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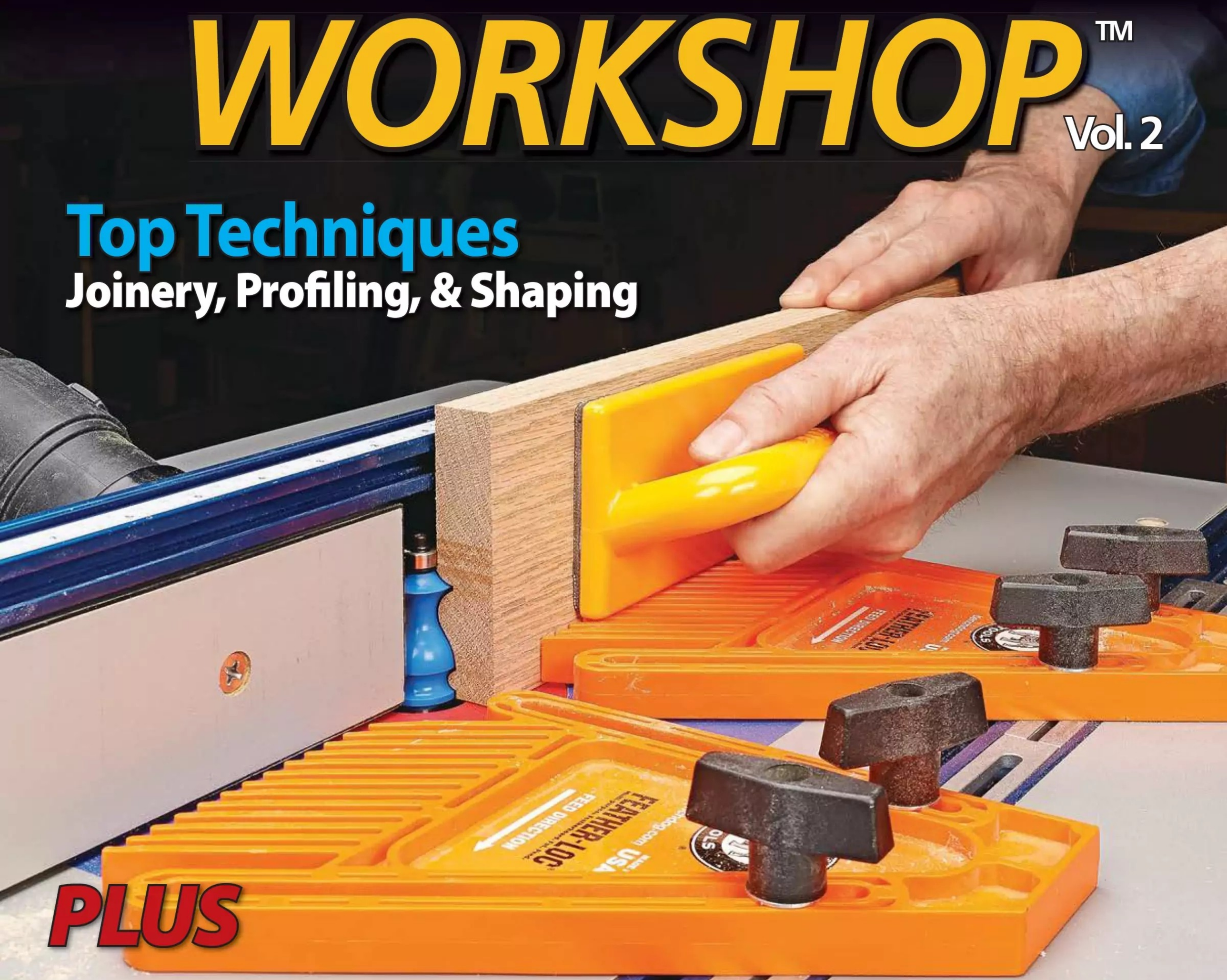
OVER 35 Tips & Tricks

Router Table WORKSHOP™ Vol. 2

Top Techniques
Joinery, Profiling, & Shaping



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Router Table **Workshop** Vol 2

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HOME GROUP
ACTIVE INTEREST MEDIA

Router Table Workshop Volume 2 is published by the Home Group of Active Interest Media Holdco, Inc., 2143 Grand Ave., Des Moines, IA 50312. Canada Post Agreement 40038201. Canada BN 84597 5473 RT.

For subscription information about Woodsmith, visit us online at:

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A Supplement to Active Interest Media Publications
2143 Grand Ave., Des Moines, IA 50312
Printed in U.S.A.

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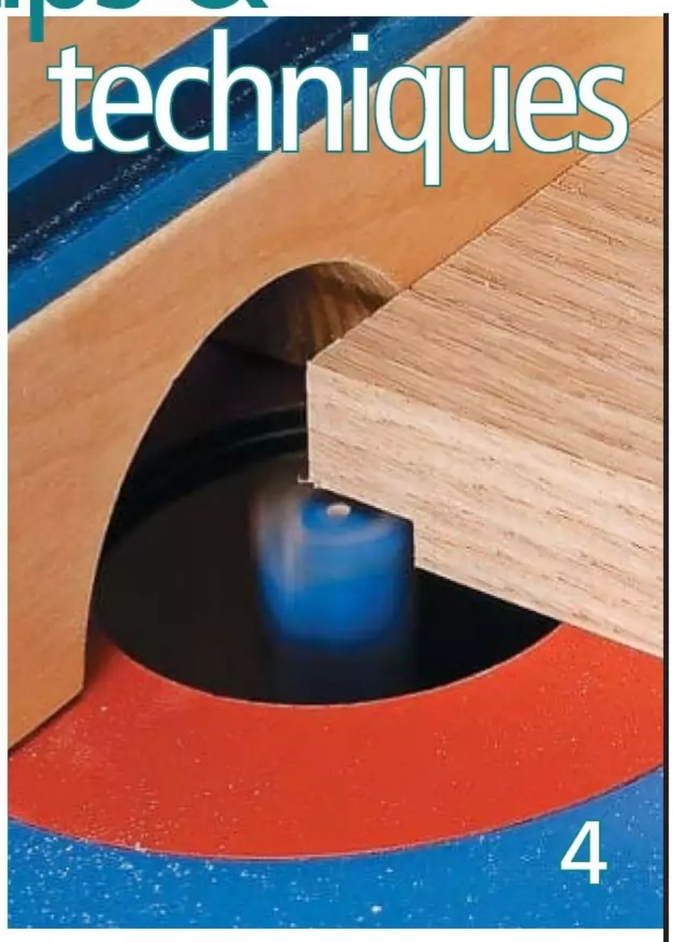
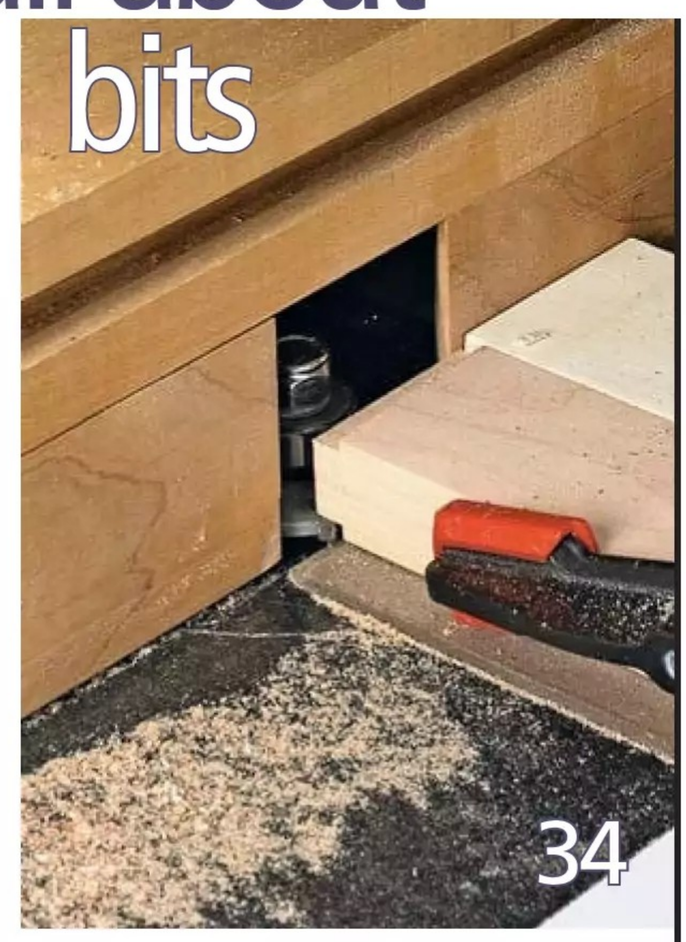
tips & techniques



all about bits



router table upgrades

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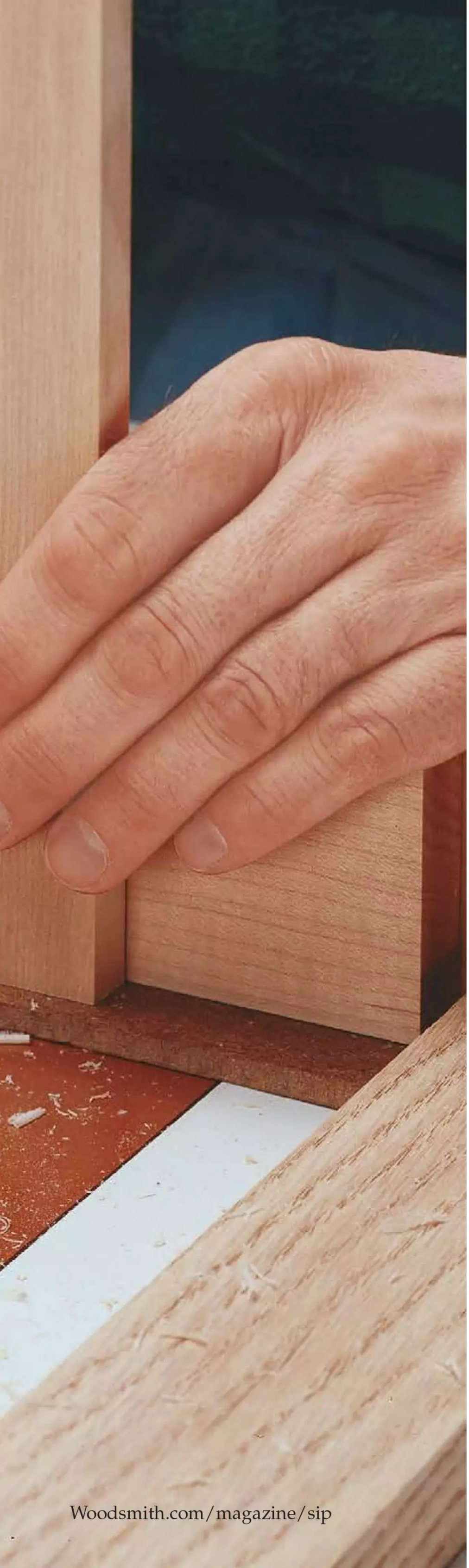


Tips & Techniques

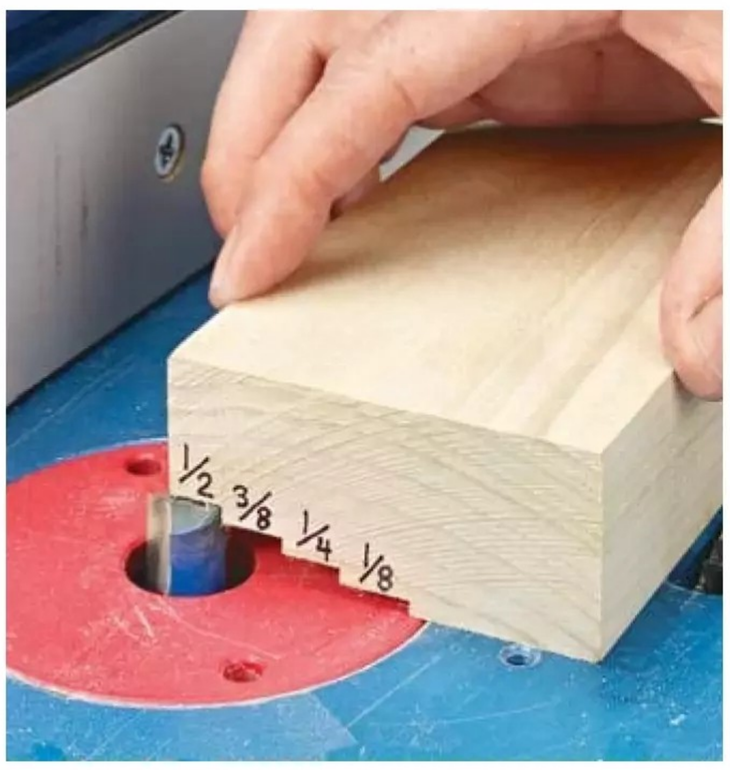
In the shop, knowledge is often your best tool. In this section, we'll explore the top tips and techniques for working with a router table. You'll find the basics of setting up your bit and fence as well as how to deal with complex tasks like routing circles and joinery.

5 Time-saving Tips

The router table is one of my favorite tools in the shop, mainly due to its sheer versatility. Whether I need to shape decorative profiles on project parts or form complex joinery on pieces, it's always up to the task.

Of course, all that versatility does come with one drawback: I often find that I spend more time fussing with setups — making bit changes, setting the bit height, adjusting the speed controls and fence settings, etc. — than I do actually routing my workpieces.

While some of this work, such as switching bits for different profiles, is inevitable, there are a number of things that you can do to speed up the setup process. Here are a handful of the time-saving tips and tricks I've come up with through the years. They've helped my process and techniques become more efficient, as well as accurate, when working at the router table.



Stepped Depth. This stepped gauge helps quickly set the bit height for different depths of dadoes, grooves, or rabbets.

1 Profile Setup Blocks

A lot of my work at the router table involves routing decorative profiles on parts — roundovers, chamfers, ogees, and the like. And I often go back to the same profiles over and over again.

To save time in this process, I made some setup blocks. These are just scraps of wood that have common profiles routed on each edge and labeled. With these blocks in hand, you can set both the bit height and the fence in one easy step, as shown in the photo above.

2 Stepped Depth Gauge

One of the biggest headaches that I have with my router table is getting the bit height set just right. Due to the opening in the router table around the bit, there's no good way to get a ruler right up to the bit to measure the height accurately.

To solve that problem, I made a stepped setup gauge. As you can see in the photo at left, it has a series of rabbets routed to the depths of my common cuts. This makes a quick and easy method of setting the bit height. You just place the desired "step" above the bit, and raise the bit until the end just grazes the bottom face of the step.

3 Joinery Helpers

I create a lot of cope and stick door joints and locking miter joints at my router table. These require routing the mating parts with two router bits. As you can

Profile Setups. By keeping a scrap piece with an accurate profile already cut on it (the "sticked" cut of a cope and stick joint), you can make quick work of setting the bit the next time you use it.

Setup Fence. I make cuts on the ends of parts by backing them up with a miter gauge auxiliary fence. If you keep this fence after making a cut, it also makes a handy setup block.

imagine, it can take a lot of trial and error (as well as lots of test cuts) to get a good fit between parts with these bits.

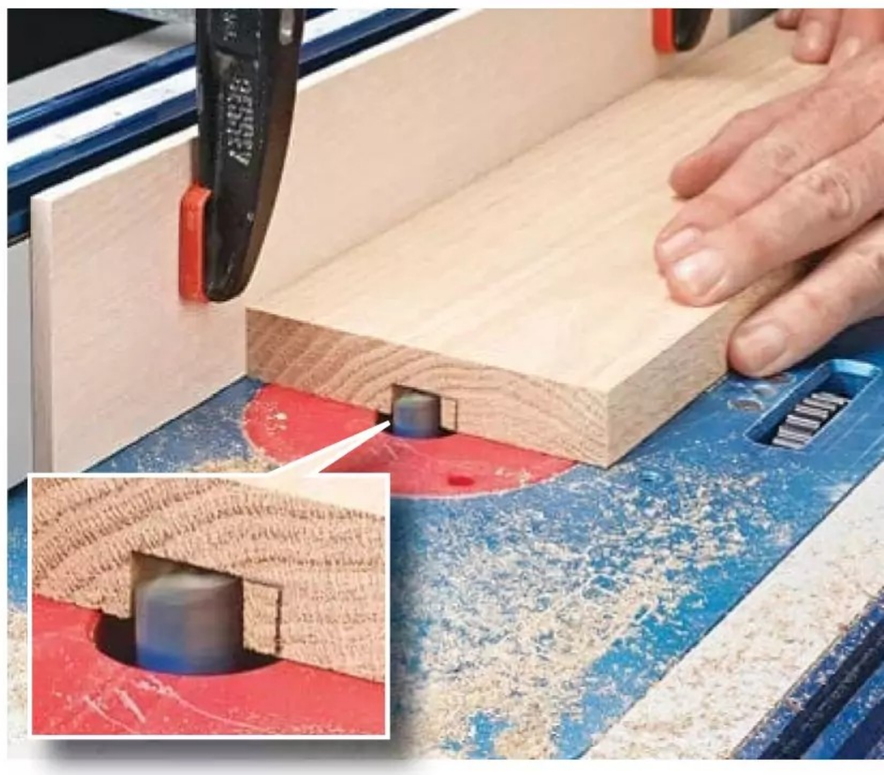
Luckily, the same concept of using setup blocks discussed earlier is also handy here. Once you get the setting of the router bit dialed in just right, rout the profile of the joint on a scrap block. Then label the cut and the thickness of the workpiece on the block, and stash it away with the mating cut in a drawer. (Hold them together with rubber bands.) You'll have an easy setup for the next time you need to make the cut, as shown above left.

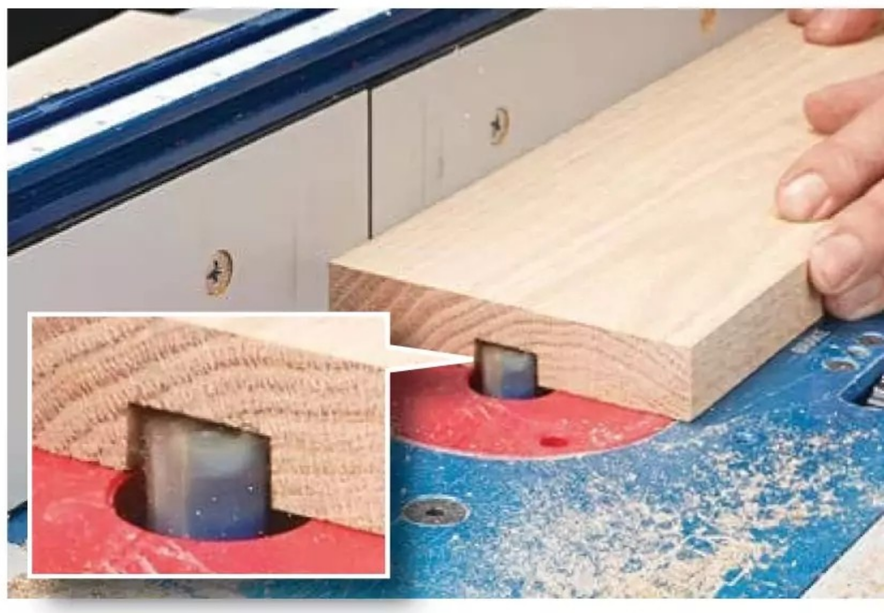
4 Auxiliary Fences

For profile or joinery cuts on the ends of workpieces, I like to use a miter gauge auxiliary fence with adhesive-backed sandpaper to back up the cut and hold the piece perpendicular to the router bit. Another simple trick for these cuts is to cut all the way through the auxiliary fence once you get set up properly, and then label and save it for future cuts. Now you have a handy setup gauge for subsequent cuts that already has predrilled holes for easy installation on your miter gauge (upper right photo).

5 Spacer Blocks

I sometimes like to cut dadoes and grooves on small parts at the router table rather than the table saw because router bits leave a flatter bottom than most dado blades. However, if the dadoes or grooves are not a standard dimension, such as for plywood, this can be challenging. The answer is a spacer planed to the extra width of the dado or notch that is then clamped to the router table fence. The first cut is made with the spacer in place, then it's remove before making the second pass, as shown in the photos below.





Slot Spacers. By using a scrap spacer block clamped against the router table fence, it's easy to form wide dadoes or grooves in two passes — just remove the block.

Auxiliary Switch

Sometimes, the simplest additions to your router table can be the most helpful. And that's the case with an auxiliary switch. If you ever get tired of stooping down to flip on the router motor underneath the table, then this is the accessory for you. The switch mounts to the side of the table to make turning the router off and on super-simple. Plus, it enhances safety at the router table by putting the switch in easy reach if needed.

Plug & Rout. Simply plug the router cord into this auxiliary switch to turn the router off and on without straining your back.

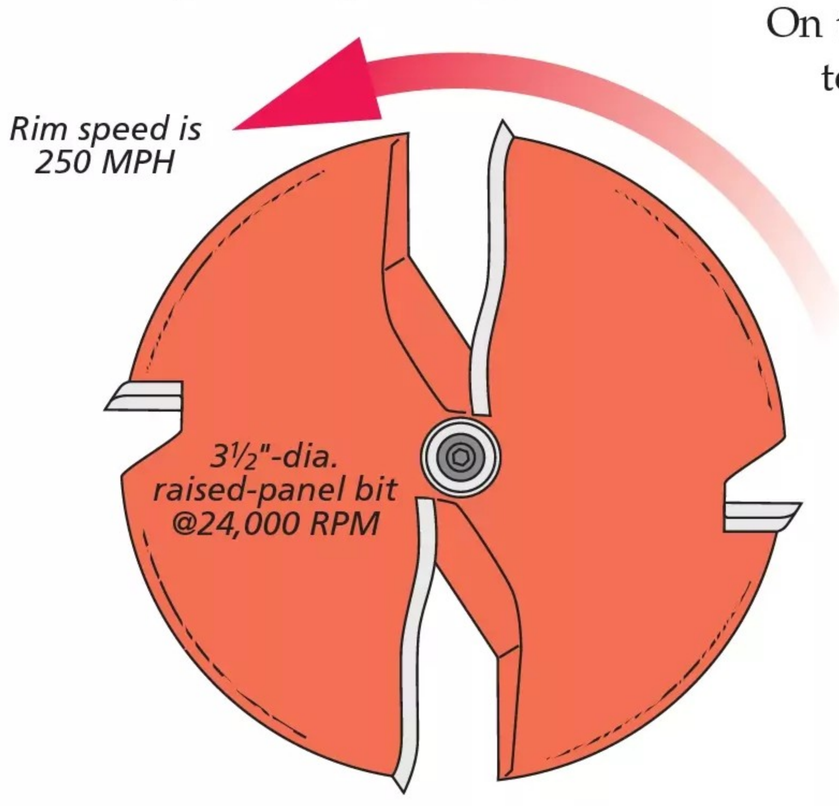
Right Router Speed

As power tools go, routers are uncomplicated. Beyond installing a bit and setting the cutting depth, you're pretty much ready to fire up the router and get to work. But many routers also include a variable-speed function as a feature.

This feature allows you to adjust the bit through a range of speeds, from 24,000 RPM down to around 10,000 RPM. Here's the challenge: How do you know what speed to set for a given task?

There are few rules when it comes to adjusting the speed on a variable-speed router. On one hand, this allows for some flexibility and experimentation when deciding on the right speed. On the other, without some guidelines to go by, it's tough to know when or how much you should adjust the speed. While I usually run the router at full speed, I've found four places where it makes sense to slow down in order to get better results.

BIG BITS. About the only place that you find specific instruction on slowing down a router is when using a large-diameter bit, like the raised-panel bit shown in the photo above. It all has to do with the rim speed of the bit. The drawings below demonstrate that as the diameter increases, the rim speed jumps way up. Higher speeds reduce your



Router Bit Speed Chart

Bit Diameter	Maximum Speed (RPM)
Up to 1"	24,000
1¼" to 2"	18,000
2¼" to 2½"	16,000
3" to 3½"	10,000

Speed Control. Routers with built-in variable speed controls allow you to easily dial in the correct speed (left). Aftermarket speed controllers provide the same features for older or single-speed routers (right).

Burnt Ends. At the beginning and end of a stopped cut, the bit lingers and can lead to burning (right flute). A reduced bit speed can help you avoid it.

ability to control the workpiece. In addition, the router motor is subjected to strain that can lead to damage.

Large diameter bits usually include a speed range (or upper limit) for setting your router. If you don't have that information, you can often find it on the website of the router bit manufacturer.

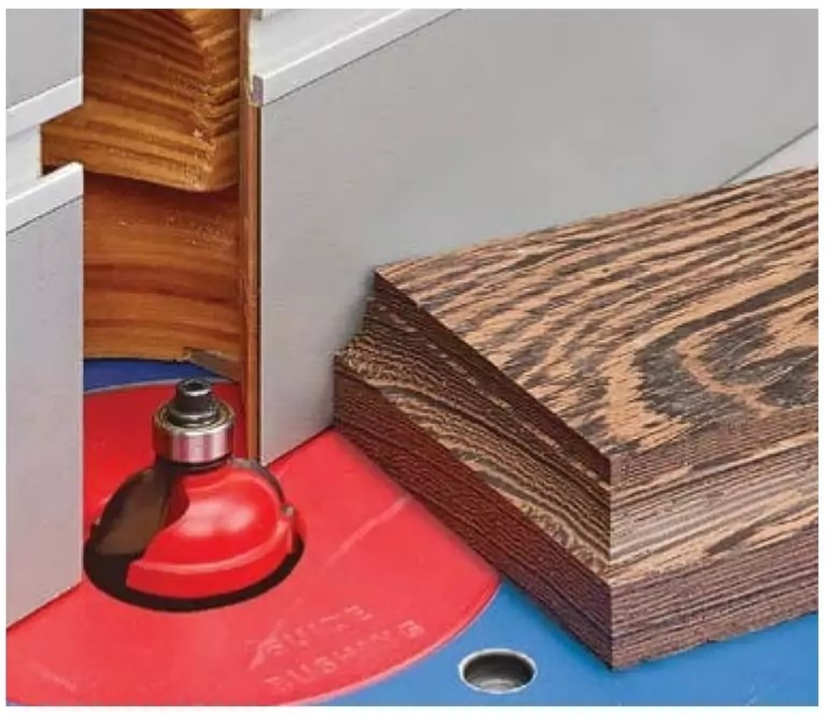
SETTING THE SPEED. Changing the router speed isn't as easy as it sounds. The speed-control dial on most routers doesn't list the actual RPMs. Instead, you may just see a set of numbers, as shown in the upper left photo. To translate the number to the actual RPM, you need to consult your owner's manual. However, it won't take long for you to remember what speed each dial setting indicates without looking it up.

If your router doesn't have a speed control, you aren't out of luck. Auxiliary speed controllers are available, as shown in the middle photo above. After plugging your router into the controller, you can change the speed with the turn of a dial. For sources, turn to page 98.

STOPPED CUTS. Another operation where you may want to slow the router down is when making stopped cuts. The reason is heat buildup. When a spinning bit lingers over a portion of the workpiece, heat rises and causes the wood to scorch. Using a steady feed rate, you can prevent heat from building. But at the beginning and end of a stopped cut, it's impossible to avoid.

You can see a good example in the flutes in the upper right photo. At full speed, the right-hand flute burned at the start of the cut. That blemish is difficult and time-consuming to remove. By stepping down the speed just one notch, I was able to rout the other two flutes without burning.

Bowls. When routing bowls, heat can build up and lead to burn marks and dull bits. Slow down the router to prevent damage.



Dense Woods. Exotic wood like this wenge can be a challenge to rout smoothly. Slowing down the router speed helps get the best results.

This technique applies not only to decorative effects like stopped chamfers and roundovers, but also joinery details like stopped rabbets, grooves, and dadoes.

DEEP CUTS. A related situation is found when routing deep inside a workpiece, like cutting a mortise or routing out the waste for bowl (photo at right). Here, you compound the problem of stopped cuts with the bit buried below the surface. Wood is an insulator, so the heat can build up even more. To preserve the life of the bit, reduce the speed of the router and minimize heat build-up.

HARD, DENSE MATERIALS. One final instance where I slow down the router speed is when I'm working with hard, dense materials — especially exotic wood, as you can see in the left photo. Used in conjunction with light passes, a steady feed rate, and a sharp bit, a variable-speed motor gives you another "tool" to respond to the material.

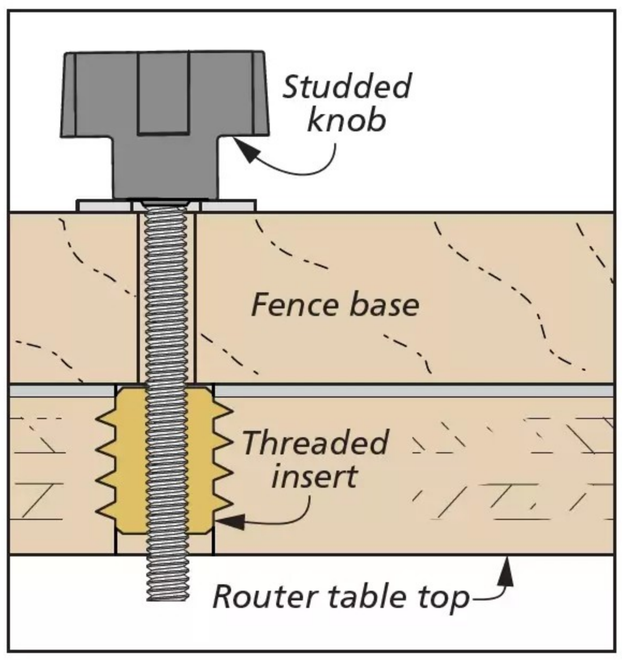
EXPERIMENT. Knowing that there aren't definitive rules for reducing a router's speed frees you to experiment with different bits and wood species. A few test cuts are all it takes. The benefit is getting to know the capabilities of your router and learning more about the materials you work with.

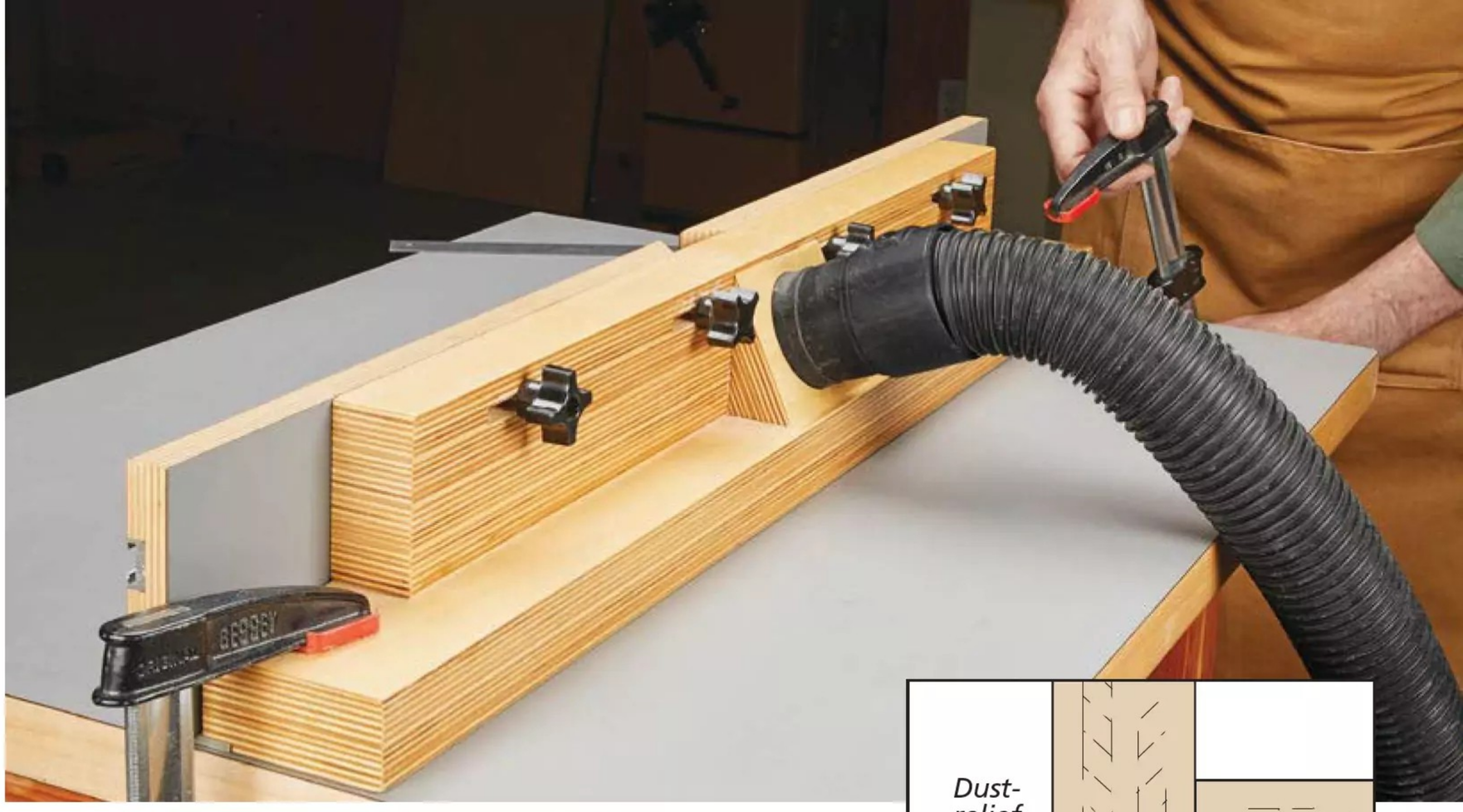
Router Table Fence Options

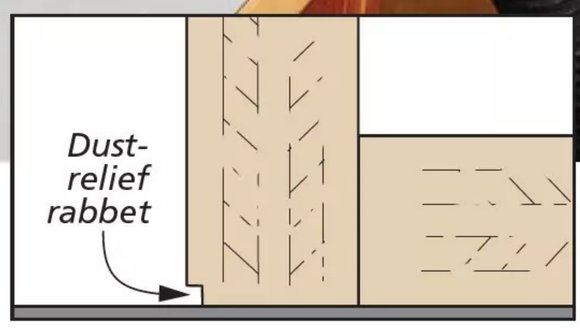
Of all the major woodworking machines, the router table makes the most sense to build for yourself. Not only is it likely to be far less expensive than a commercial version, you can incorporate any number of features.

While the add-on features draw a lot of attention and can make a router table much more pleasant to use, at its core a router table has two fundamental components — the table top and fence.

I'd like to focus the spotlight on the fence over the next few pages. Here, you'll consider how the fence is attached to the table, how easy it is to adjust, and finally the configuration of the fence face. Whether you're building a router table from the ground up or looking to improve the performance of your existing router table, you'll likely find a path that works best for your shop.







Easy Fence Adjustments. Two small bar clamps work well to attach a fence to a router table. A small rabbet at the base of the fence face keeps dust from spoiling the cut.

CLAMP-ON FENCE. The simplest style of fence is one that gets clamped to the top, as shown in the right photo. The fence itself can even be a piece of wood with a straight edge. Beyond ease of execution, this approach leaves the top smooth and clean (except for a router insert plate).

Simplicity has a cost, however. In order to move the fence, you need to loosen both clamps. This isn't a big deal for large movements. But for smaller changes, a loose clamp may allow the fence to shift more than you want. One other thing to consider is that this arrangement requires a fence long enough to span the full width of the router table.

SLOTTED FENCE & INSERTS. The type of fence most often shown in Woodsmith (photo on the previous page and drawing in upper left) attaches with studded knobs threaded into inserts installed in the top.

I find this setup is easier and quicker to adjust than the clamp-on fence. You can also get by with a shorter fence, which is easier to make (and keep) straight.

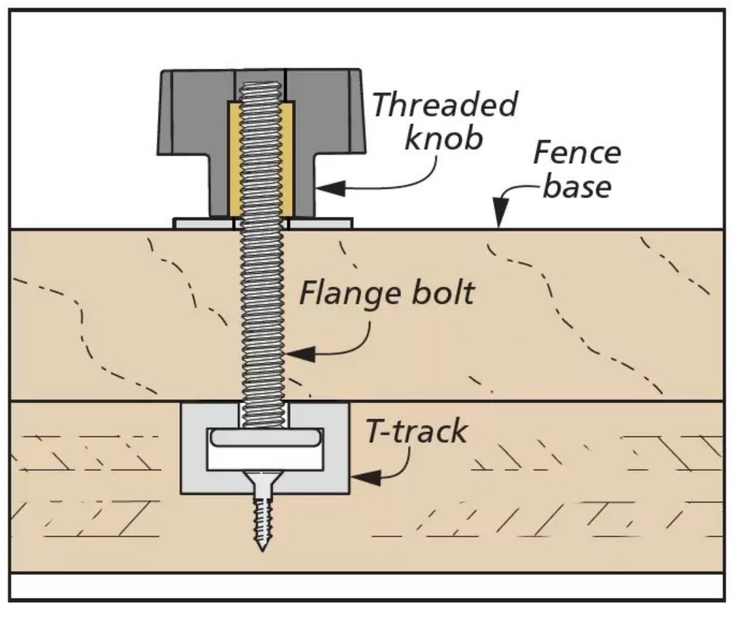
The slots in the fence base give you a decent range of motion. But for larger movements, you need to remove the knobs and use another set of inserts.

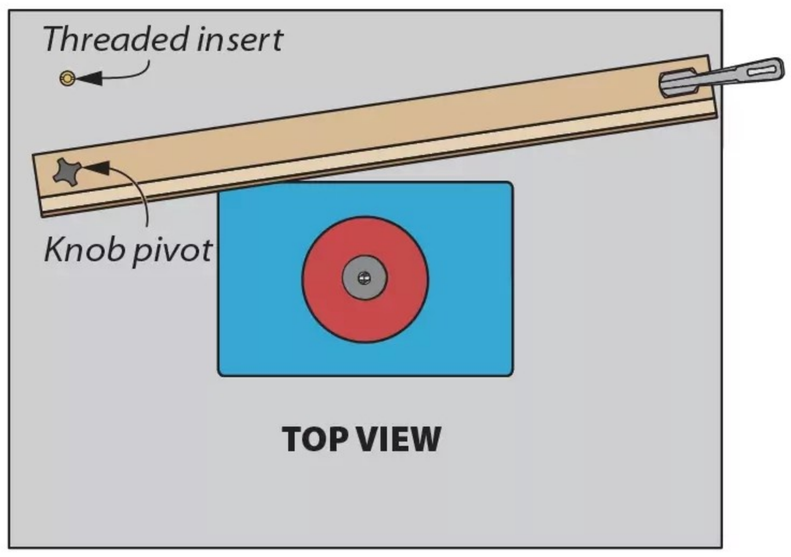
T-TRACK MOUNTED. A step up from the slots and inserts is to attach the fence to a pair of T-tracks embedded in the tabletop (photo and drawing below). This locks securely, as well.

What I like most about it is that the fence seems to slide back and forth easier. This makes adjustments more predictable.

The T-tracks can catch a workpiece as it slides across the tabletop. So you need to take care to set the T-tracks ever so slightly below the surface. Another downside is that the tracks may fill with sawdust, which can interfere with making adjustments.

Adjustable Fence Setup. Flange bolts slide in a T-track and pass through holes in the fence base. Washers and knobs lock the fence in position (drawing at right). The fence slides back and forth smoothly when making large adjustments.





All of the previous router table fences use two locking points to secure the fence in position. It's not necessarily a negative. But when there's a lot of adjustments to be made, all the loosening and tightening can get a little tedious.

The two fences on this page veer off on a different tack. The biggest advantage is that each use a single locking point. And for me, these are more efficient and precise methods for attaching and adjusting a router table fence.

PIVOT FENCE. Rather than adjusting both ends of the fence, you set up one end to pivot on a studded knob and threaded insert. The opposite end swings back and forth, as shown above. Now there's only one lock-down point (I prefer to have this on the infeed side of the table). The payoff is much simpler adjustments.

There are a few points to bring up. First, it's a good idea to install two or three inserts in the tabletop. This gives you a greater range of positions.

Pivot Fence. With only one clamp, making small adjustments to a pivoting fence is much faster than some other router table fence arrangements. The pivoting end is anchored by a threaded insert (or two) installed in the table top.

When you install the inserts, be sure the fence opening lines up with the bit when the fence is attached to the insert nearest the bit. Frankly, you rarely need to position the fence more than a few inches away from the bit, so this position will see the most use. Also, the fence needs to be long enough on the adjustment side to allow a clamp to secure the fence to the table.

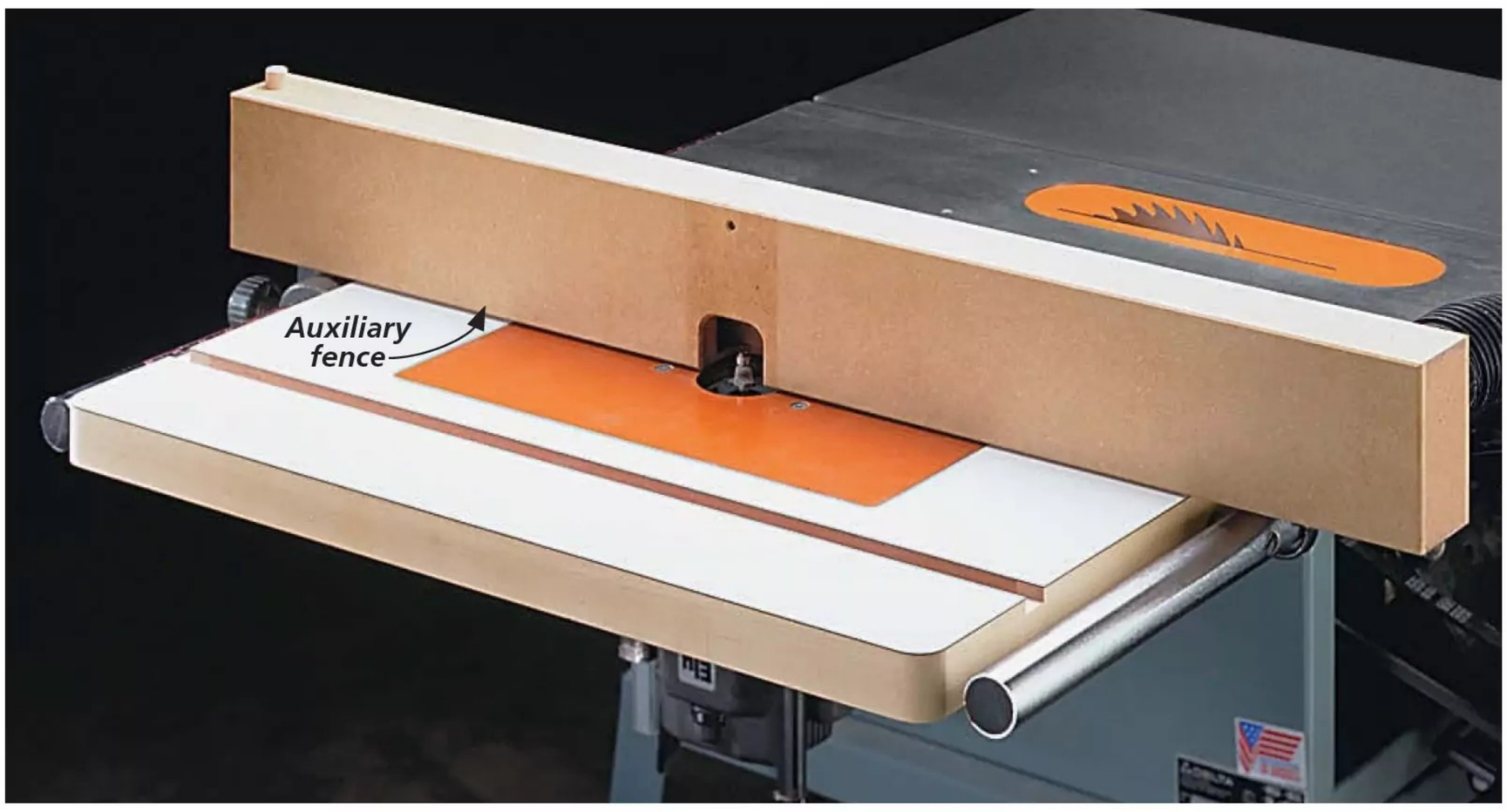
TABLE SAW RIP FENCE. To save space in my shop, I built the router table into the wing of my table saw. And rather than using one of the previous fence options, I chose to use the rip fence as the router table fence — sort of.

