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Tips & Techniques
Dado Blade Basics, Zero-Clearance Inserts, Using Featherboards

Table Saw Handbook Vol. 2

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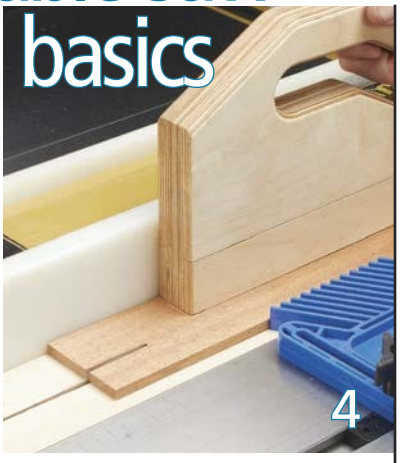
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table saw basics



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Table Saw Basics

Whether you're a beginner or an expert, it's always best to begin with (or go back to) the basics. In this section, you'll find tips and techniques on safety, making common cuts, and using table saw accessories.

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Avoid Kickback





Riving Knife. A riving knife is the number one preventer of kickback. When cutting a board with stresses in it, a riving knife will prevent the kerf from closing around the blade. It's worth noting that thin-kerf blades may not work with every style of riving knife.

Every woodworker fears being cut by their table saw. We know we must stay alert whenever the saw is on. We would never willingly put our hand in the path of the blade.

But while it is possible for a distracted woodworker to inadvertently push their hand into a spinning saw blade, amputations and injuries are more commonly caused by the workpiece pulling your hand into the danger zone through a process known as kickback. Table saw kickback may also eject a workpiece from the saw with tremendous, bone-breaking force.

Fortunately, the risk of table saw kickback may be greatly reduced and the chance of injury all but eliminated if you learn how kickbacks occur and what simple rules you should follow every time you use your saw. This article will examine six common causes of kickback and how to avoid them.

KICKBACK #1- THE CLOSING KERF

CAUSE. As a tree grows, internal stress may develop within the wood fibers. Poor drying techniques or conditions may also lead to case-hardening which can also create stresses within the board. These are usually undetectable until you begin to rip it. During the cut, that stress is released and this may cause the kerf to close, pinching against the rear of the spinning blade.

SOLUTION. Install a splitter. If a splitter or riving knife is installed behind the blade, the kerf will pinch against it rather than the blade itself. Splitters and riving knives are the number one way to prevent table saw kickback.

In addition, many saws will come with a set of pawls, as you see in the main photo. These toothed "feet" only allow the workpiece to be fed forward and can help prevent kickback.



Pawls. Often, riving knives have a set of pawls. These teeth allow the workpiece to be pushed through the cut, but won't allow it to go backwards, reducing kickback.

KICKBACK #2- THE SHIFTING BOARD

CAUSE. Rough lumber that is not flat and straight can perform in unpredictable ways. A cupped board may collapse downward as it is cut. A warped board may rock from one side to another as it's fed. And a crooked edge may cause the trailing end of a board to shift as the leading end begins to clear the fence. All these situations may result in pressure against the side of the spinning blade and potential kickback.

SOLUTION. Don't cut rough lumber on a table saw unless you have a straight-edge against the fence and one flat surface on top of the saw. If your board is too wide for your jointer, rip it with a band saw or handheld jig saw rather than a table saw.

If the table saw must be used for cutting rough lumber, you can use a sled like the one shown in the lower left photo. It holds the workpiece firmly to a base. The base slides in the miter slot and allows you to cut a straight edge with the workpiece held tightly down.

Another helper for boards that may shift are featherboards. You can see these in the main photo. These help hold the workpiece firmly against the fence and down to the surface of the table saw. These are particularly useful if you're cutting thin, floppy stock (such as molding), or for helping guide big, heavy boards.



Rough Stock Sled. A simple sled like this one will help cut a straight edge on rough cut boards. The hold downs keep the workpiece secure and a miter bar on the bottom side of the sled guides the workpiece.

KICKBACK #3- THE TWISTING WORKPIECE

CAUSE. If a workpiece turns toward the blade during a cut, the rear teeth may lift and pull the workpiece (and possibly the operator's hand) on top of the blade. This is most common when working with small pieces of wood that lack enough edge length to be kept straight against the fence. A sure sign that this type of kickback has occurred is a curved cut mark left in the surface of the board as it turns over the top of the blade.

SOLUTION. Always use a push-stick or push-block when your hand is near the blade, and position it near the center of the workpiece to ensure a straight feed. Protect the blade's rear teeth with a riving knife or splitter.

KICKBACK #4- THE MISUSED FENCE

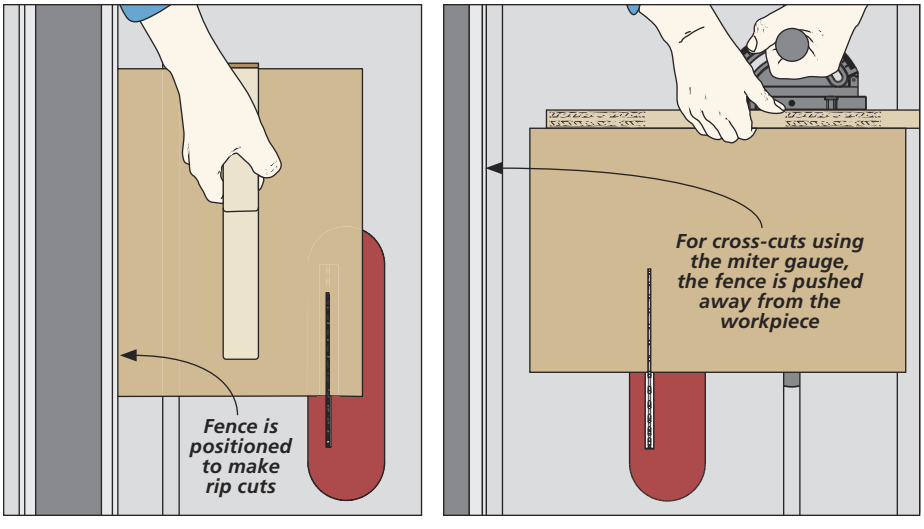
CAUSE. If used improperly, a rip fence can trap an offcut against the blade, causing a kickback. This may occur if, while attempting to make a crosscut with a miter gauge, the end of the board is placed against the rip fence, perhaps as a stop for making repeated cuts of the same length. The loose offcut is all but certain to turn and wedge itself against the spinning blade. Another dangerous situation may involve attempting to make a crosscut without a miter gauge by holding the short end of a rectangular board or panel against the rip fence. If the workpiece twists during the cut, kickback is most likely to occur.



Push Blocks & Sticks. The push-block keeps the operator's hands a safe distance away from the blade. A longer push-block allows more control of the workpiece as you make the cut, allowing you to keep it tight against the fence.

SOLUTION. Rip fences are made for ripping, miter gauges and sleds should be used for crosscutting. The two should not be used at the same time. (Exception — when cutting a rabbet or tenon on the end of a workpiece where no loose offcut will be produced.)

As a general rule for small and medium-sized panels, check the distance between the blade and the rip fence. If that is greater than the length of the edge that must be held against the fence, use a sled or miter gauge rather than a rip fence to make the cut.



Pinched Pieces. Rip fences and miter gauges are not meant to be used together. Use the fence to make rip cuts (left illustration). When using the miter gauge, as seen in the right illustration, make sure the fence is pushed away as to not pinch the offcut.

KICKBACK #5- THE MISALIGNED RIP FENCE

CAUSE. If a rip fence is nearer to the rear of the saw blade than it is to the front, it will produce a wedging effect as you cut. This often causes scorched edges with blade marks and increased resistance during rip cuts, but it may also lead to a board being ejected toward the operator.

SOLUTION. Both the saw blade and the rip fence must be parallel to the miter slots so you may be sure they are also parallel to each other. You



Keep It Parallel. Take some time to verify that your rip fence is aligned with the blade. This elimates "drift" during the cut that can cause kickback. Some people prefer for the outfeed side of the fence to be slightly further away from the blade.

can see this in the photo above. Some may choose to angle the rear end of their rip fences away from the blade by a small amount (perhaps 1/32"). Either solution is acceptable.

KICKBACK #6- LOOSE OFFCUTS

CAUSE. When making repeated crosscuts on multiple workpieces, such as trimming workpiece ends square, the loose offcuts may begin to accumulate next to the blade. Saw vibration can cause one or more of them to work their way toward the blade. If the offcuts get close enough and do contact the blade, a tooth may catch it and eject it towards the operator.

SOLUTION. Do not let offcuts accumulate on top of the saw. A sacrificial fence on your miter gauge that extends past the blade will push the offcuts clear of the danger zone with each cut. You can see an example of this miter fence below.

The common theme with most table saw kickbacks is that they are initiated by the rear, rising teeth of the saw blade. The most effective preventive measure you can take is to install a riving knife or a splitter for every cut.



Auxiliary Miter Fence. Using a sacrificial fence on a miter gauge has two main purposes. First, it helps reduce tearout by backing up the cut. Second, when you make a cut it will push any small offcuts past the blade.

If your saw is not equipped with such a device, you may make your own insert from plywood or MDF with an integrated homemade splitter. If your saw is a newer model, more than likely it came with a riving knife. If it's missing, you can often call the manufacturer and purchase a replacement, or find an after-market option. It's money well-spent. This will protect the rear of the blade and significantly reduce many common causes of kickback.

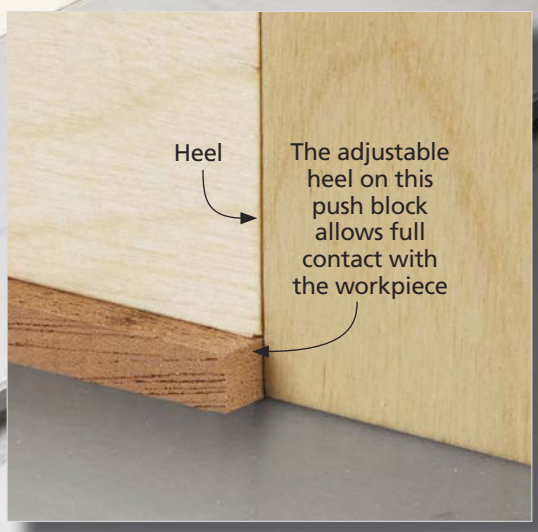
FINAL ADVICE

As a final few words of advice, always use a push stick or push block if your hand will be anywhere near the blade. If a kickback does occur, it's better for the push stick or push block to take the damage rather than your hand. Along with a riving knife or splitter, this will massively reduce your risk of injury.

Finally, when making rip cuts, position your body on the side of the blade opposite your rip fence. If a board is ejected it will be more likely to go past you rather than directly toward you.

Table saw kickbacks should be understood more than they are feared. The safety-minded, proactive woodworker can all but completely eliminate the risk from a table saw and enjoy many years of injury-free woodworking.

Working with Small Parts



Often, the size of parts is relative to the size of a project. For example, when building a table, the parts are large. Likewise, when you start to scale down projects, such as a spice cabinet or gift box, the parts get smaller.

When dealing with these small parts, the table saw might not seem to be the best tool. However, with some proper setup and technique, you can use your table saw to tackle these small parts. Here, I'll take a look at some of the best practices to make safe and accurate rip and crosscuts on the table saw.



Inserts. A fresh insert in the table saw increases safety when cutting small parts. It reduces the likelihood of the part catching on the insert or getting caught between the insert and blade.



Zero-Clearance Tape. As a temporary fix, you can refresh your insert by using packing tape to close up the gaps. The packing tape is slick and allows workpieces to glide over it.

RIP CUTS

The first type of cut we'll look at is rip cuts. Ripping small parts to width can be tricky. First, you have to feed the workpiece safely. Second, you have to do this without having the piece fall into the opening in the insert or slipping under the fence. Here are some of the techniques I use to get the best results.

ZERO CLEARANCE. It's easy for small parts to get caught or stuck in chewed-up insert plates. To avoid this, I make sure to have a fresh, zero-clearance insert in my saw. This doesn't have to be fancy. Usually, it's a shop-made insert, like the one seen above. This keeps my cuts clean and also keeps the workpiece from falling into the saw cabinet.

If my insert is still fairly fresh but I need to tighten it up for just a few cuts, I'll often reach for a roll of packing tape. As you can see in the top right photo, the packing tape can be used to temporarily close up the kerf in the insert while you make your cuts.

A SPECIAL PUSH BLOCK. One of the most important tools for making safe cuts is a push block that suits the task at hand. I've found with small parts, it's best to match the push block to the stock. Often, this means using a thin push block when making narrow cuts. Likewise, I use an adjustable push block to hold thin stock (such as in the main photo on the previous page). A push block with an adjustable heel allows the entire push block to be in contact with the workpiece, giving me more control.

SACRIFICIAL FENCE. When ripping thin stock (such as veneer or plastic laminate), I make sure my fence has no gap between the fence and the table. A piece of hardboard (lower left photo) addresses this.

SMALL RIPS. For ripping multiple (narrow) parts to the same width, I'll often use a stop block to set the width of the cut (right photo below). This gives you a cleaner cut and the pieces you're ripping don't get caught between the fence and the blade, where they may bind.



Thin Cuts. Thin stock or laminate can slip under the fence during a cut. A quick fix is to attach a sacrificial fence made from hardboard using double-sided tape.



Makeshift Stop Block. To rip multiple pieces of thin stock, I'll use the back side of a featherboard as a stop block. After making a cut, move the workpiece against the stop (inset photo) and reposition the rip fence before making another cut.

CROSSCUTS

When I'm crosscutting at the table saw, I find the way to get the most accurate results is by using a crosscut sled and cutting small parts is no exception. However, a small parts sled needs to be size appropriate. And, depending on the type of work you're doing, you may want to make some special modifications to the sled.

MITER GAUGE FENCE. The simplest form of small parts sled that I use is a fence and base on my miter gauge. You can see this in the top photo below. I like this type of sled for two reasons. First, it's easy to make. (It's a plywood fence face with a hardboard base.) Second, you get some of the benefits of a miter gauge — it stores easily and you can adjust the miter gauge for any angle cut you need.

With that being said, this simple miter sled doesn't have a lot of options for accessories. So, when I need something a little more robust, I take a slightly different approach.

COMMERCIAL SLED. The next step up from a simple miter gauge fence is a commercially made small parts sled, like the one shown below (left) from *Rockler*. What I like about this type of sled is that it's sized to handle small workpieces. It's much smaller than my normal crosscut sled and feels like it's right for the task at hand.

I also like the fact that most small parts sleds have a series of T-tracks along the base of the sled and along the fence. This is particularly helpful when adding accessories such as stop blocks and hold-downs (more on that later).

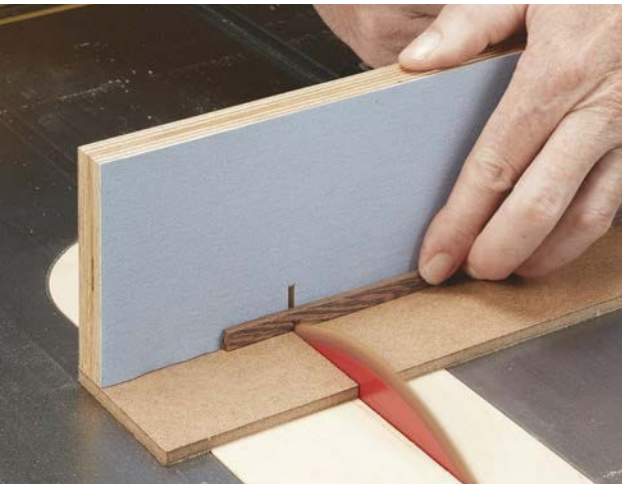
In addition, a sled like this usually has a replaceable insert. This means that you can always keep the kerf in the base of the sled tight and keep your cuts clean.

SHOP-MADE SLED. If your desire is for ultimate luxury in a small parts sled, you can't beat a shop-made cutting system (lower right photos). A system like this offers micro-adjustments and almost feels like it scales your table saw down to a smaller level — a nice benefit when working with small parts.

The great thing about a shop-made sled is that you can customize it to do what you need. You can add T-track wherever you want and make accessories like shop-made hold-downs. You can even use some of these sleds to perform rip cuts (such as the inset photo below).

LITTLE PIECES

Now that we've talked a little about some of the tools to help you achieve precise, clean, and safe cuts at the table saw, let's talk briefly about securing your workpieces before and after making the cut.



Good. Adding a hardboard base to the bottom of a plywood miter gauge fence is a quick trick I use when cutting small parts. The base and fence are zero clearance for clean cuts.



Better. A commercially available small parts sled has handy features like a replaceable zero-clearance insert as well as T-track for accessories.





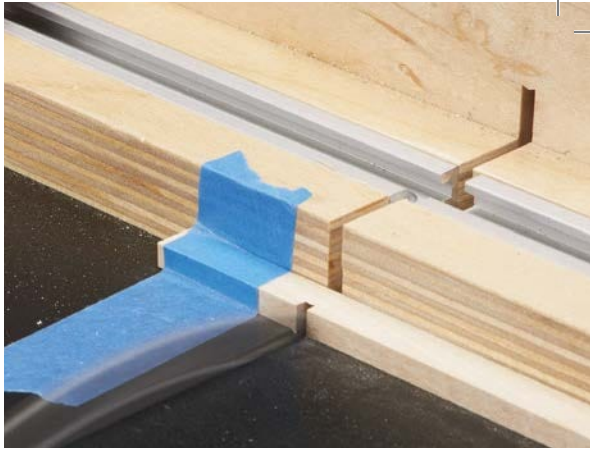
Best. A cutting system like this (*woodsmith.com/magazine/sip*) scales down your table saw. It features accessories for all your table saw cutting tasks, like a sled for precision crosscutting and a micro-adjust fence for ripping (right).

HOLD-DOWN. One problem while making a cut on a small part is securing the part after the cut is made. Small parts can "float" away (or into) the blade. Holding your workpiece down while making a cut is often as simple as using the eraser end of a pencil, as seen in the upper left photo.

Another option for keeping workpieces in place is to simply tape them to your sled while making a cut (upper right photo). If your sled is equipped with T-track, a hold-down (shop-made or commercial) also works well to secure pieces.



Small Part Holder. A pencil eraser easily holds workpieces in place while you're making cuts. The eraser is grippy enough to give good control of the part.



Tape It Up. In some instances, I don't have a free hand to hold a pencil while I make a cut. Here, a piece of tape, such as blue painter's tape, comes to the rescue.

PARTS COLLECTION. If you've ever needed to make multiple parts the same size (such as making parts for toys), you know that as you cut them, they tend to stack up and can make a mess on your saw. Or worse, if they're round, they roll onto the floor. To wrangle small parts and keep them from running off, take a look at the box below for a simple add-on to your crosscut sled.

PROPER BLADE. The final key (and maybe the most important) to getting quality cuts on small parts is to select the right blade. When ripping, I prefer to use a thin kerf blade. This style of blade takes less effort to make a cut. And for ripping small parts, it just seems to work better.

For crosscut blades, I reach for a fine-tooth crosscut blade. The key to clean cuts is to make sure the blade is sharp and to use zero-clearance inserts to keep chipping to a minimum. For really splintery woods, it helps to score your cuts with a knife, such as in the right photo.

Cutting small parts may not be something you do often. But, when the need arises, you'll be glad to have these tips on hand to ensure the best results.



Minimize Chipout. For thin, splintery woods, lightly scoring the cutline with a knife reduces chipping from the saw blade.

Small Parts Catcher

Allowing small parts to collect around your spinning table saw blade can quickly become dangerous. The vibration from your saw can cause the parts to work their way into the spinning blade and become a mini projectile fired across the shop. You can avoid this problem by crosscutting your parts with a cutoff sled with a small parts bin add-on. It consists of two parts — a platform on one side of the blade to raise your workpiece up and a small trough on the other side to catch the pieces. When a workpiece is cut, it falls down the beveled edge to be collected in the trough. That way, you can continue to make your cuts and avoid any workpieces coming into contact with the blade.



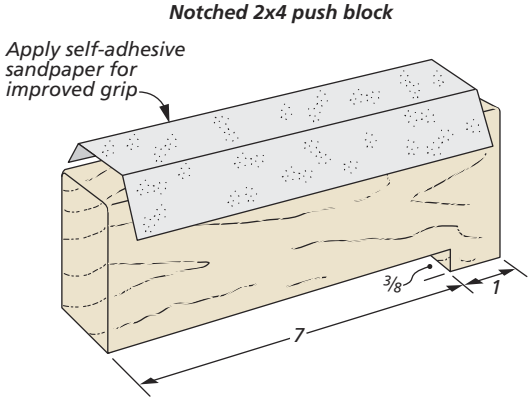
Cutoff Tray. A high tooth-count blade coupled with the catch tray on the sled keeps small parts from wandering away while you work. This version attaches to the T-track in the sled fence and uses T-bolts and knobs to hold it in place.



Ripping Thin Strips

Whether it's for edging, face frames, or filler strips, ripping thin strips at the table saw is an operation that comes up quite frequently in woodworking projects. Yet despite how common it is, many woodworkers tend to approach this cut with a measure of trepidation.

When you really take a look at the cut, it's easy to understand why it might give you pause. After all, ripping a thin strip has a tendency to put your hands and fingers a little too close to a spinning saw blade for comfort. Luckily, there are some very simple ways to enhance both the accuracy and comfort level with which you can rip thin strips. Here are three ways that I like to go about it in my shop.

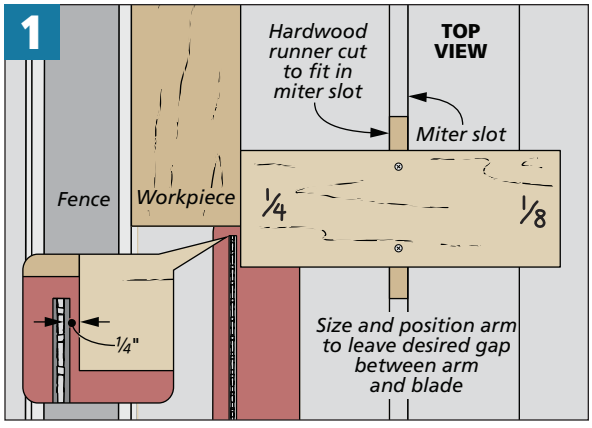


NOTCHED PUSH BLOCK

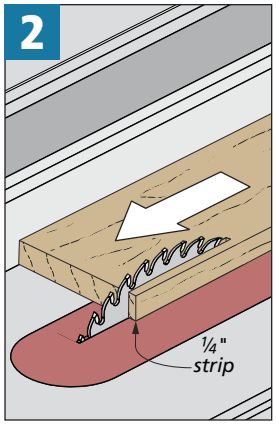
Push blocks and push sticks are nothing new in woodworking. But the problem when ripping very thin strips (⅛" to ¼") is that the space between the rip fence and the spinning blade is so tight that you run the risk of cutting into your push block or push stick.

The simple solution, instead, is to craft a push block that's designed to be cut into, as shown in the main photo above and the drawing at left. As you can see, it's just a scrap piece with a notch on the bottom edge that slips over the workpiece. I make mine about 8" long, so it can also serve as a hold-down as I push the workpiece through the blade.

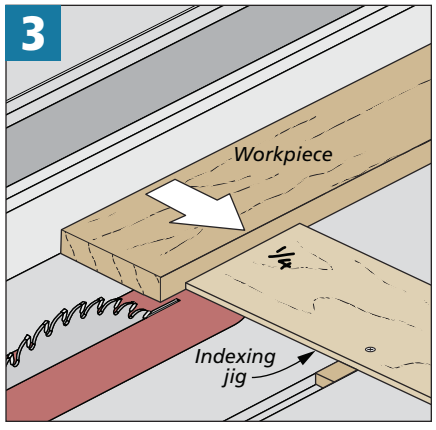
You'll want the push block to be wide enough that it won't rock or shift as you use it. Since I often have scraps of dimensional lumber around my shop, I typically use pieces of 2x4 to make these blocks. Not only do they have the width I need, but the top edges are rounded for comfortable use. I also add a strip of adhesive-backed sandpaper for a solid grip. Finally, raise the blade just slightly above the workpiece for a safe cut.



Setup. The jig is set to leave a ¼" gap between the blade and jig on one end, and ⅛" on the other. Just butt the workpiece between the rip fence and jig.



Cut. Remove the jig and make a pass to cut a thin strip from the board.



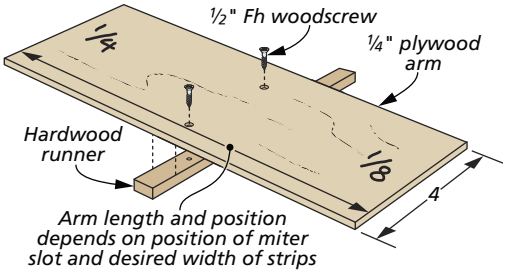
Reset. Now you can replace the jig in the miter slot and repeat the steps in order to cut additional thin strips.

USE AN INDEXING JIG

If you're still hesitant to rip a thin strip with such close quarters between the rip fence and the saw blade, another option is to rip it so it falls to the waste side of the blade instead.

To do this, you simply need an indexing jig, as shown in the drawings above. This simple jig consists of a runner that fits tightly in the miter slot, and an arm that establishes the thickness of the edging strip. To make it, you'll want to position and install the arm so that the distance between the end of the arm and the blade matches the width of strip that you want. I made mine so that one end will do ¼" strips, and the other end does ⅛" strips.

With the jig assembled, using it is easy, as shown in the drawings above. Just butt the wood against the jig, lock the fence, remove the jig, and make the cut. After ripping a strip, shut off the saw and repeat the process of resetting the fence to make another strip. You can continue to repeat this process, cutting as many thin strips as you need.



SAFE & SIMPLE STRIPS

More often than not, when you're cutting thin strips they're going to serve as edging for the exposed laminations of plywood or MDF. If that's the case, another simple method for creating them is shown below. Whichever you choose, these techniques offer some accurate options for thin strips that are sure to keep your hands safe.

Create Efficient Shelf Edging



First. Glue a wide hardwood board between two of your plywood parts. Make sure that the thickness between the parts is a perfect match.



Second. Set the table saw rip fence to match the desired width of the final workpiece plus the edging strip. Make a pass to complete one of the edged shelves.



Third. Now all that's left is to flip the second workpiece end for end. Make another pass with the same rip fence setting to complete the second part.

Cutting Clean, Safe Bevels



Digital Measurement. Digital angle gauges are a great bang for your buck and can be used on various tools.



Establish Zero. Zero the angle gauge out by placing it on your table saw top and pressing the "zero" button.



Tilt the Blade. Place the gauge on the saw blade, but not the teeth, and tilt the blade until the desired angle is reached.

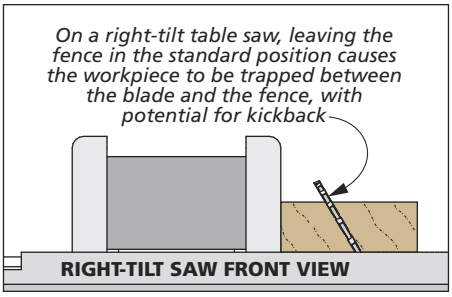
When it comes to cutting bevels, I often turn to my hand plane if the angle isn't critical. On the other hand, sometimes a bevel must be at a precise degree, such as gluing up a staved container. In these cases, my table saw can't be beat.

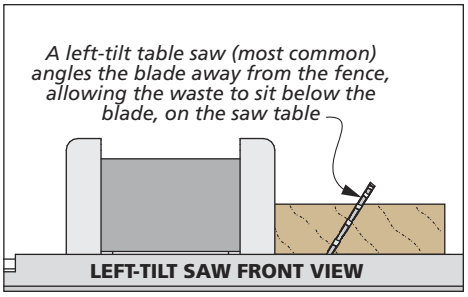
It might seem challenging, but getting a clean, accurate bevel is easy to do with a couple of steps. Here, I want to walk you through some of the steps I take to get accurate bevels every time.

DITCH THE SAW GUIDE. Most, if not all, table saws come with angles pre-marked on the saw, and you can tilt the blade following these guides. Forget them. Sure, you can calibrate your saw and set stops for the angles, however, if you're off just a fraction, your angle isn't going to be accurate. What I do instead is reach for a digital angle gauge, such as the one shown to the left. These little gauges are accurate and easy to set. See the two images above for how to set them. A benefit is they can help reset your saw to a perfect 90° when you're done.

The proper blade. I know, this should go without saying, but it's extremely

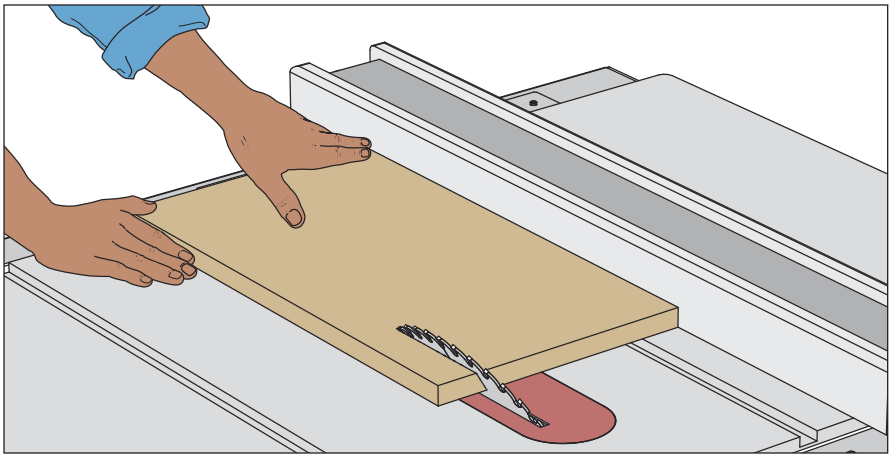
important to have the correct blade when cutting bevels. A little bit of burning can be cleaned up on a regular cut, but if you're working on a beveled glue joint, you want a clean cut off the saw. So make sure you're using a clean, sharp rip blade for ripping cuts, and switch over to a crosscut blade for making a crosscut. Now's not the time to try and make that rip cut with a crosscut blade (yep, I'm guilty of that as well).





RIGHT VS LEFT TILT. The final thing to think about before cutting is which way does your saw tilt? Not too many years ago, right-tilt saws were the norm. Now, most saws are left-tilt. You can see the difference between these in the drawings to the right.

If you have a right-tilt saw, you need to take some special precautions to make sure that the workpiece doesn't get pinched between the fence and blade, leading to a potential kick-back scenario. Most often, this involves moving the fence to the other side of the blade, such as the drawing below. If you need to make a cut on a piece that's too big with the fence in this position, you'll want to call a jig into play. You can read more about this in the box at the bottom of the page.



Tilt Away From the Fence. With a right-tilt table saw, making a bevel cut with the fence to the right of the blade can trap the cut and cause a kickback. Shifting the fence to the left ensure a safe, accurate cut as shown above.

MAKE THE CUT. Once your setup is complete, all that's left to do is make the cut. Make a smooth, fluid cut and you'll end up with an accurate, glue-ready bevel. If you're working on staves, such as the main photo on the previous page, keep in mind that you'll need to be careful with the sharp edge along the fence. Take care not to ding it up.

The next time you're working on a project that requires a clean, accurate bevel cut, spend a few minutes at your saw. Some careful, thoughtful setup will yield great results.

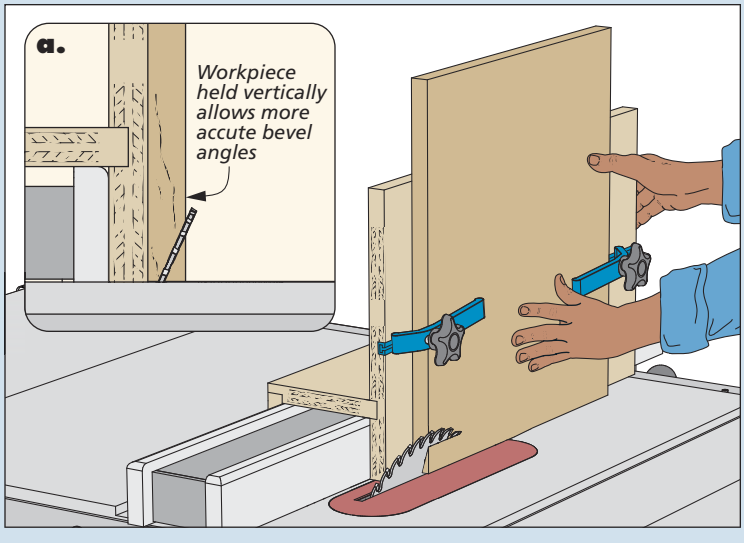
Dual Purpose Bevel Jig

Vertical Jig. One of my favorite jigs for the table saw is a vertical clamping jig, such as you see here. With a jig like this, you can extend the limits of your bevel cutting abilities and make more acute angles (detail 'a').

This jig is also dual-purpose if you have a right-tilt saw. Because the left wing of the saw doesn't have the same capacity as the right, you can still cut bevels on larger panels by holding the panel vertically. Then, you can make the cut and allow the waste piece to fall away without becoming a kickback hazard.

GO 2 Online Extras

For plans to build the vertical jig, go to:
WoodsmithSpecials.com



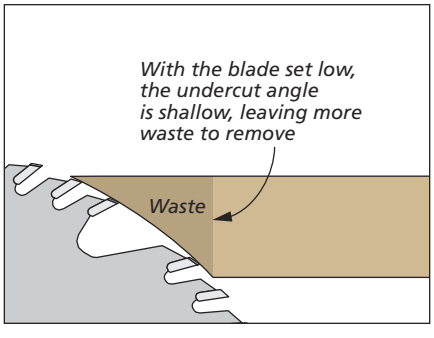


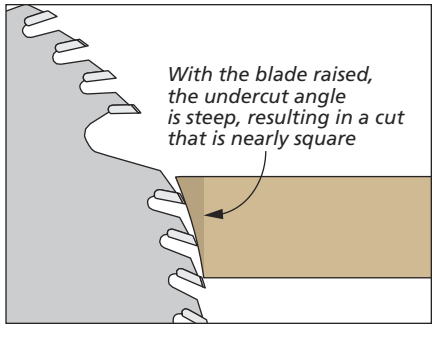
Stopped Cuts

When it comes to the table saw, most of us think of it as a tool for cutting through a workpiece. But occasionally, you may have a need to make a stopped cut. And while there are several different tools you can use to make stopped cuts, from a band saw to a jig saw to a hand saw, sometimes the cut demands the precision and accuracy that can best be provided by a table saw.

A stopped table saw cut is just what it sounds like. You push the workpiece part way into the blade, stopping at a given point. Then, after turning the saw off, simply back the workpiece out of the cut. Making stopped cuts isn't difficult, but there are a few things that you'll definitely want to be aware of in order to get good results.

Because saw blades are round, the end of a stopped table saw cut will be curved, matching the profile of the blade. The drawings above illustrate the difference in blade heights and the effect they have on the angle of the cut.





There's no way around this, but you can minimize the amount of this curvature by raising the blade to its full height. Doing so allows the blade to meet the workpiece at a steeper angle, resulting in a cut that's almost square.

Safety Note: Because more of the blade is exposed, use extra caution when making cuts with the blade raised to maximum height. And whenever possible, use a blade guard.

END OF THE CUT. These drawings also demonstrate another peculiarity of stopped cuts. You'll notice that the blade cuts further into the bottom face of the workpiece than the top. And since you can't see the bottom face, you can't really tell where the cut truly ends without turning the workpiece over.



Blade Front. To mark the blade location, use a drafting triangle to draw a line from the front tooth of the blade to the rip fence.



End Point. Extend the line up the face of the rip fence to indicate the leading edge of the saw blade. This will be your stop line.



Stopped Cut. Stop the cut when the layout line on the top of your workpiece meets up with the stop line on the rip fence.

This can make it difficult to cut precisely to a line. But there are a couple of ways you can work around this.



Upright Cuts. Standing a workpiece on edge is a simple way to make short stopped cuts. A tall auxiliary fence on the miter gauge supports the workpiece.

For relatively short stopped cuts, you can use a stop block to control the length of the cut, as shown in the main photo on the previous page. By clamping the stop block along the rip fence, you can regulate the length of the cut. This technique is especially useful if you have a number of identical stopped cuts to make.

A second method for gauging the end of a stopped cut is to transfer the location of the leading edge of the blade to the rip fence (upper left photo). A line drawn on the face of the rip fence (center photo) indicates the location of the front of the blade. Then all you have to do is lay out the end of the stopped cut on the top of your workpiece. When the layout line on your workpiece meets the line on the rip fence, you can stop the cut (upper right photo).

COMPLETING THE CUT. Because the end of the stopped cut isn't perfectly square, you may need to complete the cut with a hand saw or band saw. If you are making intersecting cuts to create a notch or opening, you can clean up any remaining waste at the end of the cuts with a chisel.

GO VERTICAL. The stopped cuts I've described so far have all been made with the workpiece lying flat on the table saw. But for short stopped cuts (less than 3" in length), you have another option. By holding the workpiece vertically on edge, you can make perfect stopped cuts.

For this method, you'll want to use a miter gauge with a tall auxiliary fence to support the workpiece, as shown in the photo at left. This technique comes in handy for operations such as notching the corners of a panel to fit around the legs of a table or inside a case.

STOPPED DADOES. Another type of stopped cut is a stopped dado. You can read more about making stopped dadoes in the box at left.

Stopped table saw cuts are generally not something you'll find yourself making every day. But it's helpful to know a few tricks and techniques for tackling them when the need arises.

Cut Stopped Dadoes

The same techniques used to make stopped table saw cuts can also be applied to making stopped dadoes using a dado blade. The key difference here is that because you can't raise the dado blade very high, you'll end up with a fairly long curved area at the end of the cut.

The solution here is simple. Just square up the end of the cut with a chisel. Most of the time, a stopped dado is used to hold a shelf or divider, so the end of the cut will be hidden anyhow.



Chiseled Finish. A sharp chisel and a steady hand quickly square up the end of a stopped dado that has been cut on the table saw.



Dado Blade Basics



The Dado Stack. Two scoring blades, a range of chippers, and thin shims comprise a quality dado blade set.

The main job of a standard table saw blade is division. You rip one wide board into two or more narrow pieces. Or crosscut a panel into smaller fractions. A dado blade, on the other hand, works on the principle of addition by subtraction. This isn't some form of new math. With a dado blade, you can add a groove to a workpiece by removing some of the material from that part.

Cleverness aside, this concept of what a dado blade does helps you understand its practicality in the shop. With this in mind, we'll look at what a dado blade is and how it works. From there, we can look into a few ways to get the cleanest cuts no matter the application.

All saw blades, unlike a knife or scissors, cut by removing a small amount of material — called a kerf. When you're cutting boards to size, a smaller kerf is more efficient in using power from the saw and for maximizing yield from the board.

JOINERY BUILDING BLOCKS. With a dado blade, you aren't sizing parts. Instead, the kerf is the important part. It's a building block for all kinds of joinery. Consider that

a wide kerf is a groove when it follows the grain of a workpiece. It's a dado when cutting across the grain.

Move that kerf to the end or edge of a workpiece and you have a rabbet. (BTW — you've also just formed a tongue, too.) A rabbet cut on both faces of the end of a workpiece creates a tenon. Follow the string and you can see half laps, bridle joints, and slots around the corner.

A KIT OF BLADE PARTS. To accomplish this, a dado blade is more like a kit of components that you mix and match to suit your needs. The photo on the bottom of the previous page shows the three elements common to most dado blade sets.

The two outer blades look like small table saw blades. Called scoring blades because they define the edges of the cut and form crisp corners along the edges of your groove or dado. These two are necessary for all blade setups. For narrow ¼"-wide cuts, these two blades are all you need.

For wider cuts, you'll want to add one or more chippers. The look of the chippers varies among the different blade models. Most have a throwing star quality to them. They come in different widths and their flat-topped teeth plow out the waste between the scoring blades.

The final element is a set of thin plastic or metal shims. There are times when you need to create a dado blade setup for an exact size. They work like microadjusters to increase the spacing between chippers and scoring blades. Like the chippers, the shims that come with dado blades are different thicknesses. They're usually labelled. You can even purchase aftermarket shims to give you more sizing options or better quality.

CARE & FEEDING. A good dado set will cost some money. And you'll get the best use from it with a little attention. The first thing is to keep the various parts protected between uses. Carbide teeth can hold a nice edge for a long time, but they're also brittle.

The act of cutting wide kerfs generates a lot of friction. This leads to resin building up on the teeth. The gunk impairs the cutting ability and reduces the life of the teeth, so get in the habit of cleaning your blade regularly.

Finally, a quality blade is designed to be sharpened several times. For consistent cuts, all the parts should get sharpened at the same time, regardless of the condition. Otherwise, you won't get flat-bottomed cuts.

INSTALLING IT RIGHT. Though installing a dado blade seems obvious, it pays to follow a few simple principles. It's also the starting point for getting smooth, reliable cuts from your dado set. The process is outlined in the photos at right. I'll pick out a few other items to keep in mind.

I keep a stiff brass or nylon bristle brush near the table saw to clear away debris from the arbor threads. These materials do a good job of clearing off gunk without marring the steel. Make sure the teeth on the scoring blades face forward when installing them (they're mirror images of each other). This typically means the blades' labeling faces out (Photos 1 and 4).

If you use shims, it's best to distribute them throughout the setup. Stacking them together could lead to a gap in the completed arrangement.

As you install chippers, position them so the teeth of one chipper aren't going to touch the teeth of another once the arbor nut is tightened. Finally, on wide setups, you won't be able to use the washer — that's okay, the arbor nut will hold fine.



Raise & Clean. For easy access, raise the arbor to its highest point. Clear away any debris from the threads and then set the first scoring blade in place.



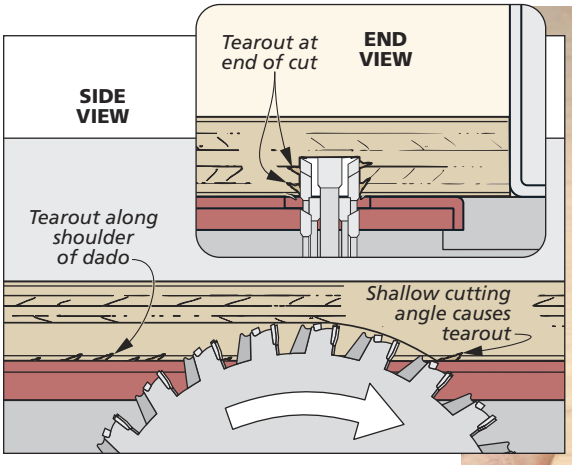
Adding Shims. To avoid creating gaps in the dado (and the resulting cut), avoid placing more than two shims in one location. Keep the shims snug against the blade.



Chippers. Stagger the chippers so the carbide teeth won't contact adjacent teeth. The design of the chippers keeps the blade balanced regardless of the arrangement.



Add the Nut. Install the other scoring blade and double-check the setup. The nut should fully thread onto the arbor. Then install an insert sized for the dado set.





Taming Tearout. This is a dado-cutting triple threat. Masking tape on the workpiece and a fresh zero-clearance insert tag team for tearout-free edges. A clamped-on hold-down ensures a consistent depth of cut.

STOP TEAROUT

The ideal cut made with a dado blade has smooth, crisp sidewalls and a flat, consistent bottom. Getting there requires experience and employing a range of options to meet difficulties as they arise.

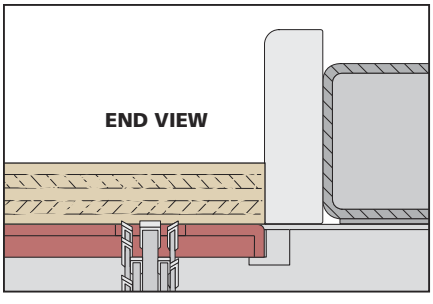
The main obstacle standing in your way is tearout. This occurs when unsupported wood fibers break away from the surface. Let's be clear. Tearout is more severe than a simple case of the fuzzies on the edges of a cut. Those can be cleaned up with a swipe of a sanding block. Torn out fibers are gone for good and leave ragged edges. The upper left drawing shows how the cutting forces of a dado blade influence tearout.

The type of workpiece and the grain orientation indicate the likelihood of getting tearout. Some materials like plywood, oak, and other open-grained hardwoods are candidates. And cutting across the grain of the wood should put your Spidey senses on tearout alert.

