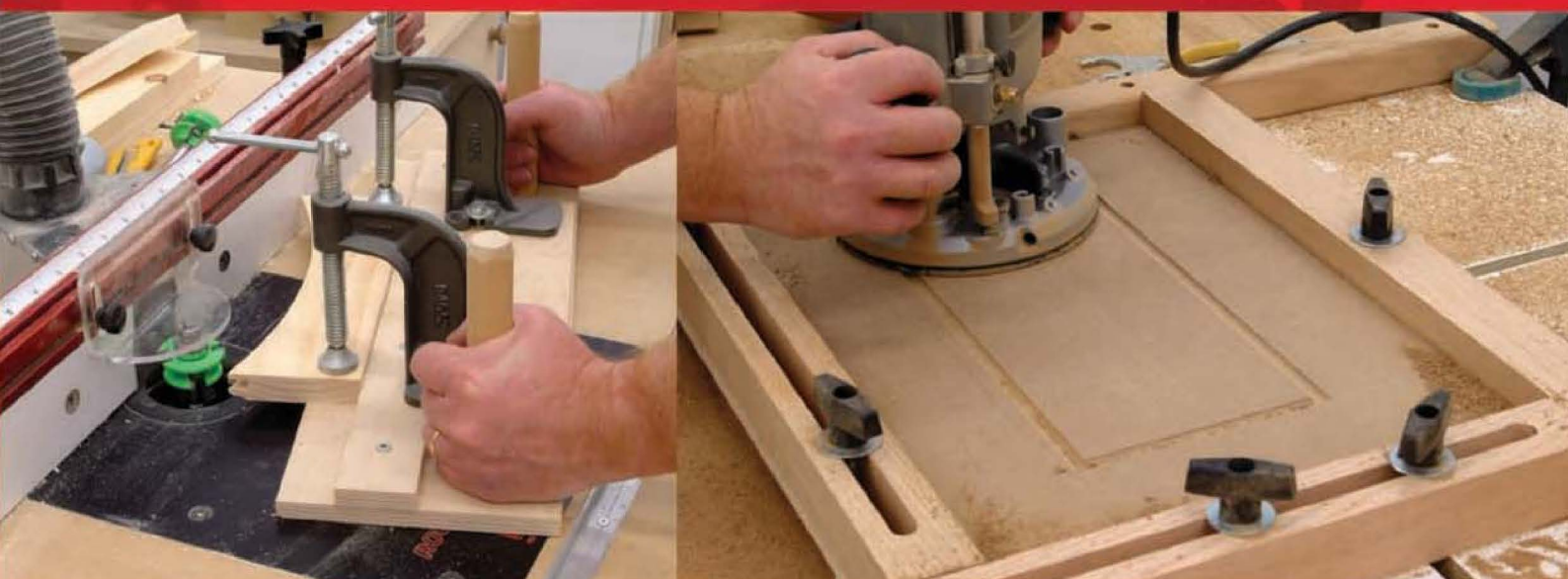


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JIGS &
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read this important safety notice

To prevent accidents, keep safety in mind while you work. Use the safety guards installed on power equipment; they are for your protection. When working on power equipment, keep fingers away from saw blades, wear safety goggles to prevent injuries from flying wood chips and sawdust, wear headphones to protect your hearing and consider installing a dust vacuum to reduce the amount of airborne sawdust in your woodshop. Don't wear loose clothing, such as neckties or shirts with loose sleeves, or jewelry, such as rings, necklaces or bracelets, when working on power equipment. Tie back long hair to prevent it from getting caught in your equipment. People who are sensitive to certain chemicals should check the chemical content of any product before using it. The authors and editors who compiled this book have tried to make the contents as accurate and correct as possible. Plans, illustrations, photographs and text have been carefully checked. All instructions, plans and projects should be carefully read, studied and understood before beginning construction. Due to the variability of local conditions, construction materials, skill levels, etc., neither the author nor Popular Woodworking Books assumes any responsibility for any accidents, injuries, damages or other losses incurred resulting from the material presented in this book. Prices listed for supplies and equipment were current at the time of publication and are subject to change. Glass shelving should have all edges polished and must be tempered. Untempered glass shelves may shatter and can cause serious bodily injury. Tempered shelves are very strong and if they break will just crumble, minimizing personal injury.

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<i>to convert</i>	<i>to</i>	<i>multiply by</i>
Inches	Centimeters	2.54
Centimeters	Inches	0.4
Feet	Centimeters	30.5
Centimeters	Feet	0.03
Yards	Meters	0.9
Meters	Yards	1.1

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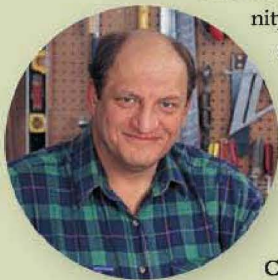
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about the authors

On November 26, 2004, Danny Proulx passed away suddenly while setting up for the Ottawa Wood Show. His death will leave a very large hole in the woodworking commu-



nity. For over 15 years, Danny shared with us his passion for woodworking through his books, magazine articles and Web site advice, as well as through teaching and mentoring his students and clients. He founded Rideau Cabinets in 1989 and started building kitchens and specialty cabinets. Over time, Danny married his love of woodworking and writing with his photographic skills and wrote 15 books over the last 9 years. He also wrote for several magazines including *Canadian Woodworking* and *Cabinet-Maker Magazine*. He started giving seminars in his home to new woodworkers and eventually started teaching courses at Algonquin College in Ottawa.

Luc Rousseau, who was Danny's student and later assistant, courageously took up the challenge and agreed to complete Danny's book. Luc, a talented woodworker in his own right, is now the owner of Rideau Cabinets.



He teaches woodworking and cabinetmaking courses at Algonquin College. The college was fortunate when Luc took on Danny's courses while continuing to teach his own students. Contact Luc at luc@cabinetmaking.com or through his Web site: www.cabinetmaking.com

Jim Stack has worked in commercial cabinet- and furniture-making shops for 16 years and ran his own furniture-making shop for 5½ years (that half a year is very memorable, so it's important to include it). For the past six years he's been the Acquisitions Editor for Popular Woodworking books. Jim is the author of *Northwoods Furniture*, *The Biscuit Joiner Project Book*, *Design Your Own Furniture*, *Building the Perfect Tool Chest* and *Cutting-Edge Router Tips & Tricks*.

acknowledgements

Over the last year and a half I received many letters and e-mails from Danny's readers telling me how Danny had touched their lives in some way — from his valuable advice to his numerous projects. I want to thank those who wrote to me sharing their memories and sending me pictures of their projects.

I don't know what I would have done without Luc's help during this difficult time. He finished this book that was only one-third written when we lost Danny. Starting a project part way through cannot be easy, but Luc wanted to finish it for Danny.

My Dad, Jack Chaters, who for many years was Danny's assistant, moved behind the camera for this book, taking all the pictures. He too wanted to make sure this last book was finished. Luc found Dad's previous experience working with Danny invaluable while they worked through the projects.

I want to thank Len Churchill who created all the illustrations. Danny would have been pleased that Len worked on this book. Len and I have never met but through the e-mails and phone calls we exchanged I know that he and Danny had a mutual respect and that he was pleased to be a part of this book.

Jim Stack, the editor of *50 Shop-Made Jigs & Fixtures*, has been extraordinarily helpful in giving practical advice and moral support to Luc, Dad and myself, which we all so very much appreciated.

We have had a huge cheering section through this project, and Luc and I want to thank our families and friends who encouraged us to finish this book for Danny.

Gale Proulx

technical support

There are a number of companies that we often turn to for advice and supplies. They are always helpful and are a source of valuable information. They have been major players in the creation of all of Danny's books, including this one, and we listed them in the back of this book under the heading of supplier sources. We would appreciate your support of these fine companies.

We would like to offer special thanks to General & General International for their great woodworking machines that you see featured in many of the pictures.

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INTRODUCTION



This book is about jigs and fixtures for power woodworking tools. Above all else, however, it's about safety! Woodworking power tools are designed to cut, mill, bore and shape wood. To accomplish those tasks, they are equipped with sharp blades, knives or drill bits, which can just as easily cut and damage our hands and fingers. Those accidents must be avoided, and the risks minimized, at all costs.

The first chapter is about jigs and fixtures for power tool operations that are high risk. Pushing strips of wood through a table saw blade, cutting thin laminates or forming wooden parts on a router table brings our hands and fingers close to the cutting tools. Those potentially dangerous situations can be eliminated by using jigs and fixtures.

Many of the photographs in this book, such as those taken at the table saw, illustrate a technique or jig in action without a guard in place. The cutting tools are not under power for these photos; they are staged for clarity only. The guards are always in place when the tools are under power in my shop!

Chapter 2 details many jigs and fixtures that can be made to enhance and increase the abilities of my favorite tool – the table saw. I wouldn't want to be without a high-quality table saw in my shop. And as I discovered many years ago, the usefulness of this power tool can be increased by using a few simple jigs and fixtures. In addition, because the highest percentage of accidents happen at the table saw, I tend to build jigs for this tool that minimize the risk of injury.



The table saw is number one on the injury list, but all the other power tools we use demand an equal amount of respect. Chapter 3 deals with router tables while chapter 4 illustrates jigs and fixtures for handheld routers. Routers need jigs and fixtures because they can't be used for much without being guided in some way. A router simply spins a high-speed cutting bit and must be guided by a bearing or jig to be of any use in a woodworking shop.

In the following chapters, I'll detail jig- and fixture-building for the drill press and band saw. Chapter 7 deals with hand and portable power tool jigs. The final chapter has a couple of ideas for your miter saw.

Fifty jigs and fixtures seems to be a large number. However, you'll be surprised how many you'll have and use as your woodworking hobby grows. I've seen some shops with many more than 50 jigs, and they are all used on a regular basis. Have fun making, and using, these jigs and fixtures. Please, work safe – if it doesn't feel right, don't do it until you find another, safer way to work that wood.

safety jigs



and fixtures



1

Power woodworking tools utilize sharp blades that

are designed to cut wood, but they are also very good at cutting flesh. Blade guards can reduce the risk of accidents, but you can't completely cover the edge without compromising the efficiency of the cutting tool.

Jigs and fixtures are additional devices that can increase your safety when working with power tools.

Many of the jigs and fixtures described in this chapter are designed for the table saw, the power tool that accounts for most woodworking accidents. You can reduce your risk of injury by constantly paying attention to your hand positions and making sure that the workpiece is held tight against the fence. It's human nature to want to watch a spinning blade, but in order to avoid trouble you must concentrate on holding the wood tight against the fence during cutting. Use the saw's blade guard, and remember that a dull cutting tool is more dangerous than one that is properly sharpened.

The jigs in this chapter are designed to improve workpiece travel and to keep your fingers away from the blade. If the wood is less than 4" (102mm) wide or less than 4" (102mm) long, use a push stick when cutting on the table saw. When cutting long, narrow boards, use a panel-cutting fixture.

Improved Push Sticks

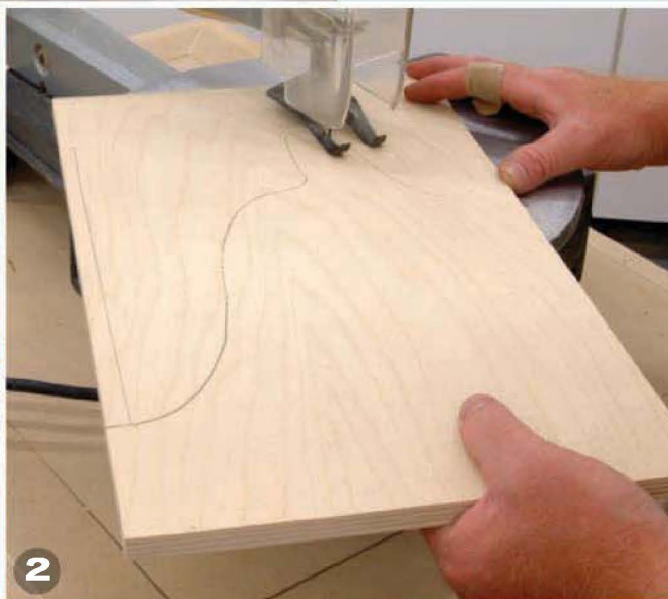


THIS VERSION OF A PUSH stick places downward pressure on top of a board. It also has a lip on the back for positive contact. The operator's hand is high above the saw table and well placed for good control over the wood. This push stick is thin enough to pass easily between a blade guard and rip fence.

The long "nose" on this guard prevents workpiece chatter (boards bouncing up and down) through the operator's downward and forward pressure. It is, by far, the best type of push stick that I've used, so I typically make four or five at a time so I can easily replace any that get damaged.



STEP ONE Create a pattern on a 1/2"-thick (13mm) Baltic birch plywood panel. Use a combination square and any round shop objects (plastic jar lids work well) to form a pattern. Take your time to draw a pattern that will fit your hand, then label it as your master template. Once you've made a push stick that's comfortable to use, keep it to trace more push-stick patterns.



STEP TWO Use a scroll saw or jig saw to cut out the pattern. Sand the edges smooth and apply a finish if you wish.

Thin Strip Pusher

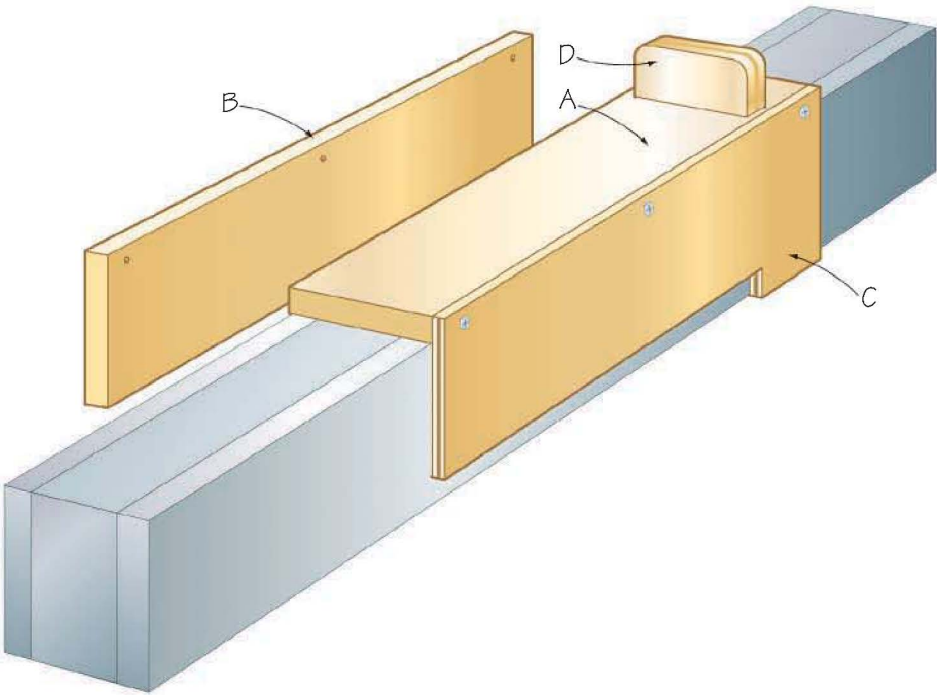
CUTTING THIN STRIPS OF WOOD ON a table saw can be dangerous. Controlled force must be applied to the part of the wood that passes between the blade and the rip fence, while the outside portion of the wood should be left without pressure so that it can fall away. You want to avoid pushing on the outer portion, which may wedge the blade and cause a kickback.

So how do you cut thin strips on a table saw? There are a number of safe methods, including having the thin strip on the outside face of the blade. But you can also cut between the fence and the blade, using this Thin Strip Pusher, shown at right. It's designed for use on a square or rail fence like the one on my General Tool saw. However, it can also be adapted to work with a Delta-style fence by adding a cleat that rides on the backside groove. With slight modifications, this safety pusher can be adapted to just about any fence on the market.



CUTTING LIST

REF. NO.	PART	STOCK	THICKNESS X WIDTH X LENGTH INCHES	THICKNESS X WIDTH X LENGTH MILLIMETERS
A	1 horizontal panel	MDF	$\frac{3}{4}$ x width of saw fence x 10	19 x width of saw fence x 254
B	1 right guide	MDF	$\frac{3}{4}$ x height of saw fence x 10	19 x height of saw fence x 254
C	1 pusher	plywood	$\frac{1}{4}$ x height of saw fence minus $\frac{1}{16}$ x 10	6 x height of saw fence minus 2 x 254
D	1 handle	plywood	$\frac{3}{4}$ x $1\frac{1}{2}$ x width of saw fence	19 x 38 x width of saw fence





STEP ONE Cut out all the parts shown above to fit your fence. I used $\frac{3}{4}$ "-thick (19mm) medium-density fiberboard (MDF) for the side and top guides, $\frac{1}{4}$ "-thick (6mm) veneer plywood for the pusher, and a hardwood block for the handle. The guides and pusher are 10" (254mm) long to fit snug on my fence. The $\frac{1}{4}$ "-thick (6mm) pusher plywood panel is cut so it rides $\frac{1}{16}$ " (2mm) above my saw table.

STEP TWO Attach the back guide panel to the top guide using glue and $1\frac{1}{2}$ "-long (38mm) screws. The top guide should be $\frac{1}{64}$ " (0.5mm) wider than your fence rail so it will slide easily along the fence after the pusher panel has been attached.

STEP THREE Before attaching the pusher panel, cut a notch along the bottom edge. Leave approximately 2" (51mm) uncut at the end of this panel. The notch depth is variable and depends on the thickness of material you wish to cut. I have three of these Thin-Strip Pushers with notches cut to securely hold $\frac{1}{4}$ "- (6mm), $\frac{1}{2}$ "- (13mm) and $\frac{3}{4}$ "-thick (19mm) wood. For example, my $\frac{1}{4}$ "-thick (6mm) pusher has a notch that is slightly less than $\frac{1}{4}$ "-high (6mm) with the back 2" (51mm) uncut as shown. When I need thin strips of $\frac{1}{4}$ " (6mm) material, I use the $\frac{1}{4}$ " (6mm) pusher because it holds the material tight to the saw table as I cut the strips.

The $\frac{1}{4}$ "-thick (6mm) pusher panel is attached to the MDF top guide using glue and screws.

STEP FOUR The thin strip pusher handle is a small block of wood that's attached with screws. It will provide a positive grip when cutting material.

Laminate-Cutting Guide



CUTTING THIN HIGH-PRESSURE laminates (HPL) on a table saw is dangerous. In fact, cutting any type of thin material on a table saw demands a lot of attention to safety procedures. These thin pieces tend to bind easily because they can slip and become trapped between the saw fence and the table.

This Laminate-Cutting Guide traps the material between a strip of sheet hardboard and a wood guide block. The hardboard strip is secured to the particleboard fence with screws to eliminate the gap where laminates can get trapped. The hardwood block holds the laminate against the lower guide, which eliminates “chattering” as the material is pushed through the saw.



STEP ONE Cut a piece of 3/4"- (19mm) or 1"-thick (25mm) particleboard that's 4" (102mm) high by 36" (914mm) long. You'll also need a 1/8"-thick (3mm) strip of hardboard sheet material 2" (51mm) wide by 36" (914mm) long and a hardwood block 3/4" x 1 1/2" x 10" (19mm x 38mm x 254mm).

STEP TWO Round over the ends on one edge of the hardwood guide block.



STEP THREE Attach the hardboard guide strip to the particleboard fence with glue and screws every 6" (152mm).

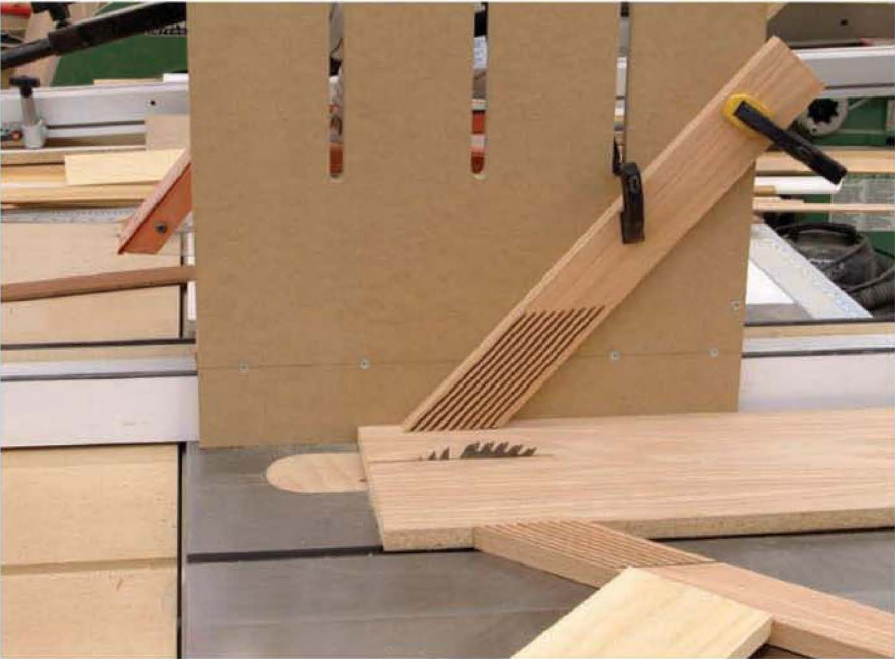
STEP FOUR The hardwood guide block should now be secured to the fence, in the center, with two 2"-long (51mm) screws. Use a piece of HPL and a couple of sandpaper shims to space the block above the hardboard strip. The gap should be about 1.5 times greater than standard general-purpose (GP) laminate, or about 1/8" (3mm).



CUTTING LIST

NO.	PART	STOCK	THICKNESS X WIDTH X LENGTH	
			INCHES	MILLIMETERS
1	rail	particleboard	3/4 x 4 x 36	19 x 102 x 914
1	strip	hardboard	1/8 x 2 x 36	3 x 51 x 914
1	block	hardwood	3/4 x 1 1/2 x 10	19 x 38 x 254

Featherboards



EVERY WOODWORKING SHOP should have at least six or eight featherboards. They can be used on table saws, router tables, and band saws. They hold the material being cut tightly against a fence or down on the saw surface to eliminate vibration. Moreover, they keep our hands away from cutters, where accidents often happen.

In the photo at left I'm using two featherboards to control the material as I push it through the saw. I'm using a raised-panel cutting fence because the slots let me clamp the featherboards where they are most effective. The raised-panel fence will be described later in this chapter.



STEP ONE I am making two featherboards so each piece of hardwood will be 3/4" x 2 1/2" x 24" (19mm x 64mm x 610mm). Mark a line on each board at a 45° angle to one end so the long point of the angled line is about 5" (127mm) from the board's end.



STEP TWO Cut each board end at a 45° angle, parallel to the guideline. Draw lines, 1/8" (3mm) wide and spaced 1/8" (3mm) apart, to help when cutting the feathers on your table saw. The kerf (saw blade thickness) lines are drawn parallel to the board's edge.



STEP THREE Push the featherboard into the saw blade and stop at the angled guideline with each cut. Move the fence 1/8" (3mm) and make the next cut. Repeat the process until all the "fingers" have been formed.

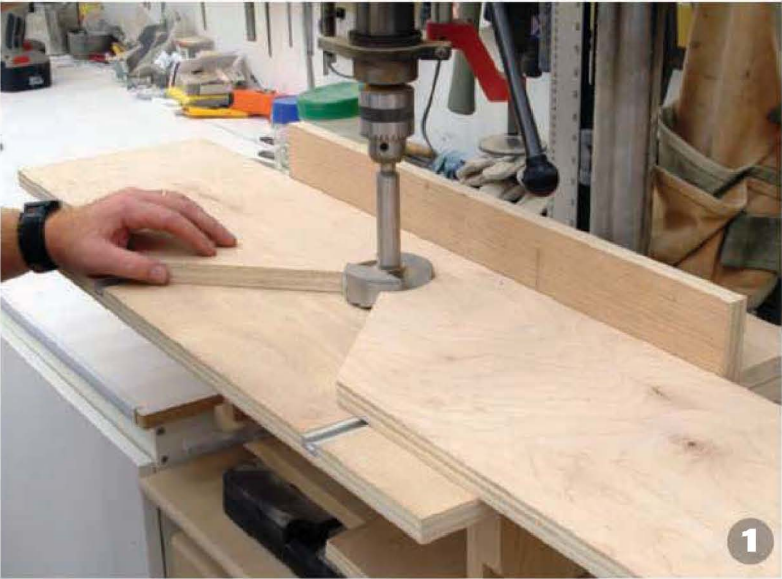
CUTTING LIST

NO.	PART	STOCK	THICKNESS X WIDTH X LENGTH	
			INCHES	MILLIMETERS
1	featherboard blank	hardwood	3/4 x 2 1/2 x 24	19 x 64 x 610
	each blank yields 2 featherboards			

Circle-Edging Safety Board

CUTTING AN EDGE PATTERN, SUCH as a roundover or cove edge, on a circle or arc with a router table has to be done with the bit unguarded. A safety can be installed, but working with an exposed bit still makes me a little uncomfortable. It's all too easy for the work to slip past the bit and contact the operator's fingers or hand.

This Circle-Edging Safety Board acts as a positive backstop should the workpiece slip past the bit. The formation of the edge is still controlled by the bit's bearing, and if you do slip, the workpiece will be stopped by the angled opening of the safety board. It eliminates a lot of potential hazards when routing this type of edge pattern.



CUTTING LIST

NO.	PART	STOCK	THICKNESS X WIDTH X LENGTH	
			INCHES	MILLIMETERS
1	jig blank	plywood	3/4 x 8 x 48	19 x 203 x 1219

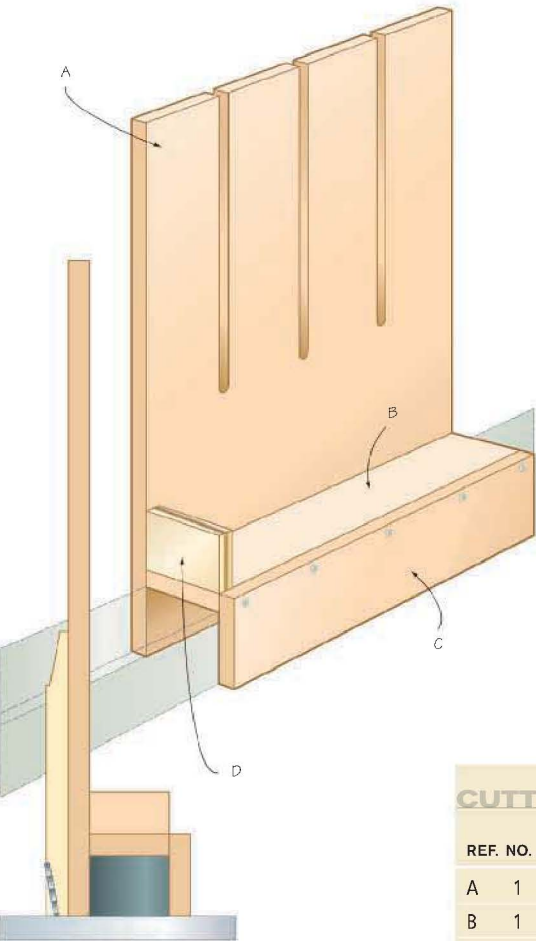
STEP ONE The board is an 8"-wide (203mm) piece of 3/4"-thick (19mm) plywood with a 45° V cut into one edge. Drill a 3"-diameter (76mm) hole at the intersection of the angled lines. That size hole should be large enough for any router bit, but you might want to change the diameter, making it either smaller or larger, to accommodate different bits for other applications.

Raised-Panel-Cutting Fixture

THE FIRST STEP IN MAKING RAISED PANELS ON a table saw is the building of a fixture that will allow you to safely and accurately cut the panels. This fixture can be built using any sheet material, but I prefer low-cost 3/4"-thick (19mm) medium-density fiberboard (MDF). It's a simple tool that's safe to use and one that improves the accuracy of your cuts.

A glued-up panel can be safely raised on the table saw with the fixture. The slots make it possible to clamp the panel tight. Set the table-saw blade at a 10° angle and push each edge on the panel through the blade.

Adjust the blade to cut an angled slice off each edge, leaving the outside edges 3/16" (5mm) thick to fit in the 1/4"-wide (6mm) stile and rail grooves. Once all the edges are cut, sand the raised panel smooth.



STEP ONE Cut a piece of 3/4" (19mm) MDF 20" (508mm) square. Drill three 1/2"-diameter (13mm) holes in the middle of this panel, spaced evenly across the panel's width.



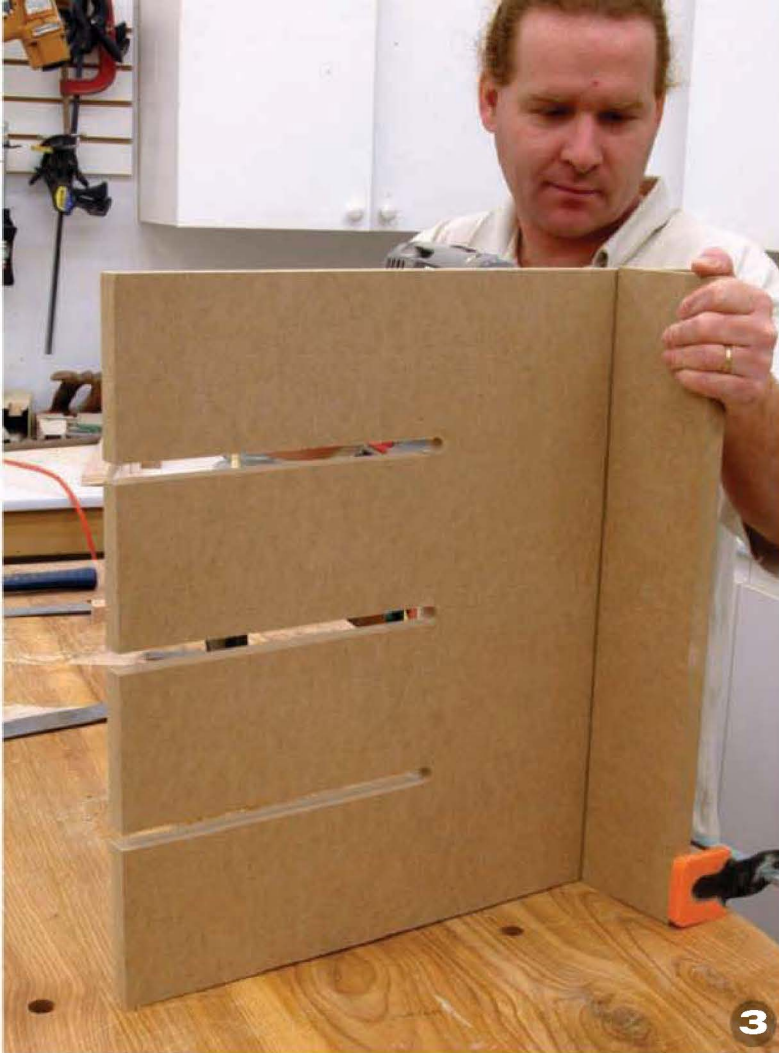
STEP TWO Draw lines extending from each hole's outside diameter to one end of the panel. Cut the slots on a band saw or with a handheld jigsaw.

CUTTING LIST				
REF. NO.	PART	STOCK	THICKNESS X WIDTH X LENGTH INCHES	THICKNESS X WIDTH X LENGTH MILLIMETERS
A	1 vertical panel	MDF	3/4 x 20 x 20	19 x 508 x 508
B	1 fence cover	MDF	3/4 x width of saw fence x 16	19 x width of saw fence x 406
C	1 fence return	MDF	3/4 x height of saw fence x 20	19 x height of saw fence x 508
D	1 handle	hardwood	3/4 x width of saw fence x 4	19 x width of saw fence x 102

SHOP tip

MY GENERAL TABLE SAW is equipped with a square tube-style fence. Many table saws have a fence similar to this but the width is slightly different. Delta table-saw fences are different because they have a groove, which tracks on a square piece of metal so the fence can be adjusted to the front or rear of the table. The jig will ride on such square-tube fences with the help of the simple box form shown in the steps on these pages.

Delta fences require an extra cleat, cut to allow for the groove at the top backside of the fence, so it will track along the fence without slipping. With a little trial and error, build a custom jig for the style of fence on your saw.



3



4



5

STEP THREE Cut a second piece of MDF 20" (508mm) long and equal to the width of your fence (see Shop Tip). Attach it to the main panel using glue and 1½" (38mm) screws. It should be located so it rests on top of the fence when the lower edge of the main panel is lightly touching the table on your saw.

STEP FOUR Attach a skirt board, using glue and 1½" (38mm) screws, so the fixture will track along the fence. The fixture should slide freely without any side movement.

STEP FIVE A hardwood handle should be attached to the back end of the fixture. This handle allows the operator to grip the fixture securely and control the feed rate safely. Use glue and screws to secure the handle.

table-saw jigs



and fixtures



A good, well-equipped table saw can perform a

multitude of woodworking tasks, but it also may present a multitude of safety hazards. Many of the jigs and fixtures in this chapter are designed primarily to help you avoid accidents. For example, an appropriate panel-cutting sled can minimize the risks of crosscutting on a table saw.

A panel-raising fence can decrease your chances of getting hurt while cutting panels at an angle for raised-panel doors. The rip-fence saddle can help you position material to avoid potential problems.

Other devices described in this chapter, such as the Finger-Joint and Tapering Fixtures are designed to improve the accuracy and consistency of your cutting. Additional devices, such as the Multi-Angle Miter Gauge and the Adjustable Miter-Gauge Fence, seek to enhance the accuracy and ease of use of various table saw accessories. Often, woodworkers are reluctant to use accessories such as the miter-gauge slide because they are difficult to align and may not seem very accurate. I hope that the jigs and fixtures in this chapter encourage you to make full use of your table saw and its accessories by increasing their safety and improving their efficiency.

THREE VERSIONS OF PANEL CUTTERS



In the first part of this chapter I show three variations of panel cutters. The same fence can be used for each one. It's only the bases that are different. Each panel cutter has a specific use, so I recommend that you make the straight panel cutter first because it's the one you'll be using the most.

Straight Panel Cutter

IN MY OPINION, THIS panel-cutting fixture is one of the most valuable tools for the table saw. It's easy to handle and improves the safety of crosscutting long sheets of wood. Crosscutting long panels on a table saw without a sliding table or panel-cutting fixture accounts for numerous accidents each year.

This is one fixture that you'll use on a regular basis, and I'm sure its accuracy and ease of use will impress you. Follow these steps to make your own panel cutter.



STEP ONE Using $\frac{3}{4}$ "-thick (19mm) particleboard, cut a panel that's 24" (610mm) wide and 32" (813mm) long.



STEP TWO The miter-slot guide rail can be made of wood, metal or polyethylene ultra-high molecular weight (UHMW) rigid plastic that's available at many wood-working stores. It is often sold to fit in the miter-fence slot on your table saw measuring $\frac{3}{8}$ " (10mm) thick by $\frac{3}{4}$ " (19mm) wide. I'll use wood guide rails on the next two panel cutter versions.

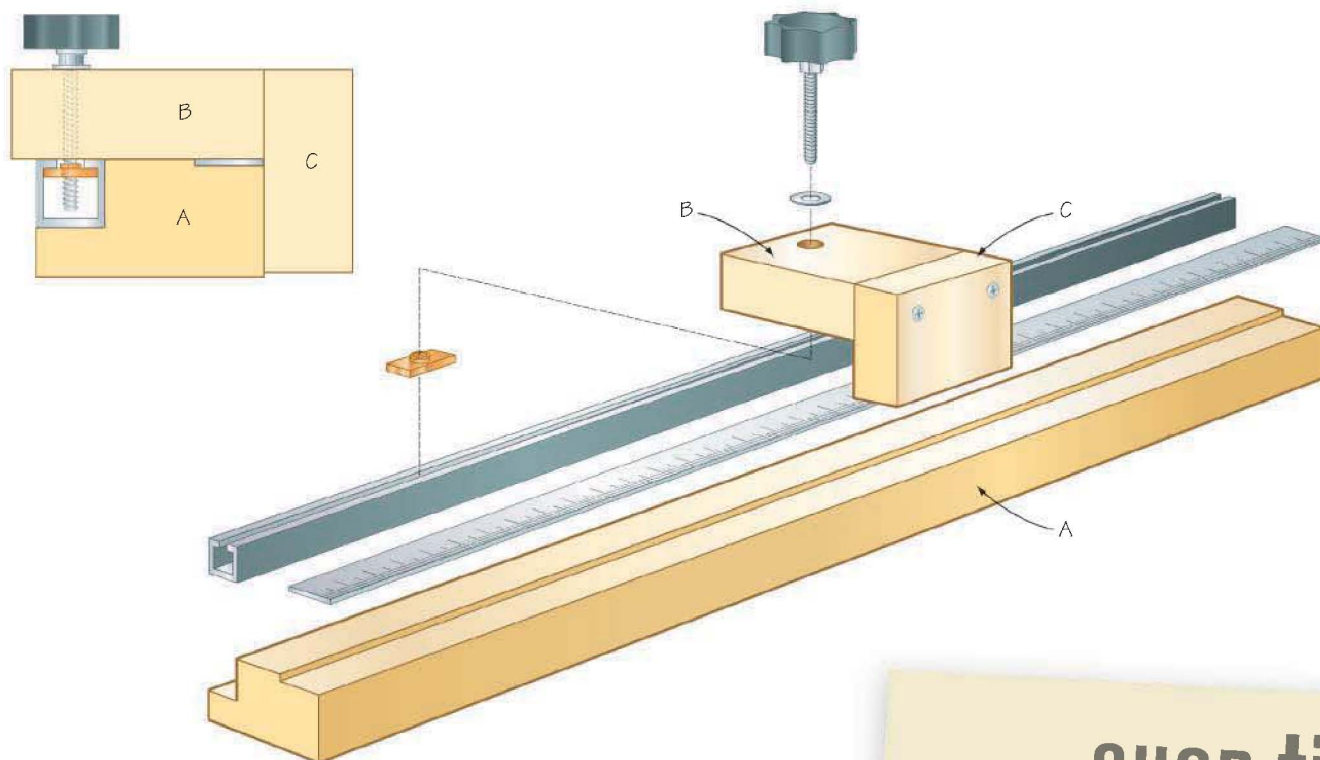
The 30" (762mm) UHMW strip is secured to the underside of the cut panel using 1" (25mm) screws at 6" (152mm) on center in countersunk holes. Leave 3" (76mm) in front and behind the panel. It's attached parallel to one short edge of the panel and positioned so there is $\frac{1}{2}$ " (13mm) of panel material on the other side of the blade when the guide rail is placed in the miter slot.

