plus material for mullions. The mullions are made one at a time from a wide (3" – 5") board. For best results, all stock should be exactly the same thickness.

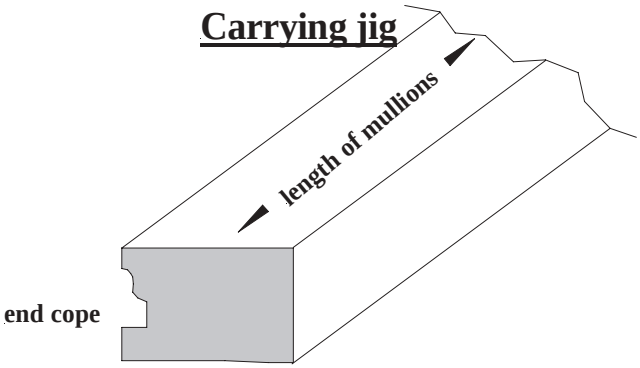
Make the outside frame of the window first. Most likely it will need to be a specific size. Cut the rails, or cross pieces, to exact length based on the width of the window. Remember to allow for the width of both of the stiles, and for the joint overlap. See the "Rail & Stile Doors" instruction sheet. Next set up the bit for the end cope, and cut all of the rail ends. While the bit is still set up, cut this end cope along the long edge of a board 3" wide, as long as your mullions, and the same thickness as the window. This will become a jig for carrying the narrow mullions through the router table. Put this board aside for now.

Change the bit over to the groove/long cut, and run the stiles and rails through. This is the inside edge detail of the door, and interlocks with the "end cope" at the corners, leaving a rabbet on the back of the window for the glass. Dry-clamp the window frame together, and check it for size and square. The easiest method for reinforcing the corners is to drill and countersink screws through the outside of the stiles into the rails, then plug the holes. Glue and screw the frame together. Now you are ready to add the mullions.

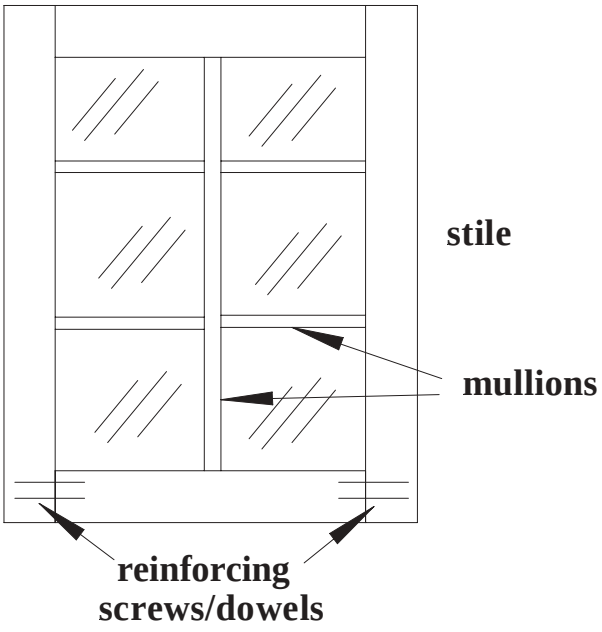
#8893, 8894, 6548, 8848



Carrying jig

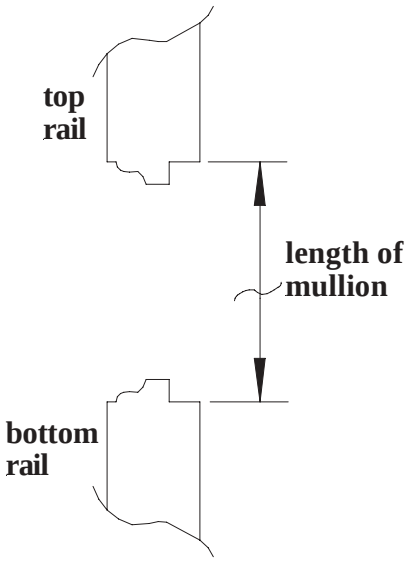


rail

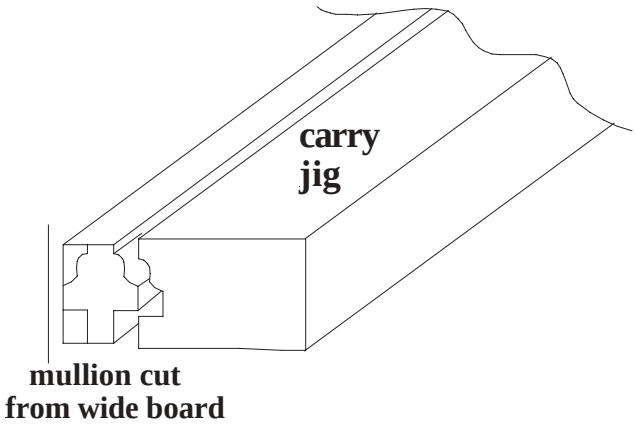


MULLIONS

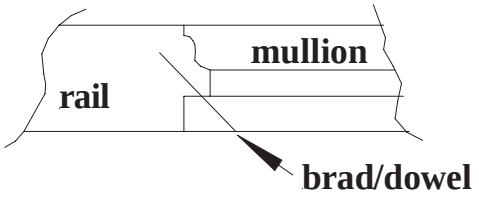
Make the vertical mullions first. Take the wide board reserved for the mullions and cut it to the exact length needed to fit into the window frame. The easiest way to measure this length is from the back rabbet cut. After the board is cut, set up the sash bit in the end cope configuration, and cut the ends of this board, just like you did on the rail ends in the frame. Re-arrange the bit in the groove/long configuration, and run the mullion board through the bit. You should now have the wide board with the ends coped, and the profile cut along one edge.



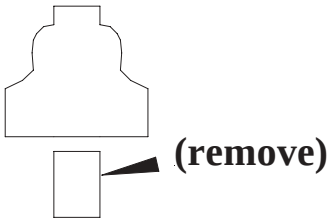
Set your table saw to rip the mullion from the wide board. Since this is a narrow cut, be sure to use push sticks and a zero-clearance insert in the saw. The piece should measure about 3/4" wide. That is the depth of the profile detail on both sides (1/4") and some wood (1/8" – 1/4") in the middle. Finally, you must rout the profile cut on the other edge of the mullion. Take the 3" board that you cut earlier, with the cope on the long edge. Fit the profile of the mullion into that edge, and use it to carry the mullion through the cut. It should be a friction-fit, or you can use a little double-faced tape. To make the job even easier, add a couple of handles and a stop on the back of the carry-board. This is a very safe way to cut the profile on this narrow piece.



The mullion should now be a good fit in your window frame between the top and bottom rails. Glue it in place and drill a small hole at an angle into it from the back for a dowel or brad for extra strength. For the rest of the mullions, follow the exact procedure as this one, starting with a wide board cut to the length of the mullion. Use the board to make two mullions at a time, (one off each edge) until it is too narrow to be safe.



If you would like some or all of the mullions to go over the glass instead of dividing it, simply remove the back part with a bandsaw, hand plane and sander.



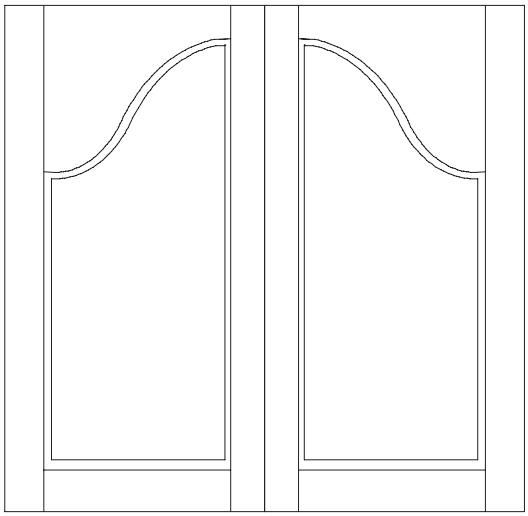
Cathedral Doors

Sets #9377, 9378

It is easy to make your own elegantly curved cabinet doors using **MLCS** router bits and **Cathedral Door Template Guides**. Our set of templates includes seven sizes of curves, allowing you to make doors from about 10” wide to over 22” wide.

Please familiarize yourself with the techniques and procedures for making straight rail and stile doors before trying the cathedral type. Review the **MLCS** instruction sheets for making rail & stile raised panel doors (*See Pages 3-7*).

MAKING TEMPLATES FROM PATTERNS. It is possible to transfer the curve shapes from the patterns to plywood or hardboard in several different ways. Use carbon paper to trace the curve onto the template material, and square off as shown on the sheet entitled “Create the Patterns” (*See next page*). Cut out the shape and sand smooth. A small notch at the centerline of the template will help with alignment. Another way to transfer the curves is with a “ponce wheel.” This is a wheel with sharp points around its edge and a handle. You roll it around the pattern. Then rub chalk over the holes made in the pattern by the wheel and onto the wood. You can buy a ponce wheel at a sewing supply store. **NOTE**: Even though the curve for the rail and corresponding panel look the same, remember that the panel fits into a groove in the rail, so the two curves are *slightly* different.



DESIGN. When designing a kitchen or series of cabinets with cathedral top doors, try to keep all the doors about the same width if possible. To make doors in sizes between the two-inch increments of the templates, simply add to the length of the straight sections at the ends of the curves or adjust the width of the stiles. Another technique for using the cathedral patterns is to use half of the curve to make one door and the other half for a second door. This layout looks great in an entertainment center or china cabinet.