What I actually do is attach an auxiliary router fence to the rip fence. Using the rip fence gives you the ease and security that a table saw rip fence has. It's also typically much smoother to adjust. The auxiliary fence is really only needed when you need to recess the bit, like you would for an edge profile.

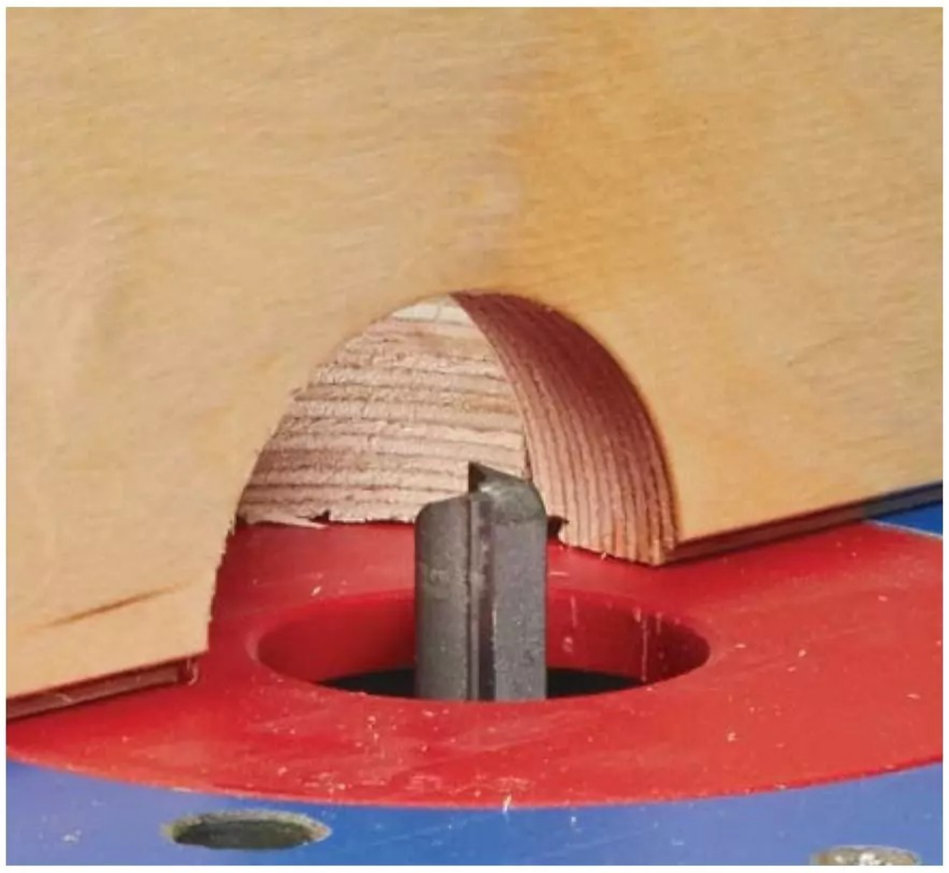
There are two options for installing the router table. The first is shown in the left photo. The router table is installed in the right wing of the saw (from the operator's position).

This allows you to keep the router fence attached to the rip fence most of the time. The bit is also less likely to get in the way of making cuts in this orientation. One drawback is that the fence handle is on the opposite end of the table from where I stand.

The other arrangement is to install the table in the left wing. I do this so I can park the right side of the saw against a wall, which saves shop space. In this



Router Rip Fence. Attaching an auxiliary router table fence to a rip fence lets you borrow the ease of use and speed of the table saw fence. This setup can also help you save space in your workshop.



Fixed Bit Opening. A one-piece fence allows a piece to slide along the fence smoothly. The opening is sized to accommodate the router bits you use most often.

Adjustable Bit Opening. A fence with sliding faces allows you to adjust the size of the bit opening. It will be able to handle pretty much every bit and operation you can think of.

setup, the fence handle is more convenient to use as well.

The cost is that the router table gets in the way of table saw cuts more often. But with some planning, the disruption is only minor.

FENCE FACES

Equally important to the fence mechanics is the face of the fence. It's where the rubber meets the road, so to speak. Of vital importance is making the fence flat, straight, and square to the router table top. Beyond that, things get more subjective. One area to consider first is the bit opening.

FIXED OR ADJUSTABLE. The photos above show you the two choices. You can make a fence with a fixed bit opening. Or you can make a fence with sliding, adjustable faces.

A fixed opening is clearly the most straightforward. The advantage is that the fence is made from a single piece. This helps keep the fence straight. The issue is sizing the opening. It can be tough to find a Goldilocks size that accommodates the bits you use most.

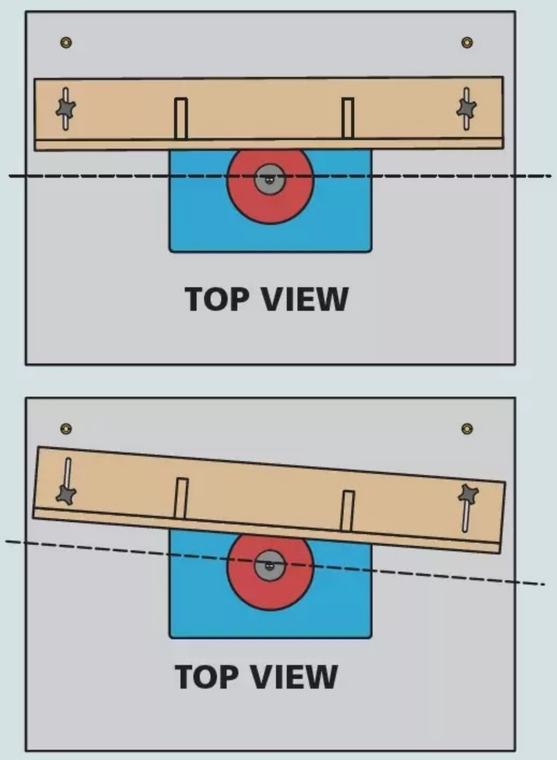
The idea behind the sliding faces is that they allow you to size the opening to better match the overall size of the bit. In practice, I find that dust may get trapped behind the fences. As a result, they're no longer coplanar and the workpiece ends up catching or shifting during a cut.

The best part of making your own router table is the ability to customize it to suit your preferences. Taking the time to consider your fence options results in a table that not only works well, but is fun to use.

The Parallel Fence Myth

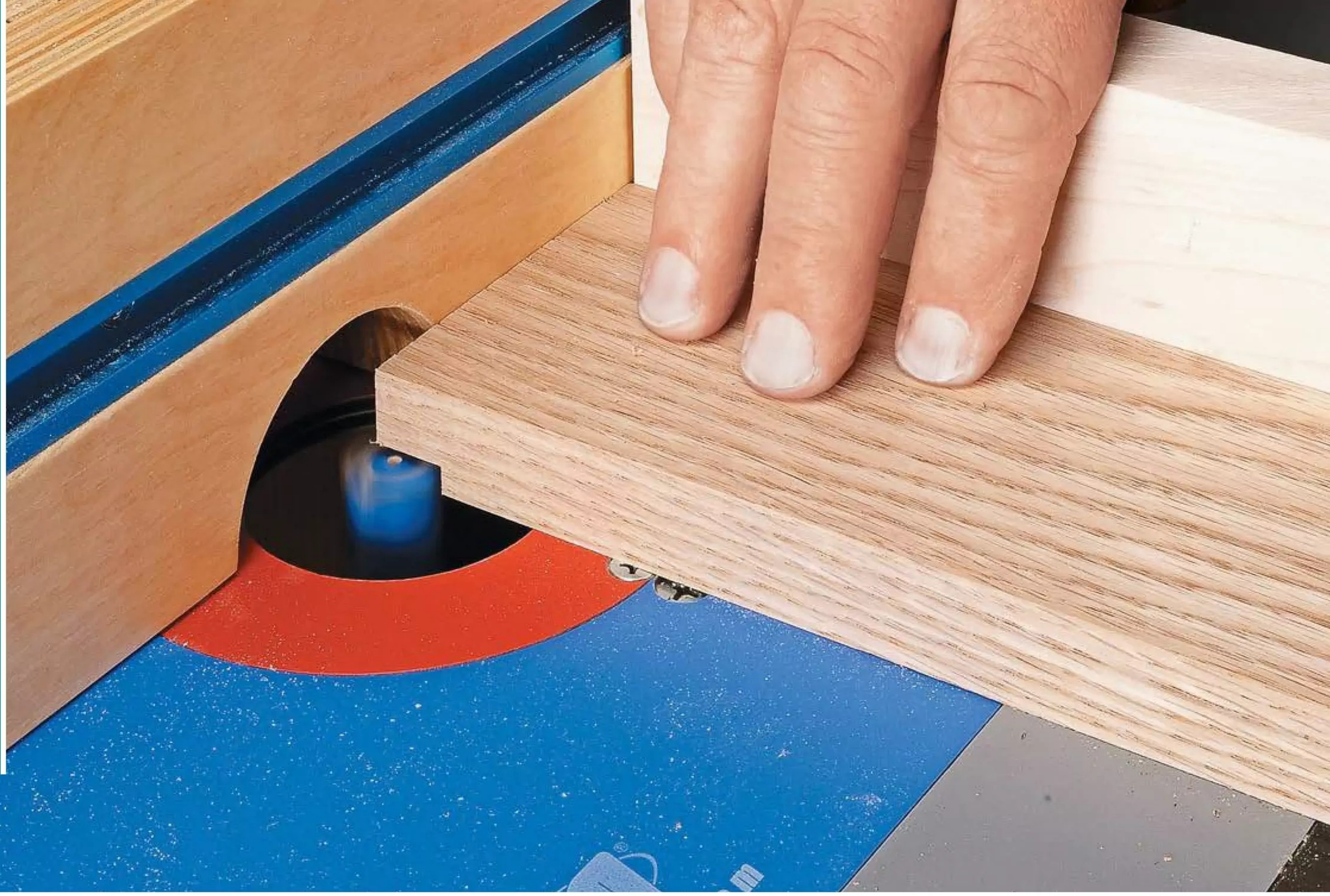
It comes up just about every time I show someone how to use a router table. "Doesn't the fence have to be parallel to the front edge?" This is a carryover from setting up a table saw where the rip fence needs to be parallel to the blade for a safe cut.

Because the fence is set based on the centerpoint of the spinning bit, its position relative to the edge of the table doesn't matter (drawings at right). When you think about it, it's the same principle used when attaching a fence to the table of a drill press.



Regardless of the fence angle, the distance between the bit and the fence remains constant

Router Fence Positioning. Unlike a table saw rip fence, the fence on a router table doesn't need to be parallel to the edge or miter gauge slot (if there is one).



5 Ways to Tame Tearout

Tearout on the router table shouldn't be something you have to live with. Here are a few simple steps you can take to avoid it.

Whether it's for joinery, shaping a part to a template, or adding a decorative profile to the edge of a workpiece, I use my router table on just about every project. However, there are few things more frustrating when using the router table than hearing the splintering sound of tearout. It's usually a signal that I'm going to be in for a lot of sanding or that I'm going to have remake a part.

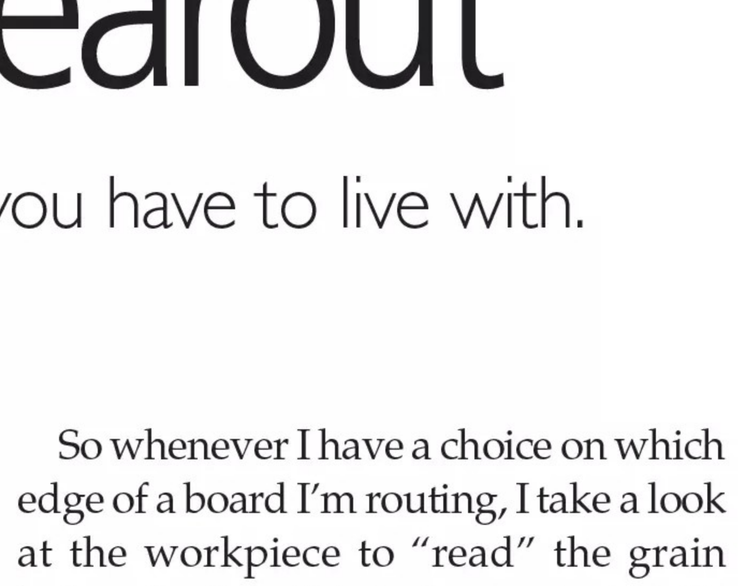
Fortunately, there are several steps you can take to prevent tearout from happening. Starting with a clean, sharp bit is an important one, though tearout is caused by more than just a dull bit. The five techniques you'll find on this page and the next will help you address why the tearout might be happening and how to avoid it.

1 Read the Grain

Just like the fur on the back of a cat, the grain along the edge of a board tends to run in one direction. If you feed the workpiece into the bit "against the grain," the odds of experiencing tearout greatly increase.

Rout Downhill. Whenever possible, I try to orient the workpiece so the grain runs "downhill" from the feed direction.

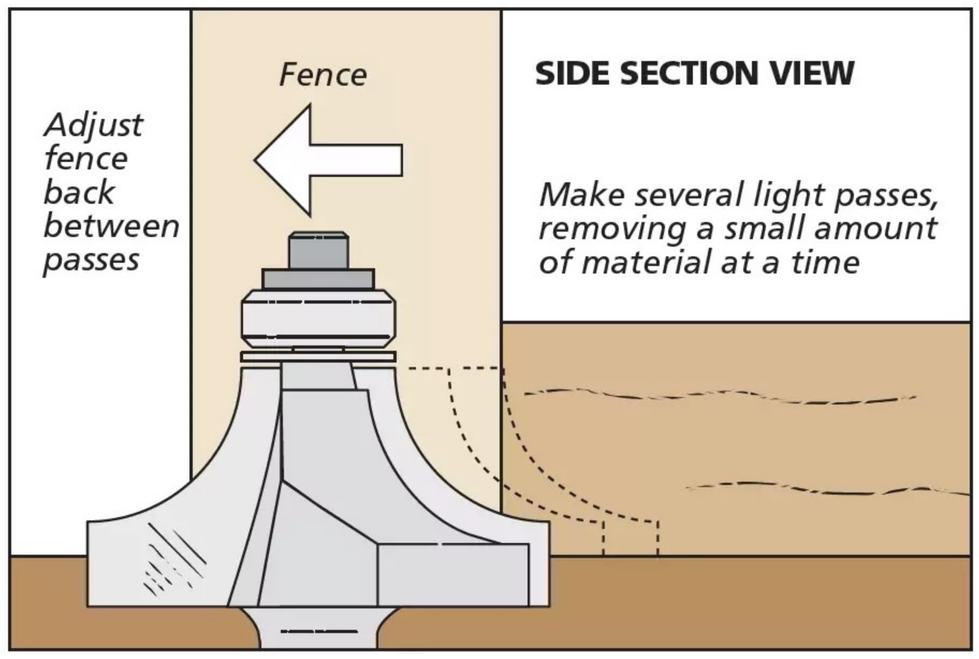
So whenever I have a choice on which edge of a board I'm routing, I take a look at the workpiece to "read" the grain before feeding it into the router bit. To minimize tearout, the grain should run off the edge of the board in the same direction as the rotation of the bit, as shown in the drawing below.



2 Shallow Passes

You may have noticed that tearout seems to occur more often on heavy cuts. If you try to "hog off" too much material in one pass, the bit tends to pull out large chunks from the workpiece. A good way to avoid this problem is to rout the profile in multiple, shallow passes.

Usually, I'll set the bit to the correct height and use the fence to control the depth of cut (see the drawing at right). I start with the fence positioned for a light cut. From there, I gradually move the fence back between passes. Taking shallow passes removes less material at a time, giving you a smoother cut with minimal tearout.



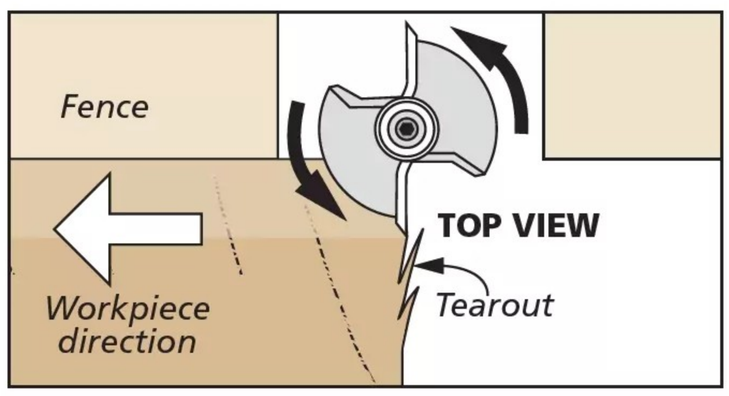
3 Back It Up

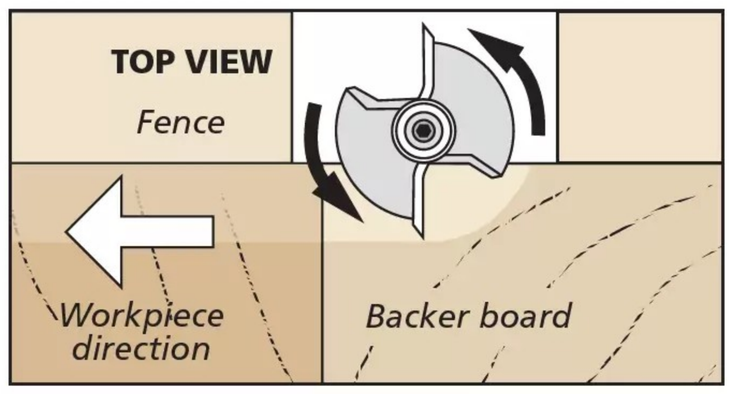
Without a doubt, the worst situation for tearout on a router table is when you're routing across end grain. As the bit exits the cut, it's almost guaranteed to pull large splinters out of the trailing edge of the workpiece, as shown in the upper drawing at right.

There are a couple of ways to deal with this problem. If I'm routing across all four edges of a workpiece, the easiest solution is to simply rout the ends of the workpiece first. This way, the areas of end grain tearout on the workpiece will be cleaned up when you rout the long edges.

BACKER BOARD. One other method of avoiding end grain tearout is to use a backer board. This is nothing more than a scrap piece of wood that is held against the back edge of your workpiece as you push it past the bit. (I actually rout into the backer board for about an inch or so, as you can see in the lower drawing below.)

The backer board supports the wood fibers as the router bit exits the cut, preventing tearout.





4 Reduce Opening

Another way to control tearout is to provide support for the workpiece as close to the edge of the bit as possible. Some router table fences have adjustable faces that allow you to adjust the size of the opening to match the bit you're using. But for even more support, you can make a "zero-clearance" auxiliary face for your router table fence.

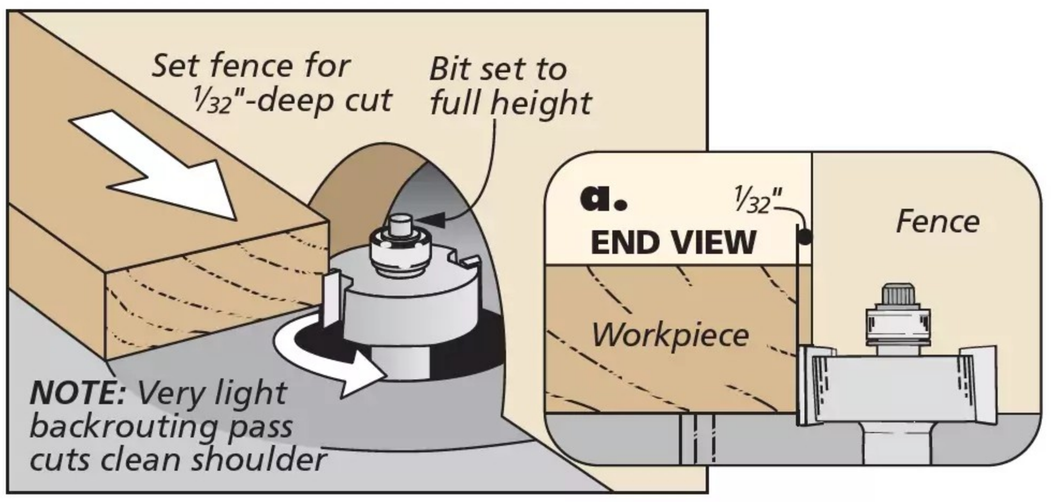
Simply trace the bit profile onto a piece of hardboard and cut it out with a scroll saw or jig saw. Then, attach the auxiliary face to your router fence with double-sided tape.

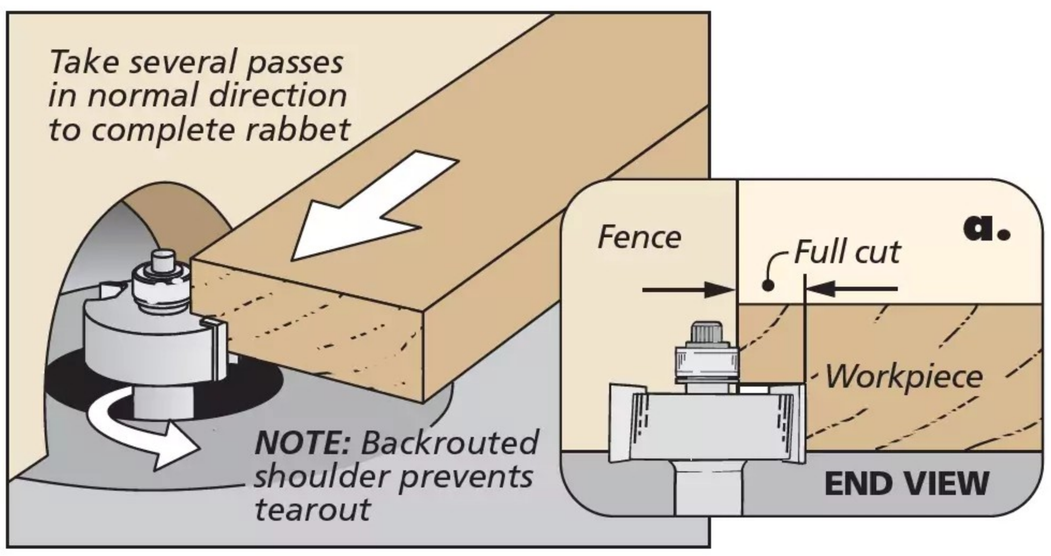
5 Start by Backrouting

One frequent task at my router table is cutting rabbets. I find that it's pretty common to get tearout along the upper shoulder of the rabbet, and this kind of tearout has a lot to do with the direction that the workpiece is fed into the router bit. When routing right to left on a router table, the cutting edges of the bit remove material as they exit the cut. As a result, fibers tends to chip along the edge.

By feeding the workpiece into the bit from the opposite direction (a.k.a. backrouting), the bit is cutting as it enters the workpiece, eliminating most tearout. The problem with backrouting is the tendency for the bit to grab the workpiece and pull it forward, or kick it out away from the fence. However, if done safely, there are occasions when backrouting can really help to avoid tearout.

The trick to backrouting safely is to take a very light pass (about 1/32" deep), as shown in the upper drawing at right. This initial pass establishes a clean, crisp upper shoulder for the rabbet. Once this is done, you can remove the rest of the waste by routing in the opposite direction, just as you see in the lower drawing at right.





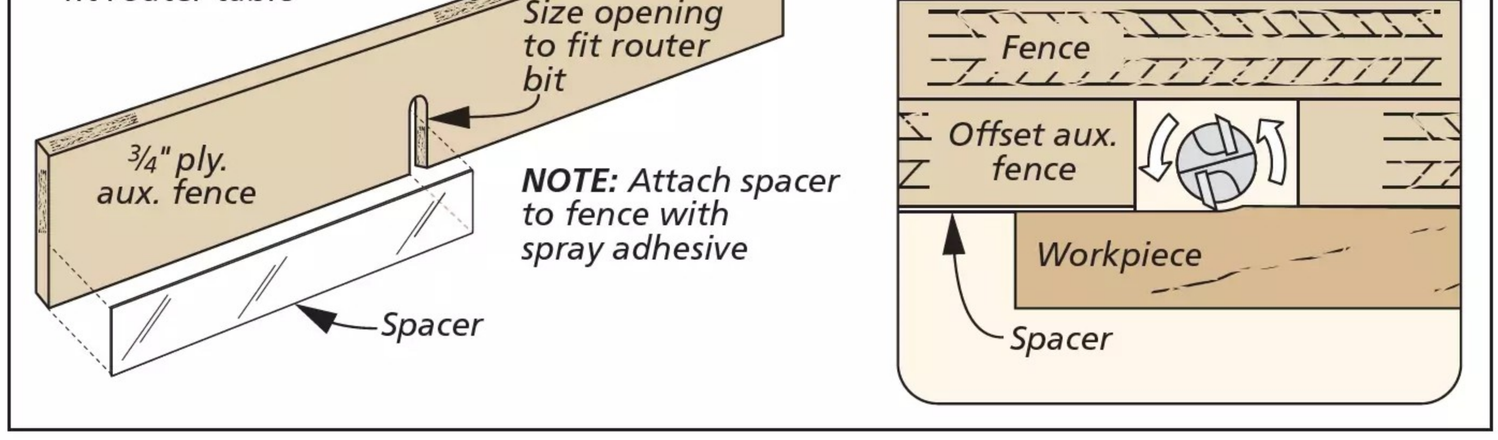
Edge Jointing

Achieving a straight, smooth edge on a workpiece is typically a critical step for a successful woodworking project. And while cutting a board with a quality rip blade at the table saw will generally accomplish the "straight" portion of the equation, it doesn't always leave a smooth surface. You're often left with blade marks on the edge, or worse, burn marks.

Smoothing the edge by running the board through a dedicated jointer is the obvious solution. But for many woodworkers — especially those just starting out in the hobby — an expensive jointer may not be in the cards. Fortunately, there's a foolproof way to get similar results at the router table.

ALL IN THE FENCE. The trick to using the router table as an edge jointer lies in the router table's fence. Some commercially available router table fences have two independent fences that are adjustable in and out on either side of

Spacers. These are just a few options you could use for the spacer material on the edge-jointing auxiliary router fence.



Outfeed. With the right end of the router table fence clamped to the table, use a straightedge to swing the left side of the fence into position. The router bit should just touch the edge of the rule.

Fence Position. After postioning the left side of the fence, carefully clamp the router fence to the table. It's a good idea to do a test cut to make sure it's not removing too much material at one time.

the center opening. This type of fence is perfect for setting up for a jointing operation. It allows the "outfeed" side of the fence to be offset from the infeed side. In essence, it acts just like the offset tables of a stationary jointer.

However, if your router table fence doesn't adjust in this manner, don't despair. You can still set up for jointing with a one-piece router table fence. All that's required is to make a simple auxiliary fence, like the one shown in the main photo on the previous page.

MAKING THE FENCE. The auxiliary fence is nothing more than a piece of plywood with an opening cut in the center for the router bit. The left side of the opening is what makes this auxiliary fence different. On this side, you'll apply a thin spacer that makes the "outfeed" side stand proud of the infeed side. The drawing at the bottom of the previous page shows what I mean.

I'll talk more about the spacer material in a minute. But for now, just understand that this offset fence configuration is what makes the fence act like a stationary jointer's table.

MATERIAL CHOICES. You have several options when it comes to the material for the spacer. Thin aluminum sheeting or UHMW are excellent candidates. I opted to use a thin sheet of high-impact polystyrene (HIPS). This material is flexible, but also strong. And best of all, it's sold by thickness in increments of .010". This makes it a great choice since the thickness of the spacer determines the amount of material removed per pass. The piece I used is .020" thick (just a shade over 1/64"). HIPS is also easy to hold in place with a light-duty spray adhesive. All of these spacer material options are shown in the lower left margin photo on the previous page.

CHOOSING THE BIT. Another nice feature of this edge-jointing setup is that no special router bit is required. A standard straight bit will work just fine. I chose a 1/2"-dia. bit with a 1/2" shank. A spiral bit could also be used for this operation, but with the minimal amount of material being removed, you probably won't notice an appreciable difference between the two.

SETTING UP FOR THE CUT. Like the rest of this jointing method, the setup is pretty straightforward, as well. After clamping the auxiliary fence to the router fence with the opening centered on the bit, I locked the right (infeed) end of the fence to the table.

Then, using a straightedge, I pivoted the left (outfeed) end of the fence so that it's just flush with the bit, as shown in Photo 1 above. This allows the outfeed side of the fence to fully support the workpiece after it passes the bit.

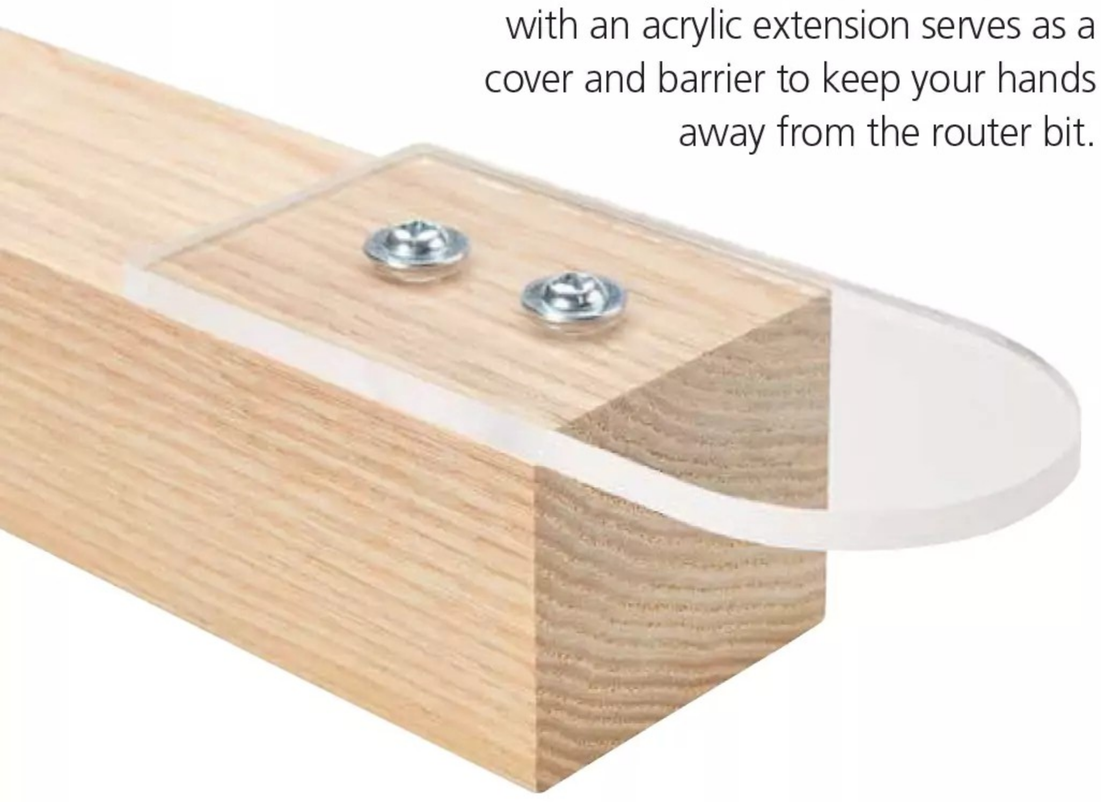
With the fence in position, clamp the left end to the table (Photo 2). You can use the workpiece you're jointing to set the height of the bit. It should extend just over the top edge of the board.

MAKING THE CUT. After the fence position is set, using it is a snap. I would recommend using a pair of push pads to keep your hands clear of the spinning bit (main photo). With the workpiece tight to the infeed side of the fence, start it into the bit. Once the leading few inches of the workpiece pass the bit, keep the leading push pad on the outfeed side to maintain pressure against the outfeed fence. The trailing hand (push pad) provides the forward motion.

Depending on how rough the edge of the board is, a couple of passes may be necessary. But in short order, you'll end up with a smooth-edged workpiece, as shown in the photos below. All with a simple, shop-made fence for the router table.

Jointed Edge. Before jointing, the stock is rough (above). A couple passes using this fence on the router table cleans it up (below).

Ripping at the Router Table



Bit Protection. A piece of hardwood with an acrylic extension serves as a cover and barrier to keep your hands away from the router bit.

With a title like "Ripping at the Router Table," you're forgiven if you raise an eyebrow in skepticism. And it's true, I'm not saying you can (or should) use your router table to cut wide boards into narrow parts. Instead, the idea here is more trimming to width in small increments, leaving a smooth, glass-like edge.

This is an idea that I've toyed with for some time, but got serious about after a conversation with another woodworker. We both had set up and used a router table for jointing the edges of pieces. The technique works really well, and the smooth edge is tough to beat. The only issue is that after a few jointing passes, you may end up with a slight taper along the width of a board.

This isn't a big deal if you finish by ripping the board to final width at the table saw. However, if you want to keep the sides parallel while trimming off a small amount, then the technique shown here is one to consider. And you still end up with smooth edges.

Stabilized Workpiece. A featherboard keeps steady pressure against the workpiece, holding it against the fence while you focus on pushing the piece past the router bit.

ITS ALL IN THE SETUP. Like many machine operations in woodworking, success depends on taking the time to accurately set up the tool. So I'm going to spend a good amount of time on the finer points, first.

For starters, for ripping to work, you need to pass the workpiece between the bit and the fence. The usual right-to-left motion won't work here. That's because the piece would be moving in the same direction as the bit rotation. The part gets pulled out of your hand in a heartbeat.

The answer is to move the workpiece from left to right, as shown in the main photo on the previous page. It might seem odd at first, but it puts the workpiece in the proper orientation.

ROUTER BIT. The next thing to consider is the bit. I find larger diameter straight bits have a smooth cutting action and are more stable, so, I use a ¾"-dia. bit. But if you have a 1"-dia. bit, go ahead and use that.

Since the workpiece travels between the bit and fence, the bit is left exposed. You can remedy this with the bit cover shown on the previous page. The idea is to create a physical and visual barrier to remind you to keep your fingers away.

FENCE & FEATHERBOARD. Next up on the list is setting the fence. Like I said earlier, this approach works best when removing small amounts. That amount depends on the thickness and density of the material. The heaviest pass I would take is ⅛".

Between passes, rather than loosening the fence, I often nudge it over with a few light mallet taps, as in the lower left photo.

Finally, I also set up a featherboard on the infeed (left) side of the router table, as shown in the photo above. The featherboard applies pressure to hold the piece against the fence. This stabilizes the workpiece throughout most of the cut for consistency. Keep in mind that after any fence adjustment, you may need to readjust the featherboard. Depending on the depth of cut, the featherboard may not be applying just the right amount of pressure.

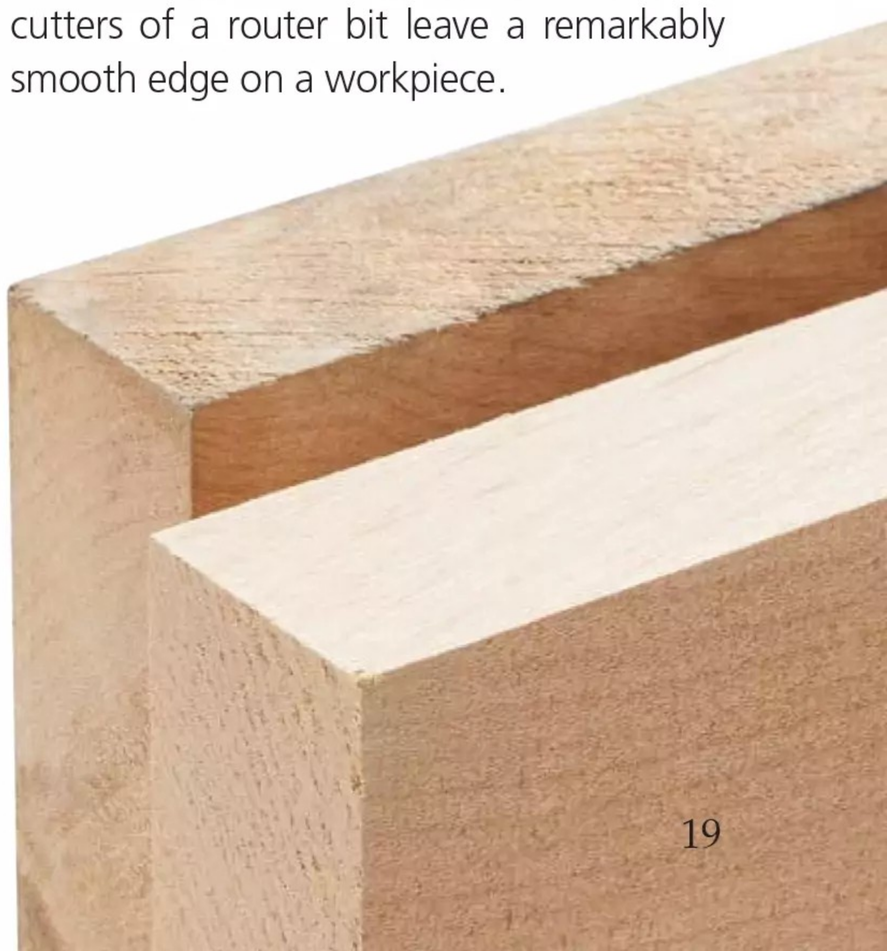
MAKING A PASS. At last, you're ready to make a cut. With all the prep work, this is a matter of turning on the router and guiding the piece past the bit. This will feel similar to making a skim cut on the table saw.

With narrow boards, a push block is a good idea. The key to getting the smoothest edge is maintaining a steady feed rate. The shavings coming off the bit should look like small ribbons. When held up to the light, you shouldn't see any scallops on the edge of the board.

Ripping on the router table isn't something you'll do every day. But it's a solid technique to have on hand — especially if your table saw is set up for another operation. Try it out yourself, the results will speak for themselves.

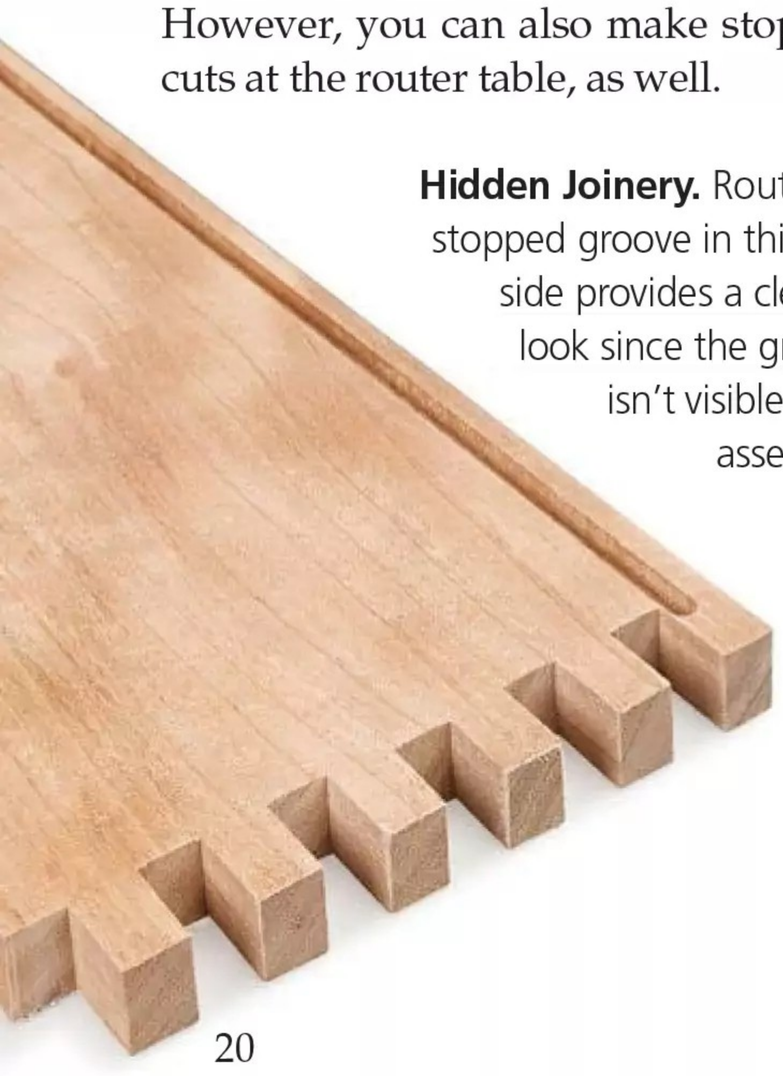
Fence Adjustments. Since this operation is really meant for removing small amounts of material with each pass, a few light taps with a mallet will shift the fence enough between passes. Then it's a good idea to make sure the fence is tight.

Routed Edge. The high speed and sharp cutters of a router bit leave a remarkably smooth edge on a workpiece.



Precision Stopped Cuts

One of the appeals of working at the router table is just how straightforward it is to use. Set the bit height and the fence, and you're ready to make one cut — or a dozen. For most tasks, you'll start at one end of a workpiece and proceed until the bit emerges from the end. However, you can also make stopped cuts at the router table, as well.



Hidden Joinery. Routing a stopped groove in this box side provides a cleaner look since the groove isn't visible after assembly.

A stopped cut is where a cut ends before running out one or both ends of the workpiece. In order to make this kind of cut, you have to lower the workpiece over a spinning bit, make the cut, and then stop at the right place. Although it may sound intimidating, I think you'll find that the differences from an ordinary cut are pretty minor.

Stopped cuts can be used for profiles as well as joinery cuts like rabbets, dadoes, and grooves. In this article, I'll demonstrate the process of making a stopped groove to accept the bottom for a small box, but the approach applies to most other stopped cuts, too.