CUTTING LIST

REF. NO.	PART	STOCK	THICKNESS X WIDTH X LENGTH INCHES	MILLIMETERS
A	1 fence	hardwood	$\frac{3}{4}$ x $1\frac{3}{4}$ x 30	19 x 45 x 762
B	1 top stop block	hardwood	$\frac{3}{4}$ x $1\frac{3}{4}$ x 2	19 x 45 x 51
C	1 front stop block	hardwood	$\frac{3}{4}$ x $1\frac{3}{8}$ x 2	19 x 35 x 51

hardware

1 T-track	$\frac{3}{8}$ " x $\frac{3}{4}$ " x 30" (10mm x 19mm x 762mm)
1 threaded knob	$\frac{1}{4}$ -20 x $1\frac{1}{4}$ " (32mm)
1 tight nut	$\frac{1}{4}$ -20

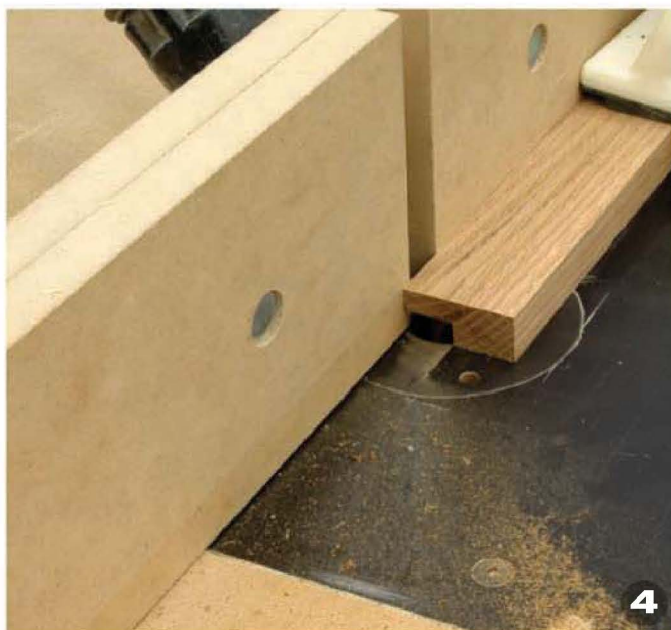


SHOP tip

ULTRA-HIGH MOLECULAR WEIGHT (UHMW) plastic can bend easily, so securely clamp a straightedge to your work surface and hold the plastic strap tightly against the edge to keep it properly aligned.



STEP THREE Place the panel on the saw with the guide rail in the miter track. Trim the $\frac{1}{2}$ " (13mm) overhang off the panel by pushing the assembly through the saw blade. The cut side of your panel is now perfectly aligned to the miter-saw slot.



STEP FOUR The front fence requires a rabbet on one face that's $\frac{3}{8}$ " (10mm) deep by $\frac{3}{4}$ " (19mm) wide. The rabbet can be cut on a router table or table saw and will be used to secure a T-slot track, which will hold the adjustable stop assembly.

STEP FIVE The fence must now be secured to the panel assembly. Use a large framing square, with one leg held tight to the previously cut panel side edge, and draw a reference line $1\frac{3}{4}$ " (45mm) from the panel's front edge.

STEP SIX Temporarily secure the fence from the underside of the panel using one $1\frac{1}{4}$ " (32mm) screw in each end of the fence. Cut a test panel and check it with a square. If the cut is accurate, secure the rail using $1\frac{1}{4}$ " (32mm) screws at 4" (102mm) centers.

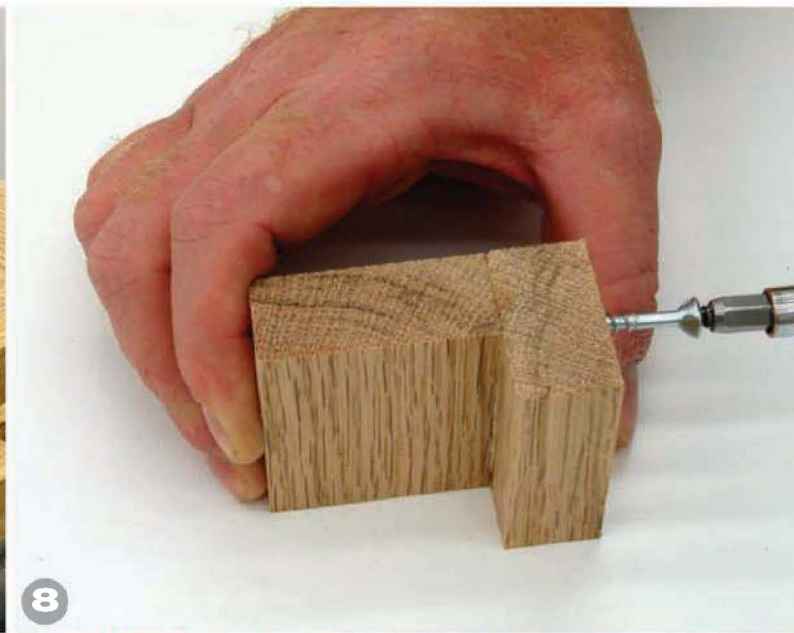


SHOP tip

A WIDE SELECTION OF T-track, knobs, nuts and other related hardware is available at most woodworking stores and home centers. This hardware can be used to make all kinds of shop jigs, fixtures and workstations.



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STEP SEVEN Install the T-track in the rabbet with $\frac{5}{8}$ " (16mm) screws every 6" (152mm) along the fence length.

STEP EIGHT The adjustable stop block is made using two pieces of wood that are joined as shown using $1\frac{1}{2}$ " (38mm) screws and glue.

STEP NINE Drill a hole through the $1\frac{3}{4}$ " (45mm) block that's centered on the track when the stop block is in its normal position. Install a threaded knob and tight nut in the hole, which will be used to position and secure the stop block.

STEP TEN I'm installing a self-adhesive measuring tape to my straight panel cutter so I can quickly position the stop block for specific cut lengths. With the panel cutter in place, measure the reference line 12" (305mm) from the blade.

Fixed Miter Panel Cutter



YOU MIGHT THINK THAT A dedicated 45° panel cutter is a waste of material. However, for those woodworkers who cut 45° miters on an ongoing basis, accuracy is critical. This dedicated angle cutter can be used for picture framing or for those woodworking projects that require a lot of mitered trim work.

The standard table-saw miter slide, or an adjustable miter slide, can be used for mitered panel and trim cutting. However, because they are adjustable, sometimes they become difficult to align to an exact 45° angle after they've been used in other positions. Setting adjustable miter-cutting tools, testing and tweaking until your angles are perfect, is time consuming and never absolutely accurate.

On the other hand, a fixed miter cutter never changes, so you're guaranteed perfect 45° cuts every time, without having to spend an hour aligning the fixture. Is this Fixed Miter Panel Cutter a waste of money? I don't believe so — not when you need consistently accurate 45° miters for every cut.

STEP ONE Cut a $\frac{3}{4}$ "-thick (19mm) particleboard panel that's 24" (610mm) wide and 32" (813mm) long, as well as a hardwood fence $\frac{3}{4}$ " x $1\frac{3}{4}$ " x 36" (19mm x 45mm x 914mm). This time, in place of the UHMW plastic for the miter slot guide rail, I will use a strip of hardwood that's $\frac{3}{8}$ " x $\frac{3}{4}$ " x 30" (10mm x 19mm x 762mm).





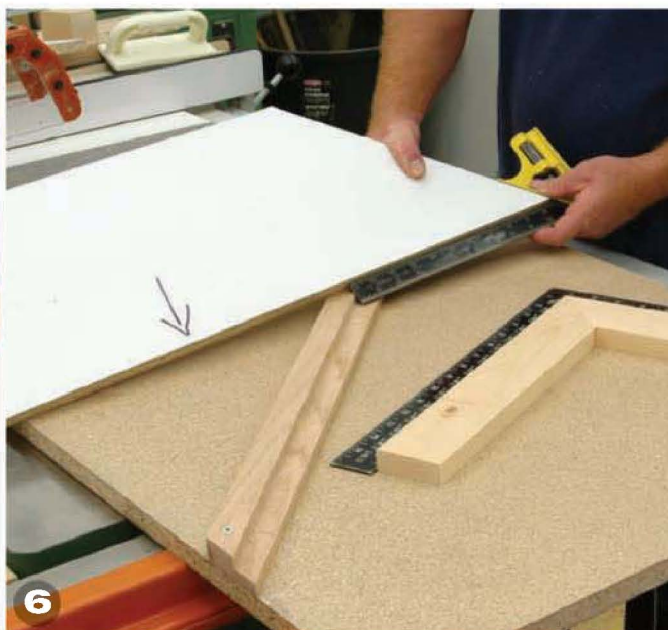
STEP TWO Attach the wood guide strip to the underside of the panel as described in step two of the Straight Panel Cutter project. Trim as previously described to align one edge of the panel with the saw blade and miter slot.

STEP THREE Cut a stopped rabbet in the hardwood fence, leaving 6" (152mm) at one end uncut. Square the rabbet cut with a chisel.

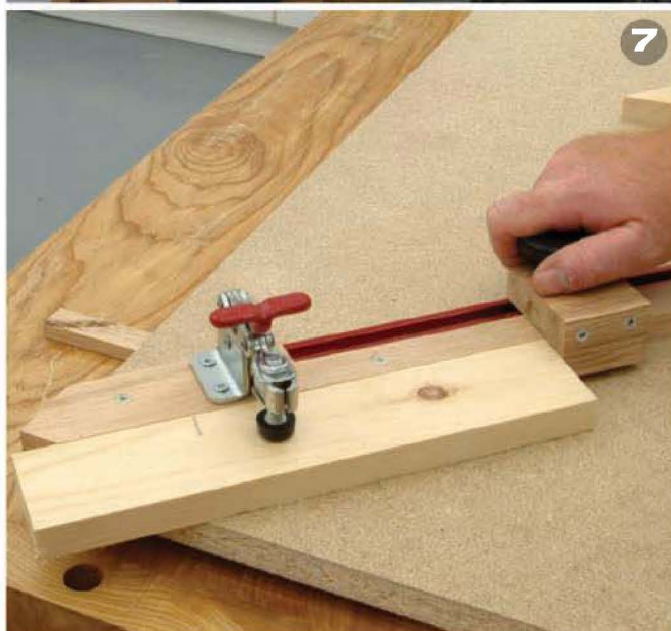
STEP FOUR Position the 36" (914mm) fence at 45° to the panel's straight edge and draw a reference line so the fence can be repositioned after it's trimmed. Reference the fence position to the panel's edge closest to the table-saw blade (trimmed end). Mark the overhang on the underside of the fence and trim to fit.



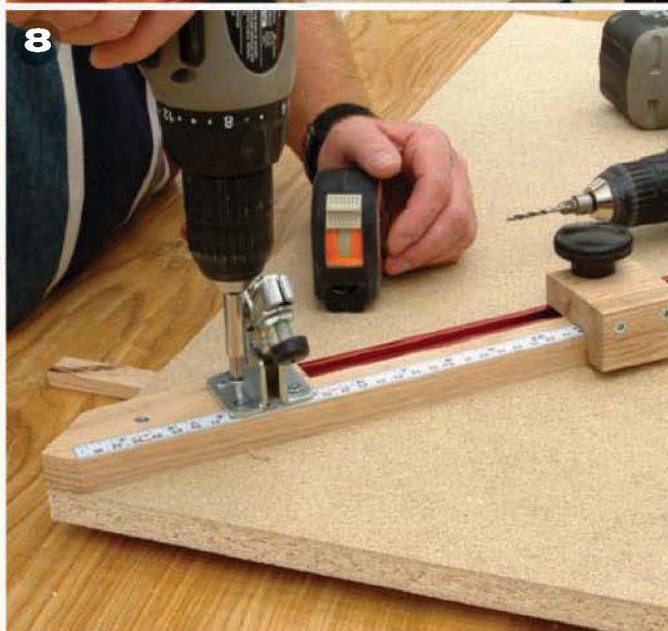
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STEP FIVE After it has been trimmed, place the fence along the 45° line previously marked. Use a 1¼" (32mm) screw on each end, through the fence's top surface, to secure it to the panel.

STEP SIX Cut a panel resting against the fence to verify that the cut is at 45°. In addition, cut two boards to verify that the 45° miters form a 90° joint. If the angle cuts are not at 45°, adjust the fence position and try the test procedures again. Once you have verified the cut's accuracy, secure the fence to the panel with 1¼" (32mm) screws at 5" (127mm) centers.

STEP SEVEN Install a T-track and stop block assembly following the same steps as previously described in the Straight Panel Cutter project. Material tends to slide when it is pushed through a table saw at an angle. To prevent this, use the stop block in combination with a toggle clamp. This can be installed in the area that doesn't have a rabbet cut.

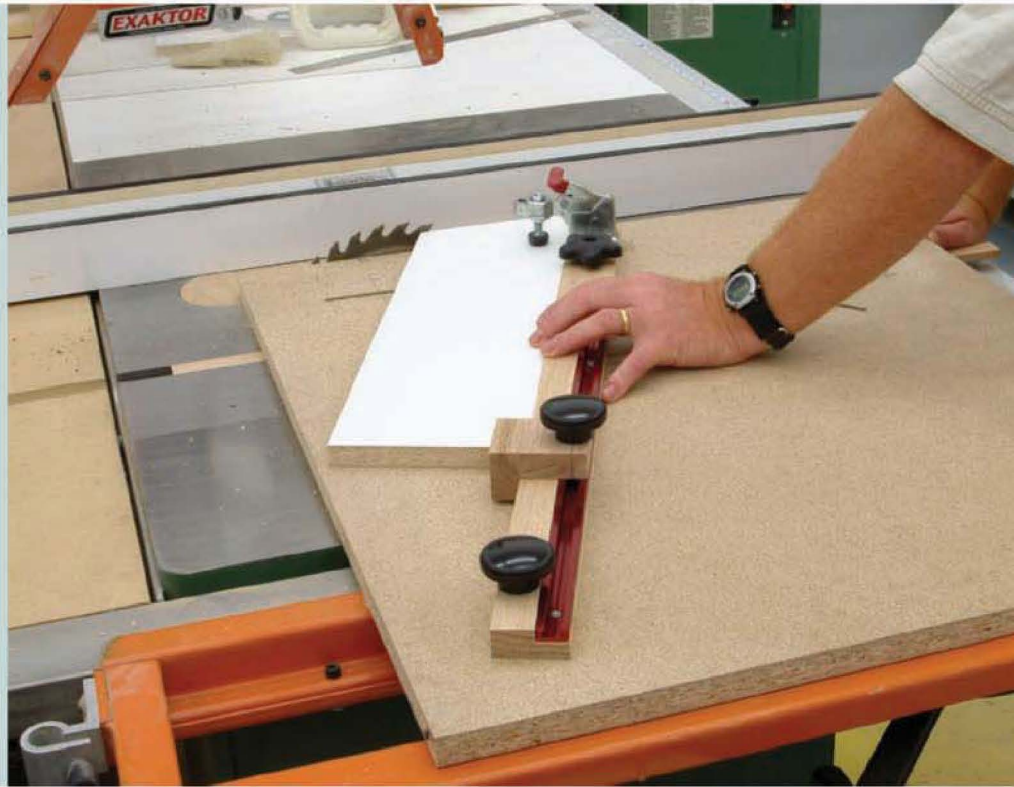
STEP EIGHT I installed a self-adhesive measuring tape. The tape was set to measure angle cuts from the long end of the miter to the butt end of the board being cut. The position can be determined by cutting any length of wood and measuring its length after the cut. It can then be used to mark a position reference for the self-adhesive ruler. Reinstall the toggle clamp once the ruler tape is secured in the correct position.

Adjustable Panel Cutter

I SUPPOSE YOU COULD CALL THIS the ultimate panel cutter. It incorporates all the features found on the Straight Panel Cutter and Fixed Miter Panel Cutter previously described. This adjustable version is the most versatile, but don't discount the usefulness of the first two.

I have and use all three. When I want a simple straight cut, I grab the straight version or the fixed-angle model. I know they will deliver the cut I want because they haven't — and can't — be adjusted. The adjustable cutter is available to me for odd-angle cutting needs that always seem to arise in the shop.

Which panel cutter should you build? Why not build all three? They're handy and inexpensive to make. The most expensive part of all three panel cutters is the toggle clamp, so next time you see these on sale, pick up a few for these projects.



1

STEP ONE Cut a particleboard panel $\frac{3}{4}$ " x 24" x 28" (19mm x 610mm x 711mm). You'll also need a miter slot rail $\frac{3}{8}$ " x $\frac{3}{4}$ " x 30" (10mm x 19mm x 762mm), as well as a board that's $\frac{3}{4}$ " x $1\frac{3}{4}$ " x 26" (19mm x 45mm x 660mm) for the fence.

Attach the miter slot rail to the panel and cut the edge parallel to the rail, following the same procedures that were described in the previous two panel-cutter projects. Use a $\frac{3}{4}$ " (19mm) router bit in a router (or table-mounted router) to form a stop rabbet on the fence, as previously shown. It should stop 6" (152mm) from the end for the T-track.



SHOP tip

THE T-NUT is driven into the $\frac{3}{4}$ "-diameter hole from the underside of the panel. The easiest way to properly drive and seat a recessed T-nut is to use a short piece of $\frac{3}{4}$ " hardwood dowel as a seating punch.



STEP TWO Drill a $\frac{3}{4}$ "-diameter (19mm) hole $\frac{3}{8}$ " (10mm) deep on the underside of the panel cutter for a T-nut. It should center 3" (76mm) from the panel cutter's front edge and 4" (102mm) from the panel side edge opposite the table-saw blade side. Now, drill a $\frac{1}{4}$ "-diameter (6mm) hole completely through the panel in the center of the $\frac{3}{4}$ "-diameter (19mm) hole.

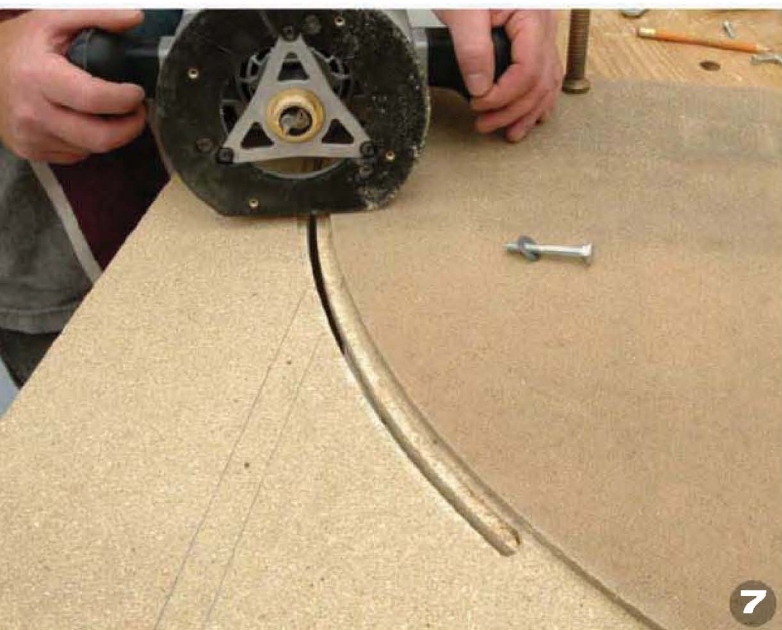
STEP THREE Drill a $\frac{1}{4}$ "-diameter (6mm) hole centered on the fence that is 24" (610mm) from the saw blade end. Screw a knob with a $\frac{1}{4}$ by 20 threaded shaft into the T-nut to secure the fence to the panel.



STEP FOUR Drill a $\frac{1}{4}$ "-diameter (6mm) hole centered on the fence that's $3\frac{1}{2}$ " (89mm) in from the saw blade end. Use a pencil to mark the travel arc of the fence. The arc should begin at the 0° position and end at the 50° position of the fence.

STEP FIVE Now, trace the same arc onto a sheet of $\frac{1}{4}$ "-thick (6mm) hardboard to mark the arc for a router template. Cut the arc along the line with a jigsaw or band saw. The arc travel passes over the guide bar so it can be removed for the next few steps.

STEP SIX Install a $\frac{5}{16}$ " (8mm) template guide and a $\frac{1}{4}$ "-diameter (6mm) straight bit in your router. Clamp the template in place so it will guide the router along the arc and cut through the panel. It's best to use a plunge router and make four or five cutting passes until you cut completely through the panel.



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STEP SEVEN Flip the panel and clamp the hardboard template in place so this cut can be made on the bottom face of the panel cutter. Install a template guide that will accept a $\frac{3}{4}$ "-diameter (19mm) straight cutting bit. Set the depth of cut so the head of a $\frac{1}{4}$ by 20 carriage bolt will ride slightly below the lower panel's surface. Center the $\frac{3}{4}$ "-diameter (19mm) cut on the $\frac{1}{4}$ " (6mm) arc slot and cut along the entire length of the arc.

STEP EIGHT Reinstall the miter slot guide bar and fence. Screw a 2"-long (51mm) $\frac{1}{4}$ by 20 carriage bolt into a $\frac{1}{4}$ by 20 knob to lock the fence at any position (0° to 50°) along the arc radius.

STEP NINE Install a length of T-track in the fence rabbet, a stop block assembly as previously described and a toggle clamp like that shown in the previous project. The panel can be marked at various positions once the cuts have been verified. I use the backside of the fence for straight cuts (similar to the Straight Panel Cutter) and the front edge to secure material when making angle cuts.

Fence-Alignment Jig

THIS JIG IS BUILT USING THE KISS THEORY (keep it simple, silly) and it's one that makes many woodworkers say, "Why didn't I think of that? It's so simple!" Like a lot of the jigs and fixtures in our shops, it's the simple ones that always seem to be the most valuable.

Proper table-saw fence alignment is critical for accurate cutting. But more important, precise alignment of the fence will prevent serious kickback accidents. In my opinion, the fence must be parallel to the blade. I know some woodworkers maintain that a slight "kick-out" of the fence away from the blade is safer, but I don't hold to that belief. No matter which method you prefer, proper alignment is a critical issue.

This simple jig is made with three pieces of wood and a few screws. To align your saw fence, place the jig in the table groove and bring the fence to the dowel rod so it just touches the end. Lock the fence and slide the jig forward to the end of the fence and check the alignment. If the jig binds on the way to the end, you'll know the fence is improperly aligned toward the blade. If there's a gap, it's out of parallel away from the blade. Adjust the fence alignment screws until the front and rear of the fence touch the jig equally. Fence alignment is quick and accurate with this jig so keep it handy and check your settings on a regular basis.

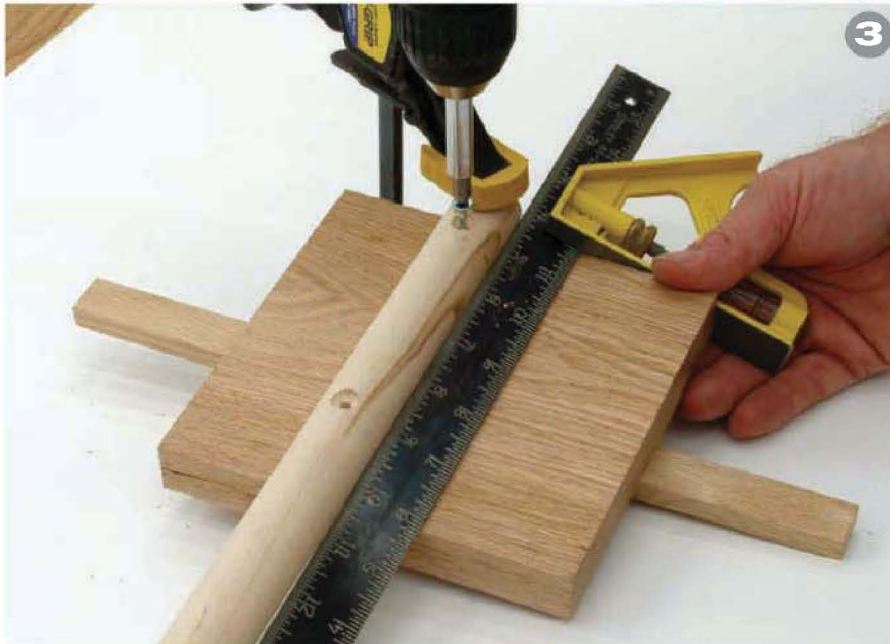


STEP ONE Cut a piece of wood $\frac{3}{4}$ " (19mm) thick by 6" (152mm) square. Then cut a strip of wood $\frac{3}{8}$ " x $\frac{3}{4}$ " x 12" (10mm x 19mm x 305mm) that fits in the miter slot groove on your table saw. Attach the strip in the center of the square board with glue and 1" (25mm) screws. Remember to countersink the screw heads and align the strip parallel to the board.



STEP TWO Cut a 14" (356mm) length of 1"-diameter (25mm) hardwood dowel rod. Countersink through-holes 1" (25mm) and 5" (127mm) from one end of the dowel. Drill the holes large enough so the screws will turn with threading in the rod. This technique helps prevent "screw bridging" that occurs when the screws lock down (or "bottom out," as some people say) to the material being attached before both pieces are drawn together.

STEP THREE Use two 1½" (38mm) screws to secure the dowel rod to the flat board. Align the rod so it's at 90° to the miter groove strip and flush with one edge of the square board.



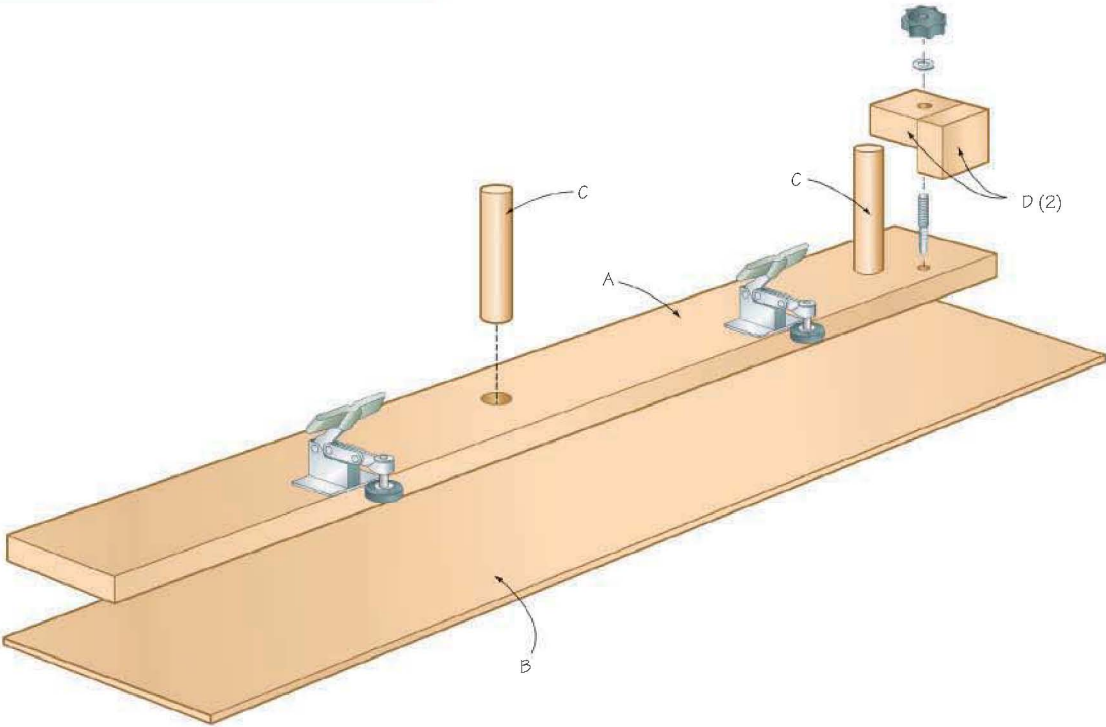
Rough-Lumber Sawing Fixture

FINDING DEALS ON ROUGH LUMBER is a passion with many woodworkers. The savings over dressed lumber can be significant. However, processing rough lumber is a lot of work and requires a jointer and a planer. Often, a lot of time is spent jointing the first edge after one face has been jointed flat. Many boards have a large edge curve that will require quite a few passes to true it up. This sawing fixture can shorten the time considerably because the saw is able to take a lot more material off per pass than a jointer.

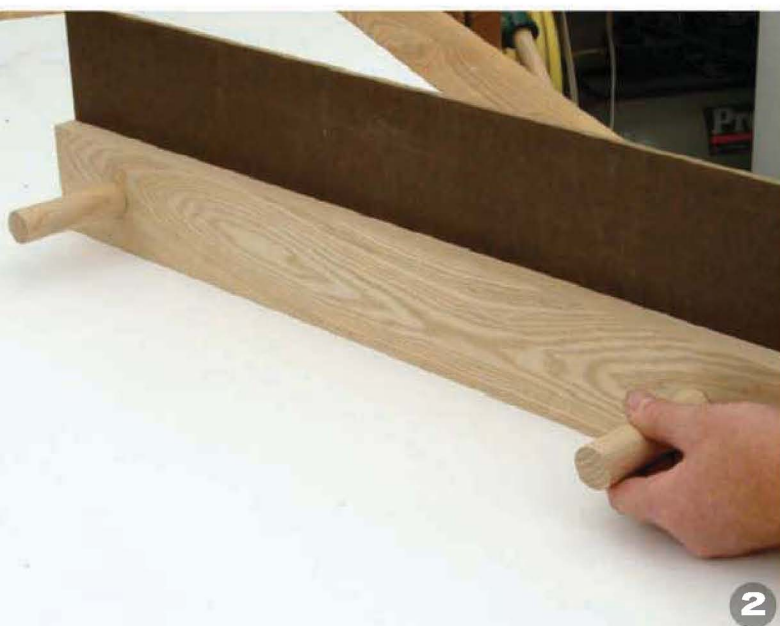
This fixture is also useful for those who don't have a jointer or planer. One edge can be cut straight in the fixture, and that cut edge can then be pushed against the table-saw fence to cut the opposite edge parallel. You'll soon see the value of this fixture no matter how you use it.



STEP ONE Cut a length of solid wood $\frac{3}{4}$ " x $3\frac{1}{2}$ " x 48" (19mm x 89mm x 1219mm). This guide board must have parallel edges, so if you don't have a jointer ask your lumberyard to joint the edges for you.



CUTTING LIST					hardware
REF. NO.	PART	STOCK	THICKNESS X WIDTH X LENGTH INCHES	MILLIMETERS	
A	1 guide board	hardwood	$\frac{3}{4}$ x $3\frac{1}{2}$ x 48	19 x 89 x 1219	2 toggle clamps
B	1 carrier panel	masonite	$\frac{1}{4}$ x 7 x 48	6 x 178 x 1219	1 threaded knob $\frac{1}{4}$ -20
C	2 handles	hardwood	1 dia x $3\frac{1}{2}$	25 x 89	1 hanger bolt $\frac{1}{4}$ -20 x $1\frac{1}{4}$ " x (32mm)
D	2 stop blocks	hardwood	$\frac{3}{4}$ x $1\frac{3}{4}$ x $1\frac{3}{4}$	19 x 45 x 45	



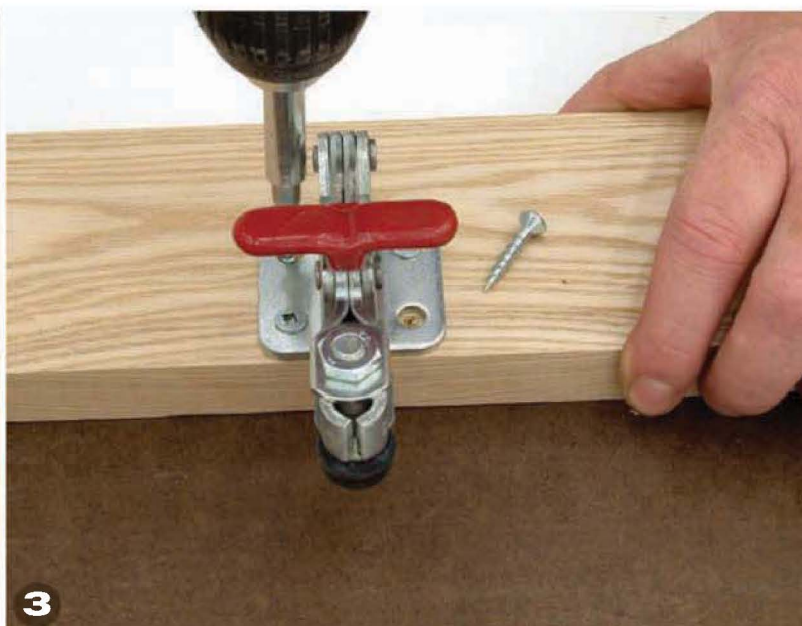
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STEP TWO Attach the carrier panel to the underside of the guide board using 1" (25mm) screws every 4" (102mm) along the length.

Attach the handles to the top of the guide board with 2" (51mm) screws from the underside. Locate one handle 3" (76mm) from the operator's end of the fixture and the other at the 24" (610mm) position. These handles can be used if needed for extra control when you are feeding the loaded fixture into the saw blade.

STEP THREE Install two toggle clamps at the 16" (406mm) and 32" (787mm) position, measured from the operator's end of the fixture. Use $\frac{3}{4}$ " (19mm) screws to secure the clamps close to the inside edge of the carrier board.

STEP FOUR To make the stop block, glue the two stop-block parts together to create an L shape. It's secured to the fixture using a hanger bolt that accepts a threaded knob. The stop block prevents board slippage during the ripping process, particularly when cutting thick hardwood.



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SHOP tip

THE 48" (1219mm) guide board will straighten lumber up to 5' (152.4cm) long. If you need a sawing fixture for longer lumber, you'll have to increase length of the guide board and carrier board. However, it's a bit difficult to hold an 8' (243.8cm) sawing fixture, so I would suggest limiting the lengths of rough lumber to 5' (152.4cm) if possible.

Finger-Joint Fixture

CUTTING FINGER OR BOX JOINTS IS AN EASY PROCEDURE using your table saw, dado blade and this shop-made fixture. You'll get perfect results every time and you won't hesitate to show these joints on your projects.

Finger joints aren't restricted to drawer-box construction. They can be used in dozens of woodworking applications such as jewel or display boxes, picture frames and chests. Take your time making this fixture because you'll be using it often.



STEP ONE Attach a long 1x2 board extension to your table-saw miter fence. It will be used to support the finger-joint indexing panel.

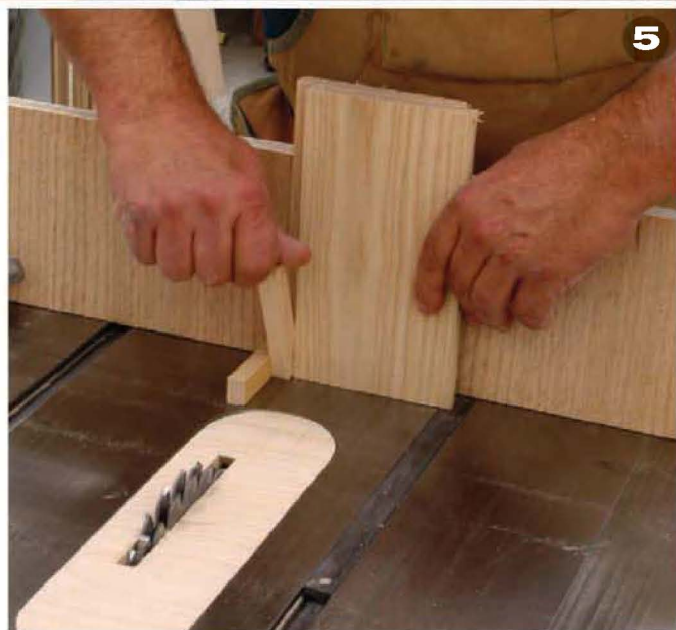
STEP TWO Clamp an indexing panel, about 8" (203mm) high and 24" (610mm) long, to the extension board on your miter fence. This tall indexing panel will help support large boards as they are pushed through the dado blade. Once this is secured, cut through the indexing panel. I am setting up and testing this fixture with a 1/2"-wide (13mm) dado blade.



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STEP THREE Cut a wood indexing pin equal to the cut width, and glue it in the notch on the panel.

STEP FOUR Use a loose indexing pin, also the same width as the notch, to set the fixed indexing pin $\frac{1}{2}$ " (13mm) away from the dado blade. Clamp the indexing board securely to the miter-fence extension.

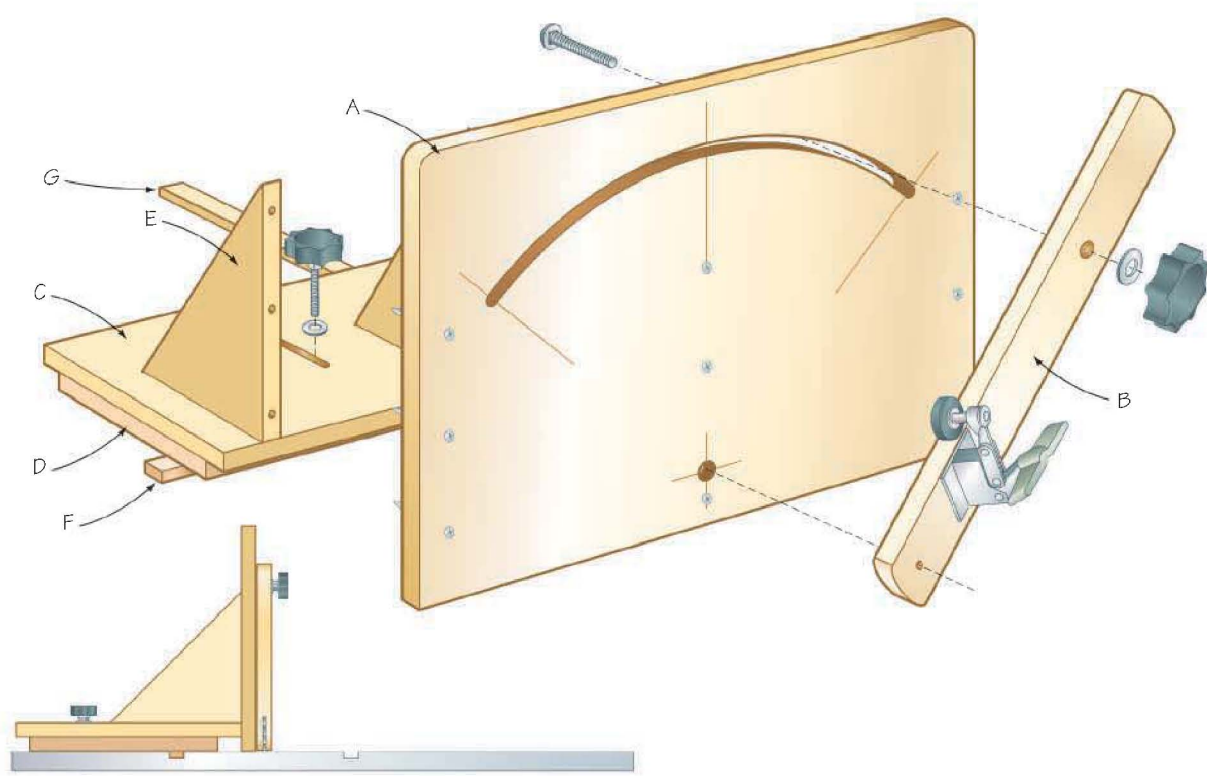
STEP FIVE Cut the two boards to be joined together. Hold the rear board tight to the fixed indexing pin and set the front board away from the fixed pin using the loose spacer block as a guide. Remove the loose index pin and make the first cut.

STEP SIX Make the second cut with the rear board notch over the index pin and the front board tight to the pin. Make the remaining cuts by moving the notches over the pin until all fingers and slots have been formed.