CREATE THE PATTERNS:

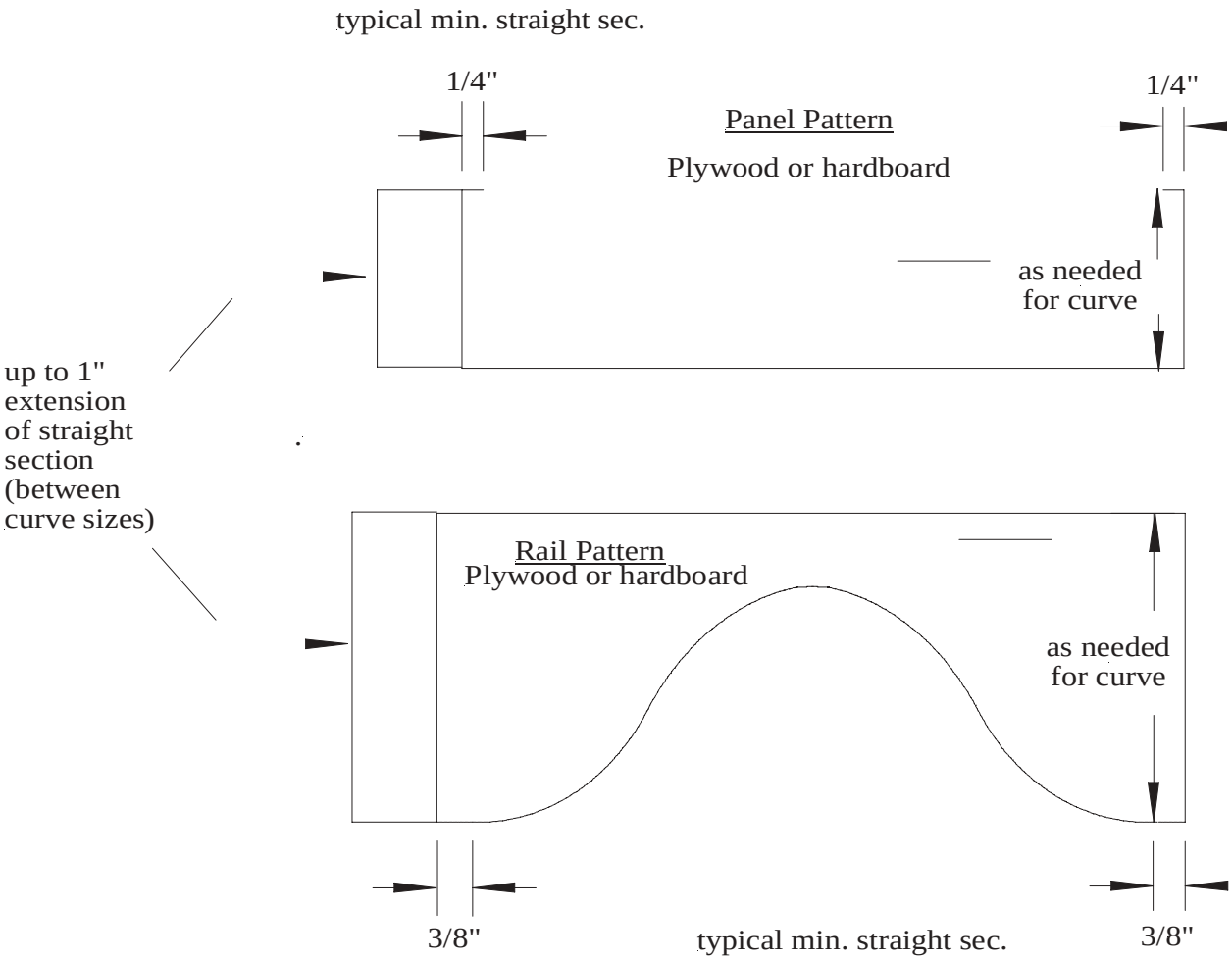
1) Select a panel and rail curve for the door size.

2) Transfer curve to 1/4” plywood.

3) Square the piece to about 3” to 4” long.

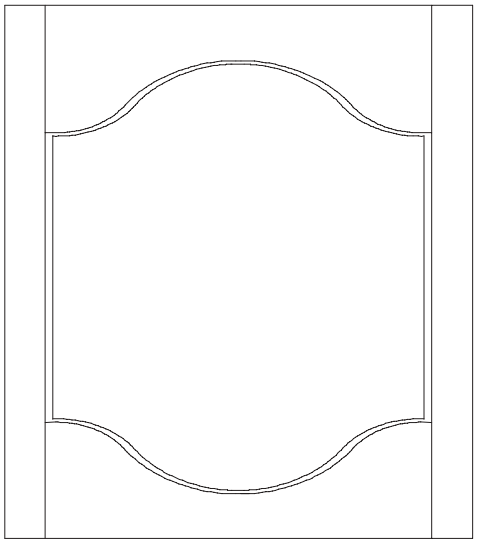
4) Cut out and sand smooth to lines.

5) The 1/4” for the panel and 3/8” for the rail are the panel tongue and the joint overlap. These can be extended to widen the door to a dimension between the curve sizes.

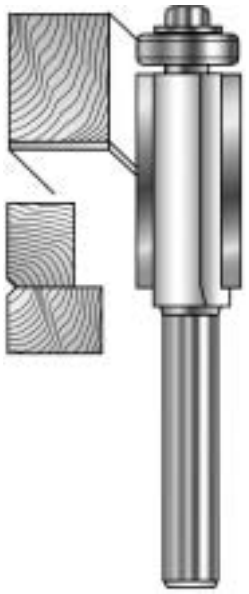


Cathedral Doors

Prepare your stock as you would for straight doors. Be sure that edges and ends are square to each other and to the face, and that all of the rail and stile material is of uniform thickness. Have a few extra pieces for test cuts. For the curved rails, the stock needs to be wide enough to accommodate the curve. This means you may need 4-5 inch width for your rails. Stile material is usually around 2 inches wide. Rails need to be cut to the exact length at this time. This length is determined by the required width of the door. Stiles can be left a little long for now. For more help with the setup and sizing see the **MLCS** video "**Making Your Own Raised Panel Rail and Stile Doors**" (**MLCS Item #9063**).



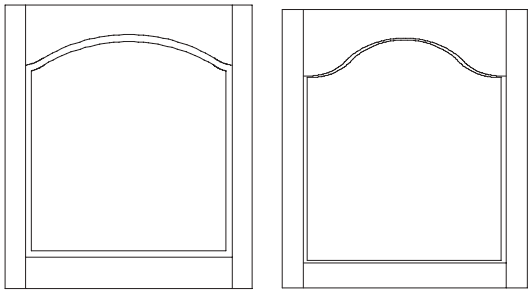
When making curved rails, the end or "cope" cut must be done first. Set up your bit in the router table, and cope the ends of all your rail stock, including the wide ones for the curved pieces. Also make a few extras for test cuts. Select a curve pattern template from the "Rails" set that is closest to your rail length without being longer. Remember that you can lengthen the 3/8" straight part of the curve to get to the width that you need. Use double-faced tape to attach the template to the rail blank, using the center mark to help you align it. If everything is right, the template ends should be parallel to the coped ends of the rail. Cut along the curve with a bandsaw, coping saw or jigsaw to within 1/8" or so of the template. Be careful not to cut into the template. If you are afraid you may damage the template, you can trace the line of the curve and cut it out before taping the template down. Trim the rail to the template being careful of the grain direction of the wood.



Set up a flush trim router bit (**MLCS #6506 or KATANA #16506**) in the router table. This is used to cut the curved shape of the rail to the exact shape of the template. It is best to have a minimum of material to remove with the bit; that's why you cut to within 1/8" or so in the previous step. This is also a good time to practice with a *starter pin* in your router table. A starter pin is a short pin that is set into the baseplate near the bit opening, which acts as a fulcrum to help you pivot the workpiece into the spinning router bit safely and easily. You will be using the starter pin again later when cutting the profile and groove into the curved rail.

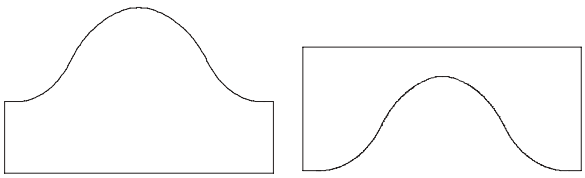
Try to always cut with the grain, even if you need to *climb cut*, that is, cut with the rotation of the bit instead of the usual against the rotation. Feed lightly and *use your push pads!* The **MLCS** video **#9063** shows this technique. **REMINDER**: Be aware that climb cutting tends to pull the work into the bit.

Next, change your router bit setup to cut the profile on the rails and stiles. This is the detail and groove that is around the inside of the doorframe. Make the cuts on the straight pieces of the frame, then set up the starter pin again as you did when shaping the curved rail. Cut the profile and groove on the curve, again using the pin to guide the workpiece into the cut.



At this point you should have four doorframe pieces, including the curved top, that fit together to form the door. Dry-fit the pieces and check your width measurement again. Mark the stiles to locate the rails for the required door height. Measure the inside of the frame at this time to determine the size of the raised panel blank. Make it about 1/4" bigger than the frame inside dimension on all sides (e.g. a 10" wide frame needs a 10 1/2" wide panel). First, cut the panel blank square, then choose the matching template or prepare a pattern for the panel curve as you did for the curved rail.