The groove extends nearly to the ends of the box sides, but I don't want it to come out, so the starting and stopping points for the groove need to be right on. For precise work like this, I often set up a pair of stop blocks to control the cut.

SETTING UP. While stop blocks guarantee consistent limits of a cut from workpiece to workpiece, the blocks need to be located accurately. The drawings at the top of the next page show you the process. To get there, you need to start with a little layout.

After installing the bit and setting the height, position the fence in relation to the bit. It's a good idea to make a test cut to ensure it's right on the money.

At this point, you're ready to set up the stop blocks on the fence. The starting block on the right side of the fence is located so that the distance from the left edge of the bit to the stop matches the distance from the end of the workpiece to beginning of the cut (Figure 1).

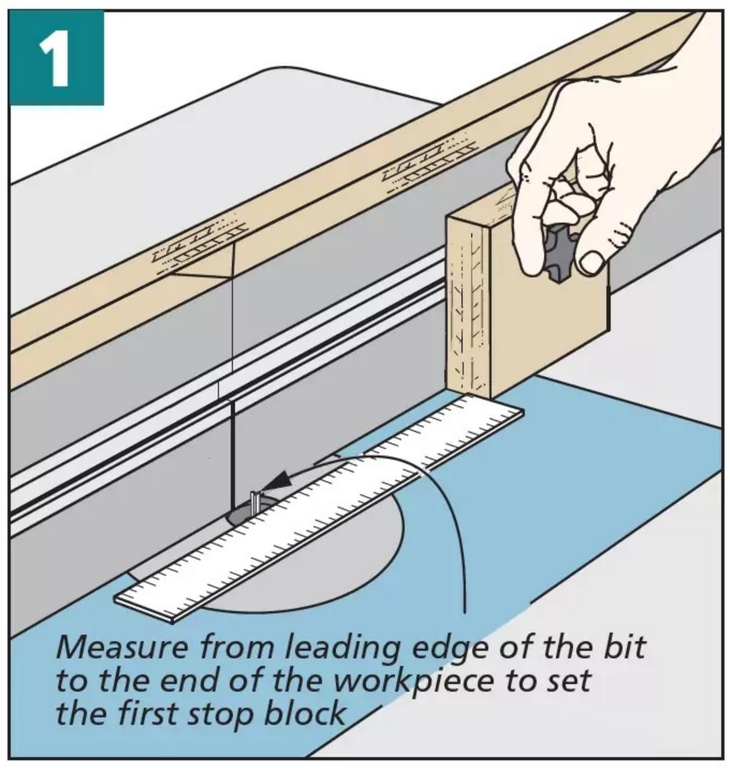
The end block on the left side is set in a similar way. The only difference is that you'll use the right side of the router bit as the reference point when measuring, as you can see in Figure 2.

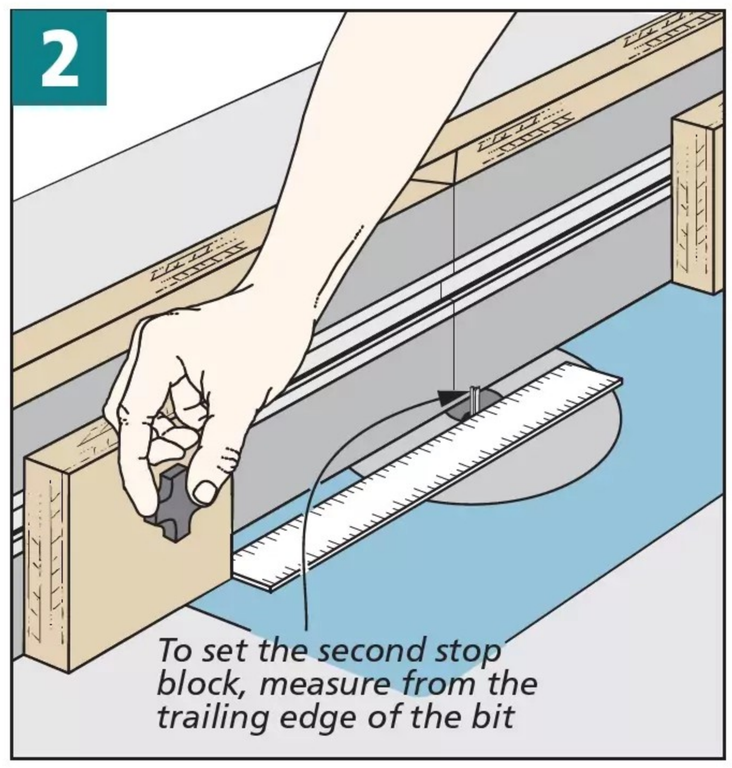
MAKING CUTS. At this point, you're all set to make a stopped cut. Here's where a little technique comes into play. As I said earlier, you lower the workpiece onto the spinning bit to make the cut.

The key is to do this in a controlled manner. You do that by turning on the router and bracing the back end of the workpiece against the right hand stop block, as shown in the main photo on the previous page. Hold the front end above the bit, while keeping the workpiece snug against the fence.

The first time I tried this technique, my fear was the bit would jerk the workpiece from my hands. Instead, you'll feel a slight pull as the bit engages the wood. A little pressure is all it takes to settle the piece firmly against the table. Then proceed like you would for any router table cut until the workpiece contacts the other stop block. (Like many router operations, it's a good idea to create deep cuts in several light passes, raising the bit slightly between each pass.)

The end of a stopped cut presents another set of choices. You can lift the workpiece off the bit — the reverse of how you started the cut. Or you can hold the piece in place, turn off the router and wait for the bit to stop. Do what feels most comfortable to you. I usually will lift the piece away if the cut is shallow. But for deeper cuts, I'll turn off the router first, then remove the workpiece.





ALTERNATE TECHNIQUE

Using stop blocks to start and end a cut works great. However there are a couple of limitations. It isn't possible to use stop blocks if parts extend beyond the ends of the fence. Also, if you're only making a few cuts, taking the time to set up stop blocks may not be worth the effort.

The solution is to use a slightly different technique. The drawings at the bottom of the page cover the main steps. In this method, you align marks on the workpiece with marks on the router table fence to begin and end a cut.

The first step is to do a little layout work marking the starting point and ending point of the cut on each of the workpieces. To make them useful, these marks are drawn on the opposite (upper) face of the workpiece than where the cut is made. You can see how this is done in Figure 1 at left.

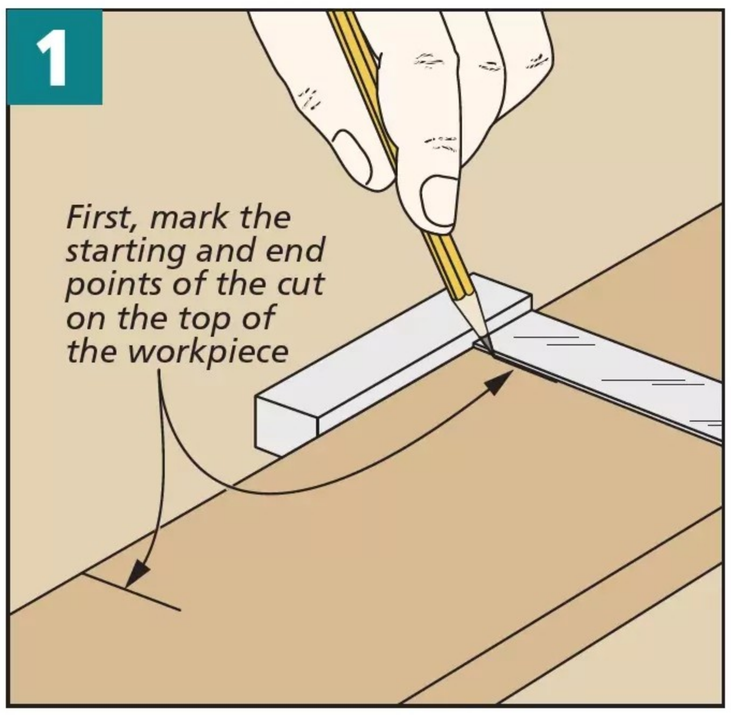
After setting the position of the router table fence, you need to mark the cutting edges of the bit on the fence faces, as shown in Figure 2. Extend the lines up the fence a few inches so they're easily seen during the cut.

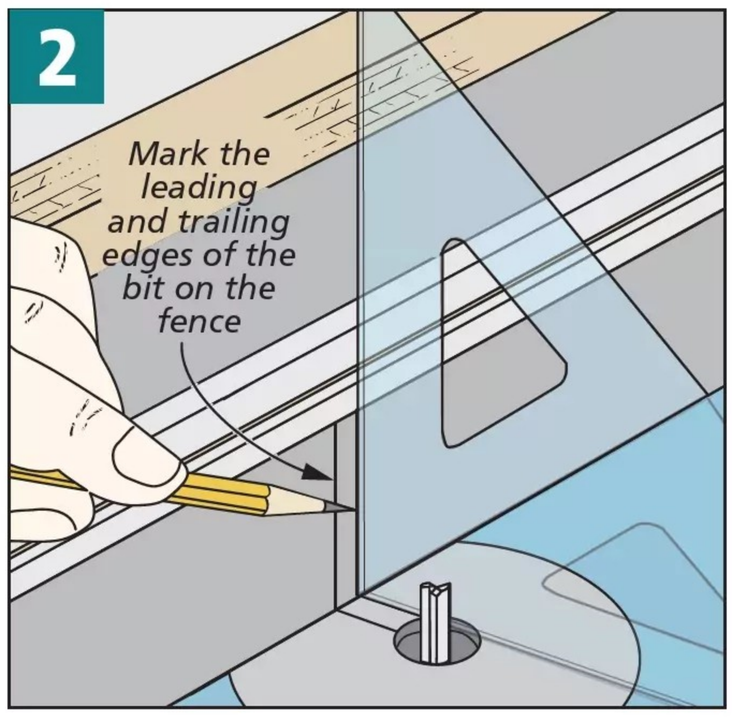
Making the cut is a matter of holding the workpiece against the fence with the leading end raised above the bit. Align the starting layout mark on the workpiece with the left bit mark on the fence, as you can see in Figure 3.

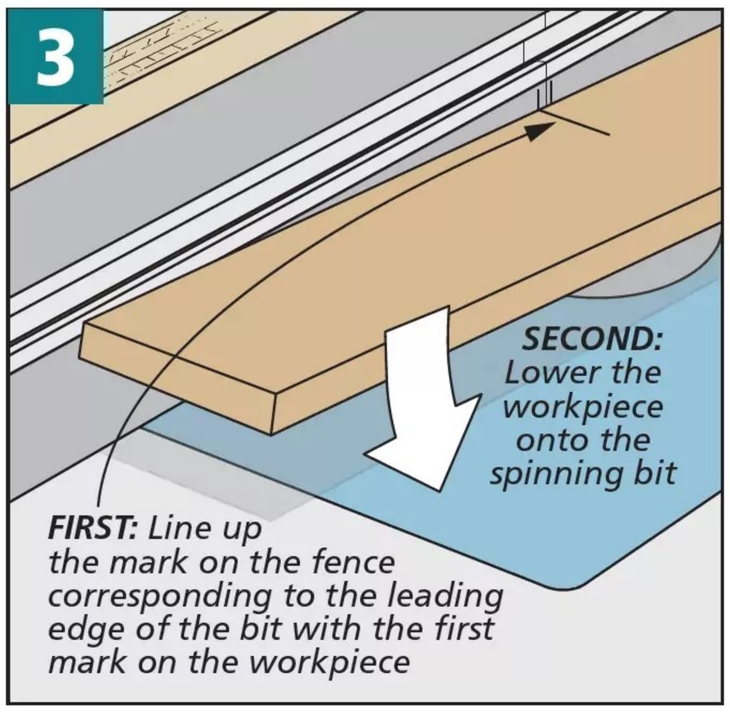
Lower the workpiece until it rests solidly on the table and push it forward along the fence until the end layout mark aligns with the right bit mark. This is shown in Figure 4.

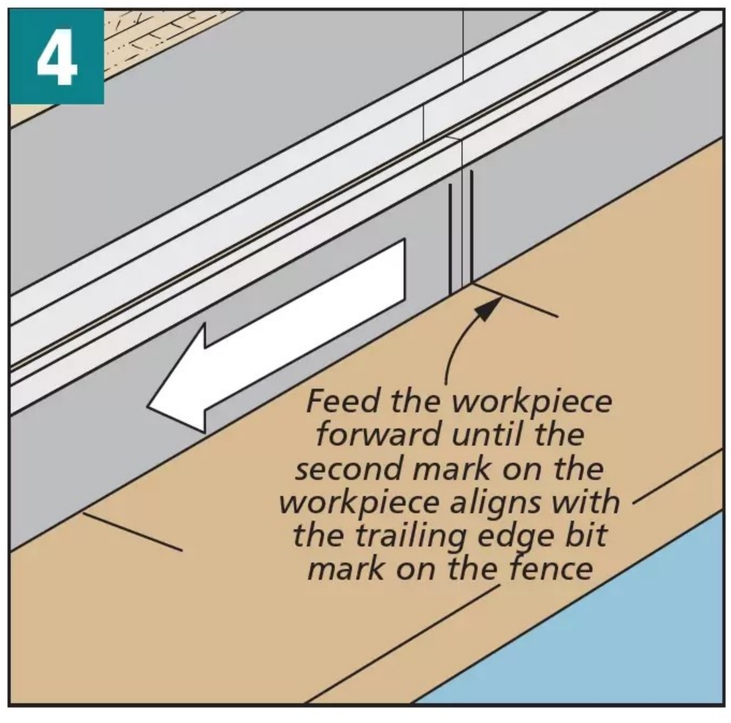
FINAL CONSIDERATIONS. Due to the nature of starting and stopping a cut in a workpiece, don't be surprised to see some burn marks. In a cut like the stopped groove shown here, burned ends won't affect the joint's strength — or be visible.

Safety, accuracy, and convenience are big benefits to working at the router table. Using it for stopped cuts takes advantage of all three. And it opens up new opportunities to get more from your router table.









Rout It Round

Who says you can't teach an old router table new tricks? Here are a couple of handy techniques that will expand its repertoire.

The router table is without a doubt, a versatile tool. Rabbets, dadoes, grooves, tenons, box joints, moldings and profiled edges — you name it, the router table can usually handle it. However, you might think that turning to the router table to shape round workpieces sounds like a stretch.

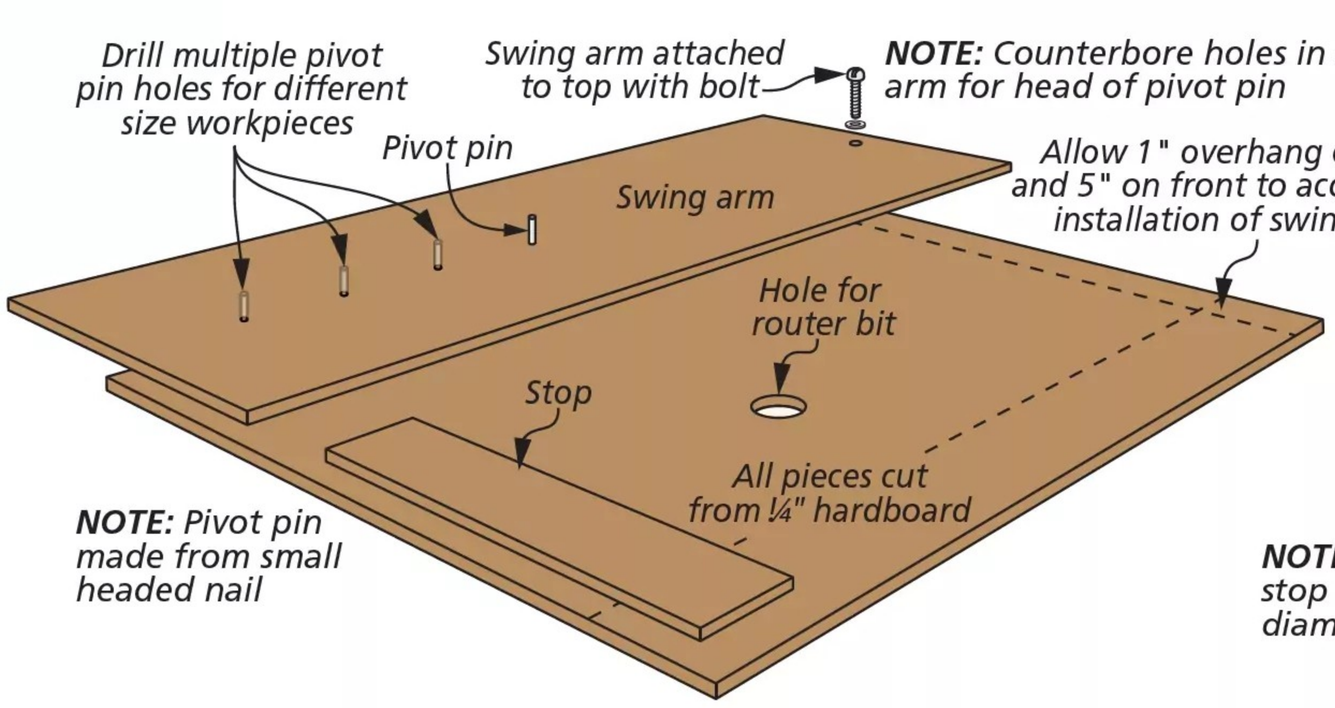
Pardon the pun, but the truth is that there are a couple of very straightforward router table techniques that allow you to create perfectly shaped circular panels or dowels. I'll share the basics of each one with you.

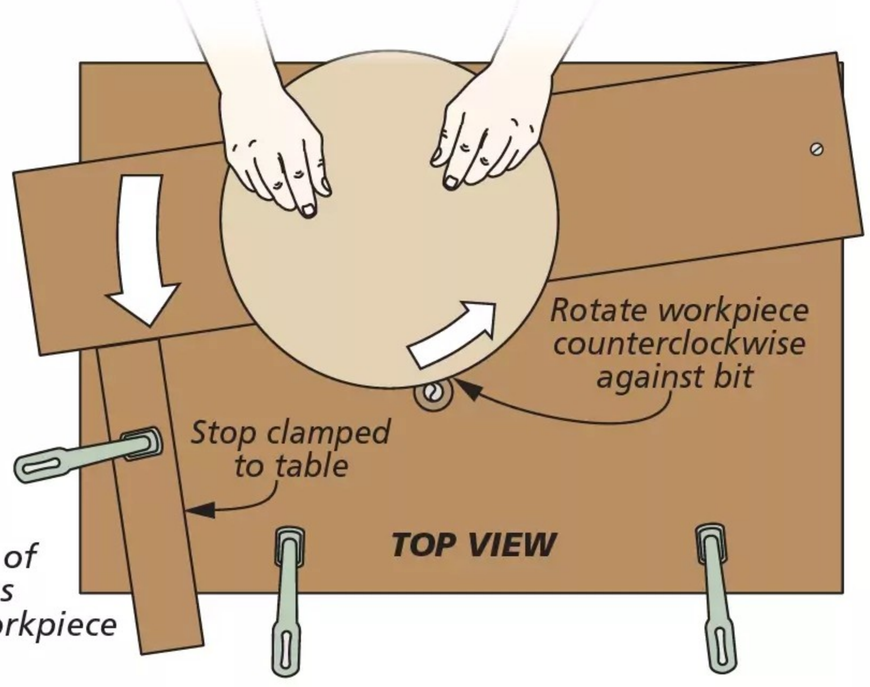
TURNING CIRCLES

You may be familiar with the technique for using a router fixed in a trammel to "spin out" a perfectly circular workpiece. It's a great way to shape round tabletops or other large, circular pieces. Making round workpieces on the router table works similarly. The difference here is that the router and bit are stationary while it's the workpiece that rotates instead.

A SIMPLE JIG. The key is a barebones jig made up of an auxiliary tabletop, a swing arm, and a stop (lower left drawing). Construction of the jig is very easy. All of the pieces can be made from ¼" hardboard.

To accommodate the swing arm, I sized the top to overhang the sides and front of the table. Then I laid out and drilled a 1"-dia. hole for the router bit.





After drilling a series of pivot pin holes in the swing arm, it's attached near the front left corner of the top with a bolt, washers, and nut. The stop is just a narrow cutoff.

SET UP. A look at the drawings on the opposite page and a brief explanation are all it takes to understand how the jig works. To set up, a straight bit is installed in the router table (I like to use a spiral flute up-cut bit) and the auxiliary top is positioned over it and clamped down. Then, after drilling a small centered hole in the rough-shaped workpiece, it's placed over the pivot pin (a nail) in the swing arm. Finally, you'll clamp the stop in place to limit the travel of the swing arm and produce the desired diameter.

THE SPIN. With everything ready to go, you simply turn on the router and pivot the arm and workpiece toward the bit. When the arm contacts the stop and the bit is engaged, you slowly and steadily rotate the workpiece counterclockwise. After a full turn or more, retract the arm with the trimmed workpiece.

A FEW TIPS. It often works best to sneak up on the final diameter by trimming the workpiece incrementally, especially when routing solid wood. You'll get a smoother end result. You simply move the stop back a little bit between passes.

Be sure to maintain a good grip with both hands as you rotate the workpiece. And you'll need to apply constant forward pressure to keep the arm in contact with the stop. I'll usually make a couple of revolutions to be certain I've cut to full depth all around the perimeter of the circle.

Custom Dowels. It's easy to make dowels in a variety of sizes from any type of wood.

MAKING DOWELS

Making dowels of many standard diameters (down to 3/8") in any kind of wood is as simple as routing a roundover — or rather, four roundovers. In a nutshell, a square blank is "turned" round by knocking off all four edges (corners) with roundover cuts.

GET READY. I'll illustrate with an example. Start by milling an extra-long, square blank matching the diameter of the dowel you want to make — let's say 3/4". Then install a roundover bit in the router table that corresponds to the dowel's radius. This would be a 3/8" bit.

Next, I add a long auxiliary fence to the router table. This simply provides the support you need to make longer dowels, as you'll see (drawing below).

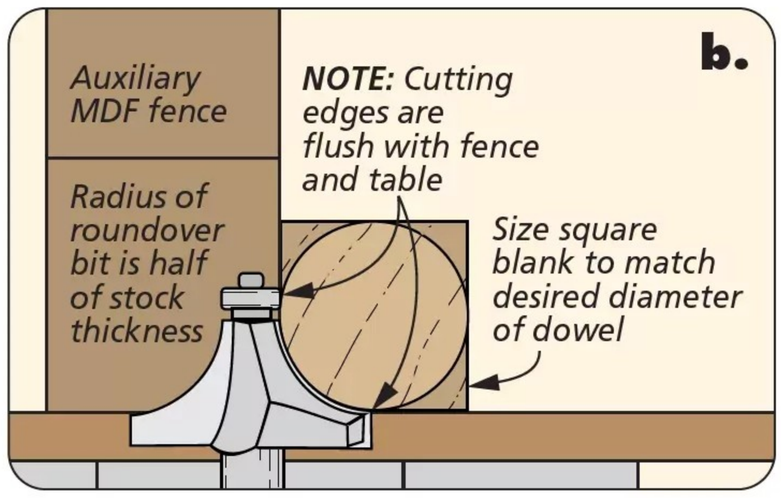
The fence is aligned flush with the bearing of the bit. The height of the bit is adjusted to align with the fence's base (detail 'b').

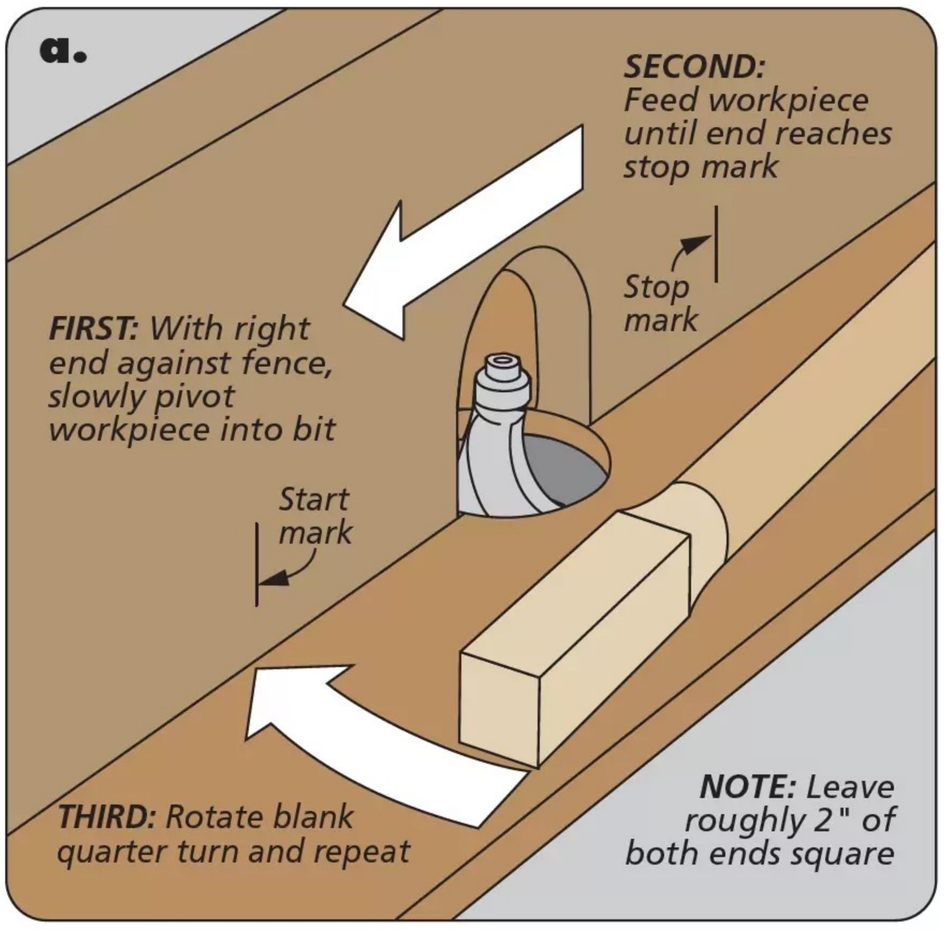
MAKE A DOWEL. When you make the four roundover cuts, you need to maintain square reference edges to keep the blank from rolling. You can do this by not routing a short section at both ends of the blank. I like to mark a reference line about 2" to either side of the bit to show me stop the roundover cuts.

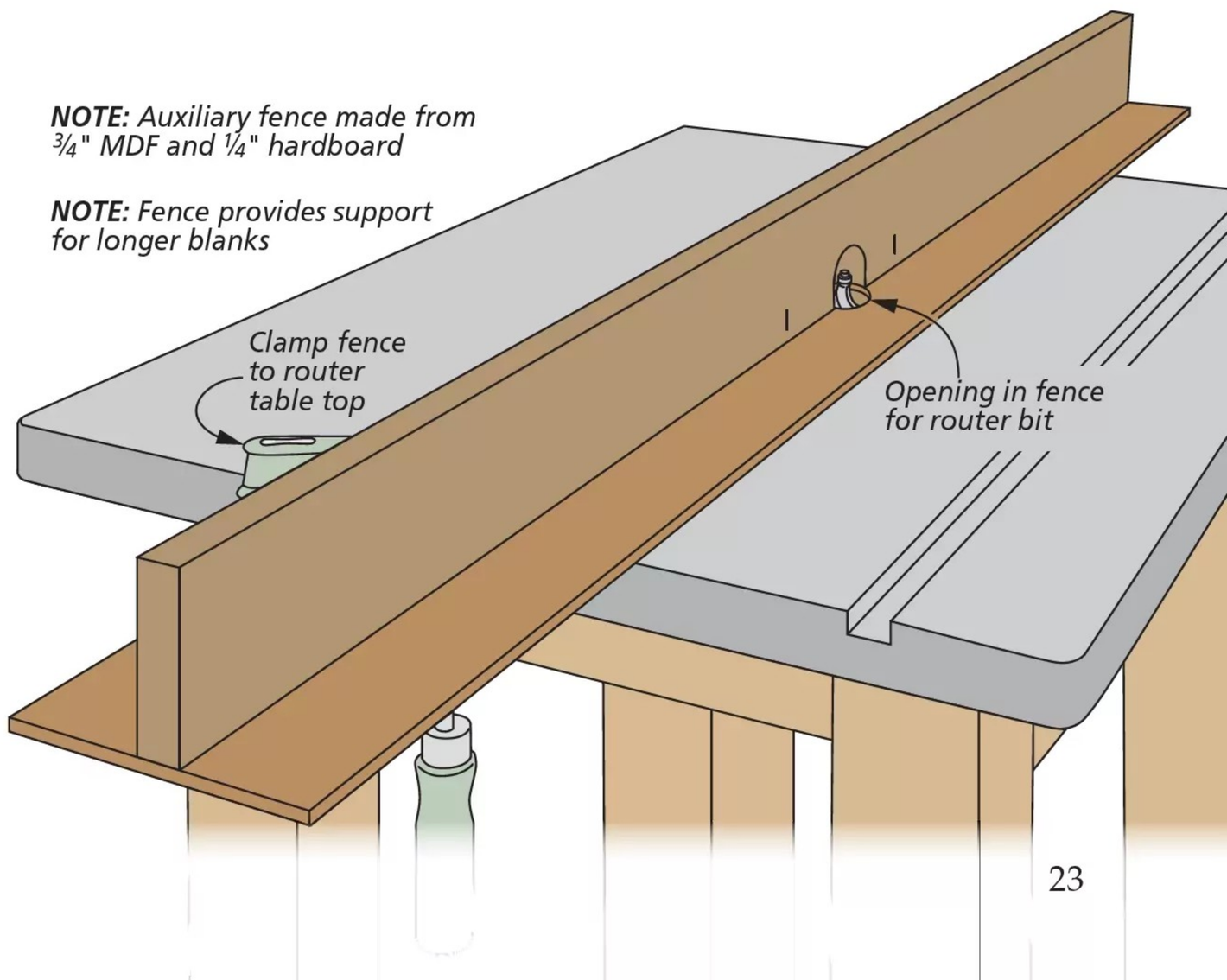
That's the hard part. The rest is easy. With the router turned on, align the left end of the blank with the start line, pivot it into the bit and feed it slowly until the right end reaches the stop line (detail 'a'). Then give the blank a quarter turn and repeat the process.

When routing larger diameter dowels, you'll get a better result by working down to round. Set the fence for a partial cut and then move it after a series of passes.

Once all four edges have been rounded, the ends of the blank can be cut off. The dowel will be perfectly round or pretty close to it. A minor sanding will be all you need to smooth the surface.



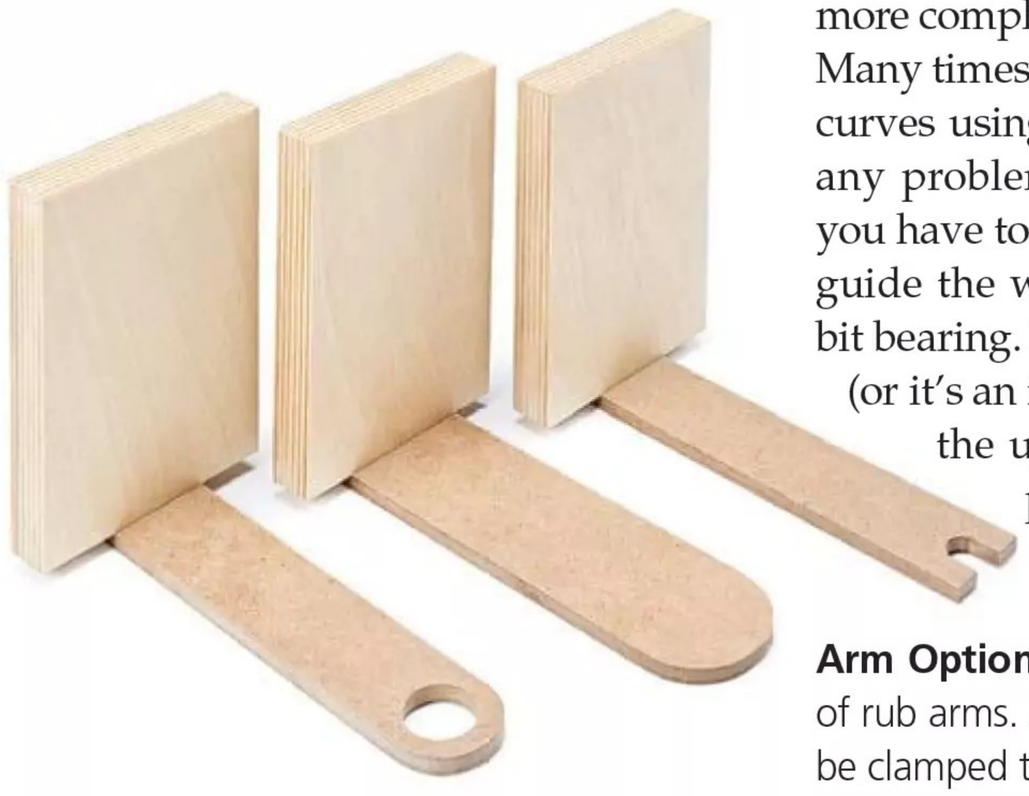




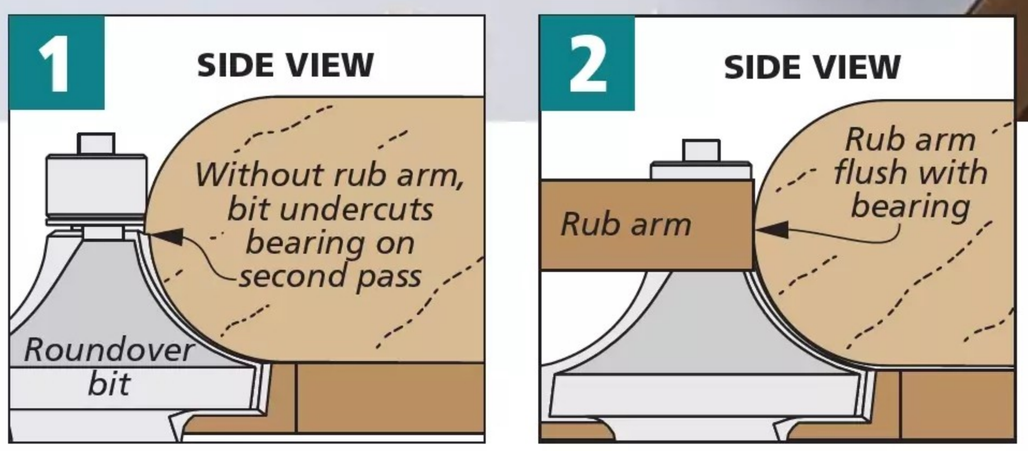
Rub Arms

In the woodworking world of straight and square, curved parts add elegance to any project they're applied to. Although they take a little extra time to create, they're worth the effort in the long run.

The process of making curves usually goes along the lines of: lay out the curve, rough cut at the band saw, and sand smooth to the layout line. Then shaping the profile as the project calls for. This can be as simple as using a sanding block or a small round-over bit. Often, the profile being applied to the curved part is larger and more complex than just easing an edge. Many times you can rout gentle convex curves using the fence without having any problems. In other instances, all you have to do is remove the fence and guide the workpiece along the router bit bearing. But if the curve is too tight, (or it's an inside curve, as is shown in the upper drawing on the next page) that's when a rub arm comes in to play.



Arm Options. Here are three examples of rub arms. All of these are designed to be clamped to the router fence.



A rub arm is a shop-made accessory clamped to your router table fence that creates a bearing surface for the curved surface of the workpiece to follow. As you see in the photo to the left, there are lots of options when it comes to making a rub arm. Each of these designs meet a specific challenge that makes routing curved parts a lot easier. The How-to box on the next page shows the basics of making a rub arm.

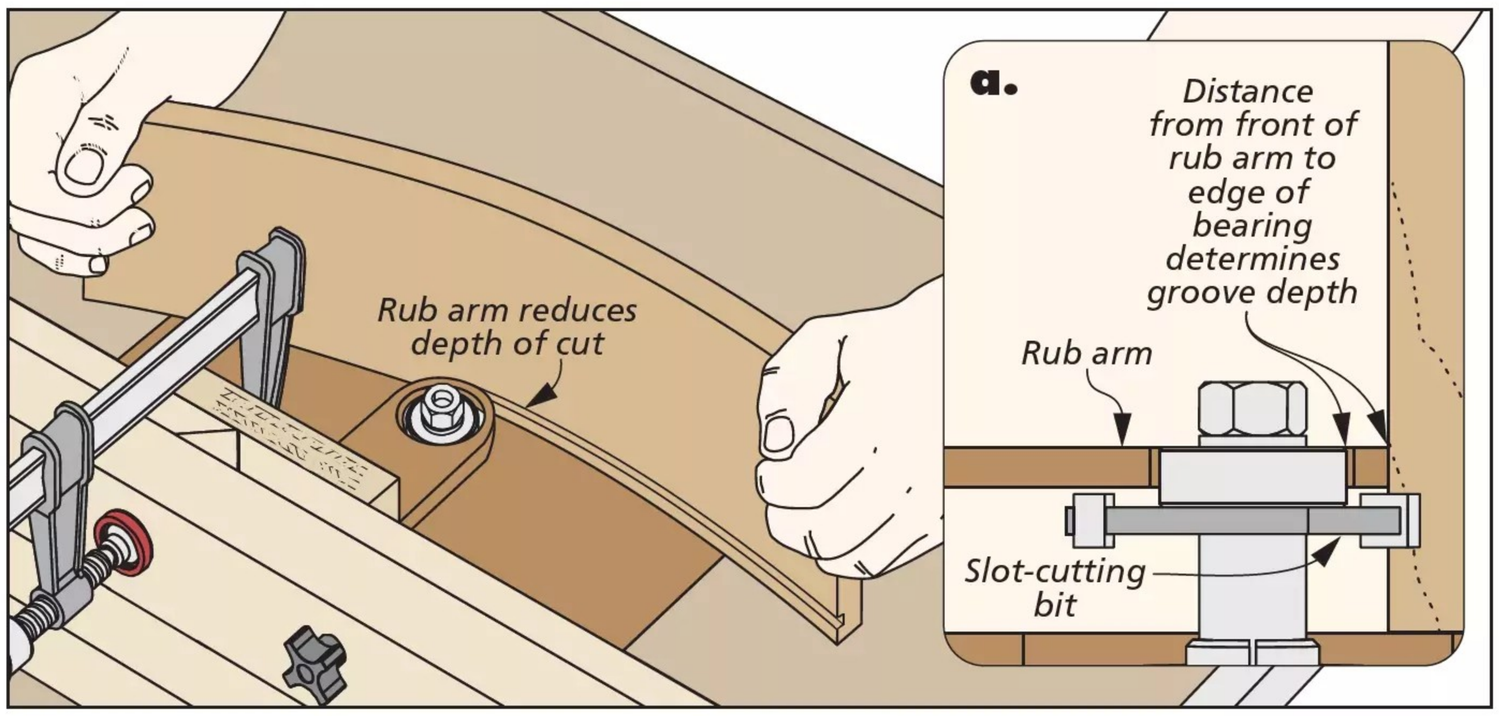
ROUNDOVERS. The first rub arm is shown above. The goal is to make a perfect roundover on a ¾"-thick workpiece. Routing one side of the piece works just fine. But, when you flip the board over, it becomes clear

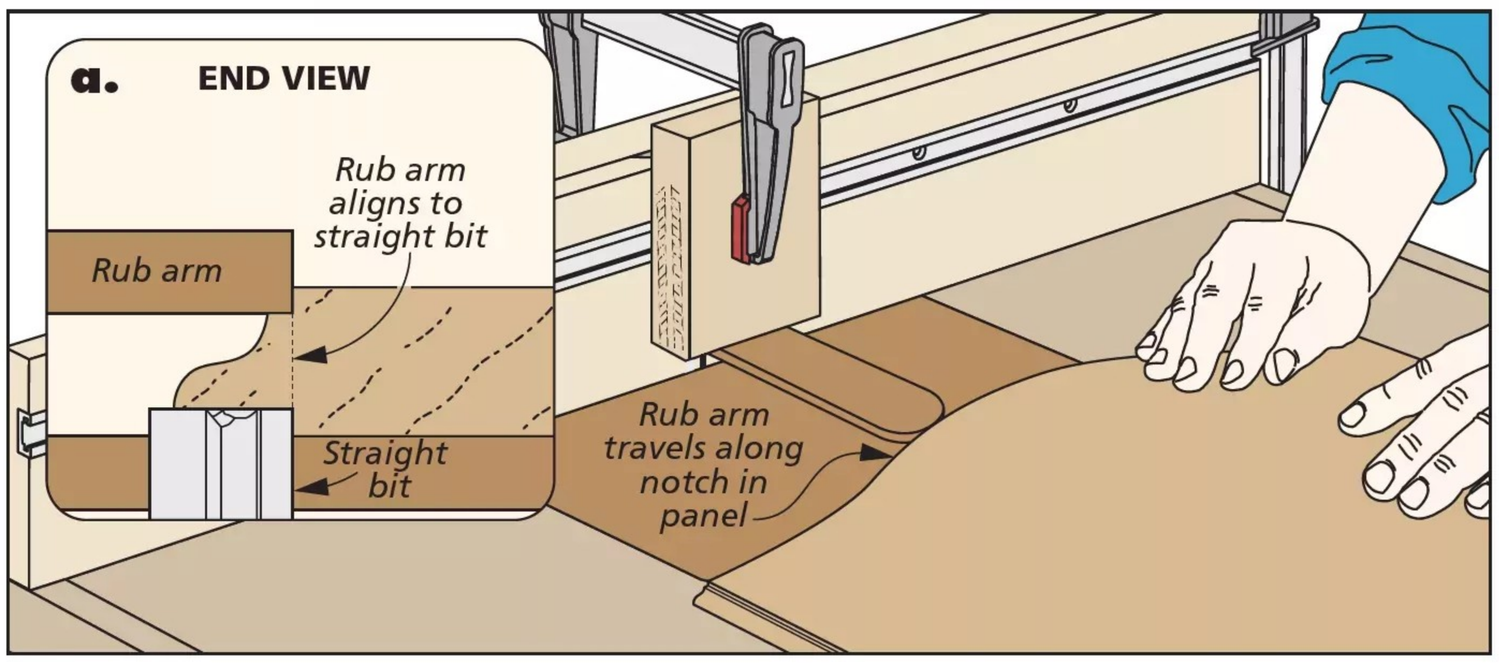
that there's a problem. The first pass has removed the surface that the bearing needs to ride against. The result is that the second pass will leave a shoulder (Figure 1). To solve the problem, I made the rub arm you see in the main photo on the previous page. When you position the rub arm as in Figure 2, it becomes an extension of the bearing and will guide the center of the workpiece the proper distance from the bit.

The hardboard tongue has a notch slightly larger than the diameter of the router bit bearing. Once this rub arm is mounted to the fence and aligned to the bit, as the drawing on the previous page shows, you can make roundovers without the shoulder.