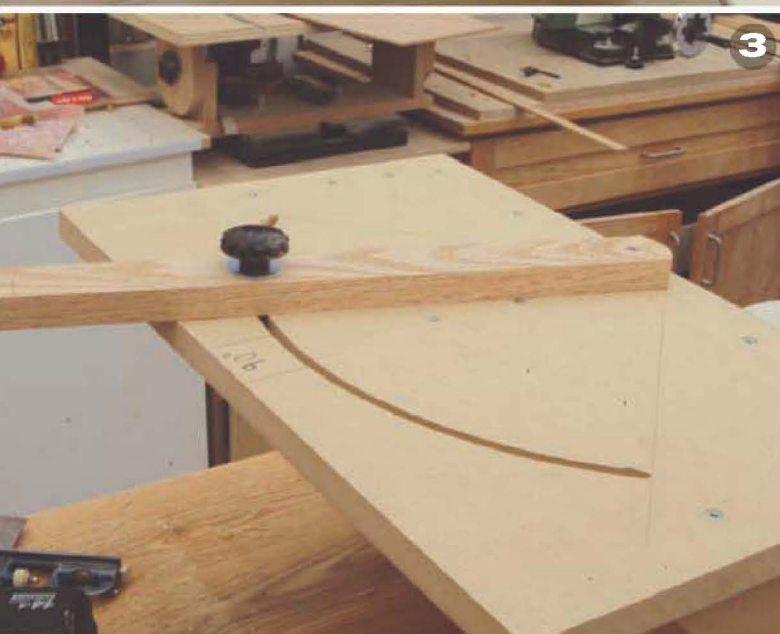
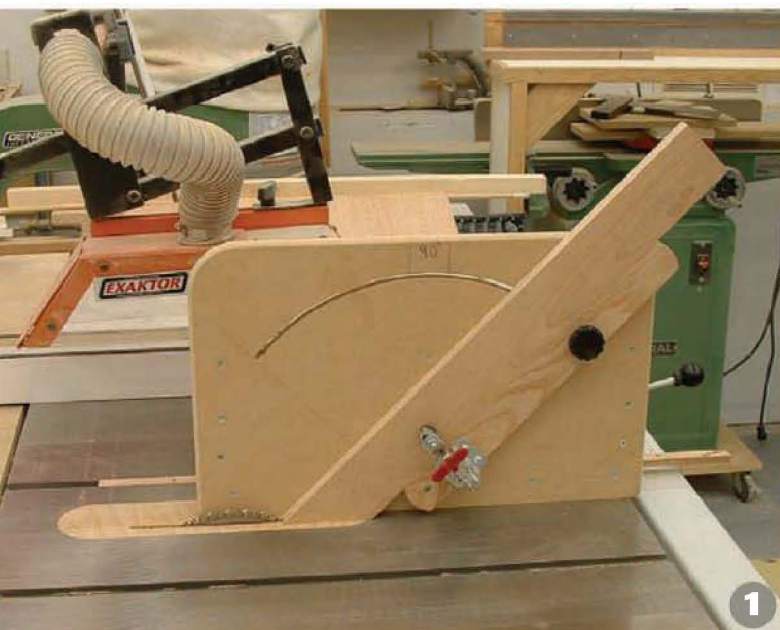
If the test joint is loose, move the indexing panel so the fixed pin is slightly farther away from the blade. If the fingers are too wide for the notches, move the fixed indexing pin towards the blade. Be careful while moving the index board because it doesn't take very much pin movement toward or away from the blade to dramatically change the finger and slot width.

Table-Saw Tenoning Jig

HERE IS A TENONING JIG THAT IS ADAPTABLE TO MANY TABLE SAWS ON THE MARKET. IT is easy and inexpensive to build and you will find it very handy to use. We will build this assembly in two parts: the vertical fence and then the sliding horizontal assembly. I've rounded over the edges and corners of the upper panels to protect the MDF from chipping and splitting.



CUTTING LIST					hardware	
REF. NO.	PART	STOCK	THICKNESS X WIDTH X LENGTH			
			INCHES	MILLIMETERS		
A	1	vertical panel	MDF	¾ x 12 x 20	19 x 305 x 508	1 toggle clamp
B	1	adjustable fence	hardwood	¾ x 1½ x 16	19 x 38 x 406	1 threaded knob ¼-20
C	1	horizontal plate	MDF	¾ x 12 x 20	19 x 305 x 508	2 threaded knobs ¼-20 x 1¼" (32mm)
D	1	base plate	MDF	¾ x 10 x 20	19 x 254 x 508	2 T-nuts ¼-20
E	3	gussets	MDF	¾ x 7 x 7	19 x 178 x 178	1 carriage bolt ¼-20 x 2" (51mm)
F	1	track	MDF	⅜ x ¾ x 22	10 x 19 x 559	3 flat washers ¼"
G	1	track	MDF	⅜ x ¾ x 14	10 x 19 x 356	



STEP ONE I marked my pivot point at $1\frac{1}{4}$ " (32mm) from the bottom of the vertical panel on center. Measuring 10" (254mm) from that pivot point, draw an arc to the 45° degree angle front and back.

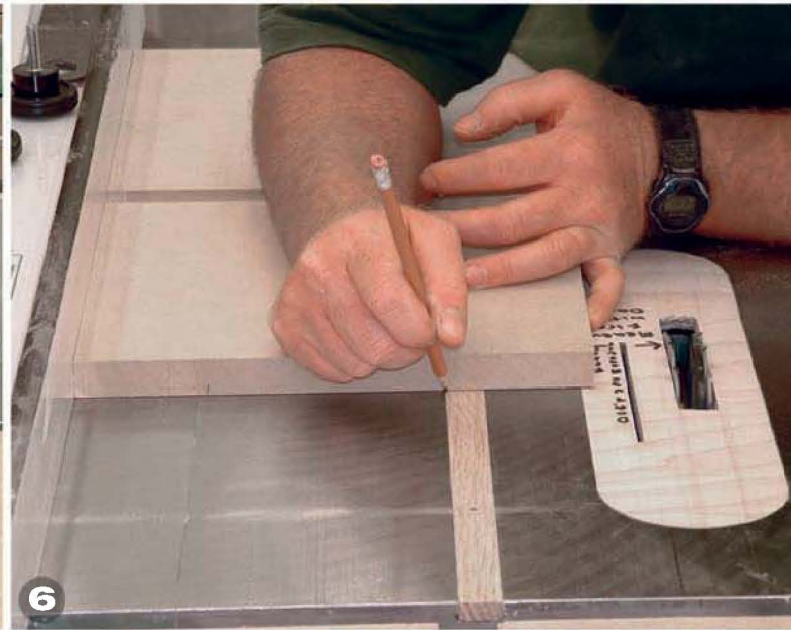
STEP TWO Using the band saw, cut a template out of $\frac{1}{4}$ "-thick (6mm) material for the same arc; then, using a $\frac{1}{4}$ " (6mm) straight bit with a collar on a plunge router, rout a groove through the MDF, following the arc. Make a few passes at different depths to get a clean through cut.

STEP THREE Round over the adjustable arm at both ends. Fix it on the board at the pivot point with a $1\frac{1}{2}$ " (38mm) particleboard screw.

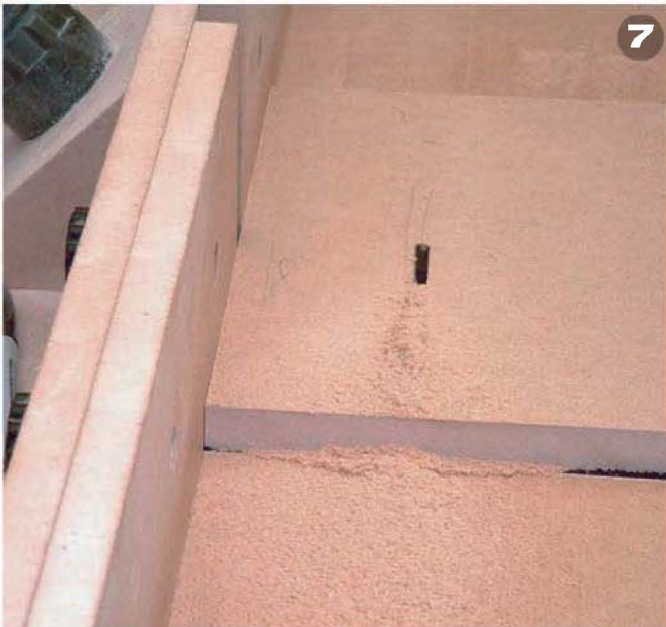
STEP FOUR The locking knob is put on by simply drilling through the arm where it meets the groove. Insert the carriage bolt from the back, using a screw-on knob to lock the arm in place. Attach a toggle clamp on the adjustable arm roughly 3" (76mm) above the pivot point.



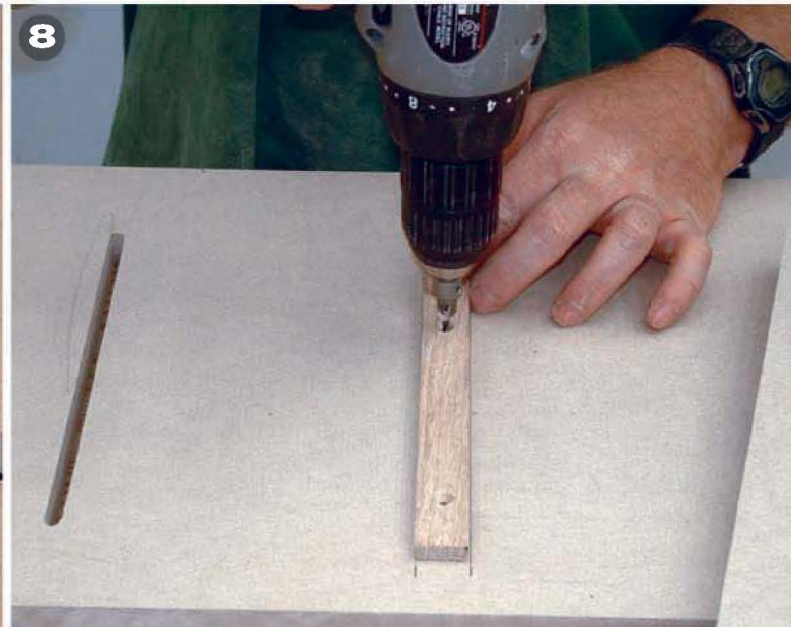
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STEP FIVE Cut a $\frac{3}{4}$ "-wide (19mm) by $\frac{3}{8}$ "-deep (10mm) dado in the center of the bottom plate. This is the groove for the track that will be attached to the horizontal plate.

STEP SIX Install the 22" (559mm) track on the bottom of the bottom plate so the panel can move front to back on the table saw.

STEP SEVEN On the router table, cut two slots measuring $\frac{1}{4}$ " wide (6mm) by 8" long (203mm) and 12" (305mm) apart along the width of the horizontal plate.

STEP EIGHT Install the 14" (356mm) track in the bottom center of the horizontal plate, so it can move sideways in the groove on the bottom plate.



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STEP NINE In the underside of the bottom plate, drill holes and a counterbore for T-nuts 12" (305mm) on center and in line with the slots of the horizontal panel.

STEP TEN Install the threaded knobs through the slots in the horizontal plate and into the T-nuts in the base plate.

STEP ELEVEN Attach the vertical panel to the horizontal plate using 2" (51mm) particleboard screws. Then attach the gussets to the vertical and horizontal plates.

STEP TWELVE Put the entire assembly on the table to make sure it's at 90° to the saw table. Make adjustments if needed.

Sacrificial Fence

THERE ARE MANY FENCES ON THE market, but the problem is that you can't drill through them or put a screw into them. One way to allow you that flexibility is to build a saddle over your fence and secure a Sacrificial Fence to it. There are many different styles of fences, so adapt these measurements to your particular fence. The one I'm using is made by General. It's 4" x 42 1/4" (102mm x 1073mm).

With the blade lowered, slide the Sacrificial Fence over the dado blade to the width needed or zero clearance. Then start the saw and slowly raise the blade to the depth of cut needed.



STEP ONE Cut out the parts for the box. This box fits over your existing table saw rip fence.

STEP TWO To make the assembly easier, I clamped the pieces in place over the fence and fastened them using 2" (51mm) particle-board screws with a pilot hole. The box should fit snugly over the fence to prevent forward or backward movement of the box.

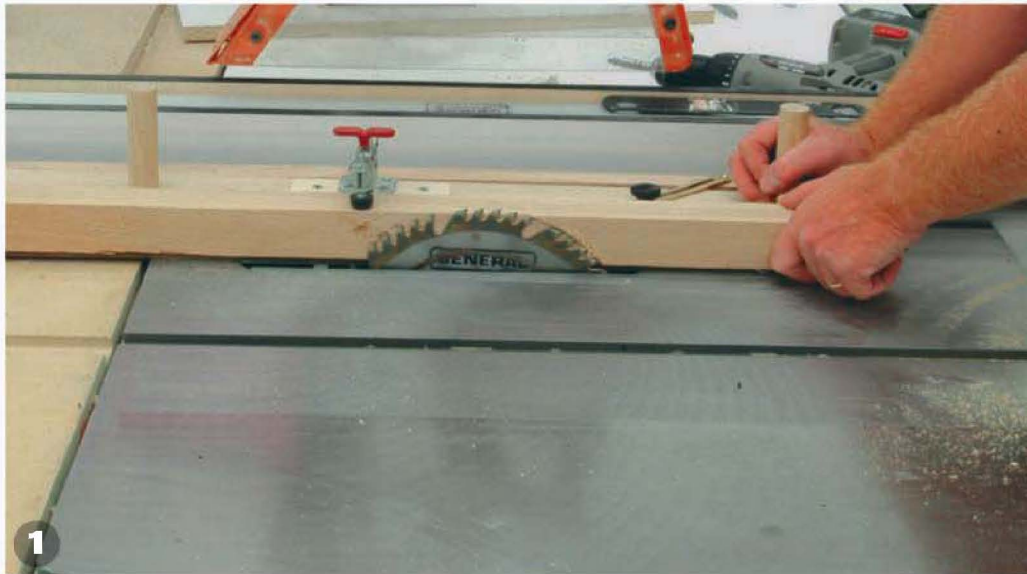
STEP THREE Attach the Sacrificial Fence to the box with screws. The Sacrificial Fence can be a scrap of hardwood, particleboard or MDF. When this fence is no longer usable, it can easily be replaced.

CUTTING LIST

NO.	PART	STOCK	THICKNESS X WIDTH X LENGTH INCHES	THICKNESS X WIDTH X LENGTH MILLIMETERS
2	sides	particleboard	3/4 x 4 x length of saw fence plus 1 1/2"	19 x 102 x length of saw fence plus 1 1/2"
1	cap	particleboard	3/4 x width of saw fence x length of saw fence	19 x width of saw fence x length of saw fence
2	end caps	particleboard	3/4 x width of saw fence x 4	19 x width of saw fence x 102

Tapering Fixture

THE THOUGHT OF CUTTING angles on a table saw is not appealing at first, but using this fixture can make the process safer and more accurate. It will allow you to set different angles for your taper. You can build this fixture by modifying the Rough-Lumber Sawing Fixture made previously in this chapter.



STEP ONE Remove the original 3"-wide (76mm) clamping board and replace it with a 1"-wide (25mm) strip of hardwood. Fix the strip to the Masonite carrier board using 1" (25mm) screws every 4" (102mm).

STEP TWO Reattach the clamping board to the fixed board using a butt hinge at the front of the inside edge, or simply add a 1" (25mm) screw from the underside that will act as a pivot point.

STEP THREE To lock the angle in place, I used a lid stay. Drill a hole 8" (203mm) from the end through the adjustable board and drive in a T-nut. The hole may need to be counterbored so that the T-nut sits flush with the face of the board. The threaded knob is then used to lock the lid stay in place. The angle bracket is simply fastened to the fixed board with $\frac{5}{8}$ " (16mm) screws.



Multi-Angle Miter Gauge

I MADE THIS EASY SETUP jig to cut down on time and the amount of wood I use to test the angles every time. It's inexpensive to make and it will give you a quick reference every time you need it.



STEP ONE Cut an 8" x 8" (203mm x 203mm) square piece of particleboard or MDF from $\frac{3}{4}$ "-thick (19mm).

STEP TWO Run a series of three dados roughly 2" (51mm) apart on both sides of the square piece. The grooves should be $\frac{1}{4}$ " (6mm). Cutting dados on both sides will allow you to set the gauge at either a right or left angle.

STEP THREE Check the width of the dado by sliding the miter bar in place. It should fit tightly in the groove to ensure the accuracy of the jig.

STEP FOUR The miter gauge can be set from 30° to 90°, so I opted for 30° - 45° - 90°. Mark the angles you need and cut them on the miter saw. This is critical to the accuracy of the jig, so take your time.



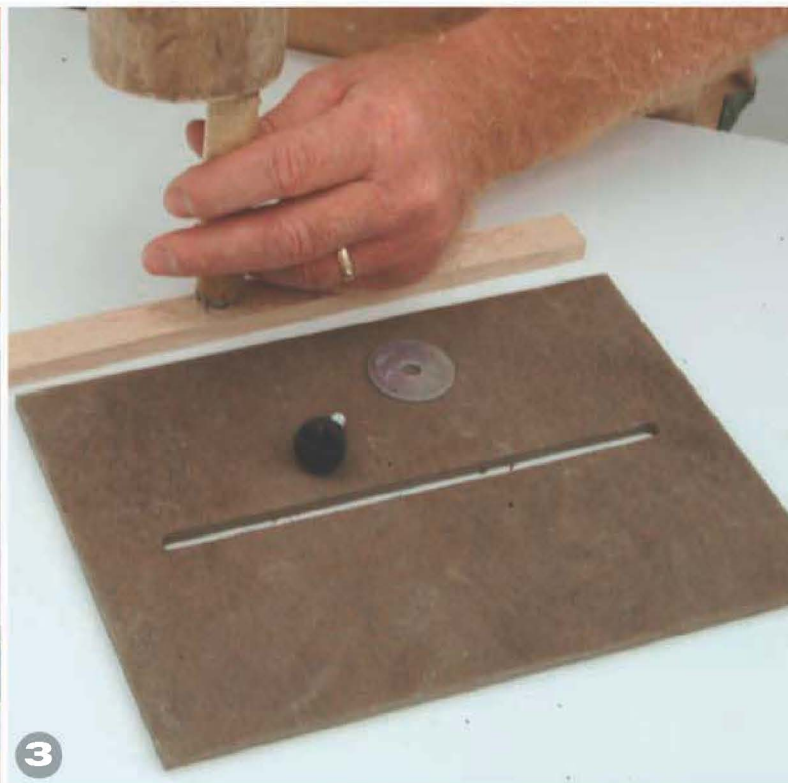
Adjustable Repeatabl-Ripping Fixture



RIPPING A SERIES OF strips to the same width is easy with this fixture. It allows you to keep the wider part of the board between the fence and the blade, minimizing the chance of kickbacks.

STEP ONE Set the router table with a $\frac{1}{4}$ " (6mm) straight bit, then set the fence at 3" (76mm) on center from the bit. Cut a slot in the center of a 6" x 9" (152mm x 229mm) piece of Masonite or high-density fiberboard (HDF), stopping 1" (25mm) short of the front and back of the board. You can do this in two different ways: either raise the router bit up through the stationary board, or drop the panel slowly onto the bit. Use a push pad to feed the wood past the bit.



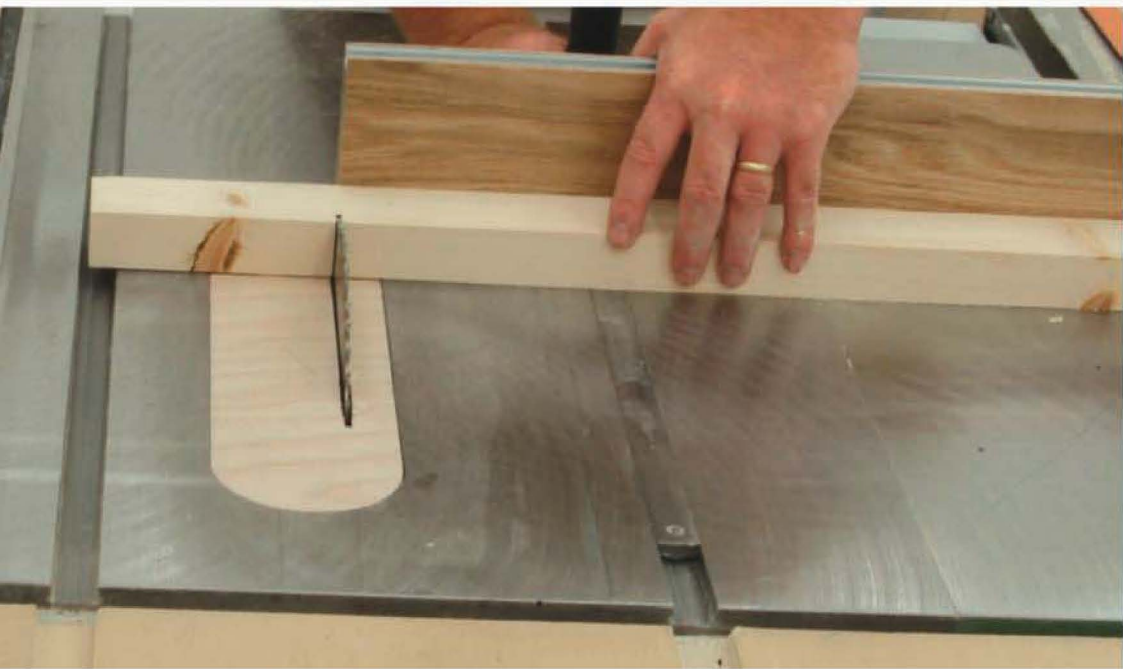


STEP TWO Cut a 12" (305mm) strip of hardwood or UHMV plastic track to fit the table-saw groove.

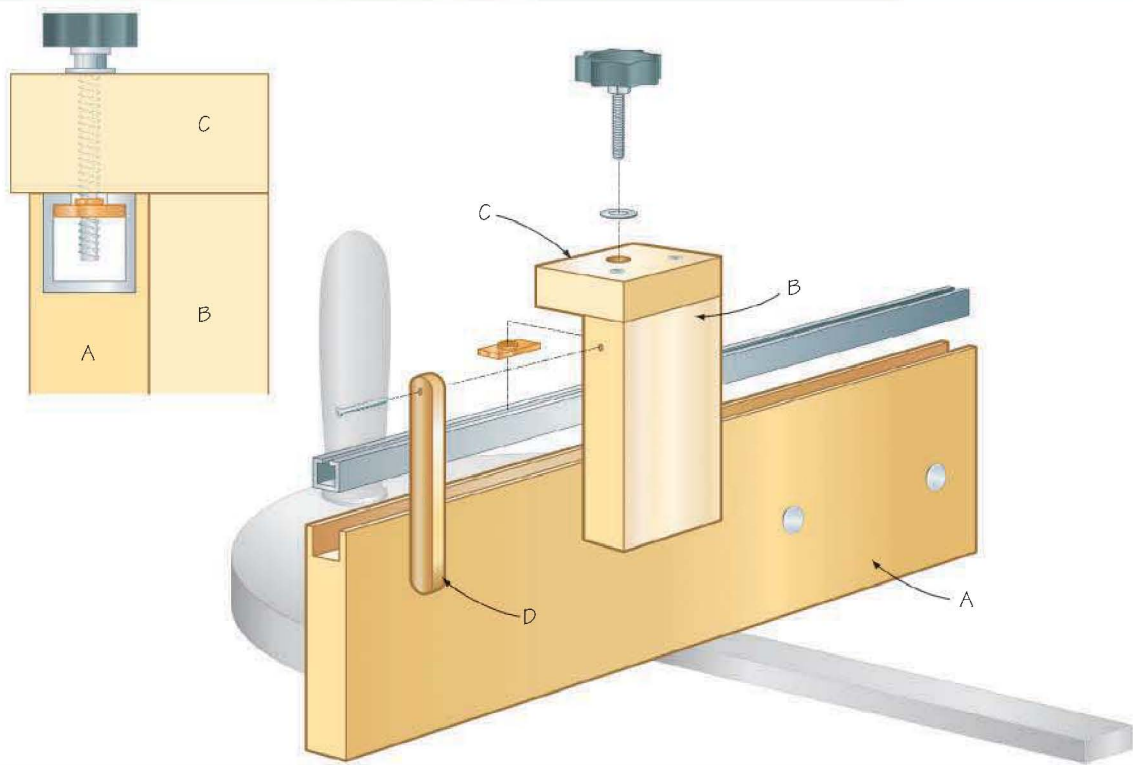
STEP THREE Drill a hole in the center of the track and drive in the T-nut. Assemble to the board with a 1/4" washer and a 1/4" by 20 threaded knob.

STEP FOUR Bring the fixture next to the blade to adjust the width of cut needed and lock it in place. Move the fence and board against the fixture and lock the fence in place. Repeat for each cut.

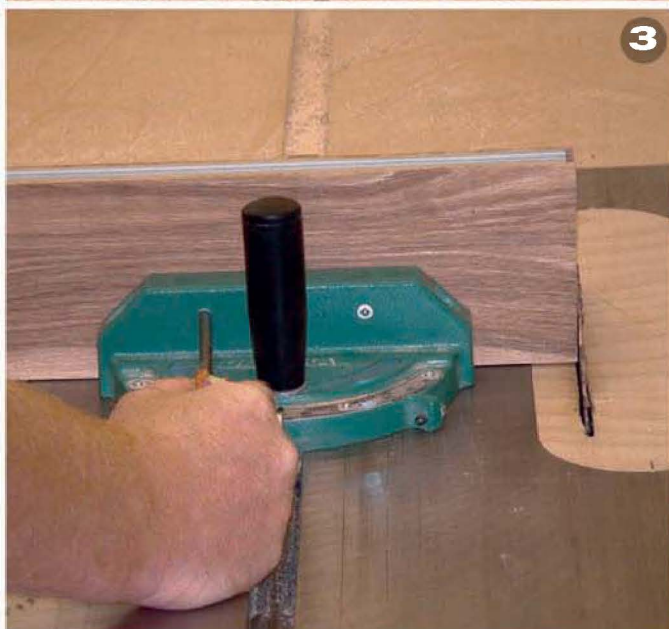
Adjustable Miter-Gauge Fence



THIS ADJUSTABLE Miter-Gauge Fence will give you more support when cross-cutting on the table saw. The added flip-up spacer block will allow you to cut both ends of the board without resetting the stop.



CUTTING LIST					hardware	
REF. NO.	PART	STOCK	THICKNESS X WIDTH X LENGTH INCHES	MILLIMETERS		
A	1 fence	hardwood	3/4 x 4 x 24	19 x 102 x 610	1 T-track	3/8" x 3/4" x 24" (10mm x 19mm x 610mm)
B	1 stop block front	hardwood	3/4 x 1 3/4 x 3 3/4	19 x 45 x 95	1 threaded knob	1/4-20 x 1 1/4" (32mm)
C	1 stop block top	hardwood	3/4 x 1 3/4 x 1 3/4	19 x 45 x 45	3 tight nuts	1/4-20
D	1 flipper	hardwood	1/4 x 1 x 3 3/4	6 x 25 x 95		



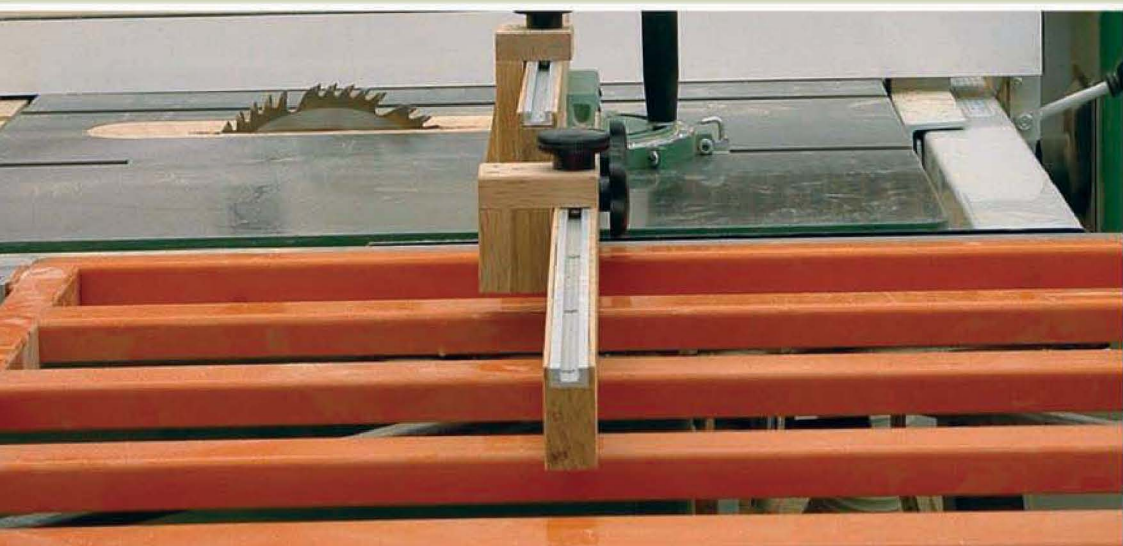
STEP ONE Cut a $\frac{3}{4}$ "-wide (19mm) by $\frac{5}{8}$ "-deep (10mm) groove in the top edge of the fence and secure the T-slot track with $\frac{5}{8}$ "-long (16mm) screws.

STEP TWO Using 2" (51mm) screws in countersunk pilot holes, secure the top stop block to one end of the front stop block. Drill a $\frac{1}{4}$ " (6mm) hole in the top block and insert the threaded knob and the tight nut. Then attach the flipper using a 1" (25mm) round-head screw to the side of the front stop block.

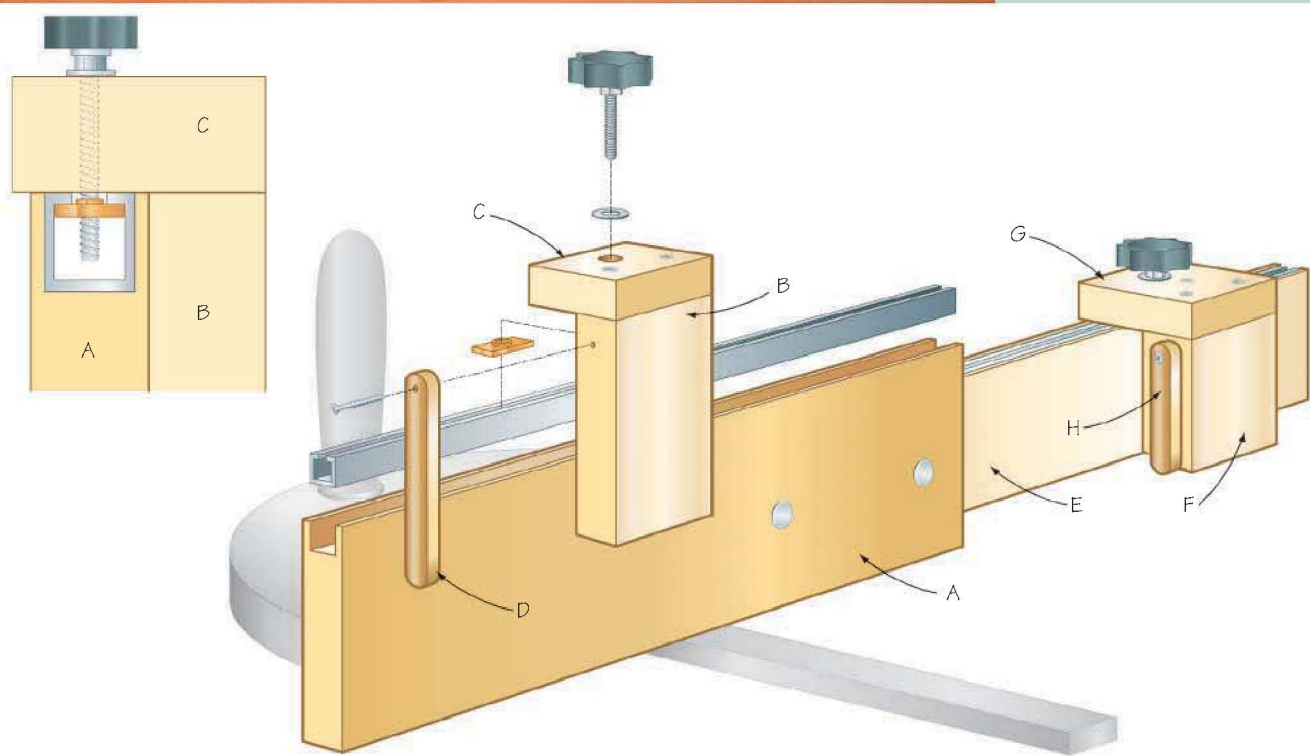
STEP THREE Secure the adjustable fence to the table-saw miter gauge with two screws and zero clearance to the blade as shown.

STEP FOUR Install the stop block on the track. Make your final-cut measurement from the blade to the block with the flipper down. Make the first cut with the flipper up. This will give you $\frac{1}{4}$ " (6mm) extra in the length of your board. Turn your piece around let the flipper down for the final cut length.

Extended Miter Fence



THE EXTENDED MITER Fence with the stop block may be used at times when you want to repeat longer cuts, so you can just add an extension to the previous project. I made the extension shorter in height because its main purpose is to provide a stop block. The support you need comes from the miter fence.



CUTTING LIST

REF. NO.	PART	STOCK	THICKNESS X WIDTH X LENGTH	
			INCHES	MILLIMETERS
A	1 fence	hardwood	1 x 4 x 24	25 x 102 x 610
B	1 stop block front	hardwood	3/4 x 1 3/4 x 3 3/4	19 x 45 x 95
C	1 stop block top	hardwood	3/4 x 1 3/4 x 1 3/4	19 x 45 x 45
D	1 flipper	hardwood	1/4 x 1 x 3 3/4	6 x 25 x 95
E	1 fence	hardwood	1 x 2 x 30	25 x 51 x 762
F	1 stop block front	hardwood	1 3/4 x 1 3/4 x 1 3/4	45 x 45 x 45
G	1 stop block top	hardwood	3/4 x 1 3/4 x 2 1/2	19 x 45 x 64
H	1 flipper	hardwood	1/4 x 1 x 1 3/4	6 x 25 x 45

hardware

1 T-track	3/8" x 3/4" x 24" (10mm x 19mm x 610mm)
1 T-track	3/8" x 3/4" x 30" (10mm x 19mm x 762mm)
2 threaded knobs	1/4-20 x 1 1/4" (32mm)
2 T-track nuts	1/4-20



1



2



3

STEP ONE Cut a $\frac{3}{4}$ "-wide (19mm) by $\frac{3}{8}$ "-deep (10mm) groove in the top edge of the fence and secure the T-slot track with $\frac{5}{8}$ "-long (16mm) screws.

STEP TWO Drill two holes through both the fence and the extension. Counterbore the holes in the front of the fence and insert two 3" (76mm) carriage bolts with threaded knobs at the back.

STEP THREE Assemble the stop block for the extension fence and attach it to the fence. That's it, you're ready to start cutting.

Rip-Fence Saddle



THIS RIP-FENCE SADDLE can be used as a no-frills tenoning jig and is adaptable to most fences available on the market. It is simple and easy to construct and will allow you to cut square tenons.

STEP ONE Cut the inside and outside fence parts plus the vertical support to the sizes indicated on the cut list. The width of your fence will determine the size of the top spacer for the saddle. The General rip fence I am using is 4" (102mm) wide, so I cut a 4" x 10" (102mm x 254mm) top spacer, plus a 2" x 4" (51mm x 102mm) handle for pushing. Assemble the saddle parts over the fence and clamp it down. Mark the positioning for the screws and draw a line across. Drill countersunk pilot holes and secure the panel with 2" (51mm) particleboard screws.

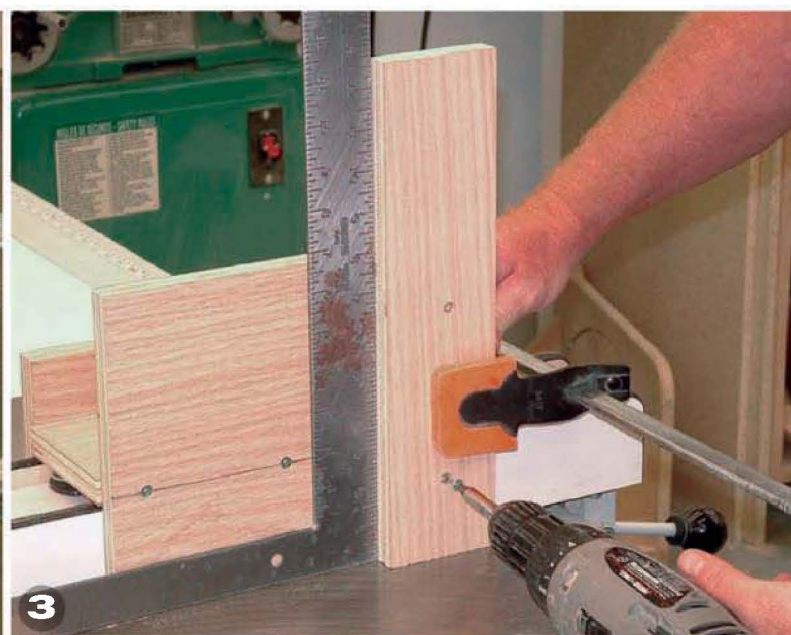


CUTTING LIST

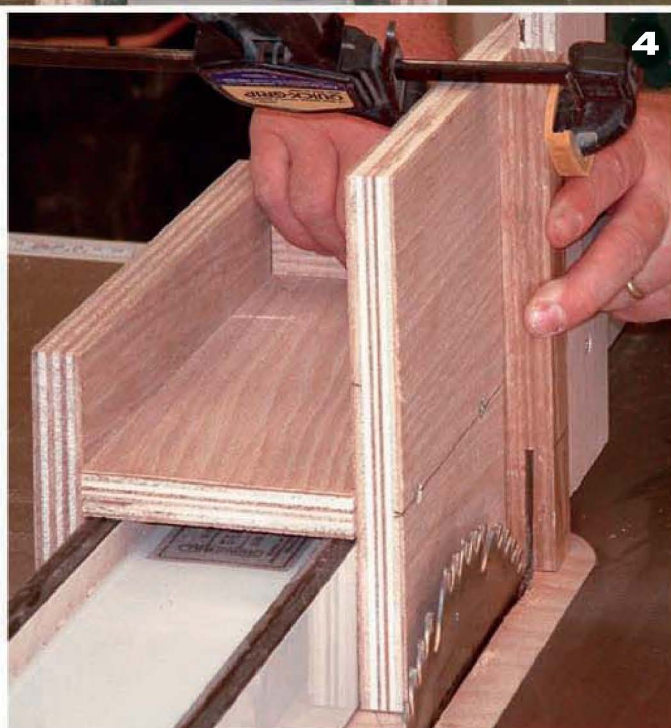
REF. NO.	PART	STOCK	THICKNESS X WIDTH X LENGTH INCHES	THICKNESS X WIDTH X LENGTH MILLIMETERS
A 1	vertical panel	oak plywood	3/4 x 8 x 10	19 x 203 x 254
B 1	outside panel	oak plywood	3/4 x 6 x 10	19 x 152 x 254
C 1	vertical fence	oak plywood	3/4 x 3 x 12	19 x 76 x 305
D 1	top spacer	oak plywood	3/4 x width of saw fence x 10	19 x width of saw fence x 254
E 1	handle	oak plywood	3/4 x 2 x width of saw fence	19 x 51 x width of saw fence



2



3

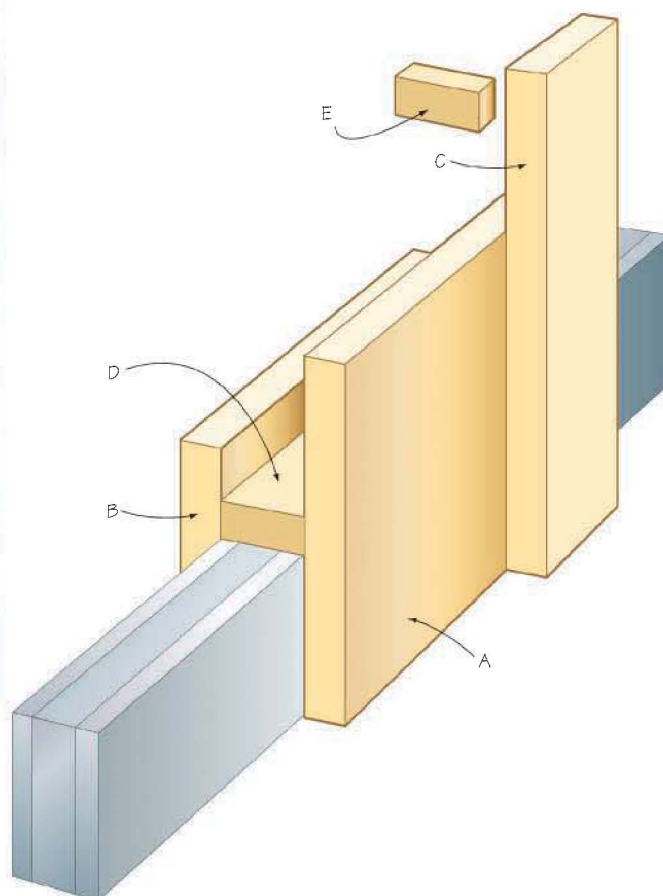


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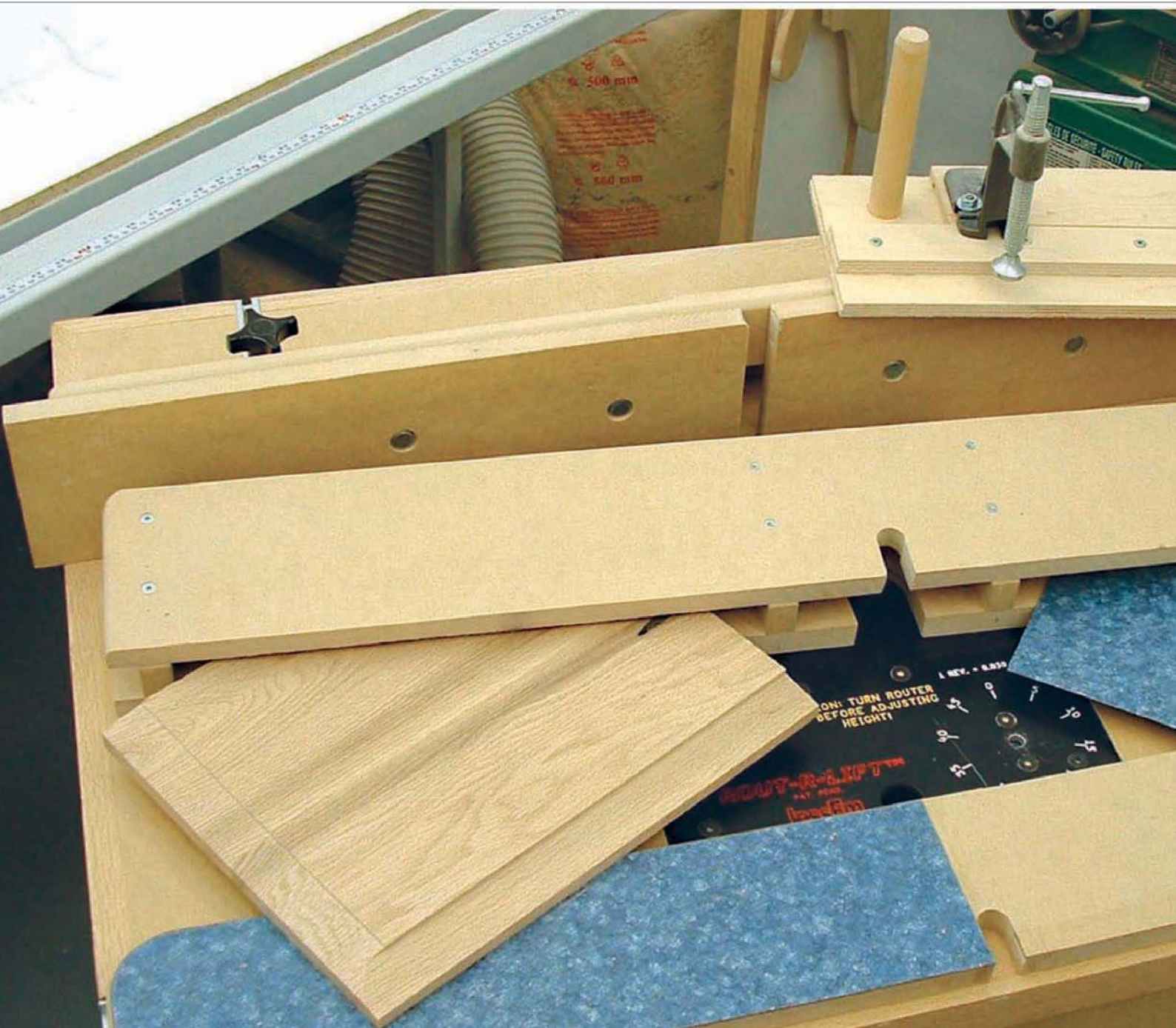
STEP TWO Adding a handle will square up the saddle over the existing fence and allow the operator to safely control the feed rate. I rounded the top edges of the handle to make it comfortable.