Follow the same procedure that you did for the curved rail, first cutting to shape and flush trimming. Next you will set up your raised panel bit in the router table with the starting pin. Refer to the Video for helpful hints. Start with the bit just above the work surface and take light cuts around the four sides of the panel. All panel bits should also be run at a reduced speed, using either a variable speed router or the **MLCS #9000 Router Speed Control**. Continue raising the bit and taking light passes until the panel has a 1/4" tongue. **WARNING**: **Do NOT attempt this if you are using a bit with an undercutter!**



Panel template Rail template

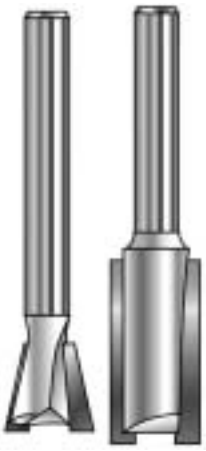
Test fit the panel in your doorframe and, if everything fits, proceed to assembly and finishing. Remember not to glue the panel into the frame groove; it must float freely. Use the rest of the patterns to create the size of doors you will need.

Dovetail Jig

Items # 6401, 8701

As seen in and HIGHLY RECOMMENDED by *Wood Magazine* (Jun-July 02, Issue 142, pg. 18)

NEW Instructions!



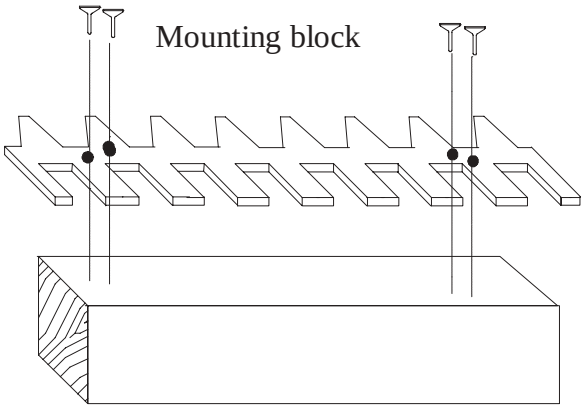
The Pins & Tails Traditional Thru Dovetail Jig requires a simple, one-time setup and assembly. After this, boards to be dovetailed are clamped to the jig, router depth is set to match wood thickness, and dovetails are cut. The template cuts 3/4" wide tails, 1-1/8" on center, a good size for drawers.

Setup for both templates is identical. In addition to the template and router bits supplied (3/4" x 14° dovetail and 3/8" straight) you will need these items to get started:

- A 5/8" O.D. router guide bushing to fit your router. Many router brands offer this as an accessory, or you can purchase **MLCS Item # 9096 Universal Guide Bushing Kit**, which includes this size and fits most any router. **Note**: The bushing must be 1/4" long to work with the template.
- A mounting block for each template. It can be of any hard or softwood, and should measure 2-7/8" thick, 18" long, and 4" wide. Note that the templates are attached to the 2-7/8" edge of the block.
- Several test boards, about 6" square x 3/4" thick.

MOUNTING
Begin by attaching a template to the 2-7/8" side of the mounting block. Use the slotted holes and #8 wood screws, centering the holes in the block (1- 7/16" from the edge) and centering the screws in the slots, to start. After final adjustment you will drive screws permanently into the round holes in the templates to lock in the setting.

ALTERNATE METHOD:
Cut a piece of stock 2-7/8" x 18" x 3/4". Using four 1-1/2" wood screws, attach foot to mounting block allowing 1-1/2" on either side. Using appropriate sized C clamps attach to any table edge and proceed as above.



Final adjustment is made by actually making a dovetail joint and checking the fit. Set up your router with the 5/8" guide bushing and the dovetail bit. Clamp a test board in a vise with the end grain pointing up. Using two C clamps, attach the template-mounting block to the test board, so that the end grain of the board is against the bottom of the template and the mounting block is clamped to the test board. The

The straight fingers should be sticking out over the end of the test board, facing you.

Lay a second test board up underneath the template and against the first board and draw a pencil line indicating the board thickness. Set the router on top of the template and adjust the router bit to this line. Make a test cut on the board, creating dovetails along the end of the board by feeding the router into the finger slots. Don't worry about the left-right adjustment at this point; it's easy to do this later.

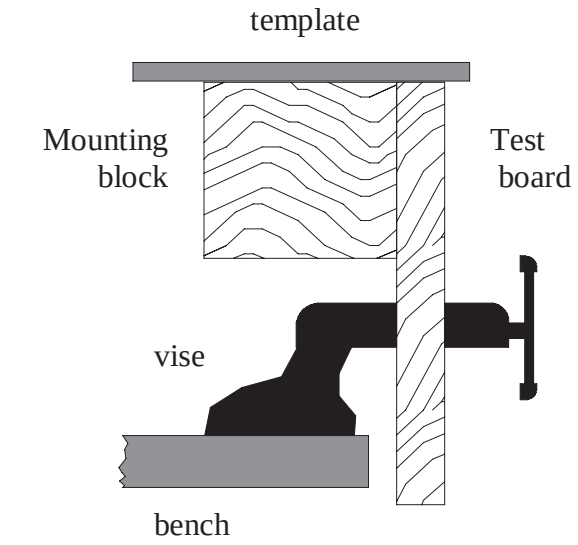
Put the dovetailed board aside for the moment, and install the straight bit in your router (The guide bushing remains the same). Clamp a second test board under the angled fingers of the template, same as you did before. Set the depth of the straight bit exactly like you did with the dovetail bit.

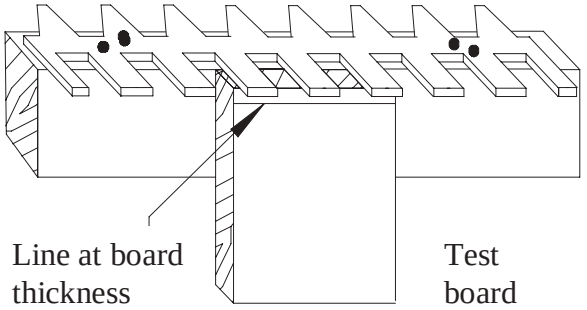
Cut the pins now by feeding the straight bit through the angled fingers. Remove this piece from the jig and try the fit with the first test board. By sliding the template forward and back in its slots, you loosen and tighten the fit of the joint. The dovetail/pins cut (first cut) does not change; only the sockets (second cut) are affected.

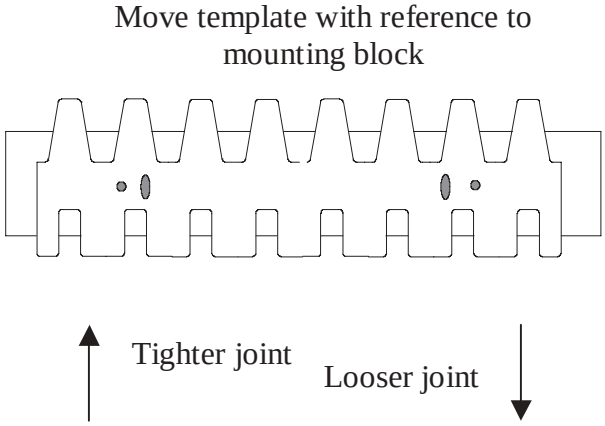
In order to get equal spaced dovetails from the top and bottom edge, you should space the stock's corners equally between the fingers of the template. For example, if your stock is 1/2" wider than the finger spacing, then set the stock 1/4" proud of each finger. Marking registration lines on the block will help in setting up your stock. The registration lines should be in the exact center of the dovetail/pins and sockets. Draw these lines on each side of the block for each pin or socket.

The dovetails/pins and sockets are cut basically the same. First clamp your stock to the side with the straight fingers centering it between two registration lines. Mount the dovetail bit and guide bushing in your router. Cut out the dovetails in the stock. Next, mount your second piece of stock on the other side of the jig, again centering it between two registration lines. Change to a straight bit and make your cuts. Remove the stock and test fit. Make any adjustments and when satisfied, make permanent by driving screws into round holes.

You can cut joints longer than the templates by simply shifting them along the boards. With practice, you can also vary the dovetail spacing with the same technique.



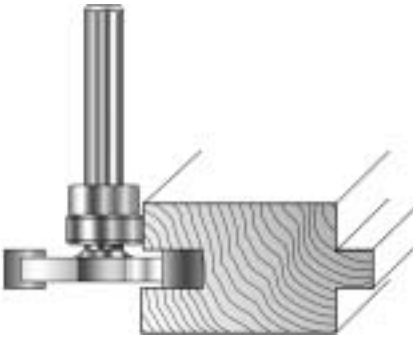




Biscuit Joinery

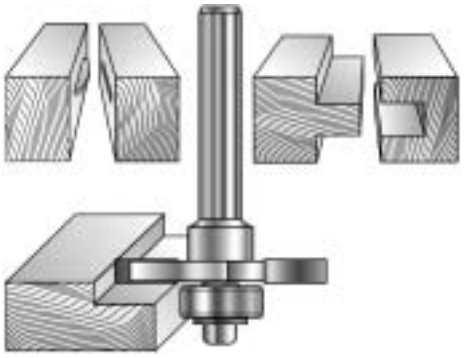
Kits # 6065, 8365, 6064, 8364, 6063, 8363
Katana Kits #16065, 18365

Biscuit joinery has become a standard woodworking operation, replacing many traditional techniques such as doweling and mortise and tenon. Originally, an expensive ($300 - $500) machine was needed to make this easy and convenient joint. Now MLCS has a system for less than $35.