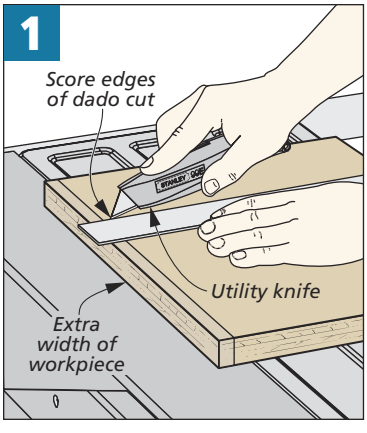
TEAROUT TAMERS. The drawings below highlight several prevention solutions. They fall into two general approaches. The first is to slice the wood fibers at the point of the cut to prevent long splinters from forming.

The other method is to provide backup to the wood fibers. This way there's no free space to break away.

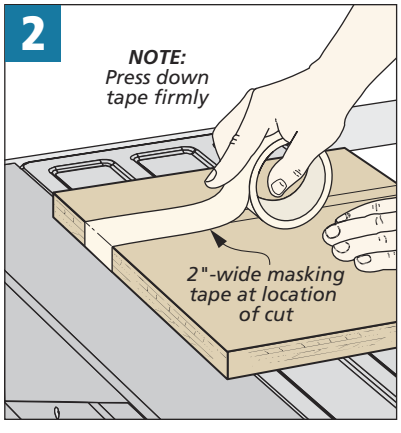
You don't need to employ all of these on every cut. Here's where experience comes in. Some solutions are more effective and practical than others depending on the task.



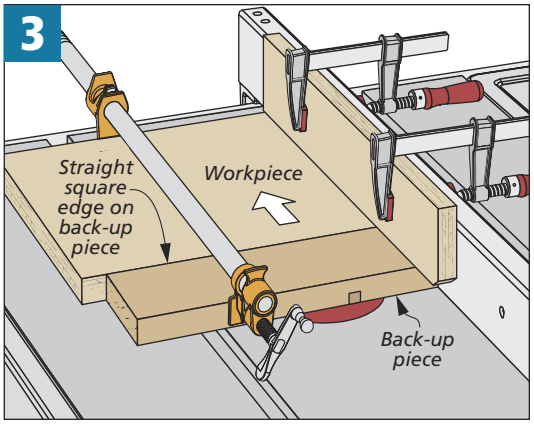
A Scoring Pass. With the blade raised 1/32", cut a scoring pass to prevent the veneer from chipping.



Score the Edges. Slice the face veneer with a knife and straightedge to stymie tearout.



Masking Tape. A strip of wide masking tape backs up the wood fibers, preventing them from lifting.



Backer Board. Clamp a scrap piece to the trailing edge of a workpiece to prevent tearout as the blade exits the cut.

SUPPORTING CAST

Surrounding your dado blade with a solid team is another element of good work. The accessories shown in the photos here complement a dado blade for getting better quality cuts or adding other capabilities.

ZERO-CLEARANCE INSERT. The first of these is a zero-clearance insert. This type of insert hugs the sides of the blade so there isn't a gap. It supports the workpiece to prevent tearout. It's a good idea to have a few inserts dedicated to commonly used dado blade setups. Buying that many inserts can get pricey, so I like to make my own. You can see the process at *Woodsmith.com/magazine/sip*.

SIMPLE HOLD-DOWN. If a workpiece isn't perfectly flat, the depth of cut can vary along its length. Sometimes it's subtle enough that you don't notice it until assembly. A hold-down clamped to the rip fence, as shown in the photo on the previous page, offers some insurance. You'll notice this one is basic: just a piece of plywood. Commercial featherboards offer a leveled-up option.

A hold-down only works when the fence is relatively close to the blade. In other situations, wide push pads press the workpiece flat to the saw table.



Rabbeting Fence. A sacrificial plywood auxiliary rip fence allows you to bury a wide dado blade to make accurate rabbet cuts. Wide push pads keep your hands away from the blade and distribute pressure for a consistent depth of cut.

AUXILIARY RIP FENCE. Rabbeting is a common dado blade operation. The setup I use is shown in the photo above. I temporarily attach a plywood auxiliary fence to the rip fence. An arrangement like this allows the dado blade to be partially recessed in the fence without damaging the face of your rip fence.

The exposed portion of the blade matches the width of the rabbet I'm cutting. Another benefit of this technique is that you can make fine adjustments to the width of the rabbet by simply repositioning the rip fence.

SETUP BOARD. One last dado-related accessory is shown in the left photo. It's a sample board that I use to record the "recipe" of my chipper and shim combinations used to make custom cuts. One easy example is matching the exact thickness of plywood.

Whenever I need to make another similar cut, I can see if one of my previous setups matches — or at least gets me in the ballpark. I enjoy my time in the shop, but spending a lot of time tweaking a dado setup isn't exactly the experience I'm looking for.

In my opinion, dado blades are a must-have table saw accessory. A dado set transforms your table saw from a cutting tool into a joinery station. Combine these tips with some practice and you'll never look back.



Dado Sizing Gauge. Get in the habit of recording a custom dado setup by making cuts with various setups in a sample board. Don't forget to write down the chippers and shims you used so you can recreate it later.

GO 2 Online Extras

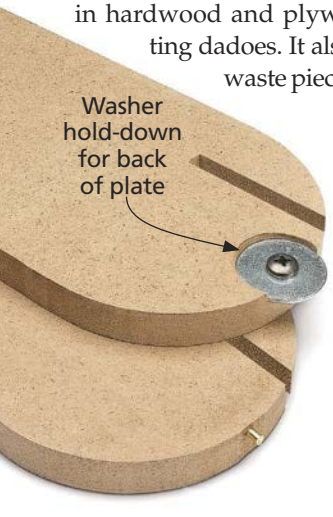
For instructions to make your own insert plates, go to: Woodsmith.com/magazine/sip

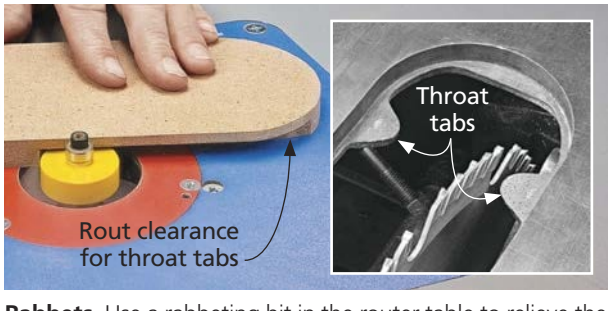


5 Tips for Making Zero-Clearance Inserts

One of the easiest ways to improve both the quality of cuts and safety of your table saw is to use a zero-clearance insert plate. By providing support right next to the blade, the insert plate helps prevent tearout when making crosscuts in hardwood and plywood and cutting dadoes. It also keeps small waste pieces from falling between the insert plate and blade and getting wedged.

While you can purchase insert plates, I find that it's pretty simple to make your own. In addition to saving money, it's easy to make extras to keep on hand to suit just about any task. I prefer making insert plates from ½" MDF, as you can see in the photos on these two pages.





Rabbets. Use a rabbeting bit in the router table to relieve the underside of the insert plate to sit flush with the saw table. The tabs on the inside of the blade opening serve as a guide.

It's flat, smooth, easy to shape, and inexpensive. The initial shaping of the insert is straightforward, but there are some simple details you can add to improve the performance of the insert.

[1] CUSTOM INSERTS

To create insert plates, I like to use the stock insert as a template. With a flush trim bit in the router table, you can quickly make perfectly sized plates.

It pays to take a close look at the stock insert (or a commercial zero-clearance plate) for other details to include. A couple of examples are shown in the left photos. The back end of the plate may have a pin or tab that keeps the plate from lifting up during cutting. You can add a cut-off screw or a washer to serve the same function (far left photo).

Insert plates rest on tabs formed in the blade opening in the saw table.



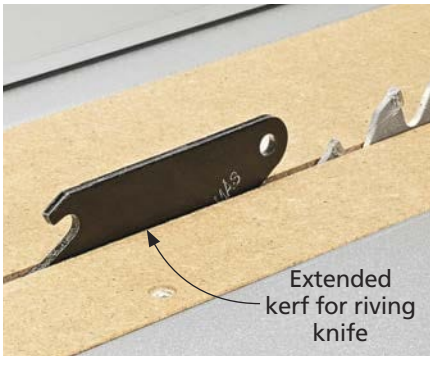
Leveling Screws. Thread small set screws into the insert plate. This allows you to adjust the fit of the plate while it's in place.

These tabs may be less than ½" below the surface. Rather than make a thinner plate, a better idea is to cut a rabbet around the underside of the plate so that it can sit flush with the surface, as shown in the right photo on the bottom of the previous page. This allows the plate to be thicker and, as a result, more rigid.

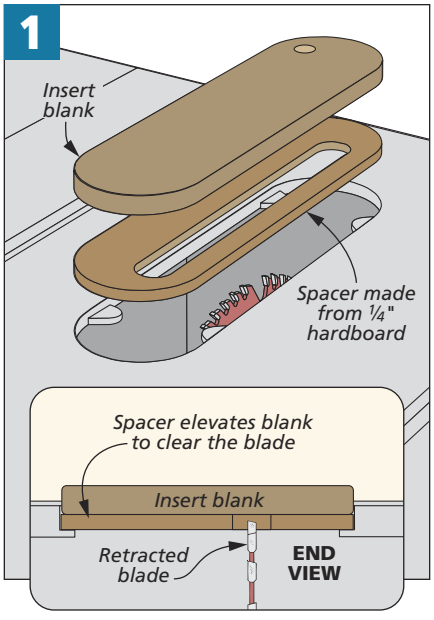
[2] ADD SET SCREWS

Minor inconsistencies in the tabs that support the insert plate may prevent the plate from sitting flush. This could also mean the plate rocks, which could cause a workpiece to catch during a cut.

I'd prefer not to fiddle with the fit of each plate when I want to use it. A simple solution is shown above. Install four small set screws around the perimeter of the plate. This way, you can fine tune the height of the plate so it sits flush with the saw table and is more stable.



Riving Kerf. If your table saw comes equipped with a riving knife, extend the blade kerf in your insert plate to fit it.



[3] START THE KERF

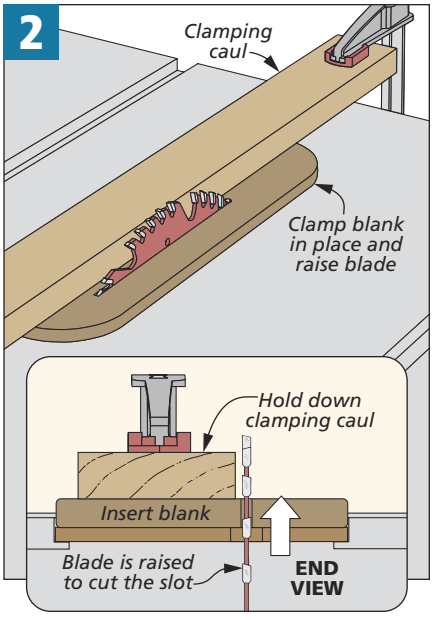
The whole point of a zero-clearance insert is that it's matched to a specific blade. So once you make the insert, you need to cut a kerf in it. The problem is the blade on many saws doesn't retract low enough to allow the blank insert to rest on the tabs. The solution is to make a thin spacer to raise the insert temporarily. The two drawings above show how the spacer works to cut the kerf.

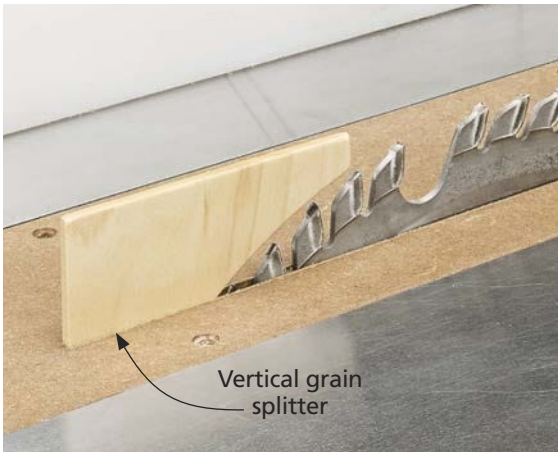
[4] SPLITTER & RIVING KNIFE SLOT

Zero-clearance inserts really shine for stopping tearout when making crosscuts. But I use one when making rip cuts, as well. However, it's easy to overlook a key safety measure when making your own inserts. And that's to use a plain insert and skip using the splitter or riving knife that came with your saw.

However, it doesn't take long to remedy the situation. The inserts shown in the photos on the previous page have a notch cut out at the back. This accommodates the blade guard/splitter common to many older table saws.

Newer saws incorporate a riving knife that rises with the blade. For these, the solution is even easier. All you need to do is extend the blade kerf back to allow the riving knife to pass through the insert just behind the blade, as you can see in the photo at left.





Splitter. A hardwood splitter glued behind the blade minimizes the gap between the blade and splitter, increasing safety.

[5] ADD A SPLITTER

Another option is to simply make an insert with a built-in splitter (photo above). Placing the splitter close to the blade increases safety by reducing the chance of the kerf pinching the blade.

After making a blade slot, glue a hardwood strip into the back edge of the slot with the grain running vertically. Lower the blade, turn on the saw, and raise the blade. The blade shaves the splitter for a close match. To keep the gap between the blade and splitter as small as possible, I dedicate inserts to specific stock thicknesses (⅝"-1", for example).

Applying simple steps creates a better insert. With it in place, you can make safer and more accurate cuts.



Hold-Downs & Featherboards

These low-cost accessories hold the key to making accurate, safe table saw cuts.

For a lot of woodworkers, the idea of shop safety seems to butt heads with practicality. However, the truth is that safe woodworking goes hand-in-hand with consistent, accurate work. As a woodworker, I'm always looking for ways to improve the results I get when using tools.



Cutting Grooves. By providing firm pressure against the rip fence, a featherboard ensures that grooves will be accurately sized.

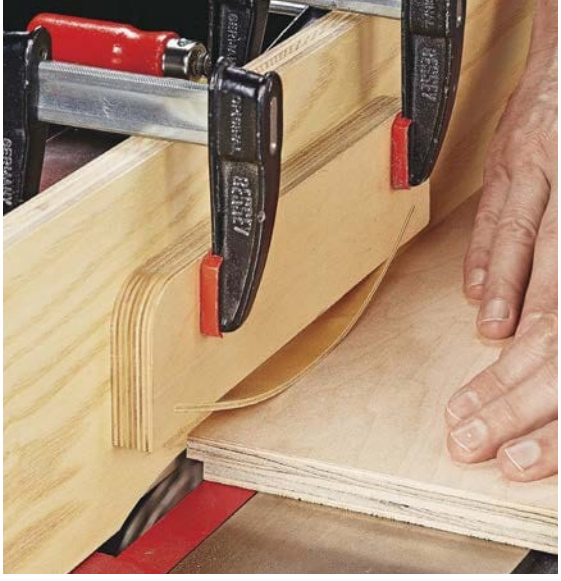
The table saw is a good place to show you what I'm talking about. No matter what kind of saw you have, an inexpensive accessory, a featherboard, can improve both results and safety.

RIP IT RIGHT. Many projects start with ripping parts from wider boards. There are two ways to use featherboards while ripping.

I attach a featherboard to the saw table when ripping long boards. The featherboard acts as a third hand to hold the workpiece tight against the fence while I control the back end.

The same setup works for ripping a number of parts from similarly sized blanks, as shown in the photo above. The featherboard ensures consistency.

THE SETUP. The key to making this work is the location of the featherboard. You want it close to where the blade is cutting, as shown in the inset drawing



Better Rabbets. A shop-made hold-down works just like a featherboard to ensure a consistent cutting depth when creating rabbets.



Stack Them. Double up a pair of featherboards to create a taller support system when cutting wide workpieces that are held on edge. Position the featherboards ahead of the blade.

on the previous page. But it should be ahead of the blade. If it's even with the blade, the pressure can force the waste piece against the blade and could cause kickback. Set the featherboard so it presses the workpiece against the fence but doesn't create too much resistance to push the workpiece through the blade smoothly.

JOINERY DONE RIGHT. Cutting joinery at the table saw offers more opportunities to put a featherboard to work. The lower left photo on the facing page shows a common task — cutting grooves in stiles and rails.

My aim here is to have consistently sized grooves no matter how many I need to cut. A featherboard presses the workpiece against the rip fence so it can't drift away. It also counteracts any minor bowing along the length of the workpiece that could lead to uneven groove widths. At times I'll attach a second featherboard behind the blade for an added measure of control.

RABBETS & DADOES. A table-mounted featherboard isn't usually helpful (or even possible) when cutting rabbets or dadoes. However, the resistance caused by a dado blade may cause a workpiece to rise up out of the cut, leading to inconsistent joints.

A featherboard attached to the rip fence above the blade keeps the workpiece fully engaged with the blade throughout the cut, creating a uniform depth, as shown in the upper left photo. This works well when cutting long parts where it's not as easy to provide downward pressure with your hand.

SHAPING WOOD. In addition to cutting parts and joinery, a table saw can also be used for shaping wood. One example is creating a raised panel (upper right photo). With the workpiece held on edge, you don't want it tipping and spoiling the cut. I used a pair of featherboards to help me hold the workpiece upright against the fence.

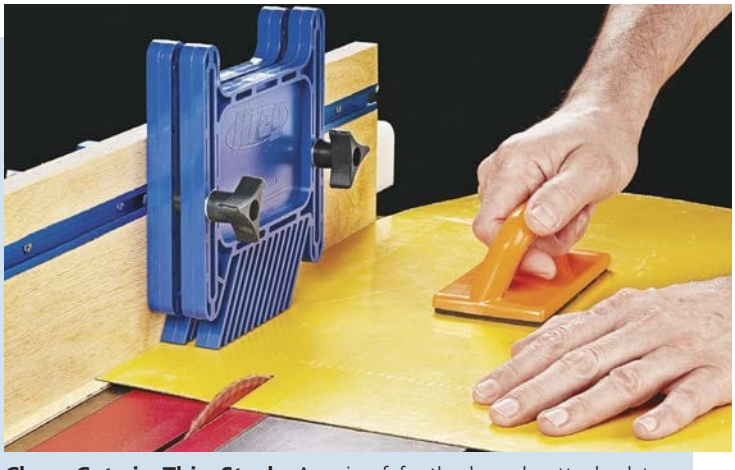
You can see another way a double featherboard setup can make a tricky cut easier in the box below. Table saw safety shouldn't get in the way of making cuts quickly and accurately. With the proper method, all three are achievable. The ideas shown here will help you get the results you're looking for.

Hold-Down for Thin Stock

Cutting thin stock like plastic laminate, paper-backed veneer, or even thin plywood can be harder than it looks. The thin relatively flexible materials are prone to vibrating as they're being cut.

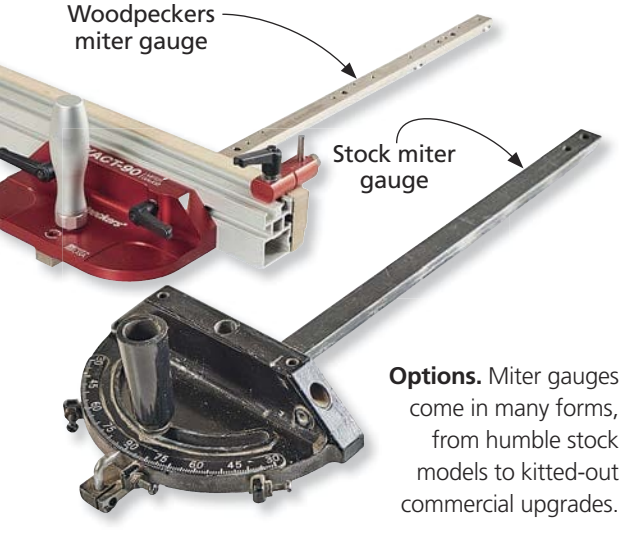
I take a three-pronged approach to making smooth cuts. The photo at right shows everything you need. A zero-clearance insert provides support and reduces chipout. Next, I made an auxiliary rip fence that includes a T-track for attaching featherboards. These hold the thin stock down and minimize chatter.

Finally, the fence has a lip along the lower edge. The purpose of this is to prevent the thin stock from slipping under the rip fence and wedging.



Clean Cuts in Thin Stock. A pair of featherboards attached to an auxiliary rip fence keep thin stock like plastic laminate from vibrating and chattering as it's being cut.

Mastering Miter Gauges



Options. Miter gauges come in many forms, from humble stock models to kitted-out commercial upgrades.

Miter gauges are one of those accessories that are easy to accumulate. Your table saw likely came with one, and there are plenty of woodworkers who choose to upgrade their gauges down the road — which means secondhand gauges aren't too difficult to come by. Either way, a good miter gauge is an integral part of the table saw.

STOCK VS COMMERCIAL. A miter gauge is a standard feature of most table saws, but those stock gauges leave a lot to be desired. Sometimes there's play between the bar and the slot, sometimes the 90° and 45° aren't quite perfect. When someone first purchases a table saw, it's often a good idea to buy a new gauge.

We've gotten good mileage from the miter gauge you see at left from *Woodpeckers*. It's precise, plus it features an adjustable fence and flip-down stop. But, even if you pursue one of these options, don't throw out that old miter gauge just yet.

MAXIMIZE YOUR MITER GAUGE

If you're not quite sold on a commercial option, don't fret.

Something fancy is nice, but there are some steps you can take to make nearly any miter gauge a precision tool.

ELIMINATE SLOP. Have you ever set a miter gauge in a slot and felt the bar wiggle a bit? That's called "slop" or "play," and it's the first thing that'll need to be addressed if your gauge has it. Luckily, fixing this is an easy task. Anything that will help the bar fill out the slot without interfering with its back-and-forth movement will work. A little reading will get you a lot of answers, but my personally preferred method is aluminum foil tape. The thin foil allows me to dial in the fit, and it slides as smooth as ever through the slot.

SETUP BOARD. On a cheaper miter gauge, one of the most finicky tasks can be setting it back to 90° after making an angled cut. To make sure my gauge returns to a perfect square position, I use the simple setup board you see in the boxes at right. It's easy to assemble, only needs a couple of scraps, and it takes me seconds to reset my miter gauge back to 90° using it.

AUXILIARY FENCE. Once your old miter gauge is fixed up, there's one more thing it'll need: an auxiliary fence. All this needs to be is a simple piece of wood (usually plywood in my case) to support whatever workpiece is being cut. Not only does an auxiliary fence provide support to wider workpieces during a cut, but it also backs up the wood fibers to help prevent chipout as you crosscut.

The stock for auxiliary fences almost always comes from my pile of cutoff scraps. As long as the piece is straight and flat, it'll work just fine. Plus, this means I don't need to be stingy with them — as soon as a fence is too chewed up, I toss it out and dig a new one from the bin to screw on.

One personal preference I have when making an auxiliary fence is to cover the front side with some adhesive-backed sandpaper. This isn't a necessity, but it provides enough friction to ensure the workpiece won't slip when making the cut. But, that's just the beginning of shop-made fences. There are a few more ways still to get mileage out of your stock miter gauge.

Miter Gauge Setup Board



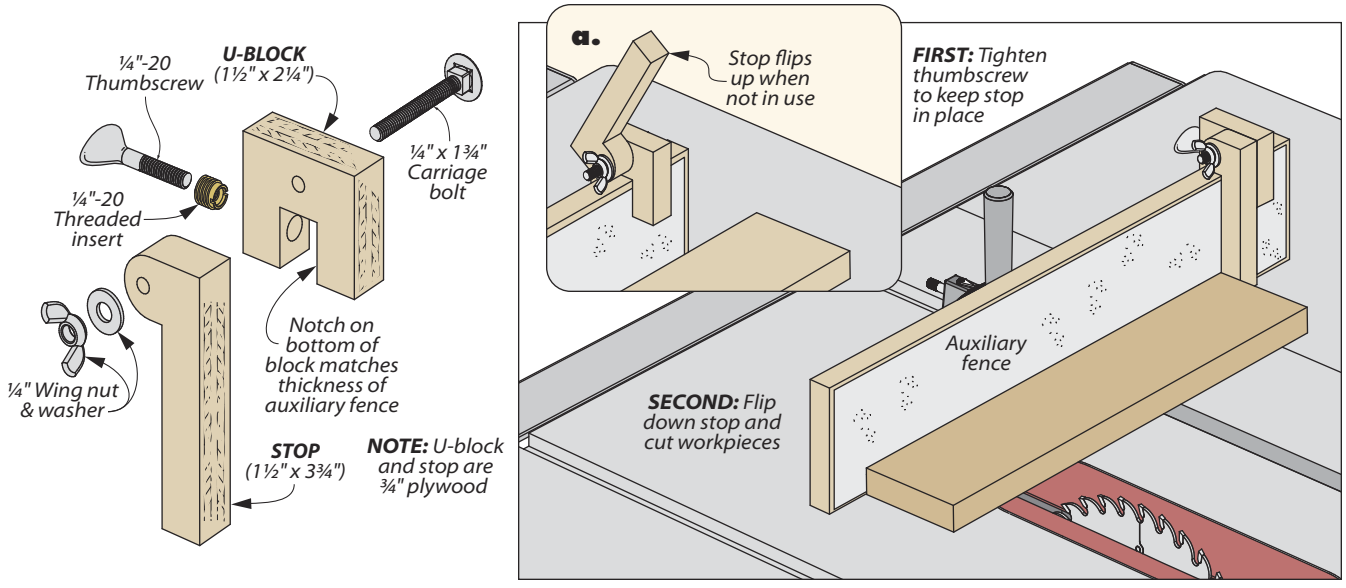
Square to the Groove. My setup board begins as a 3/4" piece of plywood. After cutting a groove down the center that matches my miter gauge bar, I scribe a square line to the groove.



Cleat. With the square line as a reference, drill pilot holes and screw on a cleat. Take your time setting this up and double-check that the cleat is square — a perfect 90° here means a perfect 90° on your gauges every time.



Using the Board. To use the setup board, slot the bar into the groove and align the fence to the cleat. This board also works well to hold an auxiliary fence as you screw it in place.



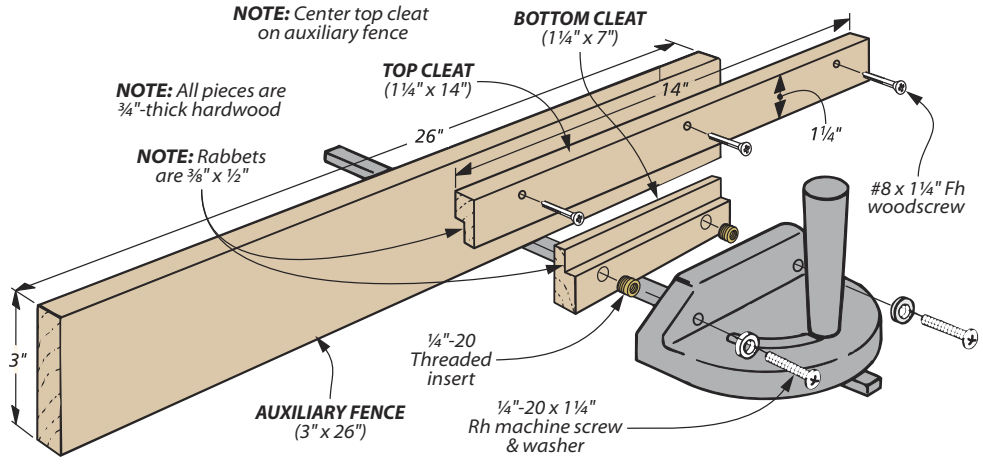
SHOP-MADE UPGRADES

Now that we've covered the basics of miter gauges, you may be interested in something a bit more advanced. If the advantages of a commercial miter gauge appeal to you but you're unsure if you want to invest the money in them, there are a number of shop-made options for achieving similar results.

If you thumb through older issues of Woodsmith, you'll eventually happen upon one of the many designs for shop-made miter gauge accessories. Some of these are pretty involved, but I often prefer something simple when it can get the job done. The two shop-made upgrades you see on this page fit the bill.

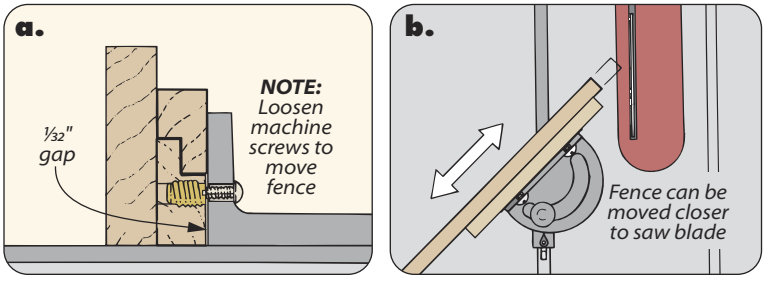
FLIP-DOWN STOP. When I'm crosscutting workpieces, there's a good chance that at least two are going to need to be the same length. And there's no better way to make sure that's the case than using a stop. The flip-down stop you see above can be attached to nearly any fence you size it for, and it only consists of a few pieces of plywood and a handful of hardware.

Using the stop is easy. When you need to cut multiple pieces to the same length (when sizing drawer parts for instance), attach the stop by saddling it over the fence and tightening the thumbscrew. After cutting, the stop flips up to get out of your way. This is an easy addition to the simple fences I mentioned before, but it also works with the more advanced option at left.



ADJUSTABLE AUXILIARY FENCE. This adjustable miter gauge fence works great to improve your gauge without going for a commercial option. It uses a pair of rabbeted cleats which allow the fence to slide towards or away from the blade depending on the angle of the cut (as shown in detail 'b'). Once in place, tightening the machine screws locks the fence in position.

Additionally, I can slide the fence beyond the blade so that it follows the workpiece through and backs up the cut. When the fence gets chewed up, all I need to do is cut a new piece and screw it on.



OUTSIDE THE TABLE SAW

As I mentioned before, spare miter gauges can be easy to



Sanding Assistant. A spare miter gauge comes in handy at the belt and disc sander, giving you a guide to achieve an exact angle.



Band Saw. A miter gauge at the band saw works great for precise stop cuts, like the tenon shoulders you see above.

accumulate. Luckily, there are reasons to keep these tools nearby a number of machines in the shop.

SANDING. Many belt and disc sanders (like the one you see above) feature miter slots. As long as the miter gauge is in shape, this is an excellent way to dial in exact angles.

BAND SAW. Most band saw tables feature miter gauge slots for crosscuts that need to be made at the band saw. However, they also work well to make stopped cuts for certain joints. Bandsawn dovetails or the tenon shoulders shown above are much easier with the control a miter gauge provides.

DEDICATED GAUGE. A miter gauge can also be devoted to a specific task. A small parts sled or box joint jig is good examples — it saves the time and headache of attaching and calibrating a jig by making it a permanent fixture instead. Regardless of what use you find, don't underestimate your old miter gauge.

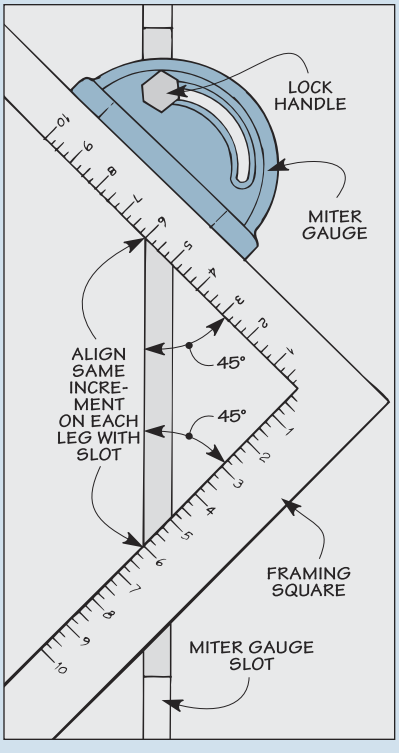
Quick Tip: Setting Up a Miter Gauge

It's not uncommon for the 45° setting on a miter gauge to be slightly off mark. Here's a quick way to set the miter gauge on your table saw to 45°. All it takes is a framing square and a little grade-school geometry. The idea is to form a right isosceles triangle using the framing square and miter gauge slot. An isosceles triangle has two equal sides, making each lower corner 45°.

Start by setting the framing square on top of the table saw. Now align the same increment on each leg of the square with the edge of the miter gauge slot. As an example, the drawing at right illustrates this using the 6" increment.



Next, loosen the lock knob on the miter gauge and gently snug the head up against the framing square as shown in the photo at left. The miter gauge is now set at exactly 45°. So after tightening the lock knob, you're ready.





Maintaining a Table Saw Top

At the heart of many shops is the table saw. There's a good reason for this. When it comes to multi-tasking, no other tool has the street cred that the table saw does. From ripping full sheets of plywood to creating a fine set of box joints, there are few that rival this tool.

My table saw's duties don't end there. It's also my second workbench. I often call upon it to act as an assembly station or a secondary worksurface.

While the saw is up to these tasks, they do take a toll that often shows up on the top of the saw. Glue, stain, rust accumulation, and random dings all combine to impede the saw from performing its core duty — cutting wood safely, accurately, and smoothly.

Not to worry, though. A little maintenance will quickly bring the surface back in shape. The steps shown here are ones that I go through once a year or so to make sure my table saw is in tip-top shape. If you're reconditioning a badly neglected saw, or one with heavy rust on the surface, you need to resort to more drastic measures. These could be chemical rust dissolvers or a product like the one shown in the How-To box on the next page.

And once the surface is back in shape, there are some simple steps you can take to protect it and make it a working top



Keep It Clean. Here are some allies when it comes to maintaining the top of your table saw.



Scraper. Scrapers make quick work of glue drips on your table saw. One that has a replaceable carbide blade is ideal.

that interacts smoothly with the material you're cutting. But first, it's time to roll up your sleeves and tackle the surface.

STUCK-ON STUFF. The best place to start is with the low-hanging fruit, which in this case involves knocking off any glue, stain, or finish buildup. A carbide scraper is what I rely on for this task (right photo, previous page). A scraper with a steel blade would work also, but I prefer the clean, aggressive bite that a carbide scraper provides.

You'll soon find that it's not just the surface of the table saw that needs attention. The edges of the table, miter gauge slot, and quite possibly the opening for the insert might have suffered some dings along the way. To smooth these out, all it takes is a couple of passes with a file. When that's done, it's a good time to sweep the surface of the saw with your shop vacuum. Now you can address any surface rust.

RUST REMOVAL. Here I'm dealing with several spots — a ring from a drink can that one of the kids left on the saw and some hazy rust from the humid summer. To remove these blemishes, I use an abrasive block that's impregnated with silicon carbide (main photo, previous page). It looks like a regular sanding block, but it's not. It's a rubber block that wears away like an eraser as you use it. This exposes more of the silicon carbide. The block is full of this material all the way to the core which pretty much guarantees you'll be able to use it many times.

SANDING & BUFFING SMOOTH. This next step is similar to the honing phase of sharpening your tools. A sanding block is called into action along with some 400-grit wet-or-dry sandpaper. These, along with some lubrication (such as *WD-40*), let you sand the surface creating a slurry that's easily cleaned up with a rag (photo above). Follow this up with your finish sander and an abrasive pad to buff the top (far left photo).

INVEST IN PROTECTION. Now that you've spent the time cleaning the top of your table saw, there's one more step to take — a protective top coat. This can be done in two ways — traditional paste wax (left photo) or a spray-on dry lubricant (bottom left photo, previous page). I have called both into duty, using the dry lubricant between paste wax applications. The more friction you can remove from woodworking, the better your project will proceed.



Sanding. A sanding block, some wet-or-dry sandpaper, and some *WD-40* work great as a final cleaning on your saw top.



Buffing. A final buff with a finish sander and an abrasive pad (cut to fit) prepares the top for the final step.



Protective Coat. A coat of wax or dry lubricant spray protects the surface and adds to the smooth operation of the tool.

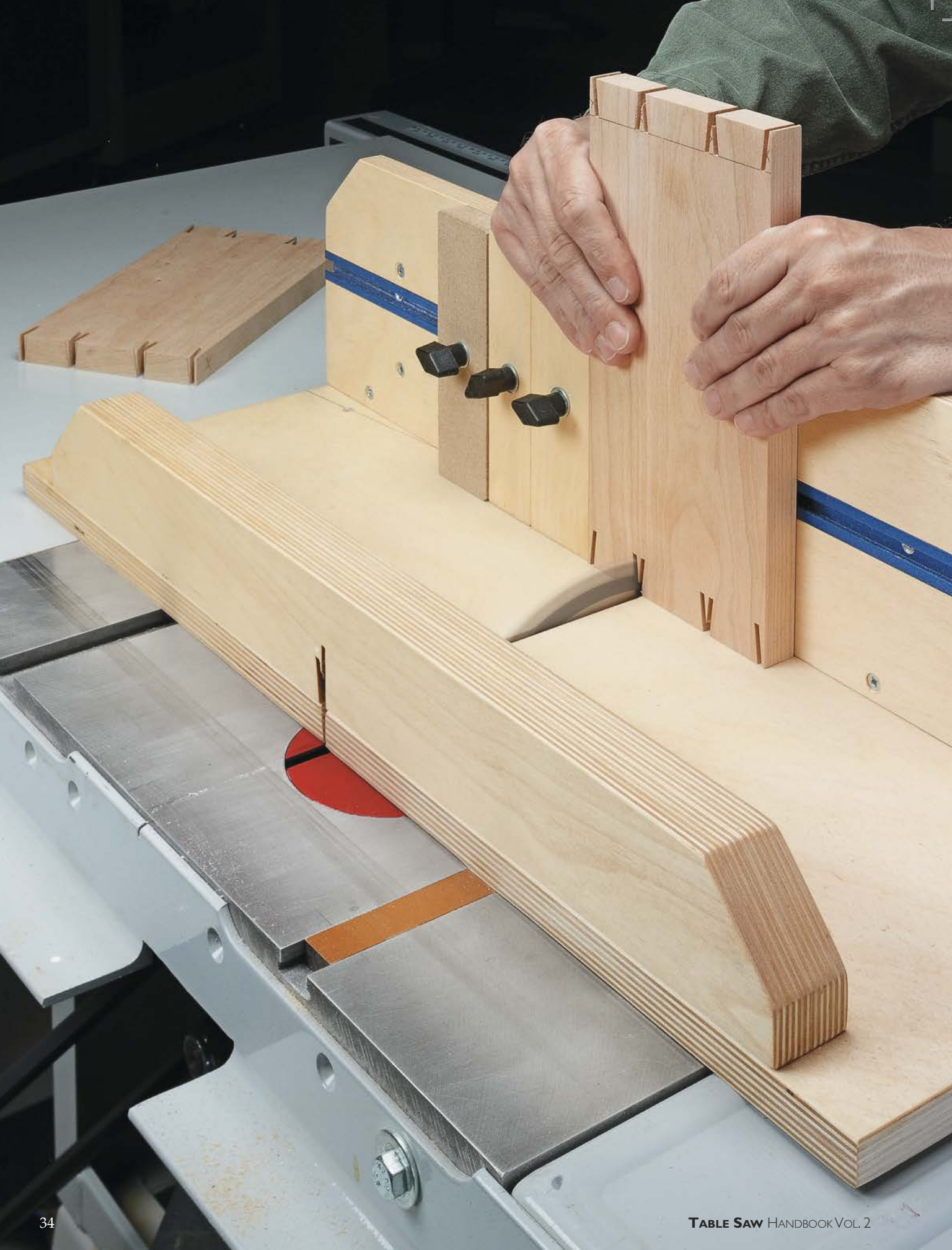
Remove Lots of Rust & Debris

On occasion, you have the task of bringing a table saw back to life that's been out of service for a long time. Often, such a saw has a surface so rusted that the standard supplies will take too long.

The disc you see here is the remedy to that problem. It's a disc that fits an angle grinder. The face is an open nylon weave coated with silicon carbide. It's designed to remove paint, glue, and rust without buildup in the disc or eating into the base material. Sources on page 98 provides the rundown on where you can purchase this disc.



Nylon Abrasive. When dealing with heavily rusted surfaces, this abrasive pad removes the debris without harming the surface.





Joinery Techniques

The most important (and often most fun) part of woodworking is the joinery. In this section, you'll find a variety of techniques for an array of joints, from miters and dadoes to locking rabbets and dovetails.

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DADOES, RABBETS, & GROOVES.....38

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ONE BLADE JOINERY 46

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LOCKING RABBET JOINT.....58

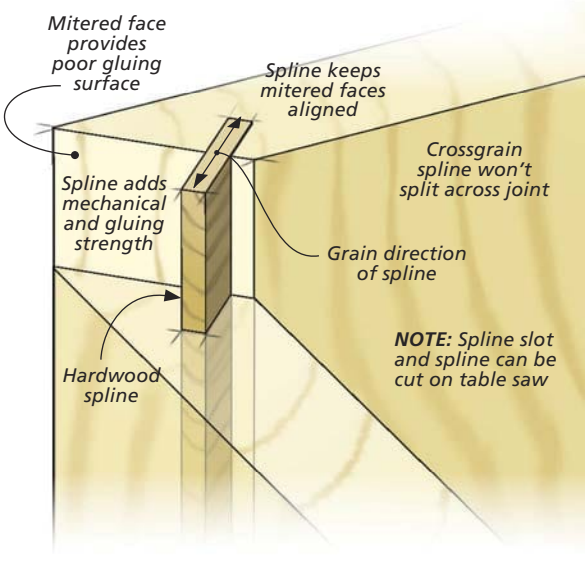
HIDDEN GROOVE JOINT 60

THROUGH DOVETAILS 62



Mighty Miters

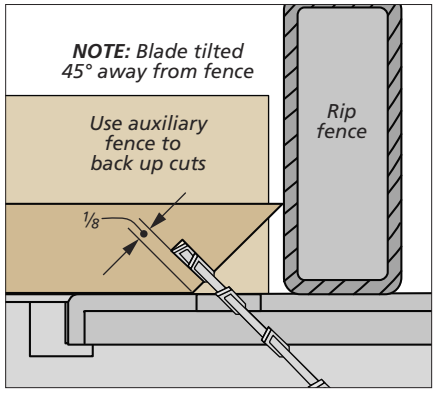
Confession time: I avoid miters if at all possible. Tight mitered corners on a box look great, but there's a lot that can trip you up. First off, you need to cut clean miters in every mating part. Not only that, the angle of those miters needs to be dead-on to avoid a gap in one or more of the corners. And I mean dead-on.



At assembly time, miters conspire against you. They slip and slide to avoid alignment. Plus, the porous end grain soaks up glue that leads to a weak joint.

MY ALLY IS THE SPLINE. So it's with admiration that I observe other woodworkers step into the ring with a miter. From their examples, I learned a method to tame some of the unruliness of this vital joinery technique. The secret is the spline. Splines are found all over, incidentally. They appear in construction as well as medicine. To sum up, a spline is a separate component that reinforces an assembly. I consider splines part of the loose tenon family. The drawing at left illustrates this concept with our current topic.

I see two quick benefits. First, the spline registers the two parts in relation to each other. This eliminates the sliding around that occurs once glue hits the surfaces. The splines allow clamps to hold the joints tight.



The other benefit is how a spline increases the glue surfaces. This results in a stronger assembly. This attribute holds greater importance as the project size increases. (Many times in small boxes, you can get by without splines.)

MITERS FIRST. Of course, cutting miters on the workpieces is where you start. As important as it is, it's not the focus here.

Once this is done, there are two remaining steps to add a spline to the joint: the first will be to cut matching slots in the mitered faces, while the second will be to make a spline to match.

THE SLOTS

Think of the spline slots as mortises, and you have a good idea of some of the considerations you need to make in the slot size and location. The right drawing on the previous page illustrates this with a table saw setup.

When you place the slot closer to the "heel" of the miter (about ⅛" from the edge in ¾"-thick stock), this allows you to cut a deep slot and use a long spline. Avoid extending the slot through more than half the thickness of the workpiece.

SETTING UP THE SAW. In the drawing, the blade is tilted to 45°. The principle behind this angle is that the slot is perpendicular to the face of the miter.

The rip fence locates the slot consistently on each mitered face. The distance between the blade and the rip fence determines the slot's position.

CUTTING SLOTS. When the project is made up of narrow parts, I guide the workpiece with the miter gauge. An auxiliary fence backs up the cut.