STEP THREE Secure the vertical fence at 90° to the table. Use a square to help hold the fence square. Make sure the screws are high enough (at least 3" [76mm] above the surface) so they can't be hit by the cutting blade.

STEP FOUR Holding the board against the vertical support, slide the saddle across the fence to cut the outside of the tenon, then flip the board over and cut the other side of the tenon.



router-table jigs



and fixtures



As I stated in one of my earlier books, I've seen a lot

of router-table systems and tried a number of different designs in my shop over the years. However, every design seemed to be lacking, or the devices were priced way beyond my budget. I often promised myself that

I would build my own range of accessories to maximize the table's usefulness.

My list of design demands included an adjustable fence that had an opening range of at least 12" (305mm). My dream table had to have a miter slide track, a panel-raising fence, a method to cut muntins and jointer capabilities. Proper dust collection rounded out my list of wants for the ideal router-table fence. I hesitate to call this the "ultimate" router station because there's always the chance that I'll discover something else that I can add, but this cabinet is pretty close to perfect for my work with the accessories I've added – and it didn't cost a fortune to build.

The complete router cabinet that's seen in some of these photos can be built with plans found in my book, *Building Woodshop Workstations*. I used ¾"-thick (19mm) MDF sheet material. It's a great board for this application because the MDF is heavy enough to keep the cabinet stable, and it's easy to machine.

Cope-and-Stick Muntin-Cutting Fixture



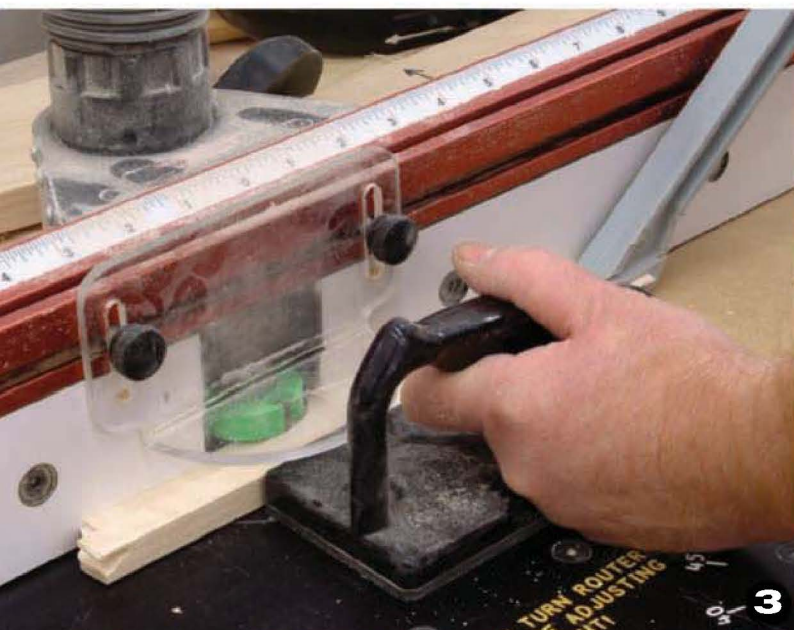
MUNTINS USED ON cope-and-stick doors are small and delicate. They are often only 1" (25mm) wide and 1/2" (13mm) thick. These small parts are easily shattered and split by cope-and-stick router bits, and cutting them can be dangerous if they're not handled properly, so you have to be careful. Here's a simple fixture that will help you avoid problems when routing small parts.



STEP ONE Align the router-table fence with the bearing on the cope bit so both the fence and the bearing guide the muntin in the same plane. Once the correct muntin length has been calculated, form the cope cuts on each end. Push the muntins through the cope bit with a wide backer board behind it. This board will provide a lot more surface area and stabilize the small muntins as they pass through the bit. Be sure the muntin is held tightly against the backer board.



STEP TWO Before cutting the stick profiles on the muntins, cut a cope profile into the edge of a 4"-wide (102mm) piece of MDF, stopping 2" (51mm) from the end. This cope profile will hold the stick profile that will be formed on one edge of the muntin.



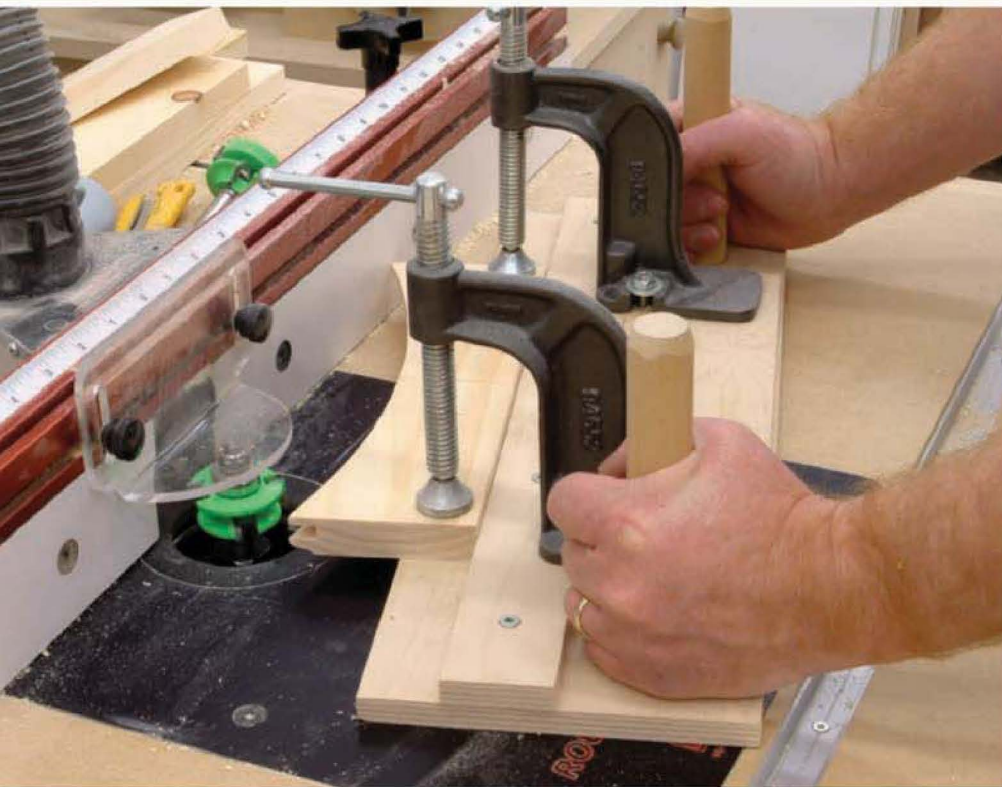
STEP THREE Switch to a stick bit and form one edge profile on each muntin. After making a test cut, turn off the router and place the profiled wood edge against the stick bit. Ensure that the outfeed fence on your router table will support the reduced width of the workpiece after cutting. If it doesn't align properly, shim or adjust the outfeed fence so the workpiece is supported by the infeed fence before the cut and the outfeed fence after cutting. The cutter bearings should be in line with the infeed fence for this operation.

STEP FOUR This is the point where problems arise when milling narrow muntins. Once the opposite stick profile is cut, there's very little flat material left on the muntin and it will tip on the router table – not a safe situation.

The previously coped MDF fixture board can support the already profiled edge of the muntin so the opposite side can be cut safely. Insert the muntin in the fixture and hold it securely against the router-table fence.

STEP FIVE The muntin is secure in the jig's cope cut and trapped tightly against the router fence. It can be pushed through the bit to cut the stick profile on the opposite edge of the muntin.

Arc and Curve Profile Fixture

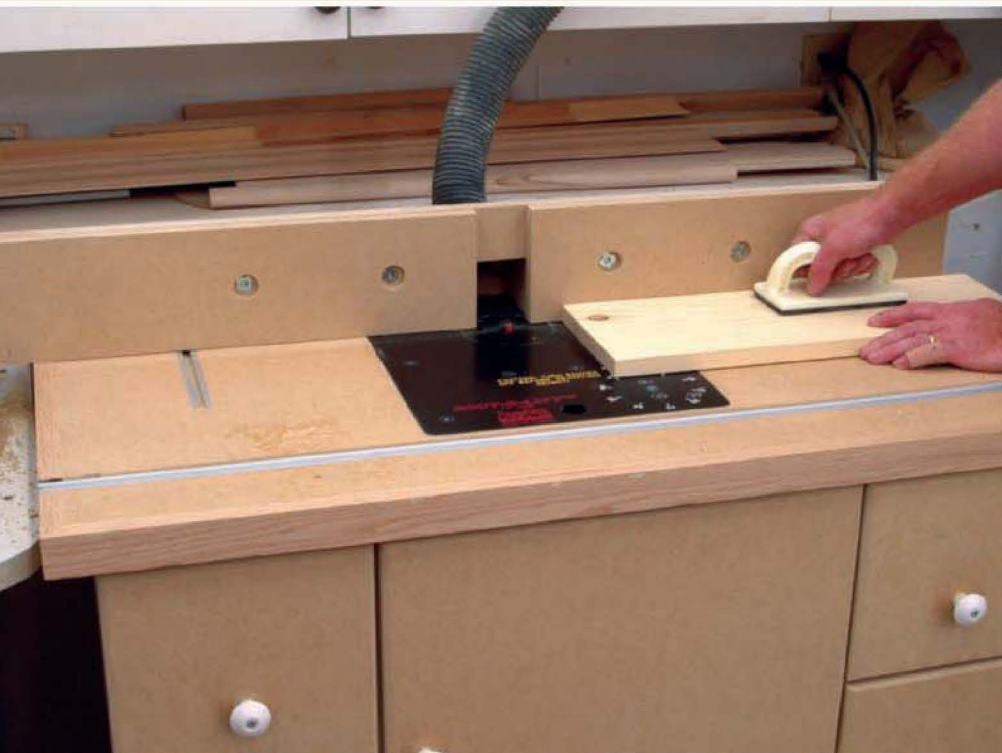


I'M NOT COMFORTABLE HOLDING small curved pieces of wood when cutting grooves or profiles on the router table. My hands get too close to the cutter and have very little protection should the workpiece jam or kick out.

I built this simple routing-sled fixture that clamps the workpiece and provides handles that are well back from the router bit. It's easy to build, as you can see from the picture at left. Use two pieces of $\frac{1}{2}$ "-thick (13mm) plywood, one narrower than the other, and attach wooden dowels for the handles and a couple of screws or toggle clamps. The hardware is available at many woodworking stores.

I like this fixture because it lets me get a good, full grip with both hands to control the workpiece. If a problem does occur, I'm well away from the blade. You can see how the piece of wood being routed is clamped and that my hands are safely behind it.

Adjustable Router-Table Fence



A GREAT DEAL OF MY WORK IS DONE on the router table. It's a valuable wood-working shop tool, but some milling operations done on the router can be dangerous, so safety is the number one concern. It occurred to me that many woodworkers do not have a good adjustable router fence for their table. Free-cutting a piece of wood guided only by the router-bit bearing isn't wise, so I always use a fence. In many cases, the fence is a safety backup or is used in partnership with the router-bit bearing as a guide system.

A fence can prevent the workpiece from being driven behind the router bit, a situation that could result in an injury. I advise you to buy a good fence or build the one shown here. It has adjustable face plates to minimize bit exposure and maximize safety.



STEP ONE All of the fence parts are made with $\frac{3}{4}$ "-thick (19mm) MDF. The upright fence board is 5" (127mm) by 39" (991mm) and the horizontal fence board is 4" (102mm) by 39" (991mm), but those dimensions can be altered to suit your table. The vertical fence board has two $\frac{3}{8}$ "-wide (10mm) grooves routed into the center and through the board. The grooves start 6" (152mm) from each end and stop 16" (406mm) from each end. This rail also requires a 4"-wide (102mm) by $2\frac{1}{2}$ "-high (64mm) notch, centered on the length of the board.

The horizontal board also has a notch that is 4" (102mm) wide by 2" (51mm) high in the center of the board. Both notches can be cut with a band saw or jigsaw.

STEP TWO Attach the vertical fence board to the horizontal board with $1\frac{1}{2}$ " (38mm) screws and glue at about 6" (152mm) on center. Remember to drill pilot holes before driving the screws to avoid material splits.

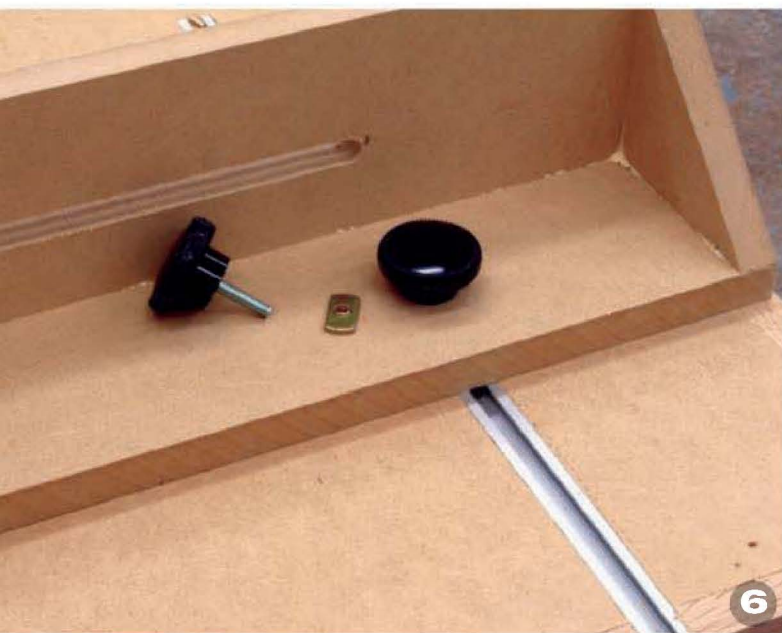
STEP THREE The four right-angle fence supports are 4" x 4" (102mm x 102mm) blocks of $\frac{3}{4}$ " (19mm) MDF cut at 45°. Use glue and $1\frac{1}{2}$ " (38mm) screws to attach the supports to the fence assembly. Install one support at each end and the remaining two on each side of the cutout notch in the fence boards.

STEP FOUR The back cover for the fence cutout has a 45° miter on both ends. Apply glue to all edges and secure the cover with a few brad nails on the top and bottom edges.

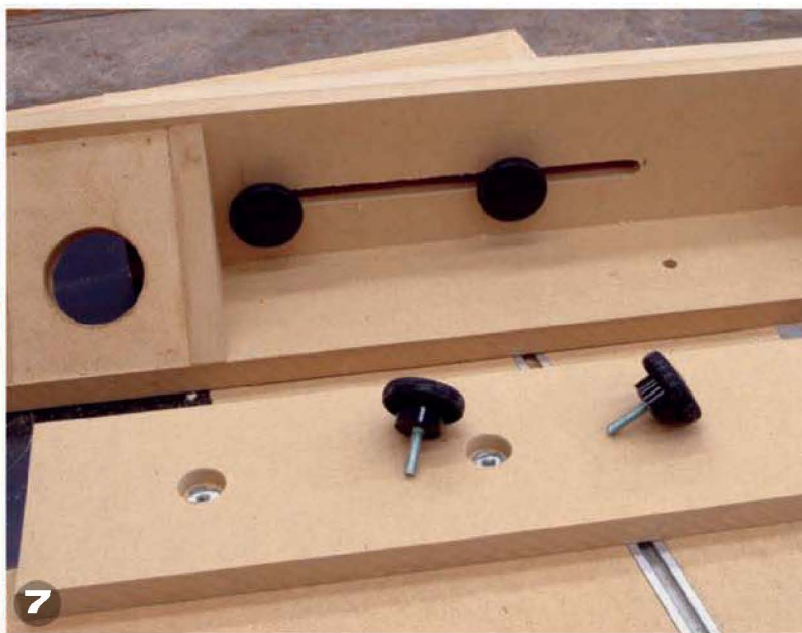
STEP FIVE Drill a $2\frac{1}{4}$ "-diameter (57mm) hole in the center of the back cover. This will be used to friction-fit a vacuum hose.

CUTTING LIST

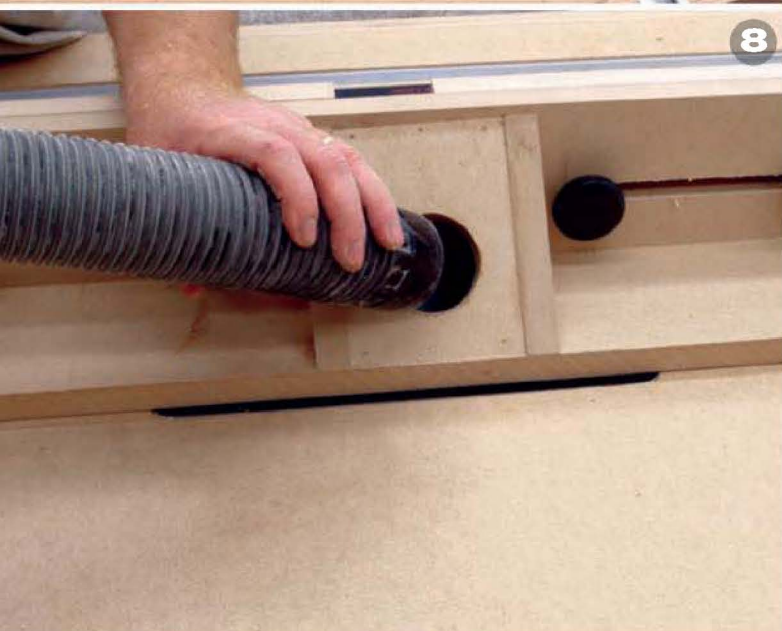
REF. NO.	PART	STOCK	THICKNESS X WIDTH X LENGTH INCHES	THICKNESS X WIDTH X LENGTH MILLIMETERS
A	1 upright fence board	MDF	$\frac{3}{4}$ x 5 x 39	19 x 127 x 991
B	1 upright fence board	MDF	$\frac{3}{4}$ x 4 x 39	19 x 102 x 991
C	4 right-angle boards	MDF	$\frac{3}{4}$ x 4 x 4	19 x 102 x 102
D	1 back cover	MDF	$\frac{3}{4}$ x cut to fit opening between right-angle boards	



6



7



8

STEP SIX The T-track that will be used to lock the adjustable fence can be attached to the router tabletop in grooves. Rout the grooves on each side, parallel to your router plate, and match the depth of the track you purchased, making sure the tracks lie flush against the tabletop surface. Secure the tracks with $\frac{5}{8}$ " (16mm) screws.

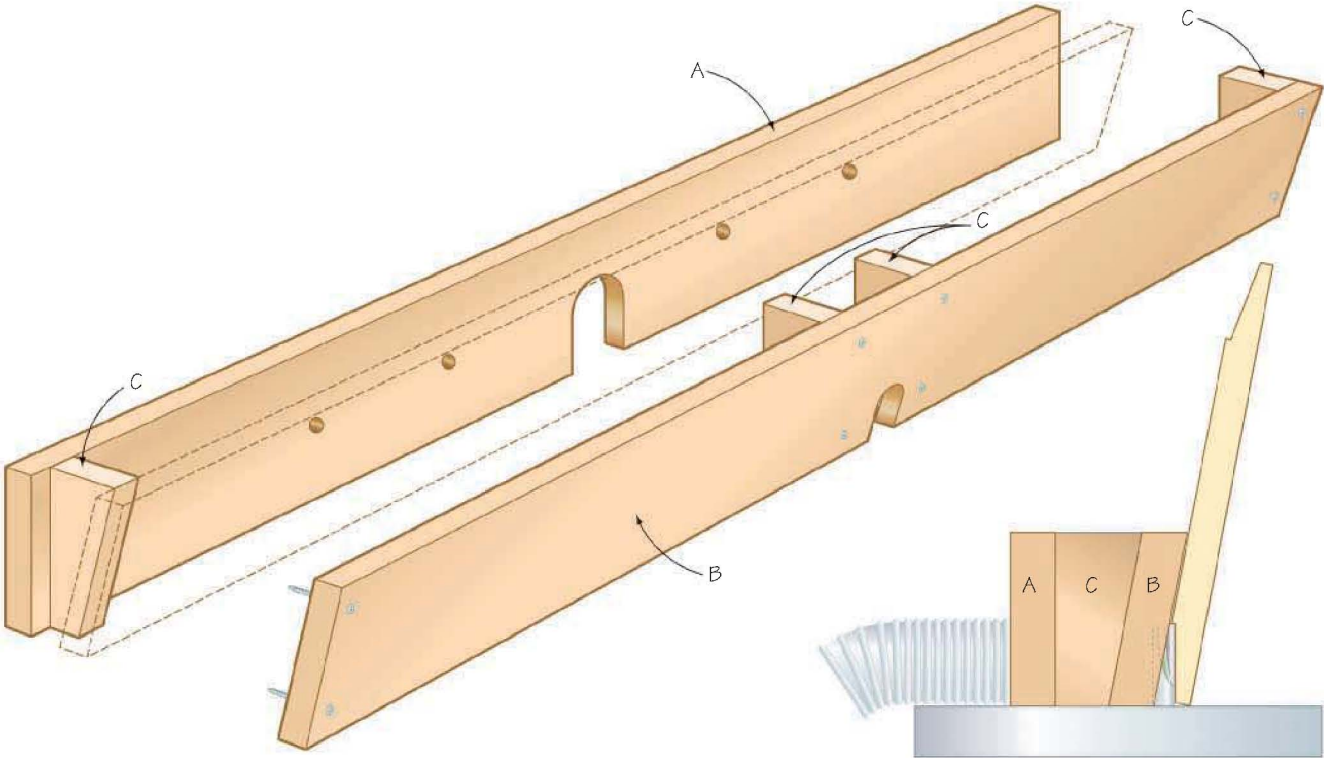
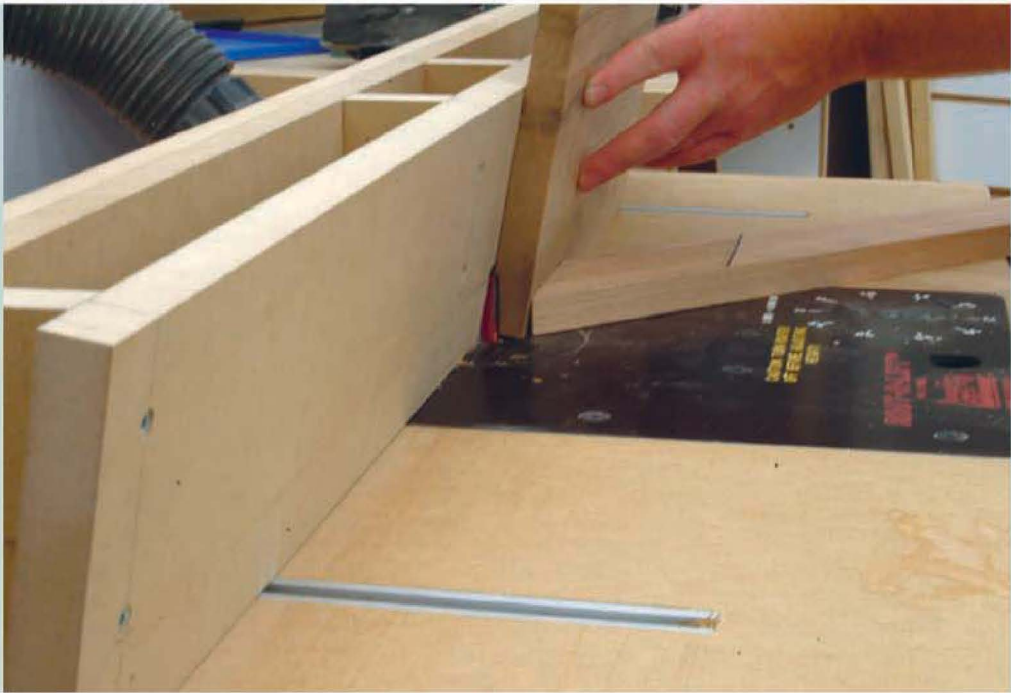
Center the fence assembly on the router table, and drill two $\frac{3}{8}$ "-diameter (10mm) holes in the horizontal support over the center of each T-track. Use a T-slot nut and knob with a $\frac{1}{4}$ "-diameter (6mm) 1" (25mm) threaded shaft screwed into the nut. Tighten the knobs and verify that the fence locks securely.

STEP SEVEN The adjustable tabletop boards, located on each side of the router-bit opening on the fence, have two three-prong T-nuts driven into the front faces. Counterbore the holes so the nuts are below the fence faces. Position the nuts so both fences can come together in the center and travel about 4" (102mm) out from the center of the fence cutout.

EIGHT The 2 $\frac{1}{4}$ " (57mm) OD (outside diameter) vacuum hose on my shop vacuum fits snugly in the dust hole and provides good particle removal.

Panel-Raising Fence

HERE'S A SIMPLE ATTACHMENT to the Adjustable Router-Table Fence that will help you cut raised-panel doors more easily and securely.



CUTTING LIST				
REF. NO.	PART	STOCK	THICKNESS X WIDTH X LENGTH INCHES	THICKNESS X WIDTH X LENGTH MILLIMETERS
A	1 rear fence	MDF	3/4 x 6 x 39	19 x 152 x 991
B	2 front fence	MDF	3/4 x 6 x 39	19 x 152 x 991
C	4 10° braces	MDF	3/4 x 2 1/4 x 6	19 x 57 x 152



1

STEP ONE The back fence provides good support when cutting door panels. The angle I like to use for raised-panel doors is 10°. So, set the miter saw to 10° and cut the four angled braces.

STEP TWO Drill four T-nut holes on the front of the back fence. The holes should match the groove of the original fence project. I used a hammer and a wooden dowel to drive in the prong T-nut. It will be fastened to the original fence.

STEP THREE Attach the four braces to the back of the fence using glue and 1½" (38mm) particleboard screws. Remember to drill a pilot hole as deep as the screw length into the edge of the MDF to avoid splitting the wood. Attach two of the braces at both ends and two more in the center 6" (152mm) apart. Place the narrow end of the angled braces at the bottom.



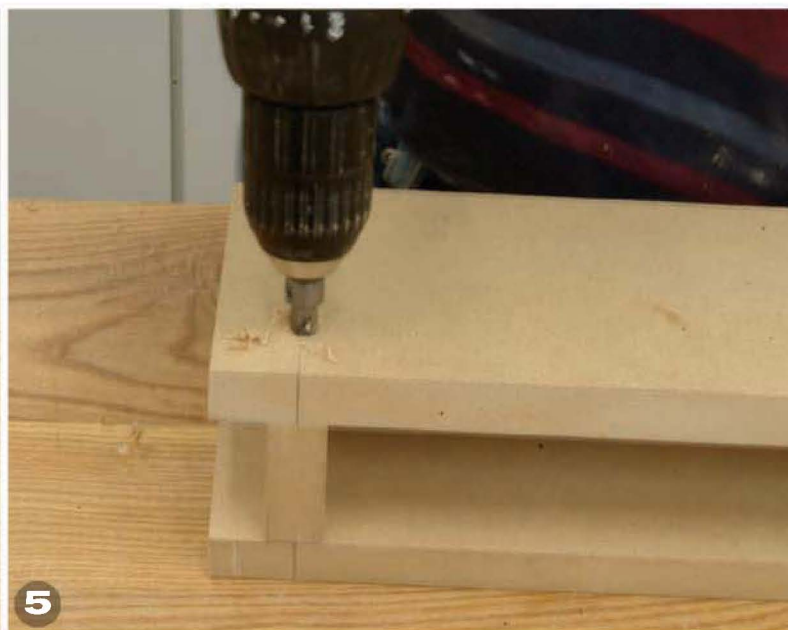
2



3



4



5



6

STEP FOUR Cut an opening in the back fence to line up with the dust-collection hole in the original fence.

STEP FIVE Cut a $1\frac{1}{2}$ " x $1\frac{1}{2}$ " (38mm x 38mm) slot (for router bit clearance) in the center of the front fence. Cut 10° bevels on the top and bottom edges of this fence. Then, screw the front fence to the back assembly with $1\frac{1}{2}$ " (38mm) particleboard screws. Countersink the pilot holes and use glue.

STEP SIX On the router table, adjust the router bit to the height desired. Move the fence in and start the router. Feed the panel across the angle fence on the four sides. To avoid tear-out, try not to cut everything on the first pass. Make several light cuts. Stop when the back of the raised panel fits into the grooves of your rails and stiles.

Jointer Fence

A ROUTER TABLE CAN BE A CONVENIENT alternative to a jointer to prepare the edges of a board before gluing. I built this attachment to fit over the original fence project in this chapter.

You will need a regular straight bit to joint the edges of a board. Using a $\frac{1}{2}$ " (13mm) shank will reduce vibration. Another bit that works really well is a reverse spiral straight cutter.

To align the fence after you install the router bit, the laminated side of the fence should be flush with the router bit.

As you joint the board, the bit will remove the equivalent of the laminate thickness. When jointing, run the boards safely past the bit using a push pad.



STEP ONE Cut a long strip of MDF 4" x 39" (102mm x 991mm). Drill T-nut holes to match the height of the original fence's routed groove. Insert the T-nut from the front, and counterbore the holes so the T-nuts are below the fence surface.

STEP TWO Cut an oversized piece of laminate 5" x 20" (127mm x 508mm) to cover one side of the fence, using the Laminate-Cutting Guide from chapter one.

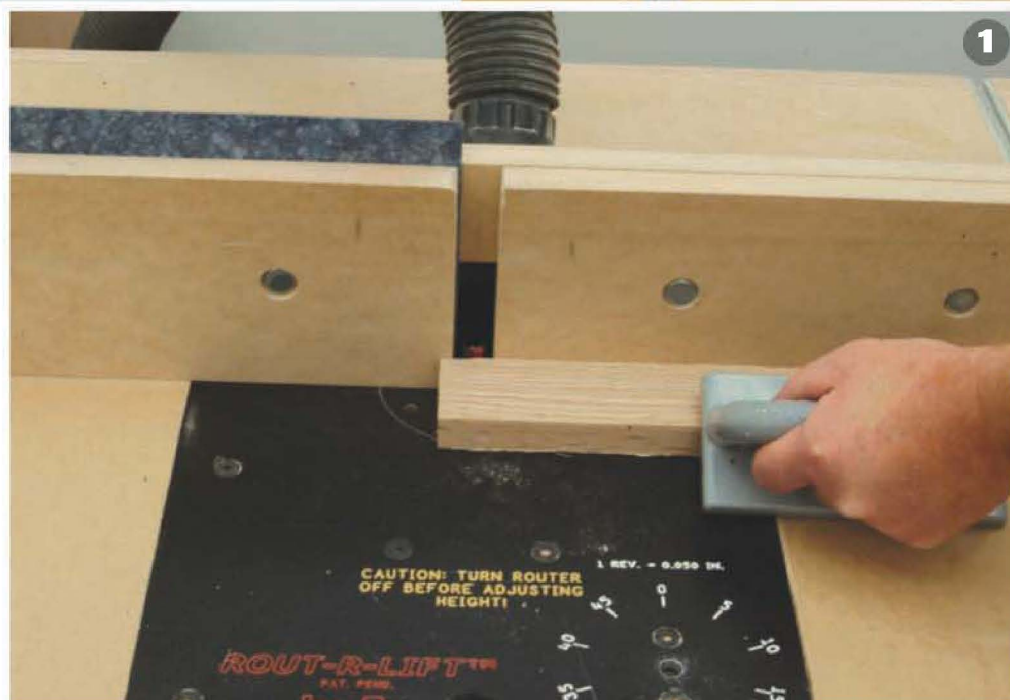
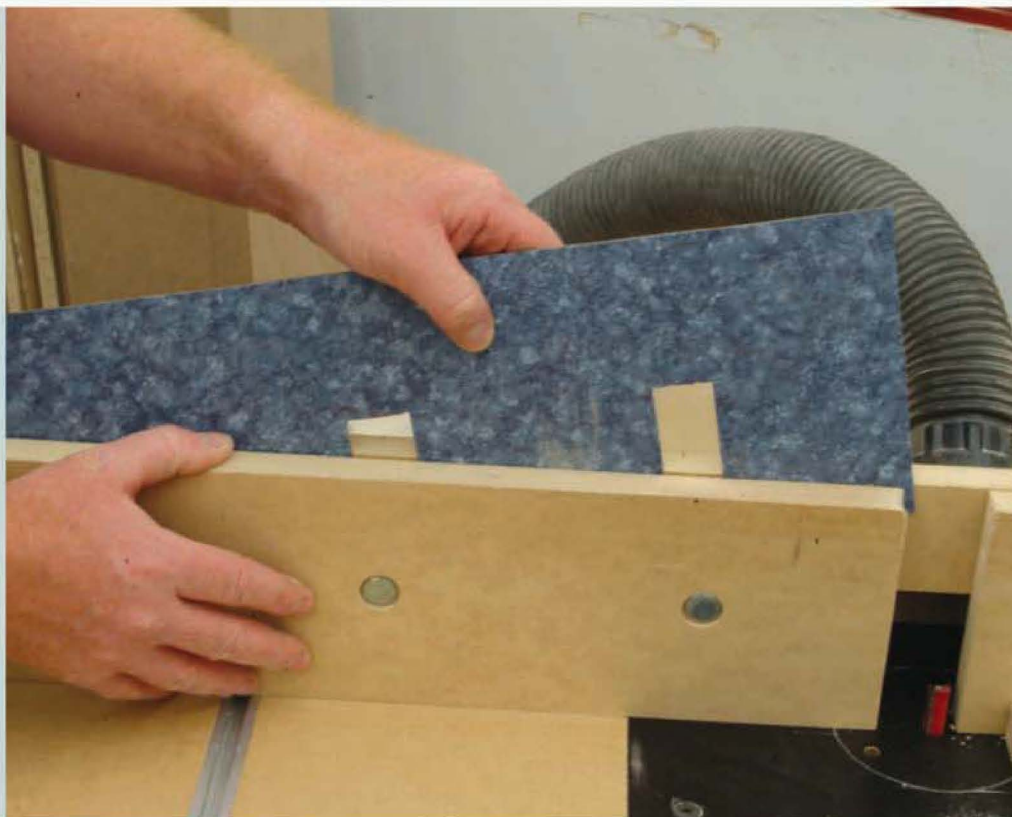
STEP THREE Use sandpaper to soften up the leading edge of the laminate closest to the router bit.

STEP FOUR Use contact cement to glue the laminate to the MDF. Trim the excess with a laminate trimmer. Cut a notch 1" x $1\frac{1}{4}$ " (25mm x 38mm) in the center of the board for your router bit.



Original Fence Spacer

AN ALTERNATIVE TO THE OTHER fence is to use a scrap piece of laminate as a spacer between the back fence and the adjustable front piece.



1

STEP ONE Using a scrap piece of laminate, make two notches to fit over the bolts inserted in the laminate between the back fence and the adjustable fence. This will move the back (or outfeed) fence forward to give support to the jointed piece.

router jigs



and fixtures



4

The router is an important tool in your workshop.