The heart of our system is a bearing guided slot cutter, sized to the standard biscuit thickness of 5/32". The biscuits are industry- standard, made of a compressed beech that swells and locks the joint upon contact with common water-based woodworker's glue. (Elmer's, Titebond, etc.) You can use the biscuit cutter either freehand or in a table-mounted router.

The basic edge-to-edge joint is easy to setup and do. Install the bit in your router, and set bit height to approximately the center of the wood thickness. It doesn't have to be exact; the beauty of this joint is that both pieces to be joined register against the router base, and cut the slot the same distance from the face of the wood. This makes the joint perfect every time. Also you do not need to make the slots any particular length or location. Just run several 5" to 6" slots and put biscuits all along the joint. This eliminates tedious marking for centerlines. Spread glue in the slots, place the biscuits, and clamp tight.



Biscuits can also be used on miter joints. These can be done with caution on the router table. Set up your bit as before. Then clamp a guide to the table for the workpiece to ride against as you feed it into the bit. The round (#11) style of biscuits works best for this application, as they are deeper and shorter than the #20 size. For particularly tiny frames, the #H-9 size biscuit is only 1-1/2" long and thinner (1/8") than standard. With thicker wood, you can use a double biscuit for a super strong joint.

Universal Baseplate

#9055

Item #9055 Universal Baseplate is designed to adapt the Router Inlay Bushing to almost any router. The router base must be 6” in diameter or less.

Remove the existing plastic base from your router.

Take the Universal baseplate and fit the machined aluminum ring into the center hole. The back, or inside, of the baseplate has hexagonal holes. The machined aluminum ring goes in from the back and rests in a groove such that it is flush on both sides of the baseplate.

The large flat washer with the three threaded holes holds the ring in place. This washer goes on the back. The three brass-colored Phillips-head screws go in through the front of the baseplate and into the threaded holes in the large flat washer.

Now mount the baseplate-ring assembly to your router. Note that some routers (Bosch, some others) have metal wings that stick into the bit opening that may interfere with the baseplate washer. You may choose to remove them.

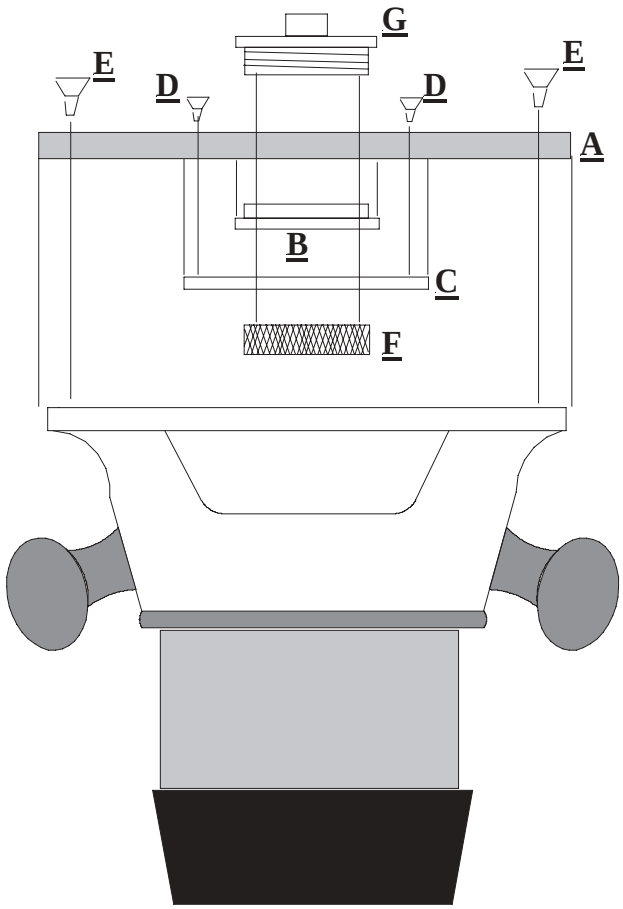
Use your original router baseplate screws to fasten the Universal baseplate to your router. Choose holes in the Baseplate that match with your router holes. You may need to use some of the washers or spacers that are included.

Unscrew the knurled ring from the Inlay Bushing and install the Inlay Bushing into the baseplate. The knurled ring screws onto the Inlay Bushing from the back of the Universal Baseplate.

Install the spiral bit in your router collet, and adjust your router so that the bit sticks through the Inlay Bushing. Loosen the baseplate mounting screws and center the bit in the bushing; then re-tighten the screws.

Now proceed to the Inlay instructions in the MLCS Technical Manual.

A...Universal Baseplate
B...Aluminum Ring
C...Flat Washer
D...Brass Screws
E...Router Base Screws
F...Knurled Ring
G...Inlay Bushing



Router Inlay

The Solid Brass Router Inlay Set #9177 will create a perfectly matched recess and inlay piece. It can be used for decorative accents, butterfly keys, and repair work. The set fits into a 1-3/16" thru hole with a 1-3/8" rim in the router base. This is standard on Porter Cable and Black & Decker routers. MLCS sells a replacement base for many other brands. A 1/8" spiral downcut bit (**MLCS Item #5161**) also comes with the set.

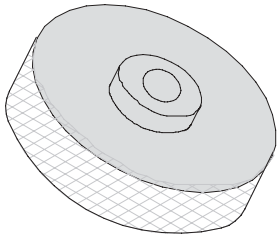
All inlay work requires a pattern. MLCS carries a selection of shapes such as hearts, bowties, geometrics, and animals, or you can make your own pattern from 1/4" thick material. The actual inlay is 3/16" smaller than the pattern. Also notice that the bushing cannot get into tight corners. Cut the patterns into a square of plastic or plywood with a scroll saw, coping saw, and drill bits. Sand and file all edges smooth, as any irregularities will show up in the finished pattern.

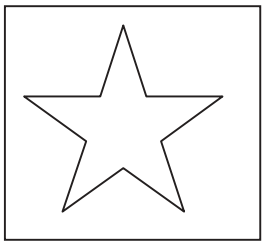
Cut the recess (female cut):
Locate and attach a pattern to the background stock securely with double-face tape (**MLCS Item #9489, 9491 or #9493**). The 9/16" diameter bushing sleeve should be in place on the guide. Set the spiral bit to cut about 3/16" deep. Cut around the pattern and waste away all of the material within the pattern.

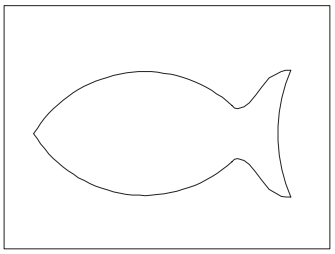
Cut the inlay (male piece):
Prepare your inlay material slightly thicker than the recess depth (3/16"). Fasten the inlay stock down to a scrap board and fasten the pattern to the stock, again using double-face tape. You will cut through the stock this time. Pull the outer sleeve off of the guide and set the bit slightly deeper than the stock thickness. Carefully plunge the bit and cut around the pattern edge. The inside is the good part. **REMEMBER**: You **MUST** keep the guide tight against the pattern or the inlay will not fit properly.

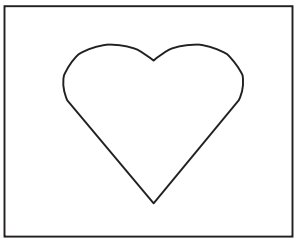
Assembly: Fit the inlay piece into the recess. Some sanding may be required on the corners. Sand flush to the background and finish.

Set # 9177, Patterns #9421-33









Spiral Up/Downcut Bits

MLCS Spiral Upcut and Downcut Bits provide a smooth shearing action, keeping steady contact with the workpiece and leaving work almost fray and splinter-free.

While most MLCS bits are carbide-tipped, spiral bits are **SOLID CARBIDE**. Though harder than steel, carbide is also more brittle. Thus, extra care must be taken with these bits. Never force your work. Don't make sudden plunges or starts. **Important**: When the diameter of the bit is less than the depth of your groove, **take the cut in multiple passes, going deeper each time**. **Do NOT try to take the full depth at once.**

CHOOSING AND USING THE RIGHT BIT

UPCUT Bits remove sawdust and wood chips from a plunge cut with upward shearing. They work well for making deep mortises. In this application, any tearout caused by the upcut will be hidden by the tenoned workpiece. Upcut bits can also be used for any edge treatment performed with the work facing upward. Upcut bits are also useful when cutting dadoes in a router table.

DOWNCUT Bits (naturally) cut downward (away from the router base). This motion gives grooves, dadoes, rabbets, shallow mortises and plunge cuts a smooth clean edge. **REMEMBER**: Downcut bits push sawdust into the cut. Making multiple passes reduces the buildup of sawdust in the groove.

COMPRESSION UP/DOWN SPIRAL Bits (**MLCS #7425**) cut upward and downward simultaneously. This unusual design makes them perfect for smoothing and tidying the edges of hardwood plywood or melamine-coated particleboard (MCP). **NOTE**: When working with easily chipped materials, you may want to precut your pieces oversized using a tablesaw.