For a wide plywood or solid-wood panel, the job is even easier: the rip fence is the only guide you need. You simply slide the long, mitered tip of the workpiece along the fence as you would for cutting a groove. A featherboard keeps the workpiece flat on the saw table and the slots consistent.

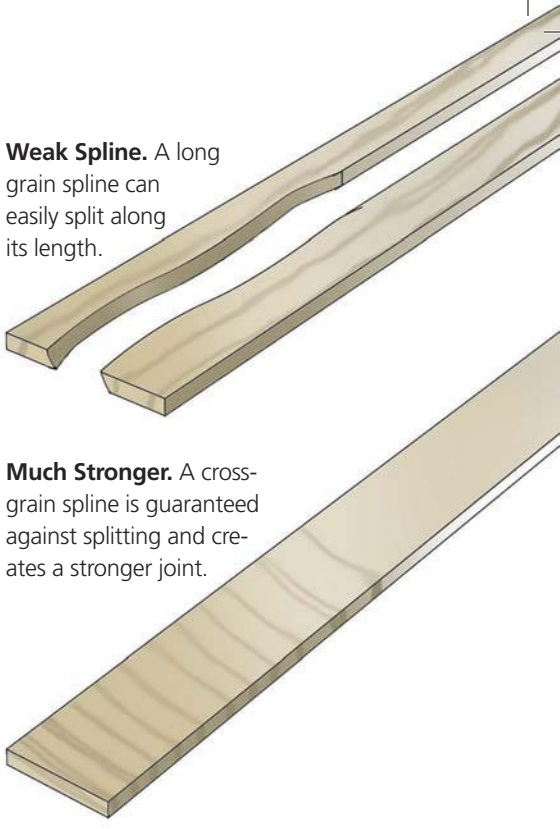
THE SPLINES

The splines that fit the slots must fit snugly but still slide easily into place. Take care here. I find that PVA wood glue tightens up the fit. Liquid hide glue (often my first choice) lubricates the parts for assembly.

If we stay with the mortise and tenon comparison, it should be clear that the splines need to be strong for a solid assembly. There are several ways to reach this goal.

SPLINE OPTIONS. For solid-wood assemblies, like the one in the main photo on the previous page, I use solid-wood "crossgrain" splines, as the margin drawings explain.

A strip of ⅛" plywood or hardboard gives you a strong spline with a fit that's ready-made for a ⅛" saw kerf when assembling wide plywood panels. In these situations, the edges are generally covered and the ends of the splines are hidden by strips of edging. For a long miter in solid wood when the spline will show, I use a different approach.



Weak Spline. A long grain spline can easily split along its length.

Much Stronger. A cross-grain spline is guaranteed against splitting and creates a stronger joint.

Here, a plywood spline can be cut a bit shorter than the slot it goes in, leaving a gap on either end. Then hardwood caps are added to create the appearance of a hardwood spline.

Miters don't need to be intimidating. Adding a spline to a miter joint isn't just a way to reinforce it, but also to make the work of aligning it much easier on yourself. If you give them a try, you'll find these small pieces yield big results.

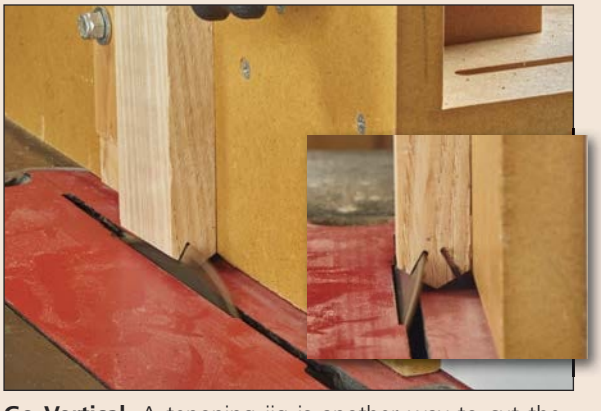
Spline Grooves on the Tray Table

In some ways, it's easier to wrap your head around a 45° miter. It's just more common. In the tray table on page 50, Shop Manager Marc Hopkins took a different tack that I think is worth highlighting, since we're on the topic.

There are two items to note about his approach. First, rather than use a miter gauge to guide the workpiece, he went with a tenoning jig. This holds the workpiece vertically. The piece is clamped in place, so it's less likely to shift during the cut. The jig shown here is a shop-made version that rides along the rip fence for easy setup and use. You can find the plans for one of our tenoning jigs on page 76 of this book. A commercial tenoning jig would work as well.

The second detail is the blade Marc used. To avoid a fragile tip between the kerfs, Marc installed a very narrow 1/16"-kerf blade. These aren't common, an alternate choice is to use a 40-tooth blade from a portable circular saw.

One last item: note that the rip fence is located to the left of the blade in order to make the cut.

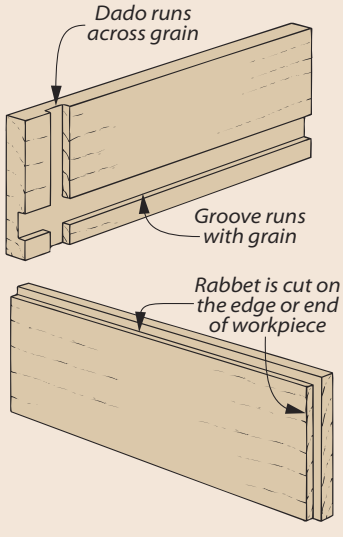


Go Vertical. A tenoning jig is another way to cut the slots for a spline to reinforce a miter joint. Here, three parts join together with 60° miters. So the table saw blade is only tilted 30°. A digital angle gauge works better than the saw's scale.



Dadoes, Rabbets & Grooves

Dadoes VS Rabbets



Know Your Terms. What's the difference between a dado and a groove? It all has to do with the direction of the grain. Dado. A dado runs across the grain of the wood. And a groove runs with the grain of the wood. This is really the only distinction. You can see what I mean in the top drawing at left.

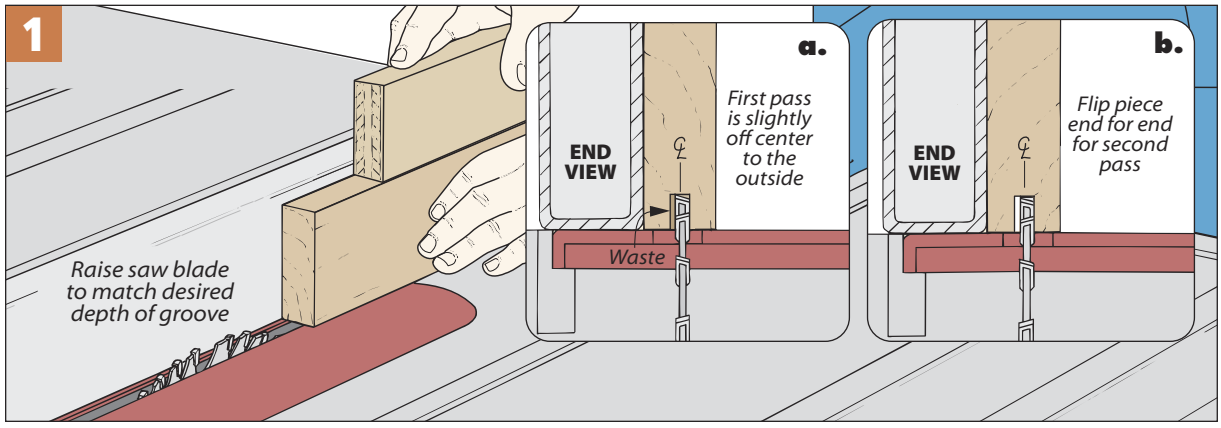
Rabbet. And what about a rabbet? A rabbet is nothing more than a dado or groove that is cut on the end (or edge) of a board. You can see an example of this in the drawing at left.

My favorite part of a project is creating the joinery. Doesn't matter what kind of joints the plans call for. It's then that generic boards turn into project parts. And I can even start to glimpse the final form of the project.

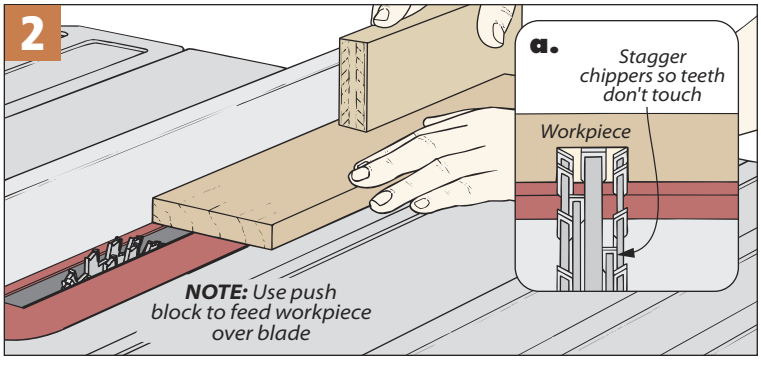
As important as the joinery is, what's surprising is the forms it takes most often. Woodworkers tend to lose their minds over dovetails and wedged through tenons. If you skim through any project plan, you'll find that grooves, dadoes, and rabbets turn up over and over. With that kind of workload, it's important to devote some time to the process of understanding what makes them different and how to create each one.

GLOSSARY. While the three joinery details share many attributes, the names help you orient the direction and location of the cuts. The box at left provides a visual guide for reference.

All three of the cuts perform several functions, sometimes in combination: These joints can house



another workpiece, forming a mechanical connection. The detail registers one part in relation to another. The joint increases the glue surface, improving the strength of the assembly. On these next pages, we'll look at the techniques as well as key details for cutting these joints at the table saw.



GROOVES

Cut along the grain of a workpiece, a groove offers a good place to start. It's similar to a rip cut. It just doesn't go all the way through a workpiece.

Your usual blade cuts narrow grooves just fine. The workpiece is guided by the rip fence. To widen a groove, simply adjust the fence and make another pass.

CENTERED GROOVES. A version of this approach is used when cutting a centered groove on the edge of a workpiece. We employ this method in *Woodsmith* for frame and panel construction.

Figure 1 above highlights how two off-center cuts both widen a groove and center it on the thickness of the part. All you need to do is flip the workpiece end for end between cuts. The photo on the previous page offers a good example. One thing to note: I like to set up this cut so the blade is offset away from the rip fence. This way, should the workpiece drift from the fence, it will be into the waste area of the groove.

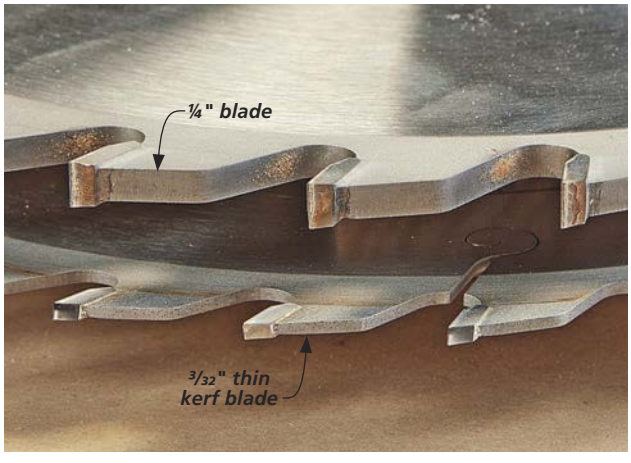
WIDE GROOVES. When a groove gets around 1/4", it's time to choose another blade. As Figure 2 shows, that usually means a dado stack. Grooves come in groups, usually. So it's time well spent to dial in the size of the dado with all the chippers and shims necessary.

The action of cutting a wide dado creates a lot of resistance. A push block and/or pads keep a workpiece flat on the saw table.

GROOVING BLADE. A dado isn't your only option. Steve Johnson in the shop at *Woodsmith* uses a 1/4"-wide grooving blade for crisp, consistent grooves. (Refer to Sources on page 98.)



Flat-Top Blade. With flat-topped teeth, the grooving blade plows a crisp channel along the length of hardwood and plywood.



Grooving Blade. Here you can see the difference in the thickness and tooth shape of the grooving blade and a combo blade.



Rabbets. A gap-free rabbet joint registers the two parts and increases glue surface area for a solid connection.



Tall Rip Fence. When you're cutting a rabbet on a wide piece, attaching a tall auxiliary fence prevents tipping. A set of featherboards keeps the piece on track.

WARREN OF RABBETS

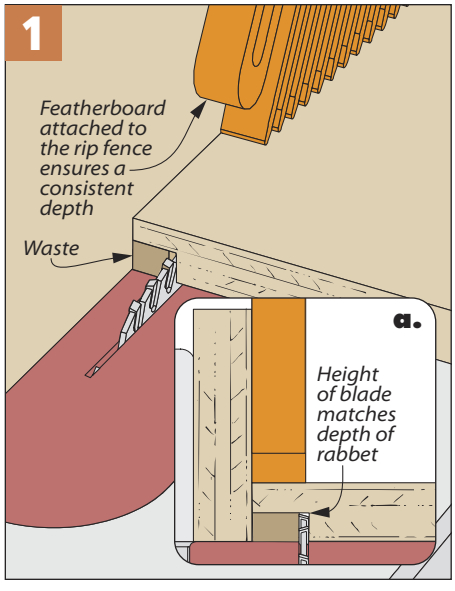
A rabbet differs from a groove or dado in that it only has one side wall, as shown in the photo above. The fact that it can be formed along the edge (with the grain) or across the end (cross grain) makes identifying it confusing for new woodworkers.

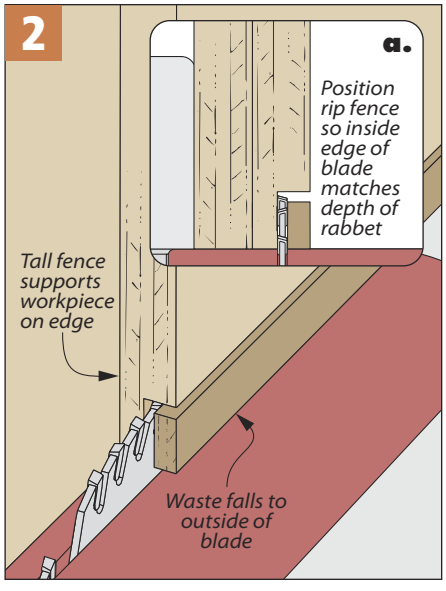
The nature of the rabbet opens up several approaches for cutting it at the table saw. All of these techniques are easily mastered. It's a good idea to have skill in using them to suit the project or tool setup at hand.

TWO-PASS RABBETS. The first rabbet-cutting technique I want to share uses a regular blade. At its most basic, you use one saw cut to define each face of the rabbet joint. The first cut is made on the face of the workpiece. For the second, the workpiece is held on its edge.

FIRST CUT. In Figure 1 you can see the setup for the first cut. I attach a tall auxiliary fence to the rip fence, like the one shown in the photo above. (This is used to support the workpiece for the second cut.)

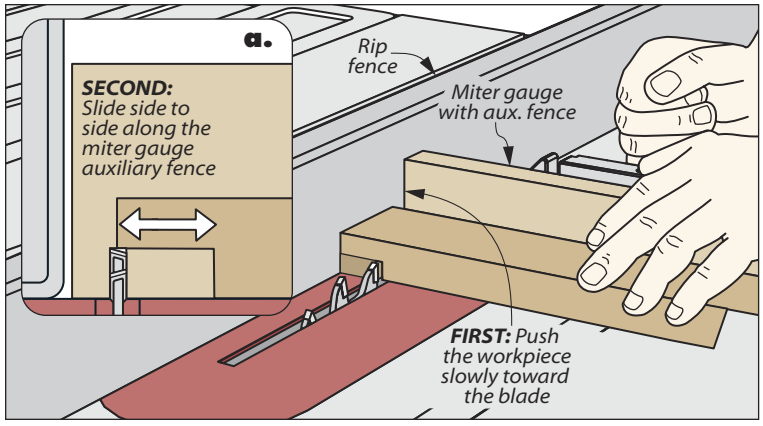
The next step is to set the rip fence. The distance from the fence to the outside edge of the blade defines the width. Most of the time, the width needs to match the thickness of a mating piece. So I like to use that piece as a gauge to set the rip fence. The height of the blade matches the depth of the rabbet.





FINAL CUT. The second cut isn't any more complicated than the first one. And it involves all the same considerations for setting it up. You can see these in Figure 2. Unless you're making a very shallow rabbet, a thin waste piece will be cut free during this step. You don't want it trapped between the blade and rip fence. Otherwise, the piece could bind and kick back. Instead, the piece should fall to the outside of the blade. To set the blade height, I use the first cut as a guide. The blade is set a tad lower than the inside edge of the kerf, as shown in Figure 2a. This gives you a crisp shoulder.

END RABBETS. There's one other single-blade rabbet technique I want to



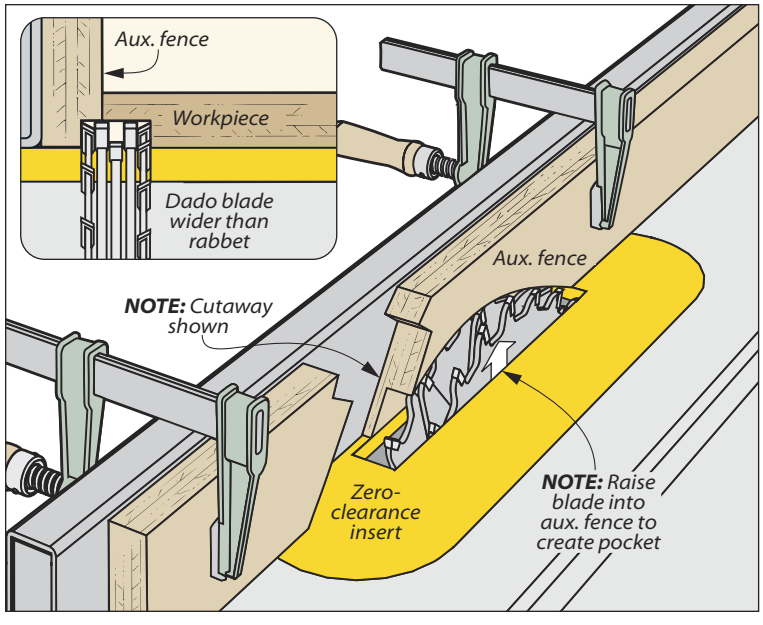
talk about. The method shown above is a variation on Christian Becksvoort's "speed tenon" technique. Like before, the blade height is set to the depth of the rabbet. The rip fence is positioned for the width of the rabbet (when measured to the outside of the blade).

To cut the rabbet, advance the workpiece towards the blade. As you do so, slide the piece side to side along the miter gauge fence. The end of the piece bumps against the rip fence at the end of each slide. This is shown in the upper right photo. The combination of the forward motion and sliding the piece cuts the whole face of the rabbet in a short time. As you can see in the photo at right, the surface is smooth. It's crazy how well this works.

DADO BLADE. The third rabbet technique should be a familiar one. I'd call it the Woodsmith default rabbet. We show it quite frequently in our step-by-step.

The main difference from the previous examples is the use of a dado blade instead of a single blade. Unlike a groove, you don't need to spend time dialing in the exact width you need. Assemble a dado stack that's wider than the rabbet.

In order to get the correct width, you'll recess a portion of the blade in a sacrificial fence attached to the rip fence. The primary benefit here is that you can form the rabbet in a single pass. When there are a lot of rabbets to cut, it's a significant timesaver in the construction process.





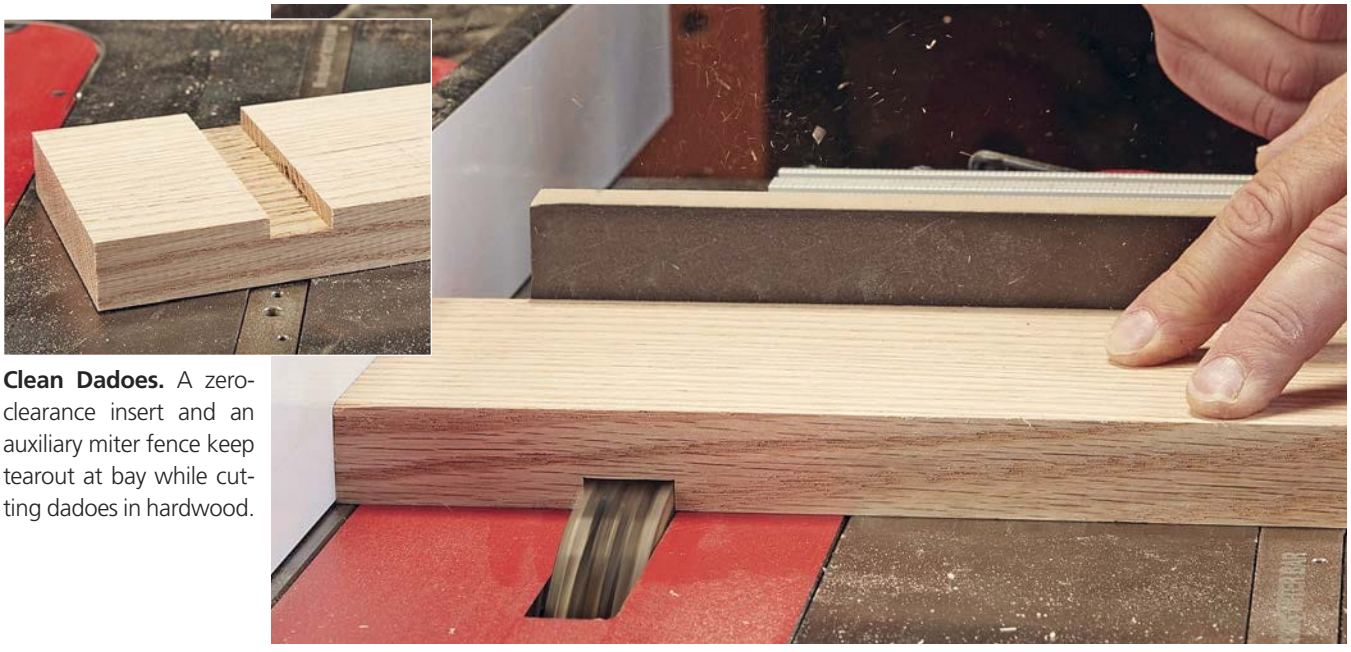
Single-Blade Rabbets. Slide the workpiece side to side as you advance it across the blade. The rabbet is formed in small bites.



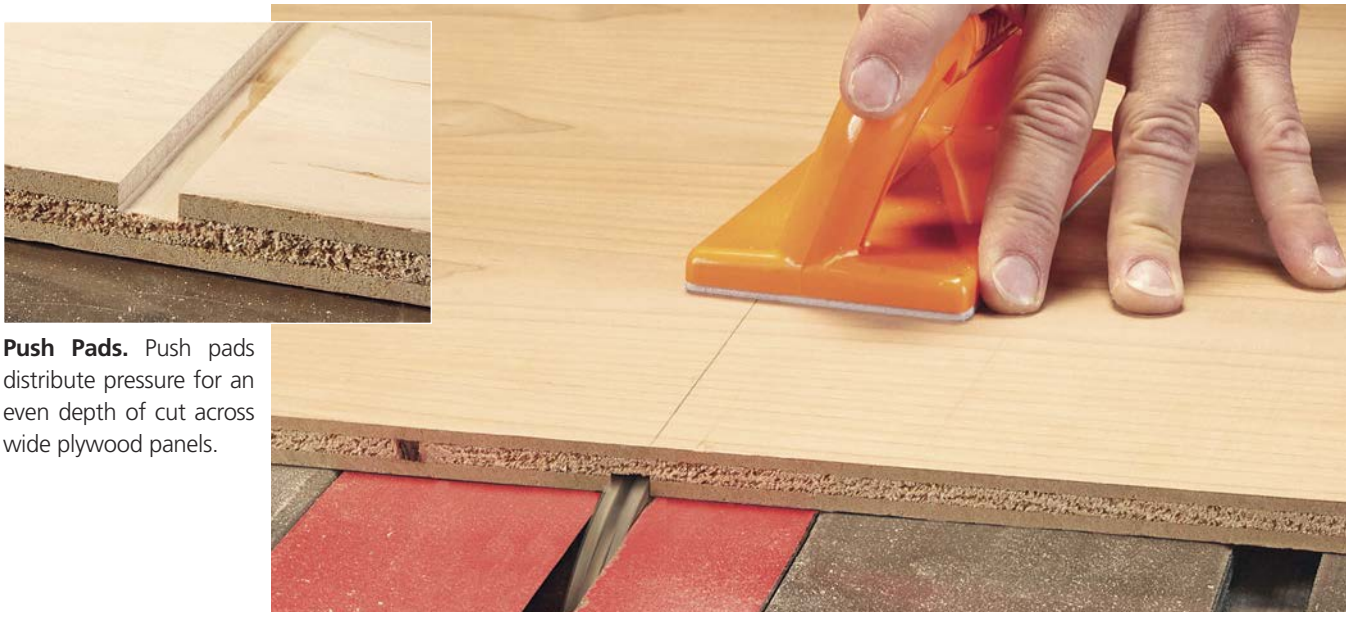
Narrow Board, Wide Rabbet. The bottom of the rabbet is remarkably smooth. For narrow pieces, this method eliminates a blade change.



Bury the Blade. A dado blade recessed in an auxiliary rip fence allows you to fine-tune the width of a rabbet. Once set, you can form rabbets in a single pass.



Clean Dadoes. A zero-clearance insert and an auxiliary miter fence keep tearout at bay while cutting dadoes in hardwood.



Push Pads. Push pads distribute pressure for an even depth of cut across wide plywood panels.

SIMPLE DADOES

If cutting a groove is similar to ripping, then dadoes resemble crosscutting. A lot of the same principles apply. The biggest factor is making clean cuts since we're working across the grain.

A little side note concerning plywood. In *Woodsmith*, we use the same terms with plywood as we do with solid wood boards. It all depends on the direction of the face veneer. So if a channel is cut across the grain of the plywood, it's a dado in our book.

ONE APPROACH. We've seen several methods of work for the other joinery details. I believe there's only one real way to cut dadoes on the table saw: with a dado blade. I'll grant that there are times when a project calls for a narrow dado that can be cut with a standard blade.

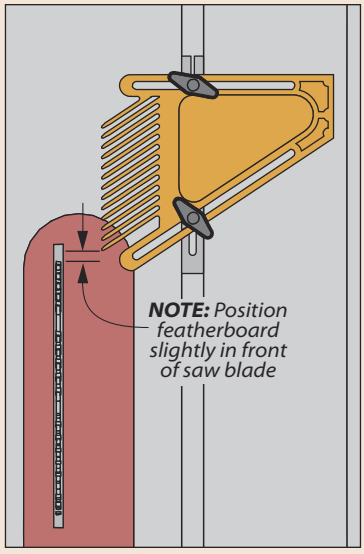
DIAL IT IN. The second key of cutting dadoes is accurate sizing. There's no substitute for making test cuts. I like to keep a sample board near the table saw with a variety of previous test cuts. Each kerf is labeled with the various chipper and shim combinations. This gauge serves as a starting point for any new dado cut I make.

In order to get crisp cuts, a zero-clearance insert in the saw is a good place to start. Make sure the blades are clean, too. I also back up cuts with a miter gauge fence (top photo).

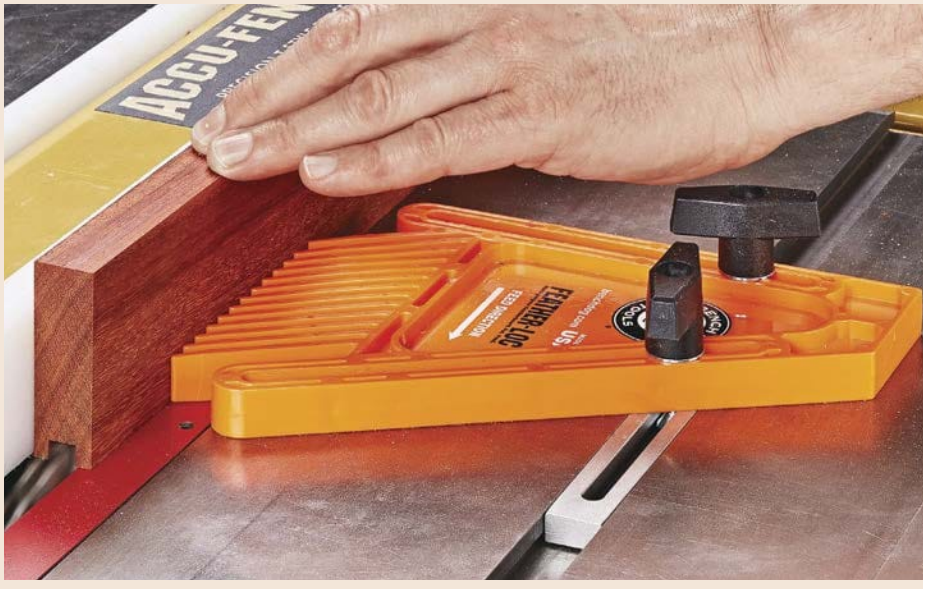
On wide panels (especially plywood), the center sometimes likes to lift as you cut. I use push pads to exert even downward pressure on the workpiece for a consistent depth of cut (photo above).

Well-made grooves, rabbets, and dadoes are confidence boosters. The look and feel of snug-fitting joints lets you know all is well and your project will turn out right.

Using Featherboards & Hold-Downs



Pressure Point. This location prevents the featherboard from pinching the blade.



Using Featherboards. A side-mounted featherboard holds the workpiece against the rip fence. Your attention can focus on holding the workpiece against the table.

Smart Featherboard Use. Featherboards and hold-downs increase safety and accuracy when you're cutting joinery at the table saw. This is especially true when you have a lot of similar parts to cut. So the natural temptation is to install several of them for ultimate results. This can be self-defeating. Enveloping a workpiece with featherboards makes it difficult to safely guide a workpiece into and past the saw blade. My approach is to use the featherboards to focus my attention.

The photo above shows what I'm talking about. Cutting a groove in the edge of a narrow workpiece requires you to keep it against the fence, hold it down on the saw table, and drive it forward across the blade. I use the featherboard to apply side pressure (upper left drawing). This frees my attention to concentrate on downward and forward pressure.

The top edge of the workpiece is left clear for pushing the workpiece with my hand from above and a push block from the back (out of frame).

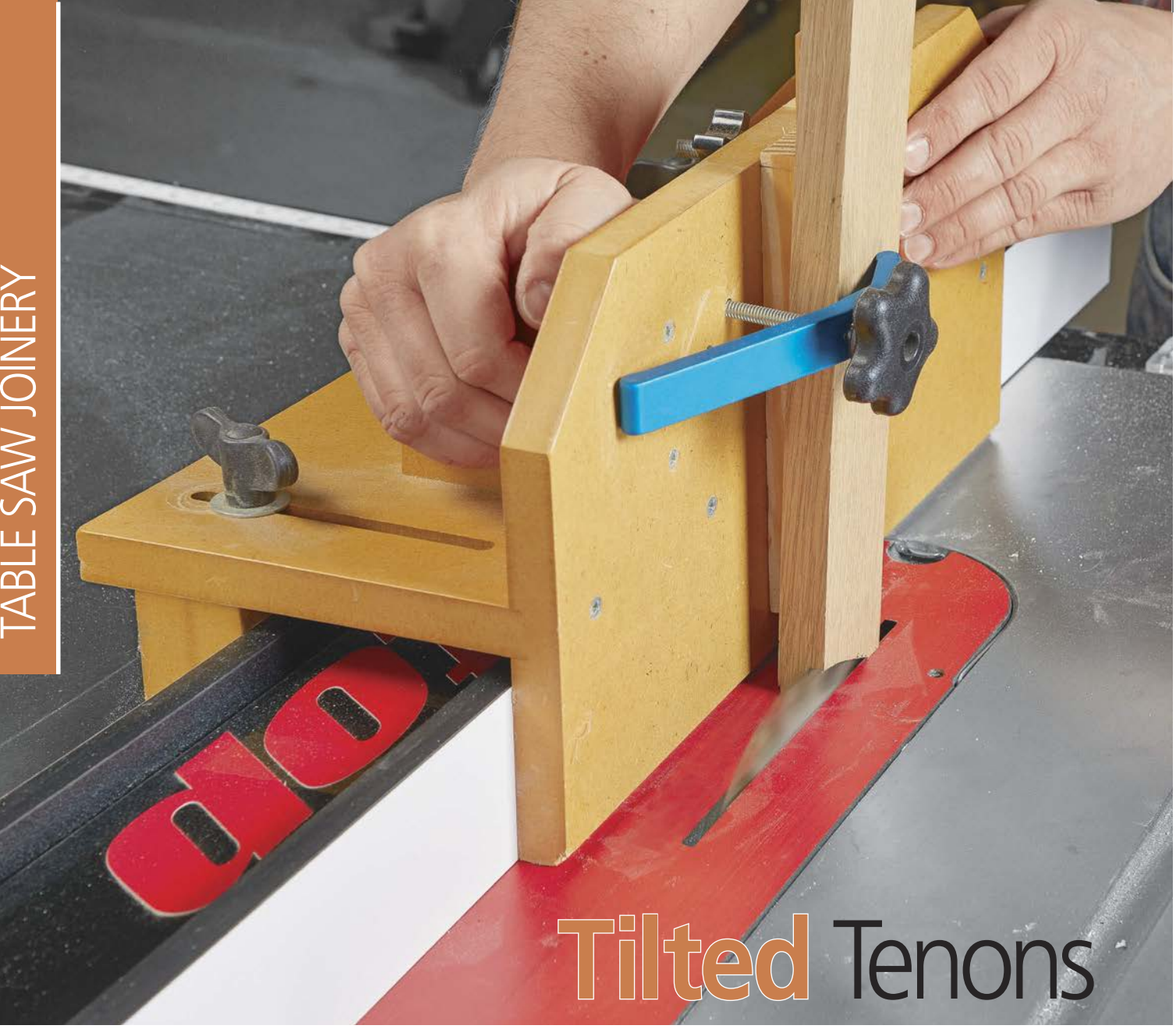
Top-Mounted. When the workpiece is wide, another setup is more effective. In this case, there's really no good way to install a featherboard to apply side pressure. Even if there was, it would be too far from the cutting action to do you much good.

The left photo shows a shop-made hold-down located above the workpiece. Its role is to apply pressure to get an even depth of cut. Your role in this dance is to keep the workpiece snug against the rip fence and moving forward.

As you can see, the side and back edge of the workpiece is open and accessible. This allows for a smooth and safe pass into and out of the cut.



Using Hold-Downs. Installing a hold-down above the piece ensures a consistent depth of cut. You can focus on guiding the workpiece along the rip fence.



Tilted Tenons



Wedged Cutting. Two types of angled tenons are easily solved by making a simple wedge to guide the workpiece.

One of the best aspects of woodworking is noodling out a process to accomplish a task. In my experience, though, I then look for a different approach that offers a simpler way of getting the same result. The obstacle this time was cutting angled tenons. A couple of recent projects illustrate this.

ROCKING CHAIR. First up is a rocking chair. The design calls for the seat to be wider at the front and narrower at the back. This means the side rails angle from front to back. So I needed a way to cut an angled tenon on each end to fit the front and back legs, as shown in the photo at left.

My usual approach to straight and square tenons is to use a dado blade in the table saw and guide the workpiece with a miter gauge. I use the rip fence as an end stop with this method to get consistent tenon lengths.

I tried modifying this method in order to cut the tenons for the rocking chair. It can work, but you end up with quite a few setups where errors can creep in. Doing a little research in some books and online led me to a shockingly straightforward solution — a wedge.

WEDGE SECRET. The gist is that you make a wedge that matches the angle of the tenon. Then you use it to position the workpiece in relation to the saw blade. One of the main advantages is that the one wedge serves as a reference for all the cuts, so it guarantees consistency.

Another advantage is that the saw blade remains fixed at 90°.

MAKING THE WEDGE. For wedges, I like using pine construction lumber. It cuts easily, and I can refine the shape with hand tools with little effort.

Lay out the slope of the angle you need along a face. Cut close to that line at the band saw (though a jigsaw works, too). I use a hand plane to trim the wedge down to the layout line. Just be sure to keep the edge square to the face.

I want to make a point here about accuracy. In very few instances do you need to hit the angle dead on. If you end up a fraction of a degree off, don't sweat it. Since the wedge is your reference, all the joints are going to be consistent and things will turn out just fine.

CUTTING THE TENON. It's time to put the wedge to work. For this, I use a shop-made tenon jig that rides along the rip fence (as in the main photo). You can find the plans for this tenoning jig in the section on bridle joints on page 52. Secure the wedge to your jig (I use double-sided tape), staying high enough to remain clear of the dado blade.

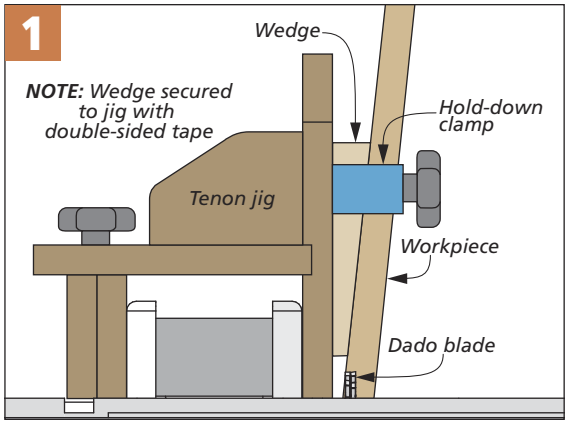
Figure 1 at right shows the setup for the first cut. Side note: It doesn't matter which tenon cheek you start with. Install a dado blade to form the cheek in a single pass. It's always a good idea to make test cuts on a scrap piece to dial in the settings.

To cut the opposite cheek, all that's necessary is to reposition the fence (Figure 2). To form the top and bottom shoulders of the tenon, I've found a hand saw works just as well as making another setup on the saw.

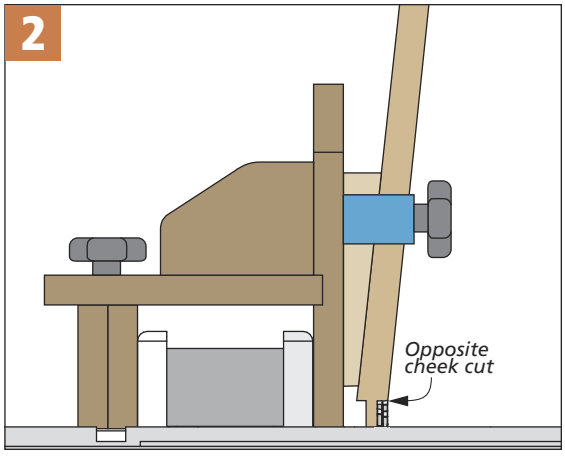
GARDEN BENCH. The other project (and another type of angled tenon) is a garden bench. Here the legs angle out, so the tenons on the stretcher that connects them must be angled as well (left photo on the previous page).

The drawings below show how a wedge works here. The wedge fits between the workpiece and the miter gauge (which stays at 90°). To cut the opposing cheek, all you need to do is flip the wedge around.

Angled tenons don't come up often. However, knowing a simple solution for accurate results means you can approach the project with confidence.

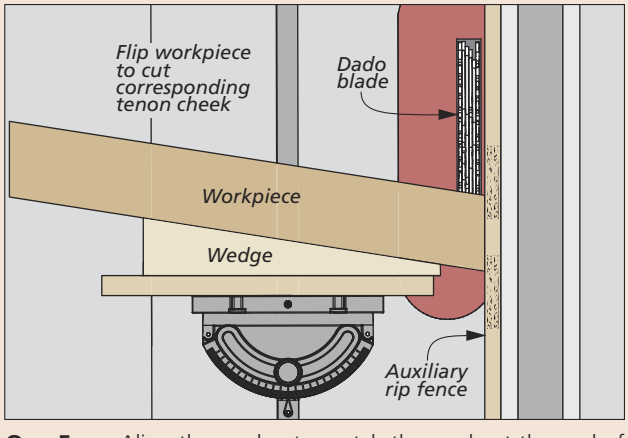


Tenon Jig. Slip the wedge between the tenon jig and the workpiece to tilt the part in relation to the blade. Make a cut on one face of the tenon.

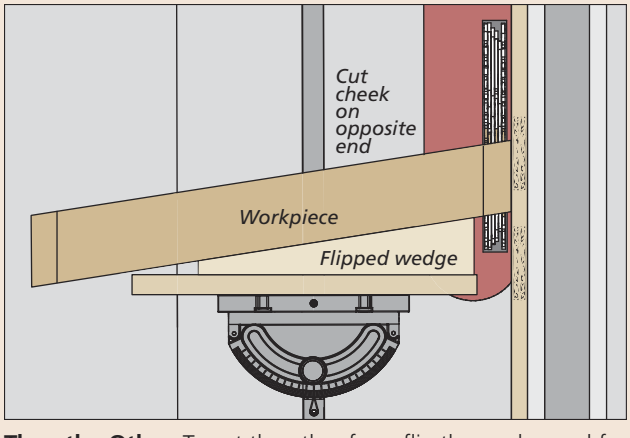


Opposite Face. To cut the opposite tenon cheek, all you need to do is reposition the rip fence. Make small adjustments until the tenon fits the mortise.

Tenons on the Ends of Angled Parts



One Face. Align the wedge to match the angle at the end of the workpiece. Use the rip fence as an end stop to control the length of the tenon. Repeat on the opposite end of the piece.



Then the Other. To cut the other face, flip the wedge end for end. Leave the rip fence set to the tenon length. Then complete the tenons at both ends.



One Blade Joinery

Shortly after getting my first table saw, I was advised to buy a good-quality combination blade. This blade, it was said, would make smooth crosscuts and rip well enough to handle most cutting tasks I asked of it. It's proven to be true and now I make the same recommendation when people ask me about getting a table saw.

That combination blade can be used for more than just cutting boards and plywood down to size. I've learned that a single blade performs just as well in creating crisp, snug-fitting joinery. While a dado blade is usually thought of as the "joinery blade," I want to highlight four joints you can make without having to take your combination blade off the saw.

Learning these skills comes in handy for times when you'd rather not switch blades during a project. They also work well if your saw can't accept a dado blade or doesn't have the power to operate a dado efficiently.

TWO-PASS RABBETS

The rabbet may not be a flashy joint, but it's on just about every project I build. The advantage a rabbet has over a simple butt joint is increased glue surface and a square shoulder that makes it easy to align the parts during assembly. The trick is cutting a rabbet with smooth faces and a crisp shoulder. This allows the parts to pull together tightly, as shown in the left margin.

All it takes is two quick cuts with a standard table saw blade. At its most basic, you use one saw cut to define each face of the rabbet joint. Of course, getting there takes a little know-how and a few handy tips.

THE RIGHT SEQUENCE. There's a definite order when making each of the cuts, both to ensure the best result and to make the cuts safely (more on this later). The first cut is made on the face of the workpiece. And for the second, the workpiece is held on edge.

INITIAL SETUP. In Figure 1, you can see the setup for the first cut. There are a few details I want to point out. First, I attach a tall auxiliary fence to the rip fence. This is used to support the workpiece on edge and keep your hands well clear of the blade for the second cut.