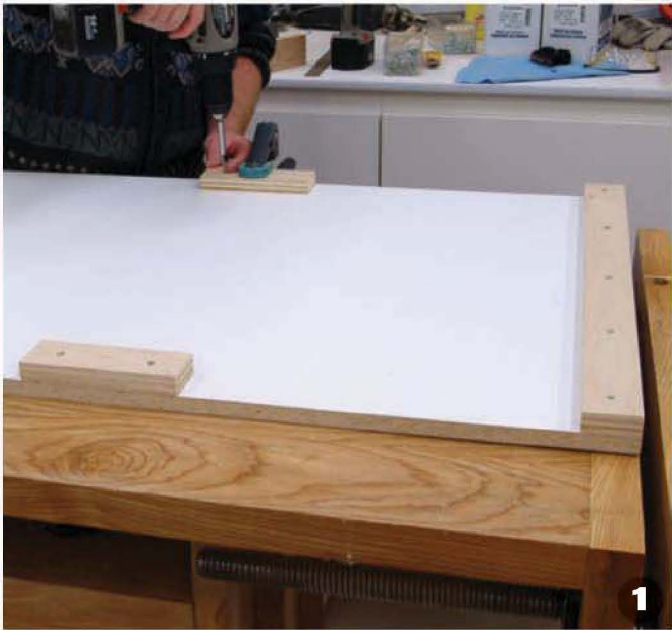
The newest style, the heavy-duty plunge router, is ideal for many projects and very versatile. It's the one to get if you plan to purchase only one router for all your work. You can easily operate with just one router, but if your budget will allow, you may want to consider purchasing a smaller laminate trim router as well.

The heavy-duty model, equipped with a good-quality carbide-edge trim bit, will mill any material easily. A router equipped with a roundover, cove or chamfer bit can add a touch of elegance as well as a professional appearance to your woodworking projects. Small laminate trim routers are easy to handle and work extremely well when you have to flush-trim high-pressure laminate material or detail small projects. However, any size router can accomplish this task.

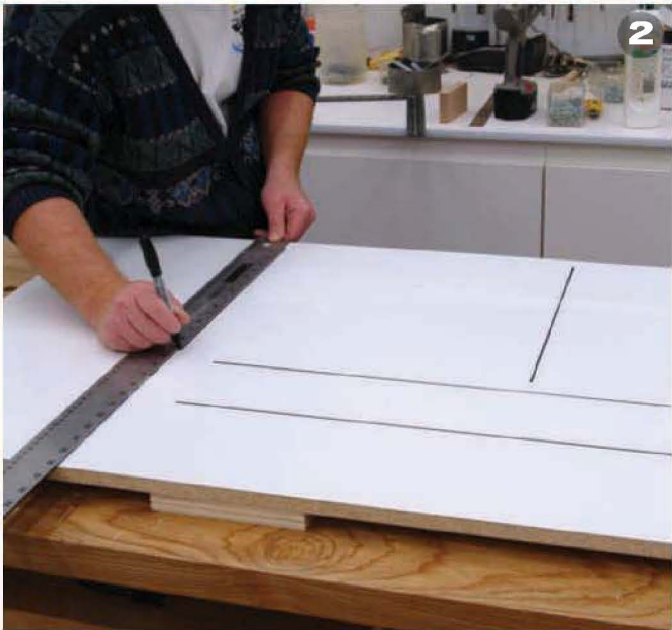
Pattern-Router Jig

CENTER-PATTERN CUTTING on door blanks is often done on computer numerically controlled (CNC) machines. These are expensive woodcutting tools; you can build a manual pattern jig for your door blanks for much less money.

This jig will cut a pattern on doors from 10" (254mm) to 20" (508mm) wide and 10" (254mm) to 30" (762mm) high, which should take care of just about any project door you'll need. The plunge router is fitted with a fancy profile cutter, which is lowered into the door face. These router bits are available at all woodworking stores.



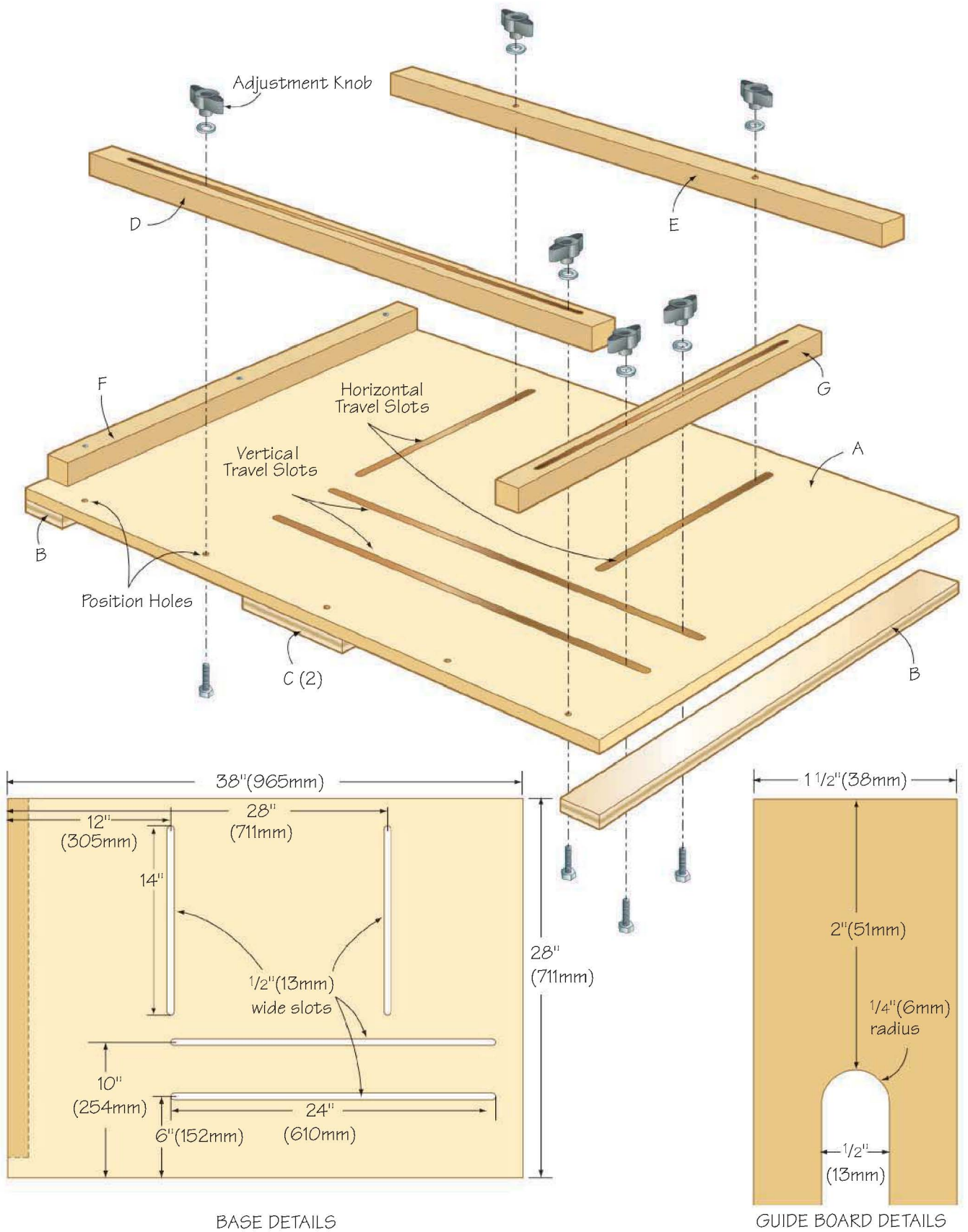
STEP ONE Using $\frac{5}{8}$ " (16mm) PB or any other sheet material of the same thickness, cut a base panel for the jig 28" x 38" (711mm x 965mm). Attach a "foot" at either end, $\frac{3}{4}$ " x 2" x 28" (19mm x 51mm x 711mm), using $1\frac{1}{4}$ " (32mm) screws. Attach two additional feet $\frac{3}{4}$ " x 2" x 6" (19mm x 51mm x 152mm) on the side edges, as shown. Align all the feet flush with the support-panel edges. These feet will raise the support panel so the bolt heads attached to the adjustable knobs will move freely.



STEP TWO Turn the support panel over and draw cutting guide lines, beginning 2" (51mm) in from the panel edges, in the positions shown on the drawing.

CUTTING LIST

REF.NO.	PART	STOCK	THICKNESS X WIDTH X LENGTH	
			INCHES	MILLIMETERS
A	1 base	particleboard	$\frac{5}{8}$ x 28 x 38	16 x 711 x 965
B	2 long feet	particleboard	$\frac{3}{4}$ x 2 x 28	19 x 51 x 711
C	2 short feet	particleboard	$\frac{3}{4}$ x 2 x 6	19 x 51 x 152
D	1 guide board	hardwood	$1\frac{1}{2}$ x $1\frac{1}{2}$ x 36	38 x 38 x 914
E	1 guide board	hardwood	$1\frac{1}{2}$ x $1\frac{1}{2}$ x 36	38 x 38 x 914
F	1 guide board	hardwood	$1\frac{1}{2}$ x $1\frac{1}{2}$ x $26\frac{1}{2}$	38 x 38 x 673
G	1 guide board	hardwood	$1\frac{1}{2}$ x $1\frac{1}{2}$ x 24	38 x 38 x 610





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STEP THREE Use a $\frac{1}{2}$ "-diameter (13mm) straight-cutting bit in your router to cut slots through the board. Place a straightedge on the panel to guide your router along the previously drawn lines.

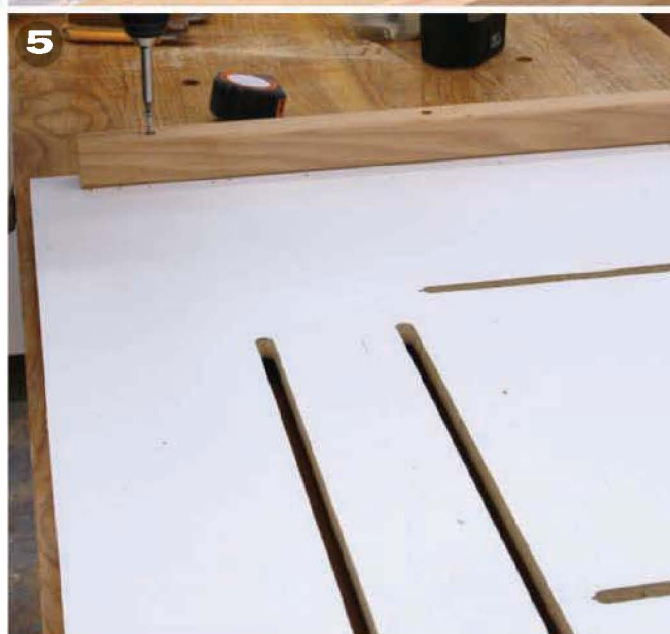
STEP FOUR You'll need four guide boards. Guides D and G require $\frac{1}{2}$ "-wide (13mm) through-slots centered along the length of each board. The slot cuts start and end 2" (51mm) from each end on both boards.

Use a $\frac{1}{2}$ "-diameter (13mm) straight bit to cut the slots. Make a number of small passes on each guide board, plunging the boards onto the bit and lifting them off the bit 2" (51mm) from the ends. You will be removing a lot of material, and there will be a great deal of stress on the router bit, so remove only a little material on each pass.

STEP FIVE Attach guide F to the base with three 2"-long (51mm) screws. It should be aligned flush with the outside top edge of the panel and flush with the right panel side as shown.



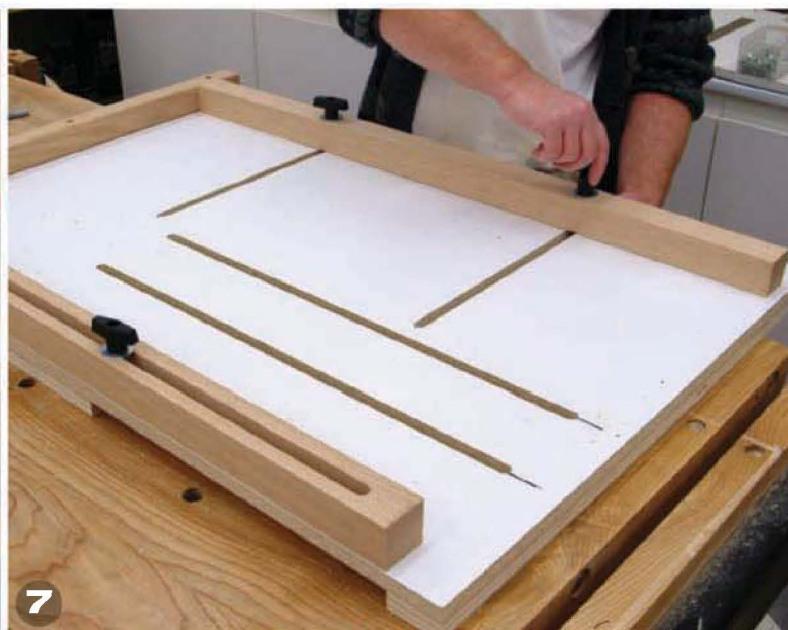
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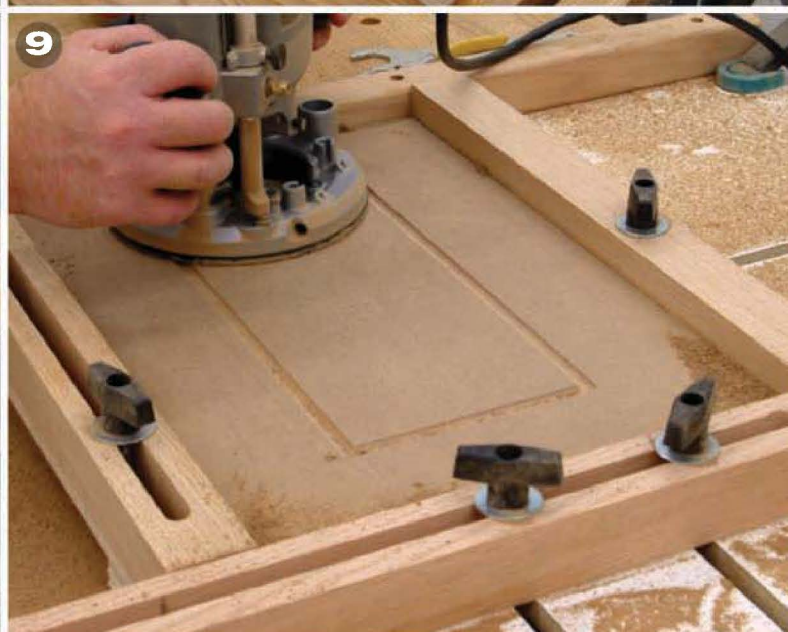
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STEP SIX Guide D will be adjustable vertically along the left edge of the panel. Drill $\frac{3}{8}$ "-diameter (10mm) holes about 6" (152mm) apart along the panel edge so guide D will be aligned with the left edge of the panel. Use 3"-long (76mm) $\frac{5}{16}$ "-diameter (8mm) bolts, two large fender washers, a lock washer and a $\frac{5}{16}$ " (8mm) threaded knob to secure the guide. The bolts can be moved to different holes depending on the amount of vertical travel that's required for the size of door you are patterning.

STEP SEVEN Drill holes through guide E, aligning them with the horizontal travel slots. Attach the guide to the panel using the same size bolts, washers and knobs as for guide A.

STEP EIGHT Install guide G using the same type of bolts, washers and knobs. It will be able to travel vertically in the panel slots and horizontally in the guide slot.

STEP NINE A door blank can now be placed in the pattern guide. Position it tightly against the fixed guide F. Guide D should be moved vertically so its bottom end is in line with the door-blank end. Next, slide guide E in the slots so it's tight against the other side of the door blank. Now move guide G vertically to the bottom edge of the door. The door blank will now be held securely by the four guides.

Position the router, with the bit raised, against one of the guide posts. Turn on the router and plunge the bit into the door blank to begin the cut pattern. Hold the router base tightly against the guide posts as you move the router around the inner frame. Raise the bit, turn off the router and remove it from the frame.

Additional Bit Profiles

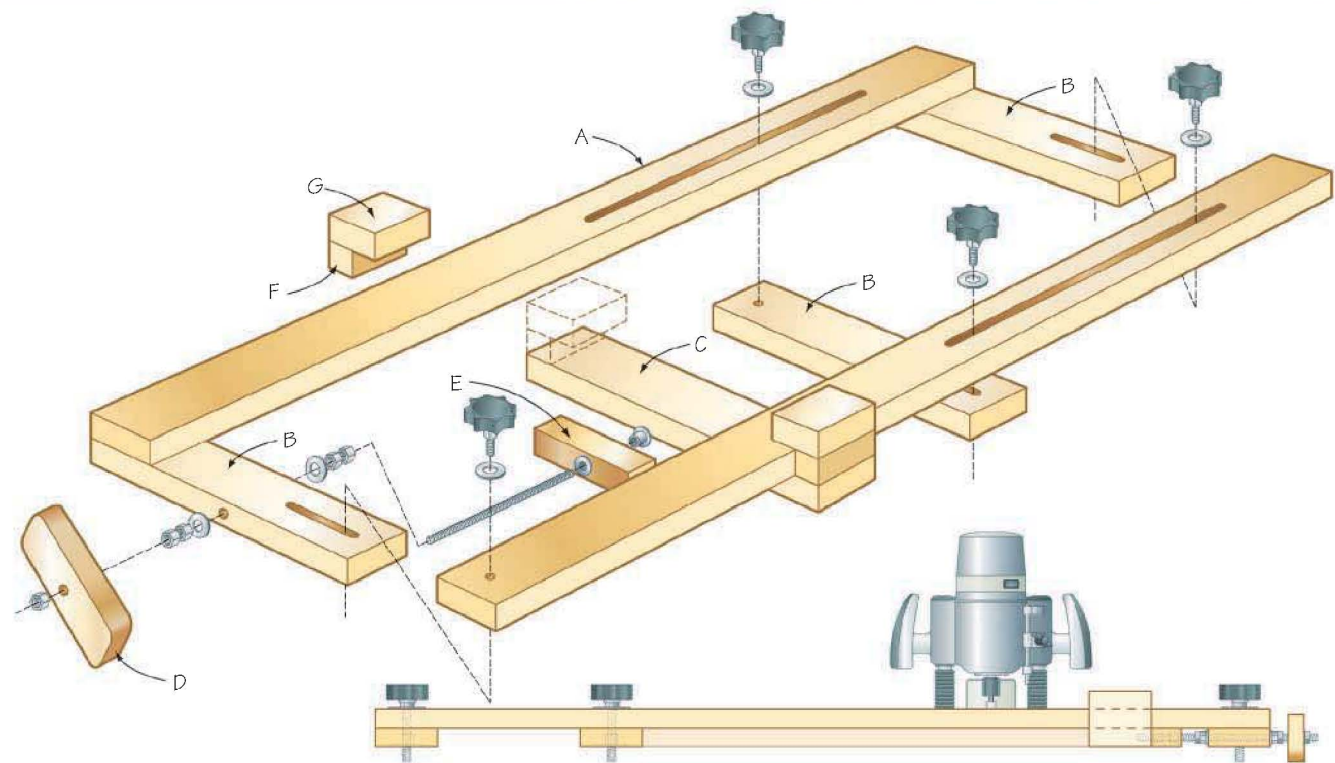


THERE ARE MANY STYLES OF ROUTER BITS AVAILABLE AT WOODWORKING STORES. I USED A BULL-nose bit for my first pattern. Buy any bits that can be plunged into a panel and experiment with a few designs.

In the picture at left, I'm using a pattern bit and cutting into a solid wood door. However, I use this example only to show another bit profile. I'm hesitant to recommend cutting patterns in solid wood because there is a risk that the door will warp due to the deep cuts. MDF and other sheet goods, which must be painted, are the best materials to use for one-piece doors with a design.

Dado Jig

CUTTING DADOES IS AN EASY TASK TO perform with a router. This jig gives you the flexibility to regulate the width of dados and cut them quickly.



CUTTING LIST					hardware	
REF. NO.	PART	STOCK	THICKNESS X WIDTH X LENGTH INCHES	MILLIMETERS		
A	2 rails	1/2 plywood	1 x 2 1/2 x 36 x 2 pieces of plywood	25 x 64 x 914	4 threaded knobs	1/4-20
B	3 cross rails	1/2 plywood	1 x 2 1/2 x 12 x 2 pieces of plywood	25 x 64 x 305	4 carriage bolts	1/4-20 x 2 1/2" (64mm)
C	2 clamping rails	1/2 plywood	1 x 2 1/2 x 14 x 2 pieces of plywood	25 x 64 x 356	4 flat washers	1/4
D	4 handle	plywood	3/4 x 1 1/4 x 5	19 x 32 x 127	1 threaded rod	5/16-18 x 7" (178mm)
E	2 pressure plate	plywood	3/4 x 1 1/2 x 5	19 x 38 x 127	2 flat washers	5/16
F	2 guide spacers	1/2 plywood	1 x 1 x 2 1/2 x 2 pieces of plywood	25 x 25 x 64	2 T-nuts	5/16-18
G	1 guide keepers	plywood	3/4 x 2 x 2 1/2	19 x 51 x 64	5 Hex nuts	5/16-18



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STEP ONE Begin by cutting the parts to size. Using a straight bit in a router mounted in a table, rout grooves in the parts that need them. (See the illustration.) Center the grooves in the parts.

STEP TWO Drill a recess hole in the top and bottom of the pressure plate for the two T-nuts. Then drill a $\frac{3}{8}$ "-diameter (10mm) through-hole. This hole will house the shafts of the T-nuts and allow the threaded rod to pass through the plate. (See the illustration.) Then drill a through-hole in one of the end cross beams.

STEP THREE Cut a wider groove in the bottom of the cross beams directly beneath the $\frac{1}{4}$ "-wide (6mm) groove for the bolts. This groove will house the head of the carriage bolt and recess it below the surface of the cross beam. Note the recess hole for the fixed carriage bolt.

STEP FOUR Using screws and glue, attach the top and the bottom (the one with the through-hole drilled in it) cross beams to one of the rails. Be sure that the cross beams are square with the rail.



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STEP FIVE Install the T-nuts in the pressure plate. Then test the fit of the opposing T-nuts by inserting the threaded rod into the T-nuts. If the rod binds slightly, adjust the depth of one of the T-nuts until the rod will thread through both nuts smoothly. Then, using glue and screws, attach the pressure plate to one of the slotted cross beams. When inserting screws into the end grain of plywood, predrill a hole a little larger than the diameter of the screw. Don't overtighten the screws. The glue will help hold the pressure plate securely.

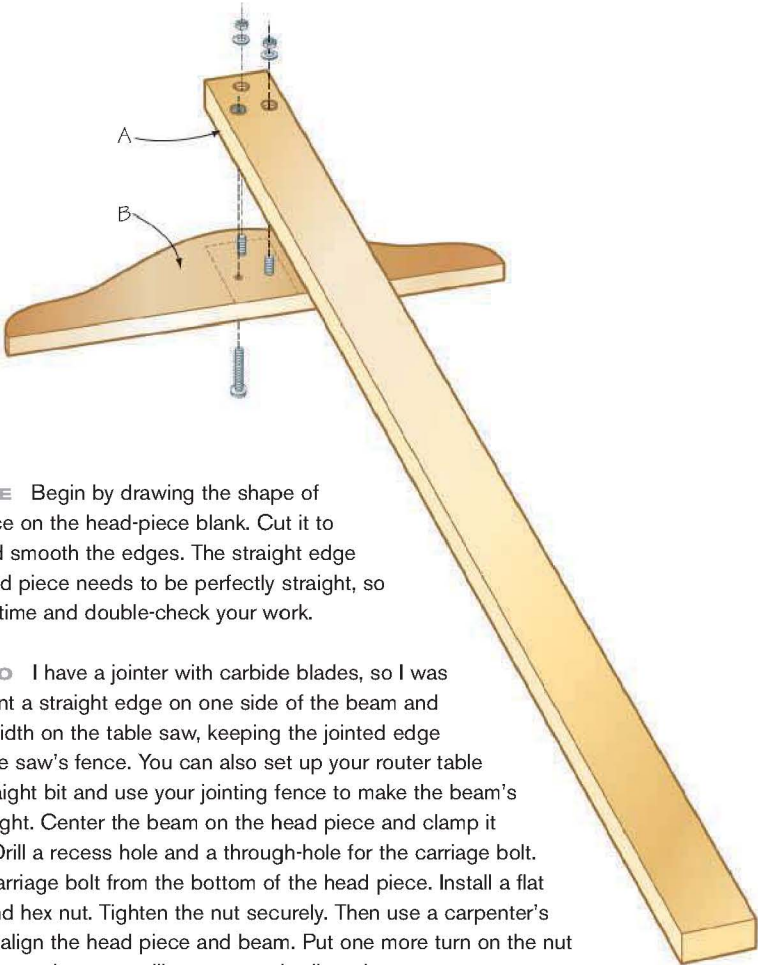
STEP SIX Install the threaded rod into the pressure plate, and install a flat washer and two hex nuts on the rod. Tighten the nuts against one another so they lock together. Attach the spacer and guide blocks to the cross beam. Install the four carriage bolts, washers and threaded knobs.

STEP SEVEN Install a flat washer and two hex nuts on the threaded rod. Tighten the nuts against each other so they lock together.

STEP EIGHT Drill a $\frac{5}{16}$ "-hole (8mm) in the handle and attach it to the end of the threaded rod, locking it in place between the two locked hex nuts and a final hex nut on the end of the rod. Tighten this nut securely so the handle is locked into place. When the handle is turned, the pressure plate and cross-beam assembly will move independently from the rest of the jig, enabling you to tighten the jig to your workpiece to hold it securely while you rout your dadoes.

Big T-Square

THIS LARGE T-SQUARE CAN BE USED TO GUIDE your router, pencil or knife when you need to draw or cut a straight line that is square with its perpendicular side. It's great for full-scale layouts of cabinetry or furniture plans when you're working in the shop. I used 1/2"-thick (13mm) plywood and laminated two pieces together to create 1"-thick (25mm) material. The plywood is stable and will always remain straight and flat.



STEP ONE Begin by drawing the shape of your choice on the head-piece blank. Cut it to shape and smooth the edges. The straight edge of the head piece needs to be perfectly straight, so take your time and double-check your work.

STEP TWO I have a jointer with carbide blades, so I was able to joint a straight edge on one side of the beam and cut it to width on the table saw, keeping the jointed edge against the saw's fence. You can also set up your router table with a straight bit and use your jointing fence to make the beam's edge straight. Center the beam on the head piece and clamp it in place. Drill a recess hole and a through-hole for the carriage bolt. Install a carriage bolt from the bottom of the head piece. Install a flat washer and hex nut. Tighten the nut securely. Then use a carpenter's square to align the head piece and beam. Put one more turn on the nut just to be sure the parts will stay securely aligned.

STEP THREE Drill the other holes for the carriage bolts and install them. Tighten the nuts securely. The big T-square is now ready for action.

CUTTING LIST					hardware	
REF. NO.	PART	STOCK	THICKNESS X WIDTH X LENGTH INCHES	THICKNESS X WIDTH X LENGTH MILLIMETERS		
A	1 beam	1/2" plywood	1 x 3 x 48 x 2 pieces of plywood	25 x 76 x 1219 x 2 pieces of plywood	3 carriage bolts	1/4-20 x 1 1/4" (32mm)
B	1 head piece	1/2" plywood	1 x 4 x 24 x 2 pieces of plywood	25 x 102 x 610 x 2 pieces of plywood	3 hex nuts	1/4-20
					3 flat washers	1/4

Router Holder

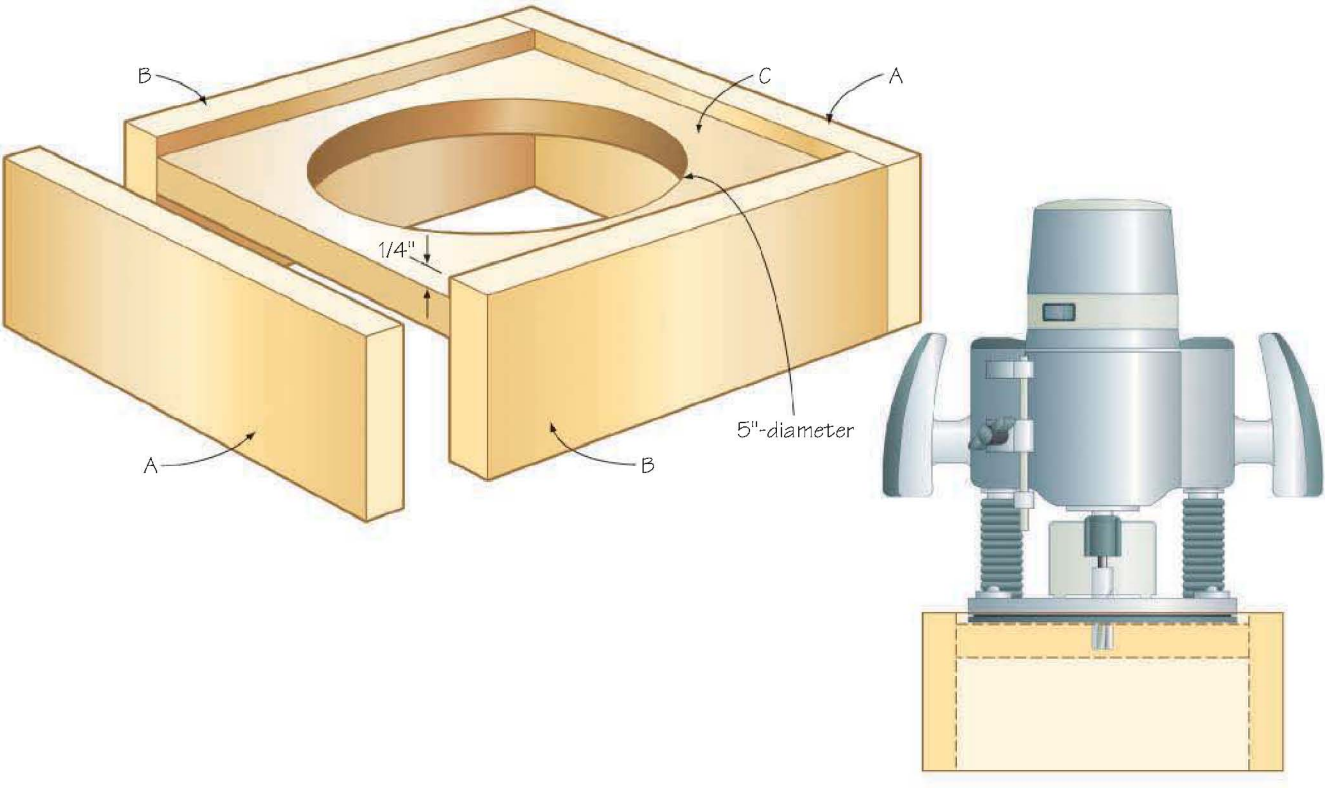
THIS MAY SEEM LIKE A SILLY PROJECT but believe me, I've found myself wasting a lot of time waiting for my router to stop turning after I've shut it off so I can set it down safely. This simple box solves that problem. Now I can shut off the router and set it down on this box while the shaft and cutter are still turning.

When you're making a whole set of kitchen drawers (we're talking 20 to 30 drawers) and you are using the dovetail router jig to cut the joints, you're going to pick up, turn on, shut off and put down the router a lot! It's amazing the amount of time this holder will save you because you can flip the switch off, set the router down and start resetting the parts in the dovetail jig while the router is still winding down.



CUTTING LIST

REF. NO.	PART	STOCK	THICKNESS X WIDTH X LENGTH INCHES	THICKNESS X WIDTH X LENGTH MILLIMETERS
A	2 sides	plywood	3/4 x 3 1/2 x 8	19 x 89 x 203
B	2 ends	plywood	3/4 x 3 1/2 x 6 1/2	19 x 89 x 165
C	1 insert	plywood	3/4 x 6 1/2 x 6 1/2	19 x 165 x 165





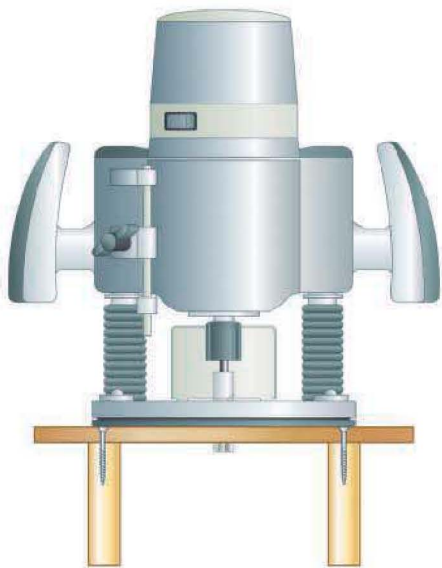
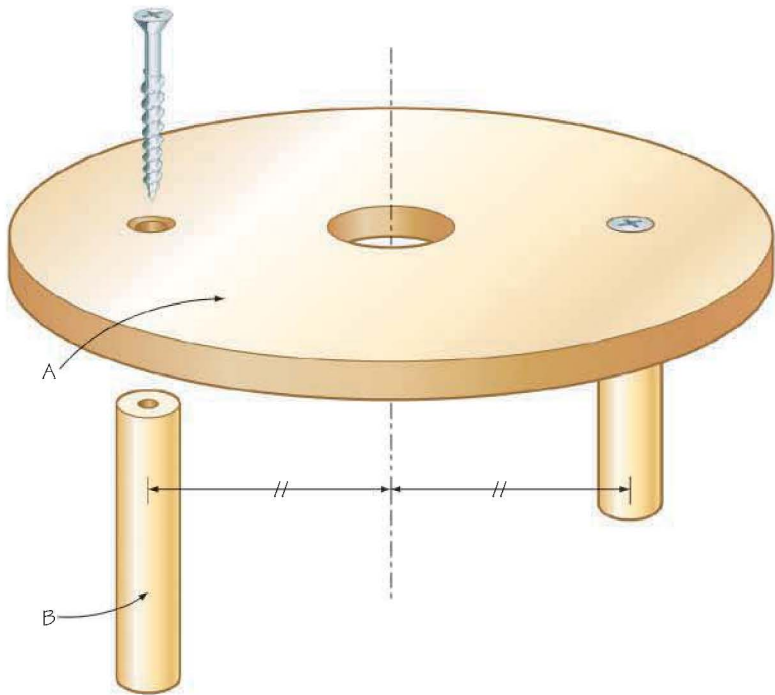
STEP ONE Attach the sides to the ends.

STEP TWO Cut a 5"-diameter (127mm) hole in the center of the insert. Install the insert in the box, holding it about 1/4" (6mm) from the top edges of the box. That's it. Simple – but what a timesaver!



Self-Centering Guide

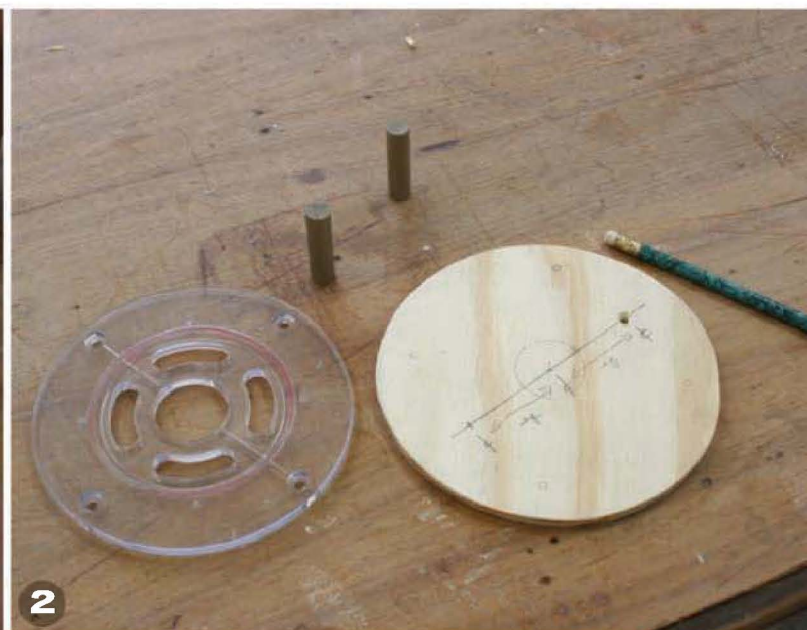
THIS IS ANOTHER ONE OF THOSE simple jigs that works well. Using this jig to cut mortises is about as easy as it gets. I recommend using a plunge router with this jig, but it will work with a fixed-base router (as shown in the photo) as well. Simply make a few incremental cuts until you reach the desired depth of the mortise.



CUTTING LIST					
REF. NO.	PART	STOCK	THICKNESS X WIDTH X LENGTH INCHES	THICKNESS X WIDTH X LENGTH MILLIMETERS	
A	1	base	plywood	1/4 x 6 1/2 diameter	6 x 89 diameter
B	2	guide pins	hardwood	1/2 diameter x 2	13 diameter x 51



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STEP ONE Cut a 6½"-diameter (165mm) disc from ¼"-thick (6mm) plywood. Using your router's plastic base plate as a pattern, mark the screw holes and center hole.

STEP TWO Connect an opposite set of screw holes center to center with a line. Mark the locations for the two guide posts, measuring equal distances from the center of the disc. The key to this jig working properly is the accuracy of the equal spacing of these guide posts.

STEP THREE Drill the screw holes and make the center cutout. Using No.10 x 1½" (38mm) wood screws, attach the ½"-diameter (13mm) by 2"-long (51mm) guideposts. Be sure to predrill for the No. 10 screws.

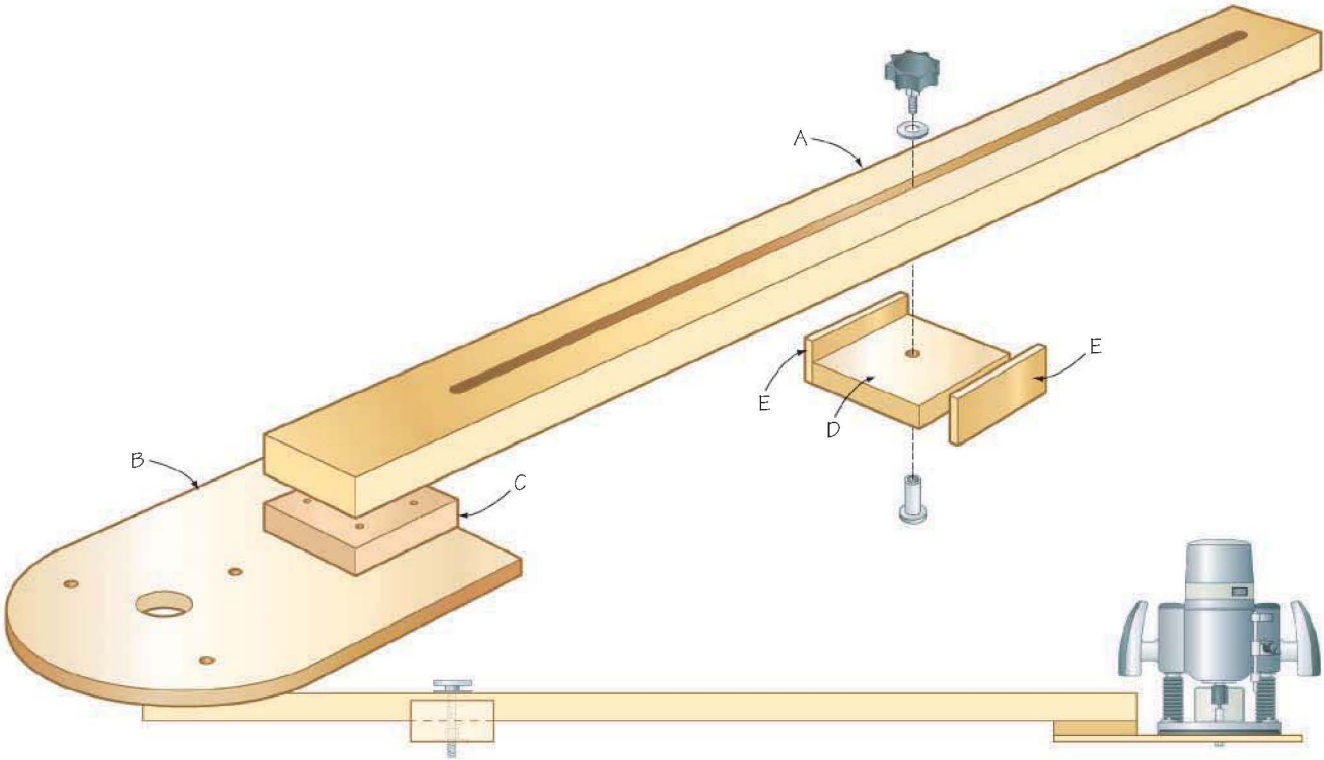
STEP FOUR Attach the jig to your router's base and you're ready to go!