Spiral Upcut Bit

Spiral Downcut Bit

Compression Up-Down Spiral Bit (#7425)

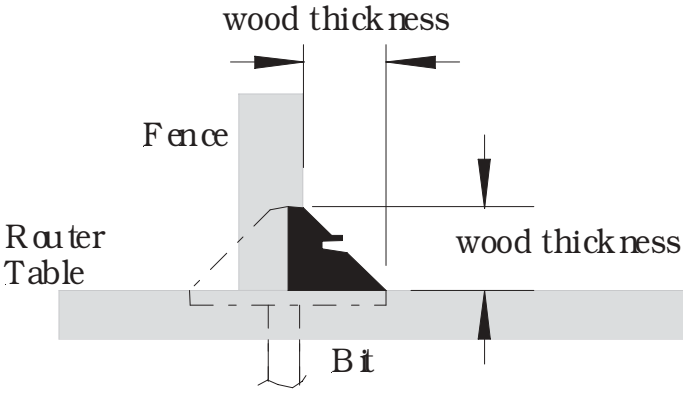
Lock Miter

Bits #5547, 5548, 7847, 7849, 7850
KATANA Bits #17849, 17850

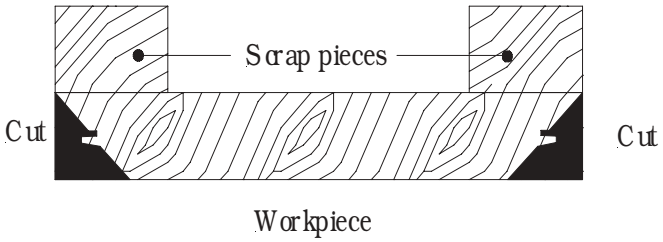
The Lock Miter bit makes clean, self-aligning mitered corners in hardwood, softwood, and plywood. Choose your bit based on the thickness of the material you plan to use, following the catalog specs. The bit must be used in a router table with a straight, squared fence. Best results are obtained with minimum clearance around the bit both in the table and fence. A variable speed router or **MLCS Speed Control #9000** will make the job easier.

The Lock Miter bit uses only one set-up for both sides of the cut. **The most important thing to remember when adjusting the bit is this**: The bit should be centered on the stock and be an equal distance form the top to the bottom, and only the diagonal of the bit should show.

Prepare some test wood the same thickness as your project, about 6" wide and cut square and true. Do not pre-miter the ends of the work. The bit does this. At the ends of the test pieces to be cut, attach a scrap of wood, as shown below, along the cut to act as a guide against the fence and table. Once the actual workpiece clears the bit, there is only a point of the piece left to ride the fence or table. The scrap piece keeps the work running straight and true. Run one side of the joint down on the table, then run the other side upright against the fence. Remove the scrap pieces and check the fit. Make a minute adjustment in the height of the bit or the depth of cut to align the corner, then run all of your corner pieces.



TIPS: Use double-faced tape (**MLCS Item #9489, #9491, or #9493**) to fasten the scrap pieces to all of the ends of the workpieces at once. Make them about an inch longer at each end for good stability. The **Merle Adjustable Corner Clamp (MLCS Item #9012)** is the best choice for gluing up a lock-mitered box.



Tongue & Groove & Glue Joint Bits

All tongue and groove bits are used to create a mechanical joint for the wood pieces to be glued. This adds tremendous strength and insures accurate alignment. In general, the bits can have a straight or wedged joint and are either one- or two-piece sets. The V-notch set adds a common decorative element to the joint.

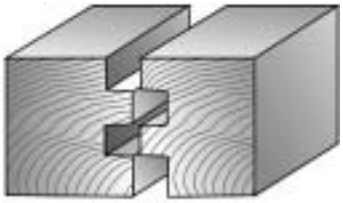
All the bits except the Tongue and Groove Assembly (with bearing) require a router table and fence. The more straight and square your table, the better the joints will be. Also, featherboards will greatly increase your ability to feed the work smoothly and evenly. Be sure that for all the bits your router fence is set so that you are taking a complete depth of cut on the bit. **Please note**: In order to use the bearing on these bits to guide the depth of cut, an additional piece of stock must be fastened or clamped to the bottom of the Tongue & Groove stock.

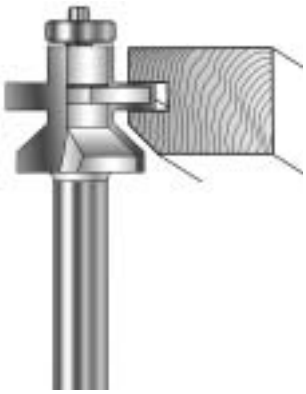
The one-piece tongue and groove bits **(#5545, #5546, #7845, #7846**), both straight and wedge, can be set once for both halves of the joint, as can the Glue Joint bits (**#5553** and **#7853**). The height of the bit is adjusted so that the center of the joint on the cutter is centered on the thickness of the wood. Both pieces are run; then one is flipped over and fitted to the other. This only works if the all the wood pieces are of even thickness and if they were run evenly through the router table. Use of featherboards is encouraged! Sometimes it is easier to run all the pieces for one half of the joint; then reset the bit height to match and run all of the other half of the joint.

TIP: If you are unsure about the straightness of your wood or if you are making a particularly long joint, choose a wedged version of the bit. It will be easier to fit the joint together.

T&G Bits # 5545, 5546, 7845, 7846, 7843, 5544, 7844, 7841, 7842
Glue Joint Bit #5553 & 7853
KATANA T&G Bits #15541, #17840
KATANA Glue Joint Bit #18846

Glue Joint Bits





Tongue and Groove with V-Notch

Tongue and Groove Assembly

Finger Joint

Bits # 5561, 7861, 7862

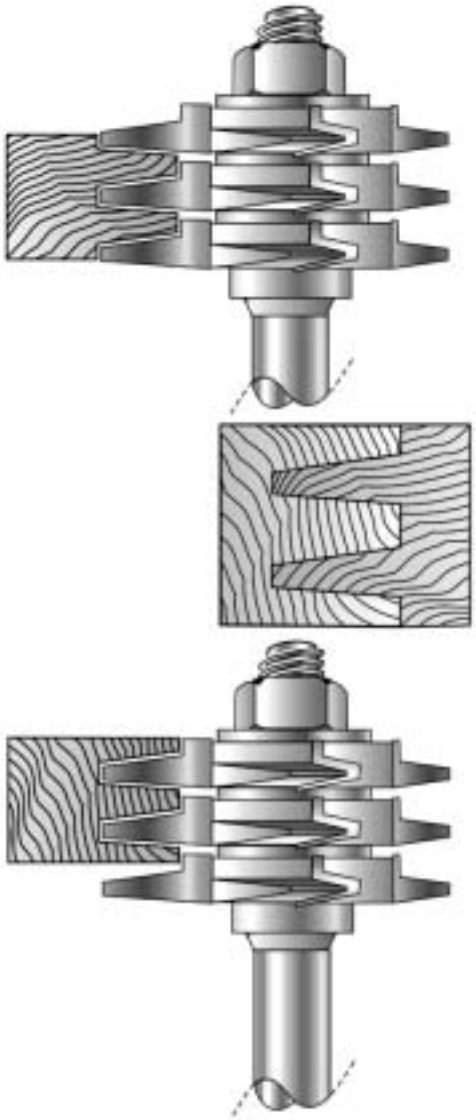
Finger joints are primarily intended for end-grain-to-end-grain joining, as in lengthening a board. It is frequently seen in mouldings that are to be painted. The joint can be used in longer edge-to-edge joining, provided that the wood is very straight and flat.

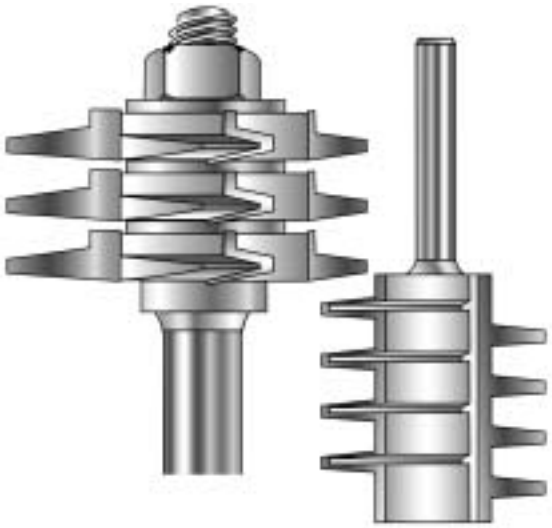
All of the finger joint bits must be used in a router table with a fence. Set the fence so that you are cutting the full bit profile. The inside edge of the bit should actually shave some length off the wood piece.

Set the height of the bit based on the thickness of the wood that you are using. Ideally, there should be a solid finger on the top and bottom of the joint. Avoid a thin shaving here that could break out or stick up when gluing.

Run all of the pieces you need for one side of the joint. Then adjust the height of the bit to match the cut pieces and cut the other side of the joint. Use a push block or miter gauge to feed the pieces.

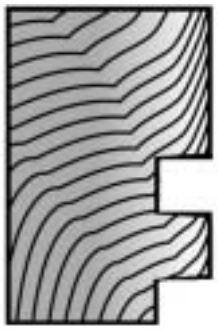
Glue, clamp, and sand for a perfect joint.