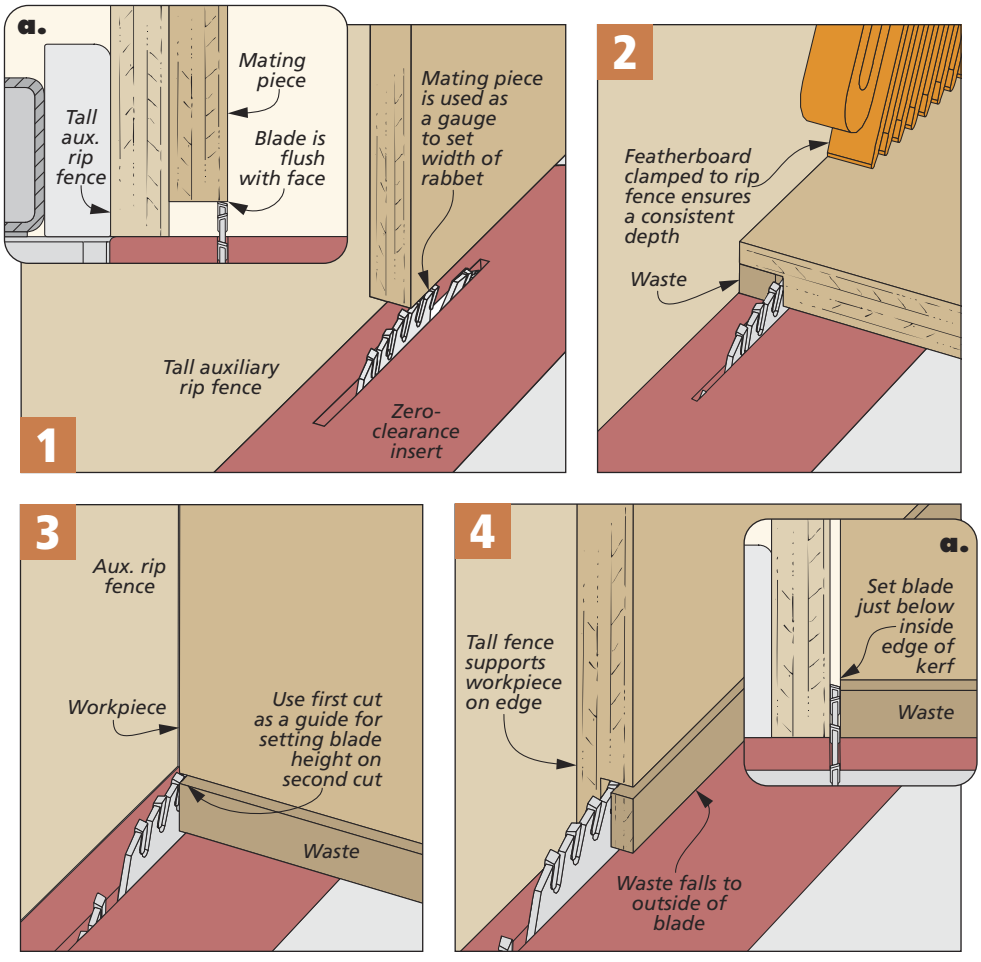
The next step is to position the rip fence. The distance from the rip fence to the outside edge of the blade establishes the width of the rabbet. Most of the time, the width needs to match the thickness of a mating piece. Rather than measure, I like to use that piece as a gauge to set the rip fence (Figure 1). The height of the blade is set to match the depth of the rabbet.

Making the first cut is straightforward, as in Figure 2. Just slide the workpiece at an even pace while pressing it against the fence.

FINAL CUT. The second cut isn't any more complicated than the first one. However, I do want to mention something about safety. Unless you're making a very shallow rabbet, a thin waste piece will be cut free during this step. You don't want it trapped between the blade and rip fence where it could kick back. Instead, the piece should fall to the outside of the blade. This means the position of the rip fence is set to match the depth of the rabbet.

Set the blade height using the first cut as a guide (Figure 3). The blade is set a tad lower than the inside edge of the kerf. This gives you a crisp shoulder.

A HELPING HAND. The main difference in the second cut is that the piece is cut on edge, as shown in the photo on the previous page and in Figure 4. The key here is supporting the piece so it won't tip and spoil the cut. The solution is to use a stacked featherboard to keep the workpiece firmly against the fence.



DEAD-ON DADOES

The one-blade approach for dadoes is a three-step technique. Steps one and two use a pair of spacers to define each shoulder of the dado. The final step removes the waste in between.

MAKING THE SPACERS. The two spacers are the real key to getting a good, snug dado joint. Each spacer needs to be sized to a specific thickness (Figures 1 and 2, next page). One of the spacers matches the thickness of the piece that fits in the dado. The other spacer is sized to match the kerf created by the saw blade you're using. They do this by offsetting the workpiece for each shoulder of the dado as well as accounting for the thickness of the saw blade.

DADO SPACER. Making the first spacer is simple. All you need to do is to use a cutoff from the material that's going into the dado. You can see this in the left margin photo on the next page.

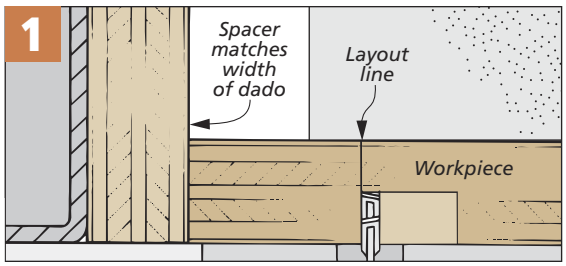
BLADE SPACER. Sizing the other spacer is just as easy. The goal is to create a spacer that fits snugly into the kerf created by your saw blade. There are a couple of ways to go about creating it. You could carefully plane a strip of hardwood until it just slips into a test kerf. But I find it's easier to use a piece of ⅛" hardboard.

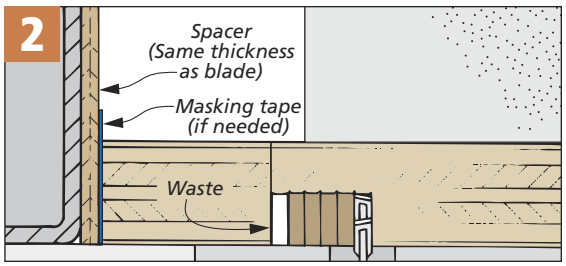
When you slip the plywood into a test kerf, the fit will be a little loose. To get a dead-on match, shim the spacer with strips of masking tape (on one side only) until you get a nice slip fit with no slop, as shown in the margin photo on the next page.

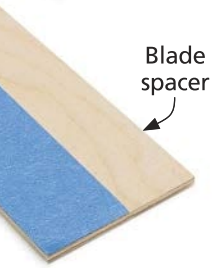


Dadoes. Getting a tight-fitting dado with plywood is a little harder than it seems.













Dado Spacer. The first cut is made by registering the workpiece against the dado spacer clamped to the rip fence. A mark on the workpiece helps position the fence.

Blade Spacer. On the second cut, the blade spacer is clamped to the rip fence. The resulting cut brackets the dado. Reset the fence to remove the waste.



Thickness. The blade spacer should just slip into the kerf made by the blade with no slop.

CUTTING A DADO. The first thing to do is mark one shoulder of the dado on the edge of the workpiece. This helps me set up the rip fence to make the cuts.

SAW SETUP. After clamping the dado spacer to the rip fence, position the fence to cut on the inside edge of the layout line closest to the fence (Figure 1 above). To guide narrow workpieces, I use the miter gauge with an auxiliary fence. It provides more support and backs up the cut to prevent tearout.

FIRST SHOULDER CUT. At this point, you can make the first cut. Be sure to maintain firm downward pressure on the workpiece as you feed the workpiece.

SECOND SHOULDER. The next cut defines the width of the dado. You don't have to adjust the rip fence. Instead, replace the dado spacer with the blade spacer. Then make another pass, as in the right photo and Figure 2.

REMOVE THE WASTE. All that's left is removing the remaining waste. For this, you simply nibble away the waste with multiple passes.

TONGUE & DADO JOINERY

What makes tongue and dado joinery a favorite is that it's versatile enough for case construction as well as making easy-to-assemble drawers. In the example here, I'm showing ½"-thick drawer parts. But the concept applies to cases, too.

NARROW DADO. Sizing the joinery starts with the dado. Using a combination blade is a good idea here, as it prevents the short grain section ahead of the kerf from popping off.

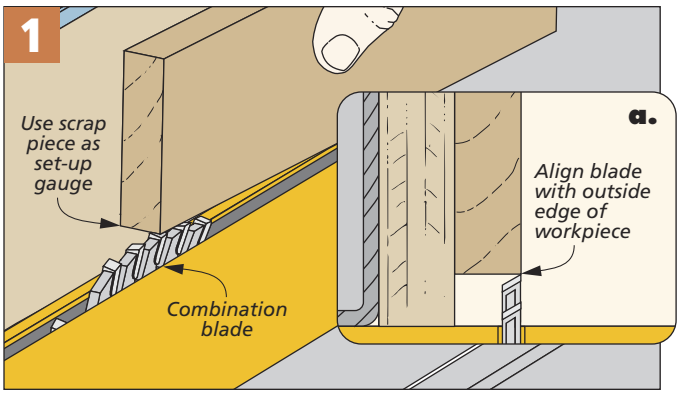
Setting up for this cut involves positioning the rip fence to align the outer edge of the teeth with the outside face of a scrap piece that matches the thickness of the drawer front or back, as you can see in Figure 1 below.

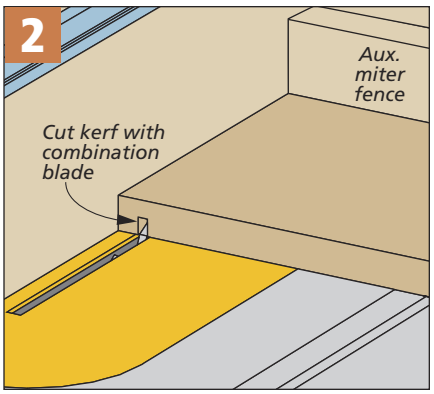
Then adjust the blade to a height of ¼". When cutting the dadoes, provide firm downward pressure on the workpiece. This keeps the dado a consistent depth, as in Figure 2.

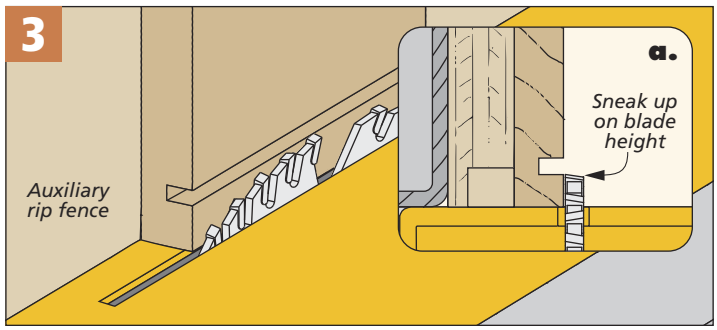
CUTTING THE TONGUE. Setting up for cutting the tongue is shown in Figure 3 on the top of the next page. You could use the same method here as for cutting two-pass rabbets. Figures 3 and 4 on the next page show another method for when the tongue is relatively short.

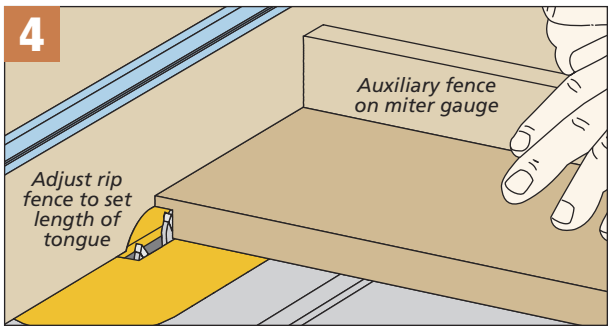


Case Joint. Tongue and dado joints are ideal for drawers and cases.









Use the piece you just cut to set the blade height. Now it's simply a matter of adjusting the rip fence to control the length of the tongue. Make a few passes until the tongue slides securely into the dado, stopping just short of the bottom.

STUB TENON & GROOVE

The final joinery technique I want to highlight is stub tenon and groove. This is used for doors and also for frame and panel case construction.

Throughout this journey, you can see how lessons from earlier techniques apply to later ones. And this is no exception.

GROOVES. The first step in creating this joint is making the grooves. The grooves need to be centered and cut to match the panel thickness. You can accomplish all this with the setup shown in Figure 1.

The key to centering the groove is to make two passes. Cut one side in the first pass, then rotate the piece end for end to cut the opposite side. Since both cuts are registered from the fence, the groove is always centered (Figure 1a).

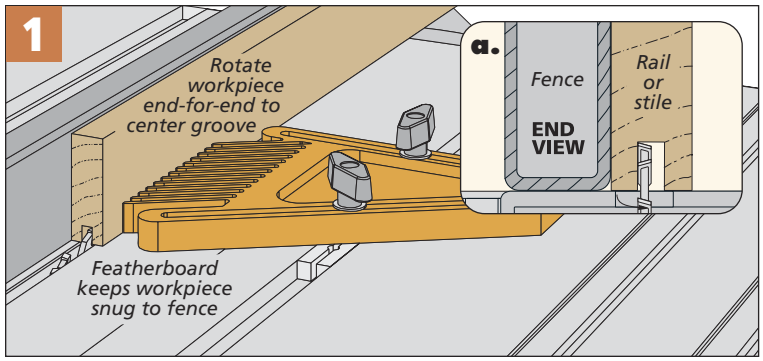
SETUP. Setting the fence position is a cut-and-test process. Start by setting the fence so that the first cut will fall near the middle of the workpiece. Make a set of passes. At this point, the width of the groove will be undersize.

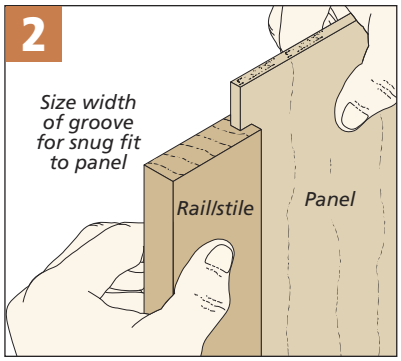
Adjust the fence setting and repeat the set of cuts until the panel is a snug, but easy fit in the groove (Figure 2). Now, you can cut grooves in all pieces.

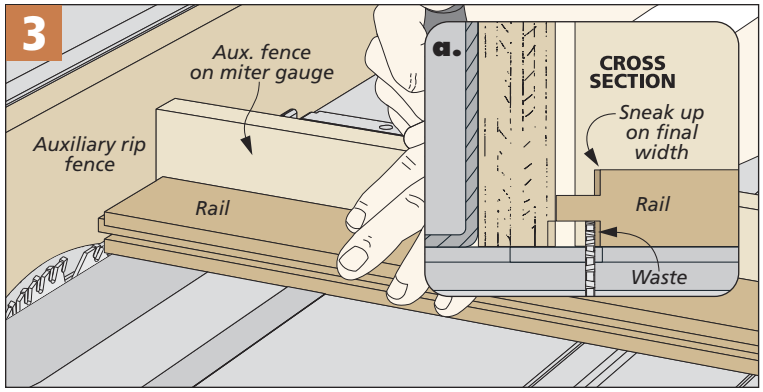
STUB TENONS. With the grooves completed, you can use them as a gauge for the stub tenons you'll cut on the ends of the rails. The setup used to cut the tenons is shown in Figure 3 below.

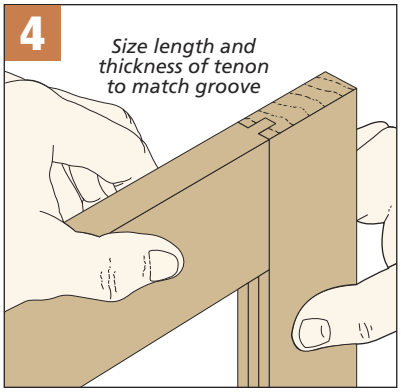
The blade height determines the thickness of the tenon and its fit in the groove, so it's important to get it right. Start by setting the fence close with the blade a little low. Make a cut across the tip of one rail, flip it over, and make a matching cut across the opposite face. Sneak up on the blade height until the tenon slides snugly into the groove. Then adjust the fence to cut the waste from the cheeks, sneaking up on that fit as well. When the fence is positioned, you can cut the tenons on all the rails.

I'll let you decide when to cut joinery with a single blade and when to install a dado. But knowing these techniques takes your skills up a notch.







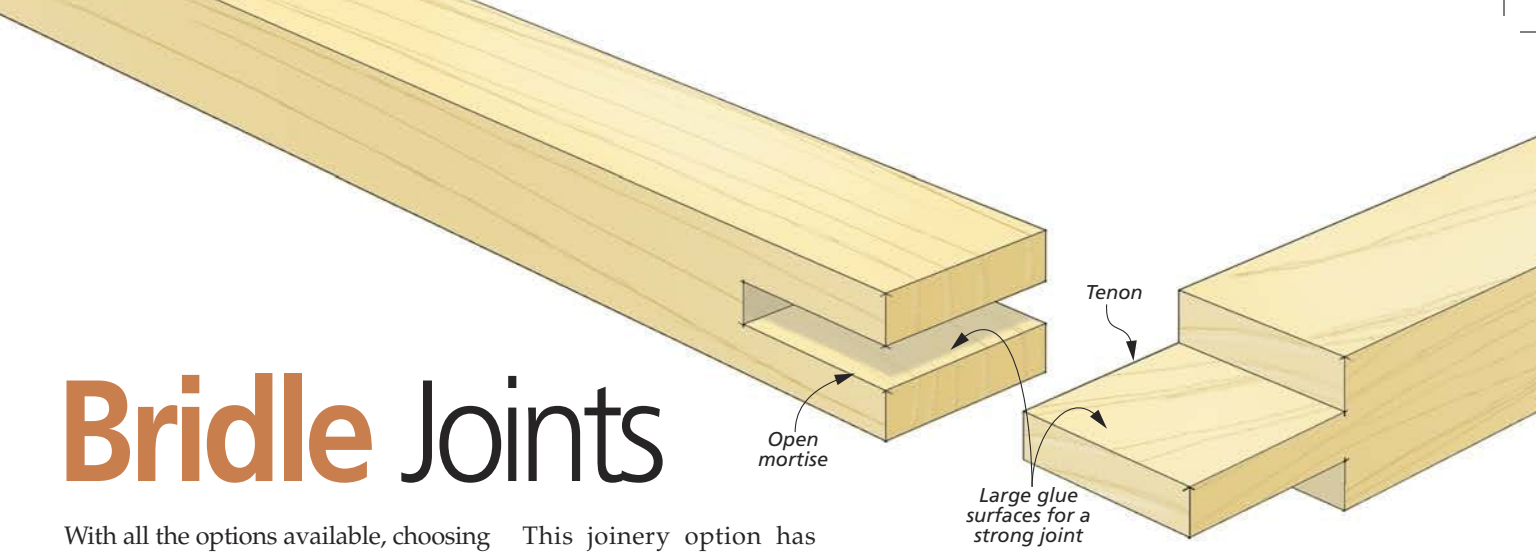


Frame Joint. Stub tenon and groove joints create strong doors.





Bridle Joints



With all the options available, choosing the joinery for a project can feel overwhelming. To be honest, it's something a lot of woodworkers (myself included) obsess about a little too much.

An easy way to narrow your choices is by first dividing joinery into two broad categories: case joinery and frame joinery. Case joints have flat, relatively wide parts. Think cabinets or boxes. Often these involve dadoes and grooves with tongues to match.

Frame assemblies cover such territory as picture frames, doors, even table bases and chairs. It's a realm ruled by the mortise and tenon. So, when design editor Dillon Baker went looking for the right joinery for his valet chair (*Woodsmith* no. 261), the mortise and tenon was waiting.





Form & Function. Bridle joints connecting the legs and rails of this chair draw your attention and add visual appeal to the look of the whole piece.

This joinery option has plenty of strength, but is out of sight once it's assembled. Sometimes, this is what we're looking for; other times we may want to show off our joinery instead.

For the chair in question, Dillon chose a showier version of a mortise and tenon called a bridle joint. You can see it in the leg and rail assemblies of the valet chair in the photos below. It works just as well in frame and panel settings, too, in case you're interested.

There are a couple of things I like about bridle joints. First, you maintain all the strength of a typical mortise and tenon. Along with it, however, the exposed joinery provides visual punctuation to the overall project. It's almost like inlay — a super-strong inlay, that is.

ANATOMY. The drawing above shows how the components work together. You can clearly see the family resemblance to regular mortise and tenon work. The only difference is that nothing is hidden.

Let's start with the mortise. It extends all the way through the width of the workpiece. It's also exposed on the end, looking like a large slot.

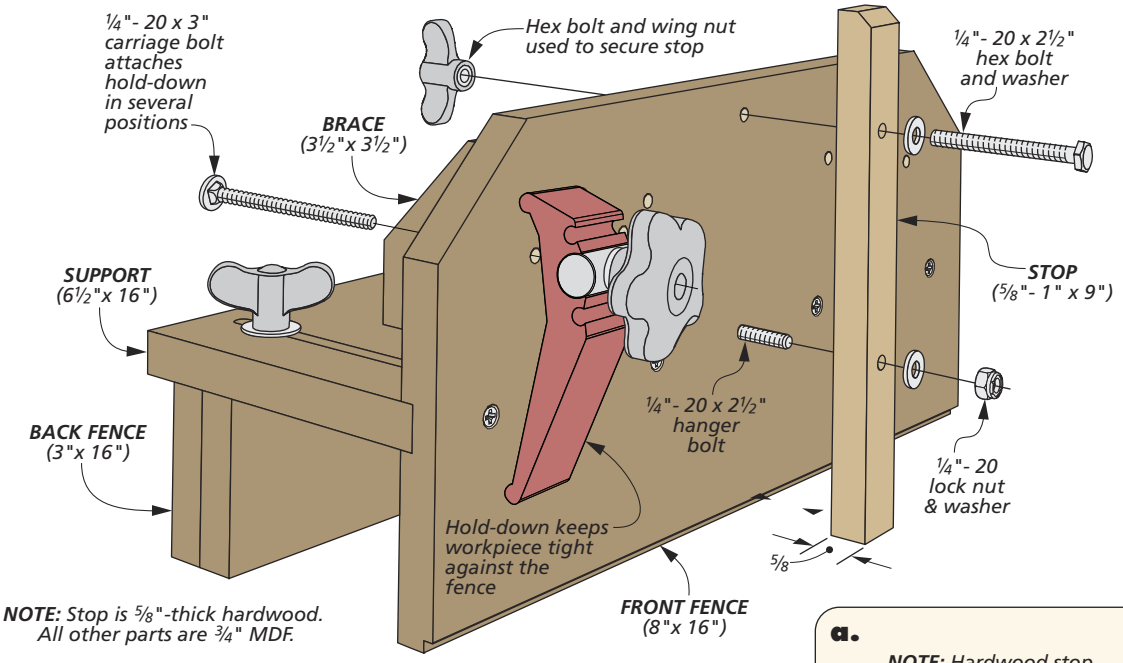
A through mortise allows the mating tenon to be longer (and stronger). You'll also notice that there are no end shoulders on the tenon, either. Adding these up means there is a lot of face grain glue surface to go with the good looks. Come assembly time, the wide shoulders will help you register the parts. They also resist racking (diagonal) forces during the life of the project.

On a side note, this joint looks a lot like a super-sized finger joint. Take a quick glance at the valet chair again and you can see how the bridle joints on the legs and the finger joints in the back support are complementary.

SIMPLIFICATION. Using bridle joinery has other benefits, too. Sizing parts is simplified. The parts run the full length so there's no depth of mortise/length of tenon ciphering that has to take place. This really comes in handy when making frame and panel doors.

Another benefit is more process related. Cutting the mortise and forming the tenon are similar steps with this joint. This can reduce the number of tools needed and eases the setup when getting started.

For this article, I show how the joint is made at the table saw. Other tools (like the router table) can also do the job, but I find the quickest, easiest, and most consistent method to be using the table saw. And all it takes is a simple jig.



START WITH A TENONING JIG

The key to cutting a bridle joint is to use a tenoning jig. You can see an example of one illustrated above. This kind of jig holds the workpiece vertically to the saw table. This allows you to create a deep mortise on the end of a workpiece. The tenon for the mating part can also be created simply by adjusting the rip fence. The icing on the cake with this method is that it results in a smoother glue surface than a typical dado blade tenon-making operation, since the cheeks are sheared by the sides of the blade's teeth rather than their tops.

OLD-SCHOOL OR DIY. Tenoning jigs take two forms: cast iron jigs, or shop-made versions. Either type of jig will work for this method. Cast iron tenoning jigs go in and out of fashion, and we're definitely in an ebb-tide situation right now.

SIMPLE & SHOP-MADE. I don't want the lack of a jig to slow you down from learning how to do this. The drawing above shows an easy-to-make tenoning jig. It rides on your table saw's rip fence. The body can be adjusted to suit your fence's width. The stop handles square and angled joints with ease. Both plywood and MDF are solid material choices. (If you're interested in a more complex tenoning jig, you'll find one on page 76.)

CUTTING THE JOINT

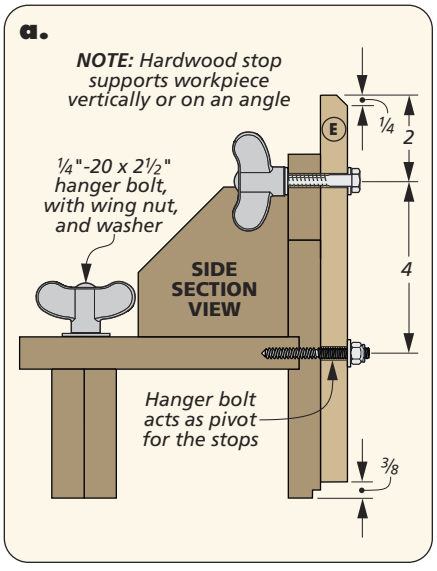
When cutting joinery with power tools, consistently sized parts make a huge difference. Spend some time planing and sizing the parts so that they're the same thickness and width. Hitting a specific dimension isn't as big of a deal as consistency among parts. Otherwise, you'll end up fiddling with every joint.

MORTISES, FIRST. The order of operations on a bridle joint is the same as with a regular mortise and tenon. Form the mortises first, then use them to gauge the size of the tenons. The tenon faces are easier to adjust than the inner recesses of a mortise — even an open mortise.

Figure 1 on the next page shows you the setup for cutting the mortise. It shows a regular blade installed in the table saw. But if you have mortises that will be wider than ¼", you can use a dado blade. Just be aware that a dado blade limits the length of the mortise.

Most of the time, the mortise is centered. I make one pass with the workpiece set just offcenter to the blade. Then I flip the workpiece around and make a second pass.

Take a moment to measure the width of the mortise. If necessary, bump the fence away from the blade to make it wider. Then fire up to cut a mortise on each end of all the relevant parts.



SHIFT FOR TENONS. The tenon-making step in Figure 2 looks nearly identical to how the mortises were formed. The big difference is that the jig and workpiece are shifted so that the blade is cutting on the outside, leaving just the tenon in the middle.

Just as with the mortise, the tenon is formed by making pairs of passes. You make a pass along one side of the workpiece, then flip it around for a second pass. This is detailed in Figure 2.

If you're using a standard blade, you may need to make a series of passes (on all your parts) to work your way down to a tenon that's close to fitting.

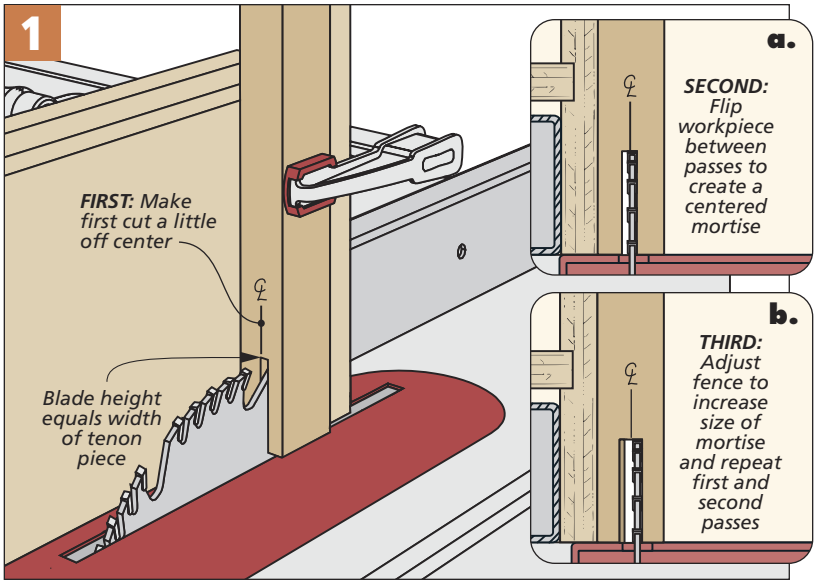
That's not a bad thing. Honestly, I prefer to cut the tenon thick, then make small adjustments to dial in the fit. Trying to get an acceptable fit in one go is asking for trouble.

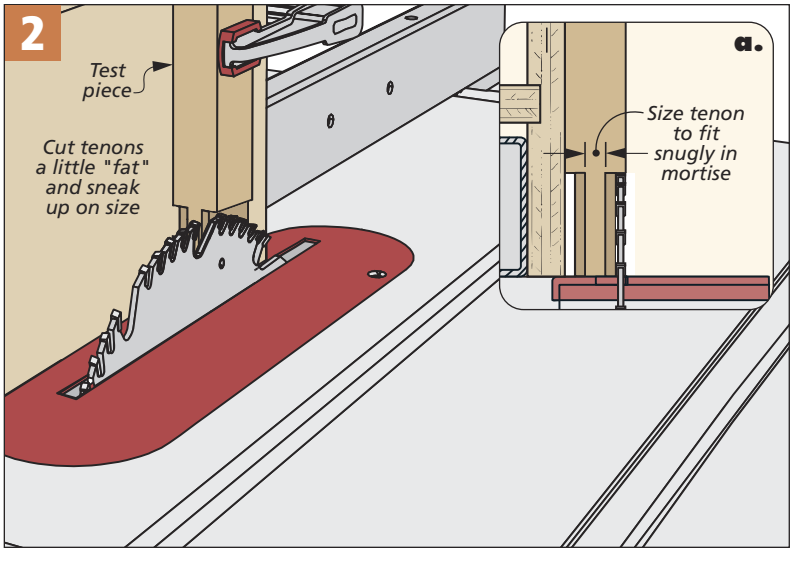
I'm aiming for a tenon to slide into the mortise with moderate resistance. Easy enough to do with my hands, without having to resort to clamps or heavy mallet blows. Once you've found this fit, complete the remaining tenons on all the rest of your parts.

PAUSE FOR GROOVES. If your project is a chair or table, you can skip ahead to assembly advice below. For frame and panel work, you need to make the panel grooves at this point in the process. Just be sure to stop the groove short of the tenons. If you don't, you'll end up with gaps and misaligned parts.

ASSEMBLY. If there's a downside to bridle joinery, you'll encounter it at glueup. The open-ended mortise means you have to apply clamps from both directions to ensure that the parts are fully seated. In addition, the mortise sides could flare away from the tenon, requiring another clamp right on the joint. This is what you see in the photo below. It's tedious, but it's a small price to pay for a good joint.

Bridle joinery and the table saw were made for each other. The skills are easily mastered, and the payoff is a joinery option that not only stands the test of time, but also packs a visual punch. That's a lesson worth learning.

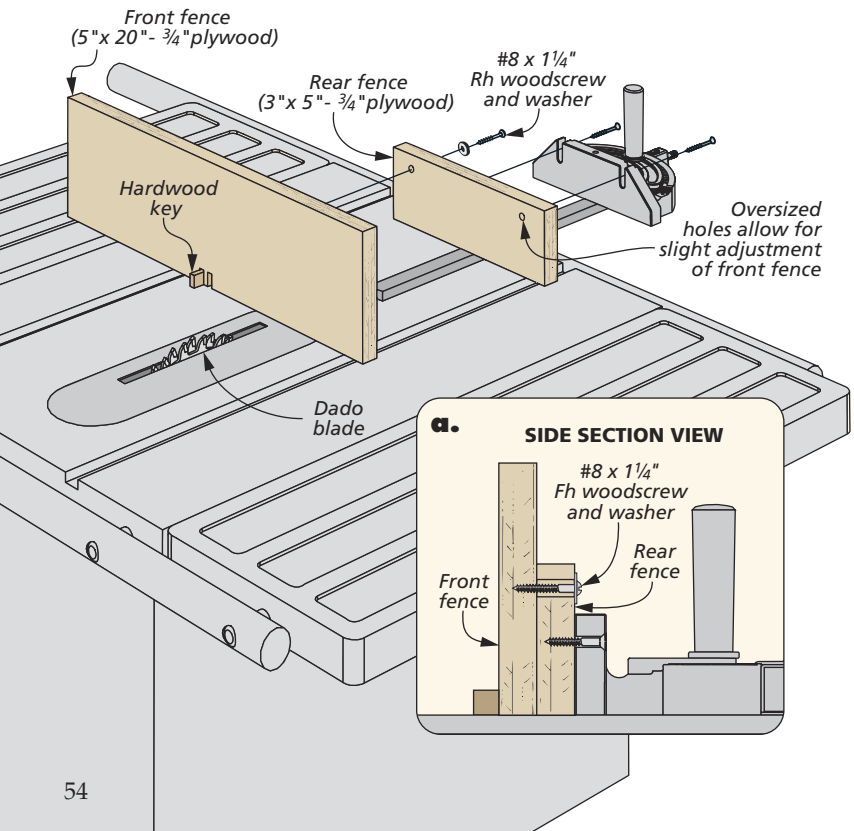






Clamp Combo. Gluing up a bridle joint often requires an array of clamps to keep the parts aligned.

Perfect-Fitting Finger Joints

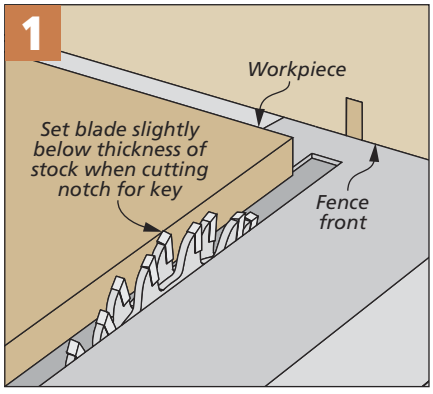


When I need to add some extra strength to a corner, my first choice is a finger joint. The interlocking pins offer more than enough glue surface to ensure a long-lasting joint, and the patterned corner of the joint is a great aesthetic addition to many projects. However, my favorite thing about the joint is that I can make the perfectly mated parts entirely on the table saw with just a simple, shop-made jig.

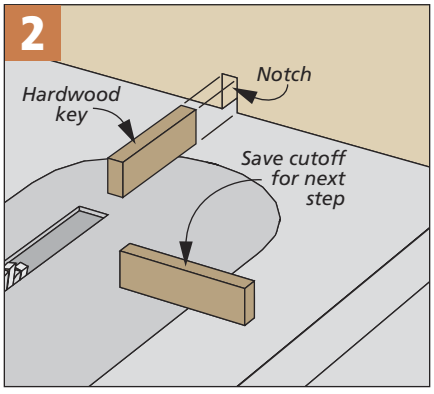
Of course, for the joint to be effective, the pieces must fit perfectly. That level of accuracy usually means some careful setup, but by building a little adjustability into this jig, fine-tuning the fit becomes much simpler. The key is how you make the jig and attach it to your miter gauge.

THE DESIGN. This jig consists of a pair of fences, with the rear fence mounted to the miter gauge, using slightly oversized shank holes to attach the front fence. These holes allow easy side-to-side "tweaking" of the spaces in between the cuts.

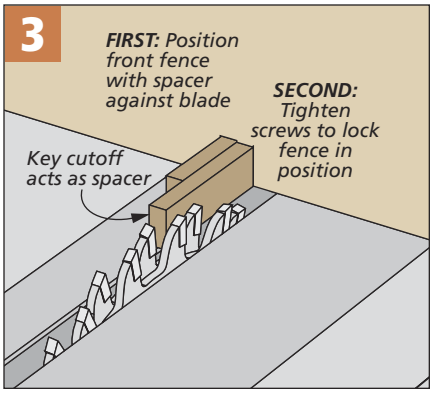
The front fence holds a hardwood indexing key offset from the blade by exactly the width of the cut to control the spacing of the pins.



First Notch. When cutting the initial notch, set the blade height to just below the thickness of your piece.



Key & Spacer. Make the piece for the key extra long so the cutoff can be used as a spacer.



Second Notch. With the key in place, use the cutoff to space the cut for the second notch.

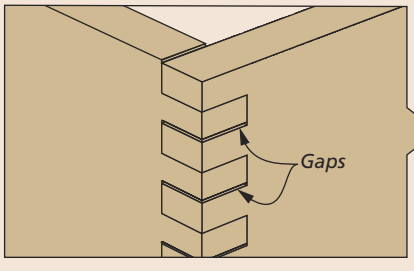
It also backs up the workpiece to prevent tearout during the cuts. The jig is simple enough that I've thrown together several of them, ranging from fine fingers to bulkier box joints.

FENCES. You can start building the jig by selecting straight, flat material (I prefer Baltic birch plywood) for the front fence. The rear fence can be a piece of plywood as well, also flat and straight. To allow for easy adjustment, drill oversized holes in the rear fence using a larger diameter bit than the screws you'll use to attach the front fence.

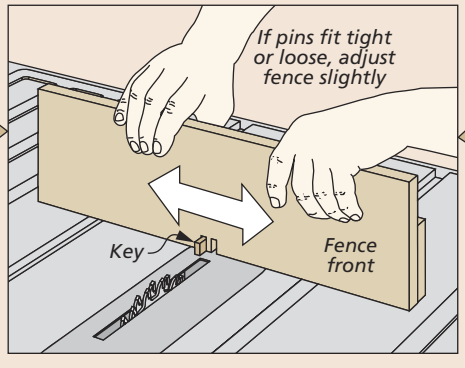
KERF & KEY. Install a dado blade set to match the width of the pins for your project. Set the blade height just below the thickness of the workpiece (as in Figure 1 above). Hold the front fence in position (don't attach it with screws yet) and make a cut through the fence. Now you'll need to cut a small piece of hardwood for the key. Be sure the piece for the key is long enough for you to trim a bit off to use as a spacer. Slide the jig up to the dado blade and put the spacer between the outside teeth of the blade and the key (Figure 3). Once you've cut the second kerf, you can now attach it to the rear fence with screws.

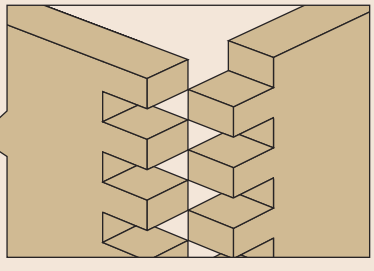
The next step in cutting the finger joints is making the test cuts, and from there it's all about fine-tuning the fit.

Fine-Tune the Fit

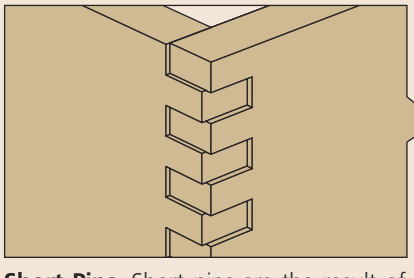


Too Loose. If the joint has gaps between the pins, adjust the fence to move the key away from the blade.

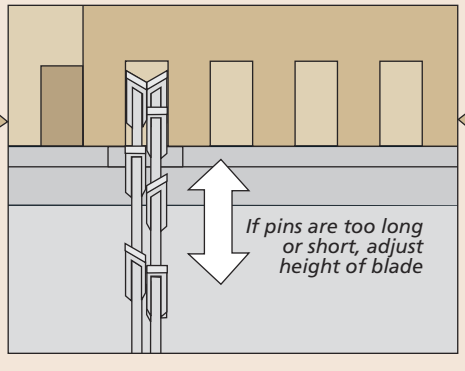


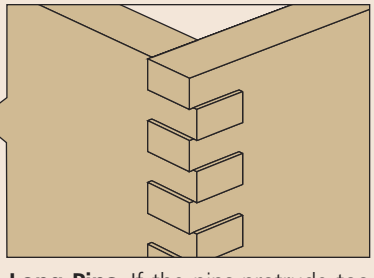


Too Tight. If the joint requires too much force or won't go together at all, move the key toward the blade.



Short Pins. Short pins are the result of the blade being too low. Simply raising the blade will correct this.





Long Pins. If the pins protrude too far (more than 1/32"), you'll need to lower the blade for subsequent cuts.

TEST CUTS. With the jig made, it's time to give it a trial run. Using a couple of test pieces milled to the same thickness and width as your workpieces, make the first cut with one edge against the key (as in Figure 1 below), then make each successive cut by placing the freshly cut slot over the key (Figure 2). Once you've cut all the notches, flip the workpiece around and use the first pin as a spacer. Butt the mating workpiece against it and continue cutting (Figure 3). I prefer a good fit, but not one that requires more than a light tap with a mallet to seat properly.

TROUBLESHOOTING. The box on the previous page should be able to guide your adjustments, but there is one other thing to watch out for when cutting these test pieces. You may find your pins beginning to drift at some point. If the spacing of your pins starts off good, but slowly becomes offset, then a few things could be at work.

First, it could be the key. It's important to get the key to the precise thickness. Any play in between the key and the slots in your pieces will cause your cuts to slowly shift off course.

Second, there could be some play between the miter gauge and the slot in your table saw. If there's any jiggle when you push the miter gauge side-to-side, then this could be the issue. The best fix I found for this is applying aluminum foil tape to the miter gauge for a slop-free fit.

Finally, you may find a bit of play between the piece and the jig itself. As with the miter gauge, consistency is key in this case. When holding the workpiece, apply pressure as close to directly over the key as you can, pressing back against the fence and down against the table. This should help to maintain the most important relationship in this jig during the cut: that between the key and the blade.

CUTTING THE FINGERS. Once you've adjusted the jig for a good fit, you're ready to move on to cutting the project workpieces. There are a couple of things to keep in mind while making the joinery cuts. First, hold the workpiece tight against the fence at all times. In the case of larger projects, particularly those that have wide and tall parts made of ¾"-thick stock, you might want to clamp the workpiece to the fence for added safety and accuracy. The second thing to keep an eye on is making sure the end of the workpiece stays flat against the table for each cut. It's frustrating to have all the pieces cut only to find out one of the pins wasn't cut deep enough once you start dry fitting them together. Keeping those things in mind, the rest is just a matter of getting to work and cutting the parts. I find it quite helpful to mark the workpieces to make sure I'm starting the cuts from the same edge each time. I also stop after each matching set and make





First Cut. Maintain a firm grip to keep the workpiece squarely in position against the fence and tight against the key.



Cut & Repeat. As you move the workpiece after each cut, make sure the bottom edge stays flat on the table saw.



Cutting the Partner. Flip the workpiece around to space the initial notch in the second piece.



Finishing the Pair. Cut the second piece in the same manner as the first, using steady speed and force.



Trim to Fit. If needed, trim the workpieces so that each one ends with a full pin or notch for a more finished look.



Brush On. A small brush makes spreading glue a breeze, while applying painter's tape on the edge of the joint helps control squeezeout during assembly.



Square Up. Clamping a three-sided assembly can be difficult to do while keeping the joint square, so I used a couple pieces of plywood to keep things in proper shape.

sure I'm getting a good fit, and that the jig hasn't drifted out of position. It only takes a minute to check, and an ounce of prevention is certainly worth a pound of cure here.

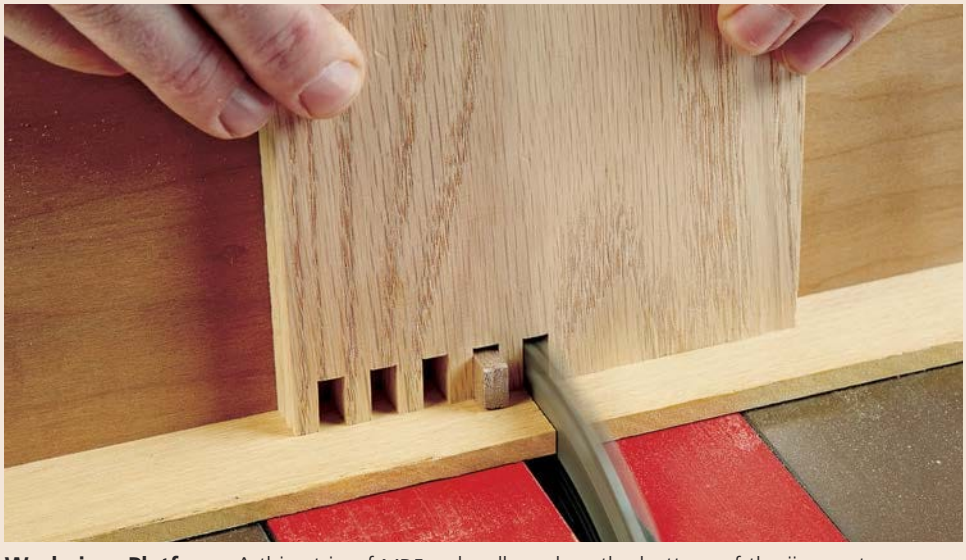
ASSEMBLING THE FINGERS. After you've completed the cuts, you can move on to assembling the project. If you've established a good setup, this is where you'll see a great payoff. Properly cut finger joints are easy to assemble while staying square. I find the biggest challenge is to work quickly enough to have the joint assembled before the glue tacks up. For this reason, a slow-setting glue can be a boon.