Circle-Routing Jig

WHEN IT COMES TO CUTTING accurate arcs and circles, the router can't be beat. This jig ensures completely accurate cuts and is a snap to adjust and set up.



CUTTING LIST					hardware
REF. NO.	PART	STOCK	THICKNESS X WIDTH X LENGTH INCHES	THICKNESS X WIDTH X LENGTH MILLIMETERS	
A	1 beam	1/2" plywood	1 x 3 x 36 x 2 pieces of plywood	25 x 76 x 914 x 2 pieces of plywood	1 knob with threaded rod 1/4-20 x 3" (76mm)
B	1 base	plywood	1/4 x 6 1/2 x 9	6 x 165 x 229	1 fender washer 1/4
C	1 spacer	plywood	1/2 x 3 x 3	13 x 76 x 76	1 T-nut 1/4-20
D	1 center block	plywood	3/4 x 3 x 5	19 x 76 x 127	
E	2 guide blocks	plywood	3/4 x 1 1/2 x 5	19 x 38 x 127	

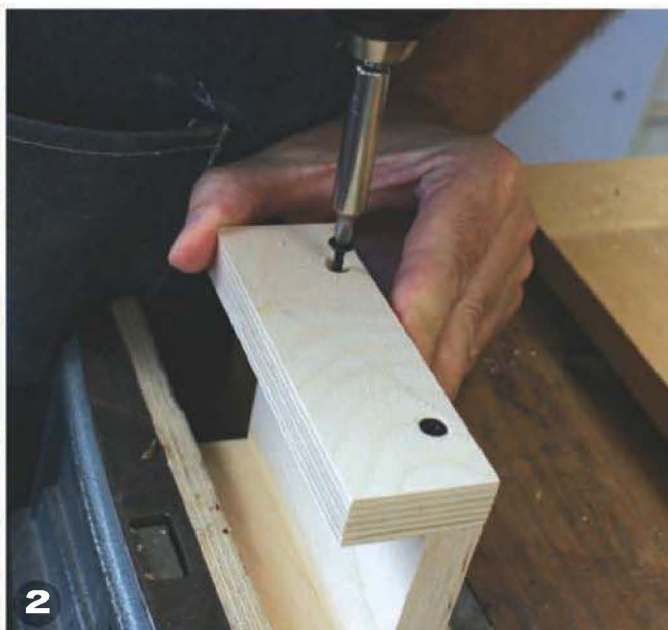




STEP ONE I used two layers of $\frac{1}{2}$ "-thick (13mm) plywood laminated together to make the 1"-thick (25mm) arm for this jig. Rout a $\frac{1}{4}$ "-wide (6mm) groove in the center of the arm.

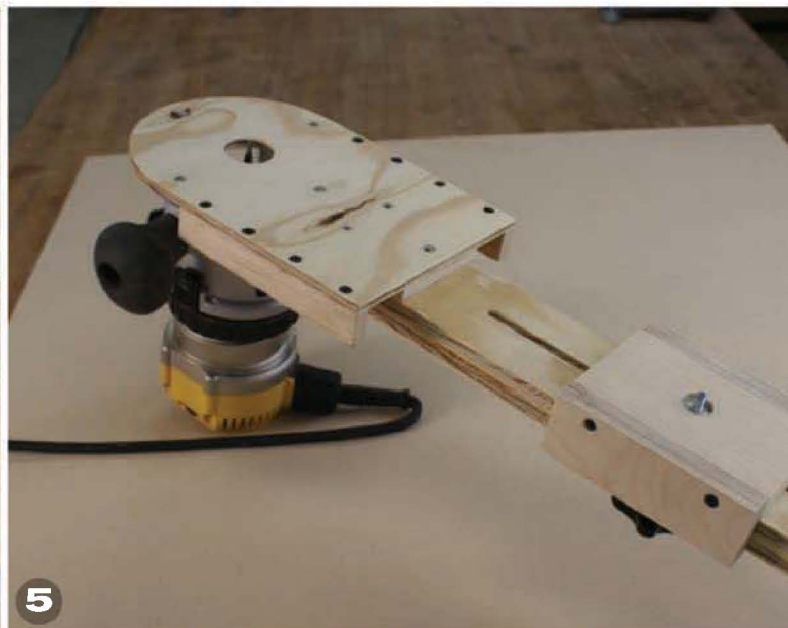
STEP TWO Before attaching the guide blocks to the center block, make sure the center block is the same width as the beam. Then attach the guide blocks to the center block. Then, in the center block, drill a recess hole and a through-hole for the T-nut and install the nut.

STEP THREE Attach the spacer blocks to one end of the beam.





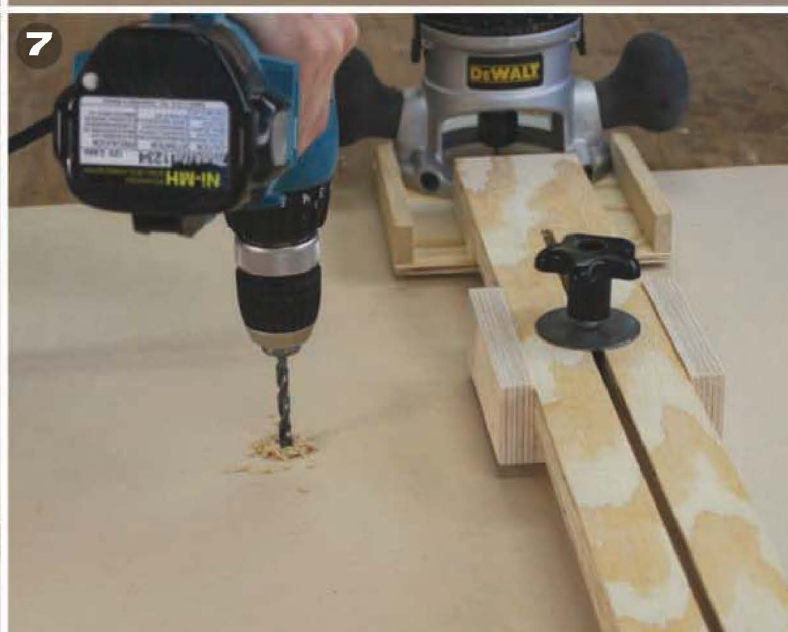
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STEP FOUR Cut a threaded rod that is long enough to be inserted into the threaded knob and also extend about $\frac{1}{4}$ " (6mm) past the bottom of the center block. Lock the rod to the knob using a hex nut tightened against the bottom of the knob.

STEP FIVE Attach the base plate to the spacer blocks. If you find that the $\frac{1}{4}$ " (6mm) plywood is flexing too much when you install the router, install two stiffener cleats on both edges of the base plate.

STEP SIX Install the router bit of your choice. To set up the jig, measure from the extended end of the threaded rod to the router bit. When making this measurement, remember to account for the radius of the router bit. One method I use is to measure the distance between the extended end and the inside of the router bit. Add the radius of the extended end of the threaded rod and you've got your arc radius.

STEP SEVEN Drill a hole for the threaded rod end in the material you're going to cut. Insert the rod end in the hole and cut the radius.

Router Guide



I'VE SPENT YEARS USING ROUTERS for a variety of tasks. Some tasks — such as cutting rabbets and profiling the edges of countertops and shelves — I do time and time again.

I used to find myself looking for a piece of wood to clamp to the router base to act as a guide for profiling, cutting rabbets and so forth. This simple but adjustable jig does that and more. It can be adjusted to cut dados, for example.

I now have one router base that has this jig permanently attached to it. All I need to do is grab a router and this jig, and I'm ready to start routing.



STEP THREE Make the guide-block assembly by first double-checking to be sure the center block is the same length as the width of the base plate. Attach the guide blocks to the center block.

STEP FOUR Set the base in the guide-block assembly and mark the location of the hole for the threaded rod. If you're just a little bit off center with your groove, don't worry. That's why you mark for the hole now instead of drilling it beforehand!

STEP ONE Cutting a curve on the end of the jig isn't necessary, but it looks much nicer. Strike the radius, cut it and smooth the edges.

STEP TWO Rout a groove down the center of the base plate.

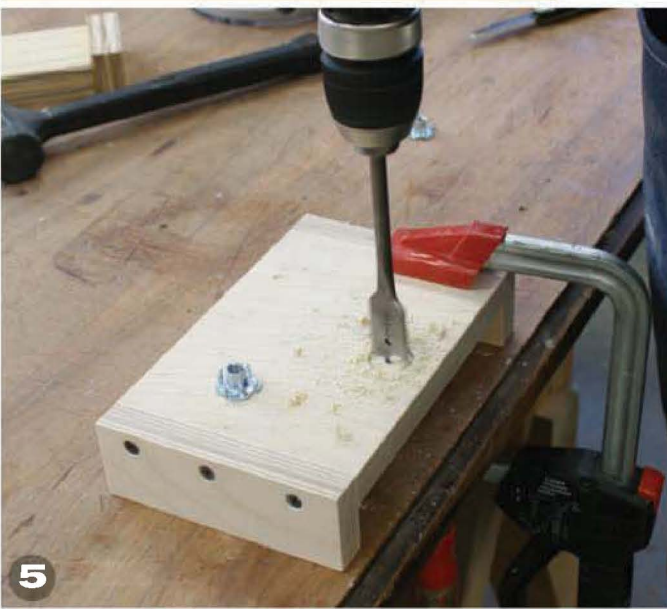
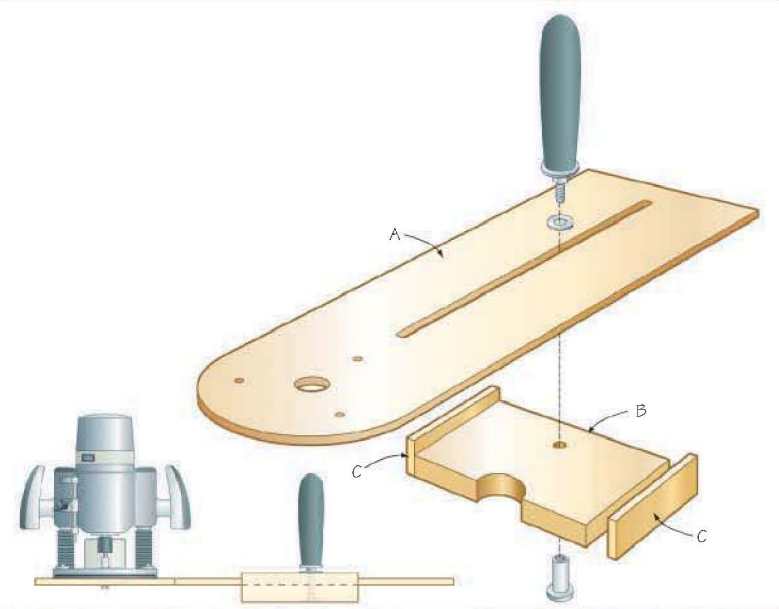


CUTTING LIST

REF. NO.	PART	STOCK	THICKNESS X WIDTH X LENGTH INCHES	THICKNESS X WIDTH X LENGTH MILLIMETERS
A	1 base	plywood	1/4 x 6 1/2 x 18	6 x 165 x 457
B	1 center block	plywood	3/4 x 5 x 6 1/2	19 x 127 x 165
C	2 guide blocks	plywood	3/4 x 1 1/2 x 5	19 x 38 x 127

hardware

1 T-nut	3/8-16
1 hex nut	3/8-16
1 threaded rod	3/8-16 x 1 1/2" (38mm)
1 flat washer	3/8
1 handle w/threaded insert	3/8-16

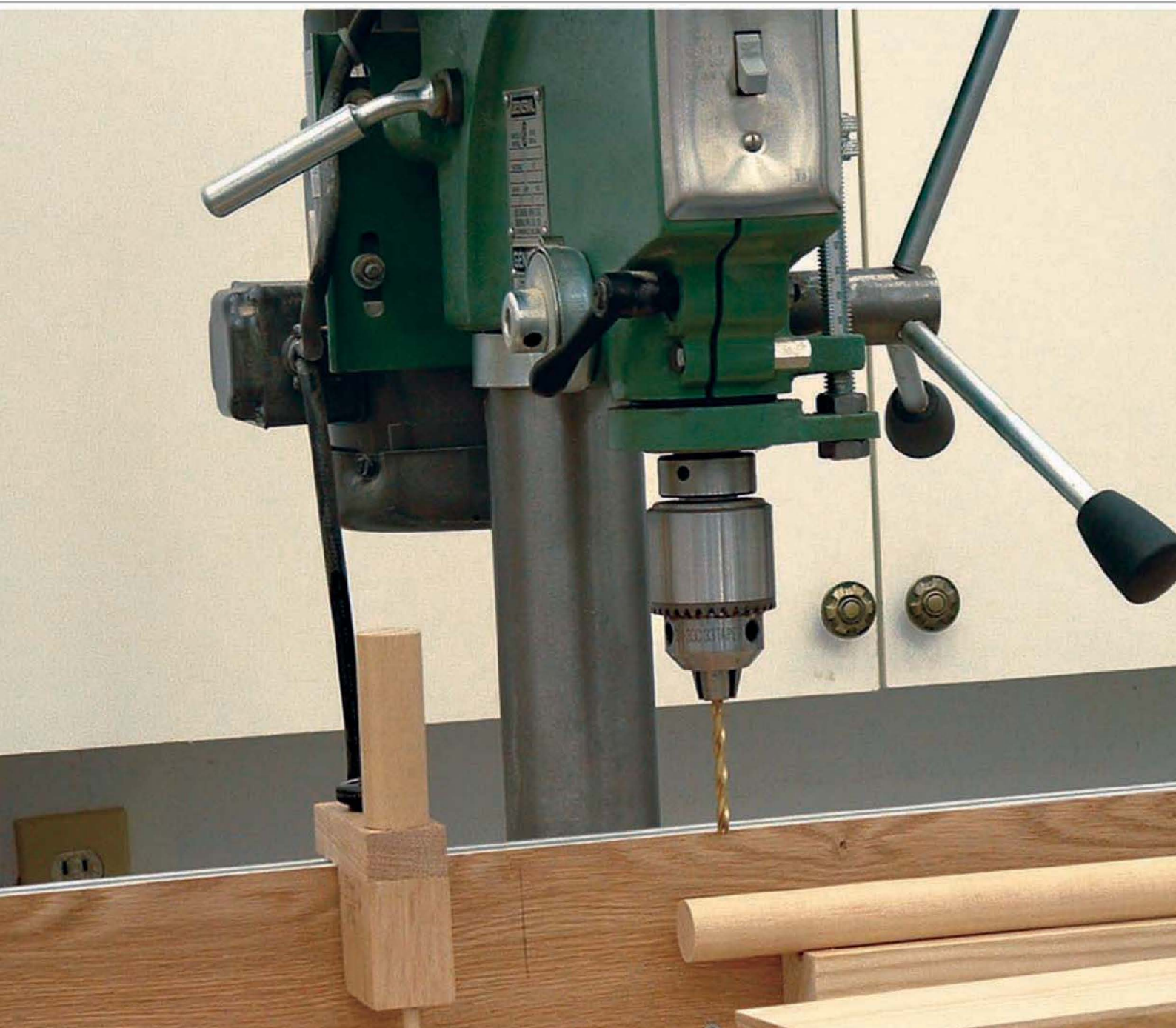


STEP FIVE Drill the hole for the threaded rod. Then drill the recess hole for the T-nut. The hole for the threaded rod will be the same hole that houses the shaft of the T-nut.

STEP SIX Cut a piece of threaded rod long enough to be inserted into the handle and still thread into the T-nut. Lock the threaded rod to the handle using a hex nut tightened against the bottom of the handle.

STEP SEVEN Use the router's base plate as a template to mark the locations of the center hole and the screw holes on the jig's base plate. Drill the holes and attach the router's base to the jig.

drill-press jigs



and fixtures

5

This chapter deals with jigs and fixtures that will allow

you to use your drill press more effectively. I built a table upgrade with pull-out extensions to give me more support when drilling larger boards. I also

added a fence with an adjustable stop block for more accuracy. Finally,

with the Spring-Loaded Adjustable Shelf-Pin Block, you will be able to drill evenly spaced holes for kitchen cabinets, bookcases and display units.

Dowel Drilling Fixture

TO HELP STABILIZE A dowel when drilling holes through it, I built this simple jig using a 2" (51mm) square piece of hardwood. I also made one out of a piece measuring 1½" × 4" (38mm × 102mm).



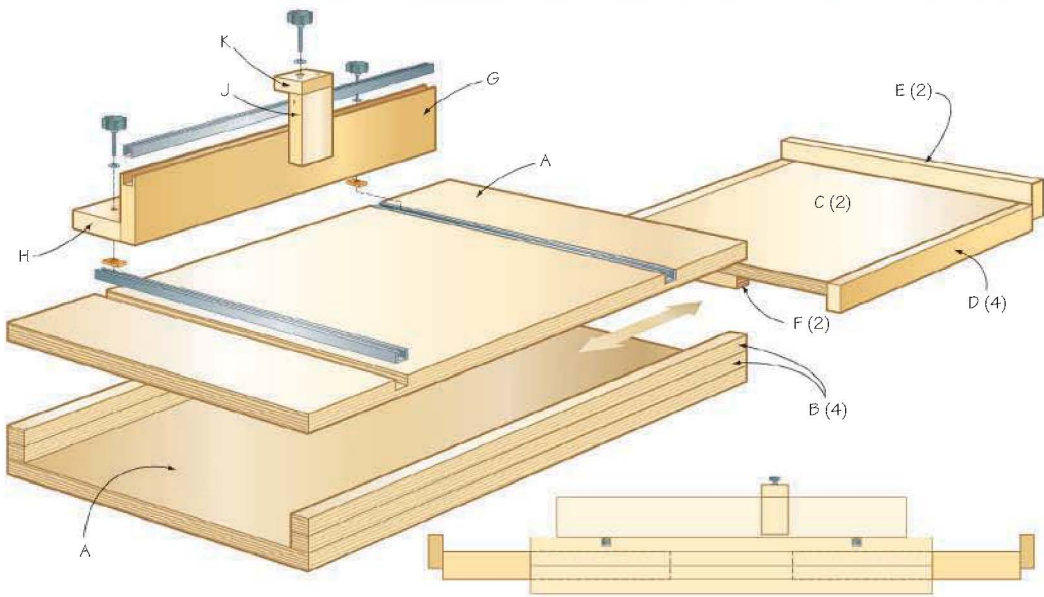
STEP ONE I set up my router table with a V-grooving bit, but you can use a different router bit such as a roundnose. You can make your own custom block using all four sides cut to different depths.



STEP TWO You can also run a V-groove on the table saw. Angle the blade at 45°. Run the board through, holding it tightly against the fence. To complete the V-shape groove, turn the board around and run it again.

Drill Press Table with Extensions

IT'S ALWAYS NICE TO HAVE A LARGER work surface, and the drill press is no exception. This 24"-wide (610mm) table has an adjustable fence and a stop block. Because shop space is a concern for many woodworkers, I have hidden pullouts that can extend the table to 48" (1219mm). For this project, I used veneer-core plywood and $\frac{3}{4}$ " (19mm) solid oak for hardwood.



CUTTING LIST

REF. NO.	PART	STOCK	THICKNESS X WIDTH X LENGTH INCHES	MILLIMETERS
A	2 top & bottom	plywood	$\frac{3}{4}$ x 16 x 24	19 x 406 x 610
B	4 spacers	plywood	$\frac{3}{4}$ x 1 x 24	19 x 25 x 610
C	2 pull-out panels	plywood	$\frac{3}{4}$ x 12 $\frac{1}{2}$ x 12	19 x 318 x 305
D	4 hardwood runners	hardwood	$\frac{3}{4}$ x 1 $\frac{1}{2}$ x 12	19 x 38 x 305
E	2 front supports	hardwood	$\frac{3}{4}$ x 1 $\frac{1}{2}$ x 14	19 x 38 x 356
F	2 stop blocks	hardwood	$\frac{3}{4}$ x $\frac{3}{4}$ x 4	19 x 19 x 102
G	1 fence	hardwood	1 x 3 x 24	25 x 76 x 610
H	1 fence support	hardwood	1 x 3 x 24	25 x 76 x 610
J	1 vertical stop block	hardwood	$\frac{3}{4}$ x 1 $\frac{1}{2}$ x 2 $\frac{3}{4}$	19 x 38 x 70
K	1 horizontal stop block	hardwood	$\frac{3}{4}$ x 1 $\frac{1}{2}$ x 2	19 x 38 x 51

hardware

2 T-tracks	$\frac{3}{8}$ " x $\frac{3}{4}$ " x 16" (10mm x 19mm x 406mm)
3 threaded knobs	$\frac{1}{4}$ -20 x 1 $\frac{1}{4}$ " (32mm)
3 T-track nuts	$\frac{1}{4}$ -20
3 flat washers	$\frac{1}{4}$ " (6mm)



STEP ONE Cut a top and a bottom, plus four spacers as detailed in the cutting list. The top panel needs two dados 16" (406mm) apart on center to receive the metal T-track. Measure the width and depth of the track and set your dado blades accordingly. It is always a good idea to run a test piece first to guarantee a tight fit.

STEP TWO Predrill the bottom panel so you will be able to bolt the assembly to the table of your drill press. Using screws, lag bolts or T-nuts instead of bolts to attach it is fine.

STEP THREE Assemble the top and bottom panels, using glue and 2" (51mm) PB screws with the spacers at front and back. This will create an opening of 14" x 1½" (356mm x 38mm) on each side for the pullout extension.

STEP FOUR The track I used needed ¾"-deep (10mm) dados. Fasten the track with ½" (13mm) screws in the countersink holes. Make sure the screws aren't so long that they would interfere with the pullouts.

STEP FIVE Cut the pullout panel to the width of the opening minus the thickness of the two runners. Measure the height opening of the assembly and cut the side runner out of leftover pieces of hardwood. Then glue and screw the side runners flush with the top of the pull-out shelf.



STEP SIX Fasten the front piece flush with the top of the assembly table.

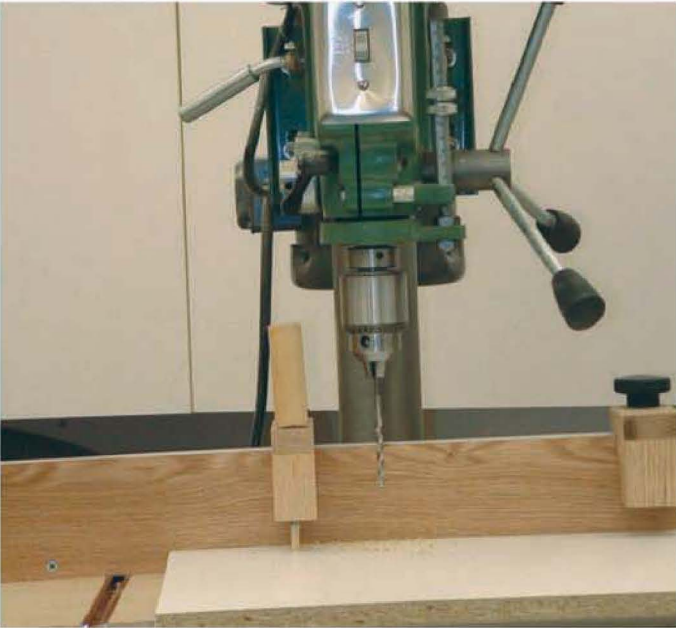
STEP SEVEN Add a stop block at the back of the pullout and insert a 1" (25mm) screw through the bottom of the assembly.

STEP EIGHT Fasten the fence at 90° to the fence support using glue and 2" (51mm) screws. Attach a T-track to the top of the fence. I routed a channel on top of the 1"-thick (25mm) material but you can just as easily attach the T-track parallel to the top of the fence.

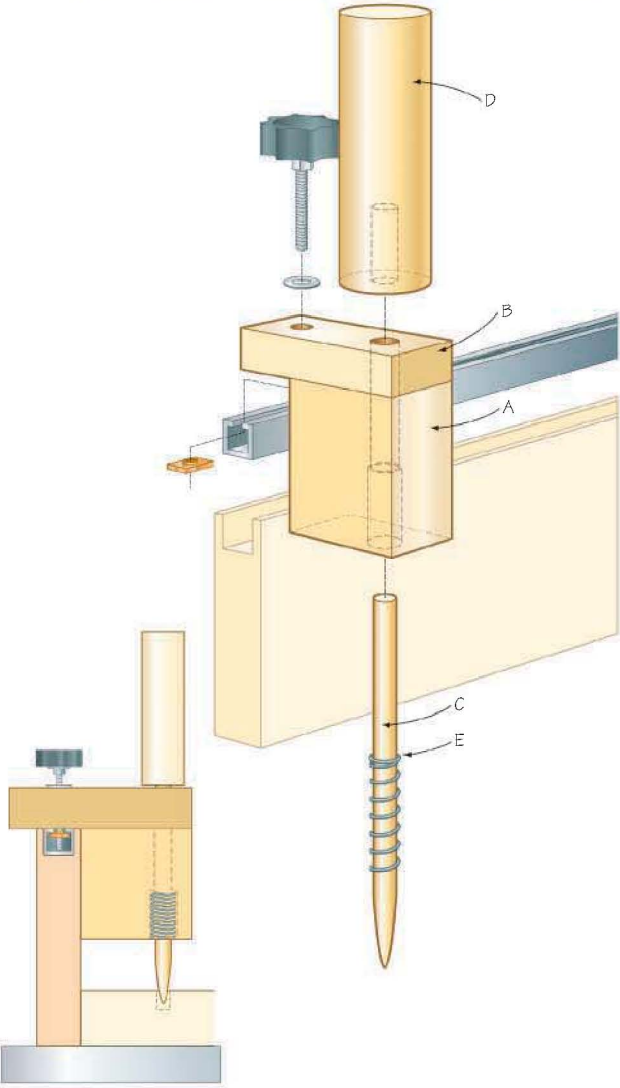
STEP NINE Drill two 1/4" (6mm) holes at the back of the fence 16" (406mm) on center to match the T-track. Insert a 1 1/4" (32mm) threaded knob 1/4" x 20" (6mm x 508mm) and assemble with a T-slot nut. Slide the fence in the table track to complete the assembly. Fix the assembly to the drill-press table with the method of your choice.

STEP TEN Join the horizontal stop block to the vertical stop block using glue and screws. Drill a hole through the top block that is centered on the track, then install a threaded knob. Note: If the fit is tight on the pullouts, plane down the runners a little.

Spring-Loaded Adjustable Shelf-Pin Block



I MADE THIS ADJUSTABLE BLOCK SO I could drill shelf-pin holes at an equal distance from one another. The jig is set at 37mm (1⁷/₁₆") from the fence, following the European system of measure for hinges and drawer glides, but it is adaptable to your own measurements. The spring-loaded pin acts as the reference point and is adjustable on the fence.

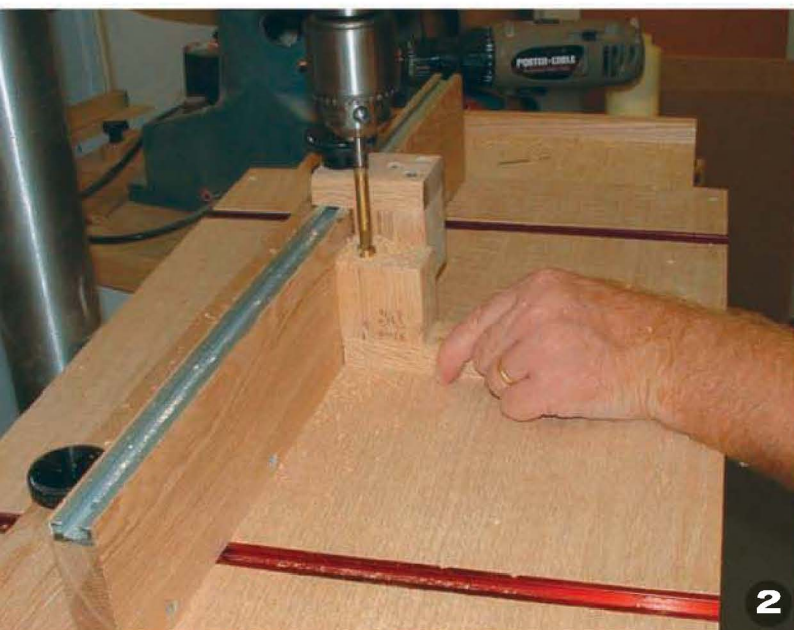


CUTTING LIST

REF. NO.	PART	STOCK	THICKNESS X WIDTH X LENGTH	
			INCHES	MILLIMETERS
A	1 front block	hardwood	1 ¹ / ₄ x 2 x 2	32 x 51 x 41
B	1 top block	hardwood	3 ³ / ₄ x 1 ¹ / ₄ x 3 ¹ / ₄	19 x 32 x 83
C	1 pin	dowel	1 ¹ / ₄ dia x 6	6 x 152
D	1 handle	dowel	1 dia x 3	25 x 76
E	1 spring	steel	7 ¹ / ₁₆ dia x 1 ¹ / ₂	11 x 38



STEP ONE Cut the front and top blocks. Glue the top block flush to the front face of the front block. Drill a 1/4"-diameter (6mm) hole through both blocks at 1⁷/₁₆" (37mm) from the back side of the front block and centered left to right.



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STEP TWO Using a Forstner bit, drill a $\frac{7}{16}$ "-diameter (11mm) hole $1\frac{1}{2}$ " (38mm) deep from the bottom of the block to fit the spring. The center of the hole should be at $1\frac{7}{16}$ " (37mm) from the back of the block.

STEP THREE I used a $\frac{1}{4}$ "-diameter (6mm) dowel roughly 6" (152mm) long. Drill a small hole through the side of the dowel and bend the end of the spring into the hole to lock it in place.

STEP FOUR Cut a 1" (25mm) dowel for the pull-up handle and drill a $\frac{1}{4}$ "-diameter (6mm) hole in one end. Insert the dowel and spring assembly into the block. Glue the $\frac{1}{4}$ " (6mm) dowel into the handle so the handle is flush with the top of the block when the spring is relaxed. Now drill a hole in the back of the top block and insert the flat nut and knob. You can now use the jig on your drill-press fence to adjust and set the jig wherever you need it.

STEP FIVE To use the jig, mark the location of the first and second holes. Set the depth and drill the first hole. Move the workpiece sideways until the second hole mark is centered beneath the drill bit. Insert the spring-loaded pin into the first hole and lock the jig in place. Now drill the second hole. Pull up on the handle of the jig to remove the pin from the hole, then move the workpiece sideways and drop the spring-loaded pin into the second hole. Now drill your third hole. Continue this until you've completed your drilling operation. The holes will be equally spaced. This will work for holes spaced any distance apart.

band-saw jigs



and fixtures



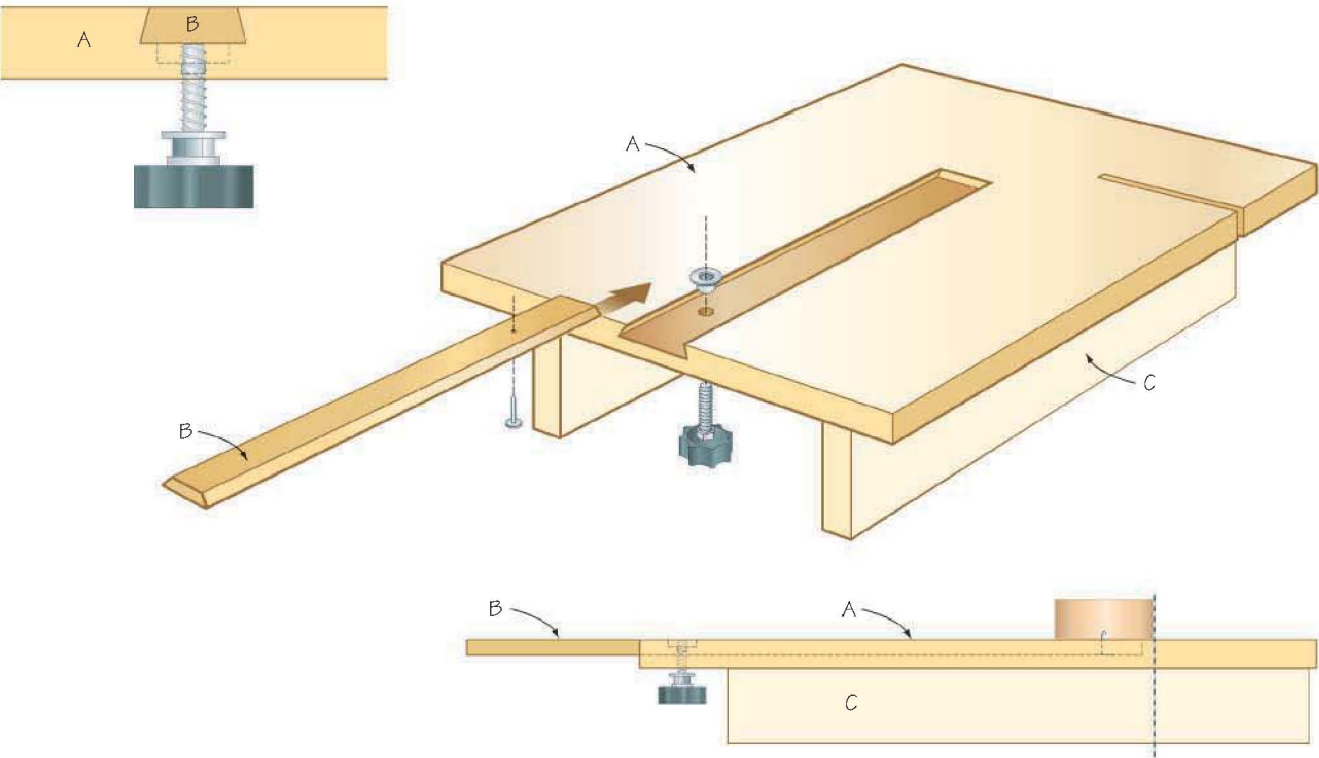
Band saws come in all sizes. They are very useful in

a shop because the thin, narrow blades allow you to cut odd-shaped pieces, while larger blades take care of straight cutting and resawing lumber. The first fixture described in this chapter gives you the ability to cut circles of various sizes with the benefit of a larger table. The second fixture is a sturdy adjustable fence that can be angled when straight cutting is no longer possible.

Circle-Cutting Fixture

MANY BAND-SAW TABLES are not large enough. The small surface makes it awkward to cut larger or round projects. This custom fixture will help solve this problem.

CUTTING LIST					hardware
REF. NO.	PART	STOCK	THICKNESS X WIDTH X LENGTH		
			INCHES	MILLIMETERS	
A	1	fixture table	particleboard	3/4 x 24 x 30 19 x 610 x 762	1 threaded knob 1/4-20 x 1 1/4" (32mm)
B	1	beveled strip	hardwood	3/8 x 2 1/2 x 24 10 x 51 x 610	1 T-nut 1/4-20
C	2	cleats	hardwood	3/4 x 1 3/4 x 18 19 x 45 x 457	



STEP ONE Cut out the table panel. Measure the opening from the arm of the band saw to the blade. From the measurement, cut a slot halfway in the back of the panel to allow the band-saw blade in the center of the panel.



STEP TWO To cut the groove in the top of the panel, fit the router with a dovetail bit and set the depth of cut at 3/8" (10mm). Clamp two boards parallel to each other. The width of the router base plus 2" (51mm) will create a 2" (51mm) groove. Run up and down the two sides clockwise, then clean up the middle of the groove by going side to side with the router.



STEP THREE Using the table saw, set the saw-blade bevel angle to the same angle as the dovetail router bit, which in this case is 10°. Cut a 2"-wide (51mm) beveled piece of hardwood to fit snugly in the dovetail groove. Plane it down to $\frac{3}{8}$ "-thick (10mm), the depth of the groove. Then drill a pilot hole through the wedge 3" (76mm) from the end and drive in a roofing nail to act as a pivot point.

STEP FOUR Cut the nail so it's sticking out by only about $\frac{1}{8}$ " (3mm). Drill a hole in the groove of the table panel 3" (76mm) from the edge and insert a T-nut from the top. Install the threaded knob from underneath, to act as a lock for the wedge strip.

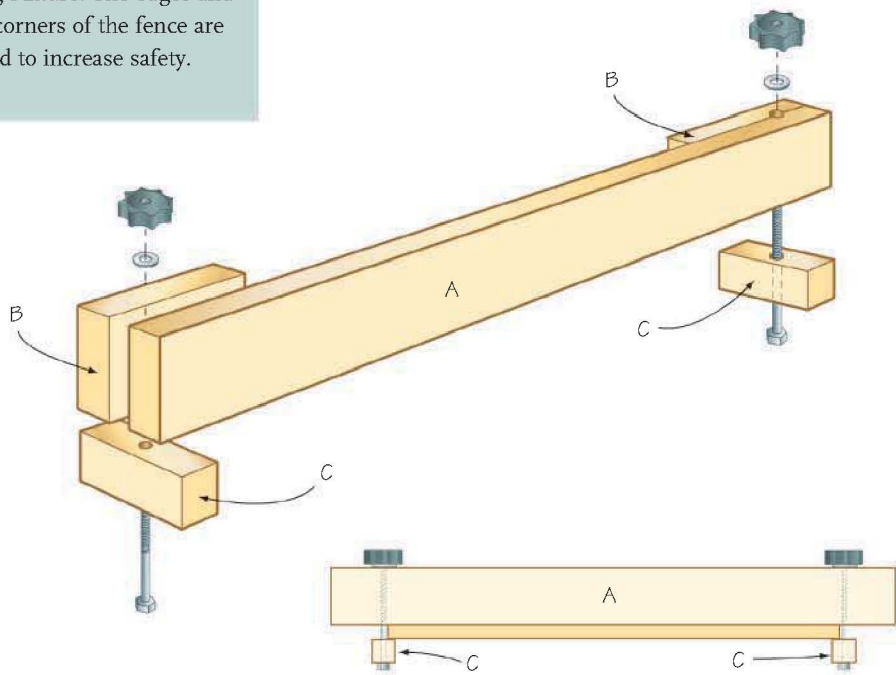
STEP FIVE Cut the two cleats and attach them with screws to the underside of the board, then secure the board to the existing table with machine screws if the table has threaded holes. Use nuts and bolts if it doesn't.

STEP SIX Take the radius of your circle and, measuring from one side of your project panel, drill a small pilot hole to fit over the pivot point of the wedge piece. Then slide it next to the blade and lock it in place with the knob under the table. Start the band saw and rotate the material slowly.