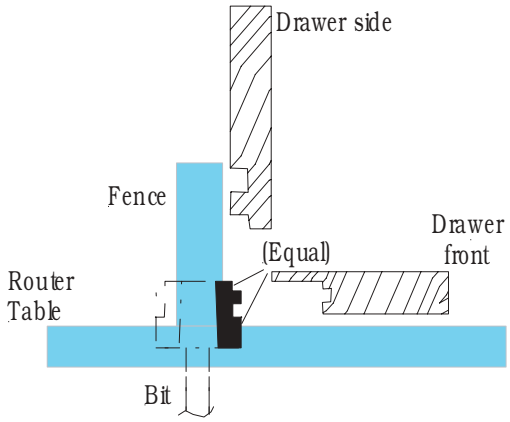
Drawer Lock

Bits #5551, #5552, #7851, #7852
SHAPER Cutter #1082
KATANA Bit #18850



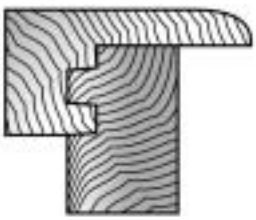
The Drawer Lock bit creates a production-style joint suitable for most common furniture and kitchen drawers. The bit should be used in a router table with a straight, squared fence. Accurate alignment and setup of the router is important for a solid, tight-fitted joint.

Cut the drawer-side joint first. Set the bit height so that the end notch on the drawer side (about 1/8" for Bit **#5551** and **#7851**) is the same as the end notch on the bit. **NOTE**: For Bit **#5552** and **#7852** and **KATANA Bit #18850**, the end notch on the side should be about 3/16". Set the fence so that the entire cutting edge of the bit cuts wood. It can be a bit deep but it cannot be shallow or the joint won't work. The sides are run through the router table vertically with the inside against the fence. A featherboard (**MLCS Item #9478)** helps give a clean smooth feed. Run all of the side joints at this time.

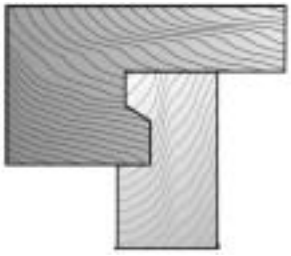


REMEMBER: Do not cut until the sides are matched with the front. Make a sample cut first!!

The drawer front is cut down on the table inside face down. Leave the bit height as before, and make a first cut into the edge against the fence. Expose more of the bit and cut again, until the proper lip overlap extends past the side piece.



Note: Wood thickness and variations can create a need for slight adjustments. Always use test pieces to determine your final settings.



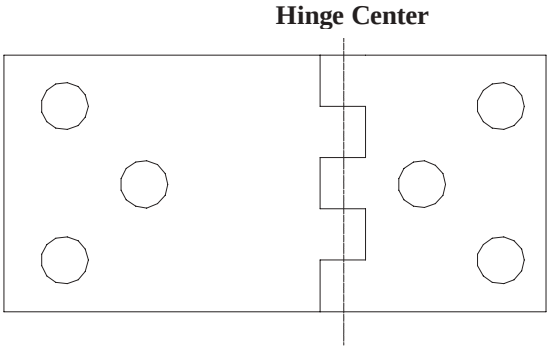
Rule Joint

Sets #6100, 8400, 8401
Katana Sets #16100, #18400, #18401

The rule joint is used to join a dropleaf extension to a tabletop. In the up position, this joint makes a tight, well-supported connection. In the down (dropped) position, this joint appears to be a nicely moulded edge.

Both 5/8” and 1/2” radius roundover and cove bits are used to make the rule joint. It depends on the wood thickness and hinge type you are using. Rule joint hinges are designed with one leaf longer that the other.

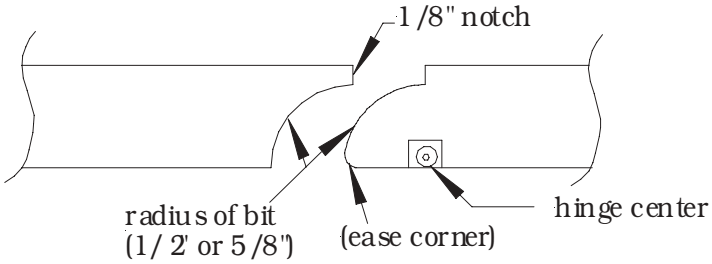
The hinge knuckle is recessed into the bottom of the main table at the center point of the edge radius. Usually, there is a 1/8” notch at the top. With 3/4” thick wood, 1/2” radius cutters are used. This puts the hinge pivot point at the bottom surface of the table, so that the leaves of the hinge can be surface mounted. If the wood is thicker, say 7/8”, the hinge point must then be recessed further into the bottom by recessing the hinge leaves as well. Use 5/8” radius cutters to avoid recessing the hinge leaves in this case. As always, have the hardware on hand before starting.



Drop Leaf Hinge

Ease the bottom edge of the main table to smooth the hinge action. Also, shift the hinge pivot point slightly toward the edge of the main table so the joint doesn’t rub and wear.

Because the location of the hinge pivot point is so important to a properly working joint, you should practice on some test pieces of the same thickness as your final project.



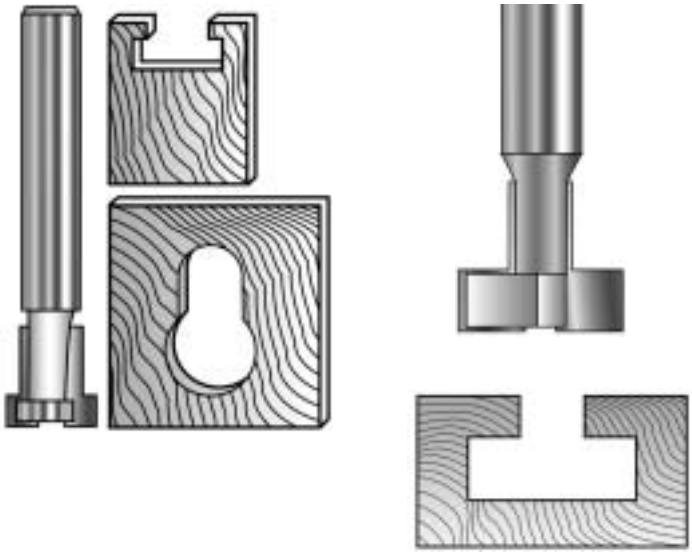
T-Slot & Keyhole Cutters

T-Slot Bits # 6333, 6334, 8637
Keyhole Bits #5438, 5439, 7738, 7739

T-Slot cutter bits are similar to keyhole cutters, except that they are larger and cut more wood in a "blind" hole. Follow these instructions for a safe and successful cut.

Use a slower speed on your router. Depending on your feed rate and type of wood, vary the speed until you get a comfortable cut. If you do not have a variable speed router, the **MLCS #9000 Speed Control** works well with all standard routers (except soft start models).

It is best to work with a router table against a fence and use featherboards and stop blocks to control the cut. But, if you work with a hand-held router, use guides clamped in place. Because of the shape of the bit, you must make the cut in one pass. In difficult wood or with the largest of the bits you can make a preliminary cut with a plain straight bit first to clean out a majority of the wood. Also, drilling the entry hole with a forstner bit helps, even though all the T-slot cutters will plunge cut.



Router Collet Extension

Item #9464

Includes: " co llet, collet nut, collet base, " extension shank

Make sure the router collet extension is properly assembled. Please note the extension shank should be secured tightly, but the collet nut should be tightened only with the same pressure as any router collet.

WARNING! Do NOT bottom bit in router collet extension.

Keep in mind that by extending your " sh ank router bit, you are increasing the strain on all parts. It is very important that you decrease the size of the cuts taken. Plan on making the full cut in several passes and make very small cuts per pass. This is especially important when using larger bits.

Crown / Architectural Molding, Chair Rail, Casing/Base Molding

Bits #7897-9, 7865-70, 7891-96
KATANA #17868, 18065, 18075, 18077, 18079

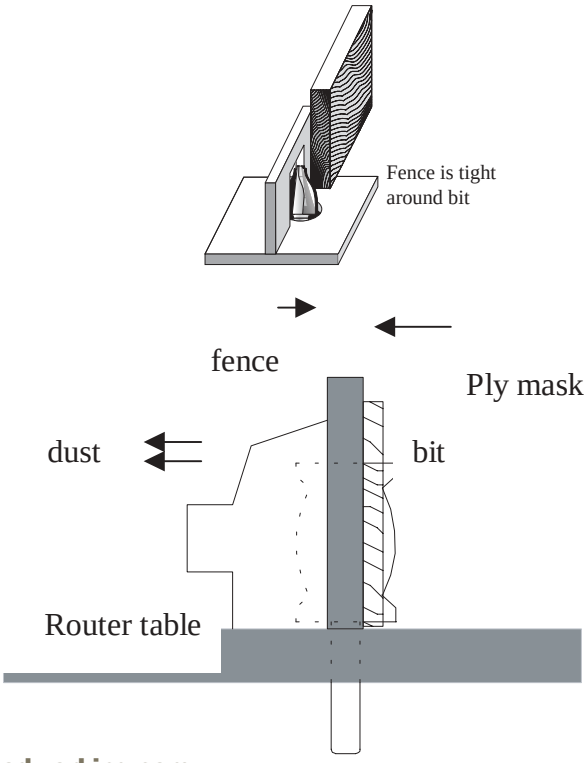
The Crown and Architectural Moulding bits will make custom trim for projects and home at a fraction of the cost of store-bought moulding and allow you to use any species of wood. The following tips will help you run these larger bits safely and produce great results.