A small brush makes spreading a thin coat of glue on all the mating surfaces a little easier, but it can still be a scramble to get things together, so it's best to start the assembly well-prepared. Once the glue is spread, all you need to do is tap the joints together, clamp them up, and take care of any squeezeout.

Fitting a couple of plywood spacers inside keeps the assembly square as you apply clamping pressure to pull the joints tight. You can fully seat the sides with a few taps on the ends, then tighten up the clamps and clean any squeezeout. Clamping blocks can come in handy too, as they disperse the pressure evenly across all the fingers.

Decking Out the Jig

Jig Deck. To get even better quality finger joints, I added a strip to the bottom of the front fence, acting as a deck. While it isn't a necessary addition for the jig, it does help to keep pieces more stable during the cut by providing a platform for them to ride on, and it allows you to set the spacer directly between the key and the blade when adjusting the jig. Use a ¼"-thick, 2½"-wide strip of hardboard or veneered MDF, gluing it to the bottom of the front fence after placing the key, but before screwing the rear fence onto the front.



Workpiece Platform. A thin strip of MDF or hardboard on the bottom of the jig creates a zero-clearance base, giving you a smoother cut. The deck also allows you to set your spacer on it and align the blade and key without having to worry about dropping the small piece into the saw.

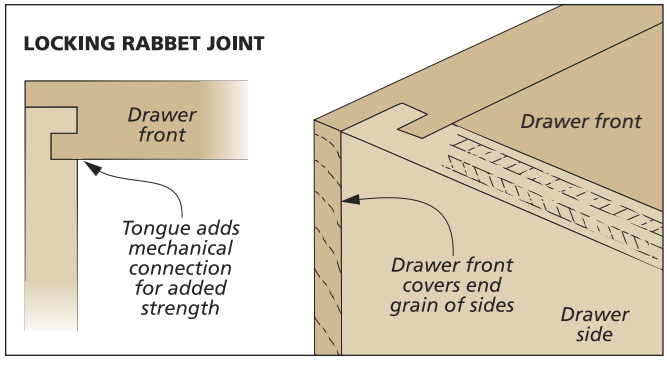
Locking Rabbet Drawer Construction

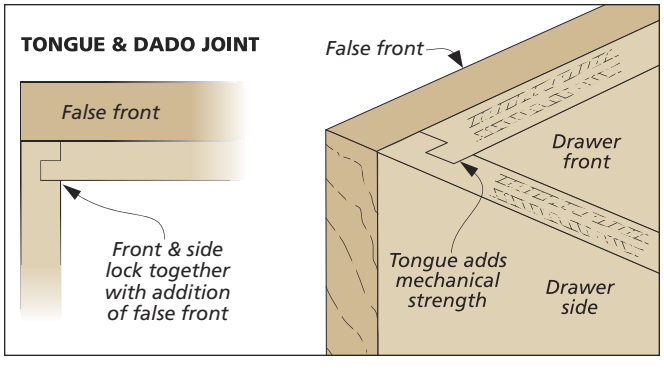


Lipped Rabbet. A drawer front with a lipped locking rabbet joint is perfect for concealing full-extension drawer slides.

I typically try not to overthink the process when building drawers for projects. Even though they're almost like building mini projects inside of a larger build, the joinery is usually pretty straightforward. But there's always an assuring sense of satisfaction when all of the parts come together nice and square. In order to keep my drawer construction easy, as well as rock-solid, I turn to a common joinery technique time and again — the locking rabbet — or some variation of it.

WHY USE A LOCKING RABBET? Whether the drawers in your project have handles attached to the front, recessed pulls in the front face, or a handhold cutout along the top edge of the drawer, all of the force required to open a drawer happens along the front. The locking rabbet joint does just what its name implies — it locks the drawer sides to the front to absorb the lateral energy created by pulling on the drawer front. This means the joint, held together with only glue, will hold up to years of opening and closing.







Front. The drawer front gets a centered groove on both ends. Be sure to use a tall backer board to hold the piece vertical.



Inner Tongues. Clip off part of the tongue on the inside of the front. The remaining tongue locks together with the side.



Sides. A shallow dado in the drawer side forms a mating tongue that interlocks with the groove cut in the drawer front.

TWO TYPES OF LOCKING RABBETS. The two basic types of locking rabbet joints that I turn to most often are shown in the illustrations at the bottom of the previous page. The first is a standard locking rabbet with a groove cut in the end of the front and a dado in the side piece that interlocks with the front.

The other type uses a false drawer front that, when added to the drawer front, creates the locking rabbet joint. This is essentially just a tongue and dado joint, but it functions just like a locking rabbet.

ADDED BENEFITS. Besides the superior strength that the locking rabbet joint provides, it also has other benefits. The first is that the groove cut in the edge of the drawer front can be cut deeper than the thickness of the side. This forms a lip on the outside edge of the drawer front and can be used to hide drawer slides (inset photo, previous page). Another option is to create that same lip around the entire perimeter of the drawer front to overlap a face frame. The box below talks more about this style of locking rabbet.

But the thing I like most about locking rabbet joinery is that it's easy to set up and cut. You can usually get by with one dado blade thickness for all of the cuts. On a drawer with a ¾"-thick front, a ¼" dado blade is ideal. This same setup will work even if your drawers have different widths and heights.

MAKING THE CUTS. The grooves in the ends of the drawer fronts are the best place to start (Photo 1, above). Here, the height of the blade should match the thickness of the drawer side for a flush outside edge. Or, when making a lip to hide drawer slides, the blade height should be set at the thickness of the side, plus the thickness of the drawer slide (typically ½"). Be sure to use a tall auxiliary fence and backer board to hold the drawer front vertical.

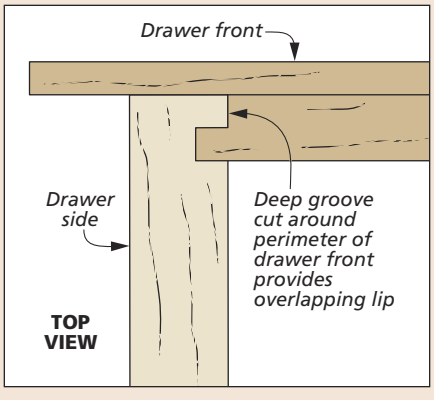
With the same blade in the saw, lay the drawer front flat on the saw and remove half of the inside facing tongue, as shown in Photo 2. That finishes the drawer front portion of the joint.

Finally, the depth of the shallow dado in the drawer side piece should match the thickness of the short tongue on the inside of the drawer front (Photo 3). When complete, your pieces should lock together with no gaps, forming a joint that will last for generations.

Full-Overlay Locking Rabbet

On some projects, simply overlapping the outside ends of the drawer front isn't enough. Sometimes you want that overlay to extend around the entire outside edge of the drawer. This style of locking rabbet, shown at right, works great when installed in projects with a wide face frame.

ONE EXTRA STEP. Creating this joint follows the same procedure as a regular locking rabbet joint with one extra step. You'll cut a rabbet along the top and bottom edges of the drawer front to match the reveal along the edge. The side locks in place in the same fashion.



Frame Pieces. The anatomy of the lipped locking rabbet is very similar to a standard locking rabbet.

Deep Groove. A full lip around the perimeter of the drawer front allows it to overlap the case or face frame.



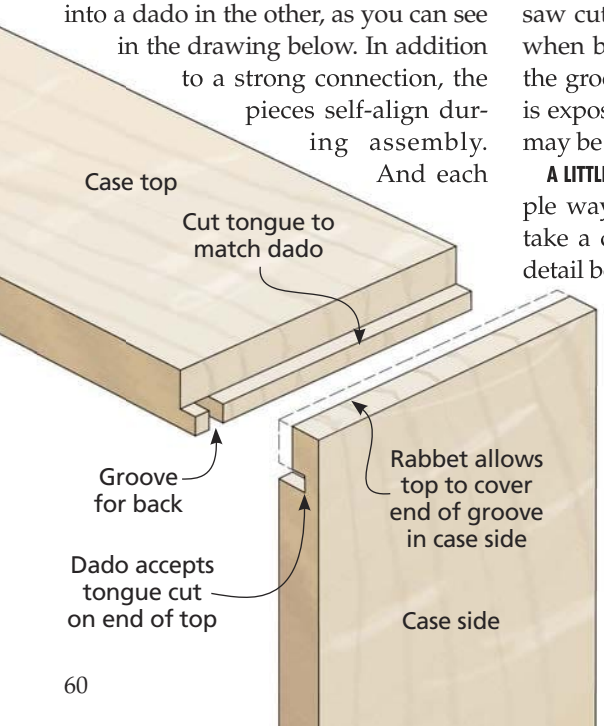
Hidden Groove Joint

Use this easy-to-make joint to build cabinets and cases that will last a lifetime.

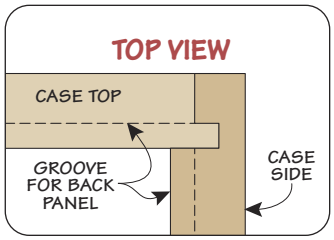


One of the first things I think about when I start building a cabinet is the joinery I'll use. A few of the things I weigh are the strength, appearance, and the difficulty of creating the joint.

The tongue and dado joint is a good choice. The tongue on one piece locks into a dado in the other, as you can see in the drawing below. In addition to a strong connection, the pieces self-align during assembly. And each part of the joint is a pretty basic table saw cut. This joint is often overlooked when building cabinets. The reason is the groove that captures the case back is exposed at the ends. And these gaps may be visible in the finished project.



A LITTLE TWIST. Thankfully, there's a simple way to conceal the groove. If you take a closer look at the drawing and detail below, you'll see I added an extra step to the process. There's a shallow rabbet cut on the end of the case sides along with the dado. This means the groove for the back is concealed by the inside face of the top and bottom to create a clean line. It's a minor twist that makes a big difference in how the joint looks.



ORIENTATION. There's one more thing to emphasize. To take advantage of the mechanical strength of the joint, you'll want to make sure to cut the tongues on the load-bearing (horizontal) pieces and the dadoes on the vertical parts.

CUTTING THE JOINERY

Now that you know how the joint works, you can get started on making it. As I mentioned earlier, cutting this joint is a simple process at the table saw that combines a few straightforward cuts.

Before getting started, I attached an auxiliary fence to both the rip fence and miter gauge. These provide support for the workpiece and make getting accurate cuts a breeze.

I like to cut the joint in a specific order, as you can see in the photos along the top of these pages. That begins with the dado and rabbet on the sides, then



Rabbet. Lower the blade and nibble away the waste at the end of the case sides in several passes.



Tongue. Start with the blade set low. Sneak up on the final size of the tongue for a snug fit in the dado.

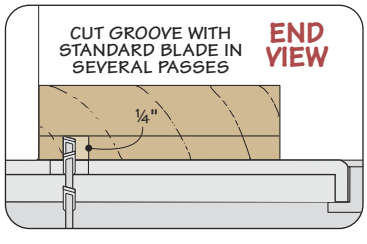
cutting the matching tongues. The reason I use this approach is that it's easier to tweak the size of the tongue for a snug fit than it is to adjust the dado.

DADO FIRST. The first step is to cut a dado near each end of the top and bottom of both sides, as shown in the main photo on the previous page. The important point to note here is the location of the dado. The goal is to end up with the side flush with the mating piece. So the distance from the outside edge of the saw blade to the fence should match the thickness of the top (or bottom). To get the setup right, I like to use one of the workpieces as a gauge to set the rip fence location.

THEN, THE RABBET. The second step is to lower the blade and cut the rabbet. This is shown in the upper left photo and drawing. The amount of material you remove here isn't critical. But this amount will also equal the depth of the groove for the back. So you want to remove enough to allow for a solid connection there (about ¼").

NOW, THE TONGUE. The other half of the joint is the tongue cut on each end of the top and bottom. This step is pretty easy. All you're doing is cutting a rabbet, as in the upper right photo. Set the blade height a little low so you can sneak up on the fit through a series of test cuts.

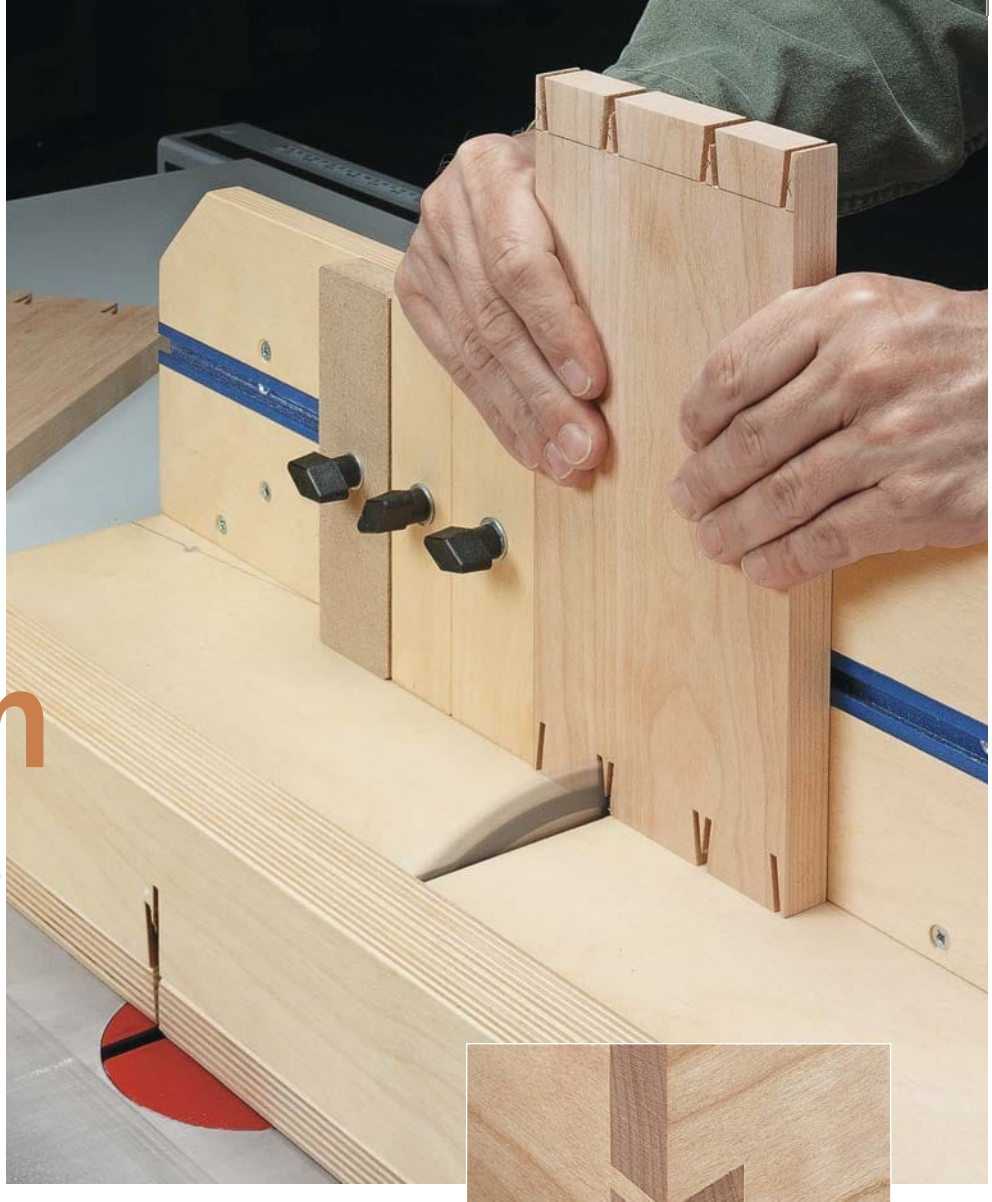
WRAPPING IT UP. Finally, you can cut a groove for the case back. The depth of the groove should match (or be slightly less than) the depth of the rabbet in the second step. Most of the time, I use ¼" plywood for the back panel. To get a snug fit, replace the dado blade with a standard blade for this cut. Then make the groove in a few passes (drawing below).



Once the back is cut to size, the case is ready for assembly. Gluing up the case is quick and easy. The result is a strong cabinet with its joinery neatly concealed.



Through Dovetails



One of the key skills in cutting dovetails is the ability to make consistent angled cuts. Perhaps this is the reason why some folk think of the table saw, at least for cutting the tails. You tilt the arbor to a specific angle and know that every cut is identical.

To cut the pins, however, the blade needs to be vertical and the workpiece rotated in relation to it. By this point, the various setups feel complex. Allow me to persuade you to transform your dovetailing by making a table saw jig, first. Follow the link to the plans at *Woodsmith.com/magazine/sip*. The jig resembles a crosscut sled, but the fence is adjustable to allow for cutting both the pins and tails.

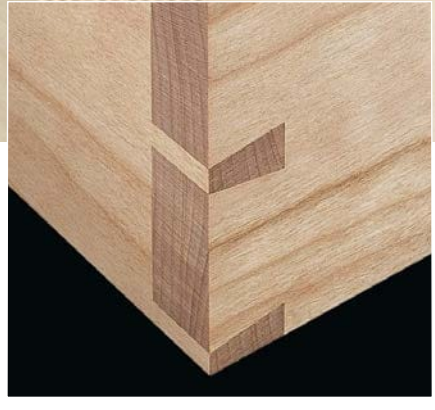
The jig does more than hold a piece in the correct position. It uses custom-made spacers to establish consistency across all of your project parts.



Digital Readout. A digital angle gauge offers good visibility to set the blade angle on the table saw, not to mention it's more accurate than the saw's gauge.

GO 2 Online Extras

For plans to build this jig, go to: Woodsmith.com/magazine/sip



Precision Dovetails. Careful setup following simple steps results in crisp, snug-fitting dovetail joints across multiple parts.

TAILS FIRST

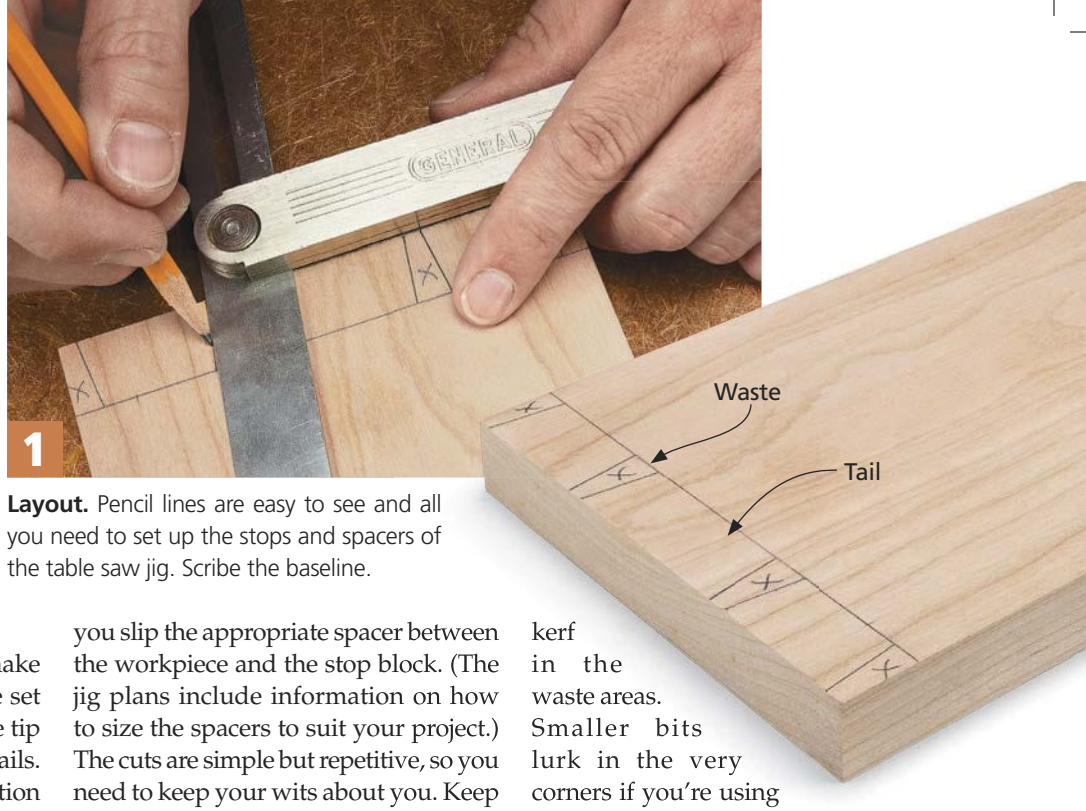
The approach I demonstrate here starts with cutting the tails. You then use them to lay out the pins. Before you jump in, cut a few test pieces to guide the setup and give you some practice parts.

LAYOUT. As with any joinery, dovetails start with the layout. Begin by scribing the baseline of the joints on all your parts with a marking gauge. (Feel free to run a pencil along this scored line to increase your visibility.) You only need to mark the sides of the tails on one set of parts since the spacers handle positioning, as shown in Step 1 on the next page. Lots of lines can lead to confusion, so indicate the waste areas.

With this jig, the size and spacing of the tails can vary, but the arrangement

needs to be symmetrical about the centerline of the workpiece. The space between each tail is limited by the thickness of the saw blade. In practice this means about 3/16" is about the minimum.

Tilt the saw blade to match the slope of your tails. I like to use a digital angle gauge to set the blade, as you can see in the lower left photo on the previous page. Some woodworkers may want to go all-in and get a blade ground to match the slope of the dovetails. You'll see that kind of blade reflected in these photos.



Layout. Pencil lines are easy to see and all you need to set up the stops and spacers of the table saw jig. Scribe the baseline.

FIRST CUTS. Raise the blade and make a cut through the jig with the fence set 90° to the blade. Set the blade so the tip just touches the baseline of the tails. This kerf helps determine the location for a stop block and spacers. Align your marked workpiece with the kerf on the waste side of the line. I clamp the piece in place while I position the stop block on the opposite edge.

This is the position for an initial set of cuts at each corner of your tail boards. Rotate and flip the pieces to make each cut. This is shown in Step 2 below.

It may come as a surprise, but that's all there is to cutting the tails. The only difference is that between each set of tails, you slip the appropriate spacer between the workpiece and the stop block. (The jig plans include information on how to size the spacers to suit your project.) The cuts are simple but repetitive, so you need to keep your wits about you. Keep an eye out for dust or chips that could wedge between the workpiece, the spacers, and the stop block. This spoils the spacing and affects later cuts.

STEP & REPEAT. Step 3 and the main photo on the previous page show the continuation of the process as more spacers are added. As you can see, once you cross the centerline of the workpiece the shape of the tails is revealed.

SOME HANDWORK. At this point, a small amount of waste remains between each kerf in the waste areas. Smaller bits lurk in the very corners if you're using a regular blade. The remedy is shown in Step 4 below. As nice as power tools are, the chisel is the most expedient solution. And, after all the table saw cuts, some handwork at the bench offers a welcome change of pace.

Sharpen a narrow chisel to chop out the waste. Flip the piece so that you work in from each face to avoid tearing out the edges. The tip of your chisel registers in the scribed baseline to ensure accurate placement.



First Cuts. A stop block registers your workpiece for the first cut. Be sure to rotate and flip the piece as needed.



Second Cuts. Slip a spacer between the workpiece and the stop block to set up for the second set of cuts.



Cleaning Up. The table saw cuts leave little waste to remove by hand. The saw kerfs and scribed line guide the way.

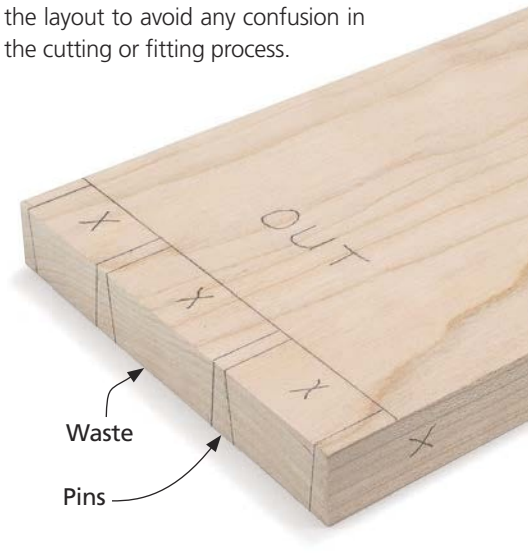


Scribe the Tails. Trace the sides of the tails onto the ends of the pin boards. Sharpen your pencil often to keep a fine point.



Straight Down. Use a small square to extend the lines across the faces of the pin boards and down to the baseline.

Waste. Indicate the waste area on the layout to avoid any confusion in the cutting or fitting process.



There's a bit of a reset between cutting the tails and making matching pins. First, return the blade to vertical. (Put in a standard blade if you used a special-purpose blade.) When you change the angle, adjust the height of the blade as well. That's an easy step to overlook.

Angle the fence on the jig to one of the pin-cutting positions. I show it angled back for the first set of cuts.

TRANSFER PORTAL. The actual tails, rather than the numbers in the plans, are the guide for marking the pins. Steps 1 and 2 above show the process. I clamp the pin board in a vise to hold it steady while I trace the tails. Square those marks down each face of the pin board. Do the same with a test piece to set up the jig and stop. Fine lines are your friends here, so don't let your pencil get too dull. Remember to mark the waste area between each pin.

THE FIRST PIN. Step 3 picks up the process. Line up the pin board with the waste side of the first pin and slide the stop block in place. Make a cut and compare the placement with its matching tail, as shown in Step 4. The idea is to nibble your way closer to perfect alignment in a few cuts. Be sure to nudge the stop block with each pass.

Once the stop block is dialed in, you're ready to start making hay. Set one of your project parts in place and make a cut like the one shown in Step 5. Then turn the board around, keeping the same face against the fence to make the same cut on the opposite corner. Hold off on the other two corners. They get cut later. Repeat this cut on all of your pin boards. You can see why accurate marking, labeling, and organizing are important here.

SPACER SEQUENCE. Bring back the spacers to this side of all the remaining pins. The same advice applies for pins as for the tails. Your initial marked workpiece is your standard to gauge your progress. Step 6 above shows the results.



Initial Cuts. Position the stop block so the size of the first pin matches the tail workpiece. Then, make a cut on both ends of all the workpieces.



Set the Stop. Sneak up on the final size of the first pin until it matches its mating opening in the tail workpiece. This is the final position of the stop.



Opposite Edge. After making one cut, flip the workpiece and make a cut for the pin at the opposite corner. Keep the same face against the fence.



Spacer. Add a spacer and make the next set of cuts. With the last spacer in place, cut all the workpieces to complete one angle.



Other Angle. After adjusting the fence to angle forward, reposition the stop block to form a complete pin on the workpiece.



More Spacers. Then, install each spacer in turn to complete the remaining pins, cutting on opposite corners.

A NEW ANGLE. To cut the other side of the pins, you need to reset the fence to its third position so that it angles forward. You need to reset the stop block and follow the steps we just worked through for this side of the pins. Step 7 highlights the differences in what this looks like. Spacer blocks come next as you work across the pin boards. By now the process should feel second nature.

By the end of the cuts, the pins have been traced by the saw blade. There's still considerable waste to remove. Do that with a progression of nibbling cuts between each pin. You can see this in Step 9. It takes time, but not as much as you think it might. Pay attention here. You don't want to cut into the side of the adjacent pin.

CHISEL TIME. This stage of cuts leaves small, wedge-shaped waste areas alongside each pin. Back at the bench, trim it away with your chisel, as you can see in Figure 10.

The moment of truth arrives when all the waste is gone. Now, test the fit of the joint. The steps I've outlined here err on the side of a too-tight fit, but aim for the parts to come together with firm hand pressure. If you can press the parts halfway (as Step 11 shows), then you've made it, and you're ready to glue up your joint. More than that though, you've learned a new skill and taught your table saw a new trick — not bad for an afternoon's work.



Wasting Away. Remove the spacers, then remove most of the waste with a series of cuts between each pin location.



Chisel Work. As with the tails, so also with the pins: remove the last bits of waste with a chisel, working to the baseline.



Hand Pressure. The pins should be sized so they just slide into the tails. If they're too tight, you'll need to fine-tune the pins.





Jigs & Accessories

In this section, you'll find a collection of excellent accessories to complement your table saw skills. From jigs and sleds to a cabinet and outfeed table, you'll find the best upgrades here.

RAISED PANELS.....68

SAW SLED DUO 70

TENONING JIG 76

TABLE SAW CABINET.....84

MODULAR OUTFEED SYSTEM.....90

FOLDING OUTFEED TABLE 94



Dado Blade. Decorative coves are easy to cut on the table saw.

Cove Profiles Raised Panels

A simple jig and a dado blade are all you need to make attractive raised panels.



Raised Panel. Decorative coves are easy to cut on the table saw.

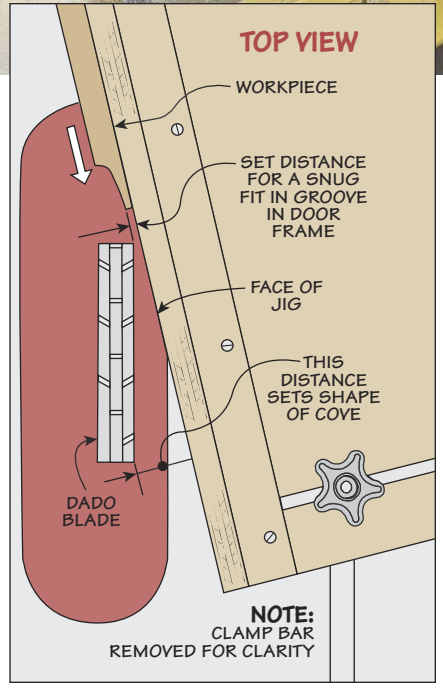
Making coved raised panels usually requires a router table and an expensive bit. However, there's a way to do it at the table saw with just a dado blade and a simple, shop-made jig.

START WITH A JIG. There's an old table saw trick that's been around for years — cutting coves by running the workpiece diagonally across the blade. To cut coves on the edge of a workpiece, all you need is a safe, reliable way to support the panel as you pass it across a dado blade at an angle. The jig you see in the main photo above and in the drawings on the opposite page does exactly that.

The jig consists of two main assemblies — an L-shaped base that's fixed to your saw's table and a tall, sliding fence that carries the workpiece.

The wide base of the jig has a pair of slots that hold miter slot hardware. This hardware fits in the miter slot of your saw and expands to lock the base in place as you tighten the knobs.

The sliding portion of the jig that holds the workpiece is pretty simple. A pair of cleats on the back side of a tall face wrap around the rail on the base. You'll want this to be a smooth, sliding fit over the rail. A little paste wax helps the sled slide easily along the rail. A wide clamp bar on the face of the fence secures the workpiece with a pair of carriage bolts and star knobs.



The jig works by presenting the workpiece to the blade at an angle. To help you decide which angle gives you the desired shape of the cove profile on the edges of the panel, see the drawing above and the margin photos on the opposite page.

DADO BLADE. The first thing to do is install a dado blade. I use an 8"-dia.

blade and install all of the chippers to ensure there's plenty of width to cut the profile. A 6"-dia. blade works too, but you'll end up with a smaller radius on the cove profile.

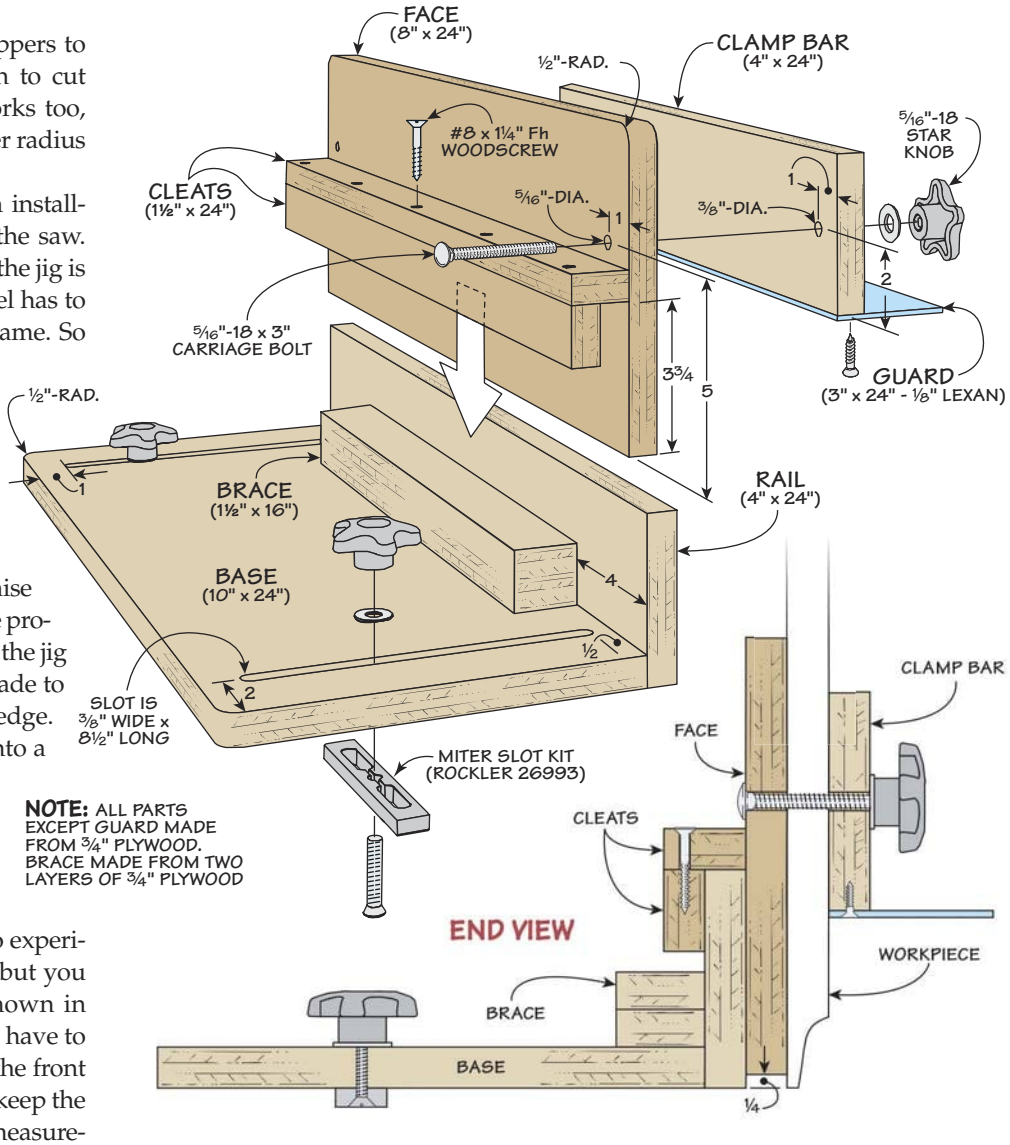
SETUP. Now you can work on installing and setting up the jig on the saw. The one constant in setting up the jig is that the edge of the raised panel has to fit into a groove in the door frame. So this is where I start making adjustments. I place the jig on the miter slot and lightly clamp it down. Before you place the workpiece in the jig, you'll want to make a couple of measurements.

To set up the jig for cutting, raise the blade to the full height of the profile you want to cut. Then slide the jig toward the front edge of the blade to set the thickness of the panel edge. In my case, this was ¼" to fit into a ¼" groove of my door frame.

The next measurement is at the rear edge of the blade and determines the shape of the cove profile, as you can see in the right margin. You'll have to experiment to get a profile you like, but you can use the measurements shown in the photo as a guideline. You'll have to work back and forth between the front and back edges of the blade to keep the jig aligned with your desired measurements. Then you can lock it in place with both knobs.

Here's something to note: The distance between the miter slot and blade may vary depending on your saw. If you can't adjust the base enough to cut the desired profile, rotate the jig 180° and use the opposite miter slot.

USING THE JIG. Before you turn the saw on, there's something I need to mention. For small or narrow profile cuts, you might be able to get away with making the cut in a single pass. If your dado stack is nice and sharp, this won't be a problem. But, for larger cove profiles, you'll want to make several lighter passes instead of just one. If that's the case, lower the blade for the first pass, then raise it about ¼" or so between cuts until you reach the full height of the finished profile.



It's a good idea to make a test cut before cutting your final panels. To do this, simply clamp the workpiece to the face of the jig with the clamp bar. It's important that the bottom edge of the workpiece is resting on the saw table.

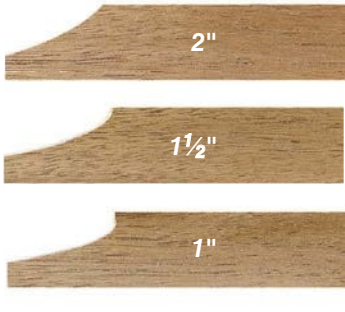
MAKING THE CUT. You'll want to start with the ends of the panels first. You'll get some tearout as the back edge of the workpiece crosses the blade. But this will be cleaned up as you make the final cuts along the edges of the panel.

To start, make sure the workpiece is pulled back away from the blade. Turn the saw on and slowly slide the assembly across the blade, making sure the panel's edge remains in contact with the saw's table.

Now you can flip the workpiece 180° to make the cut on the opposite end. Repeat the process to cut the two edges along the edge grain as well. If you're making multiple passes, raise the blade slightly and repeat the process. The important thing to remember is to always cut the end grain first to give yourself clean profiles.

CLEANUP. After a little sanding to remove saw marks, you can apply a finish. You can see how quick and easy it is to create a perfect raised panel, as shown in the margin, opposite page.

Profiles. By adjusting the distance from the back edge of the blade, you can create a variety of edge profiles.



Saw Sled Duo

A saw sled is the perfect way to ensure precise and safe crosscuts when working at the table saw, and the pair you see here can do all that and more.

Although the table saw is primarily a ripping tool, it's hard to beat its precision when it comes to crosscuts as well. If I need a perfect crosscut, whether that's 90°, 45°, or somewhere in between, then chances are I'm going to cut it at the table saw. But, miter gauges can be notoriously fiddly, and even then they don't always provide the kind of support I want for larger workpieces. That's why when I need to make a high-quality crosscut I turn to a table saw sled.

T-TRACK. In our shop here at *Woodsmith*, we've accumulated several shop-made sleds over the years, and we get plenty of use out of them. However, there's one thing that makes these sleds stand out: the T-track. Not only does this allow for the use of hold-downs to keep workpieces secure throughout the cut, but it also accepts the T-bolts used to attach the adjustable miter arms on the panel sleds, making miters at all angles a breeze.

PANEL & CROSSCUT. In this project you'll find the plans for two sleds. First up is the panel sled, which you can see at right. This one features those adjustable miter arms for angled cuts, and, when the arms are removed, it can cut workpieces up to 22½" wide.

The second sled is shown in the photo below. This is a dedicated crosscut sled, with a narrower body to cut down on weight and make it easier to store beside your saw.

We built both these sleds from Baltic birch plywood for its stability and pleasant, laminated edges. These sleds can be made in a weekend from just one 4' x 8' sheet of plywood, and you might be surprised at how much a good table saw sled can improve your woodworking.



Sized Down. At the end of this article you'll find a design for a smaller sled, which offers great crosscutting capability with less weight and a more minimal footprint.

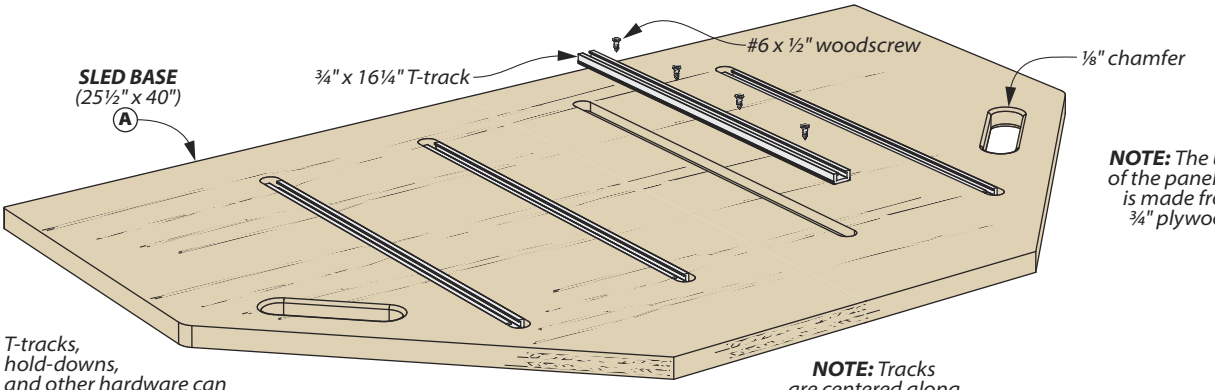


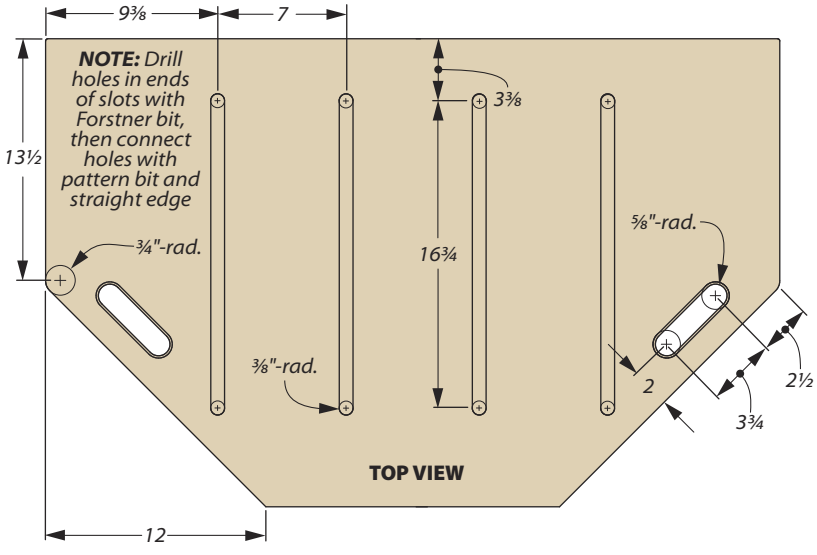


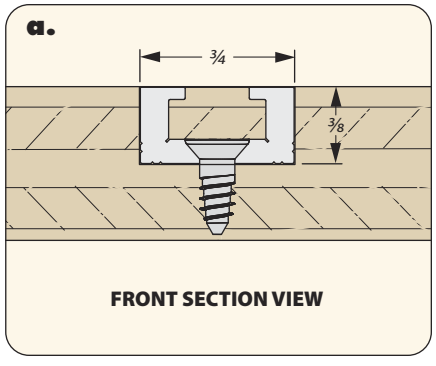
Rounded Slots. The slots for the T-track end in a radius, making it quick to slide in the T-bolts in and out.



Quick Adjustments. The miter fences and the aluminum hold-downs are easy to adjust on the fly, using star knobs threaded onto T-bolts.







Making a **Stable Sled**

Both table saw sleds follow a similar procedure, but we'll be looking at the more complex panel sled first. The action on the panel sled takes place on the base, making that the natural starting point. I made my sleds from plywood (Baltic birch specifically), and after finding a sufficiently large chunk and cutting it to size, I marked the layout across it, which you can see illustrated above.

LAYOUT. There are three important elements to note here. First, the slots for the T-tracks, followed by the handholds, then the front corners. You can see where these are located above.

T-SLOTS. When it came to the actual work, I began at the slots for the T-track (detail 'a'). With the slots laid out, I first established the ends with a Forstner bit. I left these ends radiused, as it would give me a bit of room to slide the T-bolts in after installing the track.

Now that the ends were drilled, I connected them by routing with a pattern bit, using a straightedge to register against the bit's bearing.

HANDHOLDS. Second on the sled base is the pair of slots that serve as handholds. As with the T-track slots, I initially drilled the ends with a Forstner bit before connecting them.

Like the last slots we made, I would be routing the sides of the handholds for a flat edge. However, I removed most of the waste first with a jig saw. After finishing the sides, I ran a chamfer around the edges on both faces to provide a more comfortable grip.