SHALLOW GROOVES. Another example of where a rub arm can come in handy is when making a shallow groove for a drawer bottom in a curved drawer front. In this case, the rub arm comes to the aid of a slot cutting bit. The slot cutter on hand is set up to cut ½"-deep grooves, but ¼"-deep grooves are what's called for. Normally what's done here is simply changing out the bearing to reduce the depth of the cut. If that's not possible, you can make a rub arm that acts as the larger bearing you need.

This rub arm has a clearance hole to fit over the bearing. The distance from the edge of the bearing to the front of the rub arm reduces the depth of cut to make a ¼"-deep groove, as detail 'a' in the top drawing shows. After you've assembled the rub arm, set the bit to the proper height and install the rub arm over it. Make a test cut before committing to the finished project parts.





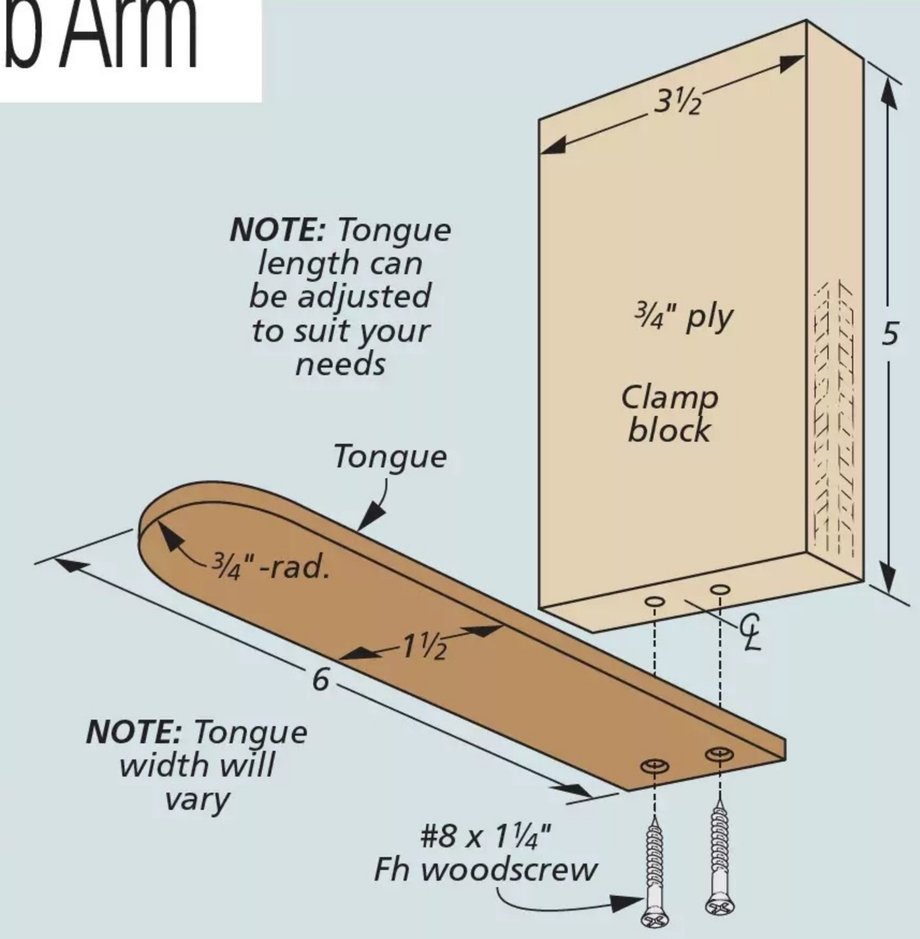
CURVED RABBETS. Routing a rabbet in a curved workpiece has its obstacles, as well. As the lower drawing shows, a rub arm is the answer to the problem again. Like the previous example, the rub arm becomes the bearing point, but in a slightly different manner. It works in tandem with a straight bit as shown in detail 'a' of the lower drawing.

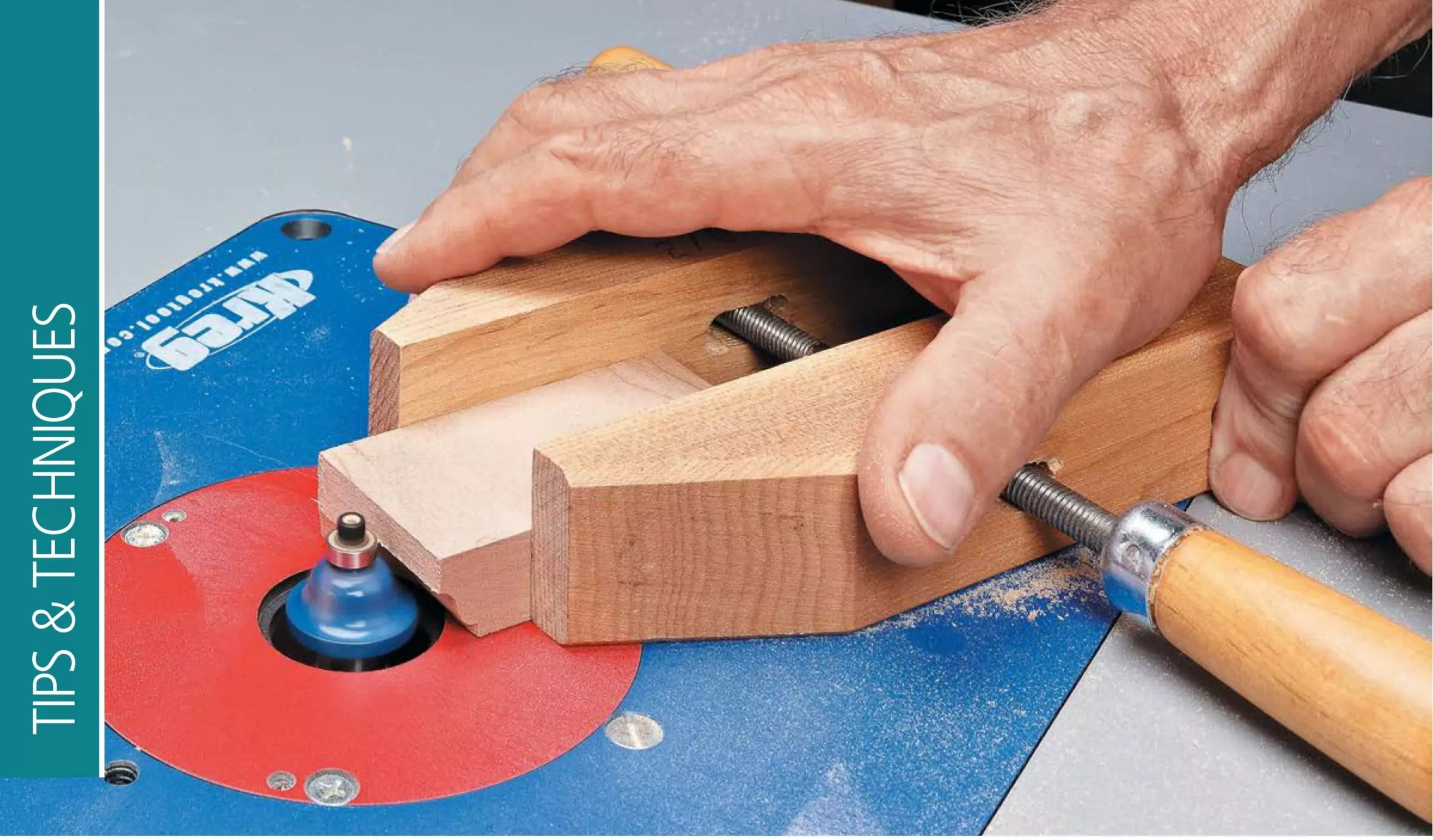
The rub arm used here is the same that's shown in the box to the left. The easiest way to set up this rub arm is to align the tongue to the notch in the finished profile on the panel, as shown in detail 'a'. Once that's done, set the location of the fence before raising the bit to the appropriate height. After that, it's just a matter of guiding the workpiece along that notch to create the rabbet. By the way, you can rout the straight sides of the panel as well with this rub arm.

I'm sure that the examples shown here are sparking all sorts of ideas. However you choose to employ a rub arm, you'll find this jig a handy asset when making clean contours on curved projects.

Making a Rub Arm

The three rub arms shown here all start with the same two pieces. They're made by attaching a hardboard tongue to a plywood clamp block (the width of the tongue will vary, depending on the application). After tailoring the end of each tongue in the manner called for, I fastened them squarely to the clamp block with two woodscrews.





Routing Small Parts

In many shops, the router table is an indispensible tool for its ability to create custom profiles. Most router tables have a surface large enough to accommodate a substantial-sized workpiece. However, one place where many router tables encounter challenges is routing small workpieces.

Large Blanks First. For small moldings, rout the profile on an oversized workpiece and then rip it to final size at the table saw.

The problem is that large openings in the tabletop and fence can cause a small part to catch or "dip" below the surface. This can not only spoil the cut, but it's also unsafe. But that doesn't mean you need to give up on routing small parts. Making cuts safely and accurately requires a different strategy and some simple, shop-built helpers.

THE PROPER MINDSET. It may seem counterintuitive, but the best way to rout small parts is to avoid it whenever possible. However, that doesn't mean you can't use small parts. Instead, the solution is to do any routing operations on a larger blank before cutting the part to final size at the table saw. The photo at left shows what I mean. It's a great way to make small parts, like corner moldings. But there are times when this method isn't possible.

HANDSCREW HOLDER. If I absolutely must cut the part to final size before routing, then securing the part in a handscrew is the perfect, quick option (see the main main photo). An added advantage of using a handscrew is that the jaws can be skewed for holding irregularly shaped parts. I even keep one close by with adhesive-backed sandpaper attached to the jaws for the best gripping power.

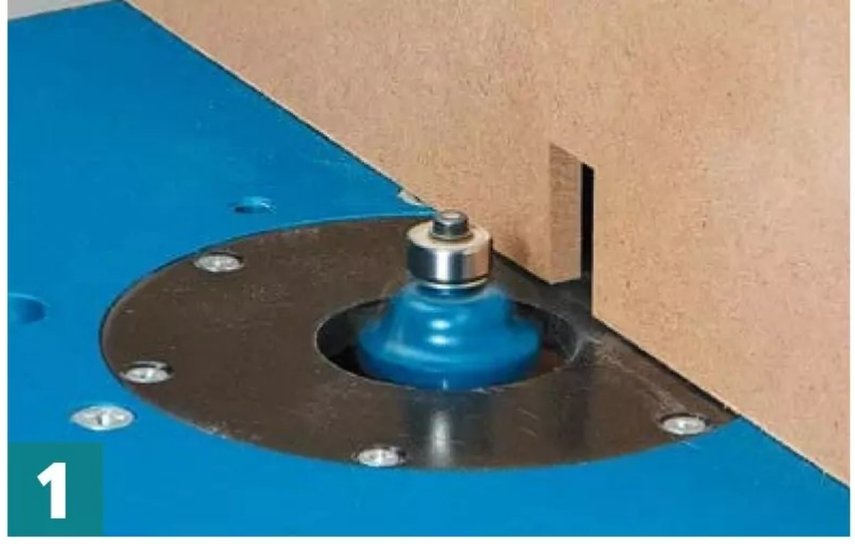
Zero-Clearance Routing. A zero-clearance table used in conjunction with an auxiliary, zero-clearance fence offers a custom solution for small parts routing.

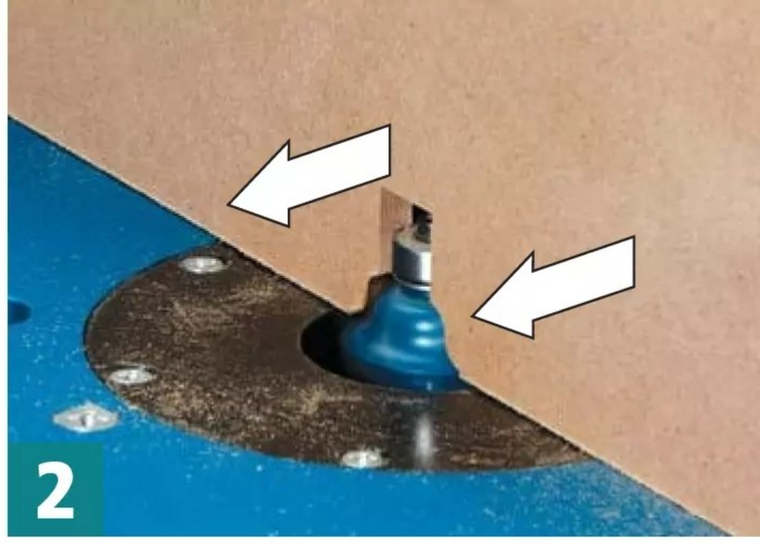
ZERO-CLEARANCE OPTIONS. But what do you do when the workpiece is small, but too big to hold with a handscrew? Well, there are a couple of ways to modify your router table to better deal with these types of small parts. And both of them address minimizing the openings where a piece could potentially catch and spoil the cut.

AUXILIARY FENCE. For router table fences that have a fixed bit opening, the best option is to attach an auxiliary hardboard face using double-sided tape. Before attaching the hardboard, cut a small notch equal to the diameter of the router bit bearing (Step 1).

To create the zero-clearance opening, simply slide the fence forward over the spinning bit, so the opening matches the shape of the bit (Step 2). Since only a small part of the bit is exposed, the workpiece will always be fully supported, as you see in Step 3.

ZERO-CLEARANCE TABLE. As shown in the right photo on the previous page, the idea behind a zero-clearance table mimics that of the auxiliary fence. Here, I covered the tabletop with hardboard and a small hole for the bit. Combined with the fence, you end up with a setup that's safe for routing small parts.





Fence. Making the zero-clearance fence starts by cutting a bearing-sized opening in the hardboard (Step 1). Then attach the hardboard to the fence and slide it into the spinning bit (Step 2). The gap-free face means the workpiece is always fully supported (Step 3).

SMALL PARTS SLED. If routing small parts is more common than not in your shop, then you might want to check out the box below. This small parts sled offers a more permanent solution.

Small Parts Routing Sled

When the need arises for routing multiple small parts quickly and safely, this small parts sled fills the bill nicely. Basically, the sled holds the workpiece so that it acts like a larger workpiece. The larger size is easier to control and keeps your fingers well clear of the bit.

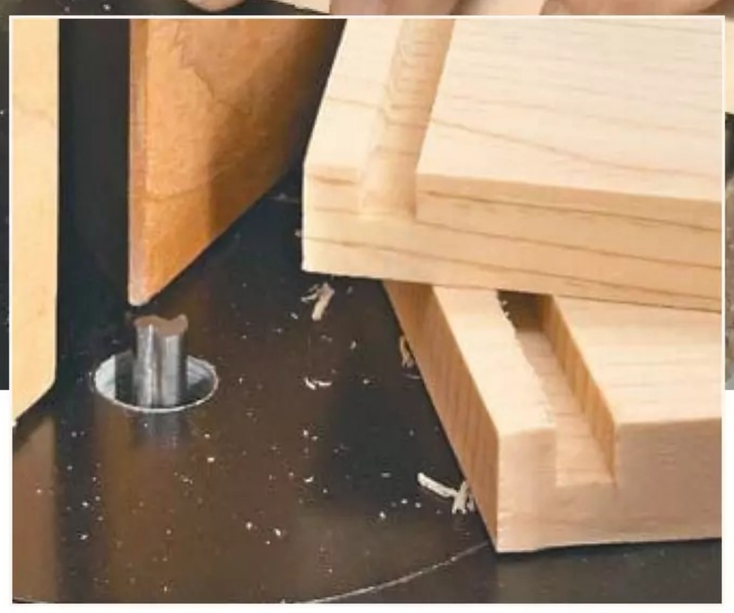
Simple Construction. The sled features a pair of adjustable stops that capture the workpiece between them. The tapered knobs lock the stops in place and serve as handles.

To secure the workpiece against the base, a modified toggle clamp is the perfect solution. The rubber tip has been replaced with a block of wood. And the upper nut is replaced with a star knob for quick adjustments. You can find the plans for the sled at *Woodsmith.com.*

Router Sled. This small parts sled essentially turns a small workpiece into a larger workpiece. The large footprint of the sled makes it easier to push the workpiece past the bit. The tapered knobs not only lock the stops in place, but they also double as handles.

No-fuss Drawers

Three easy steps and a single bit — that's all it takes to quickly build strong drawers.



One-Bit Drawers. Use a ¼" straight bit to rout flat-bottomed dadoes, rabbets, and grooves for this simple drawer joint.

The next time you need to build a lot of drawers — especially a lot of small drawers — you might want to consider using a tongue and dado joint. This strong, no-fuss joint makes quick work of building drawers.

The nice thing is, there are no tricky setups to making this joint. All it takes are the three easy steps — dadoes, rabbets, and grooves — shown on the next page. And best of all, what makes this joint even better is that you can cut it entirely on the router table — using only a ¼"-dia. straight bit.

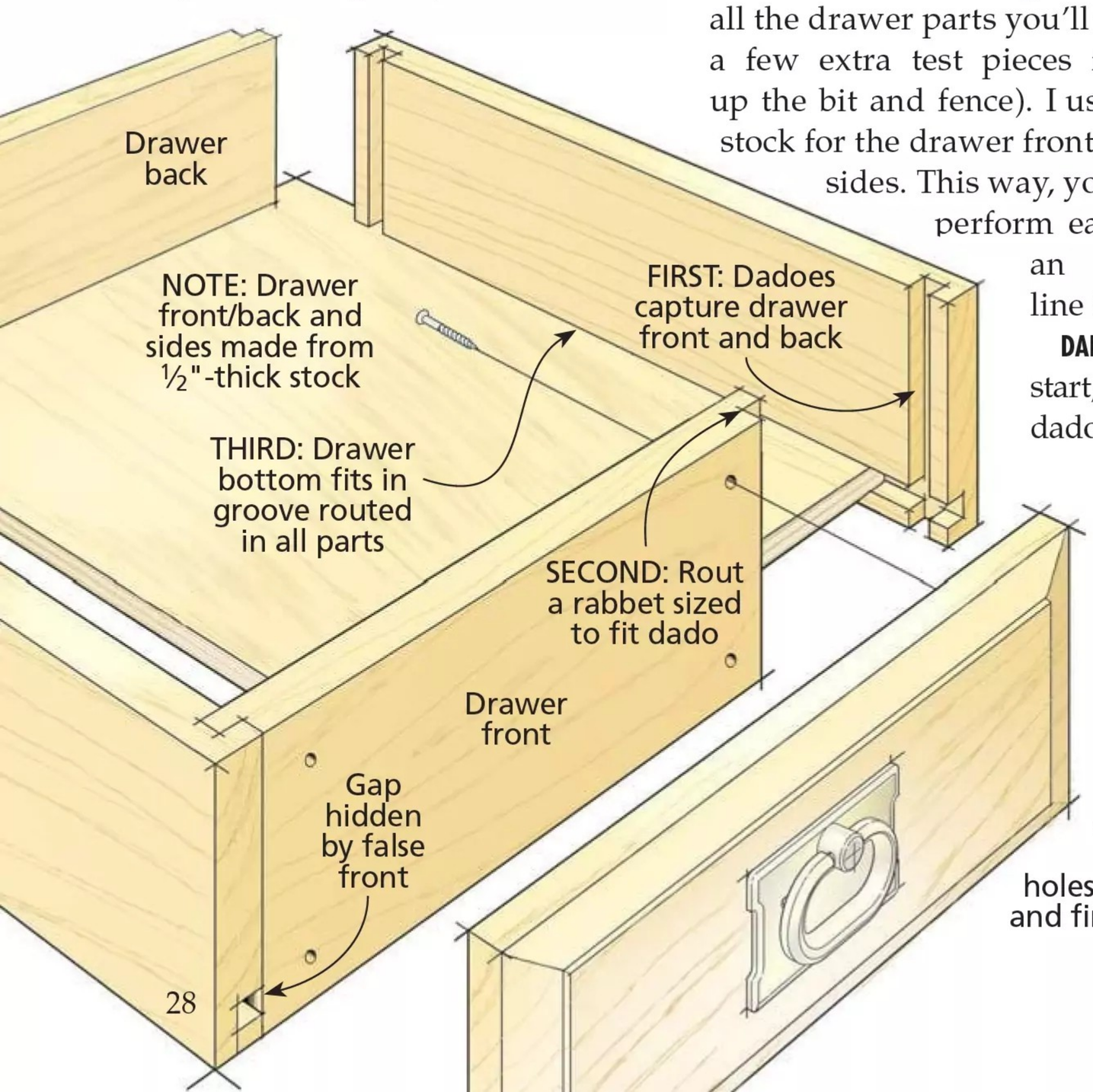
PREPARATION. Before heading over to the router table, it's a good idea to cut all the drawer parts you'll need (plus a few extra test pieces for setting up the bit and fence). I use ½"-thick stock for the drawer front, back, and sides. This way, you can then perform each step in an assembly-line fashion.

DADO FIRST. To start, you'll rout dadoes in the drawer sides. Here, I like to use a backerboard, like you see in the photo above. It does two things for me. For one, it prevents chipout in the cross-grain cut by supporting the back edge of the piece. Second, the backerboard helps keep the narrow workpiece square to the bit for a straight, accurate cut.

NEXT, A RABBET. The second step in the process is routing rabbets on the drawer front and back. Here again, you'll want to use a backer to prevent chipout. The result is a box that's square, and the front and back are flush with the sides.

GROOVES LAST. With the corner joints taken care of, the final step is routing a groove for the drawer bottom. This groove will leave visible gaps in the front and back of the assembled drawer, as in the drawing at right. But you'll take care of that in the assembly stage.

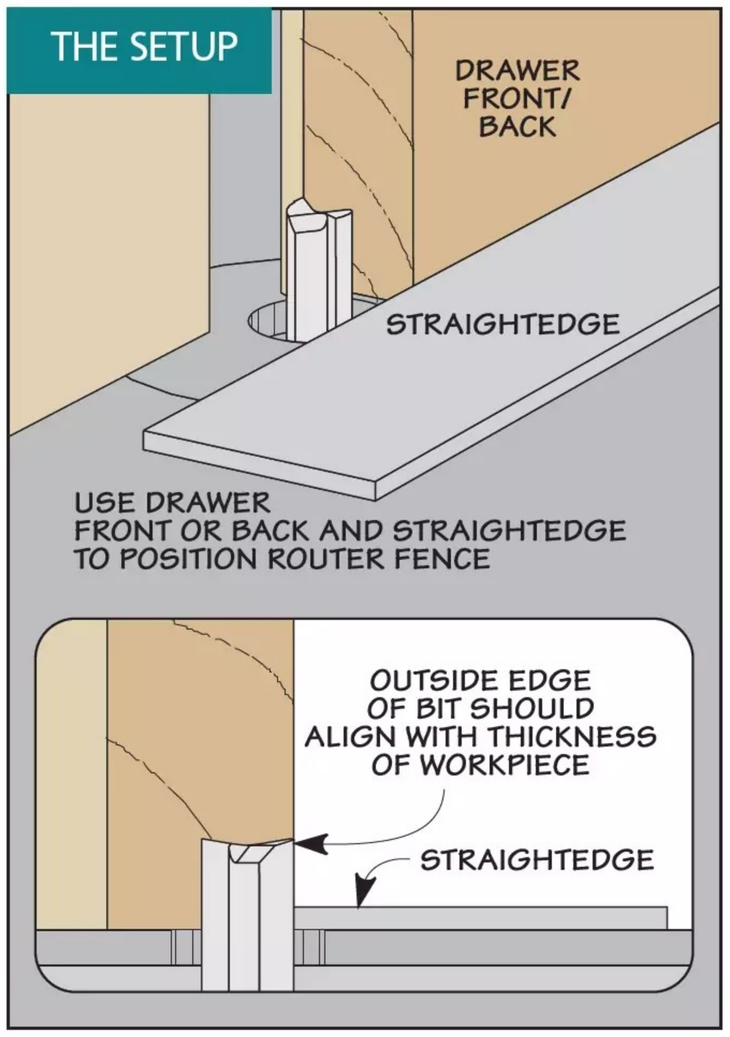
ASSEMBLY. Once the joinery is complete, you can fit the parts together and slide the plywood bottom in place. After attaching a false front to conceal the ends of the grooves, you're done.

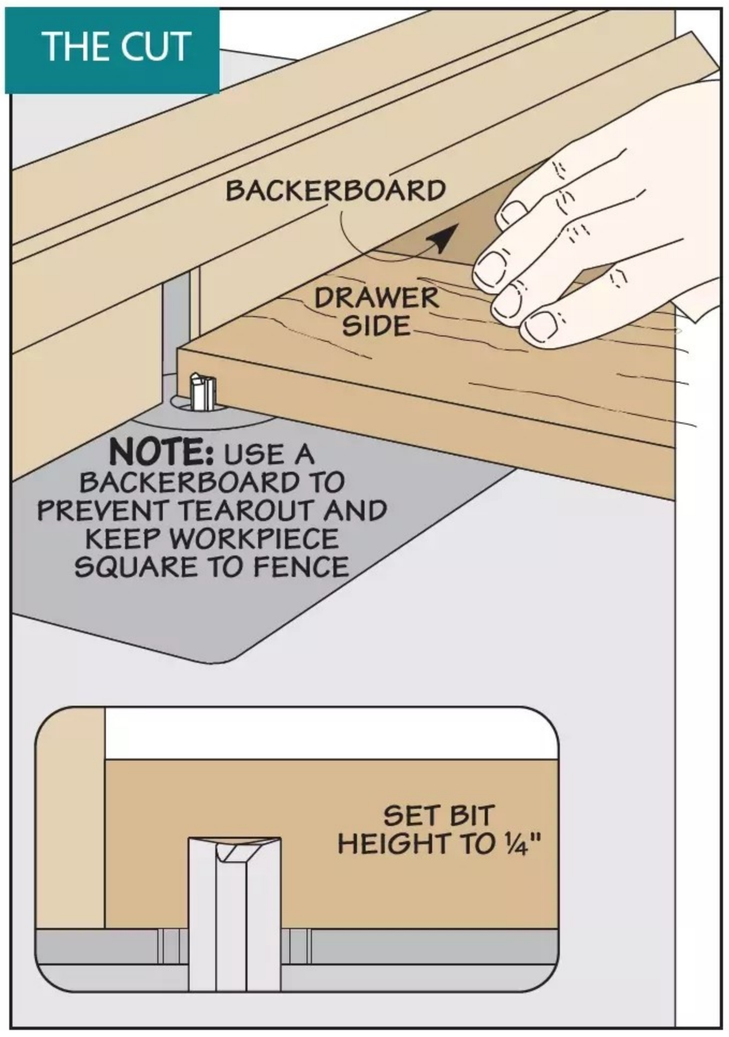


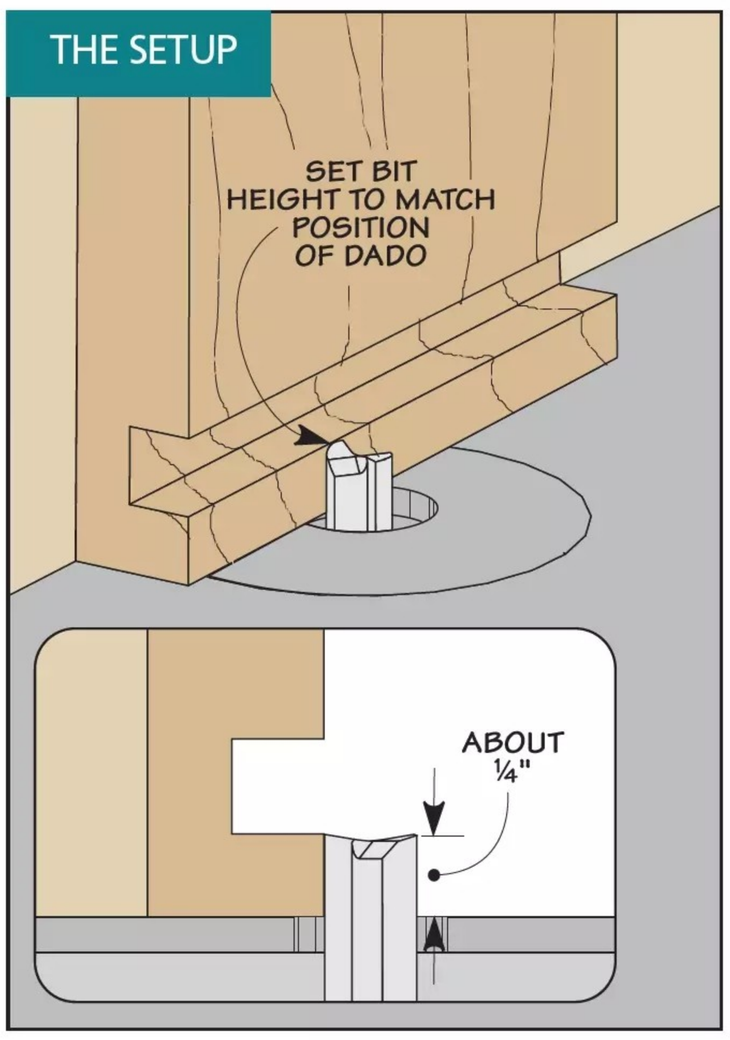
First: **Dado**

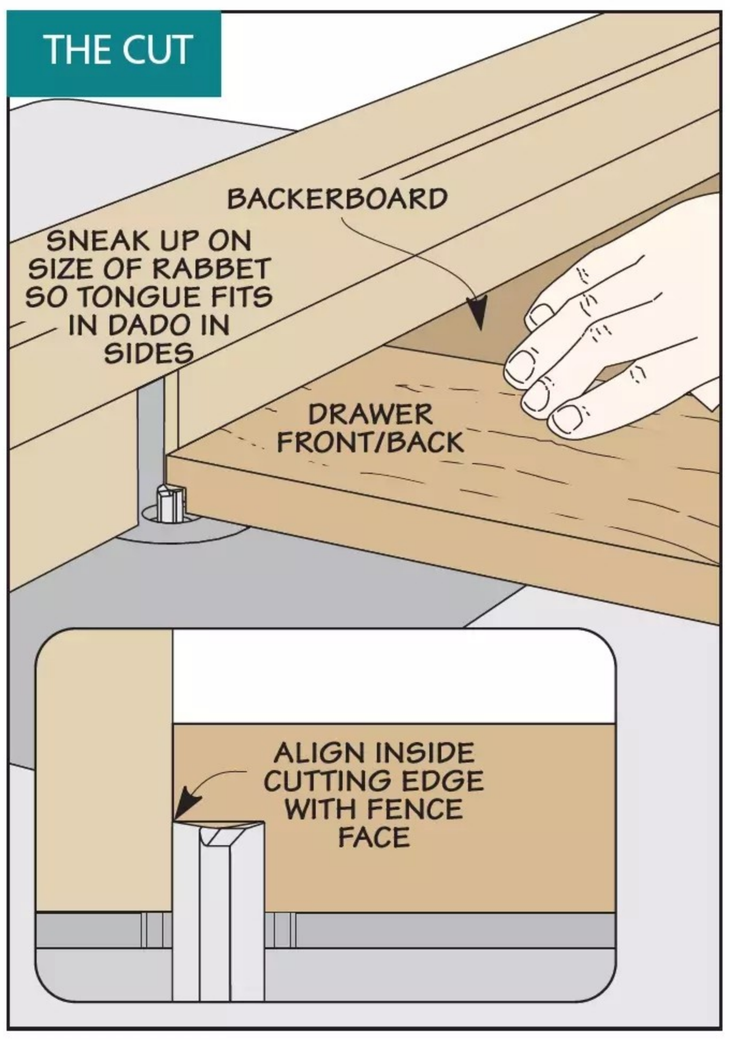
The first step in making the joint is routing a dado across each end of the drawer sides. It will accept a tongue that will be routed on the ends of the drawer front and back.

In setting up for an accurate cut, I try to do as little measuring as possible. Instead, I use the workpieces themselves as setup gauges. You can see what I'm talking about in the left drawing. Here, I use one of the front or back pieces to position the router fence. The outside face of the front should align with the outside cutting edge of the bit. The only measuring I do is to set the bit height (right drawing).









Second: **Rabbet**

The mating half of the joint is a tongue that's made by cutting a rabbet on each end of the drawer front and back. The goal of this step is to end up with a tongue that fits snugly in its mating dado in the side.

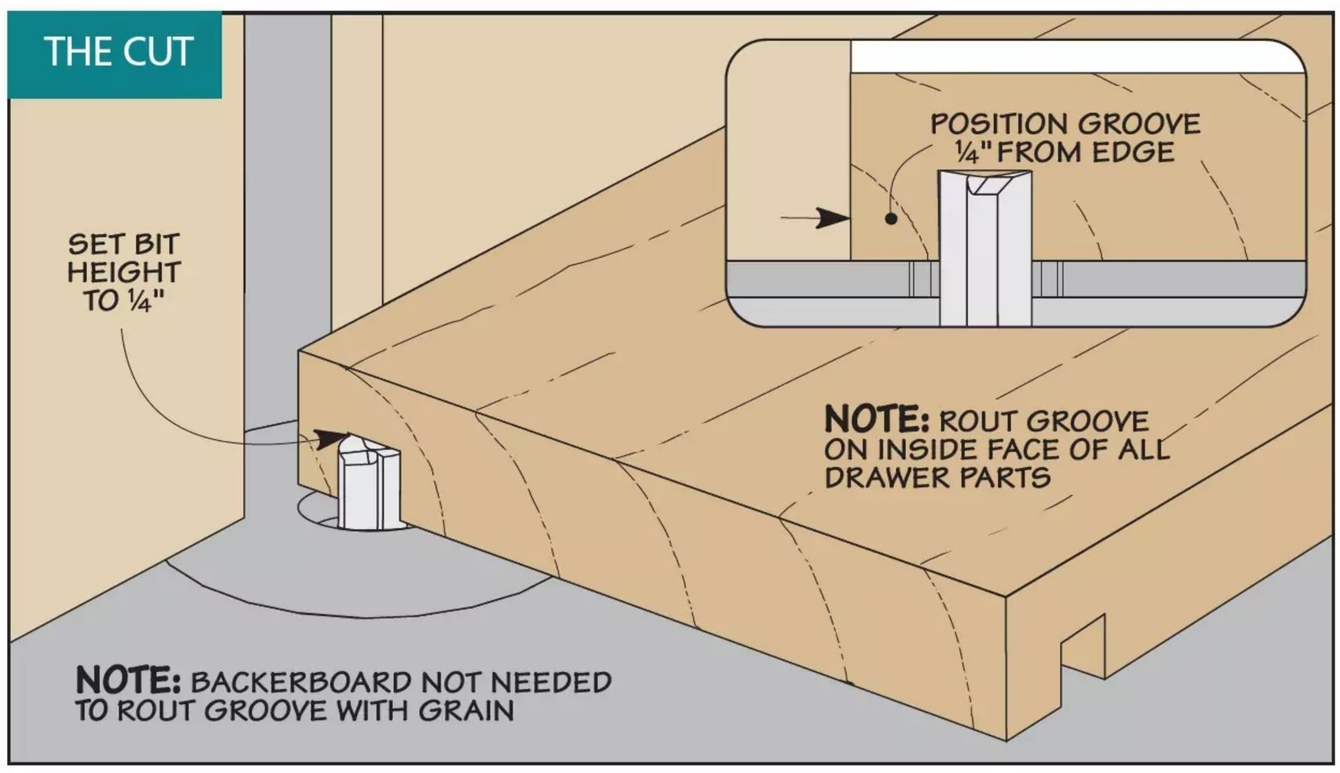
Like routing the dado, I use the workpieces to set up for the cut. In the "setup" drawing at left, you can see how I use the dado in the side pieces to set the bit height.

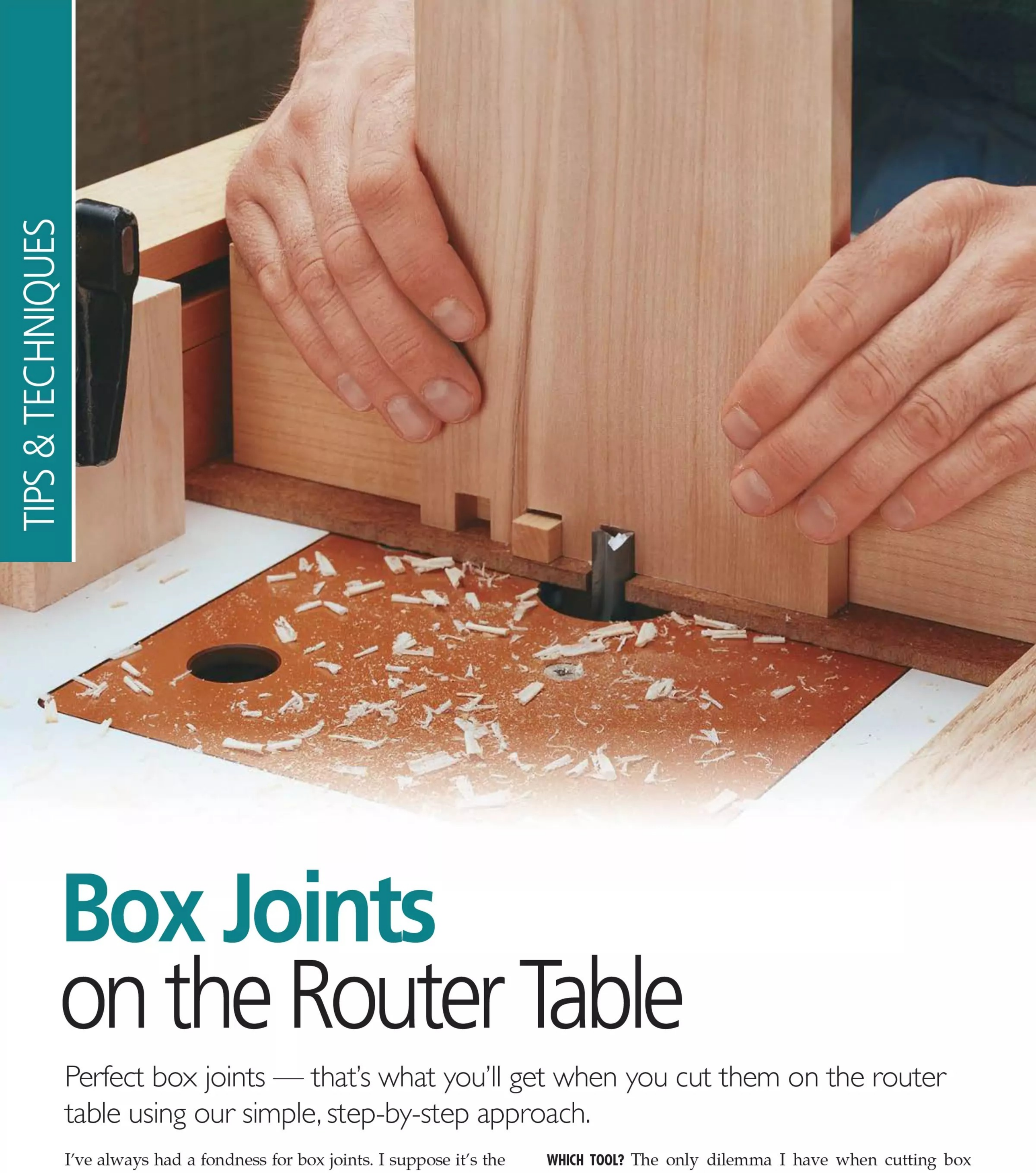
As for setting the fence, all you need to do here is position it so the face is flush with the inside cutting edge of the router bit. As always, make a test cut to check the setting.

Third: **Groove**

That takes care of the joinery, but there's still one step left, and that's to make a groove in the drawer front, back, and sides to hold the drawer bottom. I like to cut this groove about ¼" up from the bottom edge.

If you plan on using ¼" plywood for the drawer bottom, the fit may be a little loose. For a snug fit, you can do this on the table saw and make a couple passes with a standard blade to sneak up on the fit.





Box Joints on the Router Table

Perfect box joints — that's what you'll get when you cut them on the router table using our simple, step-by-step approach.

I've always had a fondness for box joints. I suppose it's the symmetry of the joint — the evenly spaced pins and tails are hard to resist whenever I need to join together the parts of a drawer or small box, like you see in the upper drawing on the opposite page. And next to its cousin the dovetail, the box joint is one of the strongest ways to join wood.

WHICH TOOL? The only dilemma I have when cutting box joints is choosing which tool to use — the table saw or the router table. As a general rule of thumb, if the stock is thicker than ½", I use a dado blade on the table saw. (It's not safe to take this large of a cut in a single pass with a router bit.) But if the stock is less than ½"-thick, I use the router table.

BOX JOINT JIG

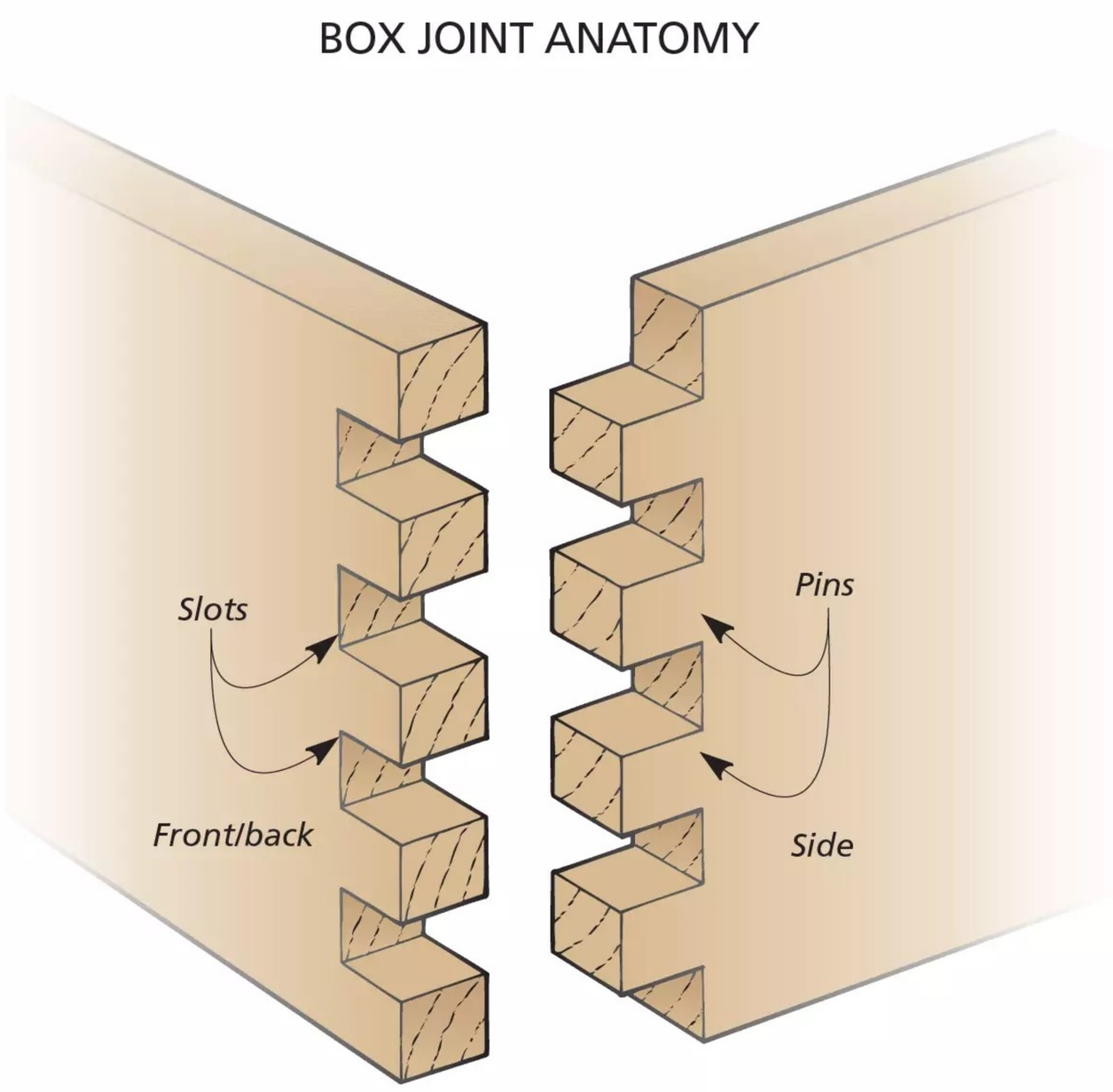
The advantage of using a router table is that a straight bit produces a perfect slot with smooth sides and a flat bottom — unlike the less than perfect cut from a dado blade. And because the router bit is a standard, pre-determined size, there's no messing with dado blades and shims. All you need to cut box joints on the router table is a simple jig, like the one shown below, and the step-by-step directions on page 33.