These bits should always be run in a router table with a fence. Bits should be run at a reduced speed to control burning and tearout. Be sure to support your work well both on the infeed and outfeed side of the table, especially with longer mouldings.

Because you are cutting into the face grain of the wood with these bits, create a zero-clearance opening in your fence to reduce tearout. This can be an extra piece of plywood fastened to the original fence that you cut through with the bit to create the zero-clearance opening.

Attach featherboards to the table and fence of the router table to hold the work firmly against the bit. This will minimize chatter marks that are difficult to sand out. Most of the time the cut can be made in one pass with a good quality 1 1/2hp or larger router. With hardwoods a two-pass operation is easy to do. Set the fence for the full cut. Then temporarily fasten a piece of 1/4" plywood on to the fence, cut out to clear the bit. This effectively spaces the work away from the bit for a light first pass. Run all the moulding, remove the 1/4" plywood “mask” and run the moulding again at the full bit depth.

Since the bits cut across almost the entire face of the moulding, you can experience difficulty on the outfeed side because there is little wood left to ride against the fence. The solution is to start with a board wide enough for the moulding profile and some flat section. Set your featherboard to push against this flat. Then rip the board to final width after the profile is run. If the board is wide enough, you can run the profile on both edges, leave the flat in the middle, and get two runs of moulding from one board.

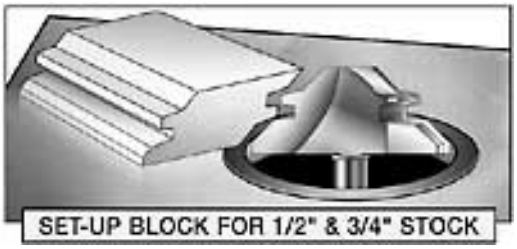


Setup Block for Lock Miter Bit

For Lock Miter #9751

INSTRUCTIONS FOR USING SET-UP BLOCKS ON 1/2" and 3/4" THICK STOCK * (For Lock Miter Joints)

See page 21 for instructions on how to use these bits. The stock must have 1/2" or 3/4" uniform thickness. Use the miter end of the set-up block with the flat edge for 1/2" stock and the full 45-degree miter end of the set-up block for 3/4" stock.



Using the set-up block, raise or lower the bit until the block aligns with the tongue and groove of the bit. (Note: the set-up block is not intended to match the profile cut; its purpose is to allow the bit height to be set quickly and properly).

Make sure the speed of the router is about 12,000-14,000 rpm. Test cut a piece of stock using extra or scrap wood.

Fit together and check for surface and joint match. You may have to fine tune the joint after testing your first cut to get a perfect fit, by either adjusting the fence in or out, or adjusting the bit height up or down. Remember any adjustment will be doubled on the cut. (for example, if you adjust the bit up or down by 1/32", then the joint will be different by 2/32" or 1/16")

Once you have a perfect fit with your extra or scrap wood, you are ready to make the lock miter joint with your good stock.

NOTE 1: If the joint is good, but the surfaces are not even or the miter portion has a square edge, you must adjust the height of the bit upward or downward.

NOTE 2: If you have a split fence, close the opening as much as safe operations, permits.

* The set-up block is slightly less than 3/4". If your wood does not match the set-up block size:

- Plane the wood to match the set-up block, if possible.
- If the wood is thicker than the set-up block, raise the bit and push the fence back slightly, until a good fit is obtained.
- If the wood is thinner than the set-up block, lower the bit and move the fence forward slightly, until a good fit is obtained.

Traditional Foot Bit

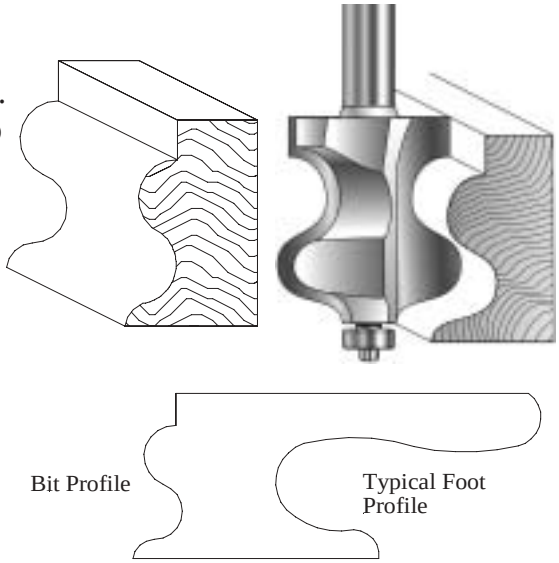
Bit #6289. 8590

Using the MLCS Traditional Foot Bit you can add classic, elegant styling and detail to any basic box. Set up the bit in your router table and prepare some stock for the feet. It should be planed to equal thickness and the long edges should be parallel and smooth.

Run sufficient lengths of the stock material, taking 2 – 3 passes to complete the cut. Run the router at a reduced speed. If you have wide stock you can make the cut on two edges, then rip them to width on the table saw.

Make a pattern of the ogee profile for your foot. Miter one end of your molded stock and cut it to the approximate length for a foot. Use your pattern to draw the profile on the back of the stock. Then cut the shape with your scroll saw or band saw. Sand smooth. Continue making the feet until you have enough to complete a box (usually 8). Remember to make right and left miters.

The foot pieces can now be rabbeted along the top edge to receive the box. Glue together corner pairs and clamp with masking tape. When dry, sand the corners and glue to the box bottom.



Setup Block (Rail & Stile)

INSTRUCTIONS FOR USING SET-UP BLOCKS ON 3/4" THICK STOCK (For Rail and Stile Doors)

Items #9741-9746

See pages 3-7 for instructions on how to use these bits. The stock must have 3/4" uniform thickness. We recommend that you start with the cope end (tongue profile) first.

Using the set-up block, raise or lower the bit until the block aligns with the cutter heads. **(NOTE**: the set-up block is not guaranteed to match the profile cut; it is guaranteed to allow the bit height to be set quickly and properly.)

Cut a piece of stock using scrap wood. For 1/4" shank bits, adjust the fence to make the full cut in 3-4 passes; or, for 1/2" shank bits, adjust the fence to make the full cut in 2-3 passes.

For the final pass, the fence should be aligned with a metal straight edge with the bearing or groove/slot on the bit. Now, match the bit height against the test piece, just cut. Run a second test piece. Fit together and check for surface and joint match.

NOTE: If there is a gap/seam in the center of the joint, you must adjust the fence inward/toward the front of the router table. If there is a gap on the surface, you must move the fence backward/toward the rear of the router table. If the joint is good, but the surfaces are not even, you must adjust the height of the bit upward or downward by half the height difference.

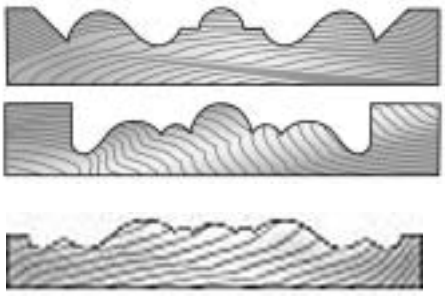
Rosette Cutters

Rosette Cutters Item # 948, 949 963 - 967, 9350

Rosette Cutters generally cut across the face grain of the wood. Follow these tips and suggestions for a safe and successful cut.

Always use Rosette cutters in a stationary machine, never in a hand held drill. The drill press, milling machine or lathe will work well. The controlled feed of a mill or lathe tailstock gives the best results.

Choice of material can affect the quality of the cut. Pine is the least desirable of wood choices. Tight-grained hardwoods, such as Maple, Mahogany, Birch, and Cherry work best. Red Oak is good but a little tearout is possible. For painted moulding, MDF (medium density fiberboard) cuts well.



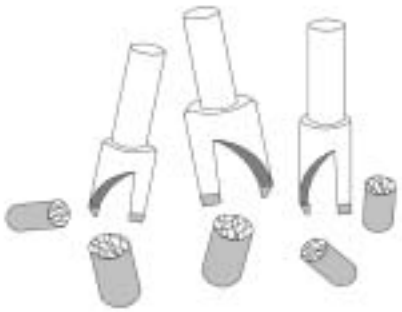
All cutters should be run at slow speeds, 300-600 rpm. ***SPECIAL NOTE: 350 RPM is the MAXIMUM for Rosette Cutter Head #9350***. Be sure everything is clamped tight and that the cutter is square to the workpiece. Cut rosettes in a long board; then separate into squares. If you are feeding the quill manually, go easy and gently, letting the cutter do the work. Aggressive feeding will cause the cutter to jam into the wood.

Plug/Tenon Cutters

Plug Cutter Set #9160, Tenon Cutters #9281-9

Plug cutters are designed to cut the face grain of wood to give nearly invisible filler for screw holes. You can also use a contrasting color wood to accent joinery and add detail.

Sizes range from 1/4" to 1". There are also several types of tool. In all cases the most consistent and accurate results are obtained using the plug cutters in the drill press. Always clamp the wood securely.



Holes to be plugged should be at least 1/4" deep to allow for flush sanding and good gluing. Cut the plugs about 1/16" deeper than the hole from scrap wood to be filled. Plugs can be removed by prying them out with a screwdriver. You can also cut them free with a bandsaw.