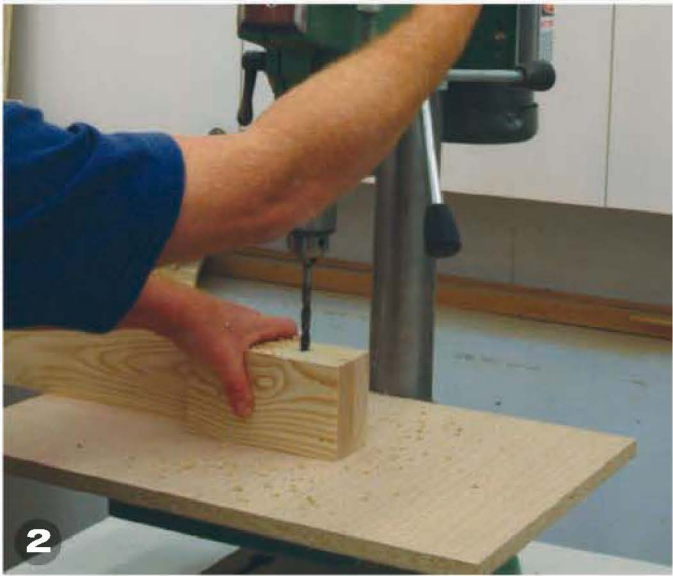
Band-Saw Fence

BAND-SAW BLADES usually drift to one side. To cut straight you need to feed the material at an angle. This fence is adjustable and can be locked at an angle to your newly made oversize table with the Circle-Cutting Fixture. The edges and upper corners of the fence are rounded to increase safety.

CUTTING LIST					hardware
REF. NO.	PART	STOCK	THICKNESS X WIDTH X LENGTH INCHES	MILLIMETERS	
A	1 fence	hardwood	1 1/4 x 3 x 30	32 x 76 x 762	2 hex bolts 5/16-16 x 6" (152mm)
B	2 doubling blocks	hardwood	1 1/4 x 3 x 6	32 x 76 x 152	2 threaded knobs 5/16-16
C	2 clamp blocks	hardwood	1 1/4 x 1 1/4 x 2 1/2	32 x 32 x 64	2 flat washers 5/16



STEP ONE I used a piece of hardwood for the fence and doubled up the thickness at each end by adding blocks of the same material. I glued and screwed the blocks in place using 2" (51mm) screws.



STEP TWO Drill a 5/8" (10mm) hole through the double-thickness ends of the fence to fit a 5/16" x 6" (8mm x 152mm) bolt. The distance between the two bolts should be 1" (25mm) more than the width of the table. For this project, the table is 24" (610mm) wide, so we will drill the holes 25" (635mm) apart. This will give enough play to lock the fence at an angle as needed.



3



4



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6

STEP THREE Drill a $\frac{9}{16}$ " (10mm) hole in each block. The blocks are used underneath the table to hold the fence to the table.

STEP FOUR Insert a bolt through the block, then through the fence, and attach it with a threaded knob at the top.

STEP FIVE To use the fence, draw a straight line parallel to the edge of a scrap board. Cut straight on the line for about 12" (305mm), then stop the saw.

STEP SIX Make sure you hold on tightly to the piece as you slide in the adjustable fence next to it. Tighten the locking knobs and finish your cut. This is the angle of deviation for this particular band-saw blade. When you replace this saw blade, you'll need to reset the fence for the new blade's angle of deviation.

hand-tool jigs



and fixtures



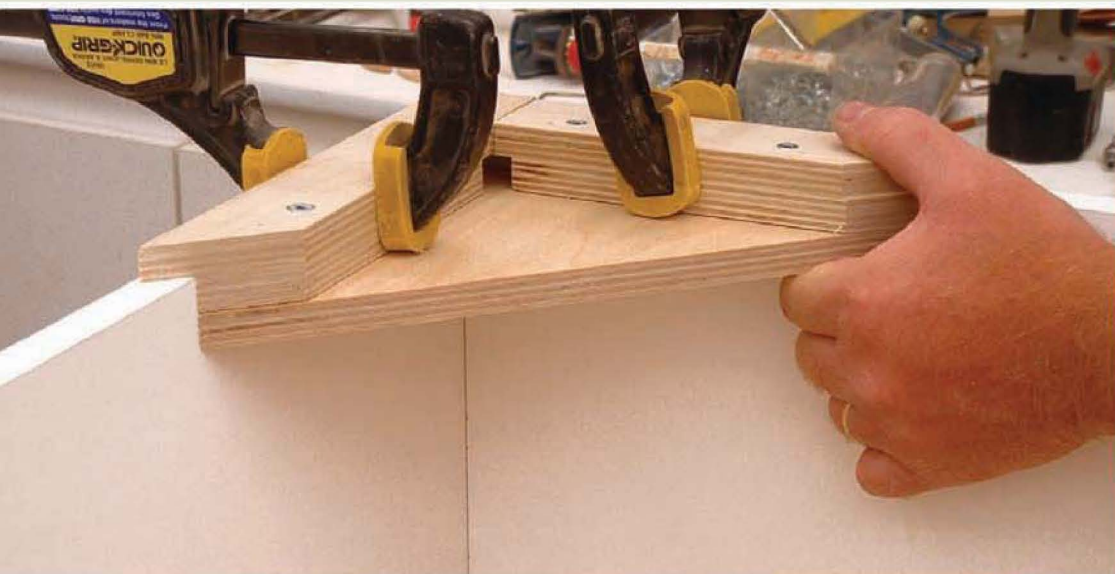
7

This chapter is dedicated to various hand-tool aids

and clamping fixtures. We spend a lot of time in the shop trying to find ways to be more efficient, but going back to the simple things is often the most effective method.

Most of the projects in this chapter were made with extra wood left around my shop. You may not find pieces with the same dimensions in your own shop, so adjust the measurements according to what you have available.

Box-Squaring Fixture

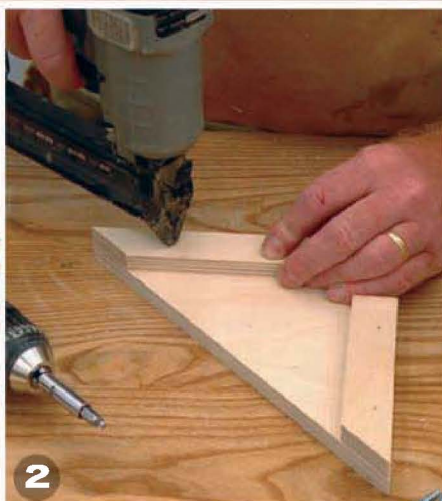


HOLDING PANELS SQUARE and flush with each other during assembly while attempting to predrill or screw isn't always easy. This simple fixture will give you that extra hand needed to get started with case assembly.



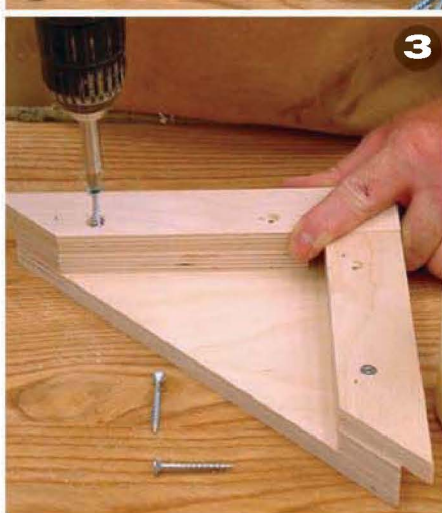
STEP ONE For each clamping jig, cut an 8" (203mm) x 8" (203mm) x 1/2" (13mm) piece of Baltic birch plywood. Adjust your miter saw to 45° and cut a triangle. It is well worth it to make several of these jigs.

STEP TWO For each clamping jig, cut two 1"-wide (25mm) strips to build up the sides. Glue the strips to the triangle and fasten them with brad nails or 1" (25mm) screws.



STEP THREE Add a layer of 1 1/2"-wide (38mm) strips to create a 1/2" (13mm) lip on the outside of the jig. Drill a pilot hole with a countersink and secure with 1 1/4" (32mm) screws.

STEP FOUR To use the jig, bring together two project panels to make a butt joint. Clamp the fixture over one side of the panel, then make a butt joint to the other panel at 90°. Make them flush on the ends and the top.



45° Miter Clamp Jig

HERE IS A FAST AND EASY WAY TO put together miters that will stay flat and square. The large base will allow you to glue wide or narrow stock.



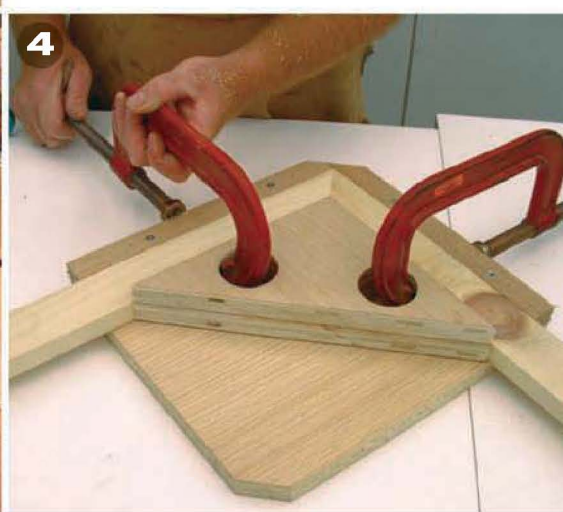
STEP ONE Cut a 12" x 12" (305mm x 305mm) piece of veneer plywood or particle-board. Add 1½"-wide (35mm) solid-wood cleats glued and screwed at the 90° corner.

STEP TWO Cut the back corner at 45° to allow a clamp to sit flat on the corner.

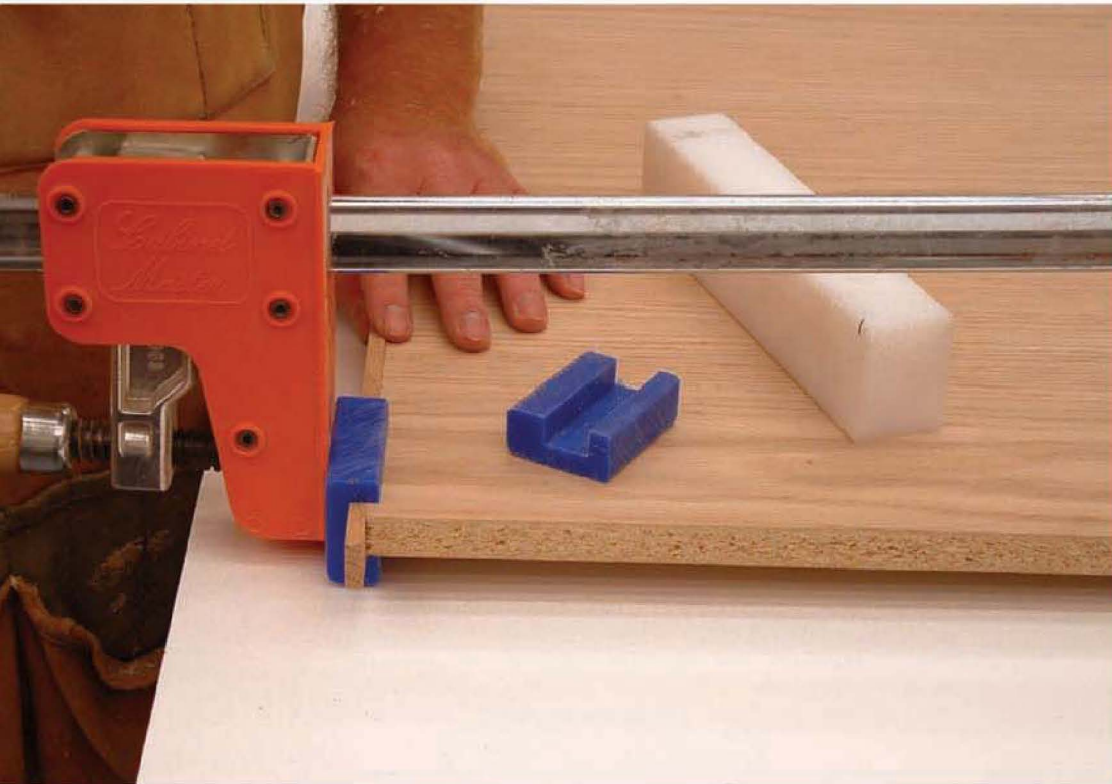


STEP THREE I glued two 8" (203mm) triangles together to create a 1½"-thick (38mm) corner block. Drill two 1½"-diameter (38mm) holes to accommodate clamp heads.

STEP FOUR To use the 45° miter clamp jig, bring together two mitered boards and clamp in place. You can also make a high-pressure laminate-covered version of this jig for easier clean up of glue squeeze-out.

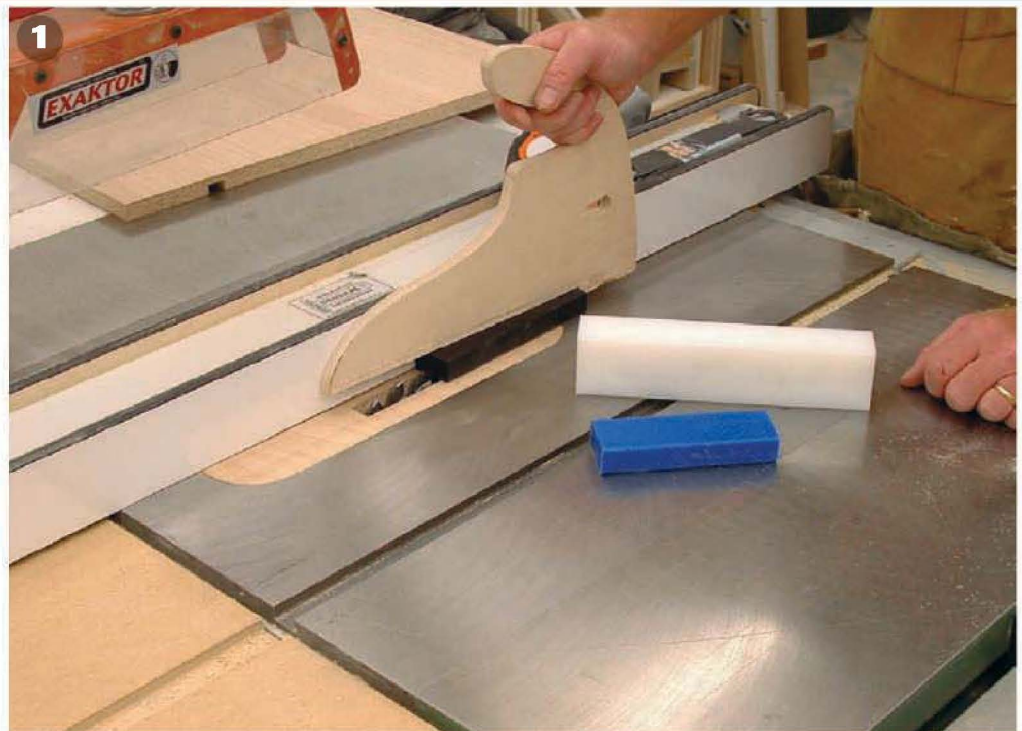


Applied-Edge Clamp Blocks



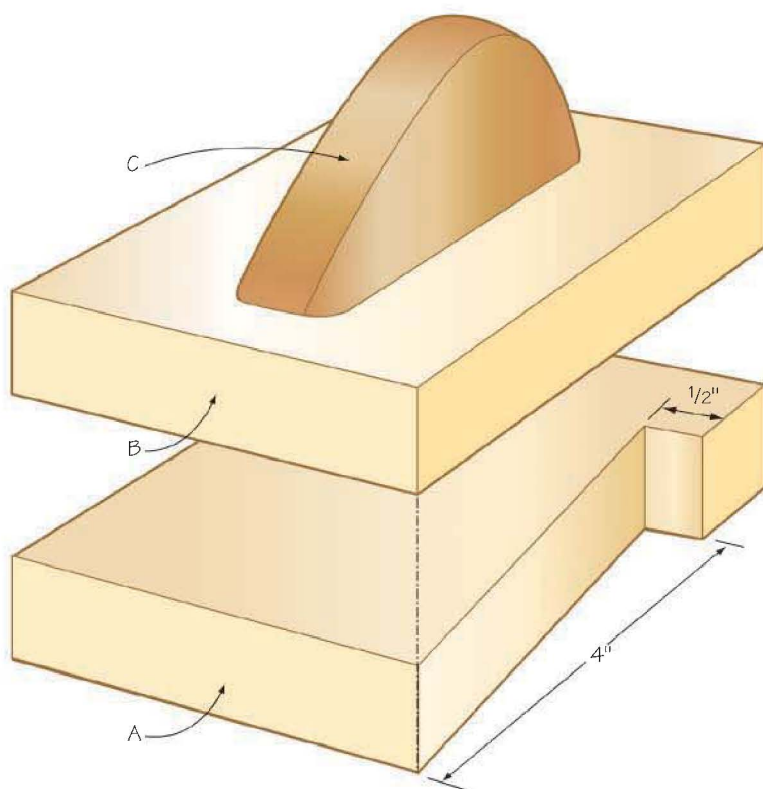
TRYING TO GLUE SOLID-wood edging is sometimes tricky because the glue makes the edging slide out of place when clamping. One solution is to make grooved blocks that will hold the edging in place. Making these blocks from UHMW plastic will not only keep the wood edging in place but will prevent them from sticking to the wood surface.

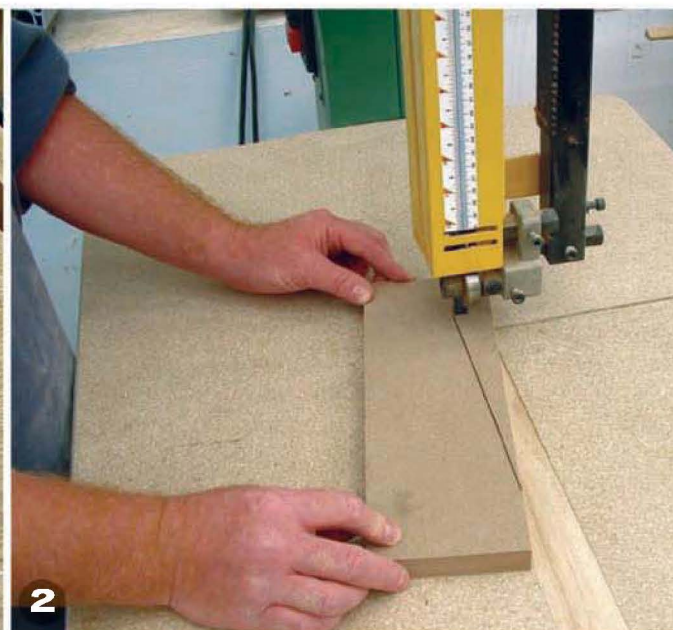
STEP ONE Rout a dado deeper than the thickness of the your wood edging so the plastic block can rest on the panel. I use $\frac{1}{4}$ " (6mm) wood edging in my shop, so a $\frac{3}{8}$ " (10mm) groove will do.



Wedge-Cutting Fixture

WEDGES HAVE COUNTLESS USES IN a shop, from leveling tools and cabinets, to augmenting clamps when gluing, to simply holding a door open. You'll want to keep several around. Cutting them safely and evenly just got easier with this wedge-cutting fixture.





STEP ONE Cut two pieces of 4" x 12" (102mm x 305mm) particleboard. The bottom piece is the template for the wedge. You can create the size wedge you want or use the dimensions in the illustration.

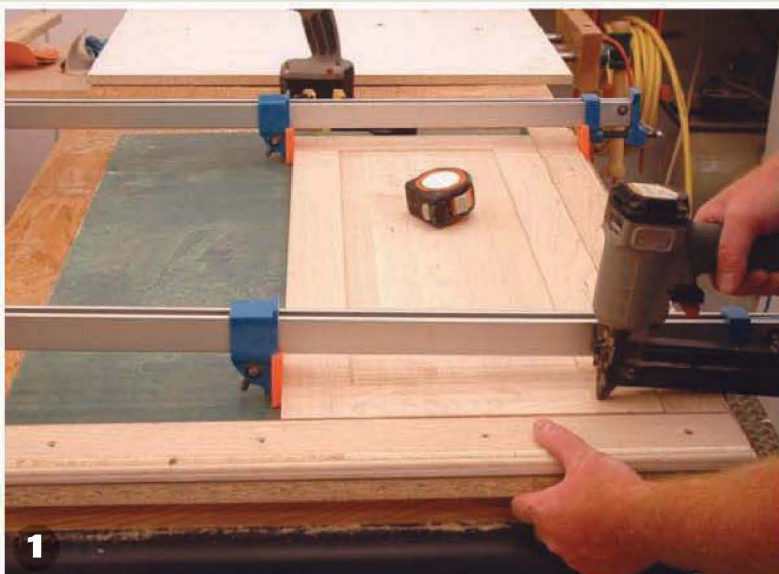
STEP TWO Using a square, cut the shape of the wedge on the band saw. I made mine 1 1/4" at the widest and 8" (203mm) long.

STEP THREE To make a comfortable handle shaped to fit my hand, I cut two small blocks 2 1/2" x 3" (64mm x 76mm). Glue them together and round over the edges and corner using a disk sander.

STEP FOUR Assemble the two parts together with 1 1/4" (32mm) particleboard screws.

Laminated-Door Squaring Jig

HERE IS A FAST AND EASY WAY TO square up a door in the gluing process. If you're building a set of kitchen doors, this jig will speed production.



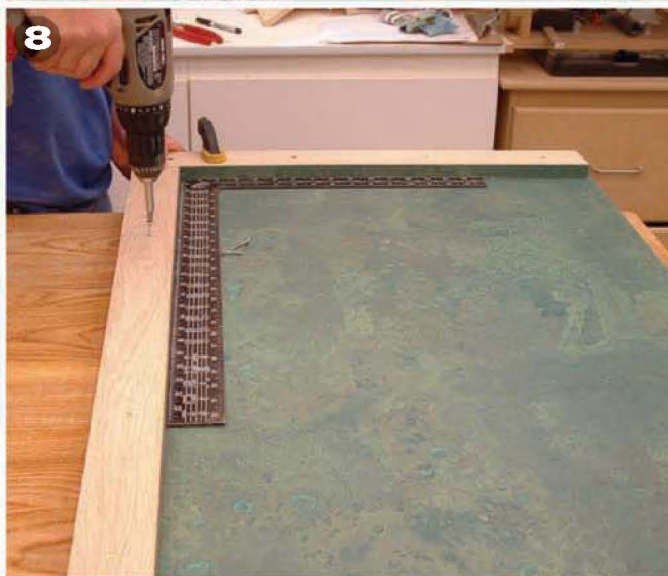
STEP ONE Cut the base and cleats from $\frac{3}{4}$ "-thick (19mm) particleboard. The base is 24" x 40" (610mm x 1016mm). One cleat is 2" x 40" (51mm x 1016mm) and the other one is 2" x 22" (51mm x 559mm). Cut the laminate 25" x 41" (635mm x 1041mm) for the base, 1" x 41" (25mm x 1041mm) for one cleat and 1" x 22½" (25mm x 572mm) for the other cleat.

STEP TWO Apply a contact adhesive to both the underside of the laminate and to the top of the PB panel. Make sure you cover all areas.

STEP THREE The adhesive is set when it's dry to the touch. Place thin dry sticks across the PB panel to keep the glued surfaces apart.

STEP FOUR Align the laminate across the sticks, making sure it doesn't bond to the panel yet.





STEP FIVE Remove the center stick and press the laminate in place with a roller. Work your way with the roller from the center to the outside edges, removing the sticks one at a time. Make sure air bubbles don't get trapped.

STEP SIX Laminate the edges of the two cleats and remove the excess with a laminate trimmer or your router.

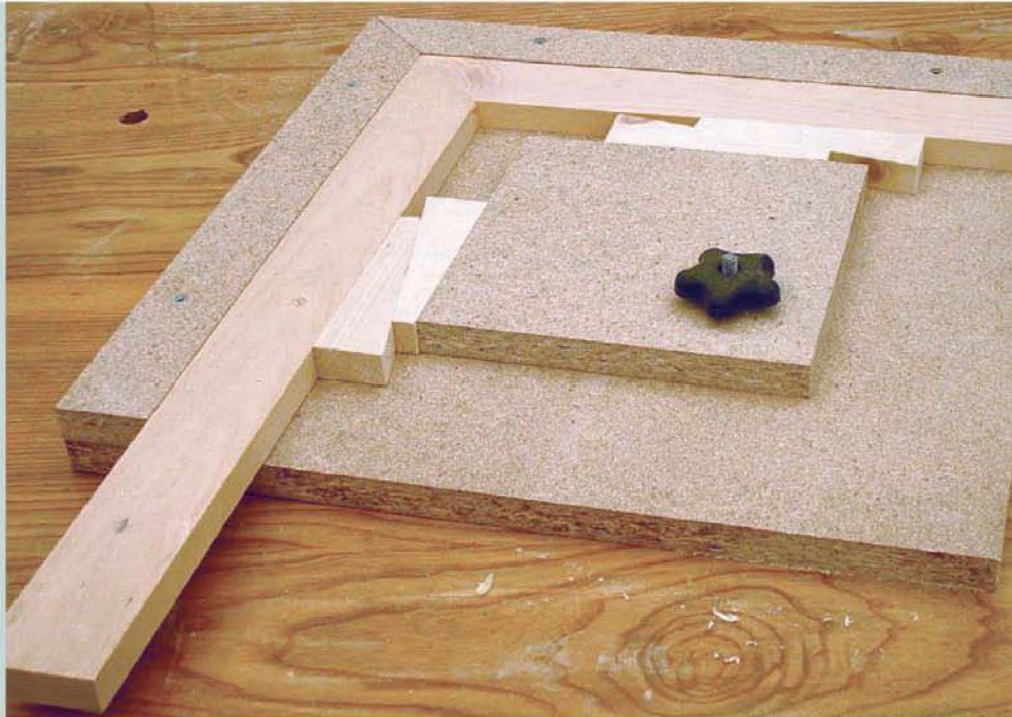
STEP SEVEN Smooth out the sharp edges of the cleats with a laminate file on a 45° angle.

STEP EIGHT Using a framing square, screw down the cleats with 1¼" (32mm) screws every 6" (152mm).

STEP NINE Glue the four corners of the stiles and rails, making sure the center panels stay free of glue. Assemble the door and place it facedown into the jig. Clamp over the rails to bring in the stiles. Use ⅝" (16mm) brad nails in the joints to keep the door together. Un-clamp the door and move on to the next one.

Miter-Frame Clamp

THE TASK OF PULLING CORNER miters together is well served with this miter clamp. For narrow or wide boards, using this pivoting base with wedges will give you tight joints.



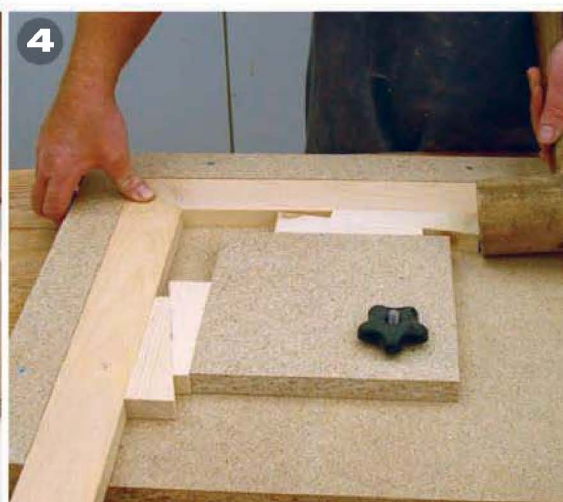
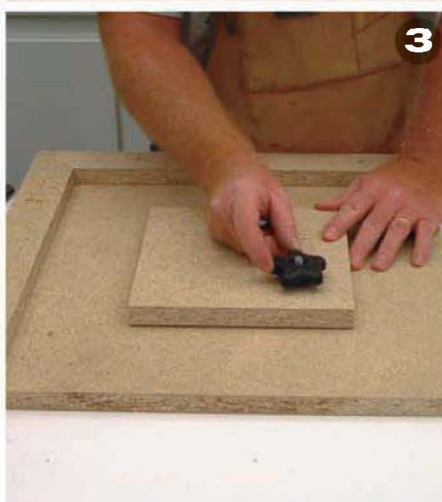
STEP ONE Cut a square of $\frac{3}{4}$ "-thick (19mm) particleboard or plywood 18" x 18" (457mm x 457mm). Add two edge cleats 2" x 18" (51mm x 457mm) with mitered ends or simply butt joint the two pieces. Glue and screw the edge cleats to the base using $1\frac{1}{4}$ " (32mm) PB screws.

STEP TWO Drill an off-center pivot point 6" (152mm) from the adjacent sides without edge cleats and install a hanger bolt. To insert the hanger bolt without damaging the machine threads, put two nuts on the bolt and start tightening the top one only. The nuts will lock together and allow you to insert the hanger bolt.



STEP THREE Cut an 8" x 8" (203mm x 203mm) pivoting base. Drill a $\frac{3}{8}$ " (10mm) hole 2" (51mm) from the corners, to fit over the screw bolt. Tighten in place with a threaded knob.

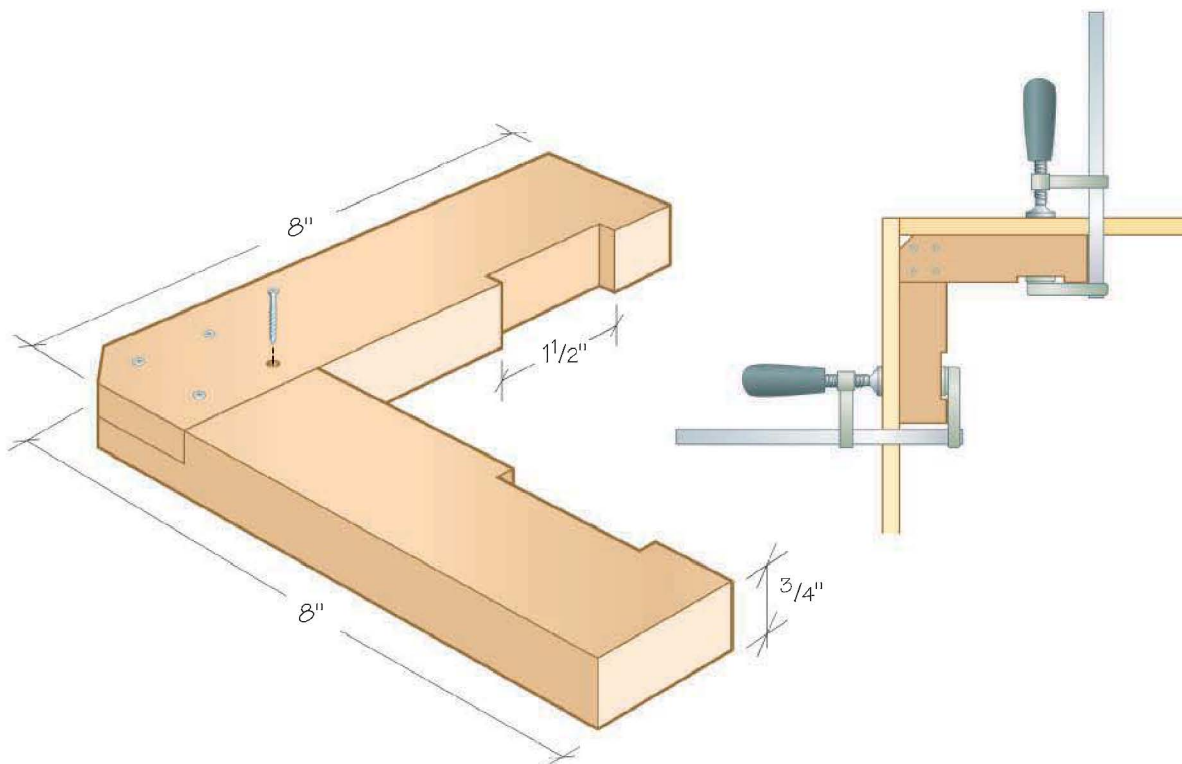
STEP FOUR To use the jig, bring the miters together by inserting the wedges. It's important that the wedges against the mitered parts point toward the miters as shown. The pressure will close the miter joint.



Inside-Corner Gluing Jig



THESE INSIDE-CORNER Gluing Jigs can be used to hold cabinet parts for assembly. I made a few sets using a left-over scrap of $\frac{3}{4}$ " (19mm) oak plywood.





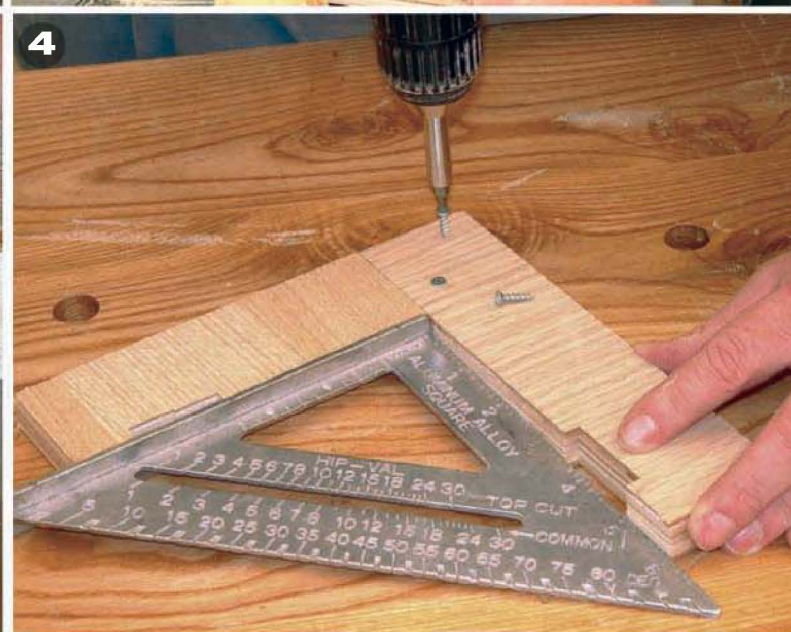
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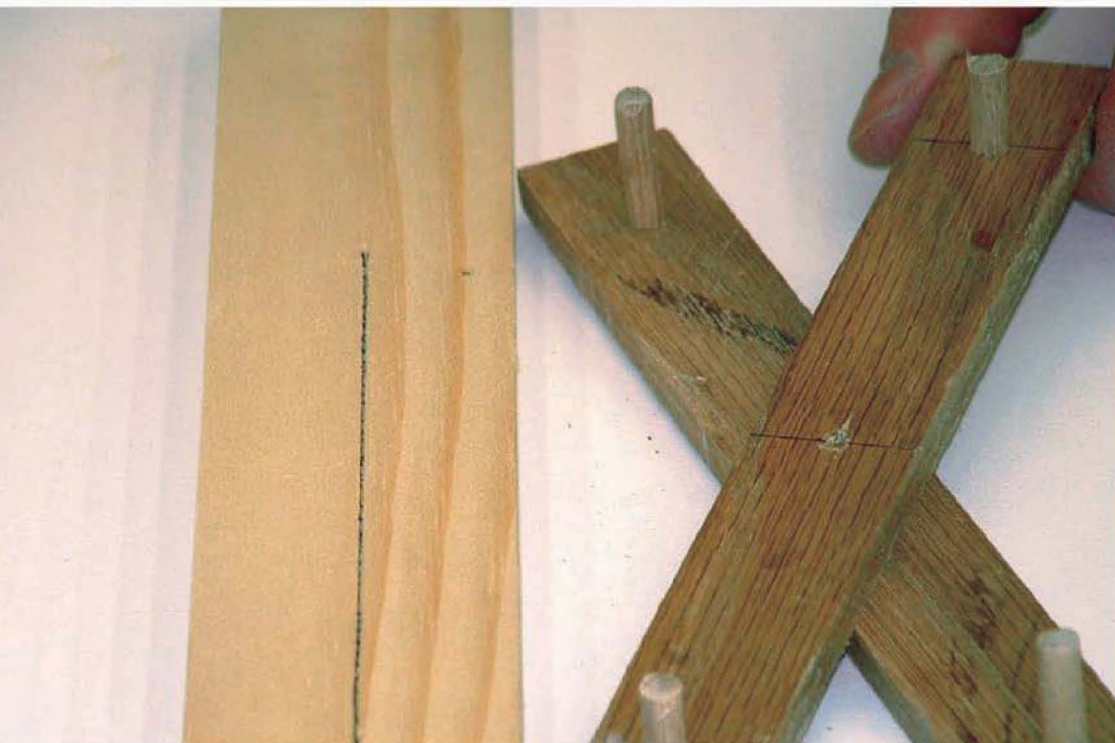
STEP ONE Cut a rabbet $\frac{3}{8}$ " deep (10mm) by 2" wide (51mm) on one long edge of an 8" x 16" (203mm x 406mm) piece of plywood. This rabbet will create the lap joints for the arms of the jig.

STEP TWO Cut 2"-wide (51mm) strips on the miter saw. You'll need two strips for each jig. Mark the position of the dadoes for the clamp heads.

STEP THREE Cut a $\frac{1}{4}$ "-deep (6mm) by $1\frac{1}{2}$ "-wide (38mm) dado on one edge of each part.

STEP FOUR Hold the parts at 90° using a square. Then glue and fasten the parts using No. 6 x $\frac{5}{8}$ " (16mm) screws.

Self-Centering Scratch Awl



THE ACCURACY OF THIS jig is dependent on equal distance between the dowels and the centering pivot point, so take your time measuring and marking their positions.



STEP ONE Cut two $\frac{1}{4}$ " x 1" x 9" (6mm x 25mm x 229mm) strips of hardwood. Drill $\frac{1}{4}$ " (6mm) dowel holes 1" (25mm) on center from both ends of each strip.

STEP TWO Glue the four $\frac{1}{4}$ " x $1\frac{1}{2}$ " (6mm x 38mm) dowels into each hole.



STEP THREE Drill an $\frac{1}{8}$ " (3mm) pilot hole through the center of both strips and insert a No. 6 x $\frac{5}{8}$ " (16mm) wood screw. The tip of the screw will protrude through the strips and will be used as a scribe.

STEP FOUR To use the jig, squeeze it so that the four dowels are touching the sides of the board and drag the jig along the edge. The tip of the screw will leave a fine center mark you can darken with a pencil.