The jig is basically a three-piece sled that rides along the fence. Although it's designed to handle stock up to 5½" in width, it can easily be modified to handle wider stock.

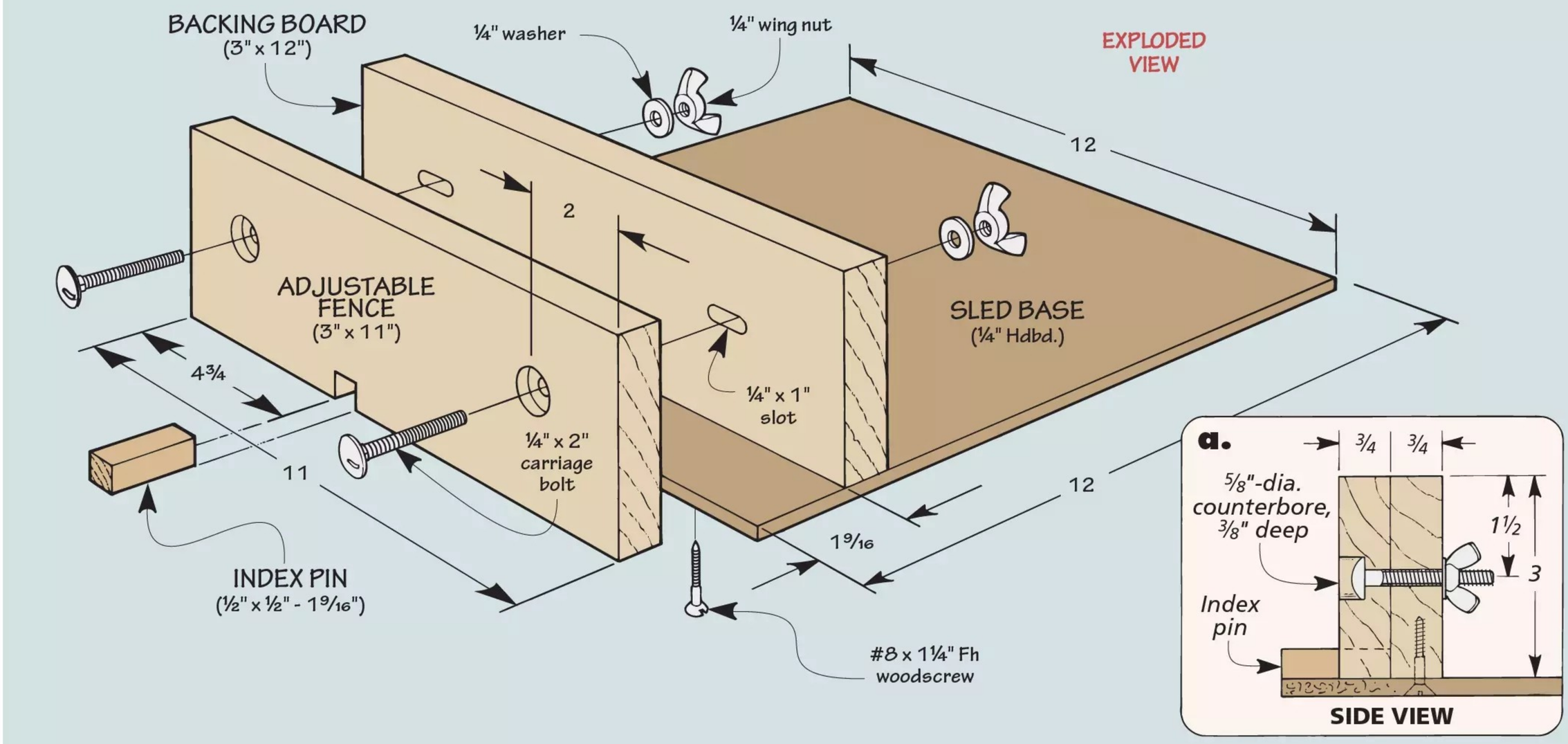
SLED. The sled is made up of a ¼" hardboard base and a hardwood backing board, as you can see in the Exploded View below. Attached to the backing board is an adjustable fence with a hardwood index pin, which makes it easy to index your workpiece to make evenly spaced cuts.

PIN. The size of this pin is what determines the width of the box joint. For example, if you're going to cut ¼" box joints, use a ¼" pin. Or for ½" box joints, use a ½" pin. Note: You'll need to make different adjustable fences for each of the different-sized box joints you're going to cut.

SLOTS. Then, to allow for small adjustments when setting up the jig, you'll need to drill two slots in the backing board for the carriage bolts that hold the adjustable fence in place.



The Jig: Adjustable & Accurate

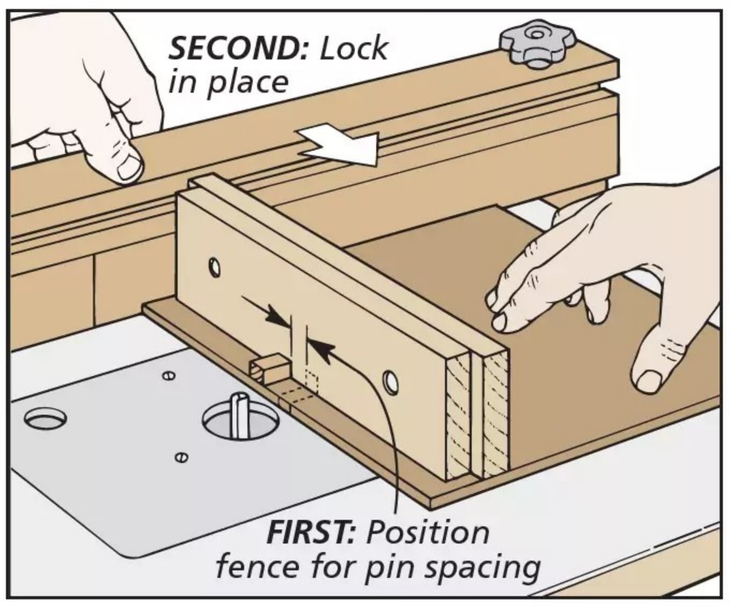


Setting Up **the Jig**

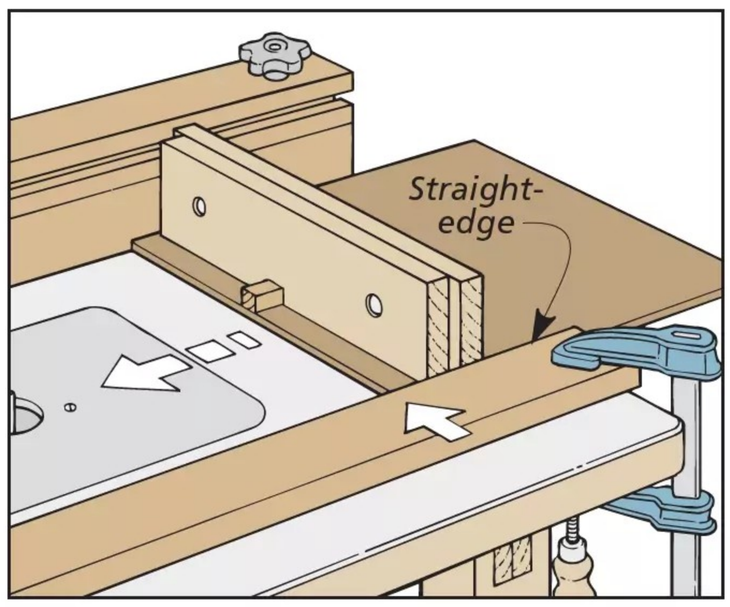
To set up the jig, first raise the bit above the sled to the desired height. Then adjust the router fence so the gap between the bit and the index pin matches the width of the pin (Step 1).

Next, to keep the jig from shifting during a cut, clamp a straightedge to the table (Step 2). A stop clamped to the router fence prevents routing through the jig's backing board (Step 3).

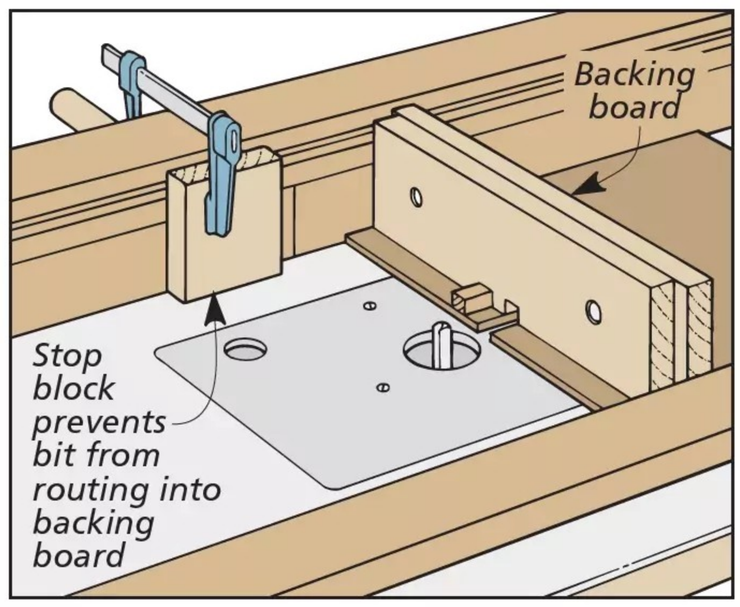
Now rout into the sled — stopping just short of the adjustable fence. Turn off the router and set the distance between the index pin and the router bit. Take a look at the upper right corner of the opposite page to see how I did this. When it's right on, make a series of test cuts to check the fit. (Troubleshooting tips are provided in the box below in case you encounter any problems.)



1 Fence. Position the router table fence so the gap between the bit and the pin matches the width of the pin.



2 Guide. To ensure an accurate cut, clamp a straightedge to the tabletop parallel to the fence.



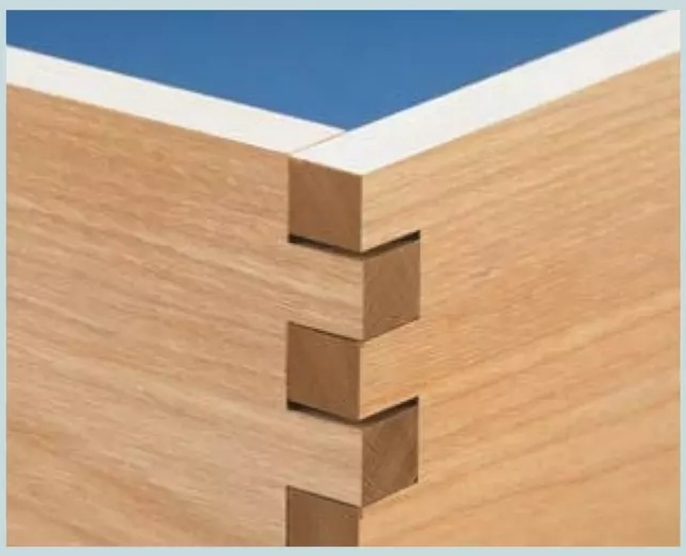
3 Stop Block. Position a stop block on the fence to prevent the bit from cutting through the backing board.

Box Joints: Troubleshooting Tips

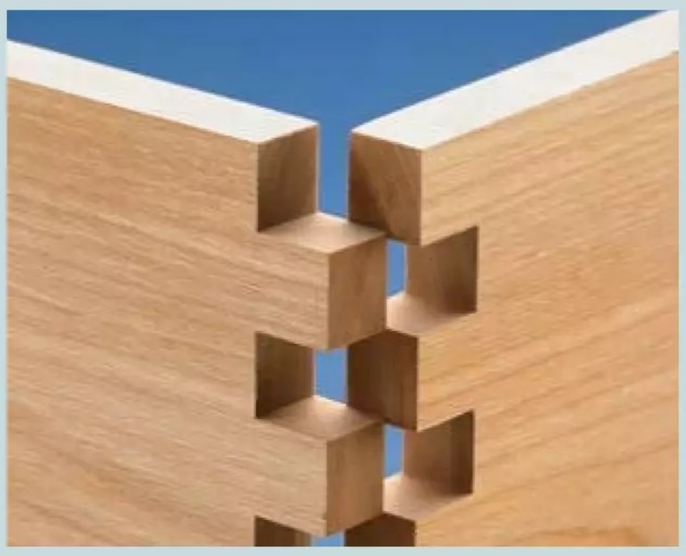
Perfect Fit. On a perfect-fitting box joint, the pins are flush with the sides and there are no gaps.

Short Pins. If you end up with pins that are too short, the problem is that the router bit is set too low.

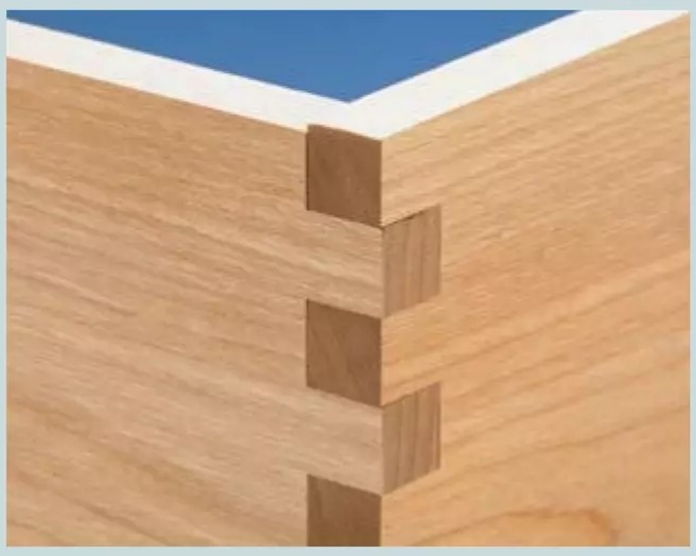
Long Pins. Pins extending well beyond the sides are caused by a router bit that's set too high.



Gap. A gap between each pin and slot is caused by an index pin that's too close to the bit.



Too Tight. If the pins won't fit in the slots at all, the index pin is set too far away from the router bit.



Offset. An offset can be caused by not having the workpiece fully seated on the index pin or the jig.

How-To:
Make Box Joints

1 Front and Back. Start with the front and back workpieces. When routing the first slot in the front (or back), hold the workpiece tight against the jig's index pin and backing board.

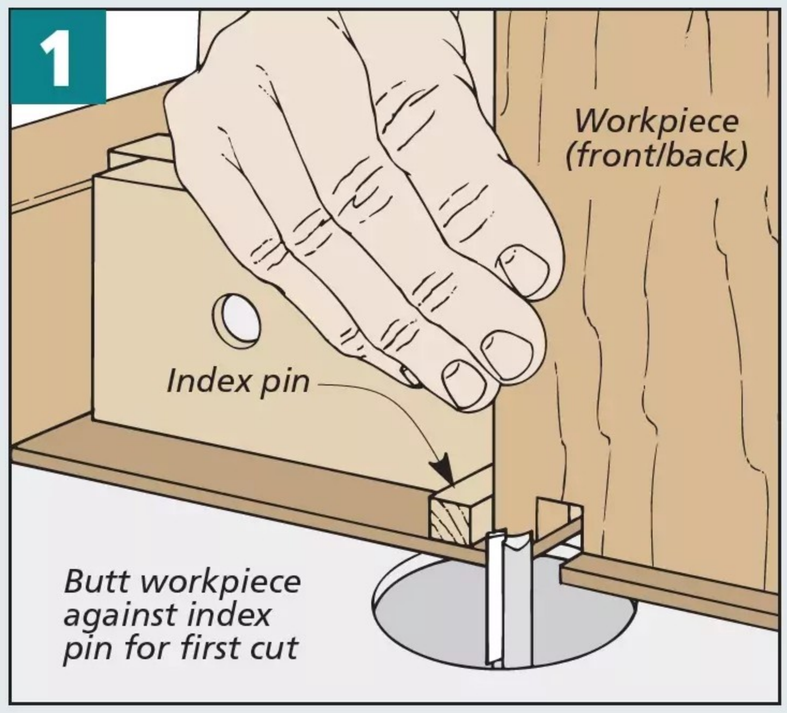
2 Index Workpiece. To rout the next slot, simply lift the workpiece, slip it onto the index pin, and take another pass. Repeat this until all the slots are complete.

3 Flip End-for-End. The matching slots on the opposite end of the workpiece are cut by flipping it end-for-end and repeating the procedure. Once the front and back are complete, work can begin on the sides.

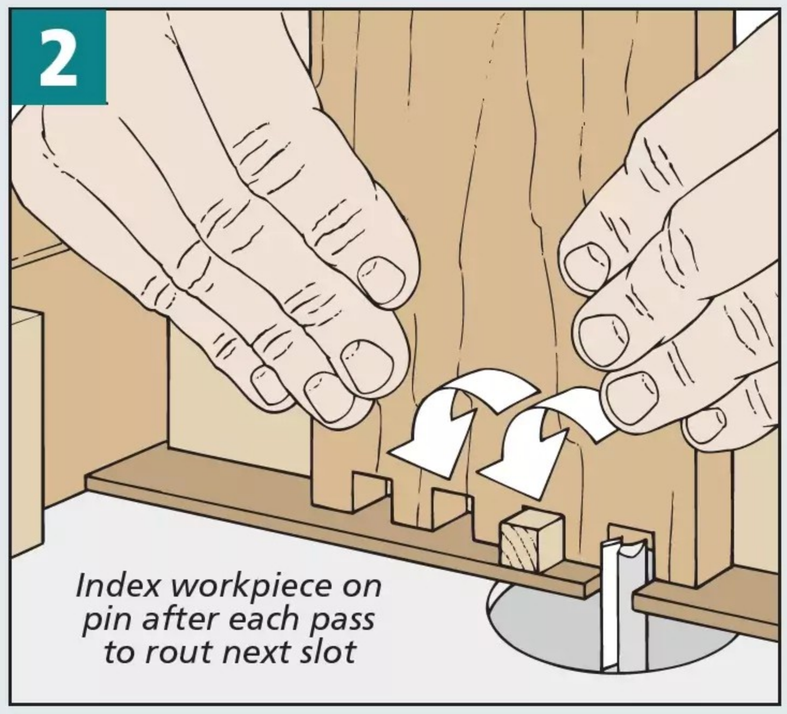
4 Side Pieces. The next step is to rout the slots in the adjoining side pieces. The difference here is you use a front (or back) as a reference to offset the slots in the sides. To do this, seat the last slot cut in the front (or back) on the index pin. Then butt one of the side pieces against it and take the first pass.

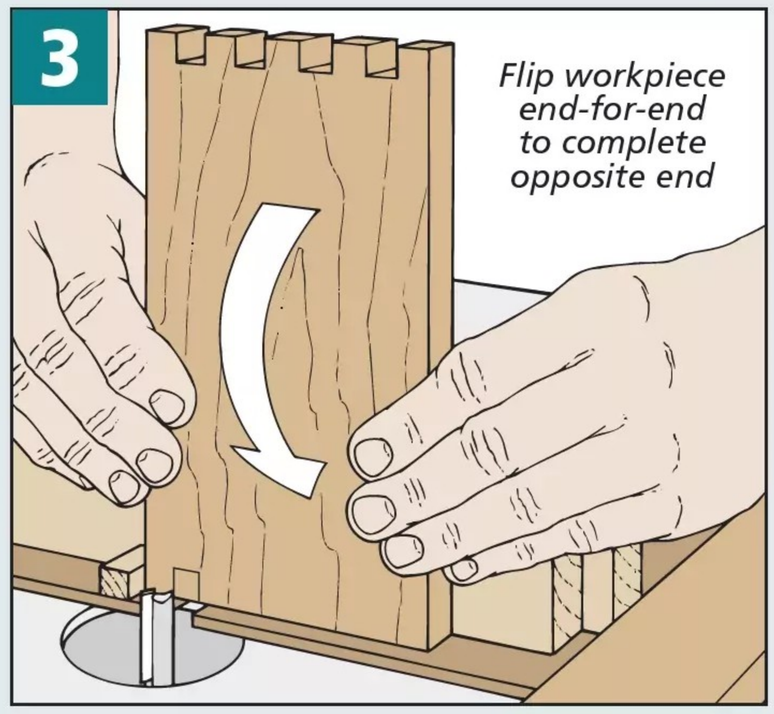
5 Complete Sides. After routing the first slot, set aside the front (or back). Now rout the remaining slots just as you did earlier. Once you've completed one end, flip the workpiece end-for-end and rout the opposite end. (Remember to offset the first slot.)

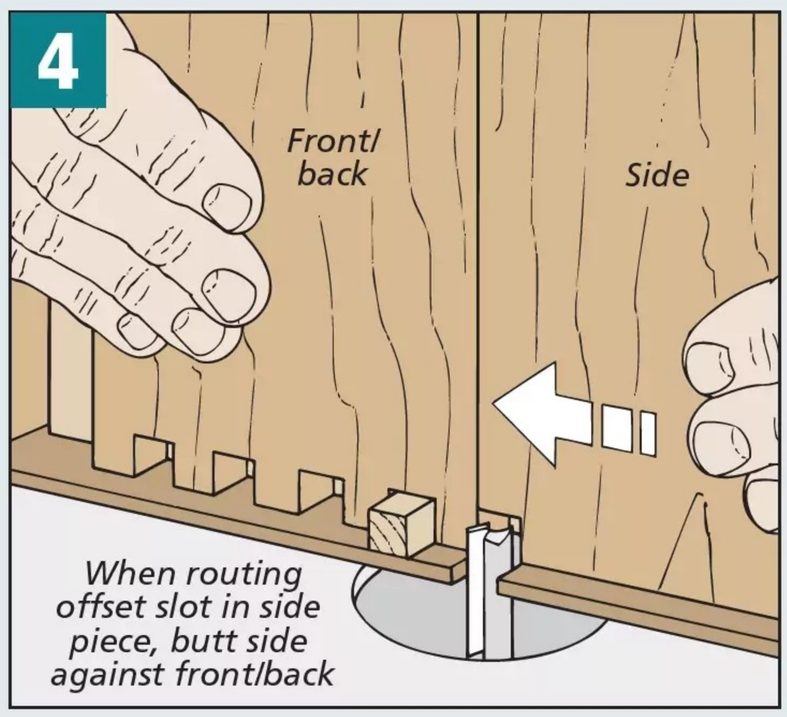
6 Bottom. If you're adding a bottom to the box, you'll need to cut a groove in each workpiece. After the box is assembled, cut a square plug to fill the notched pin on the ends of the front and back pieces. When the glue dries, trim the plugs flush and sand them smooth.

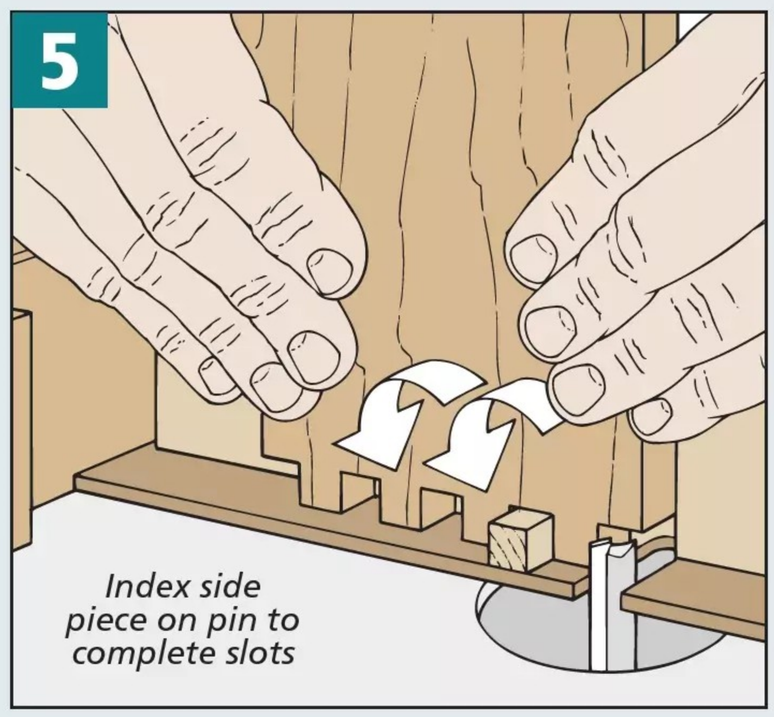


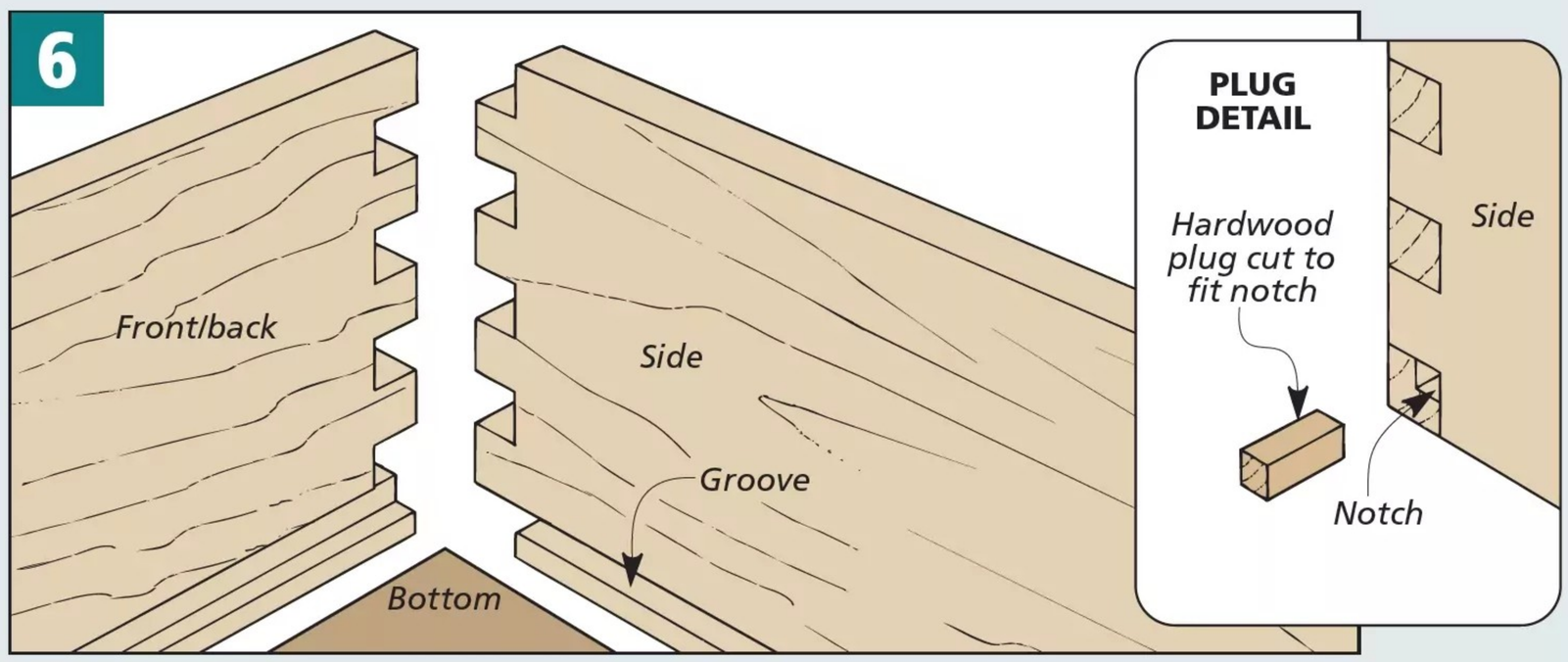
Set Up Pin Spacing. The shank of a router bit makes a handy gauge for initially setting the distance between the pin and the bit.





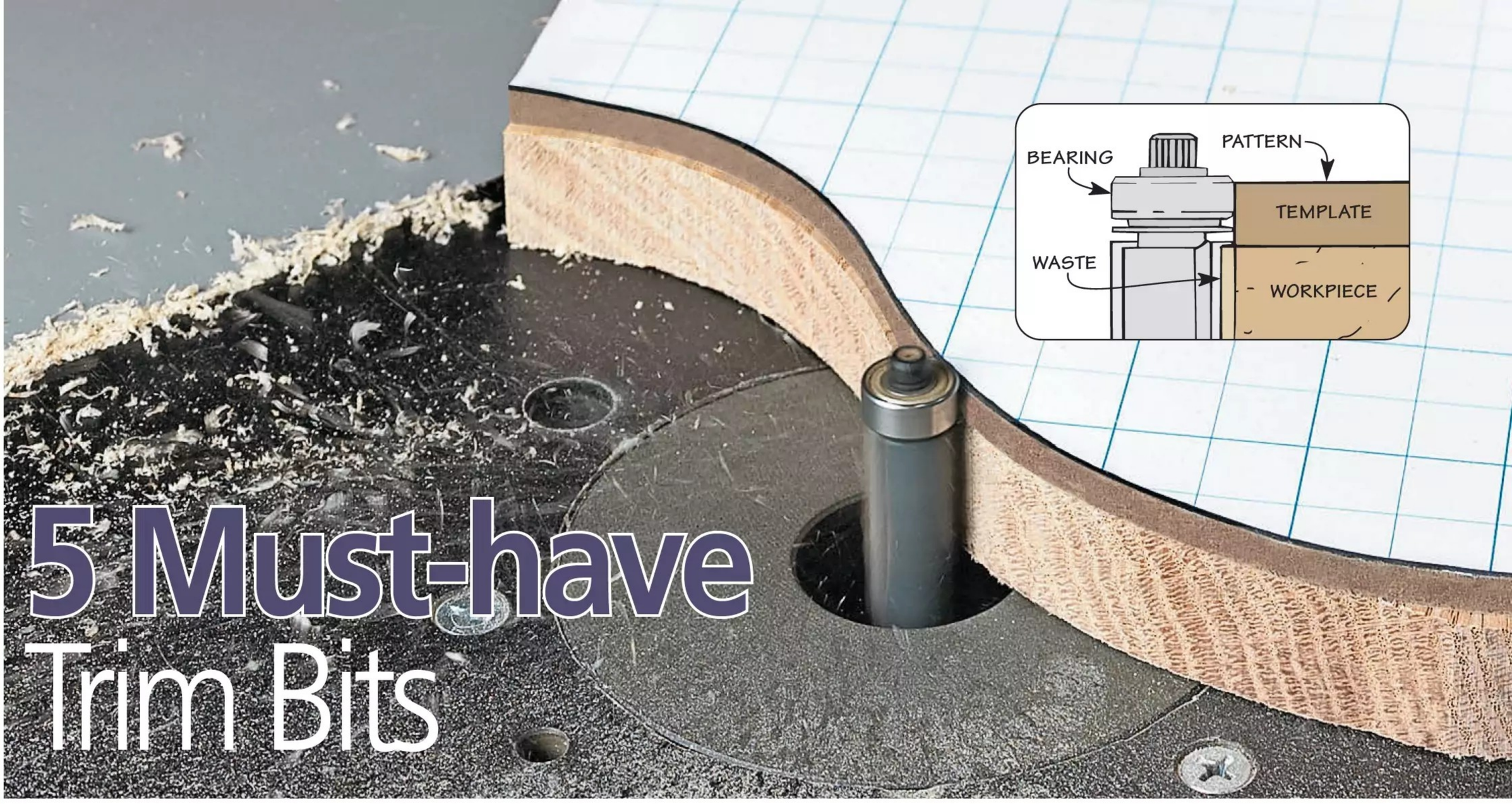






All About Bits

Much of the versatility of a router is derived from the broad array of bits that can be used with one. In this section, we'll dive into a wide variety of router bits, from simple trim bits to dedicated ones for joinery, profiles, molding, and more.



5 Must-have Trim Bits

These bits are just the thing for creating perfect parts, making multiples, and cutting precision joinery.

More than likely, you'll find a flush trim bit mentioned in nearly every list of the "basic bits" a woodworker needs. And I won't dispute that a flush-trim bit is a must. In fact, I've found that just one bit won't cut it. Here, you'll see a set of bearing-guided bits you can rely on to tackle a variety of tasks. (For sources, turn to page 98.)

WHAT'S THE DIFFERENCE? First of all, I want to clear up some terminology. Many people refer to any bearing-guided straight bit as a "flush trim bit." This can be a little confusing.

To clear things up, in Woodsmith, we refer to a bit with the bearing on the tip as a flush trim bit, the first bit you see in the photo below. If the bearing is on the shank of the bit, it's called a "pattern bit." That's the middle bit in the photo below.

TWO ESSENTIAL BITS. Actually, these two bits are the first trimming bits you should add to your collection. What makes them handy is the length of their cutting edges.

The flush trim bit shown below has a 1" cutting length. This is the bit I use most often when template routing. Having the bearing on top allows you to extend the bit to match the thickness of the workpiece you're trimming (drawing above). And it gives you great visibility while working at the router table, as in the photo above. Another advantage of this bit is it has a ½"-dia. shank. The larger shank prevents deflection and reduces vibration.

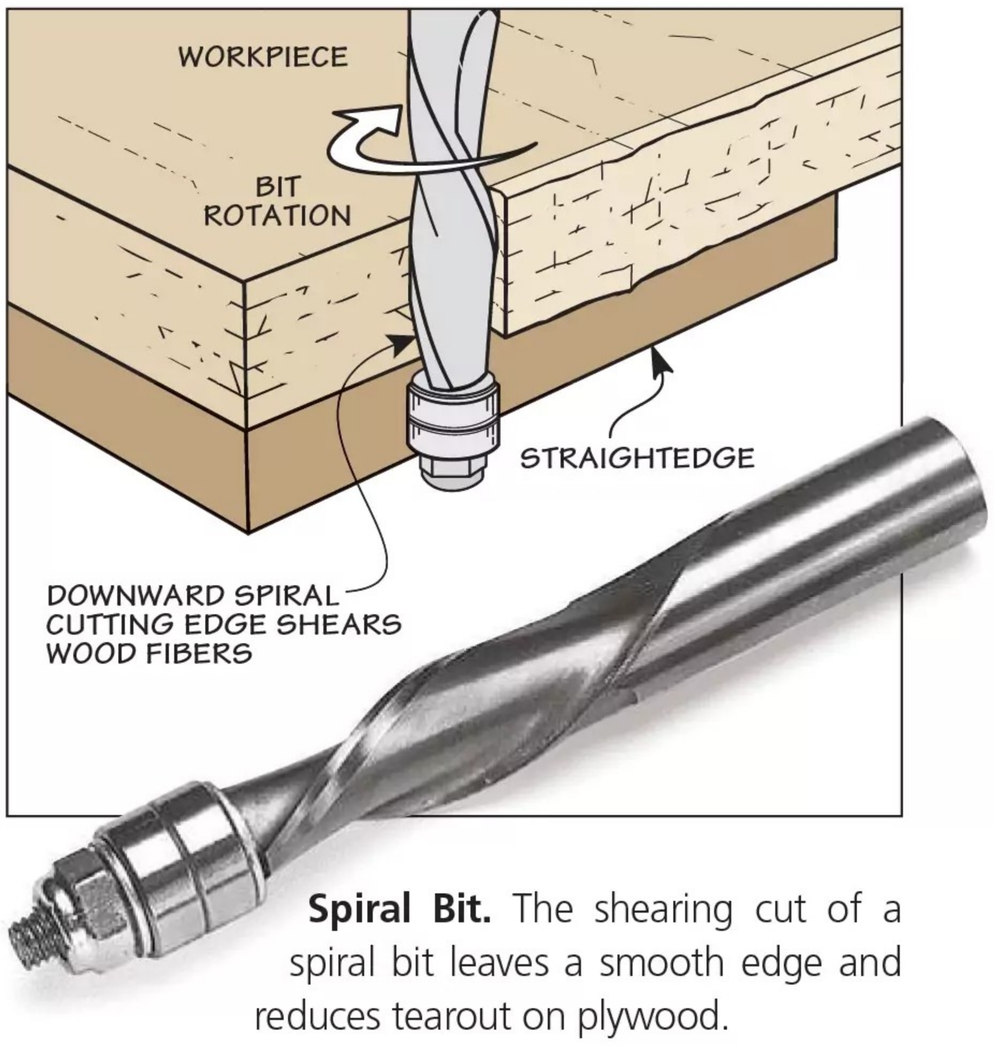
The "general-purpose" pattern bit shown in the right photo below also has cutting edges that are 1" long. I prefer to use a pattern bit when routing with a hand-held router. It allows me to attach the template on top, which provides better visibility, as illustrated in the photo and detail below.

Flush Trim Bit. With a bearing at the tip, this bit will easily handle most trimming jobs.

Pattern Bit. With the bearing on the shank, this bit can be used to make dadoes and mortises.

Double-Bearing Bit. A pair of bearings offers more options to prevent tearout when trimming.

Extra Long Flush-Trim Bit. *A 2"-long flush trim bit is just the thing for routing thick workpieces.*



Spiral Bit. The shearing cut of a spiral bit leaves a smooth edge and reduces tearout on plywood.

You'll notice this bit only has a ¼"-dia. shank. But it's a trade-off I'm willing to make. That's because I prefer a ½" cutting diameter. This allows me to get into pretty tight curves on templates. As a side benefit, a pattern bit can double as an ordinary straight bit.

These two bits are the mainstays in my shop. But I've added a few others to my collection.

COMBINATION BIT. Recently, several bit makers have come out with bits that have bearings on both ends of the bit (photo on the opposite page). This 2-in-1 bit can act like a flush trim or pattern bit.

Where this bit really shines is when trimming curved workpieces. The problem here is the changing grain direction. Routing against the grain can cause some nasty chipout. This bit solves that problem. You can simply adjust the bit height, flip the workpiece over and have it run along the opposite bearing. The result is a smooth, chip-free cut.

EXTRA-LONG FLUSH TRIM BIT. Most of time, I'm working with pieces that are ¾" thick or less. But when parts get much thicker, a standard bit just won't work.

For those tasks, I turn to an extra-long flush trim bit, as shown in the photo above. This bit can handle material up to 2" thick. That's pretty impressive. But there are a few things I want to tell you about. First, these bits only come with a ½" shank to resist deflection.

Second, it's best to take very light passes with this bit. This avoids putting too much stress on the bit and router motor.

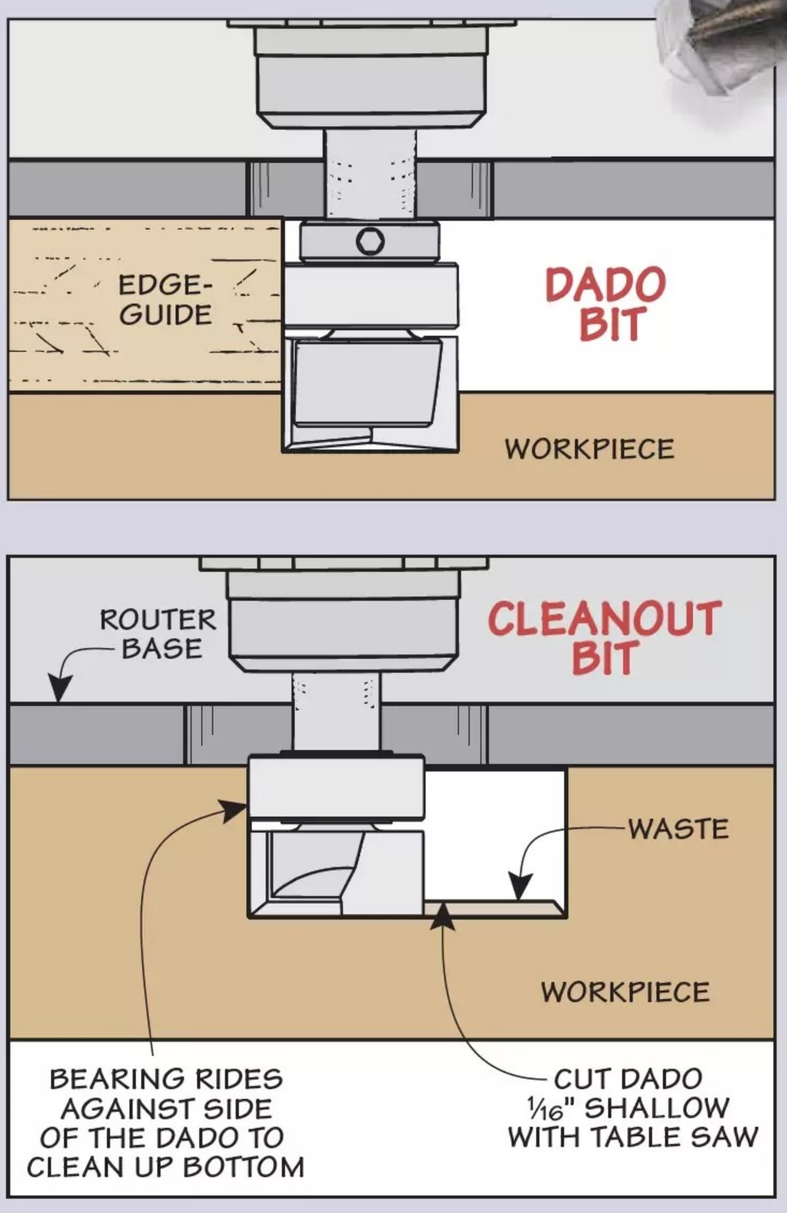
SPIRAL BIT. Ordinary flush trim bits have straight cutting edges that can sometimes cause tearout or leave burn marks. For tough tasks like routing end grain or trimming plywood panels to size, I reach for a solid-carbide, spiral downcut bit, as in the photo above. The downward slicing action of the cutting edges prevents tearout and leaves a perfectly smooth surface behind.