SHAPING THE SLED. The last task here is to cut off the front corners. This reduces the weight of the sled without limiting the functionality. Because of the size of the base, this was best done with a jig saw first, finishing the edge with a pattern bit and straightedge once more. To get the radius on the corners, I marked them out with a compass, then knocked them down with a sanding block.

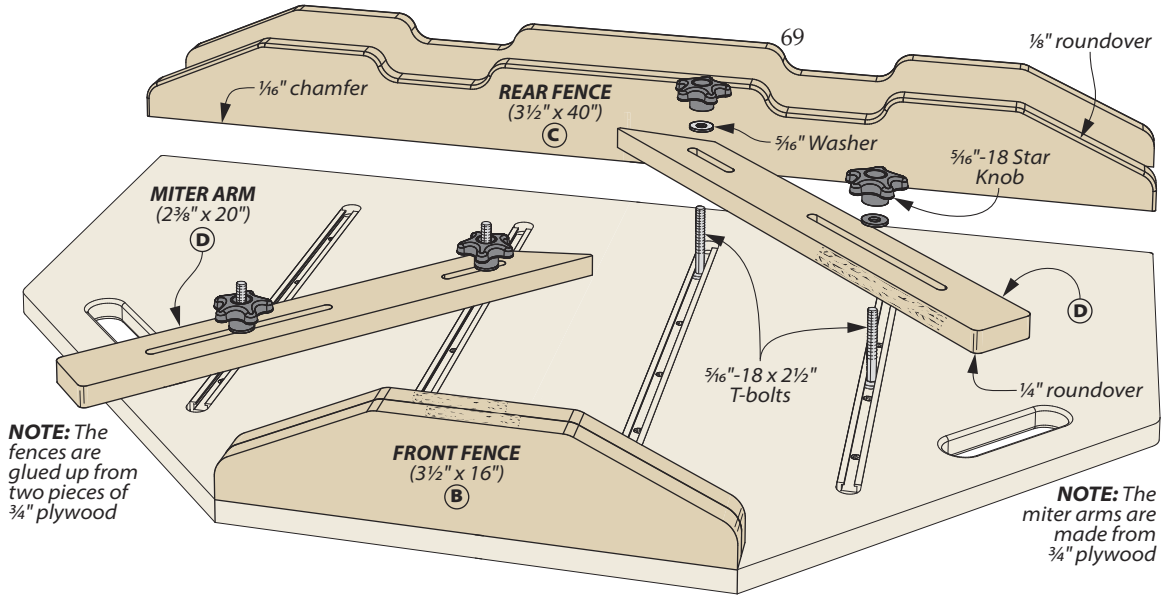
T-TRACKS. With the base shaped, it's time to install the first bits of hardware: the T-tracks. In order to install the T-track, you'll need to drill clearance holes. The track I used had a V-groove down the center to make it easy to align the drill bit.

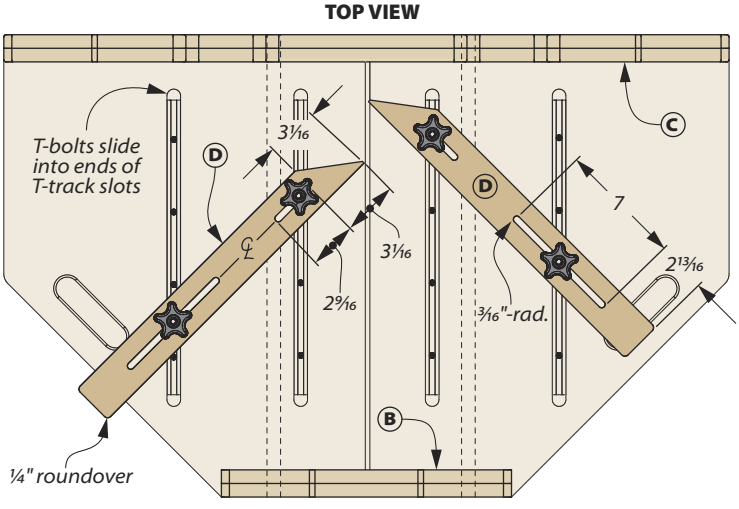
FENCES & ARMS

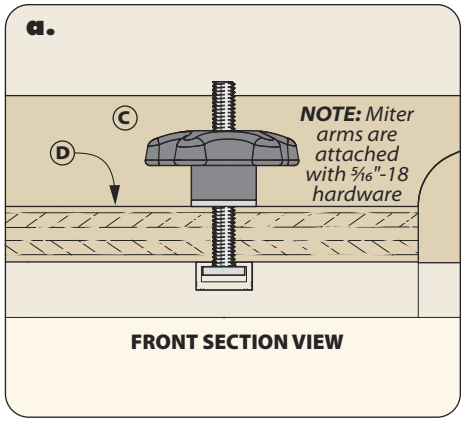
The base is now prepared for the upper parts. First will be a pair of fences to keep the workpiece on the sled and perpendicular to the blade. Second is the pair of miter arms mounted on T-bolts.

FENCES. To kick off the fences, you'll first need to glue up each one from two pieces of plywood. While the profiles of these are a mostly aesthetic choice, you can see the layout I used below.

The jig saw or the band saw are good choices for rough shaping. I reached the



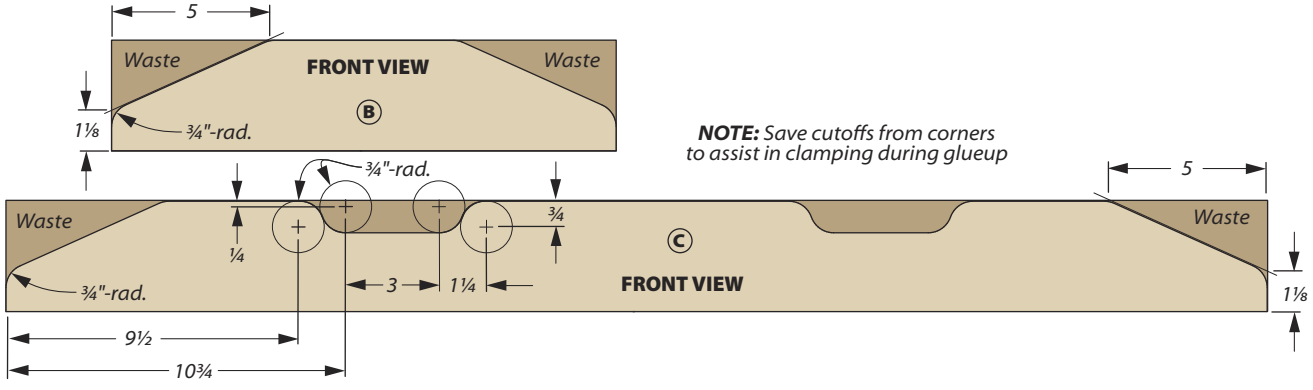


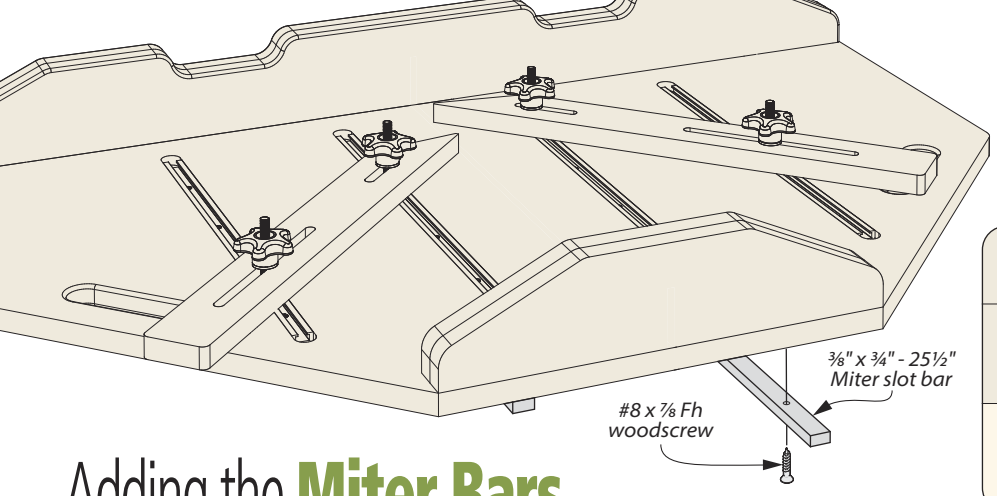


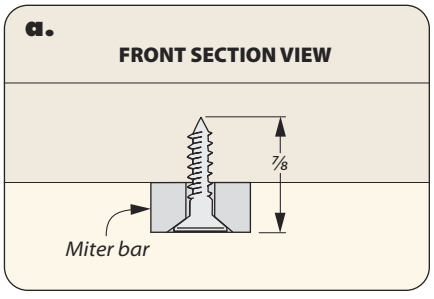
final shape at the spindle sander, then took the rear fence over to the router table. I eased the upper edges with roundovers, then routed a slight chamfer along the inner edge for dust clearance. Finally, I glued the front fence onto the base, but I only screwed the rear fence on for now.

MITER ARMS. The last parts of this sled are the miter arms. After cutting them to size, I laid out the slots that the bolts go through (main illustration above). I drilled out the ends of the slots and finished them at the router table as I did on the base. To complete the arms, I mitered the ends at the table saw and sanded radii onto the opposite corners at the edge sander.

The arms are attached by slipping the T-bolts into the tracks and slotting the arms overtop. The knobs thread down to hold them in place. On page 98, you'll find our source for a pair of hold-downs that work the same way.







Adding the Miter Bars

At this point, the panel sled is nearly finished, but there's one more important piece of hardware to attach: the miter bars. These are simply screwed in place, but their alignment is extremely important — they need to be perpendicular to the rear fence to ensure a 90° cut.

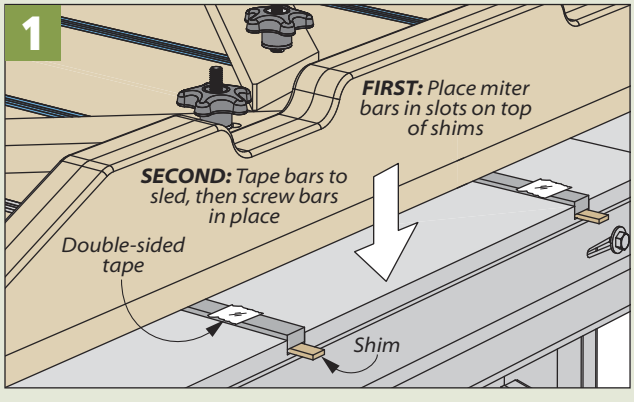
ALIGNING THE MITER BARS. To be sure the miter bars would be perpendicular, I used the technique you see below. I started by getting a couple of thin shims from my scrap bin that would fit in the miter slots of my table saw. Then I placed the miter bars overtop, setting their ends flush to the back edge of the table. I lowered the sled onto them, keeping the rear fence flush to the edge as well.

Use a straightedge to check the position of the rear fence against the table. Once that's perfect, test the motion of the sled to make sure the miter bars are sliding freely (that means they're parallel). Adjust the positioning until the sled slides easily through the miter slots and its base is flush to the table.

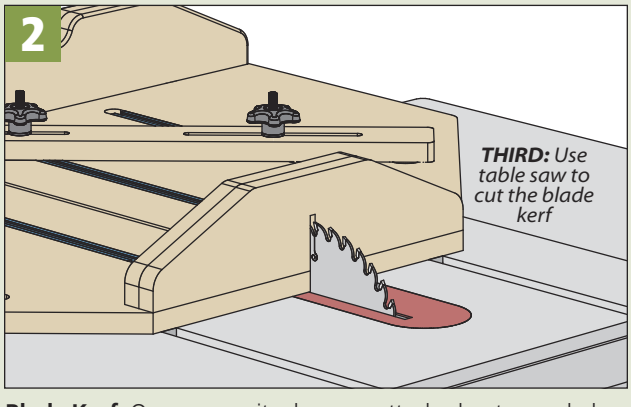
To secure the bars, I flipped the sled over onto my workbench with them taped on. I drilled the pilot holes, then drove in the screws (detail 'a').

BLADE KERF. Last is the blade kerf. To make this, I set my sled on the table saw (bars in slots) and made a cut (Figure 2). One pass through creates a zero-clearance kerf. Finally, I used that slot to make sure the rear fence would be square to the blade. Since it's just screwed in place, I could adjust it as necessary for a perfect 90° angle.

Adding the Miter Bars



Miter Locations. Use your table saw's miter slots to locate the bars. Use a straightedge to keep them flush to the base.



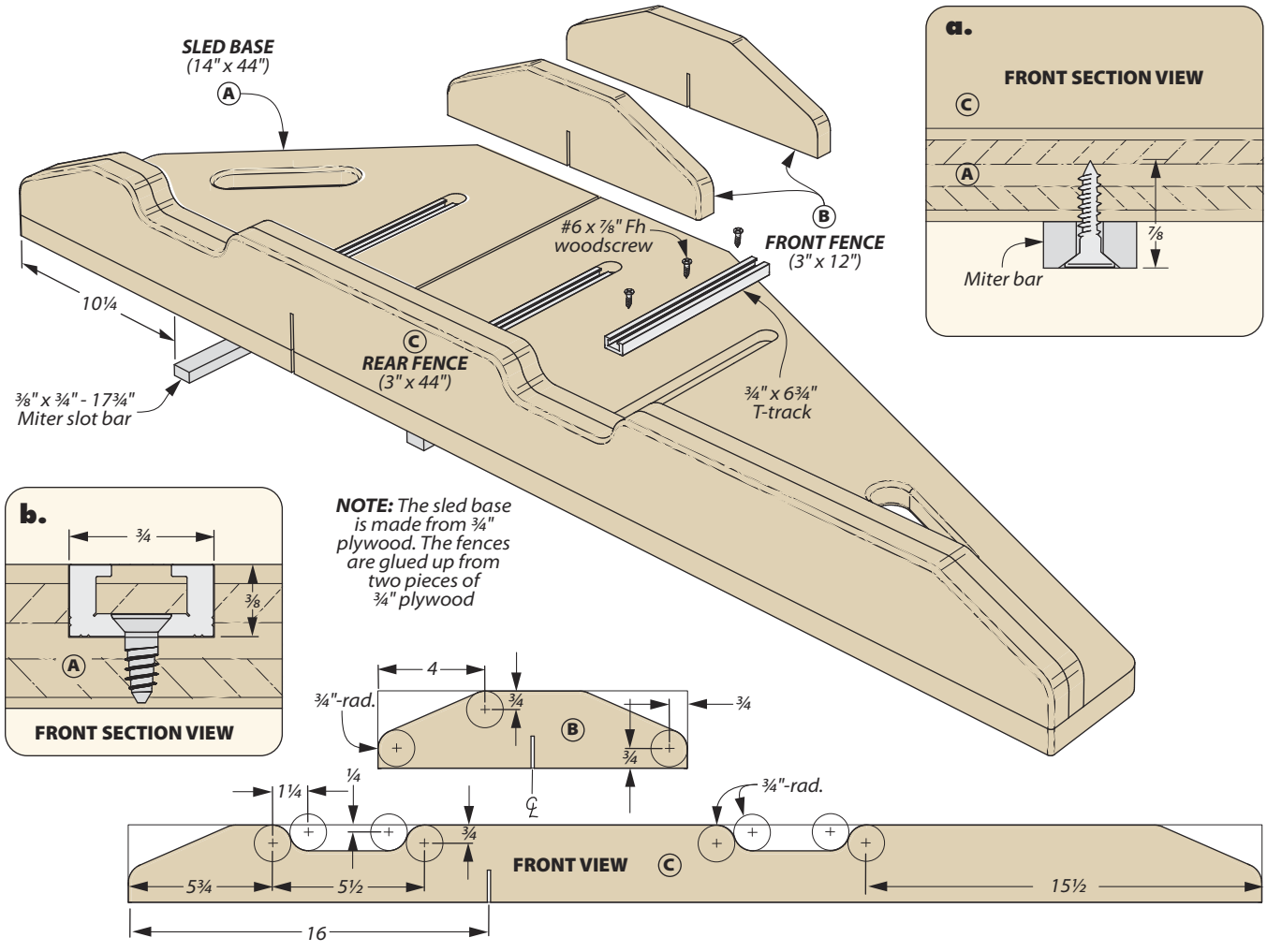
Blade Kerf. Once your miter bars are attached, set your sled on the table saw and make a cut to create the kerf.

PANEL SLED MATERIALS & SUPPLIES

A	Sled Base (1)	3/4 ply. - 25 1/2 x 40
B	Front Fence (2)	3/4 ply. - 3 1/2 x 16
C	Rear Fence (2)	3/4 ply. - 3 1/2 x 40
D	Miter Arms (2)	3/4 ply. - 2 3/8 x 20

- (4) 3/4" x 16 1/4" Aluminum T-track
- 12) #6 x 1/2" Fh Woodscrews
- (6) 5/16"-18 x 2 1/2" T-bolts
- (6) 5/16"-18 x 2 1/4" Star Knobs
- (2) T-track Hold-downs
- (2) 3/8" x 3/4" - 25 3/8" Miter Bar
- (10) #8 x 7/8" Fh Woodscrews

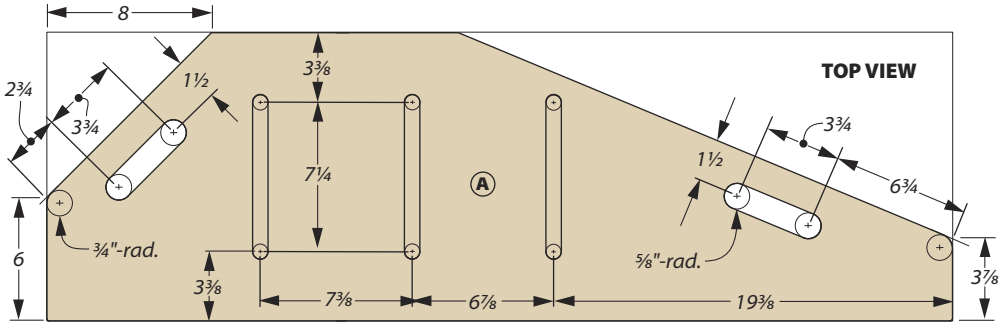
ALSO NEEDED: *One 4' x 4' sheet of Baltic birch plywood*



Crosscutting **Sled**

The panel sled isn't the only design we included. The one shown here is a smaller, simpler version. This one is great to have around for everyday crosscuts, as it takes up less space and is easier to haul around as needed.

A NARROW SLED. There are a few key differences to note here. First, it has a smaller capacity, being able to handle pieces 11" wide and under — still plenty for most crosscuts. Additionally, the sled is asymmetrical, allowing you to attach a stop on the right side for repeated cuts up to 29" from the blade. Otherwise, building this sled is similar to the panel sled, and with this duo, your table saw will feel like a high-performance, crosscutting machine.



CROSSCUTTING SLED MATERIALS & SUPPLIES

A	Sled Base (1)	¾ ply. - 14 x 44
B	Front Fence (2)	¾ ply. - 3 x 12
C	Rear Fence (2)	¾ ply. - 3 x 44

- (3) ¾" x 6¾" Aluminum T-track
- (9) #6 x ½" Fh Woodscrews
- (2) T-track Hold-downs
- (2) ⅜" x ¾" - 14" Miter Bar
- (8) #8 x ⅞" Fh Woodscrews

ALSO NEEDED:
One 4' x 4' sheet of Baltic birch plywood



Double-Stop System. Simple stops make it easy to set the thickness of the tenon.

Tenoning Jig

Unlike some tenoning jigs, this one lets you cut both tenon cheeks without flipping the workpiece. It's easily adjustable, and a built-in, spring-loaded clamp ensures accuracy pass after pass.

One of the fastest ways to cut tenons on the table saw is with a tenoning jig. With typical versions of these jigs, you hold a workpiece vertically to cut one cheek of the tenon in a single pass over the blade.

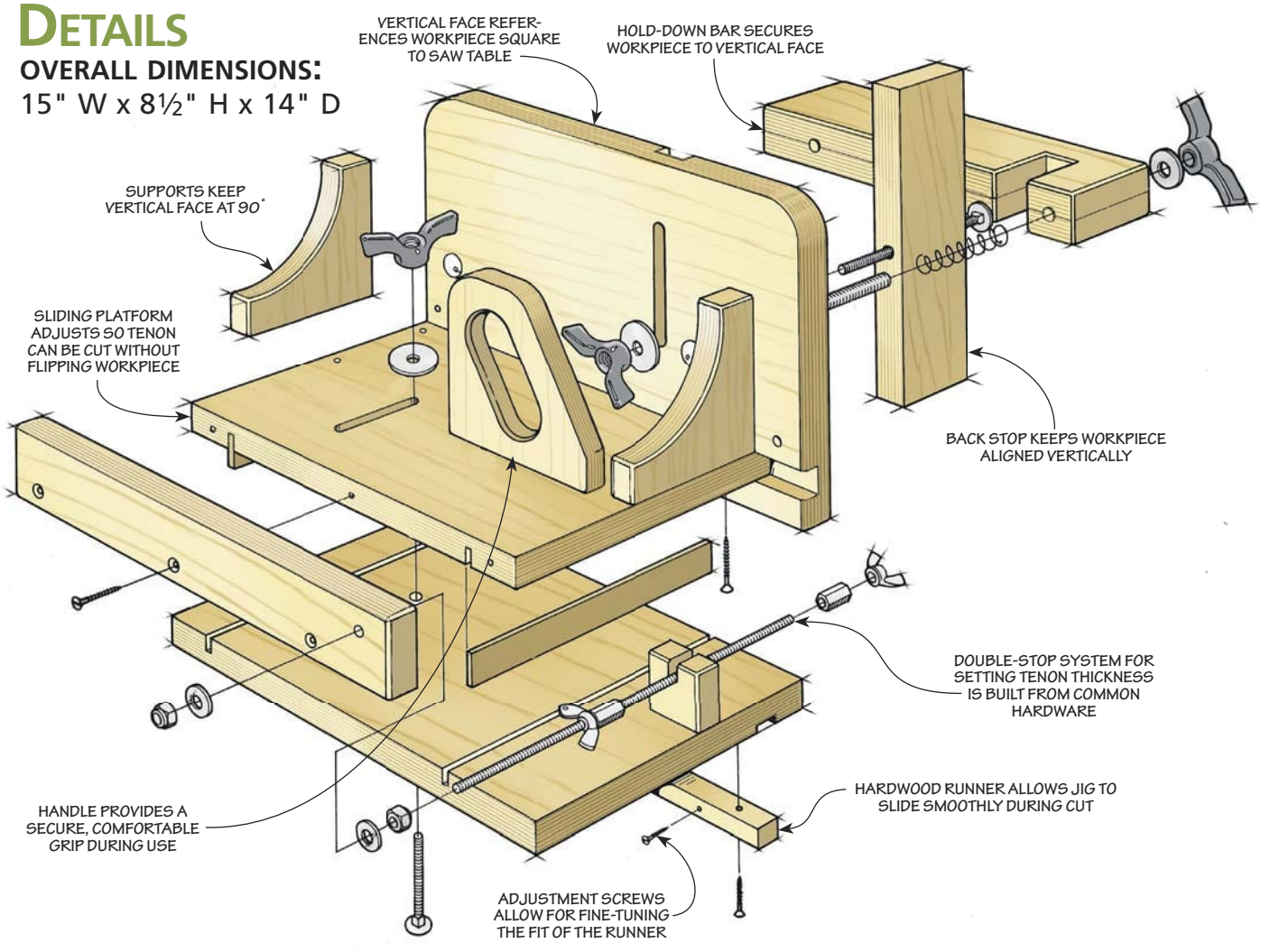
But these jigs come with a couple of drawbacks. First, it's time-consuming to make the second cheek cut using a typical tenoning jig. You need to unclamp the workpiece, flip it around, and clamp it in place again. A second drawback is that it's difficult to cut an accurate offset tenon (a tenon that's not centered on the thickness of the workpiece).

DOUBLE-STOP SYSTEM. I built this tenoning jig with a double-stop system, shown in the inset photo above, that solves both of these problems. Once you've adjusted the stops, you can make both cheek cuts without having to remove the workpiece. This jig also makes it easy to adjust the width and position of the tenon on the end of the workpiece.

BACK STOP. Another interesting feature of this tenoning jig is the back stop. It supports the workpiece as it's pushed through the blade. Plus, it's

Construction Details

OVERALL DIMENSIONS:
15" W x 8½" H x 14" D



adjustable, so you won't cut through it as you work.

HOLD-DOWN BAR. To cut accurate tenons, the workpiece must be clamped securely to the jig. The problem with most clamps, though, is you need three hands to use them — two to hold the clamp, and one to position the workpiece. Instead, I added a spring-loaded hold-down bar to secure the workpiece.

MORTISES FIRST. Of course, the tenoning jig only cuts tenons, and a tenon is only half a joint. So, before cutting tenons, I start by making the mortises. This allows you to fit the tenons to them. The drill press works well for drilling out the majority of waste from a mortise. It can then be cleaned out with a chisel.

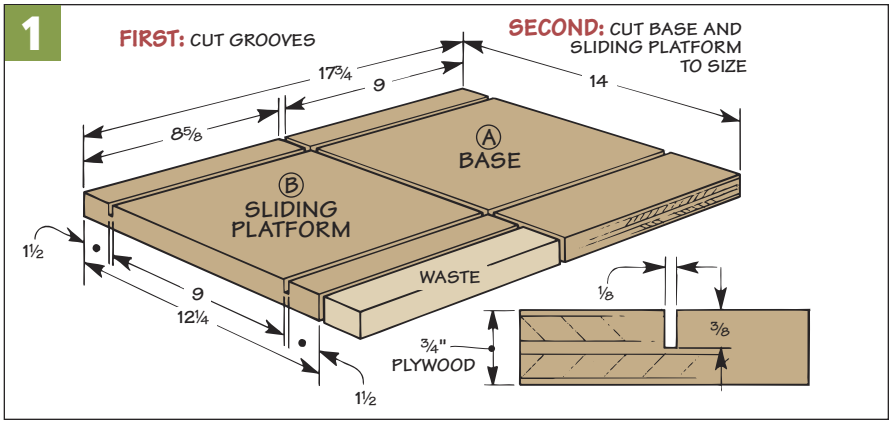
MATERIALS & SUPPLIES

A	Base (1)	9 x 14 - ¾ Ply.
B	Sliding Platform (1)	8⅝ x 12¼ - ¾ Ply.
C	Guide Strips (2)	1 1/16 x 8¼ - ⅛ Hdbd.
D	Runner (1)*	⅝ x ¾ - 14
E	Vertical Face (1)	8 x 14 - ¼ Ply.
F	Supports (2)	4 x 4 - ¼ Ply.
G	Handle (1)	5½ x 5½ - ¾ Ply.
H	Stop Bar (1)	1¾ x 14 - ¾ Ply.
I	Stop Block (1)	1¾ x 1¾ - ¾ Ply.
J	Back Stop (1)	¾ x 1¾ - 8
K	Hold-Down Bar (1)	1½ x 2½ - 11¾

* Size runner to fit your table saw

- (4) #6 x ½" Fh Woodscrews
- (3) #8 x 1" Fh Woodscrews
- (18) #8 x 1½" Fh Woodscrews
- (1) ¼" x 2½" Carriage Bolt w/Fender washer
- (1) ¼" x 3" Carriage Bolt w/Fender Washer
- (2) ¼" Plastic Wing Nuts
- (2) ⅜" x 6" Carriage Bolts w/Washers
- (2) ⅜" Plastic Wing Nuts
- (2) ½" x 2" Compression Springs
- (1) ¼"-20 Threaded Rod, 10" long (rgh.)
- (2) ¼" Wing Nuts
- (2) ¼" Coupling Nuts
- (2) ¼" Lock Nuts w/Washers

Building the Base & Platform



One of the most basic (yet most important) features of this tenoning jig is the sliding platform. It moves back and forth on a fixed base, as shown in Figure 2. This sliding action allows you to adjust the jig so you can cut tenons of varying thickness.

GROOVES. To allow the platform to slide on the base without twisting or shifting, I cut grooves in both pieces, as you see in Figures 1 and 2. The grooves will hold a pair of hardboard guide strips.

The tricky part about this is getting the grooves to align. To do this, start with an oversize blank and cut the grooves first. Then, cut the base and sliding platform to size, as illustrated in Figure 1. Note: The sliding platform is smaller than the base to allow room for a stop system that's added later.

SLOT. Figure 3 shows how the sliding platform is held on the base with a bolt and a wing nut. To make the platform adjustable, I cut a 3"-long slot for the bolt to pass through, as shown in Figure 2. To do this, simply drill a series of overlapping holes with a ¼" drill bit, and then clean up the slot with a file.

GUIDE STRIPS. The next step is to cut a pair of 8¼"-long guide strips (I made them from ⅛"-thick hardboard). As you can see in Figure 2, these two strips will be glued into the grooves that you cut in the sliding platform. Note that the width of these guide strips (1$\frac{1}{16}$") is $\frac{1}{16}$" less than the combined height of the two grooves (Side View in Figure 2). This allows for clearance.

STOP BAR. Next, I added a stop bar, as shown in Figure 3. (This is part of the double-stop system. Refer to page 78 and Figure 9 for more on this.) The stop bar is cut to match the length of the base (14") and to a width of 1¾". Once you've done this, you can screw it to the edge of the sliding platform.

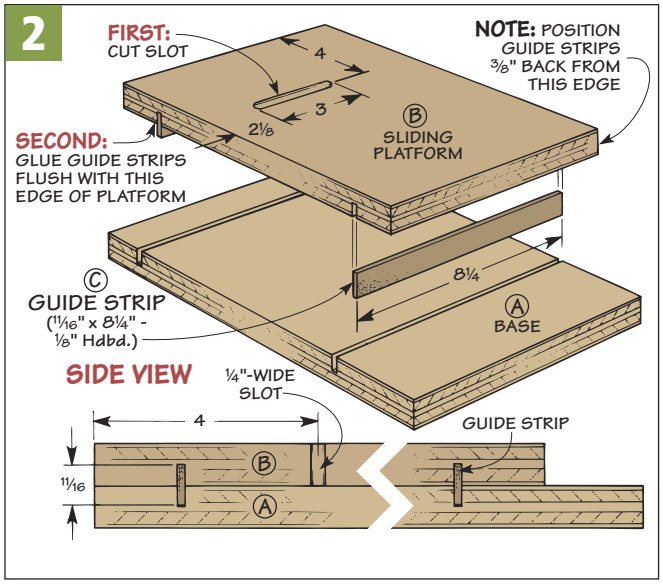
LOCATE HOLE. With the stop bar screwed in place, you can go ahead and locate the bolt hole in the base. The important thing to pay attention to here is the position of the platform. There should be a ⅜" lip on the right side of the base, as illustrated in Figure 3. This lip will fit into a dado that will be cut later in the vertical face of the jig. You can see how this works in Figure 4.

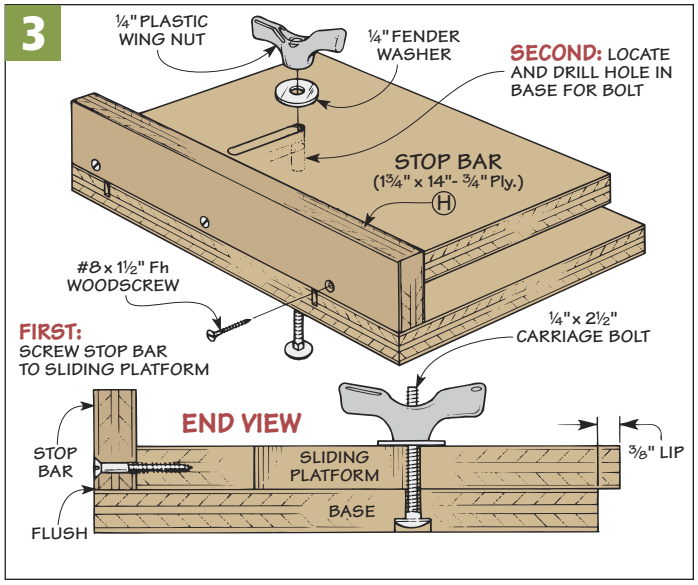
With the sliding platform in position to allow for the dado, drill a counterbored hole in the base for the carriage bolt. Then, slip in the bolt and washer, as well as thread on a wing nut (Figure 3).

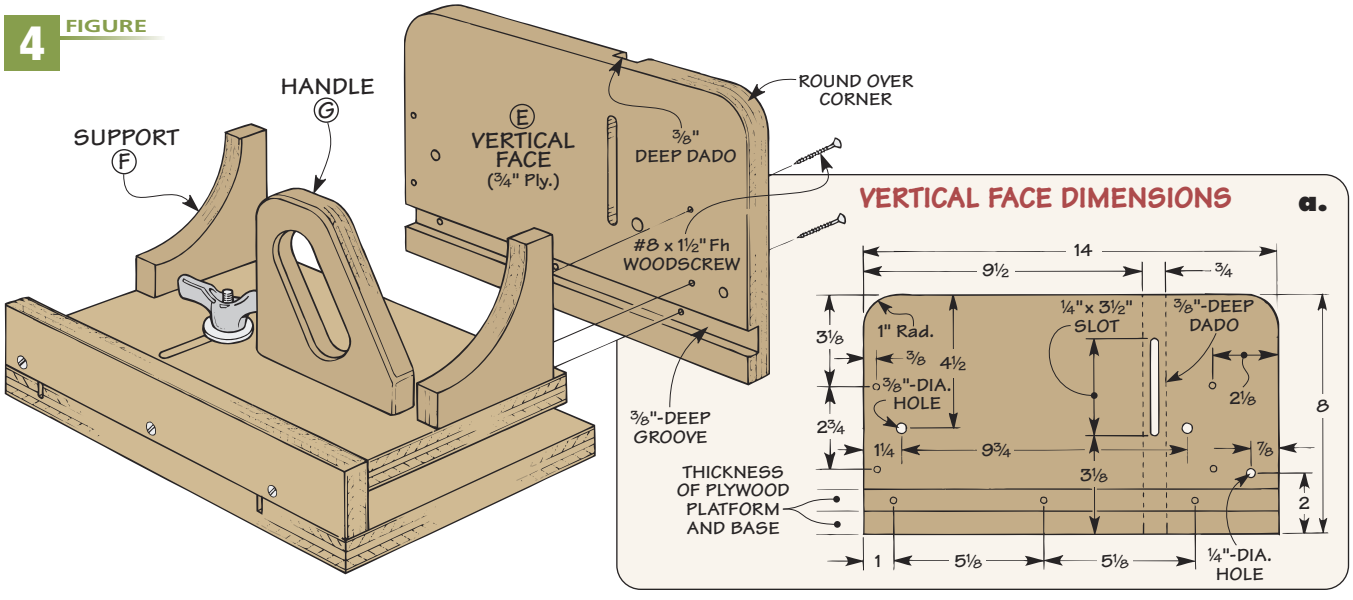
VERTICAL FACE

With the base and sliding platform complete, you're ready to make the vertical face of the jig.

VERTICAL FACE. The vertical face is screwed to the sliding platform and is designed to provide support for the







workpiece during a cut. This is shown in Figure 4. It's nothing more than a piece of ¾" plywood with the top corners rounded over.

The unusual part of this vertical face piece is that you'll need to cut a groove, a dado, and drill some holes before attaching it to the sliding platform.

GROOVE & DADO. The groove is cut near the inside, bottom edge of the vertical face. It's sized to accept the plywood sliding platform, as you see in Figure 4.

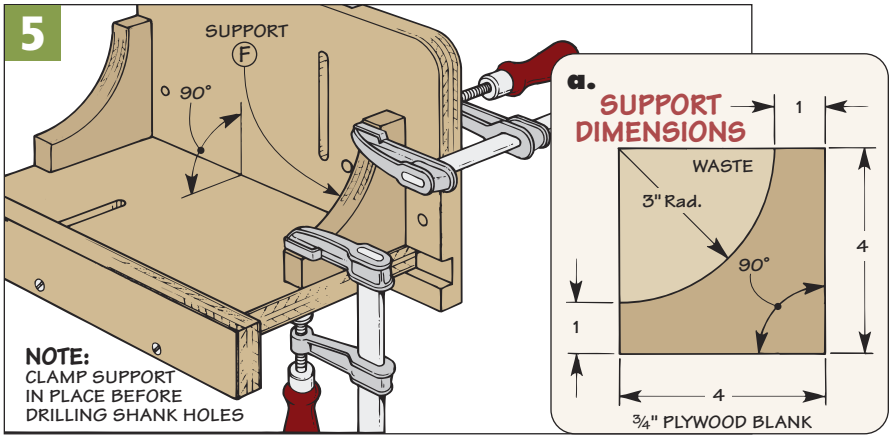
The dado is cut vertically on the outside of the face. It then forms a channel for a back stop that's added later (refer to page 80). As you can see in Figure 4, there's also a slot cut through the dado. This is what allows the stop to move up and down.

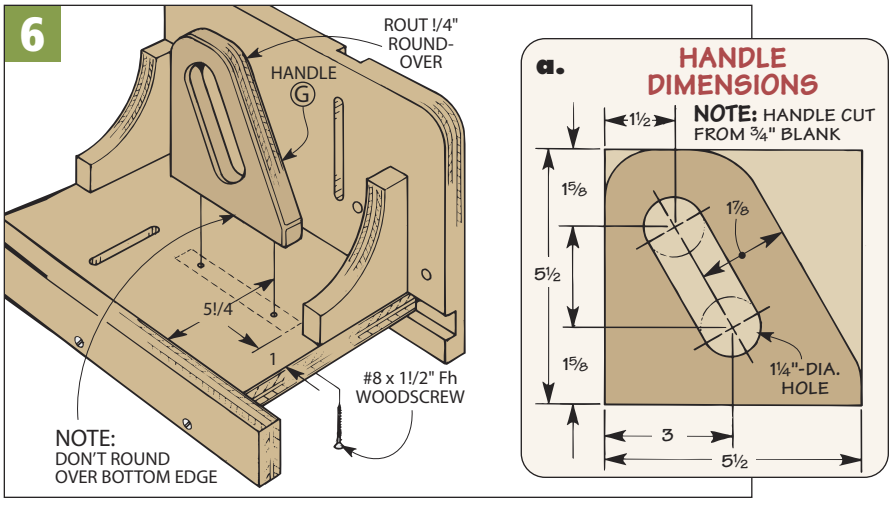
DRILL HOLES. Next, drill four countersunk shank holes in the face. In addition, there are three holes that will be used later to assemble the jig to drill at this time: two ⅜"-dia. holes and a ¼"-dia. hole. You'll find all the dimensions for this in Figure 4a. Now you can screw the face to the sliding platform.

SUPPORTS. To hold the vertical face in place, I added a pair of supports, as shown in Figures 5 and 5a. Each support starts as a square blank of plywood. From those, I cut a 3" radius out of one corner. Once that's done, the supports can be screwed to the sliding platform and the vertical face, as illustrated in Figure 5.

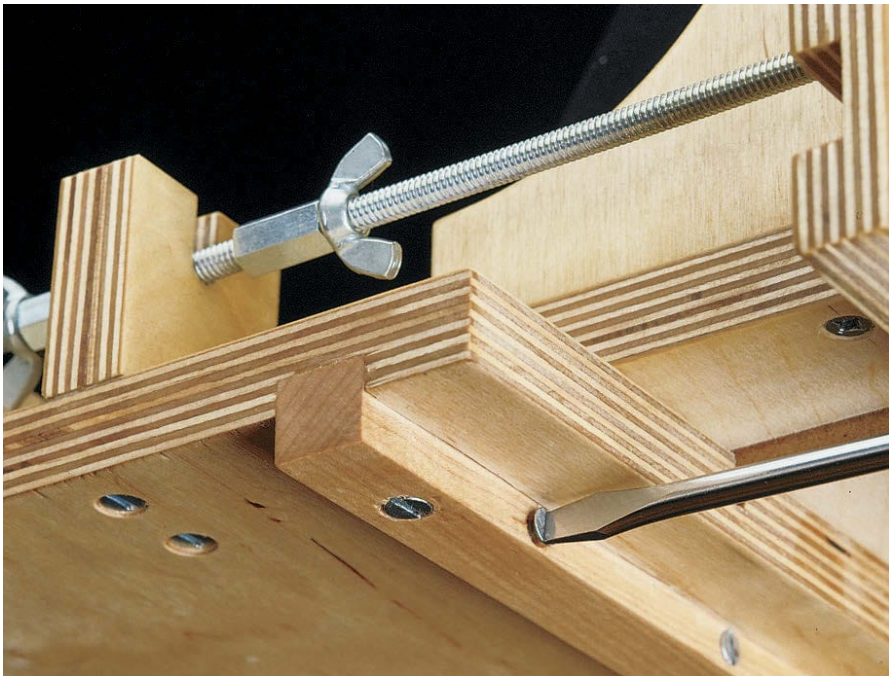
It's important to make sure the vertical face stays at a 90° angle to the saw table. You can do this by clamping each support to the platform and vertical face, as shown in Figure 5 below. Then, screw them in place.

HANDLE. Finally, to make it safe and easy to push the tenoning jig, I added a slotted handle cut from 3⁄4" plywood, as shown in Figure 6. On the next pages, you'll fit the jig to your saw and set it up to cut tenons.





Adding the Runner & Stop



Adjustable Runner. The runner is cut to fit in the miter gauge slot of your table saw (with a little clearance). Screws in the runner allow you to adjust its fit — to compensate for seasonal changes in humidity.

After the handle has been attached, the vertical face of the tenoning jig is complete. The next step is to add a hardwood runner. The runner fits in a groove that's cut in the bottom of the base and will keep the tenoning jig (and therefore the workpiece) parallel to the blade.

The only problem with using hardwood for the runner is that it expands and contracts with seasonal changes in humidity and won't fit consistently. To solve this problem, I made the runner narrower (about 1/32") than the miter gauge slot. Then, I added adjustment screws, like you see in the photo at right. This way, you can adjust the runner at any time for a snug fit that still slides smoothly.

TWO STEPS. Installing the runner is a two-step process. First, you need to locate and cut a groove in the bottom of the base. And after you do that, you need to cut the runner to fit the groove.

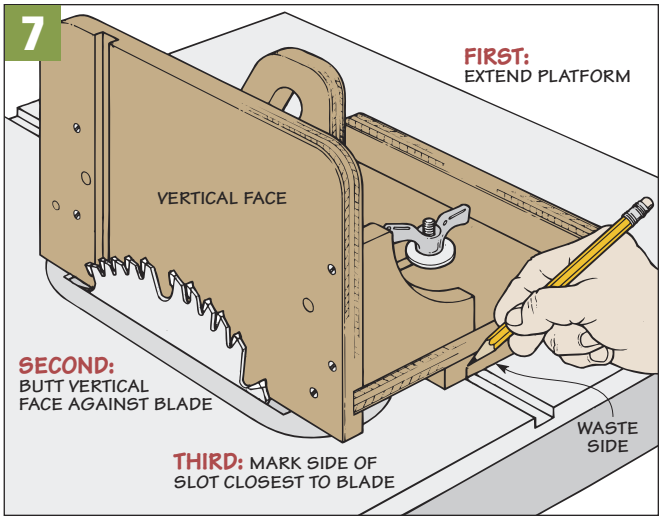
GROOVE. To locate the groove, begin by extending the sliding platform as far out as it will go, as illustrated in Figure 7. Then, raise the blade of your table saw and butt the vertical face of the jig up against it.

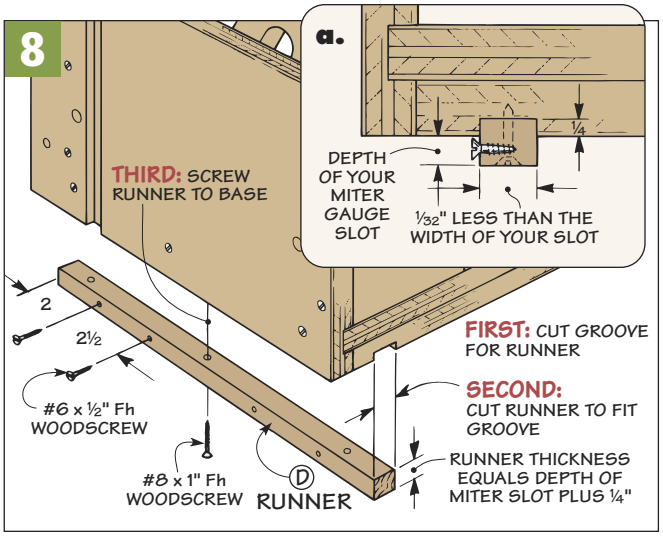
After you've done that, make a mark on the base where the side of the miter slot is closest to the blade, as shown in Figure 7. Then, cut a ¼"-deep groove on the waste side of this mark. Note: This mark should be about 1/32" less than the width of your miter gauge slot, like you see in Figure 8a.