Board-Gluing Fixture

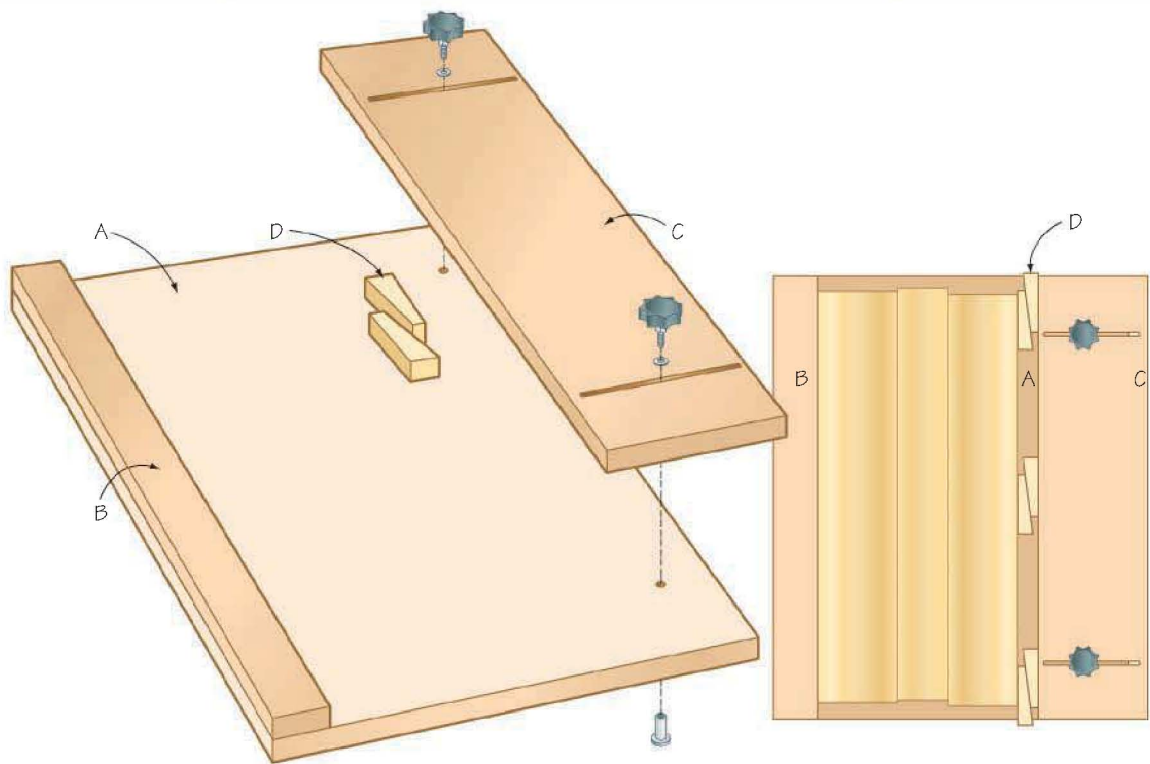
THIS BOARD-GLUING FIX-
ture is a great alternative to
pipe clamps. The adjustable
cleat slides easily on the lami-
nated base and the wedges put
even pressure on the boards.

CUTTING LIST

REF. NO.	PART	THICKNESS X WIDTH X LENGTH STOCK	INCHES	MILLIMETERS
A	1 base	particleboard	3/4 x 24 x 30	19 x 610 x 762
B	1 fixed fence	particleboard	3/4 x 2 x 30	19 x 51 x 762
C	1 adjustable fence	particleboard	3/4 x 6 x 30	19 x 152 x 762
D	6 wedges	hardwood	3/4 x 1 3/4 x 6	19 x 45 x 152

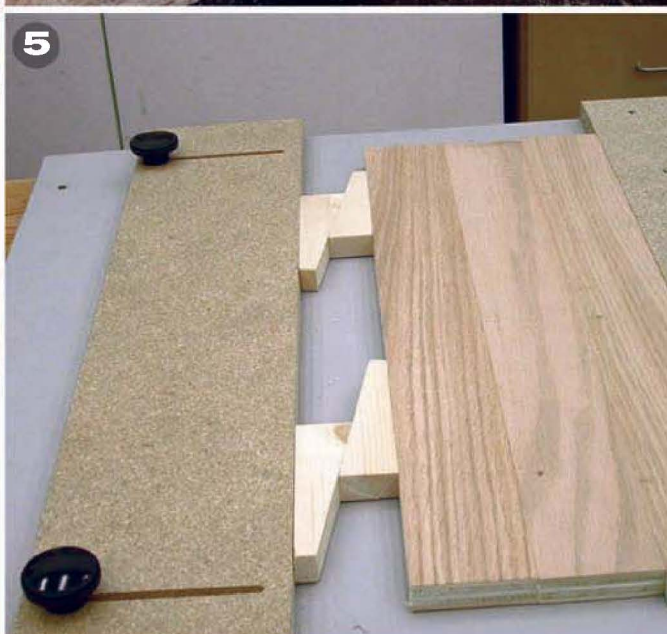
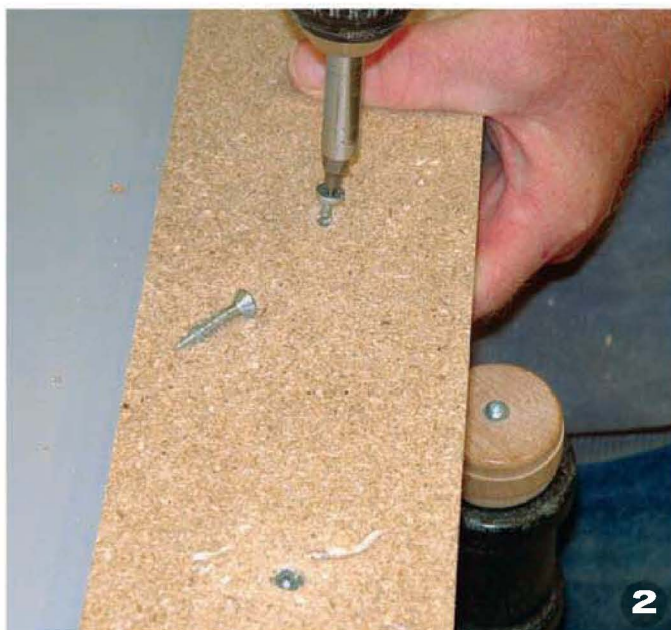
hardware

2 threaded knobs	1/4-20 x 1 1/4" (32mm)
2 T-nuts	1/4-20
2 flat washers	1/4



STEP ONE The base is laminated for easy cleanup. Cut the laminate oversize to allow for easier positioning. Apply a coat of contact cement evenly on both the laminate and the particleboard, making sure to cover all edges and corners. There are many types of contact cement available. The one I am using is liquid and is applied with a paint roller. Let it dry until the glue turns clear or until it's no longer tacky to the touch. Drying time varies depending on humidity in the room. For best results read the instructions carefully.

Lay down a series of sticks on top of the base to keep the laminate and the base apart. Then, one by one, remove the sticks starting in the center of the laminate. Apply pressure with a roller to push air bubbles to the outside edge.



STEP TWO Two cleats will be needed at opposing sides of the laminated panel. Install the fixed cleat flush with one side of the base using 1¼" (32mm) screws.

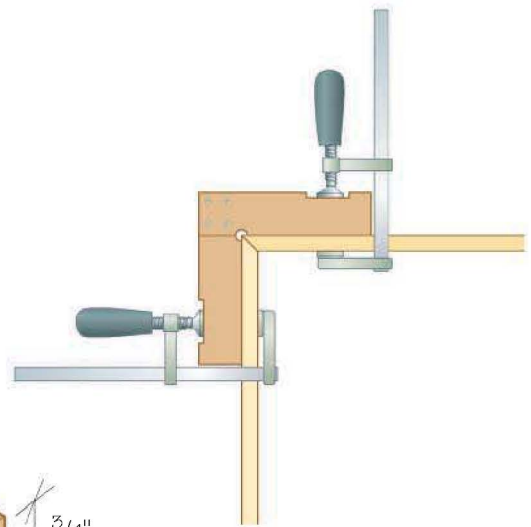
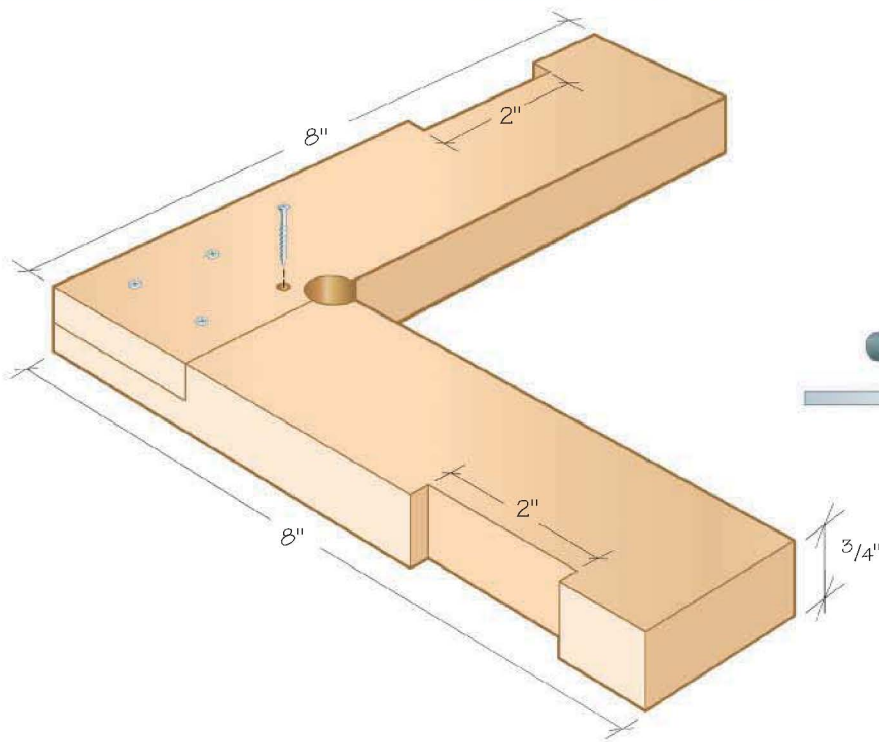
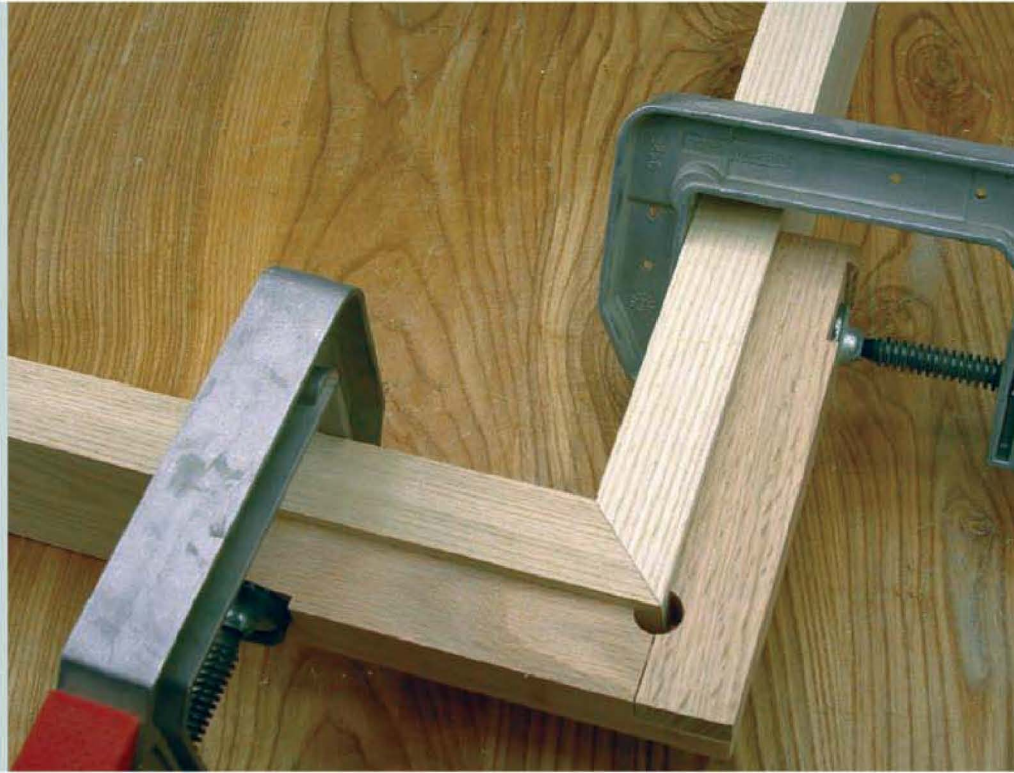
STEP THREE Rout two ¼" x 5" (6mm x 127mm) slots spaced 24" (610mm) apart on center in the adjustable cleat.

STEP FOUR Drill two T-nut holes through the laminated board 2" (51mm) from the edge of the base. Use the slotted adjustable cleat as a template to mark the hole locations.

STEP FIVE To use the jig, apply glue on the edges of the boards and lay them flat on the laminated base. Bring the adjustable side of the fixture close to the glued boards and use wedges to apply pressure.

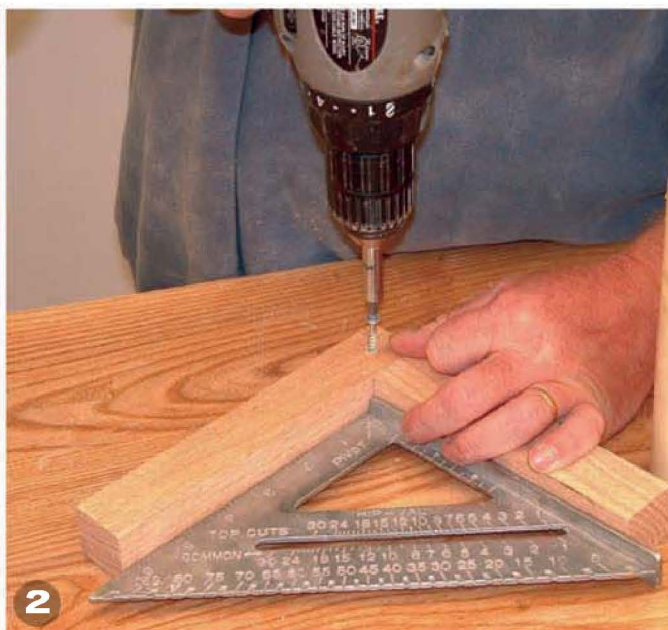
Outside-Miter-Gluing Jig

WITH THIS MITER-GLUING JIG, you will be able to bring two boards together quickly. The opening in the corner of the jig will allow you to see the miter and make the necessary adjustments to close it.





1



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4

STEP ONE You'll need to cut $\frac{3}{4}$ " x 2" x 8" (19mm x 51mm x 203mm) strips to make this jig. Each jig requires two strips, so cut as many as you need. Next, cut a $\frac{3}{8}$ "-deep (10mm) by 2"-wide (51mm) rabbet on one end of each strip. This rabbet will create the lap joints for the arms of the jig. Then cut a $\frac{1}{4}$ "-deep (6mm) by 2"-wide (51mm) dado in each strip as shown.

STEP TWO Hold the parts at 90° using a square. Then glue and fasten the parts using No. 6 x $\frac{5}{8}$ " (16mm) screws.

STEP THREE Drill the inside corner of the assembled jig with a $\frac{1}{2}$ " (13mm) Forstner bit. This will help ensure that the mitered pieces come together with no resistance.

STEP FOUR To use the jig, bring the two mitered-end boards together, placing the jig on the outside, holding it in place with C-clamps or quick clamps.

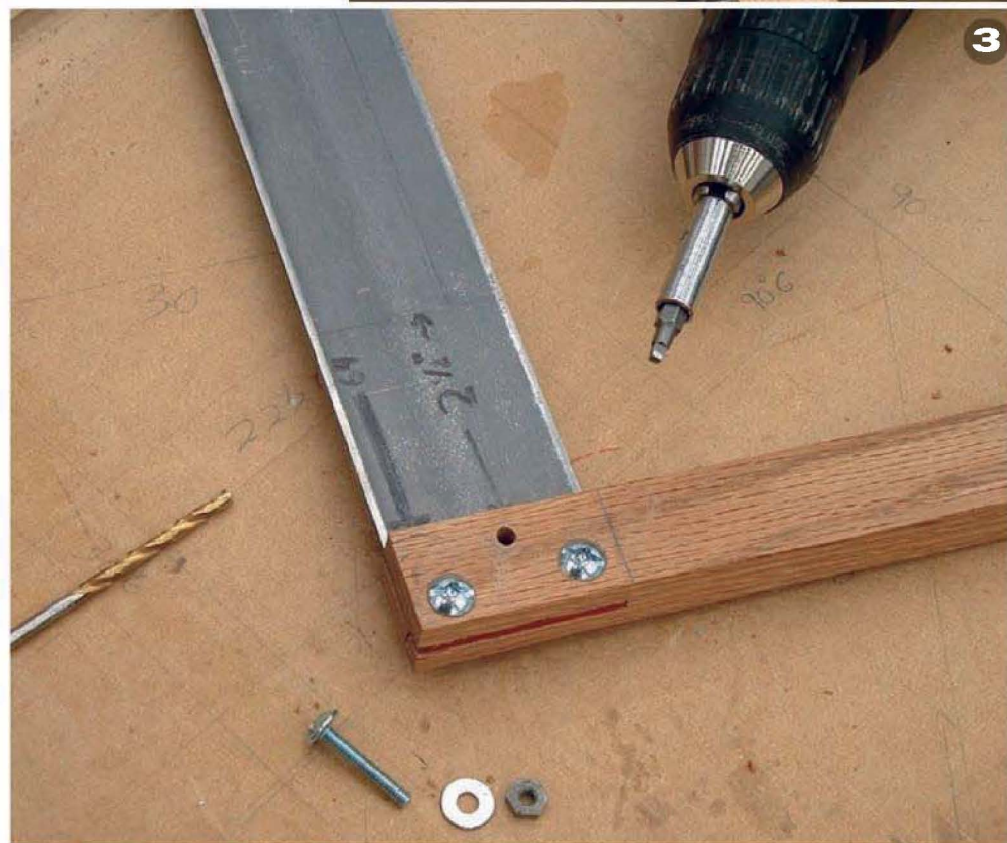
Shelf-Pin-Hole-Drilling Jig

DRILLING HOLES IN THE MIDDLE OF large panels is next to impossible on the drill press, so I built this simple jig just like a square, using an $\frac{1}{8}$ "-thick (3mm) flat steel bar and a piece of hardwood bolted through the end. I used the Spring-Loaded Adjustable Shelf-Pin Block seen in chapter five to help me drill the evenly spaced holes.



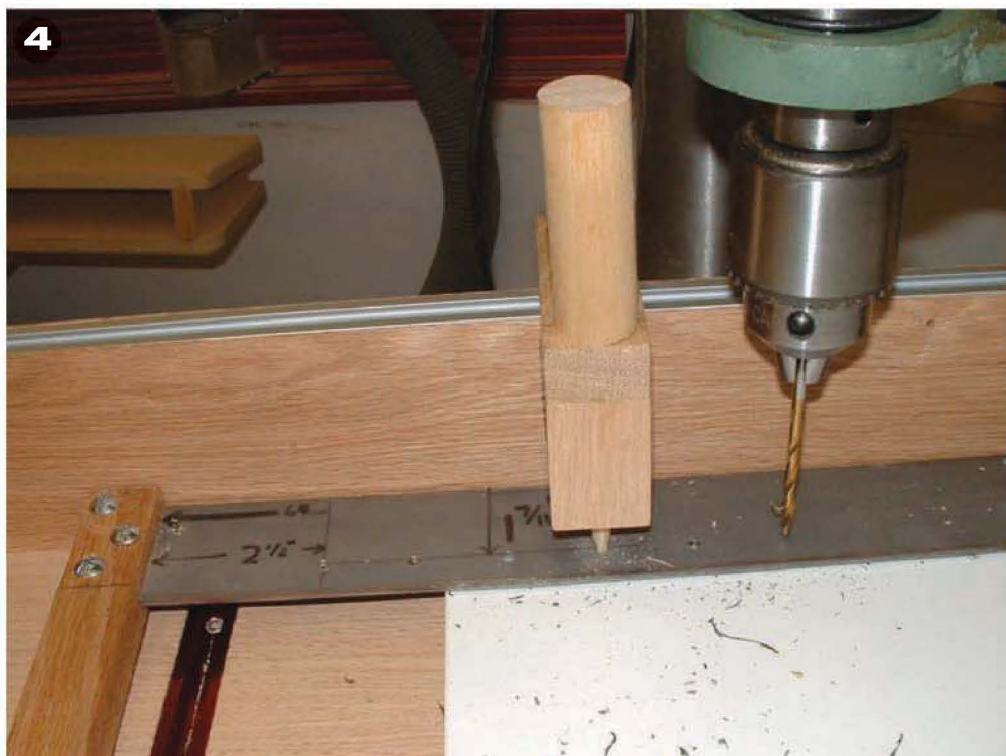
STEP ONE Cut a strip of $\frac{3}{4}$ " x 1" x 10" (19mm x 25mm x 254mm) hardwood. Then, cut a slot $\frac{1}{8}$ " wide (3mm) by 2" deep (51mm) in the center of the strip.

STEP TWO Clamp the steel bar and wood strip at 90° to each other.



STEP THREE Drill three holes for the bolts in a triangular design. Bolt together the strip and bar using 1/4-20 x 1" (25mm) bolts, 1/4-20 nuts and 1/4" (6mm) lock washers.

STEP FOUR Position the first hole at $2\frac{1}{2}$ " (64mm) and $1\frac{7}{16}$ " (37mm) from the side. Then mark the remaining holes $1\frac{1}{4}$ " (32mm) on center. The holes can be made using a power drill or with the drill press and the Spring-Loaded Adjustable Shelf-Pin Block from chapter five. With these measurements, you will be able to drill holes with the European system of concealed hinges, drawer glides, etc.



STEP FIVE Use a wooden dowel as a depth gauge. Here's how to make the dowel stop: After drilling through the dowel with a $\frac{3}{16}$ " (5mm) drill bit, add the length of the shelf pin plus the thickness of the steel bar. This is how far the end of the drill bit should be exposed past the dowel stop.

Shelf-Pin-Hole-Drilling Fixture

THIS FIXTURE IS A HANDY shop tool. It will act as a guide for drilling accurately placed holes in cabinet sides up to 31" (787mm) long. The flat steel is available at most hardware stores. All the other materials required are readily available from any home store.

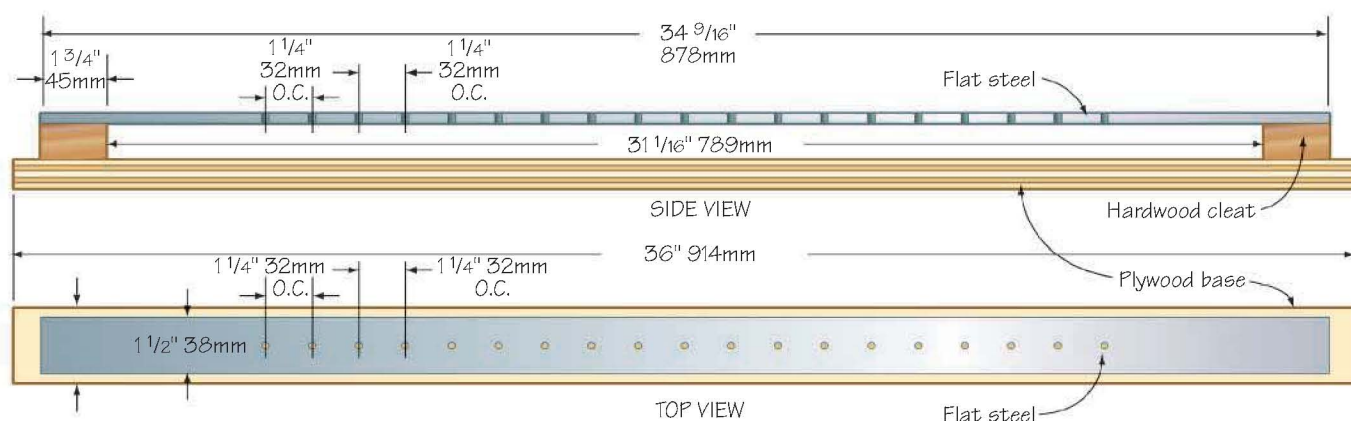


STEP ONE Cut a piece of plywood $\frac{3}{4}$ " x 13" x $34\frac{1}{16}$ " (19mm x 330mm x 866mm). Attach two boards, each $\frac{3}{4}$ " x $1\frac{1}{2}$ " x 10" (19mm x 38mm x 254mm). Use four $1\frac{1}{4}$ " (32mm) screws per board. Install the boards flush at each end so there is $3\frac{1}{16}$ " (789mm) between them.



STEP TWO To help keep the cabinet sides oriented properly, mark the fixture as shown. I note the top of the cabinet side with an X when drilling shelf holes on each board's edge.

SHELF-PIN-HOLE DRILLING JIG



Leave $31\frac{1}{16}$ " (789mm) for gable end placement.

Drill $\frac{3}{16}$ " (5mm) holes in the flat steel at $1\frac{1}{4}$ " (32mm) on center to guide drill bit.

Drill shelf-pin holes in gable ends at $1\frac{7}{16}$ " (37mm) [or $2\frac{13}{16}$ " (956mm) for inset doors] from each edge.



STEP THREE Prepare a piece of $\frac{1}{4}$ "-thick (6mm) flat steel that's $1\frac{1}{2}$ " (38mm) wide by 34" (864mm) long. Drill holes at $1\frac{1}{4}$ " (45mm) on center up the middle of the bar. If you prefer, you can increase or decrease the hole spacing. You should also decide which shelf pin you will be using and drill the guide holes to the diameter required for those pins. Locate two holes at either end of the flat steel and attach it to the end boards with $1\frac{1}{2}$ " (38mm) screws.



STEP FOUR The fixture will accept cabinet sides up to $\frac{3}{4}$ " (19mm) thick and 31" (787mm) long. If you want to drill shorter sides, put spacers in the fixture to hold the cabinet side tightly against the top board. Drill one vertical set of holes and move the cabinet side over to drill the other set. Normally, each cabinet side will require two parallel sets of holes. Guide marks on the fixture's end boards will help position the holes 1" (25mm) in from each side board's edge.



STEP FIVE Drill through a piece of dowel rod to make a simple drill-depth stop. Set the drill bit in the chuck, with the stop in place, so the bit can travel through the steel and approximately three-quarters of the way through a cabinet side. The stop will prevent the drill bit from exiting the finished face of the cabinet side. Make sure the hole is deep enough for the shelf pin to be properly seated and secure.

miter-saw jigs



and fixtures

8

We've all carried around a miter saw for weekend

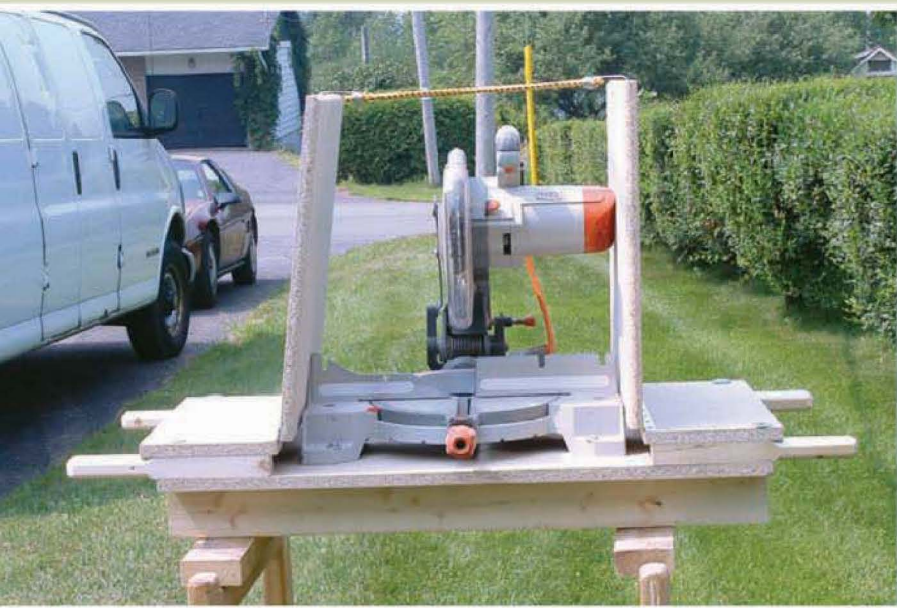
projects, usually setting it up on the ground or on a chair with someone to help support the weight of the boards. The devices in this chapter will provide you with better stability and cleaner cuts for your mitering projects.

The folding extension offers more horizontal support for cutting long boards, and the Adjustable Zero-Clearance Fence will give you support at the back to minimize tear-outs.

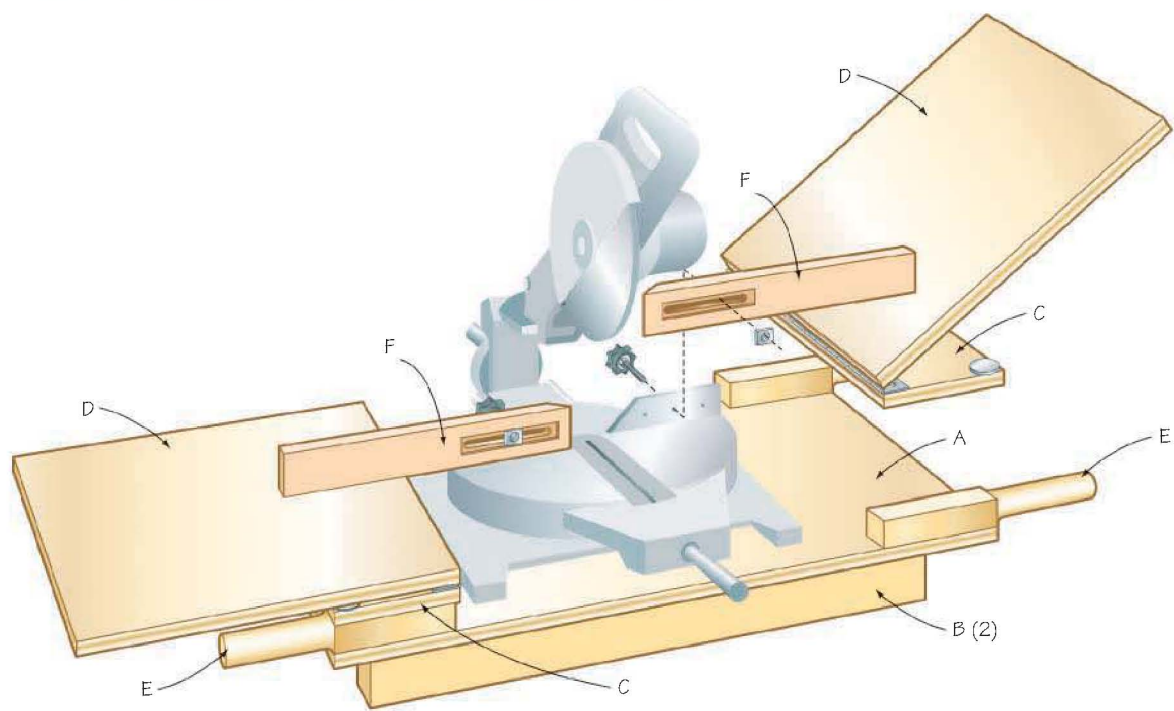
These projects are made from particleboard and medium-density fiberboard but can easily be adapted to what you already have in your shop. Many parts are rounded over to avoid chipping or breaking the edges of the projects, and to prevent scrapes and other injuries.



Portable Miter Station



I BUILT THIS PORTABLE miter station with two things in mind: first, the larger surface to support the ability to transport it without having to dismantle it. Second, it is easy to carry and not too heavy. You will appreciate its stability when up on saw horses or at the back of a pickup truck.

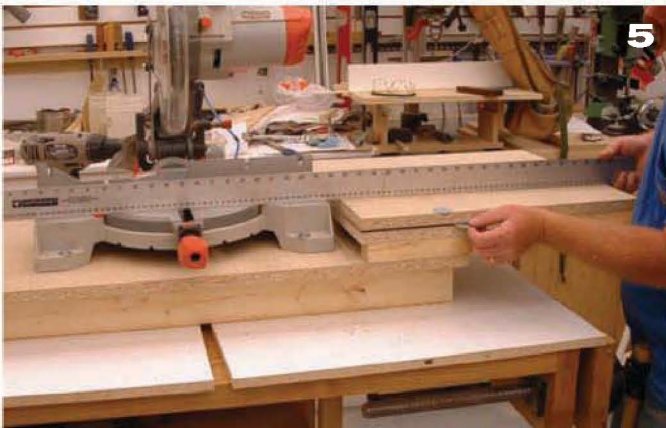
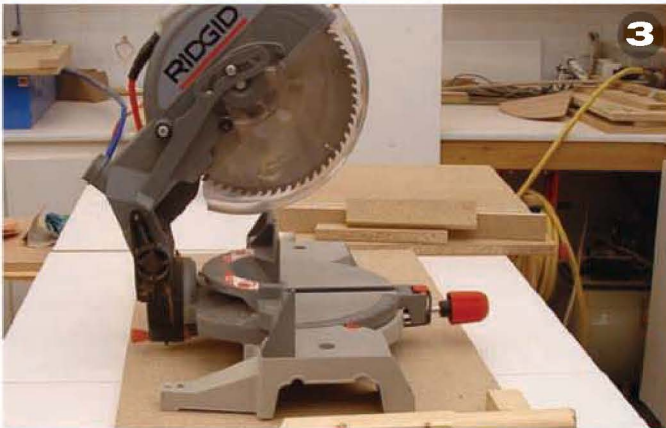
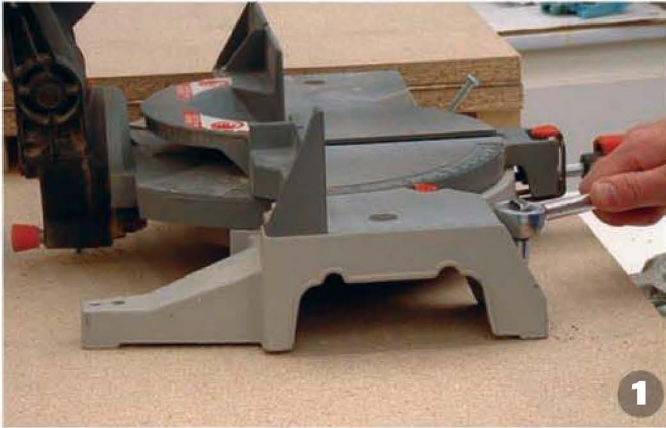


CUTTING LIST

REF. NO.	PART	STOCK	THICKNESS X WIDTH X LENGTH	
			INCHES	MILLIMETERS
A	2 base	particleboard	3/4 x 18 x 36	19 x 457 x 914
B	4 feet	2x4	1 1/2 x 3 1/2 x 36	38 x 89 x 914
C	2 fixed hinge bases	particleboard	3/4 x 8 x 18	19 x 203 x 457
D	4 flip-up extensions	particleboard	3/4 x 18 x 24	19 x 457 x 610
E	4 handle/spacers	2x4	1 1/2 x 1 1/2 x 18	38 x 38 x 457
F	1 zero-clearance fences	particleboard	3/4 x 3 x 18	19 x 76 x 457

hardware

2 continuous hinges 16" (305mm)
8 flat washers (used as hinge spacers) 1" - (25mm)-diameter



STEP ONE Center the miter saw on the base. Line up the feet with the feet of the miter saw. Mark the hole positions of the miter saw base onto the particleboard, then drill a pilot hole through the base and into the feet. Secure the miter saw to the base assembly using 3" (76mm) lag bolts.

STEP TWO The flip-up extension consists of a fixed hinge base and a flip-up extension joined by an 18"-long (457mm) piano hinge. Lay the parts flat and attach the hinge. Make two of these assemblies.

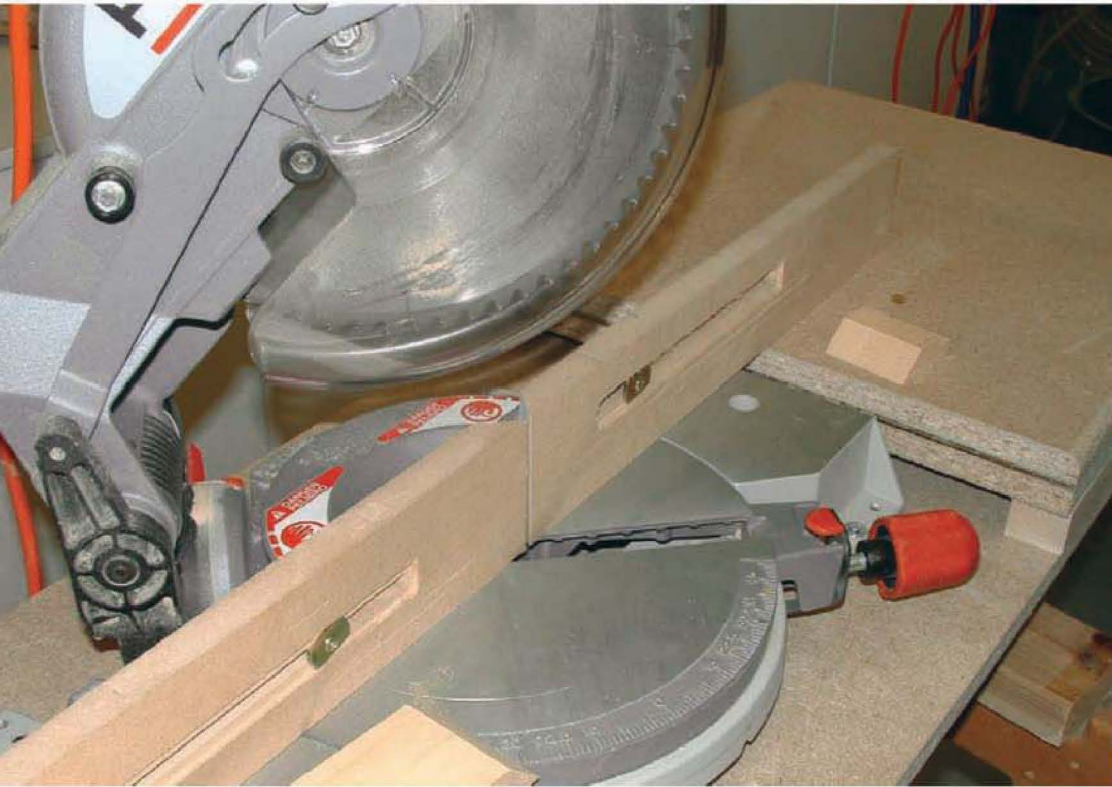
STEP THREE The height of the handle spacers is determined by the height of the miter saw table minus the thickness of the flip-up extension assembly.

STEP FOUR Fasten the handle spacers to the fixed hinge base using No. 8 x 2" (51mm) PB screws from the top and the bottom.

STEP FIVE To compensate for the thickness of the piano hinge and to keep the extension table level with the miter-saw table, I added a spacer to the underside of the flip-up table.

STEP SIX I drilled a 1/2" (13mm) hole at top end of the extension table and used a bungee cord to hold the extension tables up for transporting the portable miter station. I also rounded the edges of the flip-up extensions and the handle bars for comfort.

Adjustable Zero-Clearance Fence



THE MITER SAW PLUNGES down to give you a nice, sharp cut at the front surface, but the board tears out at the back because it is not supported. One way to add that support is to have two adjustable boards secured on the miter saw's back fence. Miter saw models differ, so you will need to adjust the measurements given here to your saw. New fences can easily be made to replace the old worn-out ones.



STEP ONE Cut the two zero-clearance fences, set them against the saw's fence and mark the position of the mounting holes on each fence. I like to make several of these fences, so when one wears out, I've got a quick replacement fence ready to go.



STEP TWO Cut one end of each board at 45°. Keeping the long side of the angle at the front gives zero clearance next to the blade.

STEP THREE On the router table, cut a 1/4"-wide (6mm) slot the length of the distance between the holes of the fence plus 1" (25mm). This slot should line up with the hole marks.

STEP FOUR On the face side of the fence, rout a shallow groove on top of the 1/4" (6mm) slot to allow a T-nut or T-track nut to sit flush with the face.

STEP FIVE Attach the fences to the miter saw with threaded knobs from the back of the fence. When making a cut, set the saw, then move the fence next to the saw blade and make the cut.

SUPPLIERS

There have been many suppliers who have contributed products, material and technical support during the project-building phase. We appreciate how helpful they've been and recommend the companies without hesitation. If you have trouble locating a product that we've mentioned, please e-mail Luc at luc@cabinetmaking.com.

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ABOUT THE AUTHOR

Danny Proulx has authored more than a dozen woodworking books. Known for his ability to break things down into easy-to-follow instructions, Proulx has written some of the most helpful and accessible woodworking books available: *Build Your Own Kitchen Cabinets*, *Building Woodshop Workstations*, *Danny Proulx's Cabinet Doors and Drawers* and *The Best of Danny Proulx's Storage and Shelving*.

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