Finally, in the box below, you can learn about two other bits I wouldn't be without. And with the set complete, you're guaranteed to get more from your router.

Dado Bits

Dado Bit. Rout dadoes, grooves, and hinge mortises with this bit.

Cleanout Bit. Short cutting edges allow bit to ride inside a dado.



The bits shown in the article are mainly used to trim the full edge of a workpiece flush to a template. But the two short pattern-type bits shown above are perfect for cutting precision joinery.

The dado bit (left photo above) is designed to cut crisp, flat bottom dadoes and grooves when guided by a straightedge guide (upper left drawing). Since most cuts like this are shallow, this short bit is perfect for the job.

The cleanout bit at the upper right has even shorter cutting edges. It's designed to ride along the walls of a dado or groove to cut a flat bottom. You don't need a separate template or guide (lower drawing).

Straight Bits & Spiral Bits

At first glance, straight router bits seem like they'd be the simplest type of bit to choose from. After all, they're basic bits that are available in common diameters for tasks like cutting grooves, dadoes, rabbets, and the like. But when you start to dig into the wide variety of straight-cutting bits that are available, the choices become a little overwhelming.

Through the years, I've found that different types of straight bits excel at different operations. For example, I might use a standard straight bit, a straight bit with shear, or a spiral upcut or downcut bit depending on the task at hand (photos below). Here's how I choose between these different types of straight bits when working in my shop.

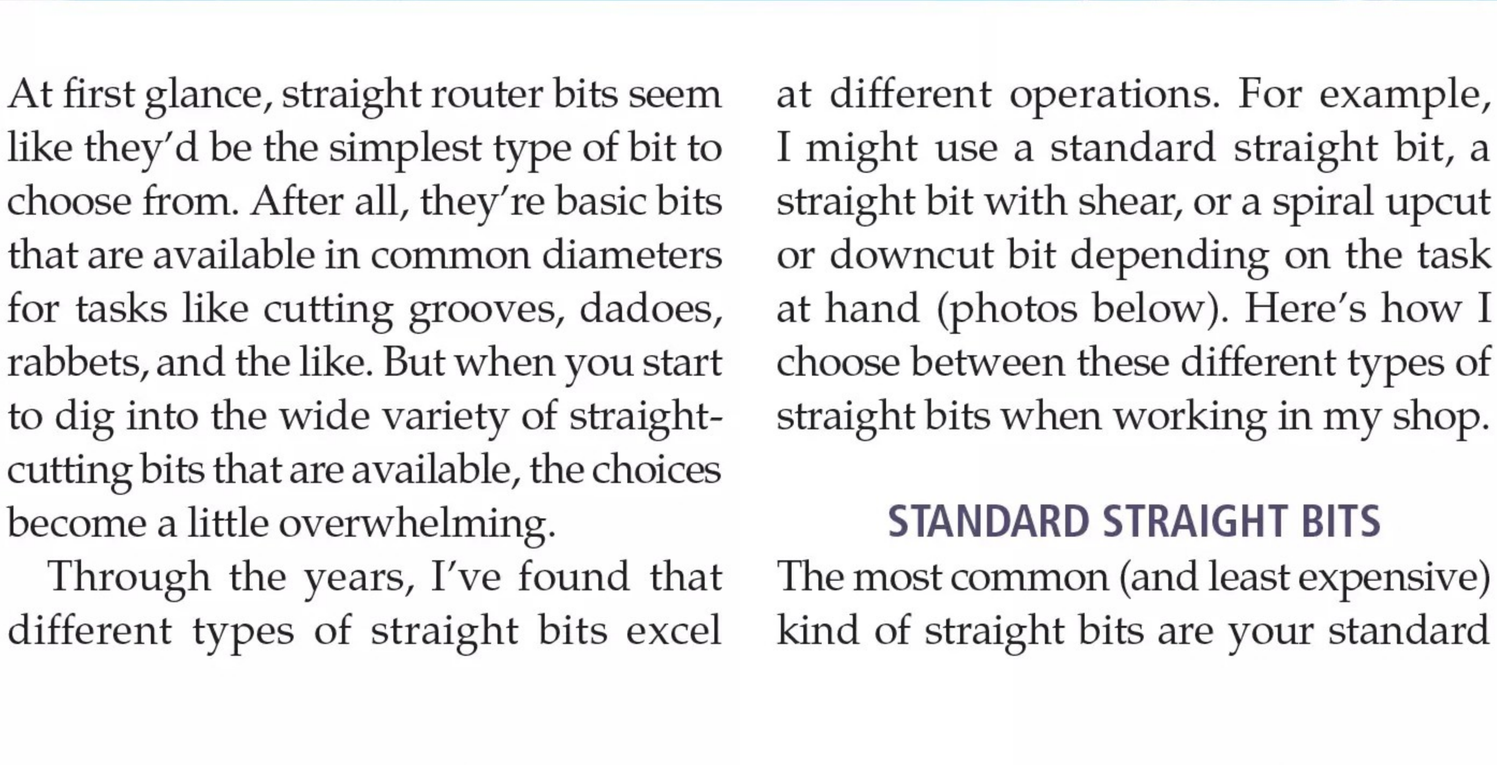
STANDARD STRAIGHT BITS

The most common (and least expensive) kind of straight bits are your standard straight bits. These bits have carbide cutting edges that are parallel with the shank of the bit and are available with anywhere from one to three cutters. The bits range in diameter from 1/16" up to 2".

You'll find standard straight bits are recommended often for common cuts like dadoes, grooves, and rabbets. The parallel cutting edges also extend to the ends of these bits, so they tend to leave a flat, even bottom for these types of cuts.

The drawback to these bits, though, is that the straight cutters create a bit of a chopping action where they make direct, 90° contact with the surface of the wood. This can leave a slightly rough, chattered surface on the sides of the dado, rabbet, or groove. It also can "fuzz up" or even chip the top veneer layer of plywood.

Having a bit with more cutters (like two or three) helps alleviate this



Basic Bits. While straight bits are the most common choice, shearing bits and spiral bits offer an advantage for some cuts.

Freehand Routing. Standard straight bits are less prone to drifting than shear or spiral bits. This makes them a good choice for freehand cuts.

Jig Routing. When the workpiece is fully supported, a standard straight bit to provides smooth cuts with no tearout. That's why I like to use common straight bits for routing box joints, along with a jig that supports the bottom and the back of the cut.

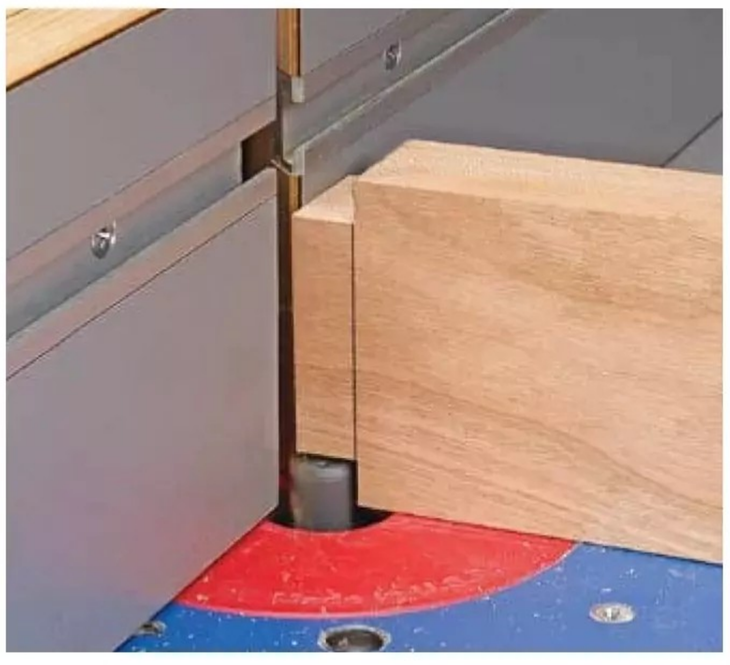
situation somewhat, but the parallel orientation of the cutters can still cause these effects, especially as the bits get dull over time.

Despite these issues, standard straight bits still have an important role in my shop. Their ability to create a flat bottom makes them ideal for cuts like hinge mortises or box joints (refer to the photos above).

The parallel, straight cutters on the standard straight bits also don't pull or drift as much as spiral cutters tend to do. This makes them useful for making shallow freehand cuts, as the upper left photo indicates. Plus, you can always address some of the tearout and chipout issues related to these bits by backing up the cut with auxiliary fences (upper right photo).

STRAIGHT BITS WITH SHEAR

If you find the chatter that's left behind by a standard straight bit to be bothersome, or if you have a lot of cuts to make in end grain, then a good upgrade to consider is a straight bit with shear.



Shearing. For cuts on tricky end grain, a straight bit with shear does a nice job of shaving the wood and preventing chipout.

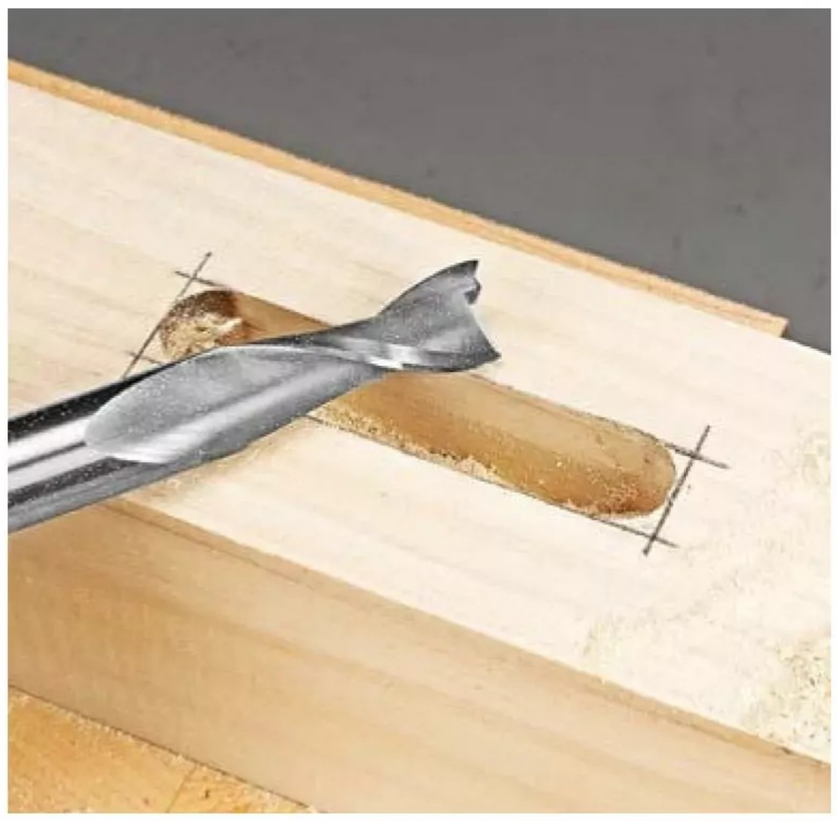
These bits are similar to standard straight bits, and in the same ballpark price-wise, but the cutters are skewed at a slight downward angle to produce a shearing action rather than a chopping action. This results in smoother cuts on the end grain of a workpiece, such as when cutting rabbets or tenons, like in the lower left photo.

I also find that they produce clean results when cutting shallow dadoes and grooves in plywood (main photo, previous page). Finally, if you need to trim the edge of a workpiece with a straight bit, they'll shear it smooth and clean.

SPIRAL BITS

When it comes to straight bit options, spiral bits are the gold standard. These bits are solid carbide or high-speed steel and have cutting flutes that spiral around the shank of the bit. As you can see in the lower right photos on the previous page, the flutes on the two bits wind in opposite directions in order to perform different tasks.

Downcut bits are similar to straight bits with shear but provide superior results. Their cutters as shaped to have a downward cutting motion that shears the wood and prevents fuzzing or tearout on the surface of plywood or



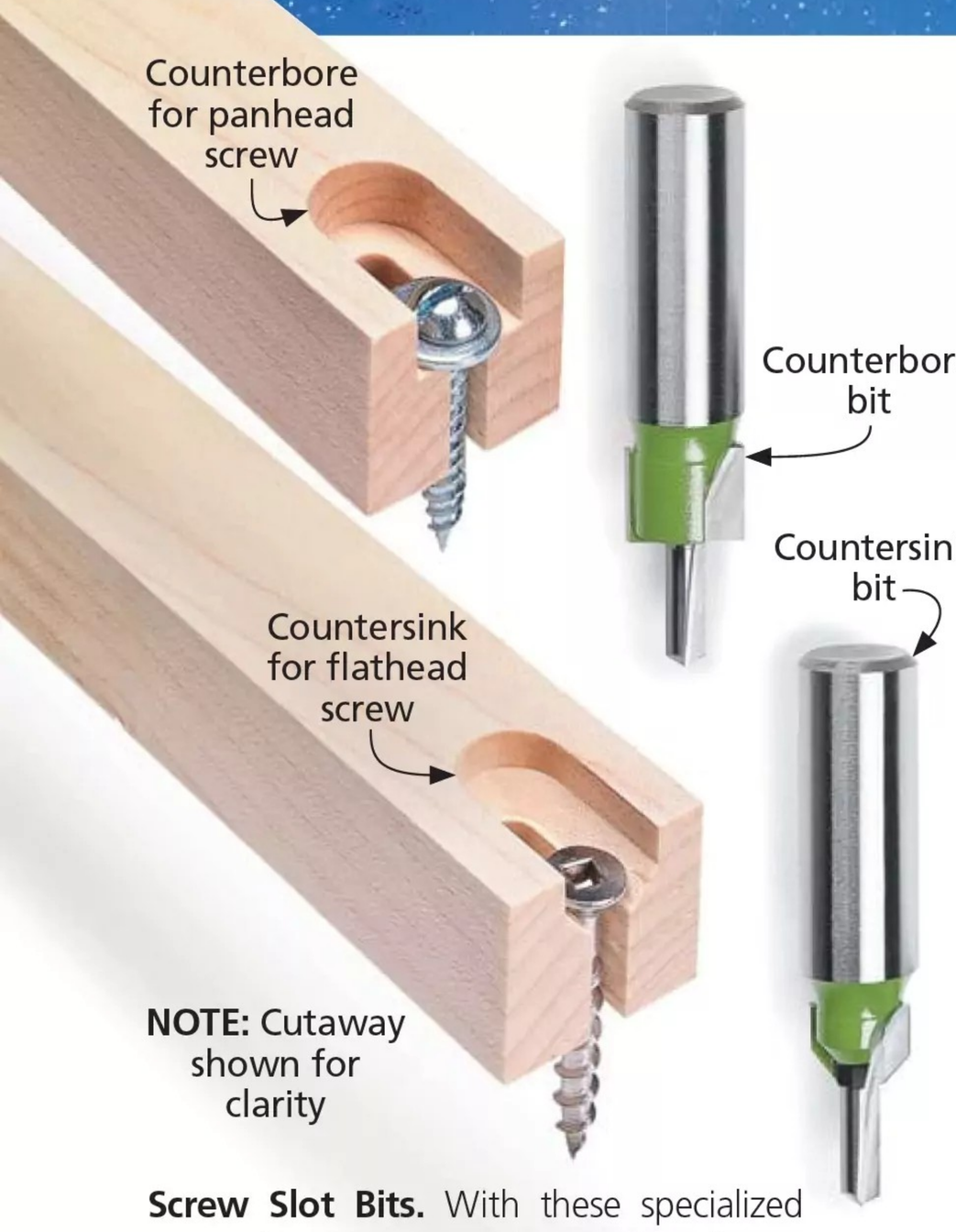
Upcutting. With cutting edges on the end and flutes that pull chips up and out, the spiral upcut bit is the perfect tool for plunge-routing mortises.

end grain. I'll often turn to the downcut bit for my most important projects. When I'm cutting dadoes, grooves, and rabbets in expensive, cabinet-grade plywood, for example, or cutting joinery on the ends of small box parts, it's my bit of choice.

A spiral bit is also a must if you're routing deep mortises (photo above). Here, you'll want to invest in a spiral upcut bit. The bits have cutting edges on the end for plunging into the wood easily. And the rotation of the cutting flutes pulls chips from the mortise as you rout, which makes routing easier.

THE STRAIGHT STORY. In truth, I find that all three types of straight bits have an important job in my shop. The key is knowing which type of bit yields the best results for the task at hand.

4 Unique Router Bits



Screw Slot Bits. With these specialized router bits you can slots with either a coutersunk or counterbored profile.

Anyone who's been in our shop or seen one of our shop tour videos knows that we have a lot of router bits. And I mean a lot. Truth be told, some of them are for very specific operations. However, there are a few of these specialty bits that, quite honestly, work so well that they're worth the expense and the shop space. Let's take a look at a few of these unique bits.

SCREW SLOT BIT

The first unique bit that I really like is the type shown to the left. These are screw slot bits. They form slots in a workpiece for the shank of a screw to pass through while holding the head — all in one pass. You can see the bit in action in the main photo above.

THE USES. The main use behind a screw slot bit is to allow the screw to move along the length of the slot. This is particularly useful when you need to account for wood movement, such as attaching a table top. You can see this in the upper right photo on the next page.

These bits also work well for when you want something to be adjustable. A common use, at least in my shop, is creating adjustment slots in jigs. You can also make adjustable drawer runners, like you see in the photo on the next page.

TWO PART BIT. The bit works by combining two cutting sections. The first is a narrower straight cutter that creates the slot for the shank of the screw. The second is the wider cutter to make the slot for the head of the screw. These bits are available in two styles — a flat style (upper bit, left photo) for creating a slot for pan head or washers, and a

v-cutter (lower bit) for normal flathead screws. Screw slot bits can be used in material up to 13/16" thick. One thing to keep in mind is that using thicker material results in a deeper countersink or counterbore.

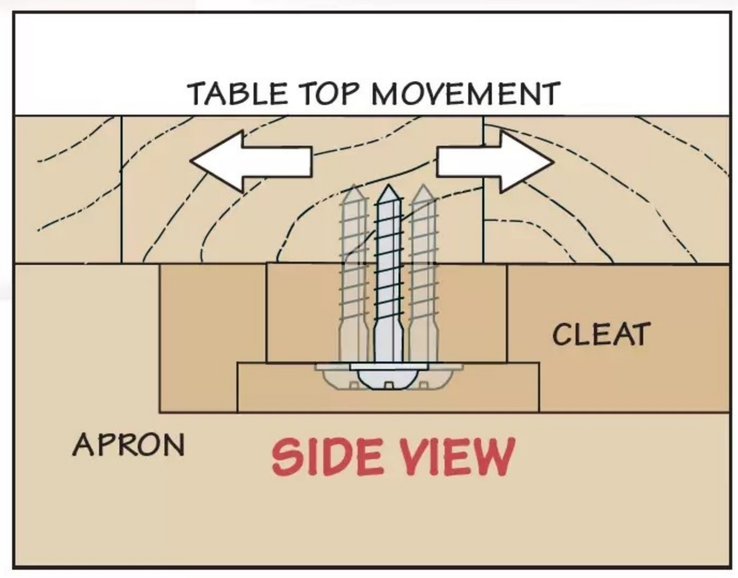
Easy Pilot Holes. With these specialized router bits you can make slots with either a coutersunk or counterbored profile.

SIMPLE TECHNIQUES. There are two quick and easy methods to put these bits to work — at the router table and using a hand-held router. I'll discuss the router table method here and the hand-held router in the box at the bottom of the page. The technique for creating a screw slot at the router table is pretty much the same as routing an ordinary straight-sided slot. You can see all the elements in action in the main photo on the previous page.

SOME SETUP. The process begins with a little layout and setup. After installing the bit in the router table, mark the centerline of the bit on the router table fence. You use this mark as a gauge to know where to start and stop moving the workpiece.

LAYOUT. On the face of the workpiece, draw lines to indicate the length of the slot. Remember, you're using the center of the bit as a reference. So you need to account for the radius of the bit when you mark the lines.

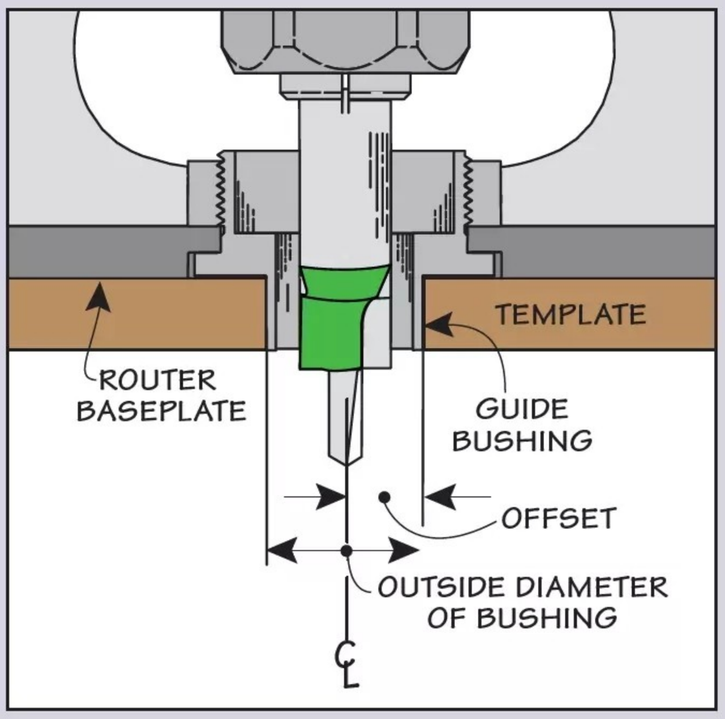
ROUTING. To do the routing, first turn on the router and brace the right end of the workpiece against the table, then line up the left layout line with the mark on the fence. Lower the workpiece down over the bit and rout until your layout line reaches the bit line.



Turn off the router and remove the workpiece after the bit stops. Thick stock will require multiple passes, increasing the depth with each pass.

Hand-held Router Technique

When a workpiece is too large to bring to the router table, I'll often use a screw slot bit in my hand-held router. The process uses a guide bushing installed in the baseplate and an MDF template sized to the bushing. You can see these below. When using this process, the slot is routed from the top side unlike the router table process previously mentioned.



SLOT CUTTING BITS

The next unique bit that I have fallen in love with is a slot cutting bit. Now, I know. Slot cutting bits are not super unique. But, instead of having a slot cutter in each width that I need, I have grown fond of a specific kind of slot cutting bit that act like a dado stack. The one I use, from *Infinity Cutting Tools*, is shown at right.

STACKABLE WIDTH. What I really appreciate about a slot cutter with a design like this is that it's convertable: with one bit, I can cover a variety of needs. The bit consists of an arbor that you can add or remove different cutters to. This means that you can dial in the cut width and even add small shims to fine-tune the fit. In addition, different size guide bearings allow you to set the depth of cut, depending on what the task at hand needs.

USES. One of my favorite uses for a slot cutting bit is when creating frame and panel parts. I find I can make more consistent parts than when I use my table saw. I also like to use the slot cutter for specialty slots, such as adding splines in the corners of miters. It's easier to guide the workpiece flat on the router table than to stand it on the table saw.

SMALL COMPRESSION BITS

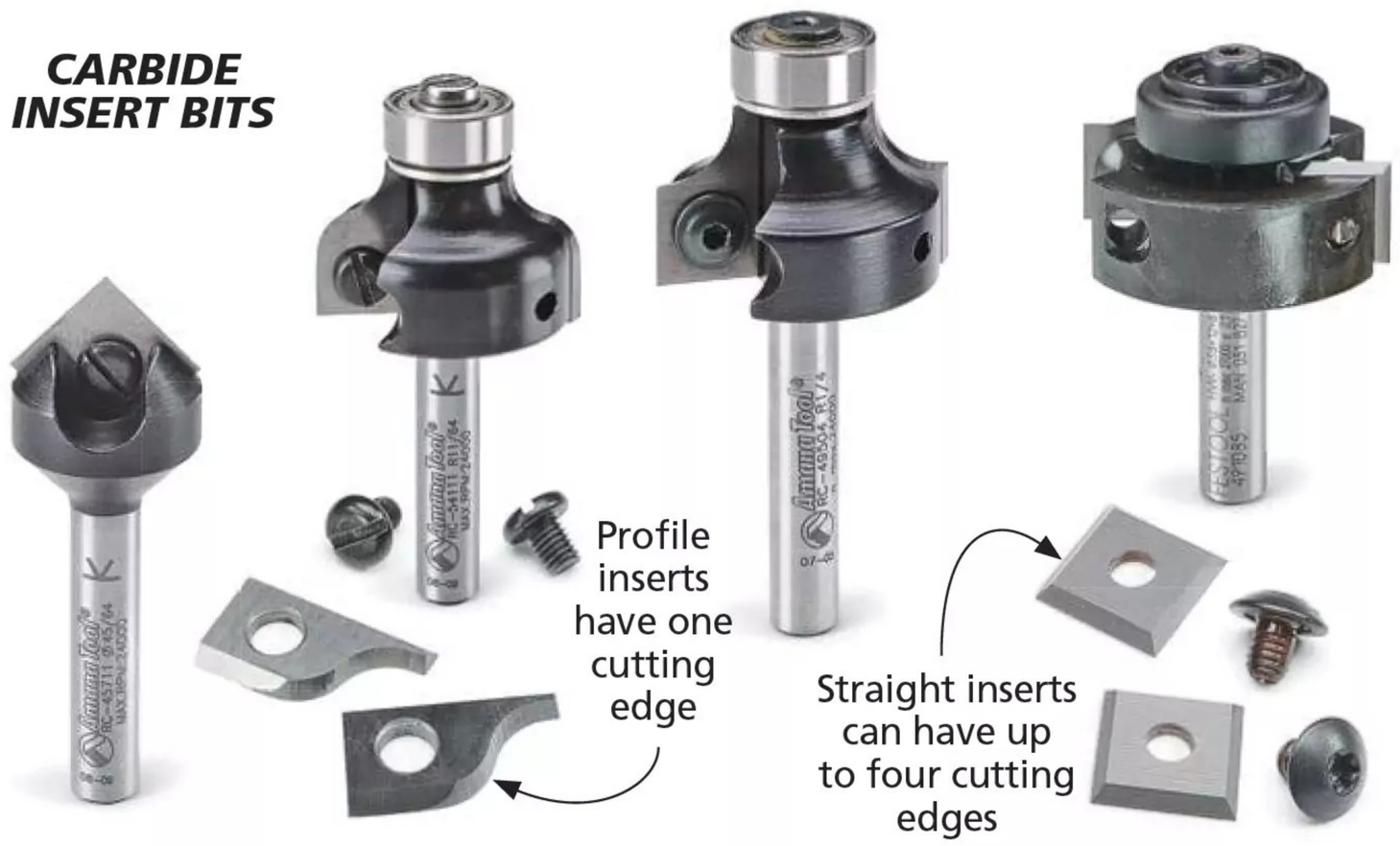
In the last couple of years, I found I've been using my palm router more and more. After I bought my *Bosch* Colt, it's my preferred router. I like the weight and size of it for most things, as it's quick to set up and easy to handle. So, when I discovered compression flush trim bits that were designed for palm routers, I was on-board.

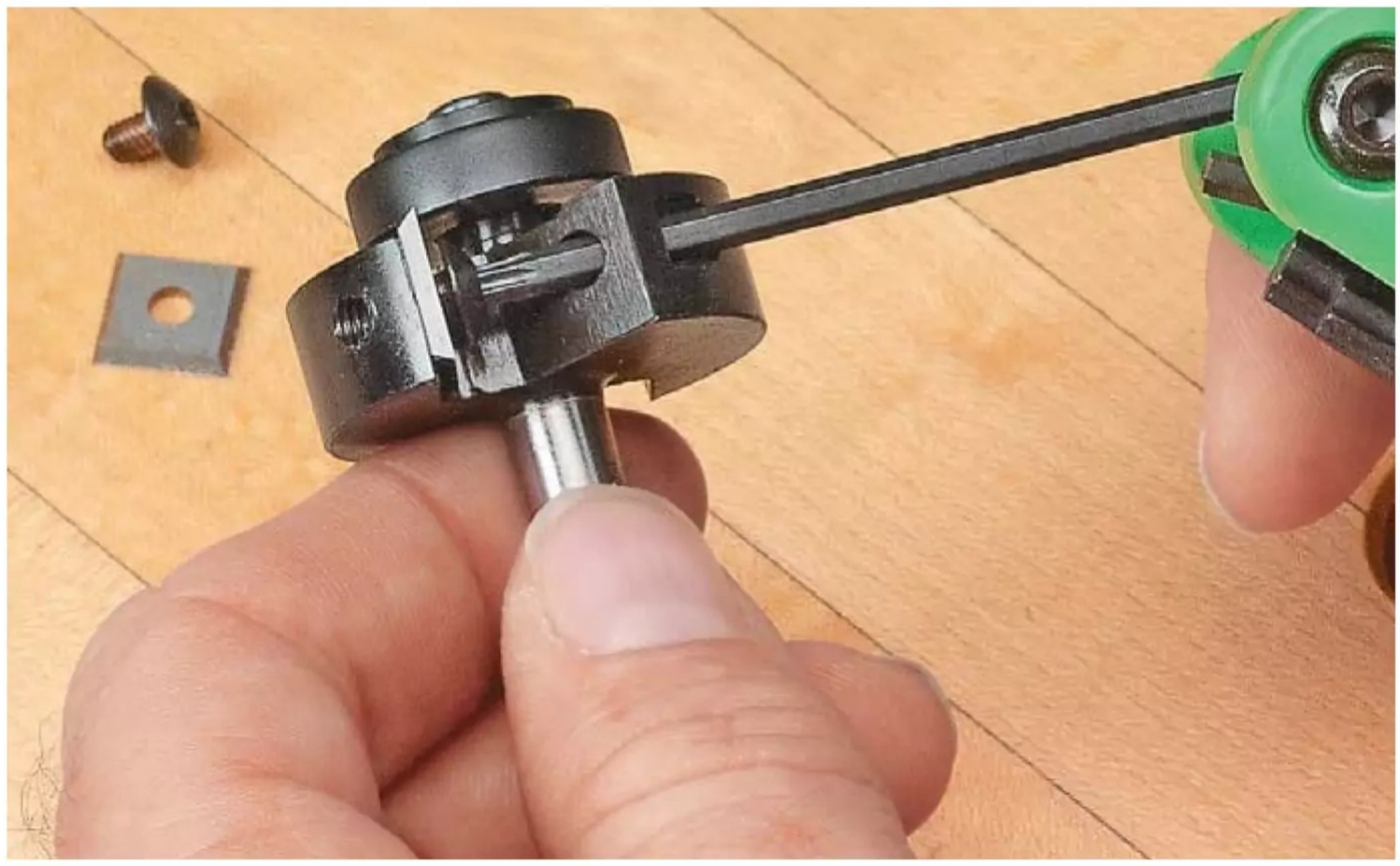
COMPRESSION PROFILE. The thing that makes the compression bits better (in my opinion) is the angle of the cutters. Rather than straight up-and-down cutters, these are angled to create a shearing action, and the opposite angles of these cutters cause the bit to cut clean on both sides of the workpiece. It bascialy becomes a spiral-downcut and up-cut bit in one. This leaves you with super clean edges on both sides of the workpiece. I also like that these bits come equipped with a bearing on the top and bottom of the bit, meaning they can be used as either a flush trim or pattern bit.

SMALL SCALE. Most compression bits are designed with ½" shanks for full size routers. The ones you see below are designed with ¼" shanks for uses with smaller routers. They are available in a couple of different lengths and diameters as well. Since I typically use compression bits to remove just a small amount of waste and clean up and edge, using these in my palm router is actually ideal.

IN USE. Cutting with these bits is much like using normal flush trim or pattern bits, except that you do need to keep in mind the smaller shank size. For me, this means trimming the

Two Spirals. A compression bit, like this one from *Infinity*, combines the cutting actions of a spiral up-cut and a spiral down-cut bit into one package. The result of these shearing cutters is a smooth surface on both faces of the workpiece.





Removable Cutters. The carbide cutters can quickly and easily be replaced. On straight cutters, like this rabbet bit, they can be rotated to a fresh edge.

Insert Cutters. The "In-Tech" router bits from *Amana Tool* come in a variety of profiles. The most commonly used in my shop are roundover, ogee and rabbeting bits.

waste close to my layout line and not hogging off a bunch of material.

One trick that I found with these is you can actually double the cutting depth by removing the lower bearing. For example, if you're flush trimming 2"-thick stock, make one pass with the top bearing following a template and the lower bearing removed. This will flush trim half of the workpiece. Then, reinstall the lower bearing and make a pass from the opposite face. The lower bearing will follow the already flush-trimmed surface and give you a smooth, trimmed workpiece.

CARBIDE INSERT CUTTERS

I'll admit it — these last router bits are ones that took me a while to warm up to. But, after using them, they're pretty dang handy. And, yes, those are replacable carbide router bits.

BORROWED TECHNOLOGY. You are likely familiar with the carbide cutters used in planers and jointers. I have been led to believe that's where the router bit manufacturers got this idea from, and just from looking, it would certainly seem that's the case. It's exactly what it sounds like: the carbide cutters in these router bits are replacable and some are able to be rotated (straight profiles like on a rabbet bit or a straight bit), just as they would be on a jointer or planer.

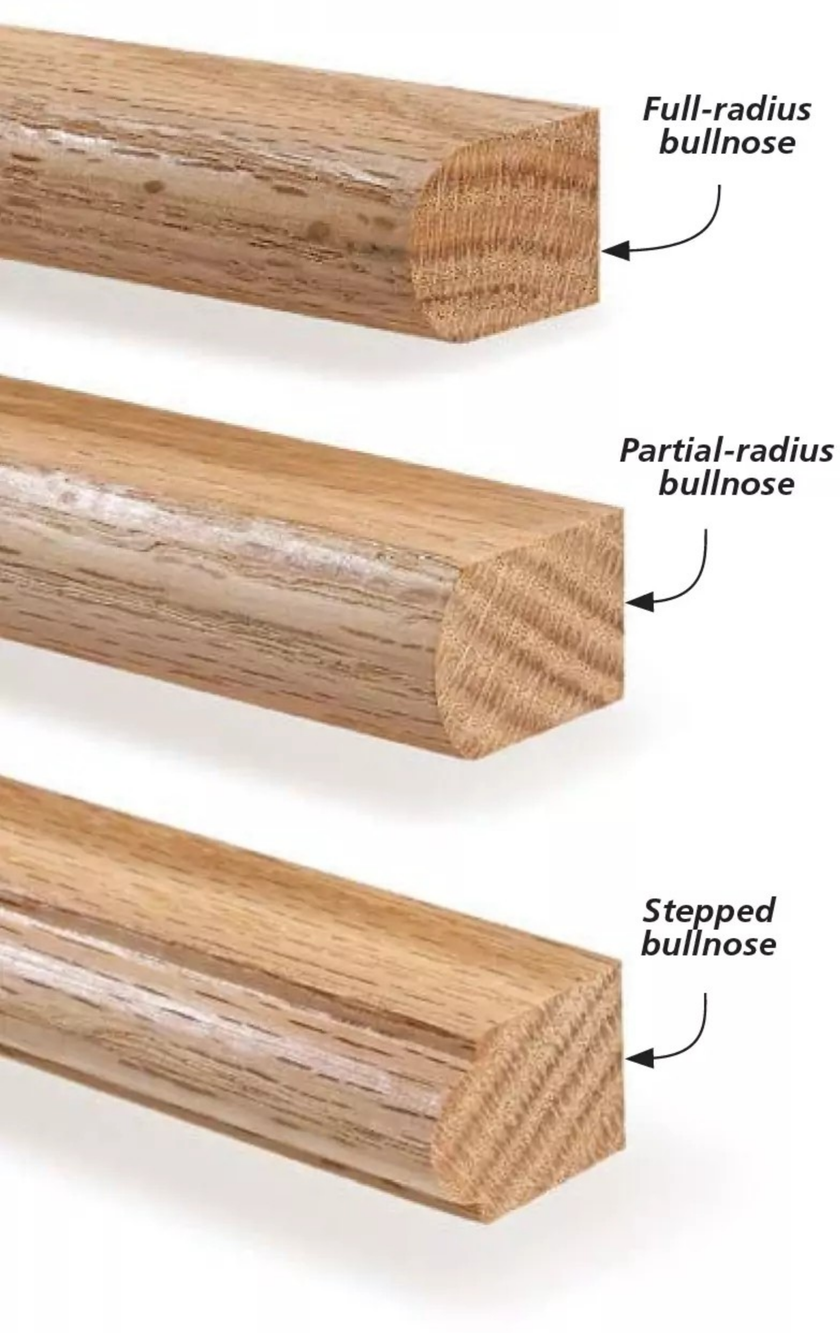
COMMON PROFILES. As you can see in the photos above, these bits are available in some common profiles including straight, cove, core box, rabbeting, roundover and more. While you won't find every profile under the sun, you will find most of the commonly used profiles, which is where these bits really shine — that is, the ability to rotate a cutter and have a fresh cutting edge when you need it. There's nothing worse than trying to complete a job with a dull router bit. At best you'll have a rough edge, and at worst you'll chip chunks out of your workpiece.

These bits do come with a drawback though. Because there's more to them, they tend to be a little more expensive than a standard bit would be. However, if the profile in question is one you use often, you're sure to gain back that initial investment by simply rotating or replacing a cutter when it dulls instead of needing to buy the entire bit again.

So, are these bits necessary to have in the shop? Absolutely not. You'll be able to get by fine without them, but they do make specific routing tasks a lot easier. If one of these bits performs and operation you often find yourself doing, I recommend giving them a try.

The more and more I use my router, the more and more I appreciate unique, specialty bits like these. These are what make the router not just a versatile machine, but a high-performance one that can achieve high-grade results. And, not only do they give me better results, but they also get me from point A to point B fussing, helping me keep up the momentum in my work.

Bullnose Profiles



Round Profiles. The simple bullnose offers up a lot of different options when it comes to edge profiles for your projects.

On most woodworking projects, a decorative profile or molding — even a simple one — is preferable to a sharp, flat edge on parts like shelves and tabletops. And though it's about as easy as it gets, one that I find myself turning to time and again is the bullnose.

At its essence, a bullnose is a pretty basic concept: It refers to a profile in which both the top and bottom edges are rounded. But from this simple idea, you can create a lot of different looks for your projects.

TYPES OF BULLNOSES. Though all bullnoses have two rounded edges, there are several approaches to making the profile. Probably the easiest bullnose to understand is known as a full-radius bullnose. As the name implies, it's a workpiece that features a full radius, or a half-circle, on the edge (refer to the upper photo at left).

A partial-radius bullnose is a flatter, more gradual bullnose profile. It usually features an oval shape along the edge of a piece, rather than a full half-circle (middle photo, left).

Both of these types of bullnoses can be varied in other ways, too. As an example, for a different look you can form a bullnose that doesn't cover the full thickness of the workpiece and has a shoulder on one or both edges (lower photo).

MAKING BULLNOSE PROFILES. I usually make bullnoses by using a standard roundover bit, either in a router table or with the router hand-held. The approach I take typically depends on the size of the workpiece. For example, if I want to add a bullnose to a tabletop after it's assembled, I'll use the hand-held router. But if I'm routing the edge of a small shelf, the router table is a great method that offers a bit more control.

FULL-RADIUS BULLNOSE. Probably the easiest bullnose profile to rout is the full-radius bullnose without a step. For this operation, you simply choose a roundover bit that's half the thickness of the workpiece (for example, a ⅜" roundover bit for ¾"-thick stock). Then set the roundover bit to cut a full roundover, and pass both edges of the workpiece over the bit.

If you want to add a step to one or both edges, you'll simply choose a smaller roundover bit. For example, you could use a ¼" roundover bit to create a full-radius bullnose with a ⅛" step on each edge of a ¾"-thick workpiece (upper drawing below).

PARTIAL-RADIUS BULLNOSE. To create a partial-radius bullnose profile, I use a roundover bit that's larger than half the thickness of the workpiece. Here, I'll often use a ½" roundover bit to do a partial roundover on ¾"-thick pieces. Then you set the bit so the top edge of the carbide cutter is centered on the thickness of the workpiece, and rout both edges (lower left drawing).

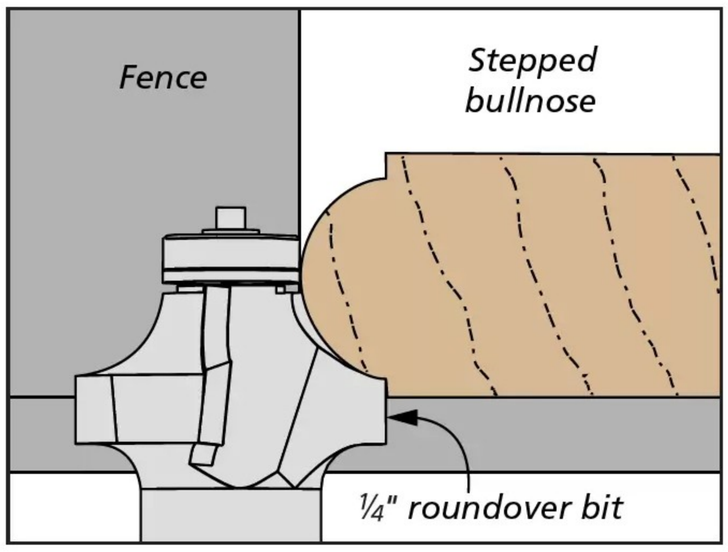
The only drawback to this technique is that it often leaves a small ridge on the edge of the workpiece, particularly when using a hand-held router (photo below). However, this is usually easy to remove with a little hand sanding. One unique solution for routing a bullnose profile without creating this ridge is shown in the box at the bottom of the page.

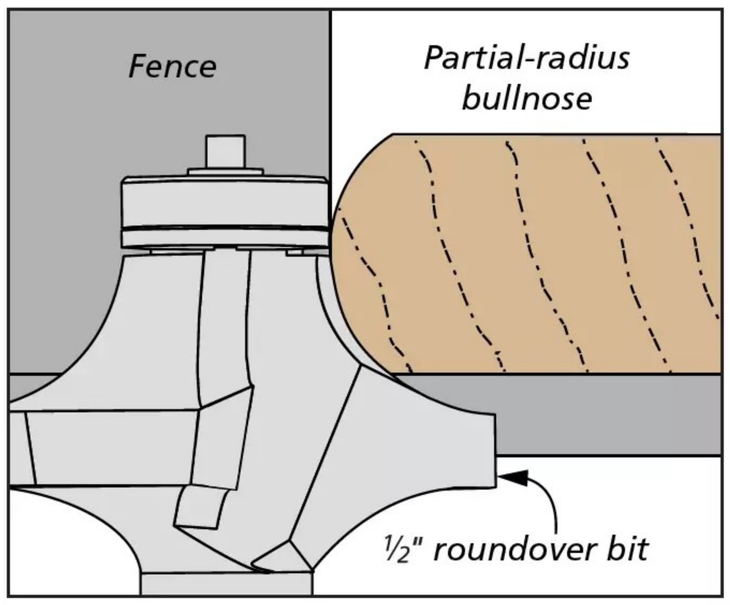
BULLNOSE ROUTER BITS. Another approach to making bullnose profiles that overcomes some of the limitations of roundover bits is to purchase bits that rout the full bullnose profile in one pass. As you can see in the photos on the upper right, these are available with both full-radius and partial-radius profiles. The full-radius bits are often sold as either full-radius or simply bullnose router bits. Partial-radius bits are sold under a variety of names, including convex edge, oval edge, half bull-nose, and fingernail bits. (Refer to Sources on page 98.)