Carefully match grain and glue in place. Sand flush and finish.

Router Plate Kit

Item #9338

MOUNTING THE ROUTER BASE PLATE IN YOUR ROUTER TABLE

When mounting a larger router, the handles should fit in the same direction as the long opening. Your current router base plate will function as the drilling jig. However, you should determine the optimum router positioning PRIOR TO removing the base plate. Be sure to take into account depth adjustment knobs, depth lock levers/knobs, and, of course, the location of your switch. Place your router in the inverted position and turned properly under the table. Then mark with tape on the front edge of the router's base plate to verify the position. Next, remove the screws from the base plate.

Locate the top/front of your base plate by observing the position of the starting pinholes. The holes will be to the RIGHT of the bit opening. Again mark with tape front and center on the plate to serve as a reminder.

Center the router base plate on the nearest concentric ridge. Then position the mounting holes along the radial lines. Keep the base plate in place with tape (3 to 4 pieces arranged around the ring should be adequate).

Next, clamp the 2 plates together. Use C-Clamps or wood clamps. NOTE: Spring clamps will not provide enough clamping force and could allow the parts to move out of place.

Drill through the new base plate using a drill bit that matches the size of the holes in your router's base plate. **NOTE**: If available, perform this operation on a drill press to keep the holes perpendicular. **IMPORTANT:** A piece of wood should be clamped to the front of the router plate while drilling to avoid splintering of the plate.

After removing the clamps, countersink holes similar to the router's own base plate. For best results, we recommend a single flute countersink at a slow speed and a drill press if available.

Inset the magnets into your router table top underneath where the allen head adjustment screws are located.

Finally, mount the base plate to the router. If the screws that came with your router are not long enough, longer screws can be purchased at a hardware store or home center in your area.

Merle Clamp

The Award Winning Merle Adjustable Corner Clamp is now even better, with our exclusive MLCS Pivoting Jaws! These self-adjusting jaws will align to any angle or shape.

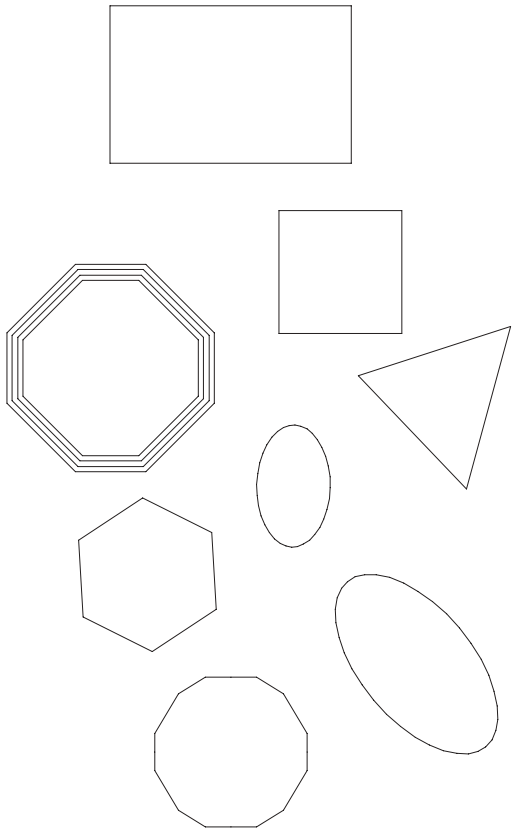
The Merle Clamp has been a standard in the workshop for clamping almost any size square or rectangular frame. It is ideal for picture frames, boxes, drawers, cabinets, and we even used it to clamp the leg frames up on our shop workbench! The standard capacity is from 2 5/8" x 2 5/8" to 69" x 69", (or 23 feet around). Added banding (purchased separately) increases capacity to 40 feet around! The only drawback was that for odd shapes, such as triangles, hexagons, octagons, rounds, or ovals, you needed to make wooden inserts for the aluminum corners to match the shape you were clamping.

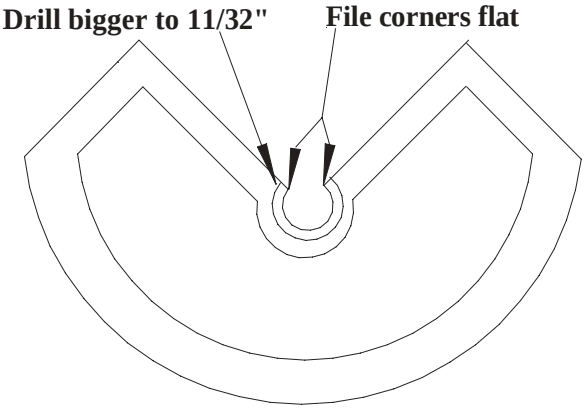
Now with the MLCS Pivoting Jaws you get all the original features of the clamp, plus the ability to clamp any shape built right in. Hold boxes or frames with 3,4,5,6,7, or 8 sides. Round and oval shapes are no problem. An added feature of the Pivoting Jaws is the plastic jaws will not mar your work, so there is no need for additional clamping pads. The jaws are also easily removed when not needed.

Additional Merle Clamp aluminum corners are now available with Pivoting Jaws, 4 to a pack for $14.95 (**Item #9013**). Pivoting Jaws are available by themselves 10 to a pack for just $5.00! (**Item #9014**) It's easy to retrofit an original Merle Clamp for Pivoting Jaws, just follow the simple instructions below:

1. Mount an 11/32" drill bit in your drill press, and clamp one of your original Merle Clamp aluminum corners firmly to the drill press table.
2. Carefully drill out the original hole of the corner.
3. Use a mill file to flatten the corners at the open side of the hole.
4. Tap a Pivoting Jaw in place.

Merle Clamp Item #9012
Corners and Jaws #9013

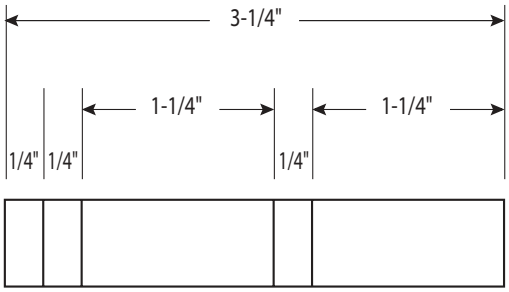




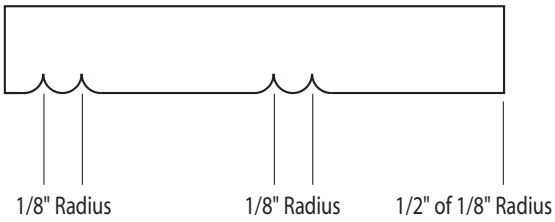
Merle Clamp corner

How To Make Beaded Panels

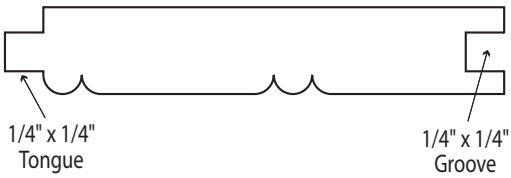
You Will Need the Following Items:
1/8" Point Cutting Round Over Bit (#6431)
1/4" Straight Cutting Bit (#5470,#5468, or #7770)
1/2" Straight Cutting Bit (#5474,#5477,#7774,#7777, or #7775)
Router Table
Ruler



1. From a piece of scrap wood, make a set up block to set the fence for all of the cuts necessary to make the beads. Lay out the first line 1/4" from the end of the set up board. This end will be the edge that the tongue will cut from. Make a second line 1/4" from the first line. Measure 1-1/4" and draw a line at this point. Make your fourth line a 1/4" from this line. Again, measure 1-1/4" and make a final line at this point. This is the edge that the groove will be milled into. This also gives you the final width of the panel.
2. Rip all of your boards to their final width (3-1/4"). You may find it to be easier to make your panels out of longer stock and cut into final length after all routing has been done. This is recommended when your panels aren't very long.
3. Set up your Router with the Point Cutting Round Over bit and adjust your bit to a height of no more than 1/8".
4. Using the set up block made in step (1), set your Router Table Fence so that the bit is centered on the first line. Rout all of your boards at this fence location. When you have finished all of your boards, reposition the fence so that the bit is centered over the next line. Again rout all of your boards at this location. Repeat until you have routed at all of the lines from the set up block. Finally, adjust your fence so that the edge of the board is centered over the top of the bit.



5. It is now time to create the groove. Set up your Router with the 1/4" Straight bit and adjust the bit height to 1/4"(*). Set the Router Table Fence so that the bit is centered on the edge of the board. The board will be routed vertically against the Router Table Fence and you will be routing the edge of the board that has one half of the radius routed on it.
   *(You can rout the groove in one pass if you are using soft-wood, but two passes are recommended for hardwoods).
6. Next it is time to make the 1/4" tongue. Set up your Router by switching to the 1/2" Straight bit. Set one of the boards that has the groove in it on the Router Table surface and adjust bit height to the bottom of the groove. Set the fence so that 1/4" of the Straight bit is exposed from the fence. Keeping the boards oriented the same way as you had the board for the set up (either beads up or beads down), rout all the boards creating one side of the tongue. Repeat set up to adjust for the other side of the tongue and rout one board to complete the tongue. Check the tongue for fit. It should be snug but not overly tight. Adjust bit height to fine tune fit, then rout all remaining boards to complete your beaded panels.



7. If you made your panels long, cut them to final length and install them in your project.