RUNNER. Once the groove is cut, the next step is to make the runner, as shown in Figure 8 below. (I used maple, but just about any hardwood will work fine.) The length and width are easy. The runner is sized to match the width of the groove you just cut in the base and cut to match the length of the base (14").

The thickness, however, may vary depending on the depth of your miter gauge slot. To determine the thickness of the runner, measure the depth of your slot and add ¼" to account for the groove in the base.

Before attaching the runner to the base, drill countersunk holes in the side of the runner, as shown in Figure 8. Then add the adjustment screws, and screw the runner to the base.





ADJUSTMENT. Finally, adjust the runner by backing out each adjustment screw until it slides smoothly in the miter gauge slot.

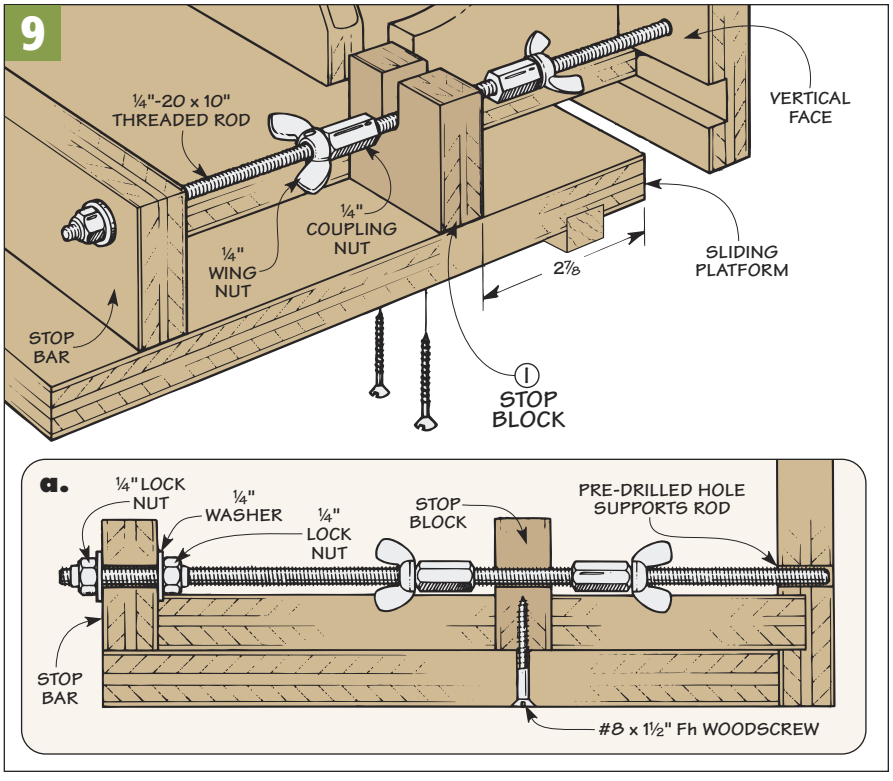
DOUBLE-STOP SYSTEM

The double-stop system is another important feature of the tenoning jig. It's designed to allow you to accurately preset the movement of the vertical face. This allows you to cut both cheeks of a tenon without having to flip the workpiece — so you can cut tenons quickly and easily. (For more on using the tenoning jig, take a look at page 81.)

STOP BLOCK. I started to work on the stop system by making the stop block, shown in Figure 9. It is simply a square piece of plywood with a notch cut in it to hold a length of threaded rod.

NOTCH. Figure 10 below shows a trick for cutting the notch so it aligns with the hole you drilled in the vertical face (for the threaded rod). I made the notch by first drilling a ¼"-dia. hole using the vertical face as a guide. To do this, clamp the stop block on the inside of the vertical face, as shown in Figure 10. Then, use the hole in the vertical face, which you drilled for the threaded rod earlier, to guide the bit through the block. After you're done drilling the hole, complete the notch with a jig saw or band saw, then file or sand it smooth.

STOP BAR. The next part of the double-stop system to make is the stop bar. The stop bar has a hole drilled in it to support the other end of the threaded rod.



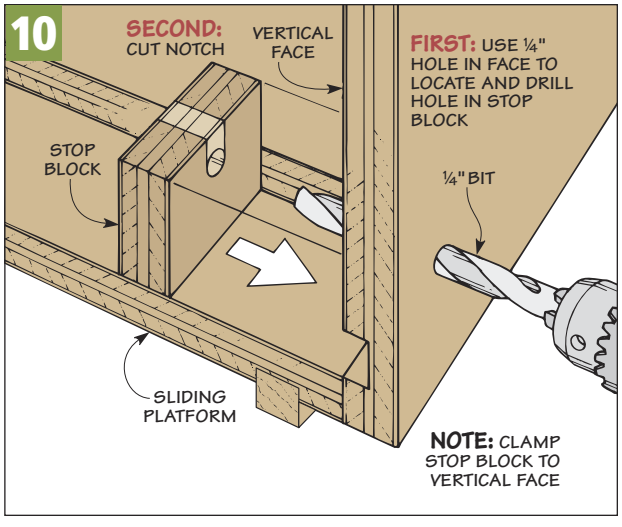
To do this, I used the notch in the stop block as a guide. Simply clamp the stop block to the stop bar, rest the drill bit in the bottom of the notch in the stop block, and drill the hole. This is shown in Figure 11.

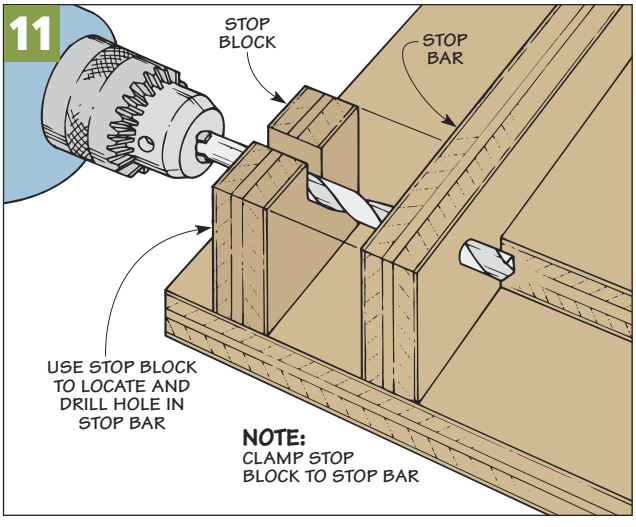
Once this hole is drilled, screw the stop block to the sliding platform, as you can see in Figure 9.

HARDWARE. With the stop block in place, the last step is to add the threaded rod and the hardware. You will slip a 10"-long piece of ¼"-20 threaded rod through the stop bar, stop block, and into the vertical face, as illustrated in Figures 9 and 9a.

Threaded onto this rod are a pair of coupling nuts and wing nuts. The coupling nuts butt up against the sides of the stop block and allow you to preset one of the cheek cuts. The wing nuts lock the coupling nuts in place after they've both been positioned.

Finally, to keep the threaded rod from spinning when the wing nuts are tightened down, I secured the rod to the stop bar with two lock nuts and washers, as you can see in Figure 9a.





Completing the Tenoning Jig

At this point, the tenoning jig is nearly complete. The two remaining pieces to make — the back stop and hold-down bar — are used to keep the workpiece square and steady while you cut a tenon on the end.

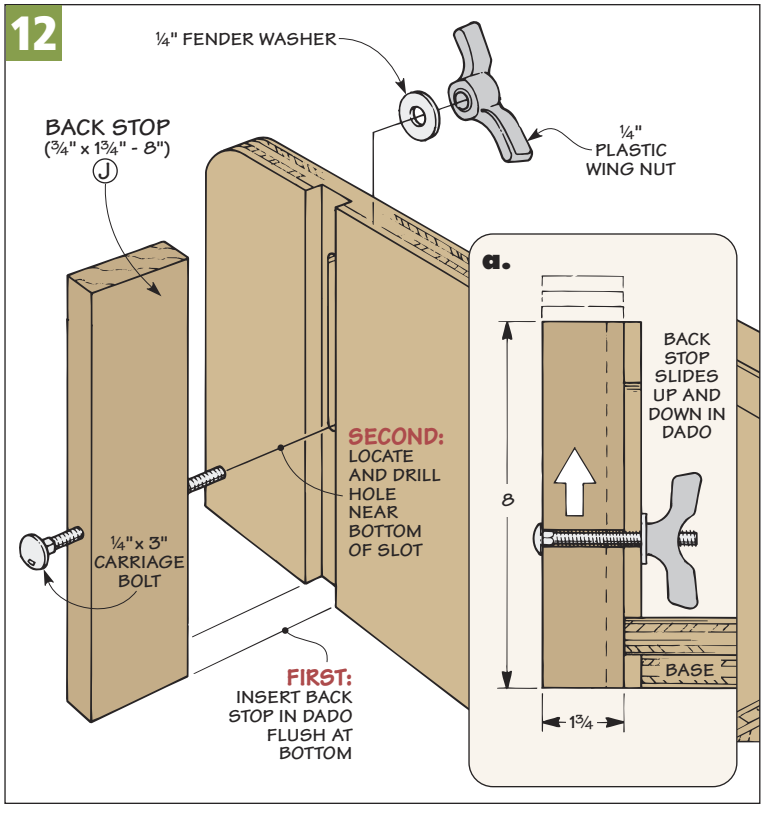
The back stop is designed to help keep the workpiece vertical throughout a cut. It also acts as a push block to carry the workpiece through the saw blade.

SLOTTED DADO. The back stop is just a ¾"-thick piece of hardwood, sized to fit in the dado you cut in the vertical face earlier. Figure 12a shows a slot that I cut in the dado to make the back stop adjustable.

The back stop is held in place with a carriage bolt and a wing nut. (I decided to use a large, plastic wing nut to make it easier to tighten.)

To locate the hole for the carriage bolt, first insert the back stop in the dado. It is important to make sure it's flush with the bottom of the base.

Then, make a mark near the bottom of the slot. And finally, drill a hole through the edge of the back stop, and bolt it in place, like you see in Figure 12a.



HOLD-DOWN BAR

To keep the workpiece in place while making a cut, you'll need to add a spring-loaded hold-down bar, as shown in Figure 13. The bar is glued up from two pieces of ¾"-thick hardwood stock.

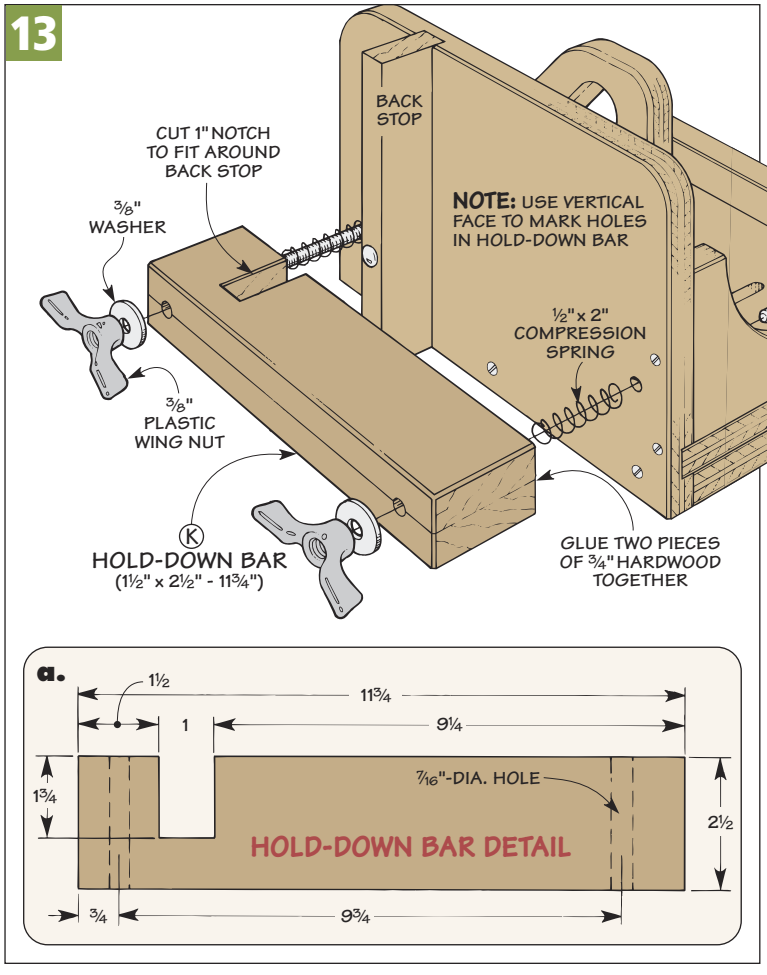
NOTCH. Once that's set, cut a 1"-wide, 1¾"-long notch near the end of the hold-down bar to fit around the back stop, as pictured in Figure 13a.

HARDWARE. The clamping power you find in the hold-down bar comes from a pair of carriage bolts and wing nuts. The bolts run through the hold-down bar and pass into the ⅜"-dia. holes in the vertical face, which you drilled earlier. You can see what I'm talking about in Figure 13 at left.

To mark the holes in the hold-down bar, use the holes in the vertical face as a template. After drilling the holes, you can install the carriage bolts.

The next step is to slip a pair of compression springs over the carriage bolts. The springs are used to automatically push the hold-down bar open when the wing nuts are loosened.

FINISH. Now, with the hold-down bar complete, there are only a couple things left to do. First, soften the sharp edges on all the parts of the jig to make it more comfortable to handle. Finally, apply the finish of your choice. (I wiped on two coats of tung oil.)



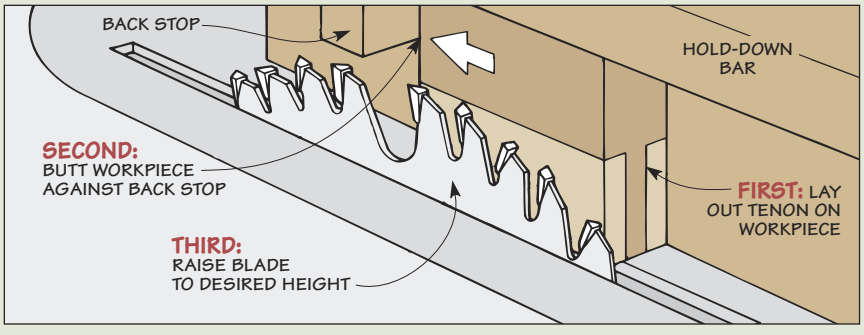
Using the Tenoning Jig



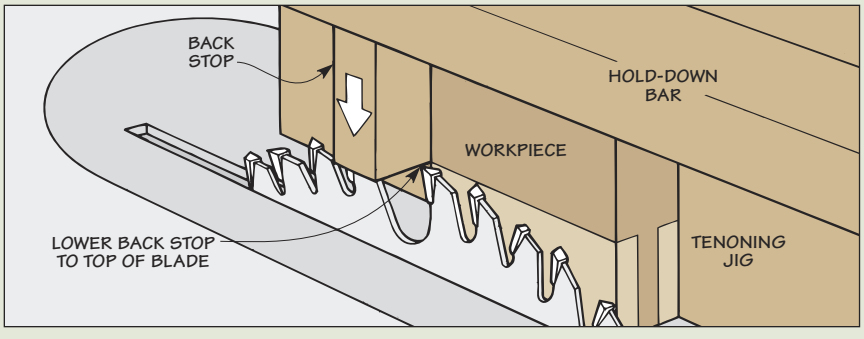
Using the tenoning jig is a simple four-step process. But there are a few things to be aware of before you begin.

Mortises & Tenons. When making mortise and tenon joints, I first cut the mortise and then cut the tenon to fit. That's because I cut mortises on a drill press and am limited by the size of drill bits — but you have more flexibility when cutting tenons. (Cut tenons shorter than mortises to allow for glue and clearance room.)

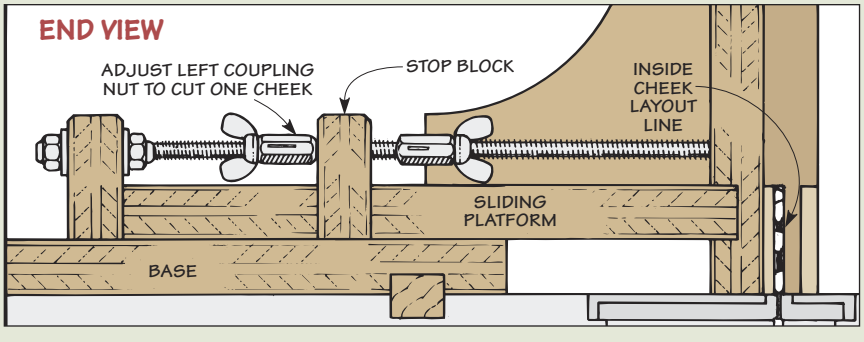
1 First, lay out the tenon on the workpiece. Then, butt the edge of the workpiece up against the back stop, and clamp it in place with the hold-down bar. Next, adjust the height of the blade for the desired depth of cut (the length of the tenon). Note: Unplug the saw before setting up the jig.



2 Once you've adjusted the height of the saw blade, you can adjust the back stop. To do this, slide the tenoning jig so the back stop is over the blade. Then, lower the back stop until it just touches the saw blade at its highest point.



3 Next, to set the cut for the inside cheek, slide the platform so that the outside edge of the blade is aligned with the inside layout line. Then, thread the left coupling nut against the stop block, and tighten the wing nut.



4 Then, move the platform to align the inside of the blade with the other layout line. Adjust the right coupling nut, tighten the wing nut, and make a test cut. Finally, remove the workpiece, and make the shoulder cuts. To do this, lay it flat on the saw table, and use a miter gauge to cut the shoulders and to remove the waste.

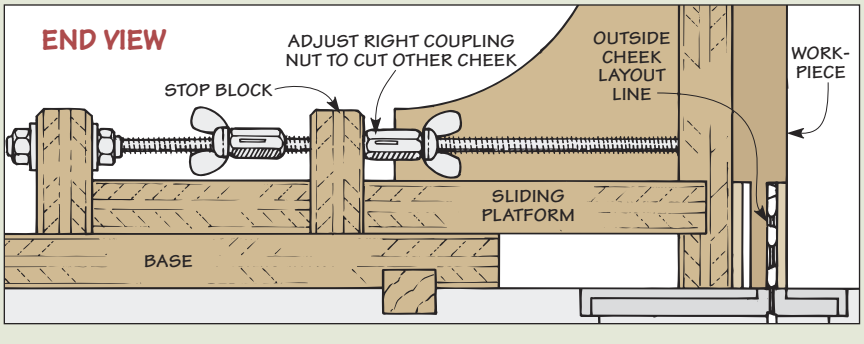


Table Saw Cabinet

Providing a perfect home for blades, inserts, and more, this cabinet is the perfect companion for your time at the table saw.

It's not always easy to keep an organized shop. Whether you've become wrapped up in a project, unearthed the contents of a drawer looking for some long-lost tool, or been stricken by a case of end-of-the-day apathy, clutter can build up quickly. For that reason, some of my favorite shop projects are simple and efficient organizers — like the one you see here.

It's no secret to anyone with a shop that space is always at a premium, and that extends to walls too. Our designer, Chris Fitch, had this in mind when creating the double-doored cabinet here. Behind the first door lies pockets for your inserts and the perfect place to store your most used blades. The second door encloses lesser-used blades and dado spacers. Magnetic catches guarantee the doors will hold fast, while the pull and cutout make opening them a snap.

While function is certainly foremost in this cabinet, that doesn't mean there isn't some room for form as well. Baltic birch provides not only strength, but visual interest along the edges and a sleek look on the faces after a few coats of lacquer. Rounded corners and edges soften otherwise harsh lines, helping the cabinet look right at home in your shop. Overall, this simple cabinet will work wonders when it comes to organizing your table saw. And, as a wiser man than I once said, "Simplicity is the ultimate sophistication."

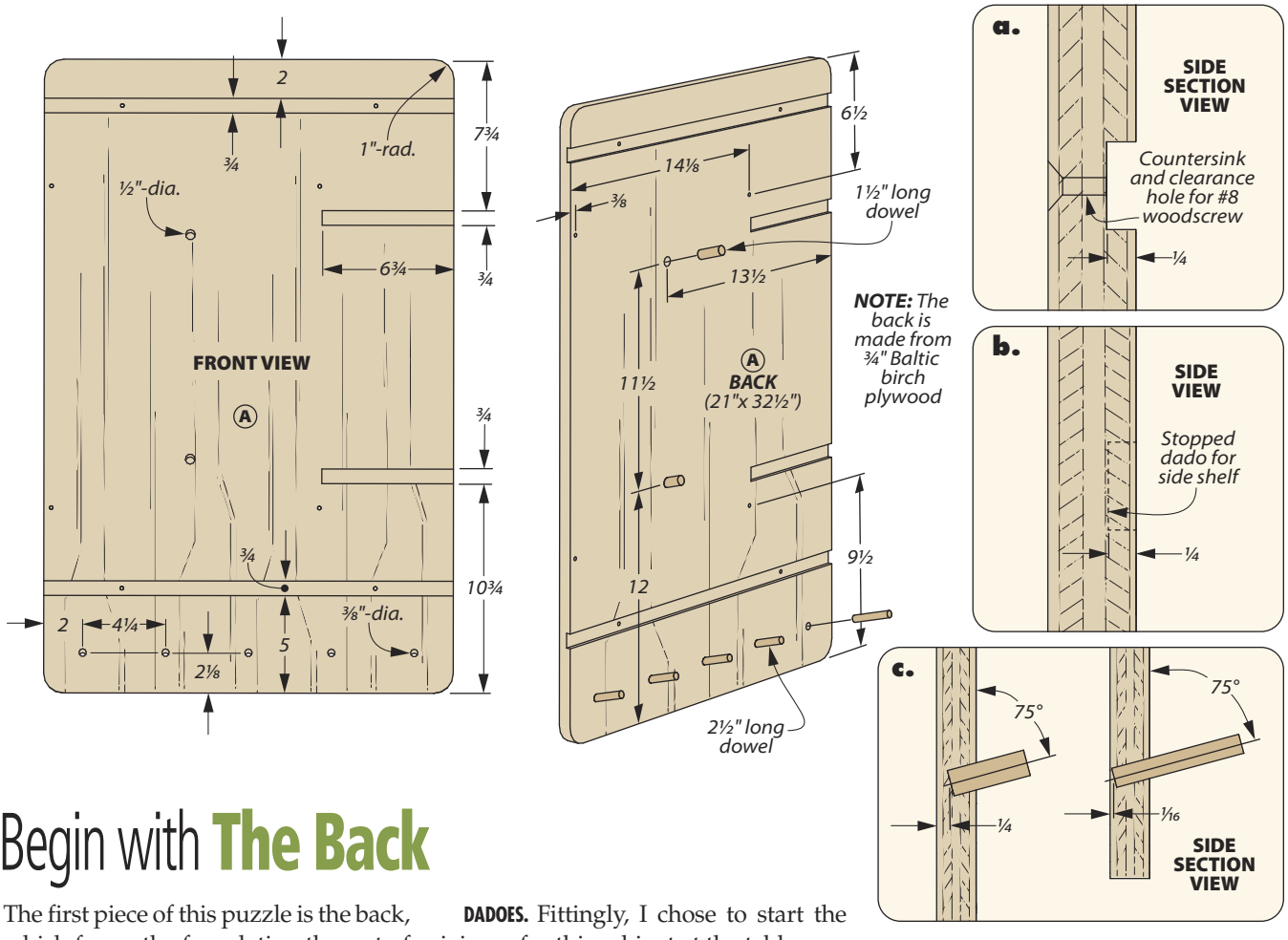


Double-Sided Storage. The back side of the outer door features a pair of pockets for your inserts, while the front face of the inner door keeps your favorite blades easily at hand.



Two Door Cabinet. The inner door — mounted simply with dowels — maximizes vertical space and makes for a great place to store specialty cutters and dado blades, both on the door as well as the back of the cabinet.


Bostik
GlideCote
Table & Tool Surface Lubricant
Lubricante Para el Cuadro y
3-IN-ONE
professional
NEW
WHITE
LITHIUM
Long-Lasting
Lubricant
Prevents Rust & Corrosion
Water and Heat Resistant
DANGER
NET WT. 10.25 OZ
CITRUS SHIELD
Premium Paste Wax
Neutral
PATENT NO.
6,016,509
www.stots.com



Begin with **The Back**

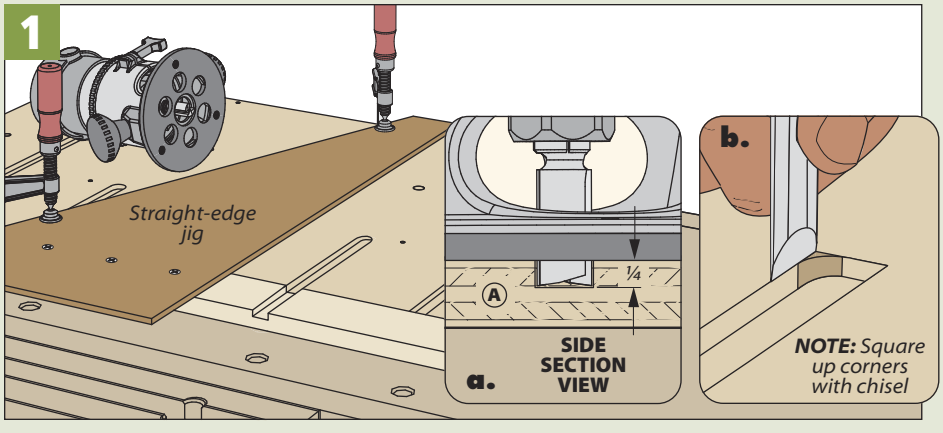
The first piece of this puzzle is the back, which forms the foundation the rest of the cabinet will be built on. The back itself is simple, with a few bits of basic joinery and a handful of holes for the dowel hangers.

DADOES. Fittingly, I chose to start the joinery for this cabinet at the table saw. After first cutting the back to size, I used a dado blade along with a miter gauge and an auxiliary fence to cut the two through dadoes that will hold the top and bottom of the case (shown in detail 'a' above).

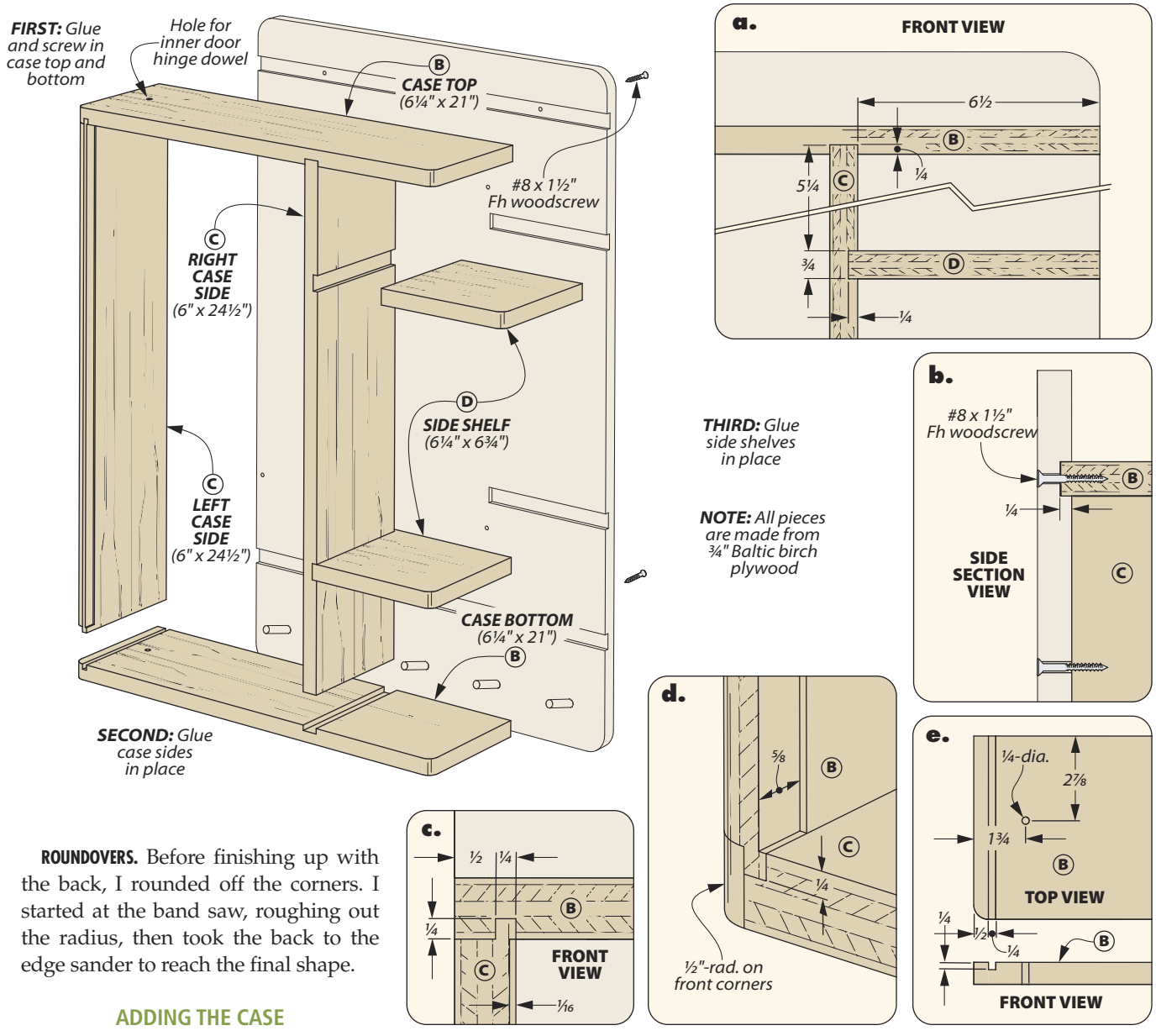
With those in place, I got out a router and chisel to make the stopped dadoes (detail 'b' above). These dadoes will support a pair of shelves later on. As you can see illustrated in the box below, these are easy to make with a straight bit (matching the plywood's thickness) and guide.

HANGER HOLES. The back features dowel hangers of two different diameters: smaller ones for lighter items and larger ones for blades. To keep blades and accessories from sliding off their hangers, the holes are drilled at a 15° angle (detail 'c'). To make sure my angle was right, I cut a block at 15° to use as a drilling guide. Lastly, I cut the dowels to length and glued them in.

Making Stopped Dadoes



Router & Chisel. To make stopped dadoes, use your router — along with a straight bit and jig — to remove a majority of the waste. Chisel out the corners to finish.



ROUNDOVERS. Before finishing up with the back, I rounded off the corners. I started at the band saw, roughing out the radius, then took the back to the edge sander to reach the final shape.

ADDING THE CASE

Next on the docket are the case pieces, along with the shelving that goes beside them. The top and bottom fit into the through dadoes cut in the back, with the sides sandwiched in between. The shelves are held by dadoes on two sides.

JOINERY. After cutting the pieces to size, I began the case joinery at the table saw. After swapping in a dado blade, I rabbeted the ends of the left side, as you can see in detail 'c.'

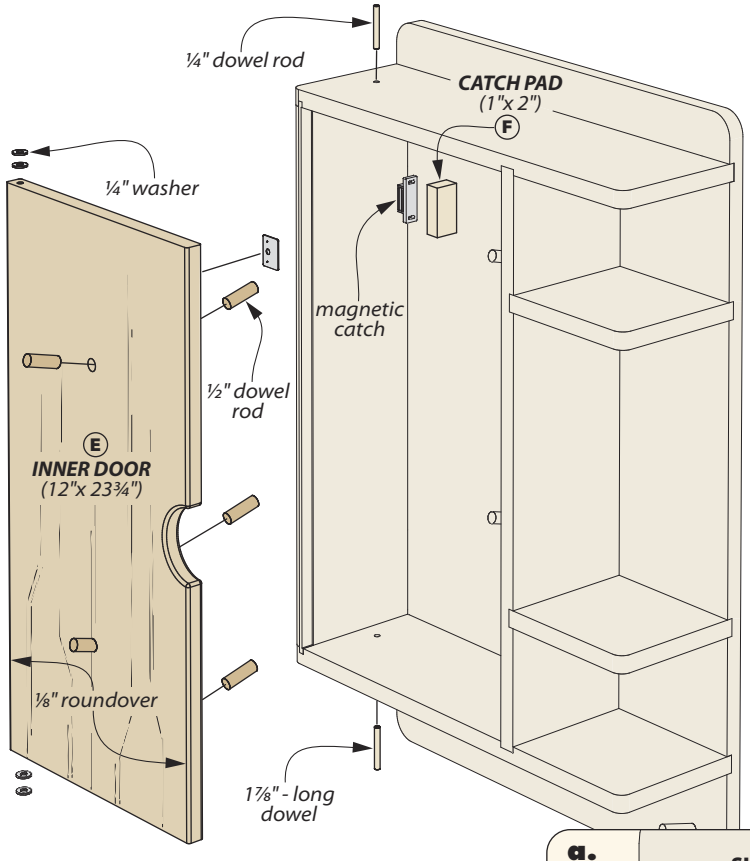
Sticking with the dado blade makes quick work of the dadoes in the top, bottom, and right side. Keep in mind while making the cuts that the dadoes holding the left side will be narrower for the rabbeted ends. Details 'a' and 'e' depict these dadoes.

One piece of joinery remains for the case: a shallow groove for the piano hinge that attaches the outer door (detail 'd'). Since this is a stopped groove, I routed it as shown on the previous page. Lastly, this is a good time to drill the holes in the top and bottom pieces for the dowels that will hold the inner door (detail 'e').

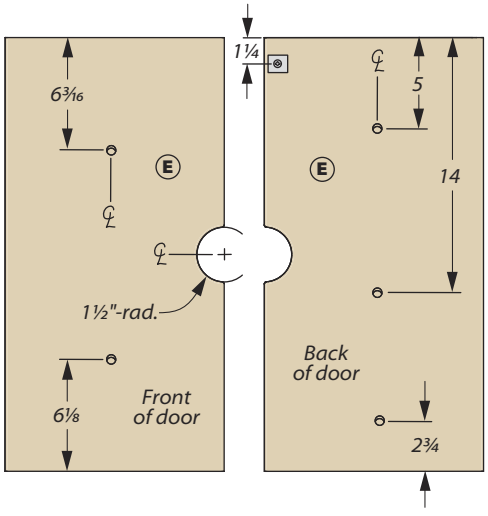
ROUNDING IT OUT. As with the back, there are roundovers on the case parts. Looking to the main illustration above, you can see that some of hard edges and corners will be eased. I started on the left, taking the left case side over to the router table. Using a roundover bit, one pass down the length of the board did the job (shown in detail 'd').

Next came the corners of the top, bottom, and two shelves. I did these in the same manner as the back's corners — starting at the band saw and finishing the radii on the edge sander.

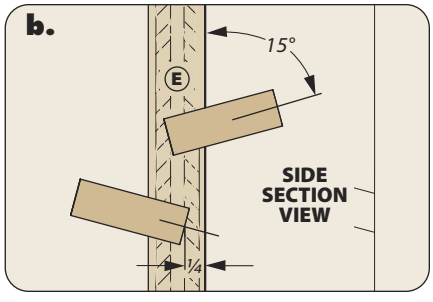
ASSEMBLY. The last step in building the case is to attach it to the back. Detail 'b' above should give you some idea of how the top, bottom, and sides fit in place. I glued the top in first, then secured it with screws. I then glued in the right and left sides, securing them with screws as well. The bottom follows next, done in the same manner as the top. Finally, I glued the side shelves into the right side and back.

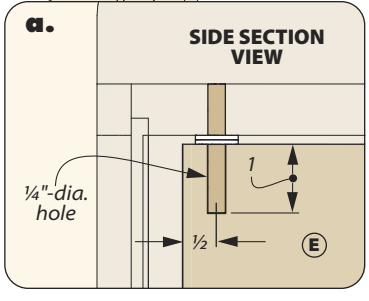


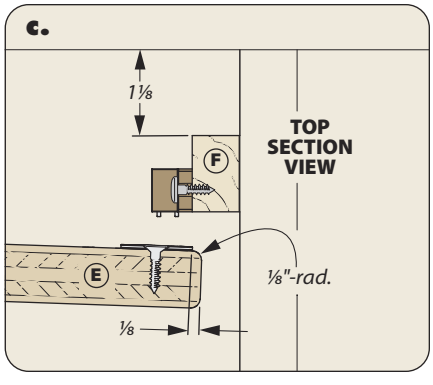
NOTE: *The inner door is made from ¾" Baltic birch plywood. The catch pad is cut down to ⅝" from ¾" Baltic birch plywood*

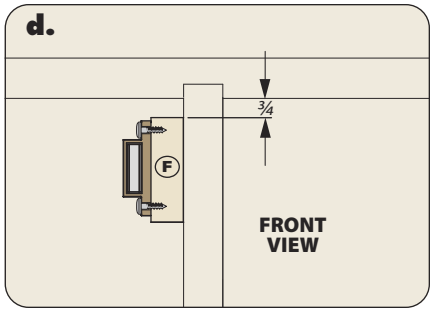


NOTE: *The ¼" dowels are oversized and trimmed flush after installing inner door*









A Duo of **Doors**

Though most of the case has been made, there are still two important parts left: the inner and outer doors. Not only do they enclose the case, but they also offer a significant amount of storage for blades, shims, and the various inserts you use.

INNER DOOR. I started with the inner door. After sizing the piece, I used a compass to lay out the shape of the notch (shown in the main illustration above). I took the door to the band saw to rough out the shape, cutting a little shy of my layout line. At the spindle sander, I removed the last bits of waste to reach the final shape of the cutout.

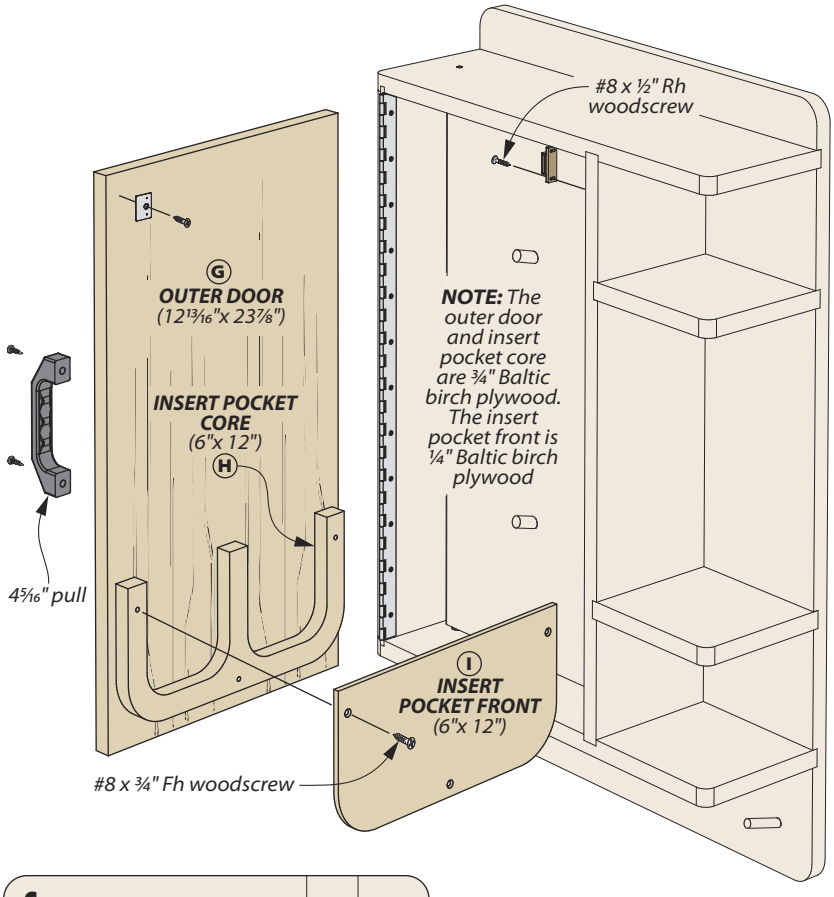
DRILLING FOR DOWELS. Next up is a bit of drilling. The inner door features sizeable dowel hangers for holding a number of table saw blades. I used the same mitered block here to guide my drill as I did with the back piece.

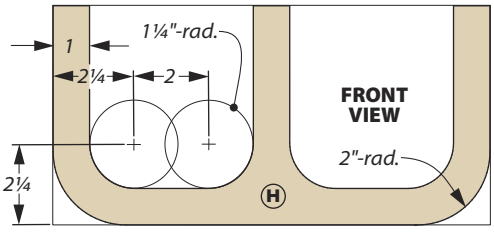
While this technique works well enough for the dowel hangers, I wanted more precision when it came to the holes that the door will pivot on. To make sure they'd be perfectly aligned, I made a guide block of the same thickness as the door, then took it over to the drill press. After drilling through it, I could then use it to make sure my hand drill stayed perpendicular to the door.

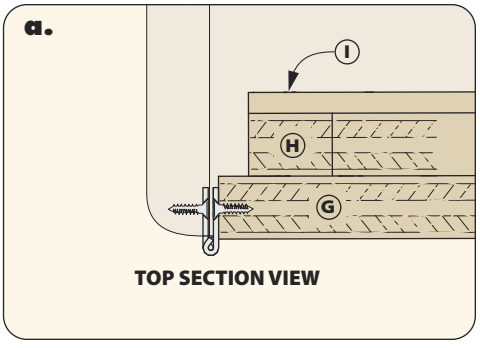
CATCH PAD. The catch pad is a simple block of plywood for the magnetic catch to be mounted on. Once you've cut it to size, set it aside for now. We'll get back to it in just a moment.

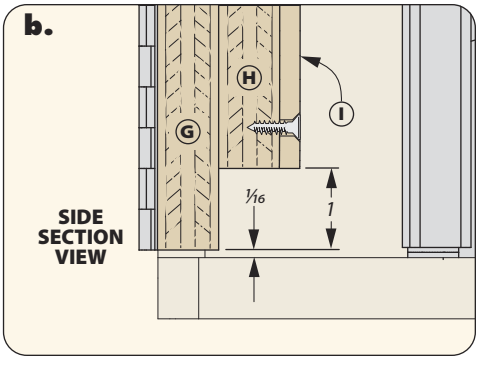
INSTALLING THE INNER DOOR. We're nearly ready to put the inner door in place. First though there's a roundover on the edges of the inner door. After a trip to the router table, you'll be ready for installation.

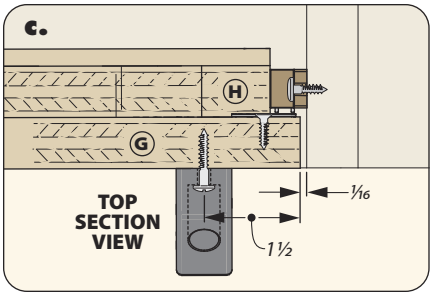
Start by pressing the dowels slightly through the top and bottom. Slip the washers over the ends of the dowels and add a bit of glue on the ends.











Set the door in place and sink the dowels in fully. Leave the ends of the dowels proud so they can be trimmed flush to the case. Finally, glue the catch pad onto its spot.

OUTER DOOR

As you can see in the art above, the outer door itself couldn't be simpler — just aim for a 1/16" gap between the case and door. After sizing, turn you attention to the insert pocket pieces. While we do provide dimensions, I'd encourage you to use them as guidelines, then adjust the size as needed to fit your own inserts.

INSERT POCKET. Once the pocket pieces are sized, lay out the outer radii on both pieces. When laying out the "pockets" of the core piece, use your inserts as templates. The outside radii were easiest to make on the band saw. Then I cleaned them up with a flush trim bit.

When it comes to the "pockets" themselves, I started on the drill press. A large Forstner bit (or a hole saw) is a great way to establish the corners of the pockets. From there, I returned once again to the band saw and followed my layout lines to the holes. After routing off the blade marks, screw the pocket pieces onto the center of the door.