Bullnose Bits. Bits are readily available to cut partial-radius or full-radius bullnose profiles on a variety of different thicknesses.

The bits come in a variety of bead lengths to match common workpiece thicknesses (½", ¾", 1"). And since you'll rout the bullnose in one continuous pass, the bits eliminate the center ridge that often appears when using a roundover bit. Since they have no bearing, these bits should be used in a router table.

BETTER PROJECTS WITH BULLNOSES. You can rout bullnoses with your standard roundover bits or purchase dedicated bits to simplify the process. Regardless of your choice, it's tough to beat a bullnose profile for adding a comfortable, pleasing edge to your project parts.



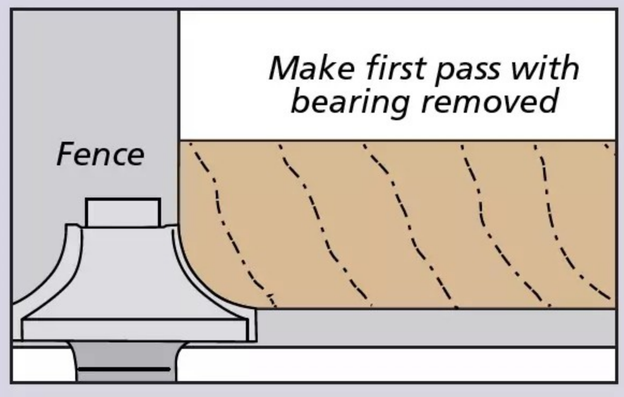


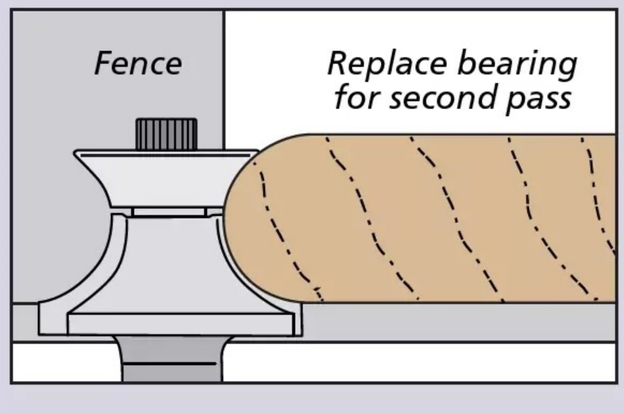
Roundover Bullnose. Cutting a bullnose in two passes with a roundover bit produce a ridge, but it's easy to sand away.

Radiused Bearing Roundover Bit

One of the problems with making bullnose profiles using two passes with a roundover bit is the ridge or flat that it creates at the edge of the workpiece. But Ultra-Glide roundover bits from Amana solve that problem. They feature a radiused bearing that matches the contour of the first cut to allow you to make a smooth second pass. As you can see in the drawings at right, the first pass is made with the bearing removed using the fence to guide the workpiece. (You can also use a matching roundover bit with a standard bearing, or simply add a standard bearing to this bit.) Ultra-Glide bits are available to cut ⅜", ½", ¾", or 1" roundovers.

Rounded Bearing. *Amana's Ultra-Glide* roundover bit follows the contour of the first roundover for a smooth second pass.





Roundover & Bead Bits

A quick glance inside the router bit cabinet in the *Woodsmith* shop tells you that our favorite router profile is a roundover. That's with good reason. A roundover is a simple profile that's right at home on a wide range of furniture styles.

Round Profiles. With just a handful of bits, you can create a wide range of details on your projects. (Refer to page 98 for sources.)

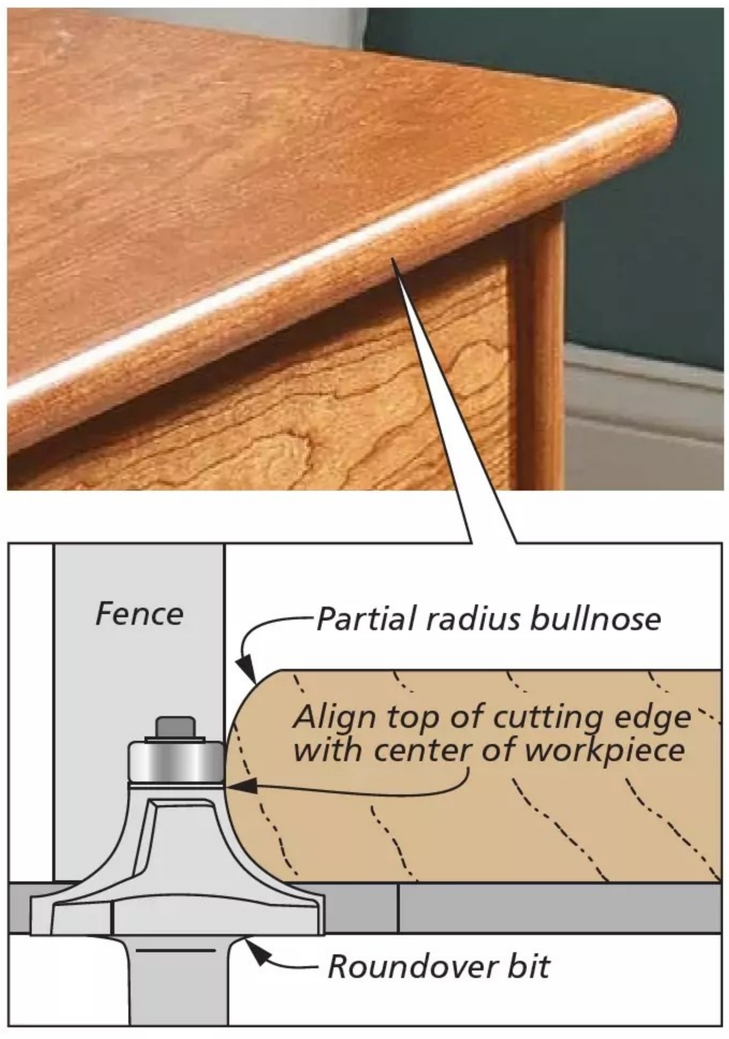
A closer look at the router bit collection reveals a few similar bits that also create a rounded profile. I decided it was time to gather them all together for a family reunion of sorts. You can see the bits in the lower left photo. The idea is to explore several ways a rounded edge can enhance the look of a project.

ROUNDOVER BIT

The obvious place to start is with the basic roundover bit. It's often the bit many woodworkers build their collection around. A roundover eases the edge of project parts to make them more comfortable. The profile protects the workpiece from chipping and splintering due to normal wear and tear.

A single roundover bit is unlikely to meet all your needs, though. These bits come in a range of sizes (described by the radius of their cut) — from a subtle ⅛" radius up to a bold 1" radius.

As straightforward as it is, the roundover bit is pretty versatile in use. You can set the bit to form a soft, curved edge. Increase the bit height, and you add a slight shoulder or fillet to the profile. This square detail creates a shadow line to add interest to the profile.



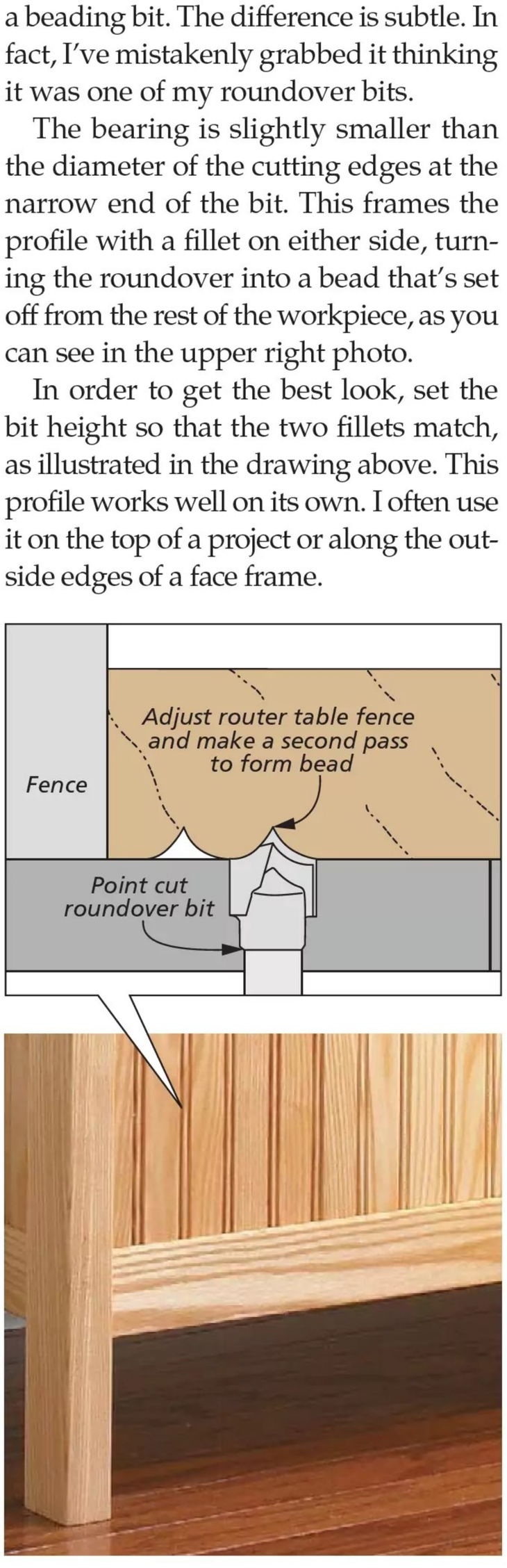
One way I like to use a roundover bit is to create a bullnose profile. Here, only a portion of the bit is put to use. You can see what I'm talking about in the drawing on the previous page. After making a pass along each edge of the workpiece, you're left with a gently rounded profile that still has a crisp, but not harsh, line at the top and bottom, as in the right photo on the previous page.

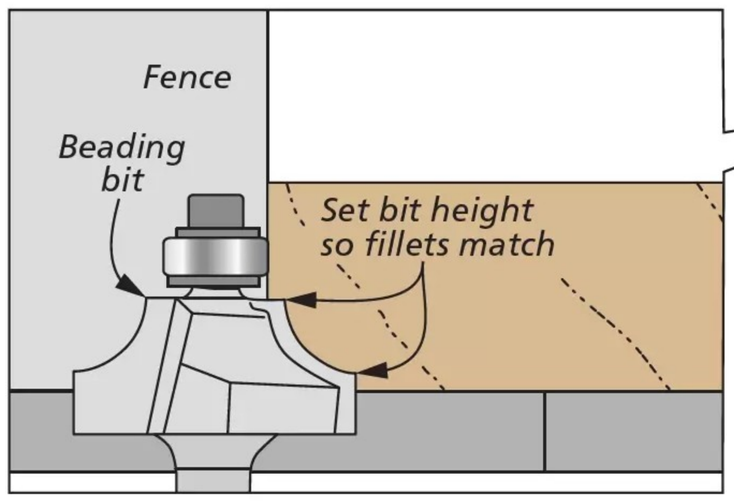
BEADING BIT

The next bit I want to highlight bears a close resemblance to a roundover bit — a beading bit. The difference is subtle. In fact, I've mistakenly grabbed it thinking it was one of my roundover bits.

The bearing is slightly smaller than the diameter of the cutting edges at the narrow end of the bit. This frames the profile with a fillet on either side, turning the roundover into a bead that's set off from the rest of the workpiece, as you can see in the upper right photo.

In order to get the best look, set the bit height so that the two fillets match, as illustrated in the drawing above. This profile works well on its own. I often use it on the top of a project or along the outside edges of a face frame.





However, a bead profile is a great team player. When combined with other profiles, the bead can be used to create unique built-up moldings.

Beading bits are available as stand-alone items. And they're sold in a range of sizes. However, it's possible to make your own from a roundover bit. Most router bit manufacturers sell sets of auxiliary bearings. So all you need to do is swap out the stock bearing on a standard roundover bit for a bearing with a slightly smaller outside diameter.

SIDE & EDGE BEAD BIT

Roundover and beading bits shape a profile that forms one quarter of a circle. The side bead bit (also called an edge bead) creates a half-circle profile. It looks like half of a dowel has been glued into a rabbet along the edge of a workpiece. This bead is set off by a narrow groove called a quirk, as in the drawing at right.

The side bead is a traditional profile that's been used for hundreds of years. The quirk and bead work together to create a visual transition.

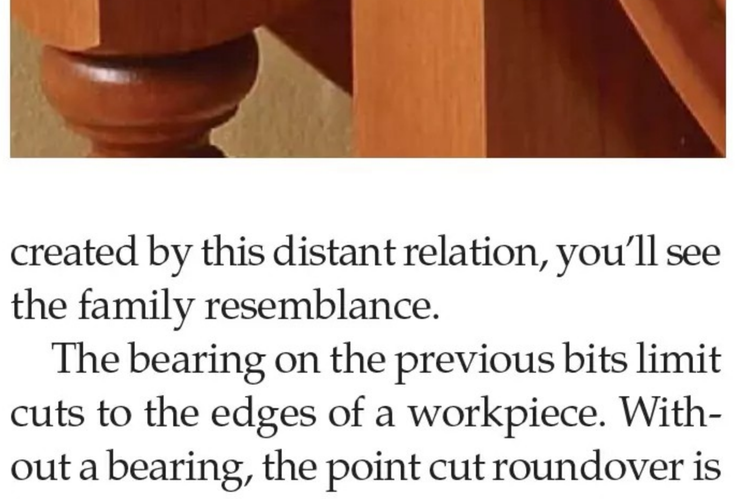
One common use is to cut a bead along the bottom edge of a table apron, as shown in the photo at right. The bead softens and protects the edge and adds an eye-catching detail.

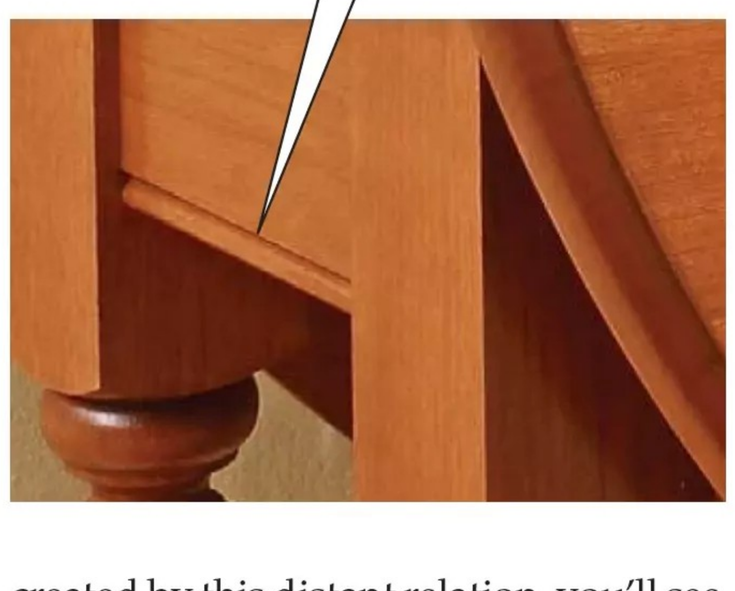
The same is true when the bead is routed on the lower edge of drawer front. The shadow lines created by the bead profile play off the gaps on the sides and top of the drawer.

Side beads can also be used to dress up face frames and dividers. These otherwise plain elements can then contribute to the overall look of the project.

POINT CUT ROUNDOVER BIT

At first glance, a point cut roundover bit doesn't seem to belong with the others. But if you take a look at the profile





created by this distant relation, you'll see the family resemblance.

The bearing on the previous bits limit cuts to the edges of a workpiece. Without a bearing, the point cut roundover is free to rout anywhere on the workpiece.

The main use for these inexpensive bits is to create beaded panels. Sure, you can purchase beaded boards or beadboard panels. But they may not be available in the right material to match your project. As the drawing and photo at left show, a no-fuss router table setup allows you to create custom beaded boards to suit your project.

Since the bit comes to a sharp point, you will notice that the bit may leave a little fuzz in the groove along the rounded profile. But a swipe with a sharp scraper or a folded piece of sandpaper removes the debris in no time.

Basic roundover bits get the job done. But when you add a few other related profiles, you expand the range of details you can add to your projects.

Tongue & Groove Joinery

If you're looking for accurate, perfect-fitting tongue and groove joints, discover why the router table is the tool of choice.

Tongue and groove joinery is a great technique. The joints are strong and simple, and you only need a table saw, a dado blade, and a little time to make them. But, just because you can make this joint on the table saw doesn't mean that it's always the best tool for the job. Sometimes using a router table makes more sense.

Using the router table to make tongue and groove joints has a couple of advantages. Unlike a dado blade (which often leaves ridges along the bottom of the groove), a router bit will give you a flat-bottomed groove. So your joints will fit together better and look nicer after assembly.

Second, since router bits are made in standard sizes, there's no messing with dado chippers and shims. If you want a ¼" groove, you use a ¼" bit. It's that simple.

PROCEDURE. There's nothing complicated about the process for making tongue and groove joints on the router table. You use a straight bit to plow a groove in the first piece. Then you rout a rabbet on one or both sides of the second piece to create the tongue. But to get the best results, there are a few points to go over.

GROOVES. Whether I'm using a table saw or a router table, when it comes to tongue and groove joinery, I'll almost always start with the groove. The reason for this is simple. It's a lot easier to cut all the grooves and then cut the tongues to fit than the other way around.

Cutting the groove (or dado) is the simple part of the equation. All you have to do is select a straight bit according to the width of the groove you wish to cut. Then use the router

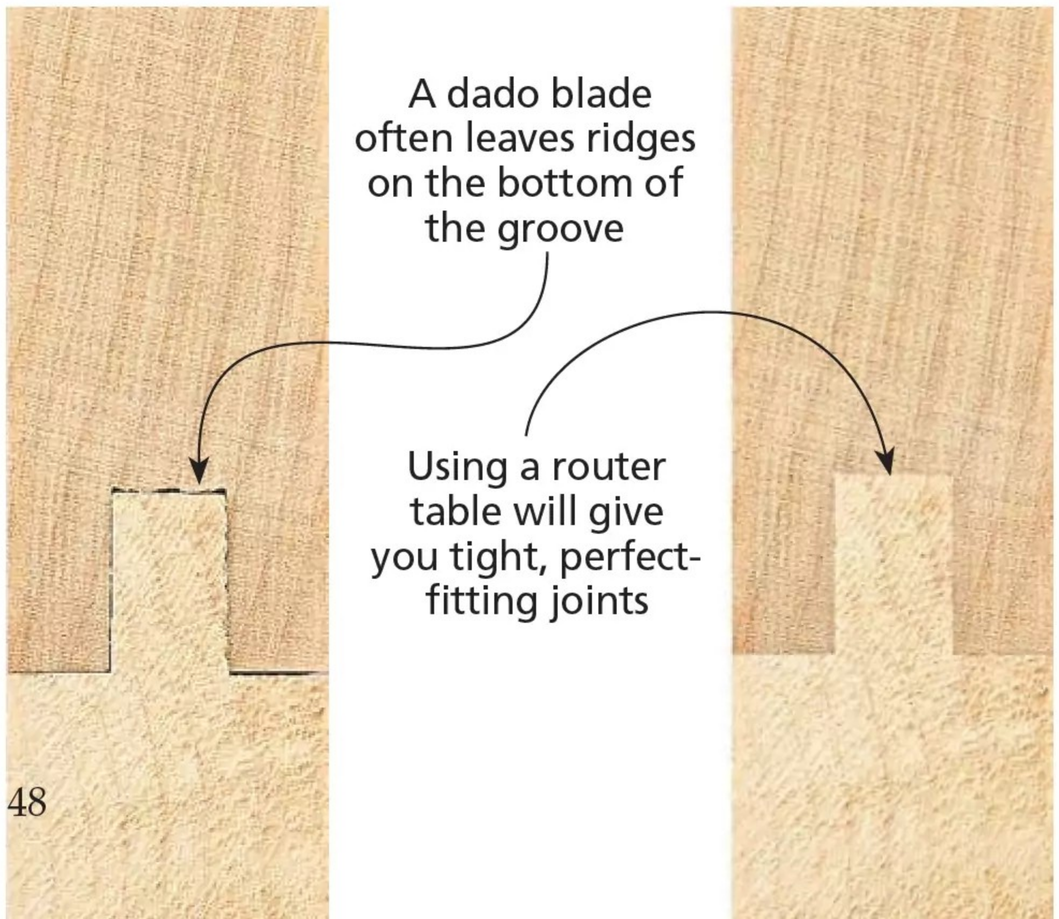


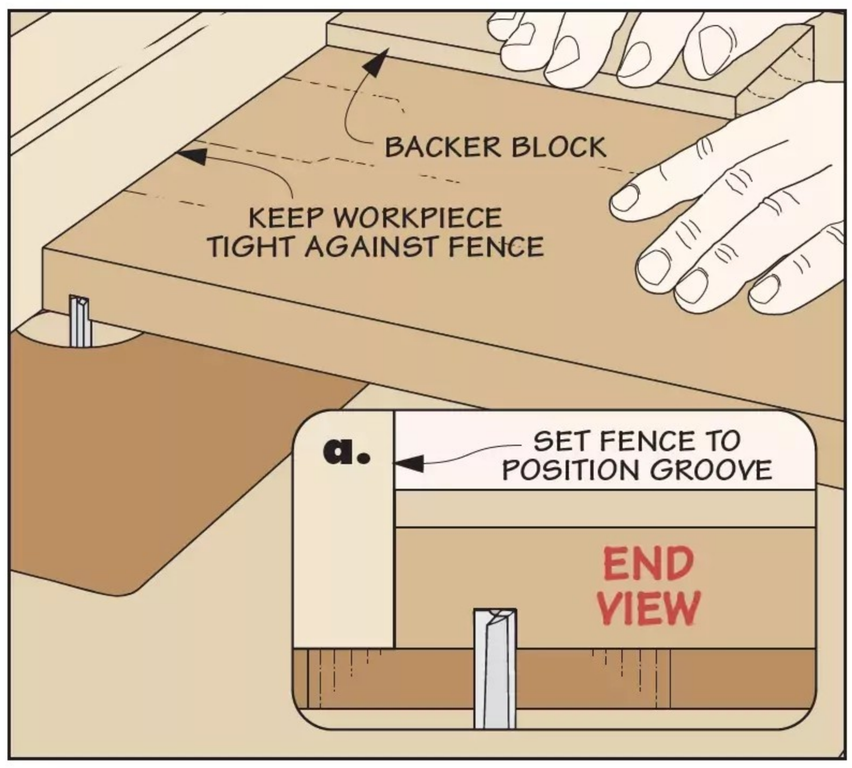
table fence to position the groove on your workpiece.

The key is to rout consistent grooves on all your workpieces. To do this, hold the workpiece tightly against the fence and down on the router table. For grooves deeper than ¼", you'll need to rout the groove in two or more passes, raising the bit in between each one.

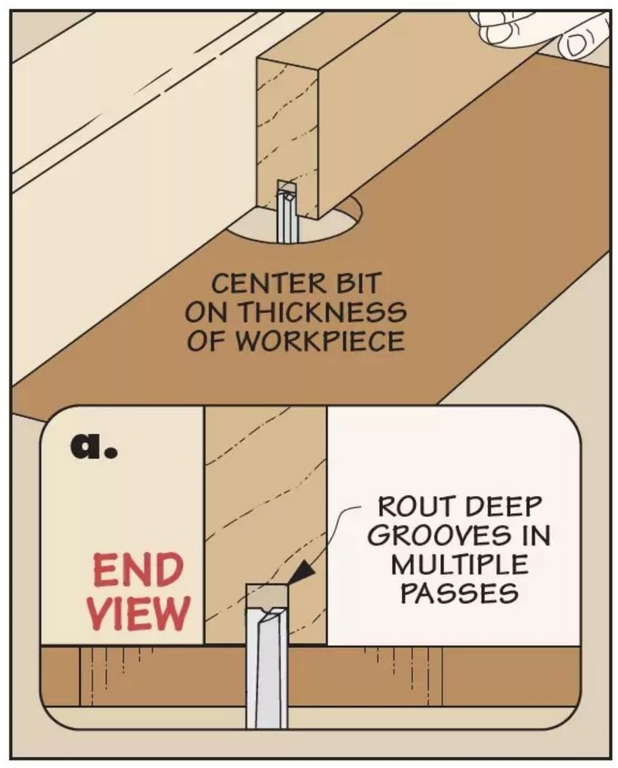
If you want to make a groove that is wider than your bit, you'll need to reposition the fence slightly to make an overlapping cut. This allows you to fine-tune the width of your groove to match plywood or other sheet materials.

AVOIDING CHIPOUT. One problem you may have with routing grooves and dadoes is chipout as the bit exits the wood. To combat this, you can use a backer block, as you can see in the first drawing at left above. For routing across narrow workpieces, use a large, square backer block, like the one in the second drawing in the box below. This will support the wood fibers and help keep the workpiece square to the fence as you push it past the bit.

TONGUE. Once you have the groove routed, the next step is routing a tongue on the mating workpiece. You'll use the router table fence to establish the shoulder(s) of the tongue.



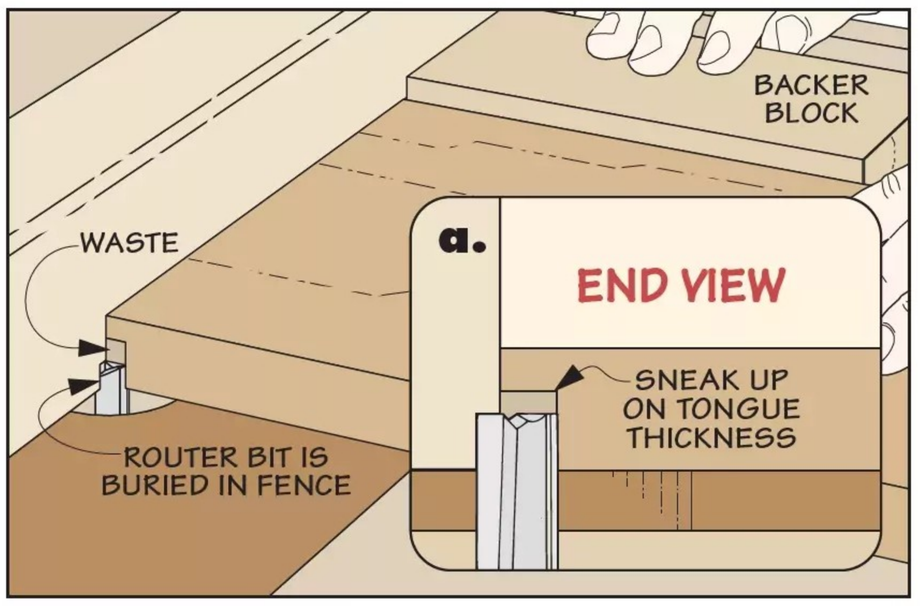
Rout the Groove. To rout a groove (or dado) in an exact spot on a workpiece, use the fence to establish the position of the groove.



Edge Grooves. To rout a groove on an edge, center the router bit on the thickness of the workpiece.

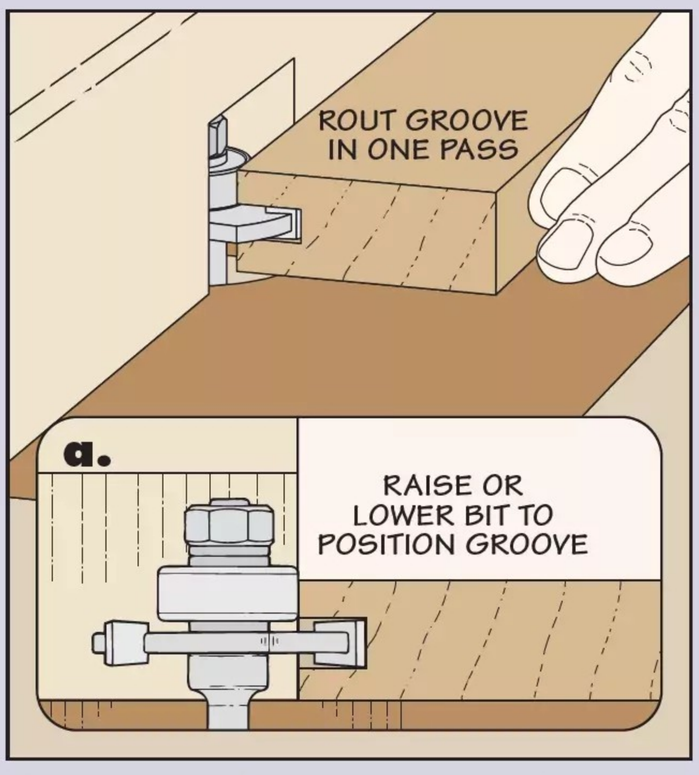
This time, bury the straight bit in the fence (drawing at right). I usually use a ½"- or ¾"-dia. bit for making the tongues.

The trick to getting a good fit is to creep up on the thickness of the tongue by raising the bit slightly between passes. Take your time until you get the thickness correct. Then go ahead and rout the tongues on all your workpieces for a perfect tongue and groove joint.

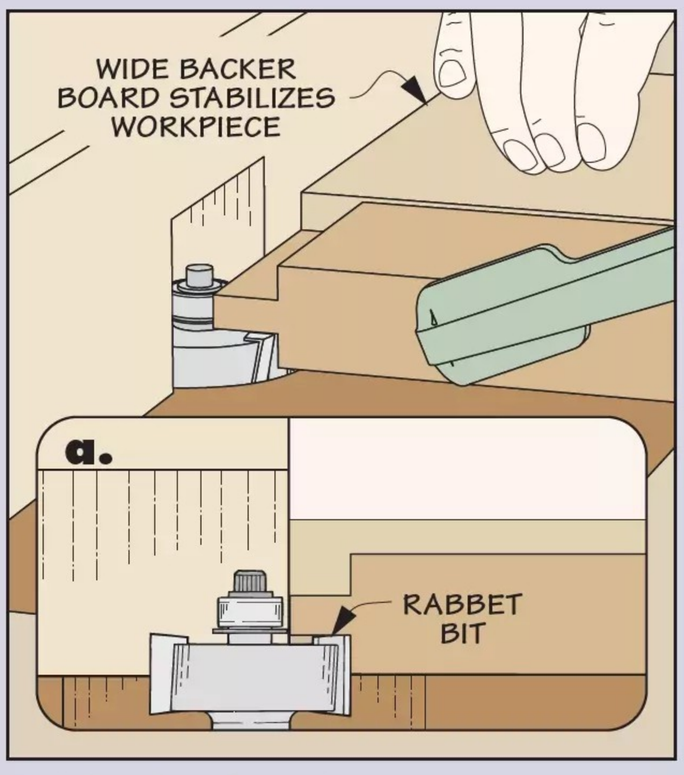


Rout the Tongue. To make the tongue, rout a rabbet along one (or both) faces of the workpiece. Sneak up on the thickness of the tongue until it just fits the groove.

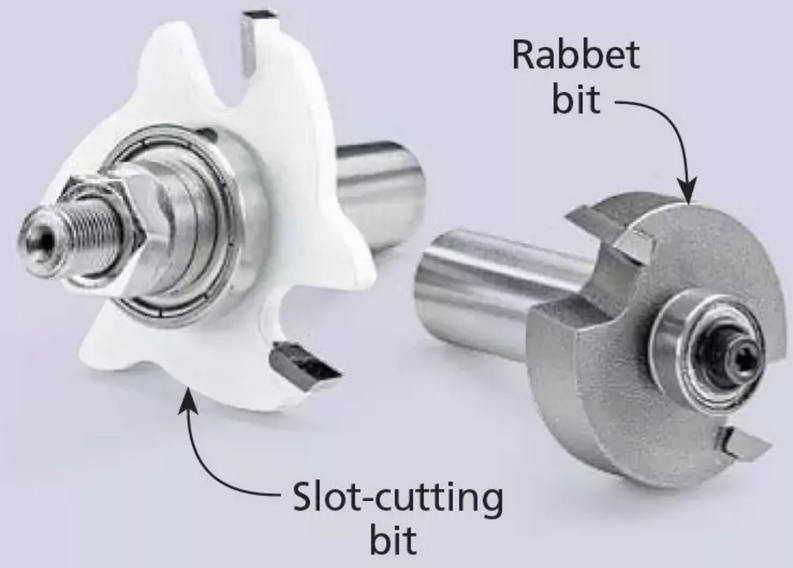
How-To: Beyond Straight Bits



Slot-Cutting Bit. A slot-cutting bit works like a mini saw blade, cutting a full-depth groove in a single pass.



Rabbet Bit. To make the tongue of the joint, a rabbet bit is used to rout a rabbet on each side of the workpiece.



Straight bits work fine for occasional tongue and groove routing. But if you're going to be doing a lot of this joinery, you might want to invest in a slot-cutting bit and a rabbet bit. Slot-cutting bits can cut deep grooves in a single pass, speeding up the time it takes to make the joint. And rabbet bits easily rout the shoulders to the create the tongue.

Perfect Rails & Stiles with One Router Bit

Find out how you can use your slot-cutting bit to make stub tenon and groove joints.

When I make simple doors with plywood panels, I usually turn to my table saw to cut the grooves for the panels and to form the stub tenons. But lately, I've been using a slot-cutting bit in my router table. I can get flat-bottom grooves and nice, clean joint lines on the tenons, as you see in the photo below.

It only takes a little set-up time to cut the grooves, as shown in the inset photo above. And a simple, easy-to-build router sled helps you form the stub tenons, as you can see in the main photo. Here's what you need to know to get some extra use out of that slot-cutting bit in your router bit collection.

ROUTING THE GROOVE

I find it easier to make the groove first and then size the stub tenons to fit. But there are a couple of challenges with creating a groove for a panel. The first challenge is getting a snug fit. The panel often ends up too loose or too tight in the groove. Another challenge is getting the groove centered on the workpiece. The good news is that an ordinary slot-cutting bit will solve both problems.

THE RIGHT WIDTH. One thing that can keep you from getting a good fit is the fact that the thickness of the plywood panel can vary. What I mean is that ¼" plywood is more often than not a little thinner than ¼". So, to get a snug fit, I use a slot-cutting bit that cuts a groove slightly narrower than the thickness of my plywood. For example, with ¼" plywood, I'll use a bit that cuts a 3/16"-wide slot. This lets me sneak up on a tight fit.

When you install the bit in your router table, set the height of the bit so it's close to being centered on the thickness of the workpiece. This gives you a good starting point for fine-tuning the final width of the groove. Next, adjust the fence on the router table to set the depth of the groove (Figure 1).

GROOVE DEPTH. The nice thing about setting the depth of the groove is it automatically sets the length of the stub tenons. This means you won't have to reset the location of the fence and risk setting it slightly off. I like to make the grooves about 5/16" deep.

Dual-Purpose. With one bit, you can create grooves and stub tenons for frame and panel joinery.

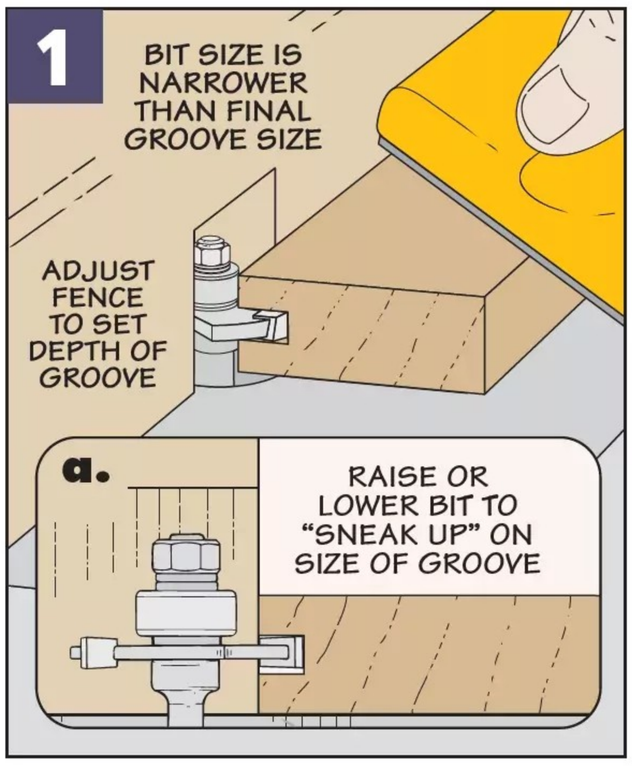
GO 2 Online Extras

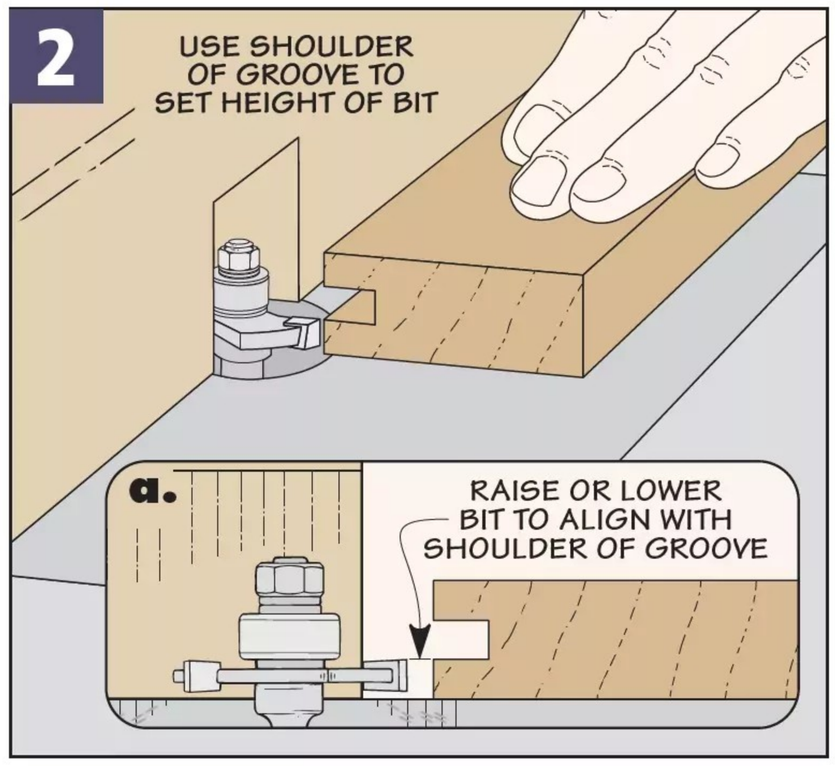
To view a video of this technique, go to our website:
Woodsmith.com/magazine/sip

Perfect Joints. Use the slot-cutting bit to size the stub tenons and grooves to match the panel thickness.

ROUT GROOVES FIRST. Once everything is set up, you can make a test cut. Then, you can verify that the groove is the correct depth and roughly centered on the thickness of the workpiece.

Next, flip the test piece end-for-end and make another pass. This automatically centers the groove on the thickness of the piece, as in Figure 1. Now you can check the fit of the panel. You may need to tweak the height of the bit and make some more test cuts until you get a good fit. Then rout a groove on all the rails and stiles.





STUB TENONS

Now that you have the grooves cut, you can set up to cut the stub tenons on the rails. What's nice is you've already determined the length of the tenon by setting the fence for the depth of the groove. This means you can concentrate on sizing the stub tenons.

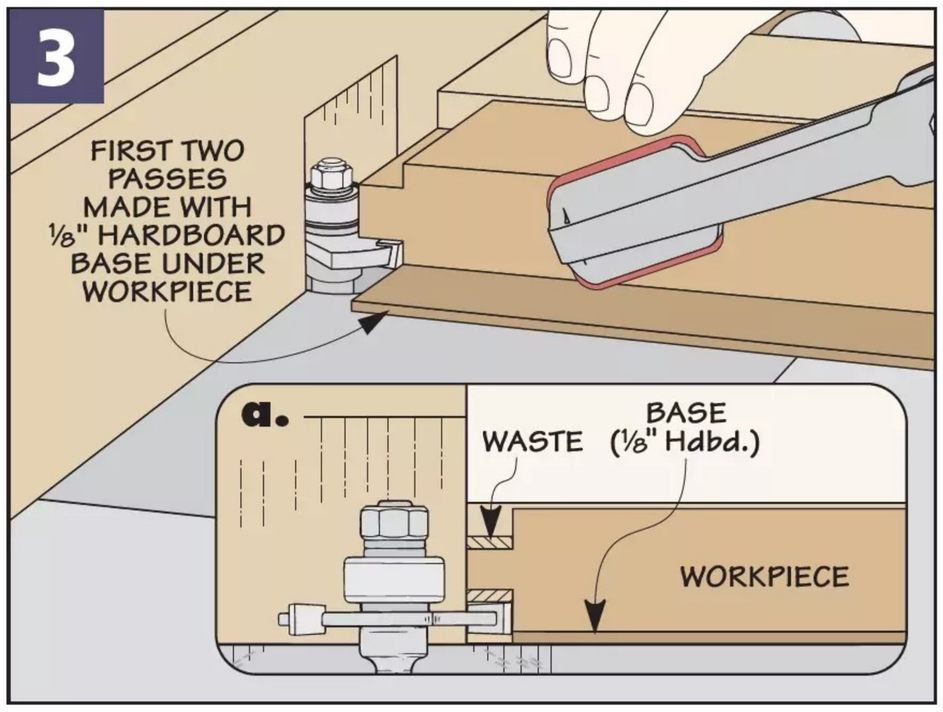
ADJUST BIT HEIGHT. To do this, you can use the groove on a workpiece as a set-up gauge. I adjusted the height of the bit so that the top of the cutting edge was just a hair below the shoulder of the groove, as you can see in Figure 2.

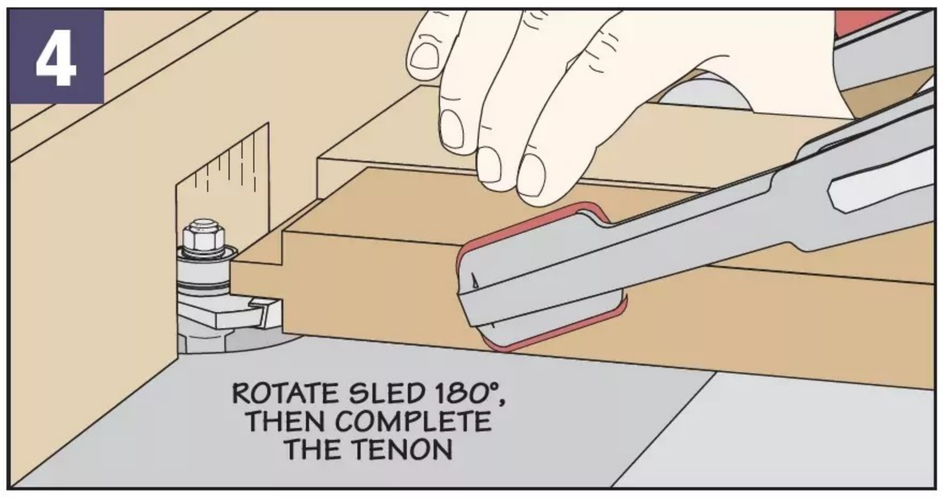
USE A SLED. To form the tenon, you'll be routing the end grain. One of the problems with routing end grain is tearout. That's why I like to back up the cut with a router sled (see box below). Another benefit is that it helps hold the workpiece square to the fence.