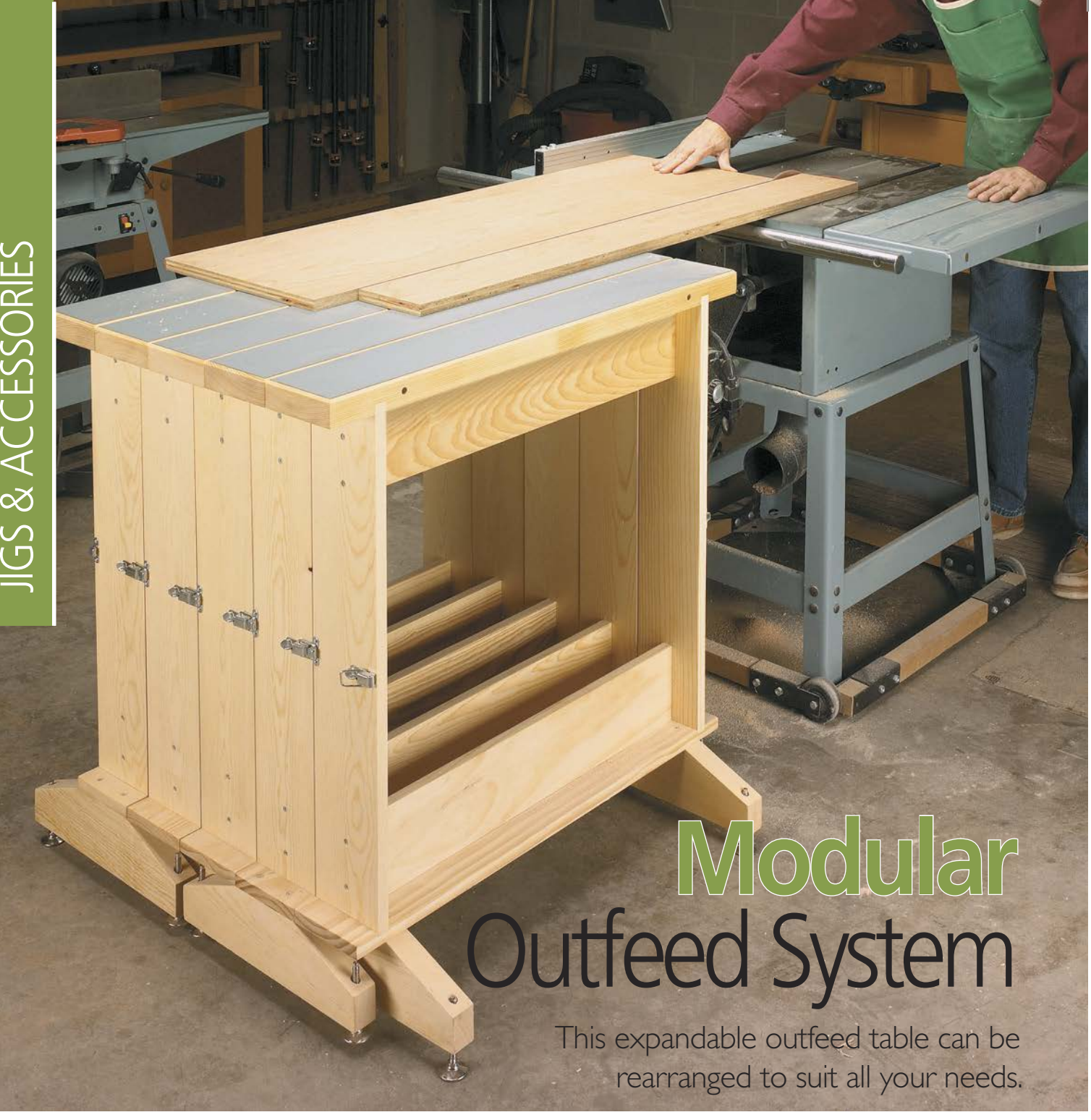
The rest is mostly a matter of drilling and screwing. The pocket core is glued in place, then countersunk screws attach the front. The magnetic catches can be screwed on, then the outer door can be attached with the piano hinge. Finally, add the pull to complete your new table saw companion.

MATERIALS & SUPPLIES

A	Back (1)	¾ ply. - 21 x 32 1/2
B	Case Top/Bottom (2)	¾ ply. - 6¼ x 21
C	Case Sides (2)	¾ ply. - 6 x 24½
D	Side Shelves (2)	¾ ply. - 6¼ x 6¾
E	Inner Door (1)	¾ ply. - 12 x 23¾
F	Catch Pad (1)	⅝ ply. - 1 x 2
G	Outer Door (1)	¾ ply. - 12 13/16 x 23⅞
H	Insert Pocket Core (1)	¾ ply. - 6 x 12
I	Insert Pocket Front (1)	¼ ply. - 6 x 12

- (1) ¼"-dia. x 12" Dowel
- (1) ⅜"-dia. x 24" Dowel
- (1) ½"-dia. x 12" Dowel
- (9) #8 x 1½" Fh Woodscrews
- (1) 36" Piano Hinge
- (1) 4 5/16" Plastic Pull
- (2) Magnetic Latches

NEEDED: *One 60" x 60" sheet of ¾" Baltic birch plywood and one 12" x 12" sheet of ¼" Baltic birch plywood*



Modular Outfeed System

This expandable outfeed table can be rearranged to suit all your needs.

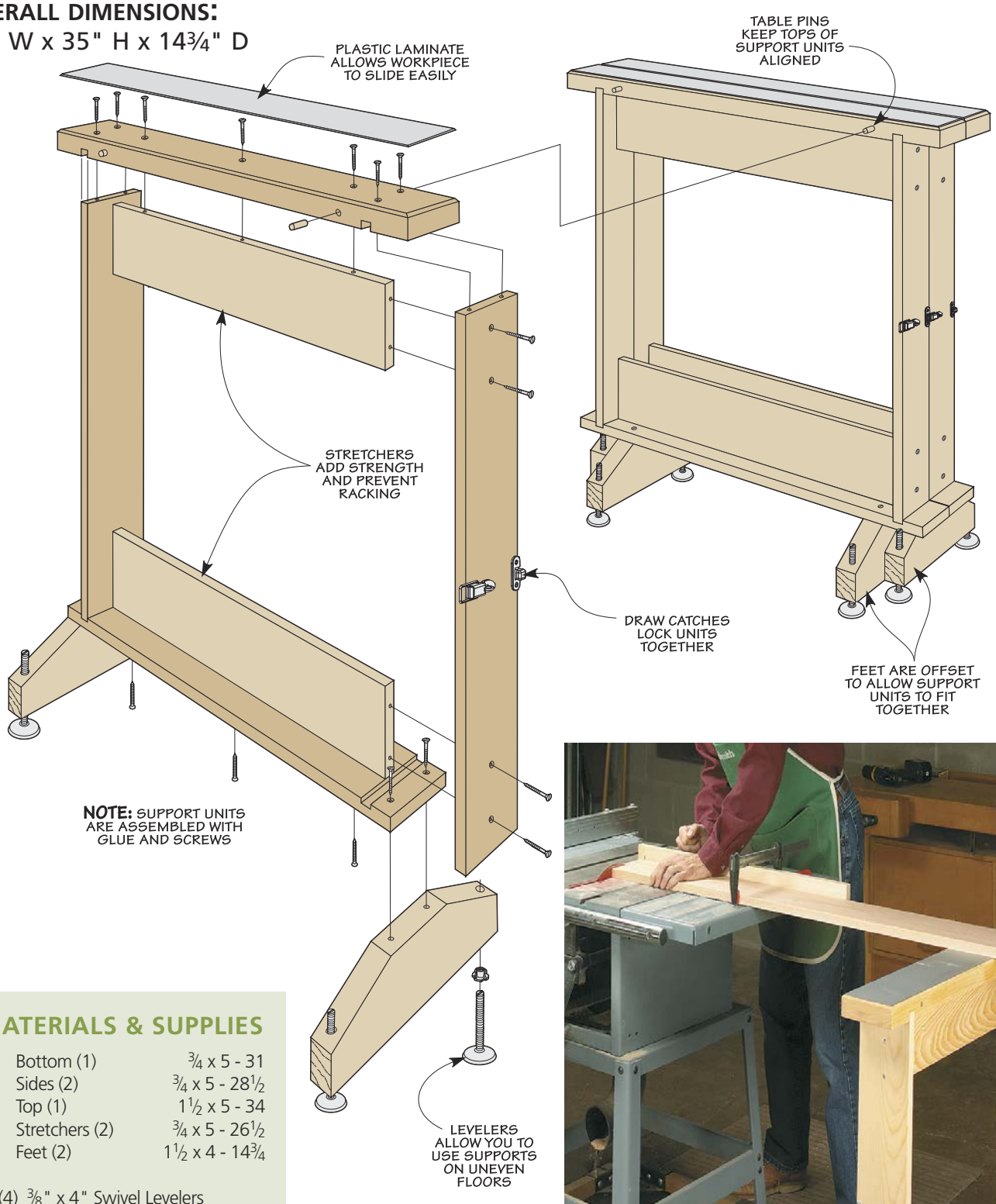
I've always been envious of woodworkers who have outfeed supports the size of aircraft carriers. It makes cutting long boards a lot easier, not to mention full sheets of plywood. But the reality is that a lot of us simply don't have that much space in our shops. That's why we came up with the project shown here.

OUTFEED SYSTEM. Instead of building a single, large outfeed table, I created an outfeed system made up of five separate outfeed supports. You can gang the supports together to create one large table, like you see in the photo above. Or you can separate the units and strategically place them around your table saw to give you support exactly where you need it. (See the photo on page 19.) What's great about this system is that it gives you large-scale capabilities without forcing you to permanently give up valuable floor space in your shop.

MODULAR. Although we built five separate units, the modular design of these outfeed supports is such that you can build as few or as many as you want. (A single support makes a great outrigger for crosscutting long workpieces, see photo on opposite page.) The feet are staggered in position to allow the individual units to nest together. And catches on the sides of the supports hold them all together.

Construction Details

OVERALL DIMENSIONS:
34" W x 35" H x 14¾" D



MATERIALS & SUPPLIES

A	Bottom (1)	¾ x 5 - 31
B	Sides (2)	¾ x 5 - 28½
C	Top (1)	1½ x 5 - 34
D	Stretchers (2)	¾ x 5 - 26½
E	Feet (2)	1½ x 4 - 14¾

- (4) ⅜" x 4" Swivel Levelers
- (4) ⅜" T-Nuts
- (1) Plastic Laminate (5" x 34")
- (22) #8 x 2" Fh Woodscrews
- (2) ⅜"-dia. Wood Table Pins
- (1 pr.) 2¾" Draw Catches

Single. The modular design of the outfeed table allows you to separate the individual units and use them alone.

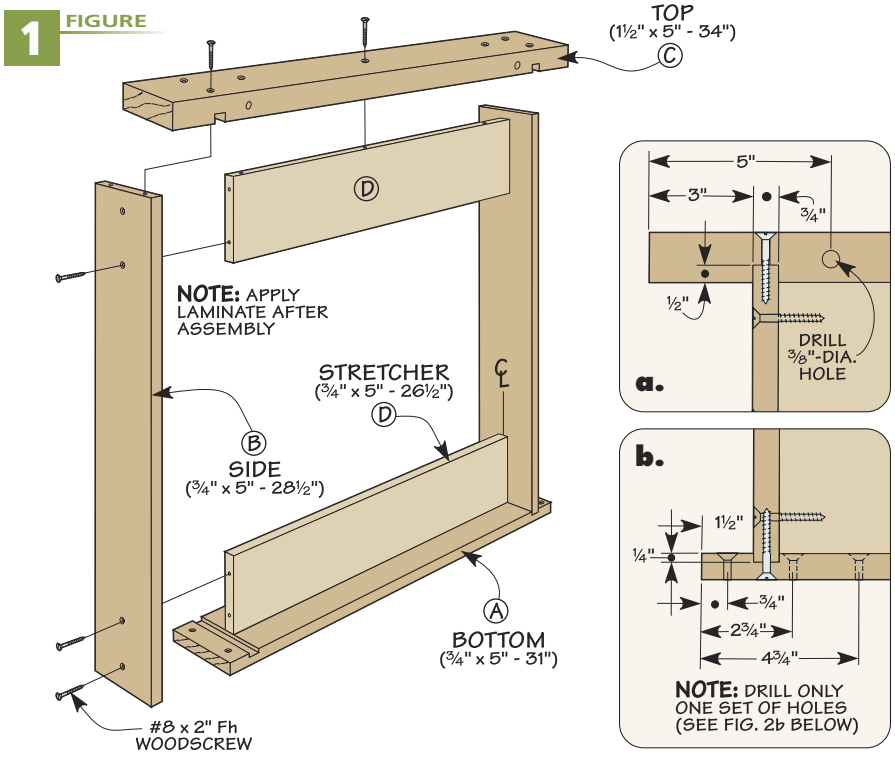


Staggered Feet. To allow the supports to nestle against each other, the feet on each support are located in different positions.

Support Unit

As I mentioned earlier, the outfeed table is made up of five separate support units. With the exception of the positions of the feet, these units are all identical. So it makes sense as you are building them to cut out the parts for all five units and work in a "production-style" method, repeating the procedure for each one.

FRAME. As you can see in Figure 1, the main body of the support unit is simply a wood frame. To make this frame, start by cutting the bottom and sides to size from ¾"-thick stock and the top from 1½"-thick stock. (I used yellow pine.) The dimensions for these pieces are shown in Figure 1.



After you have the pieces cut to size, you can start on the joinery. Although glue and screws are used to hold the pieces together, the side pieces fit into dadoes in the top and bottom. This helps keep everything aligned. I made these using a dado blade on the table saw. Cut the dadoes on the bottom piece first, positioning them according to the dimensions shown in Figure 1b.

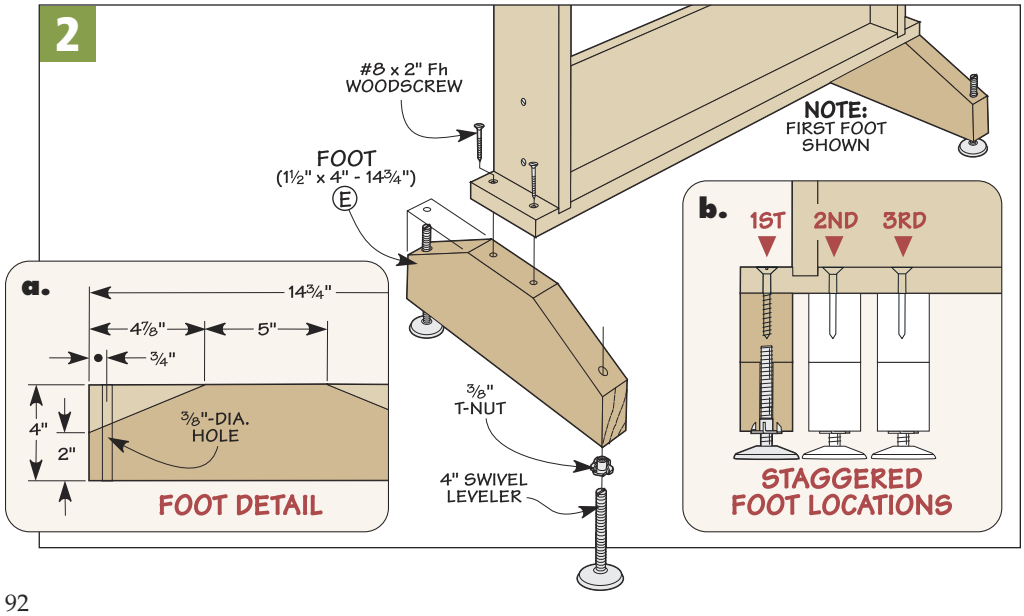
The dadoes in the top piece need to line up with the dadoes in the bottom piece. When you're laying out the dadoes on the underside of the top, you'll need to pay attention to the spacing between the dadoes, rather than the spacing from the dadoes to the ends of the workpiece (Figure 1).

After you've cut all the dadoes, you need to drill a few holes in both the top and the bottom pieces before you can assemble the frame.

To start with, I drilled two pairs of countersunk holes in each bottom piece for the feet that will be added later. There's just one thing to be aware of here. In order to allow the support units to nest together, the feet are staggered on each unit. There are three different locations for drilling the holes, as in Figure 2b. (If you're making five support units, you'll need to make two units with the feet in the first position, two with the feet in the second position, and one with the feet in the third position.)

For the top piece, you just need to drill a couple of holes on each edge of the piece for some alignment pins that will be added later (see Figure 1a).

ASSEMBLY. Once you have all the holes drilled, you

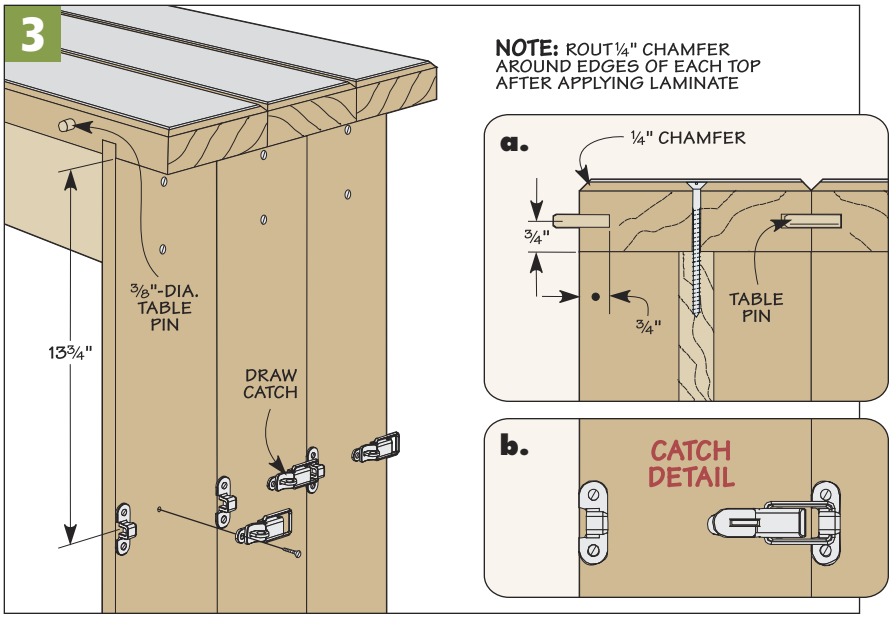


can assemble the pieces by simply gluing and screwing them together.

STRETCHERS. To help strengthen the frames, I added a couple of stretchers — one at the top and one at the bottom. These stretchers are just cut to length to fit in between the sides and are then glued and screwed in place, as shown in Figure 1.

LAMINATE. To help reduce friction on the top of the outfeed support, I added a smooth piece of plastic laminate to the top. After gluing the laminate down and trimming it flush with the edges, I routed a chamfer around the top (Figures 3 and 3a).

FEET. There's not much to making the feet. Each foot starts its life as a 1½"-thick blank. After drilling a couple of holes near the ends of the blanks to accept the levelers, the top of each foot is cut to a taper on the band saw, then sanded smooth at the edge sander. The goal here is to leave a 5"-wide flat spot on top of each foot on which to mount the frame (as in Figure 2a).



HARDWARE. Before attaching the feet, you can install the T-nuts and levelers as shown in Figure 2. Then the feet are just screwed to the frame (Figure 2b).

To help hold the support units together when you are using them as a single outfeed table, I added a draw catch to each side, as you see in Figure 3. Then, finally, to help keep the support units aligned, I glued some wooden table leaf alignment pins into the holes in one edge of each top.



Sheet Goods. By strategically placing the outfeed supports around your table saw, you can cut large sheets of plywood or MDF with relative ease.



Storage. When you're through using the outfeed table, you can fold it up for compact, space-saving storage.

Outfeed Table

With this outfeed table attached to your table saw, you'll be able to cut full sheets of plywood and long pieces of lumber with ease.

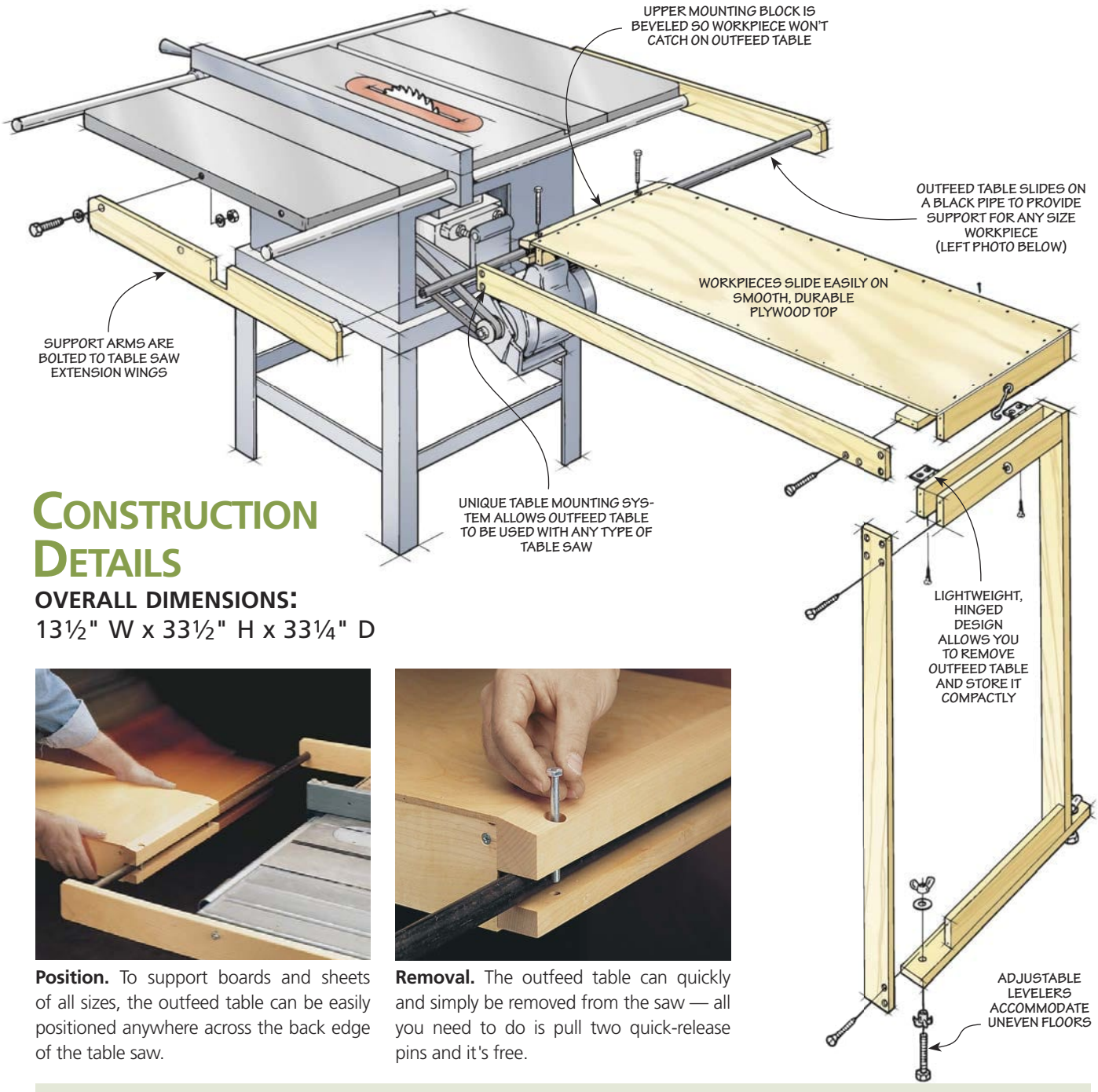
An outfeed table attached to the back of your table saw is like having a second pair of hands in the shop. This outfeed table is designed to "catch" a full-size sheet of plywood or an extra-long board as you're completing the cut.

SUPPORT. Rather than connecting the table directly to the saw, it rests on a pipe supported by arms bolted to your saw's extension wings. (If the wings don't have pre-drilled holes, you'll need to drill them.)

Supporting the table in this way does a couple of things. First, it allows the table to be mounted on any saw (even older models with a rear-mounted motor, like the one in the photo above). Second, the arms hold the pipe far enough past the back of the saw to give clearance for a rear-mounted motor to pivot when the blade is tilted.

ADJUSTABLE. There's yet another benefit to mounting the outfeed table this way. It can be positioned anywhere across the back edge of the saw — for any size piece of lumber, as you see in the left photo on the opposite page. To reposition the table, just lift up on the legs and slide it across the pipe.

STORAGE. When not in use, the outfeed table can be removed from the saw by pulling a pair of pins (right photo on opposite page). Also, as you'll see in the inset photo above, the legs attach to the top with hinges, so it can be folded up for compact storage.



Construction Details

OVERALL DIMENSIONS:
13½" W x 33½" H x 33¼" D

Position. To support boards and sheets of all sizes, the outfeed table can be easily positioned anywhere across the back edge of the table saw.

Removal. The outfeed table can quickly and simply be removed from the saw — all you need to do is pull two quick-release pins and it's free.

MATERIALS & SUPPLIES

A	Sides (2)	¾ x 3 - 33¼
B	Front/Back (2)	¾ x 3 - 12
C	Hinge Support (1)	¾ x 3 - 12
D	Top (1)	13½ x 33¼ - ¼ Ply.
E	Legs (2)	¾ x 3 - 29½
F	Rails (3)	¾ x 3 - 12
G	Base (1)	¾ x 3 - 20
H	Support Arms (2)	¾ x 3 - 28
I	Upper Mnt. Block (1)	1½ x 1⅜ - 13½
J	Lower Mnt. Block (1)	¾ x 1⅜ - 13½

- (32) #8 x 1½" Fh Woodscrews
- (1 oz.) ¾" x #18 Wire Brads
- (2) 5/16" T-Nuts
- (2) 5/16" x 2" Hex Bolts
- (2) 5/16" Flat Washers
- (2) 5/16" Wing Nuts
- (1 pr.) 2" x 2" Butt Hinges w/Screws
- (1) 3" Hook & Eye
- (2) ¼" x 3" Hex Bolts
- (1) ½"-dia. x 48" (rgh.) Black Iron Pipe

ALSO NEEDED:
Mounting hardware to attach arms to table saw

Building & Mounting

The outfeed table has two main assemblies: a large, smooth top and an open-framed leg assembly, as you can see in Figure 1. They're connected by hinges to form an "L."

TOP

The top is nothing more than a four-sided frame made up of two sides, a front, and a back, as illustrated in Figure 2. (I used ¾"-thick hard maple.) The sides are simply butted up against the front and back and screwed together.

To provide a surface to screw the hinge into later, I added a hinge support between the sides of the frame, as in Figure 2. With the frame complete, all that's left is to cut a plywood top to fit.

LEG ASSEMBLY & BASE

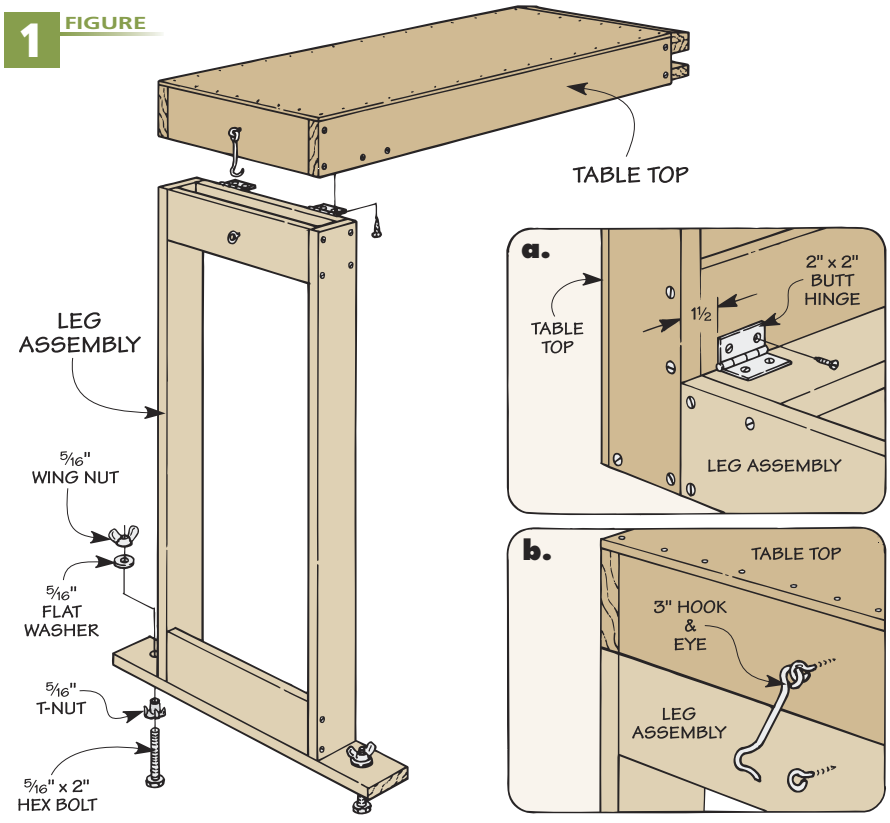
Now you're ready for the leg assembly. This is built much like the top, except it's left open and has an oversize base, as you can see in Figure 3.

To determine the length of the legs, measure from the top of your table saw to the floor. Subtract 5" to allow for the table and levelers. And to prevent racking, there are rails that fit between the sides: two at the top, and one at the bottom.

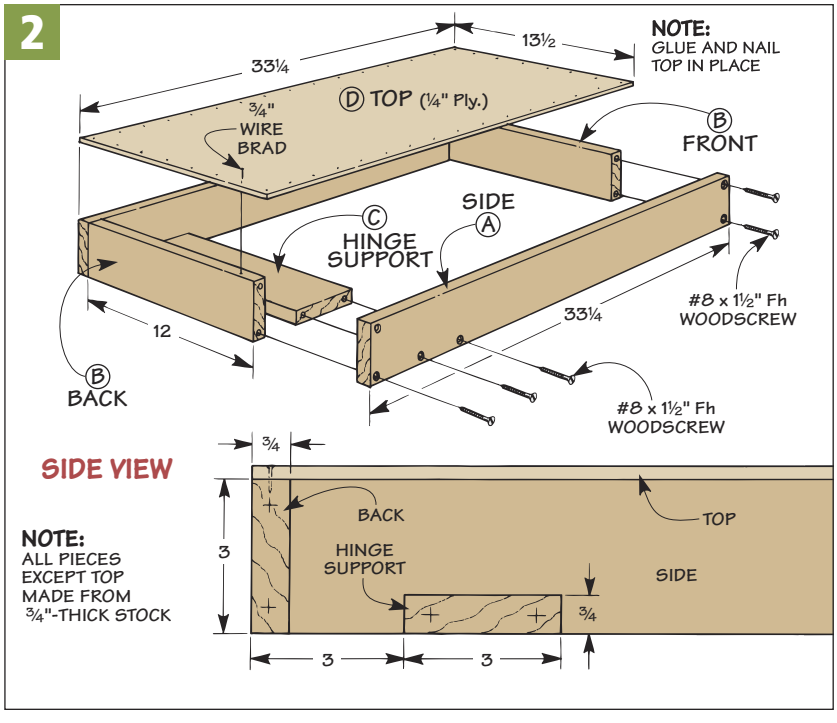
Once you've screwed the frame together, the next step is to add the base. It extends past the sides to provide a stable foundation and allows clearance for two simple levelers, as in Figure 3a.

With the leg assembly complete, you can now attach it to the top using a pair of 2" butt hinges (Figure 1a). Then, to "lock" the table to the leg assembly in position while the table's in use, install a screw hook and eye, as shown in Figure 1b above.

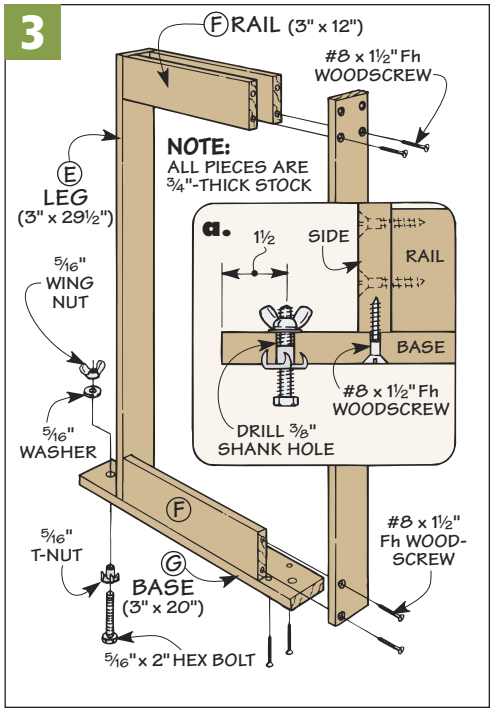
1 FIGURE



2



3

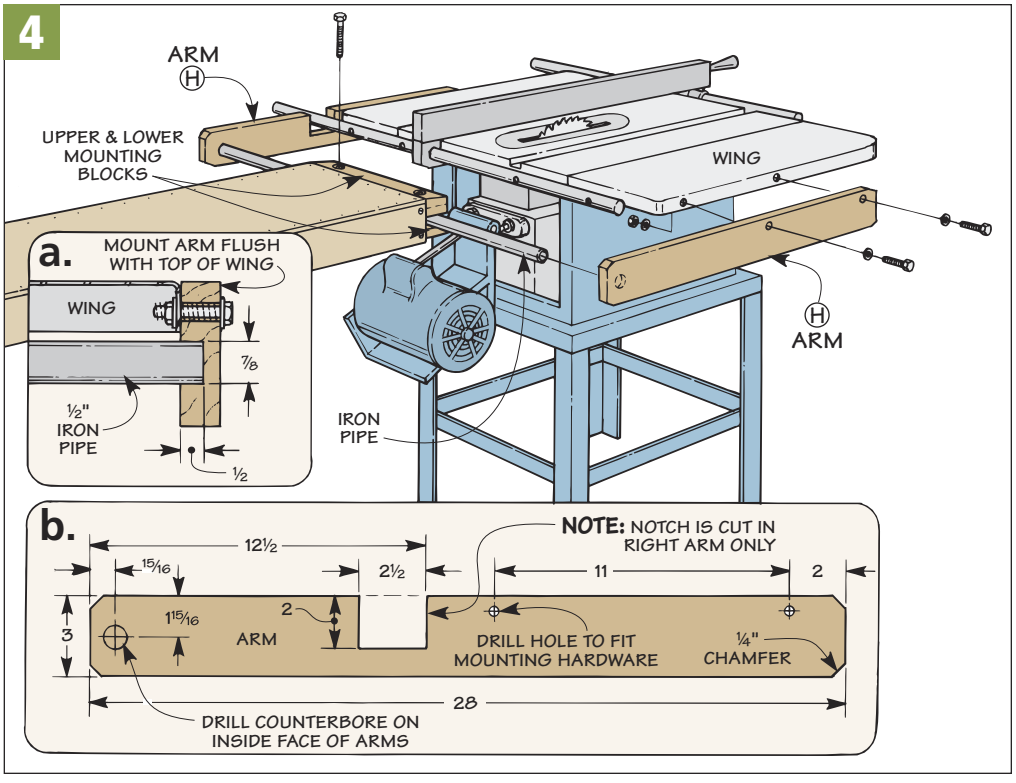


ATTACHING THE TABLE

With the "body" of the table done, you can move on to the mounting assembly. The assembly consists of an iron pipe, a pair of support arms, and two mounting blocks.

The support arms are designed to bolt to the wings. Figure 4b shows how one arm has a notch cut near the middle so it can fit around the fence rail. And there's a counterbored hole for the pipe on the inside face of each arm, as detailed in Figure 4a.

When the arms are complete, you can mount them to your saw (with the pipe cut to fit between them). Note: If you have to drill holes in the wings, clamp the arms in place, and drill through both. Then, as you mount the arms, be sure they're flush with the top and ends of the wings.



MOUNTING BLOCKS

The next thing you need to do is to provide a way for the outfeed table to "grip" the pipe, but still allow it to slide. I added a set of mounting blocks to the front of the top, as in Figure 5 below.

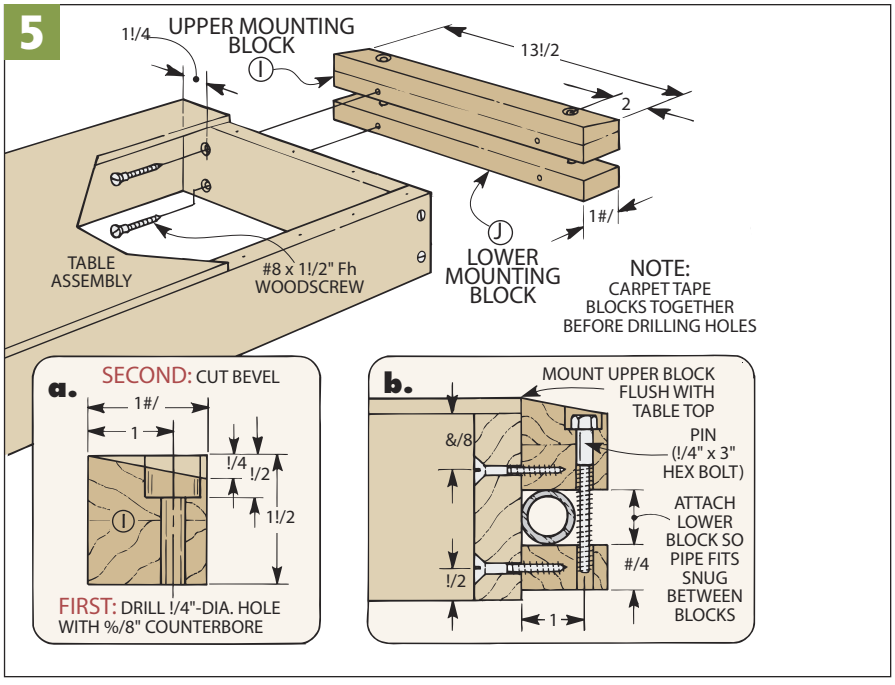
These two mounting blocks are attached to the tabletop to form a "channel" for the pipe. They are both made from ¾"-thick stock, but the upper block consists of two pieces glued together.

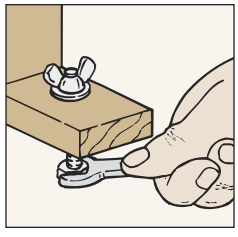
After the blanks are cut to size, drill two counterbored holes for the two ¼" pins (hex bolts) that will "lock" the table to the pipe, as shown in Figure 5a. To ensure the shank holes in each block align, carpet tape the blanks together before drilling the holes.

Once the holes have been drilled, you can separate the two pieces and cut a bevel on the upper mounting block. This is demonstrated in Figure 5b at left. Doing this prevents a workpiece from catching on the top as it comes off the saw.

With the mounting blocks complete, all that's left to do is screw them in place, as you can see in Figure 5b. The top edge of the upper mounting block is flush with the top of the outfeed table (so your workpiece won't catch). The lower block is positioned so that the pipe is sandwiched between the two blocks.

After you have pinned the outfeed table to the pipe, adjust the levelers so your tabletop is level with the saw table (this is explained in the right margin). Once that's complete, you can get to work using your saw.





Levelers. A pair of simple shop-made levelers allow you to compensate for an uneven floor.

Table Saw Handbook Vol. 2 **Sources**

MAIL ORDER SOURCES

Amana Tools
631-752-1300
amanatool.com

Amazon
amazon.com

Lee Valley
800-871-8158
leevalley.com

Lehigh Valley Abrasives
616-228-0650
lehighvalleyabrasives.com

McMaster-Carr
mcmaster.com

Rockler
rockler.com

The Rust Store
877-256-9301
theruststore.com

U.S. Plastic Corp.
800-809-4217
usplastic.com

Most supplies you'll need for projects in this book are available at hardware stores or home centers. For specific products, take a look at the sources listed here.

TABLE SAW MAINTENANCE (P. 32)

- **Rockler**
  GlideCote 97594
- **Lee Valley**
  2" Carbide Scraper 97K5101
- **Lehigh Valley Abrasives**
  Strip Disc *LVACS45CRST*
- **The Rust Store**
  Sandflex Blocks. *SF3PACK*
- **Amazon**
  Dry Lubricant. *B0BWNV9X9F*

DADOES, RABBETS, & GROOVES (P. 38)

- **Amana Tool**
  1/4" Grooving Blade 61368

RAISED PANEL JIG (P. 68)

- **Rockler**
  Miter Slot Kit. 63726
- **U.S. Plastic Corp.**
  3/16" Polycarbonate 43049

SAW SLED DUO (P. 70)

Although I've provided the commercial miter bars I used below, any commercial miter bar (or even plain steel bar stock or hardwood) will work fine, as long as they fit the dimensions of your miter slots.

- **Lee Valley**
  3' x 1/4" T-track. *12K7924*
  5/16"-18 Star Knobs *00M7001*
  T-track Hold-Downs. *13K1012*
  25 1/2" Miter Bar. *86N7045*
  18" Miter Bar. *86N7040*
- **Rockler**
  5/16"-18 x 2 1/2" T-bolt 39532

TENONING JIG (P. 76)

The tenoning jig uses a compression spring that you can usually find at a hardware store. *McMaster-Carr* also carries them (9657K121), as well as the plastic wing nuts (94924A600 and 94924A700) you'll need to complete the jig.

TABLE SAW CABINET (P. 84)

For a sleek sheen and a tough exterior, I sprayed the table saw cabinet with a couple of coats of lacquer.

- **McMaster-Carr**
  4 5/16" Plastic Pull. *1661A4*
  Magnetic Latch *1672A15*
  Piano Hinge. *1608A43*

MODULAR OUTFEED SYSTEM (P. 90)

There isn't much hardware required to build the table saw outfeed system. All you'll need is a set of levelers and draw catches, some T-nuts, and a few table pins. We ordered the 4"-long levelers from *McMaster-Carr* (62805K37) and picked up the draw catches at a local hardware store. Finally, we ordered the table pins (21253) from *Rockler*.



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- √ LOOSE TENON AND COPE-AND-STICK JOINERY
- √ SPLINE MITER JIGS FOR BOTH FRAME MITERS AND BOX/CASE MITERS
- √ HOW TO ROUT DADOES ACCURATELY ON LONG WORKPIECES
- √ BOX JOINTS THREE WAYS: USING A COMMERCIAL JIG, A SIMPLE SHOP-MADE JIG, AND AN ADJUSTABLE FINGER JIG
- √ USING BOX-SLOTTING BITS FOR CUTTING CLEAN SLOTS FOR BOX BOTTOMS
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Phil is a woodworker, Editor for Woodsmith Magazine, and host of the Woodsmith Shop TV show. He has been a wooworker for over 30 years, starting in his fathers shop. Phil enjoys making Christmas and gift projects for friends and family (usually starting in July). He specializes in wall cabinets, tables, boxes and doors. In addition, he teaches woodworking courses in the Des Moines IA area.

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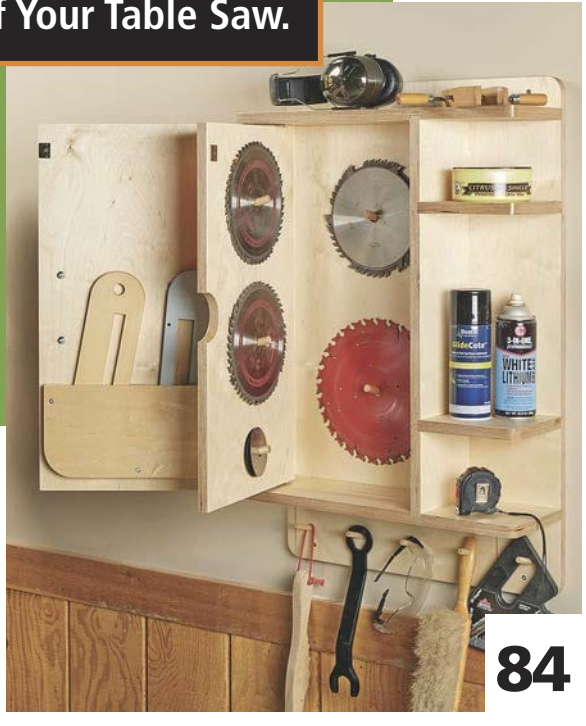
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Tips, Tricks, Techniques & Projects to make the Most of Your Table Saw.



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