TWO PASSES. In Figures 3 and 4, you'll see that I make the cheeks of the tenon in two passes per side. That's because the slot-cutting bit isn't wide enough to form the cheeks of the tenons in one pass.

The first pass is a light cut made with the workpiece "elevated" on a ⅛" hardboard base (Figure 3). Once that's done, flip the workpiece and repeat the cut on the other side. Now, rotate the sled 180° and make a second pass on each side with the workpiece resting on the router table, as shown in Figure 4 at right.

Once you get the hang of it, it doesn't take much time at all to make stub tenon and groove joints. Plus, you've found another use for that slot-cutting bit.



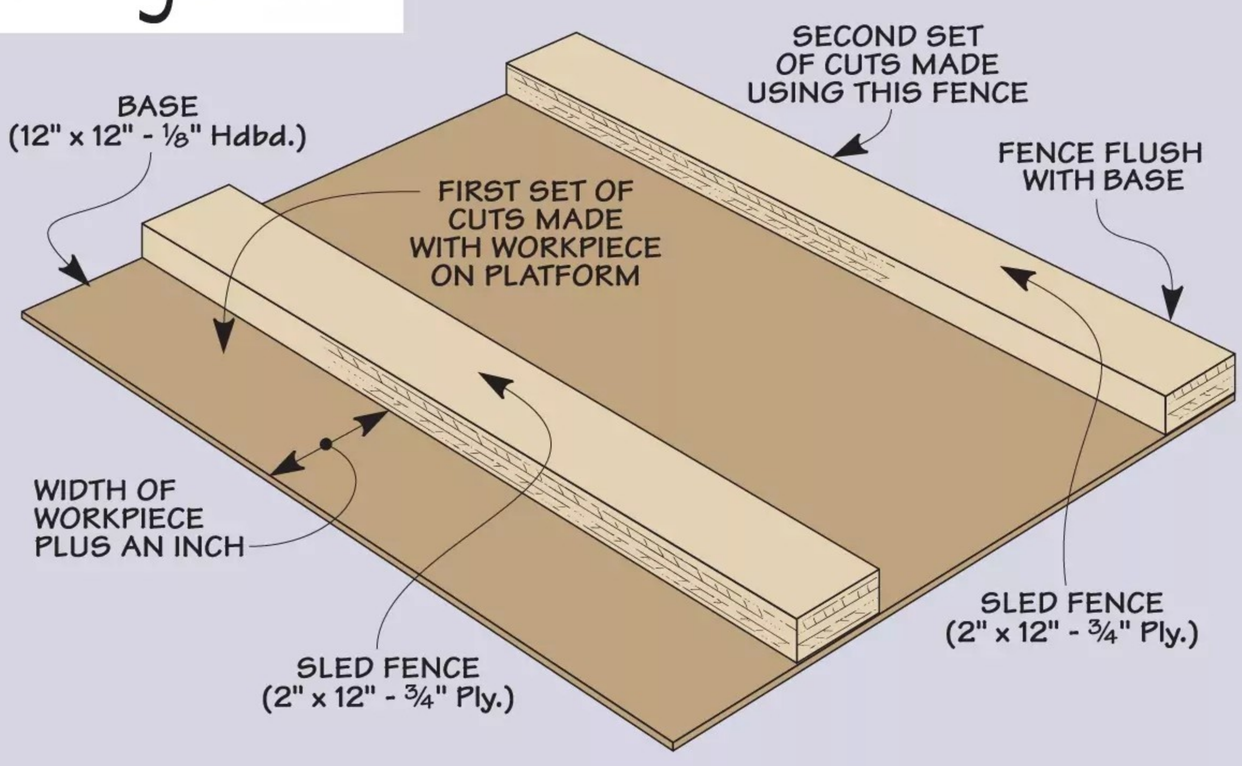


Routing Stub Tenons: Tenoning Sled

To rout the stub tenons on the ends of the rails, you need to keep the workpiece square to the router fence. And you need to make two passes on each side of the workpiece to create the tenon. This simple sled does the job.

The base is made from ⅛" hardboard. On one end of the sled, the hardboard extends out past a fence to make a platform for the workpiece. This elevates the workpiece to make the initial cut on the ends of the rails. The fence at the opposite end of the sled is flush with the hardboard. It's used to make the final cuts on each end of the workpiece.

To rout the tenon, make a pass, flip the workpiece, and repeat the cut. Rotate the sled 180° to form the tenons.

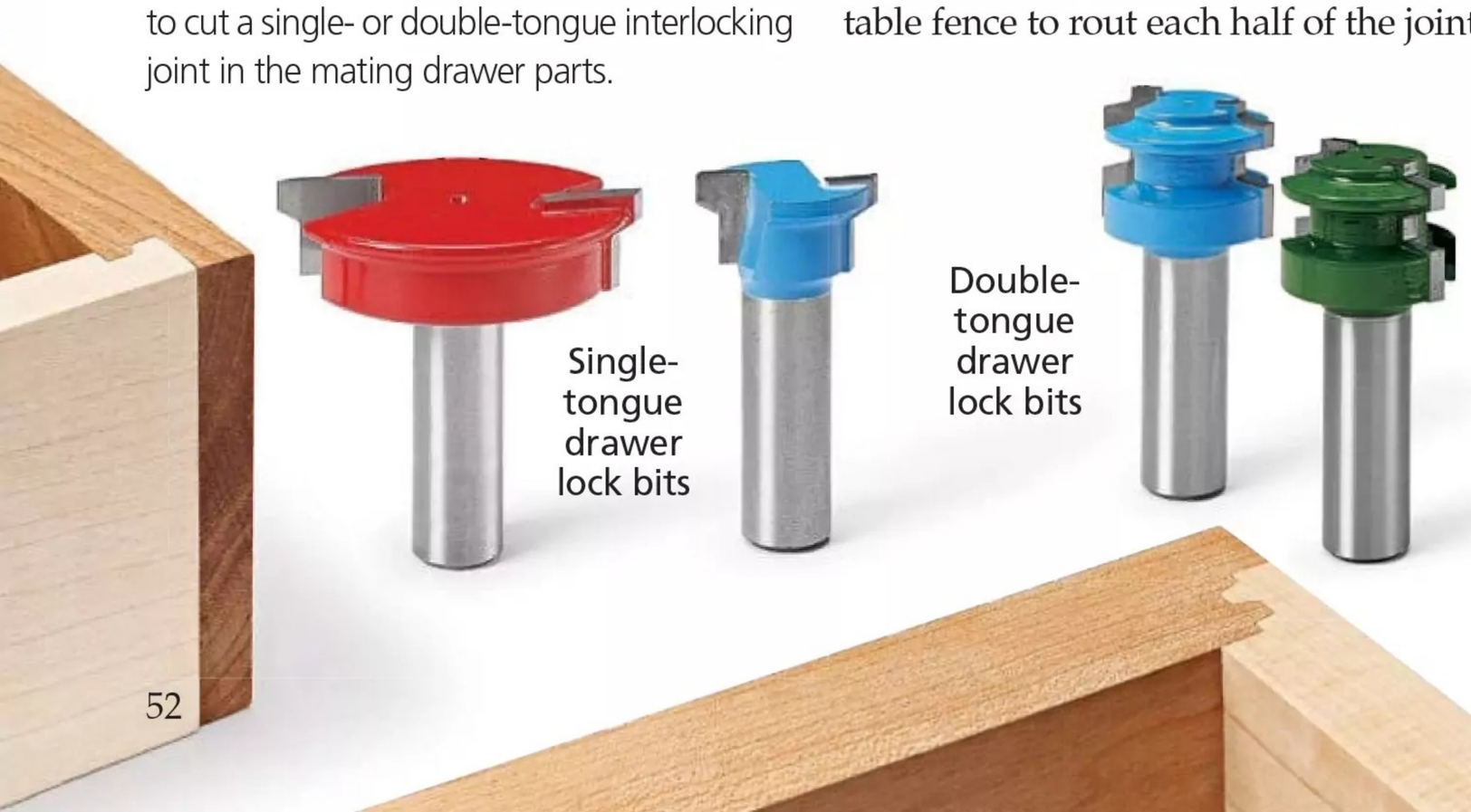


Fast, Fool-Proof Drawer Joints

Few drawer joints are stronger than a locking rabbet. The interlocking nature of the joint offers plenty of glue surface, as well as a mechanical connection. But if you've ever made one at the table saw, you know it can be a time-consuming, multi-step process to set up and cut.

Enter the drawer lock router bit, a bit that simplifies the process of cutting a locking rabbet joint. The bit cuts both the drawer fronts and backs, as well as the sides, all with a single height setting at your router table.

Drawer Bits. Drawer lock bits are available to cut a single- or double-tongue interlocking joint in the mating drawer parts.



TYPES OF DRAWER LOCK BITS. As you can see below, drawer lock bits are available with different cutting profiles. The bits on the left feature the more conventional profile, which creates a single tongue and an interlocking joint in the fronts, backs, and sides. The red Freud bit has a larger diameter, which makes it ideal for deeper cuts such as lipped drawer fronts (refer to the box on the next page).

These types of bits are well-suited for cutting parts that are ½" to ¾" thick. Once you get the height of the bit established, you only have to adjust the router table fence to rout each half of the joint.

Both Lee Valley and Rockler have a variation on this design that features two tongues, as shown below right. This style of bit is better suited for cutting parts that are ¾" or thicker. One nice thing about this bit that you don't have to change the bit height or the fence setting once you get it set up properly. (Refer to page 98 for source information on all the bits.)

Regardless of which bit you choose, setting up and using the bits is easy. While both bits work well, I gravitate more toward the standard, single-tongue bit since it's well-suited for the types of drawers I usually build (¾" fronts with ½" sides). You can see the steps required to cut a joint with this bit in the photos and captions on the following page.

USING THE BITS. The first thing you want to do is cut your drawer parts to final size. While you're at it, make some extra parts to use as test pieces to fine-tune the router table setup. Once you have everything set up to cut a perfect joint, label and save those test pieces. They make great setup blocks later on.

The first step in using the bit is to set

Setup. Use a drawer side as a setup gauge for positioning the router table fence. The cutter should be flush with the outer face.

First Cuts. As you pass the drawer front or back over the spinning bit, use a backer board to keep it square and prevent tearout.

Second Cuts. Slide the fence forward, bringing the lower cutter in line with the fence to cut the mating drawer sides.

the bit height. For ¾"-thick fronts and backs and ½"-thick sides, an initial bit height of ⅜" should work. The thing to remember is that once you establish the bit height, you leave it there for all the steps shown in the photos. After making your first set of test pieces, you may have to tweak the height of the bit. (More on this later.)

FRONTS & BACKS. With the bit height set, the next step is to position the fence to rout the drawer fronts and backs. To do this, I like to use one of the drawer sides as a gauge, as shown in the upper left photo. This creates a joint in the ends of the drawer fronts and backs that's flush with the outer faces of the sides. (For a lipped drawer front, you'll do things a little differently, refer to the box below.)

Once the bit height and fence position are established, you can rout the ends of the drawer front and back test pieces. Use a wide backer board to keep the workpiece perpendicular to the fence and to prevent tearout on the back edge (upper middle photo).

DRAWER SIDES. With the front and back test pieces complete, setting up to cut the mating sides is easy. You slide the fence forward to align it with the lower portion of the cutter. I use a steel rule to check this setting (upper right photo).

The only challenging aspect of making the sides is that you have to stand them on end while feeding them past the spinning router bit. To help support the sides while doing this, I made the simple jig you see above. It's just two scrap pieces that are formed into an L-shape. It holds the workpiece flat against the fence and square to the table. Apply firm pressure as you move the drawer side past the bit. It's not a hefty cut, so you won't meet much resistance here.

Upright Cutting. This L-shaped jig holds the sides upright and flat against the fence as you rout the kerf near the ends.

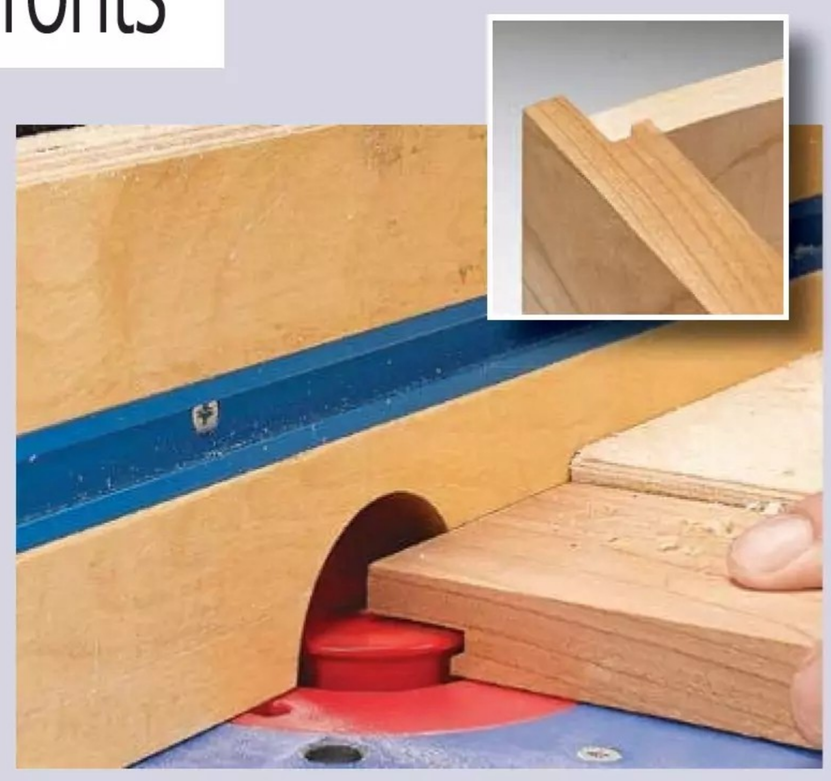
TROUBLESHOOTING. Before cutting your actual drawer parts, take a look at the fit of your test pieces and make any necessary adjustments. For example, a gap in the joint can indicate that the bit is too low, while a joint that won't close means the bit is too high. And a side that's recessed behind the drawer front means the fence is set too far back, while a side that's proud of the drawer front means that the fence is set too far forward.

A BETTER LOCKING RABBET. After cutting a groove for the bottom panel, you'll have drawer parts with a seamless locking rabbet. Plus, it squares itself during assembly and adds a lot of strength. These bits have certainly earned a spot in my router bit cabinet for future projects that call for drawers.

Lipped Drawer Fronts

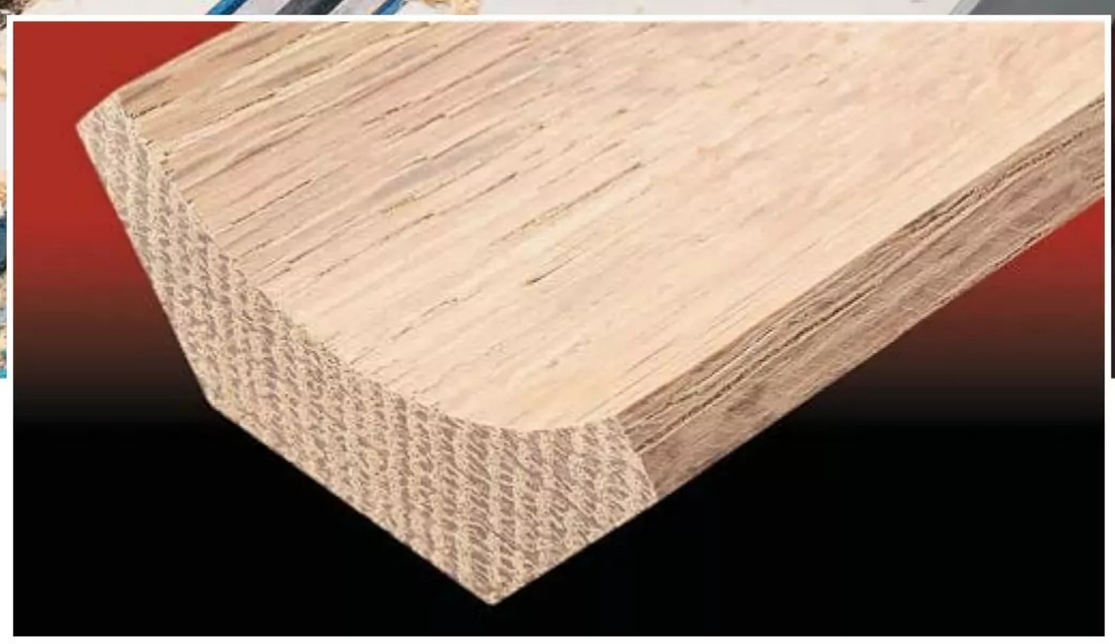
Some drawers feature a lipped front that overhangs the sides. This is often done to accommodate and hide drawer slides. And these drawer lock bits can handle this need easily, as well.

To make drawers with lipped fronts, I like to cut the joints in the back and sides first, as shown above. Then you can rout the ends of the drawer front, gradually adjusting the fence backward until you get a nice fit (photos at right).



Cutting the Lip. Creating a lipped drawer front is a matter of adjusting the fence between passes until reaching the desired cut.

Crown Molding



Add a distinctive look to your projects with classic trim molding created at the router table.

One way to add a distinctive look to your projects is to use crown molding. It's a great way to dress up your project without a lot of extra work. The style of crown I use most often is just a basic cove molding, like the one shown in the inset photo above.

ROUTER TABLE. Making this large profile at the router table is a little different than routing other traditional profiles. Most profiles are routed on the edge of a workpiece using bearing-guided bits. Here, the wide, hollowed-out curve of the cove is removed from the face of wide stock with the help of a special bit (main photo).

Later, the outside edges of the stock are beveled on the table saw. This is done so that the molding can be fit and attached between the case and top.

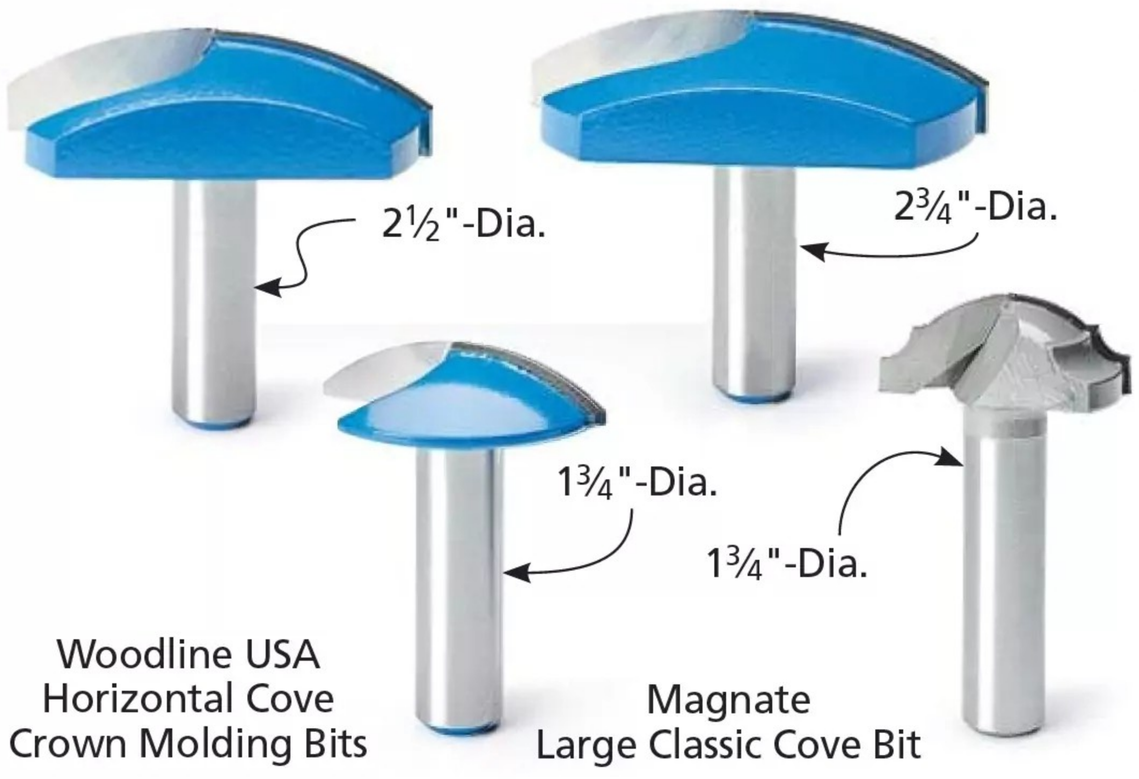
COVE BITS. The router bit I use to make crown molding is a horizontal cove crown molding bit. These bits can be purchased separately or as a set, as shown in the margin photos at left. Each one creates a perfectly shaped cove profile that requires very little clean up afterwards.

The three-piece set in-cludes bits in 1¾", 2½", and 2¾" diameters. The two-flute carbide cutters of these bits do all the heavy work, but there's one important thing to remember. These are large-diameter bits, so be sure to run the router at a relatively slow speed (about 10,000 to 12,000 RPM). The slower speed not only provides a safer cut, it also reduces the chance of the router bit burning the workpiece.

CLASSIC COVE. Another option for routing crown molding is a classic cove bit, like the one shown at far right in the margin. It features a slightly smaller cove profile (as well as a fillet and a small roundover) and comes in a wide variety of diameters.

I find the smaller diameter of these classic bits look best for a lot of the furniture I build. I use just the upper, radius portion of the bit to rout shallow profiles. You'll find sources for all the bits on page 98.

HORIZONTAL ROUTING. Once you decide on a bit, it's time to take a look at the setup and routing process. As I said earlier,



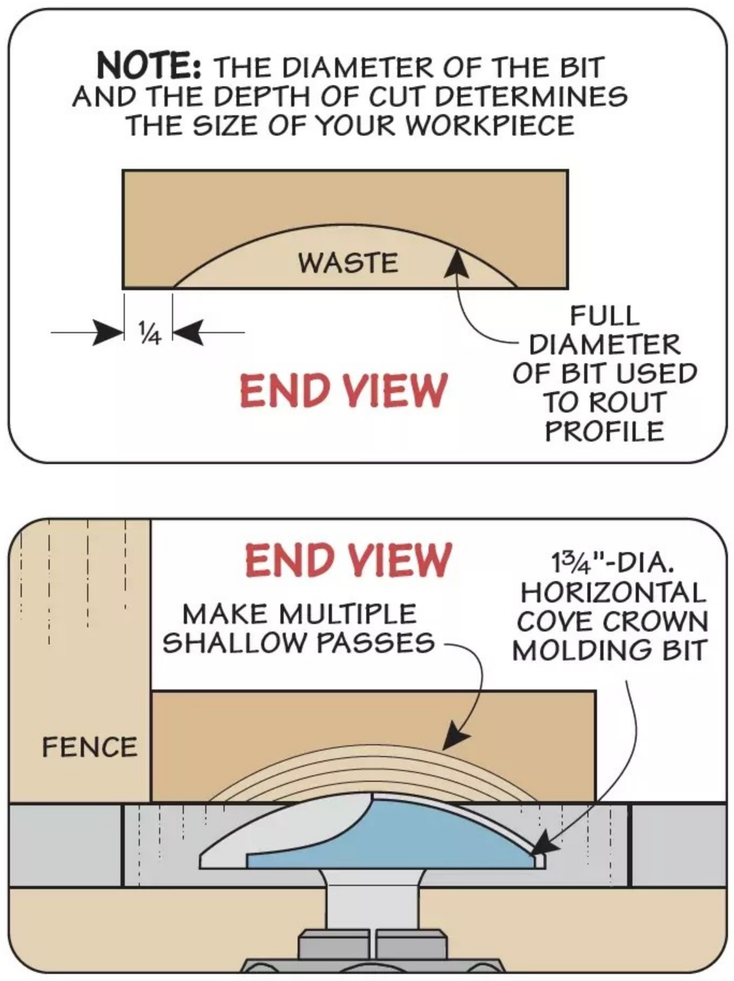
Woodline USA
Horizontal Cove
Crown Molding Bits

Magnate
Large Classic Cove Bit

this technique involves routing the workpiece face down on a router table. And since there's no bearing to guide the bit, you'll need to use a fence. I also like to use a featherboard to keep the molding properly positioned against the fence.

ROUTER TABLE SETUP. Getting the bit set up is pretty simple. The goal is to rout a cove that's centered on the workpiece with a flat area left on each side. Later, you'll complete the shaping of the crown molding at the table saw.

Setup. A setup block makes it easy to position the fence. The goal is to leave at least a ¼"-wide shoulder along each edge after routing the profile.



The look you end up with depends on the bit shape, the length of the cutters, and the amount of the profile you use. I often use the full depth of a bit to obtain the widest cove profile possible. But you can get an entirely different look by using more or less of the profile as you see fit.

Just remember, you need a minimum of ¼" flat area on each side for cutting the bevels later. For this, I use a spacer to position the fence on my router table, as you can see in the photo and detail drawings above. (My blank is 2¼" wide.)

FEATHERBOARD. Now all that's left is to use the workpiece to position the featherboard, as shown in the main photo on the previous page. Once that's completed, you're ready to start routing.

ROUTING TECHNIQUE

The secret to getting clean cuts is to rout the cove using multiple shallow passes. This also puts less strain on your router.

For the first pass, raise the bit about 1/16" above the tabletop. Then use a push block to feed the blank over the router bit, while applying downward pressure just in front of the bit (main photo).

There's no need to adjust the fence after each pass. Simply raise the bit slightly and repeat the process, as shown in the lower detail drawing above. On the last pass, take just 1/32" off. This last skim pass lessens the chance of swirls and burn marks, so very little sanding will be necessary.

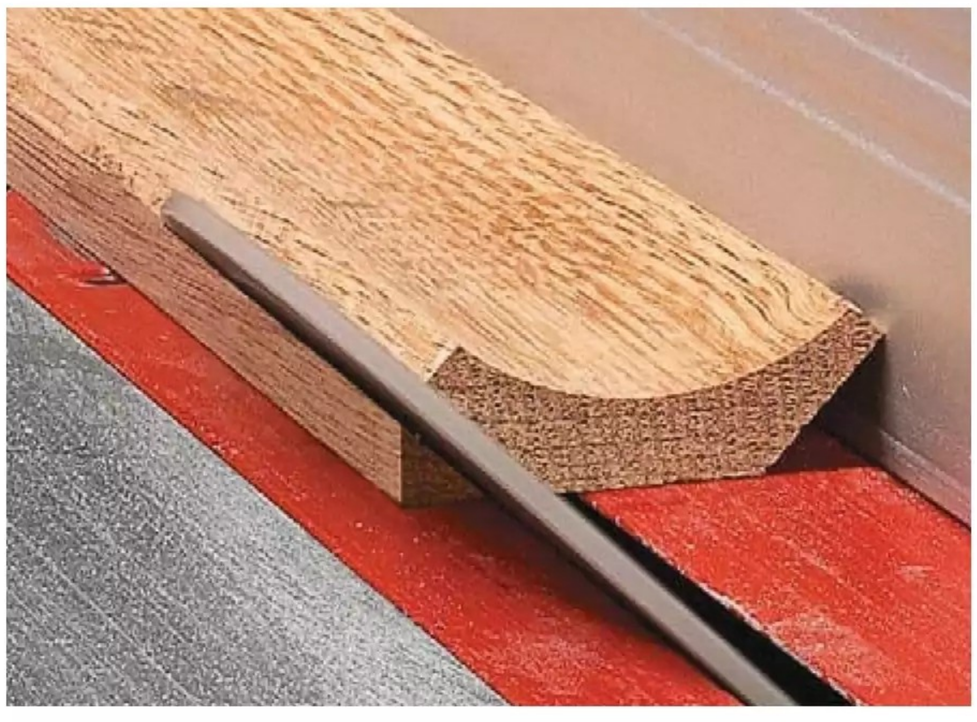
Now that the cove has been routed, you can head to the table saw to complete the profile.

CUT THE BEVELS

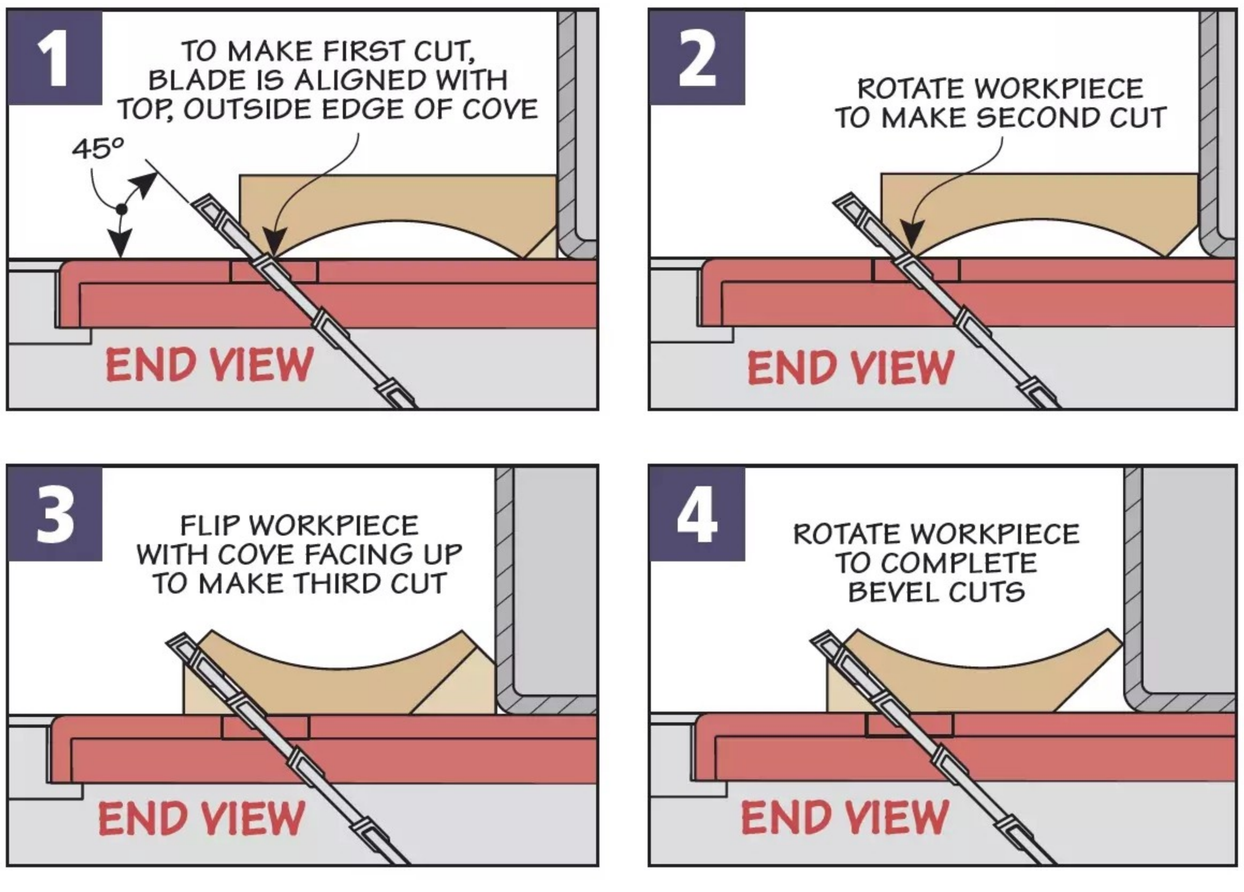
There's a simple, four-step process used to finish up the profile. In the photo and drawings below, you can see the sequence I used.

FOUR STEPS. With the saw blade tilted to 45°, place the blank face down. Then set the rip fence so the blade aligns with the edge of the cove (you can see this in Figure 1). Now you can make the first two bevel cuts, as shown in both Figures 1 and 2. Next, flip the workpiece over so the cove is facing up. A couple more passes are all you need to complete the cuts here (Figures 3 and 4).

There's no need to settle for plain-looking moldings. Instead, use a horizontal crown molding bit to dress up your next project.



Bevels. Switch to the table saw to complete the crown molding profile. After adjusting the blade to 45° and setting the fence, all it takes are four simple cuts.



Making Moldings with a Horizontal Router

By now, many woodworkers have discovered horizontal routing, or routing with the bit parallel with, rather than perpendicular to, the router table top. This growing trend was the inspiration for the combination router table that you'll find on page 78.

Lately, I've been experimenting with this router table in the shop, and the popularity of horizontal routing is starting to make sense to me. The technique offers a number of advantages and better results for certain table routing tasks. It's great for mortises, tenons, and raised panels. I thought for starters I would focus on one of the simplest ways to use a horizontal router effectively — making large, complex moldings with vertical molding bits such as the ones shown in the photos below.

WHY ROUT MOLDINGS HORIZONTALLY? There's a simple reason why a horizontal router table works so well when making profiled moldings. By allowing you to place the workpiece face down on the table, the horizontal router table takes a lot of the issues related to workpiece movement or stability out of the equation. The result is a more controlled cut and better results. This is especially true when compared to a standard router table approach, which involves passing the workpiece on edge through the spinning bit. The photos at the top of the following page illustrate the differences.

GETTING STARTED. Of course, before you can rout anything horizontally, you'll need some form of horizontal router table to try it out. The router table you see used here is the same router table you'll find on page 78. For the router

Got Options? Molding bits are available in a variety of sizes and profiles. These bits are well-suited to horizontal router table use.

Vertical Molding. Making moldings at a standard router table requires you to position the workpiece on edge. Featherboards provide support as you guide the piece past the spinning router bit.

Horizontal Molding. At a horizontal router table, you can rout the profile with the workpiece face down on the table. This offers more control during the cut. Use push pads to apply downward pressure.

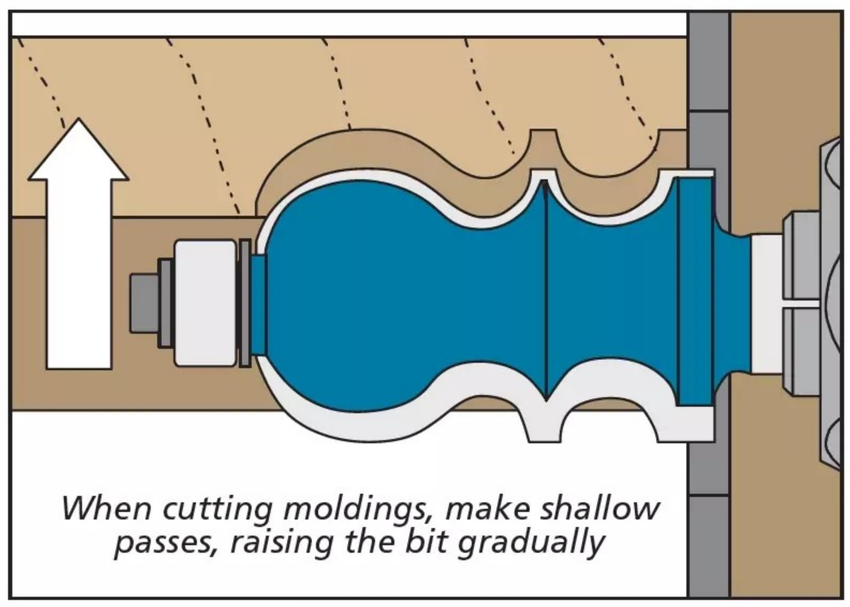
within the table, you'll want something with variable speed, as some of these bits require stepping the router speed down just a bit.

BEFORE YOU ROUT. As you can imagine, a few aspects of routing with the router positioned horizontally are different than they are with a standard router table setup. But it's nothing so unusual that you won't get the hang of it after a few test runs.

Perhaps most important, you need to pay attention to the feed direction of the workpiece. As with all routing operations, you want to feed the workpiece against the rotation of the bit, so it won't grab and pull the workpiece. And with a standard router table, that routing direction is right to left, as shown in the upper left photo.

With a horizontal router table, though, the bit is now under, rather than behind, the workpiece. This requires reversing the feed direction, so you're routing from left to right, as the upper right photo indicates.

MAKING MOLDINGS. In the past when I've made large moldings at a standard router table, running a workpiece on edge past the large bit was not the most natural cut. I would usually set up featherboards on either side of the bit to offer more control and prevent tipping. But those precautions aren't really necessary with the workpiece face down on the horizontal router table. In fact, I found that standard rubber push pads offered plenty of control as I guided the piece over the bit. You'll just want to be sure to focus the pressure down and in as you guide the piece slowly and smoothly over the bit for a smooth and clean cut.

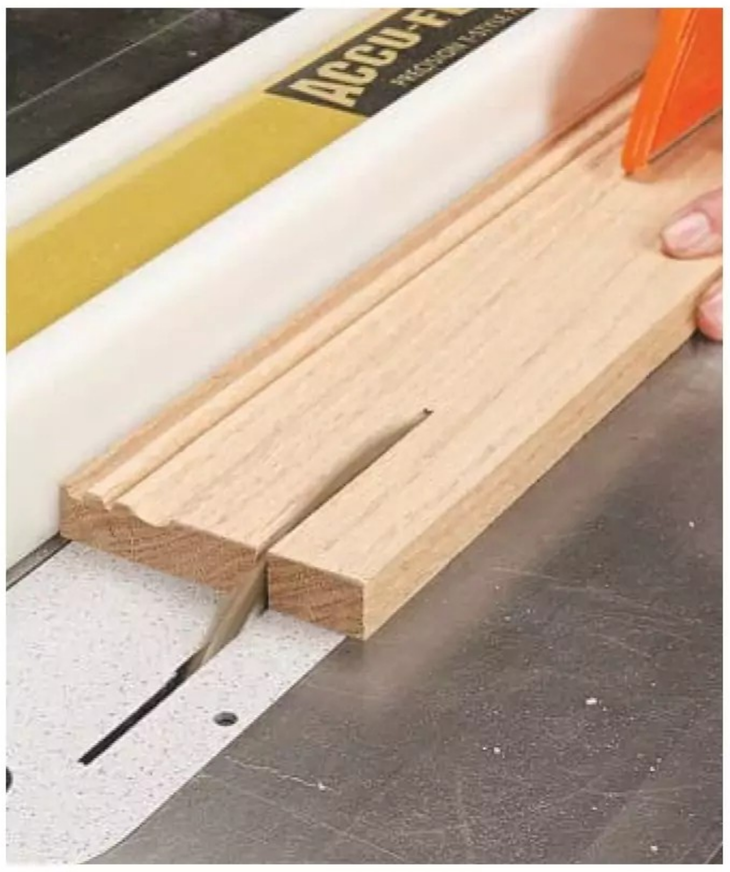


When cutting moldings, make shallow passes, raising the bit gradually

MULTIPLE PASSES. With these large bits, one rule applies whether you're routing with a standard or horizontal router table. In general, it's a good idea to rout by making a series of progressively deeper passes, rather than trying to make one large, deep cut (refer to the drawing above). This offers more control while cutting and also yields smoother results. Many molding bits have a bearing, so you'll make your final pass with the bearing aligned with the table surface.

WIDE WORKPIECES. One problem that often arises with these large molding bits is that the workpiece can have a tendency to tip down onto the bit as you begin to cut away material, simply due to their large size. To avoid this problem, I like to start with a workpiece that's a good deal wider than the final dimension of the molding. This way, I can rip the molding to final width when the profile is complete (photo at left.)

BENEFITS OF A HORIZONTAL ROUTER TABLE. Now that I have a horizontal router table set up in my shop, it's likely to be my go-to tool for making large moldings. Simply having the ability to cut the moldings with the workpiece face down, rather than on edge, offers me a lot more control and precision. And the best part is, this is just the beginning of what a horizontal router table can bring to your shop.



Start Wide. Rout the profile on a wider workpiece to prevent tipping, then rip the molding to its final width at the table saw.

Precision Hybrid Dovetails

The combination of a router table and hand-tool techniques results in great-looking dovetails with a minimum of hassle.

It's tough to beat the look and strength of a hand-cut dovetail joint. Most router jigs can't replicate the hand-cut look that comes from chisel work. However, cutting dovetails by hand is a time-consuming and fussy practice.

I've found that using a "hybrid" technique that takes advantage of a dovetail router bit to cut consistent tails gives me a good start. And for the mating pins, a combination of hand tools and the router table results in a first-rate joint without a steep learning curve.

SELECT THE BIT. The biggest giveaway that a joint is routed is often the use of the standard 14° carbide bit. However, today there are dozens of different profiles and sizes of dovetail bits on the market. Many are designed to cut traditional 1:6, 1:7, or 1:8 ratios (photo below). It's these bits that make this technique so appealing.

Having the ability to use a wider selection of profiles opens up all kinds of design possibilities on projects from small jewelry boxes to large case pieces. And since this technique isn't limited by a jig, you can lay out the spacing of the joint however you like.

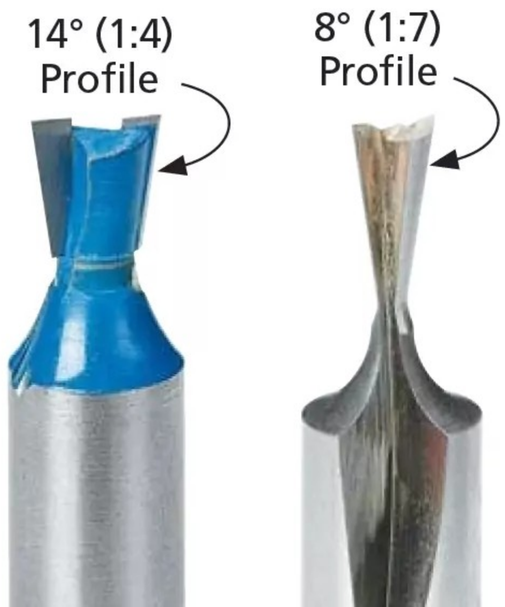
Centerlines. Marking the centerlines of the tail locations makes it easy to set the fence properly.

PREPARING THE WORKPIECES. Once you've chosen a router bit, the next step is to mill your stock flat and square. As with any dovetail joint, warped stock will prevent you from getting a good result.

With that done, I mark the centerlines of the tail locations on the sides of the piece. (Normally the sides of a box or drawer have the tails and the front and back have the pins.) The photo above shows how to use a small square to transfer the layout marks to both faces of the piece.

SLED. You'll need to build a simple sled to hold the workpiece upright on the router table. It's just a base that rides on the table glued to a vertical face. I also add a support behind the face to keep everything rigid. The exact dimensions

Decorative Details. Gap-free dovetails with a hand-cut look really make your project stand out.

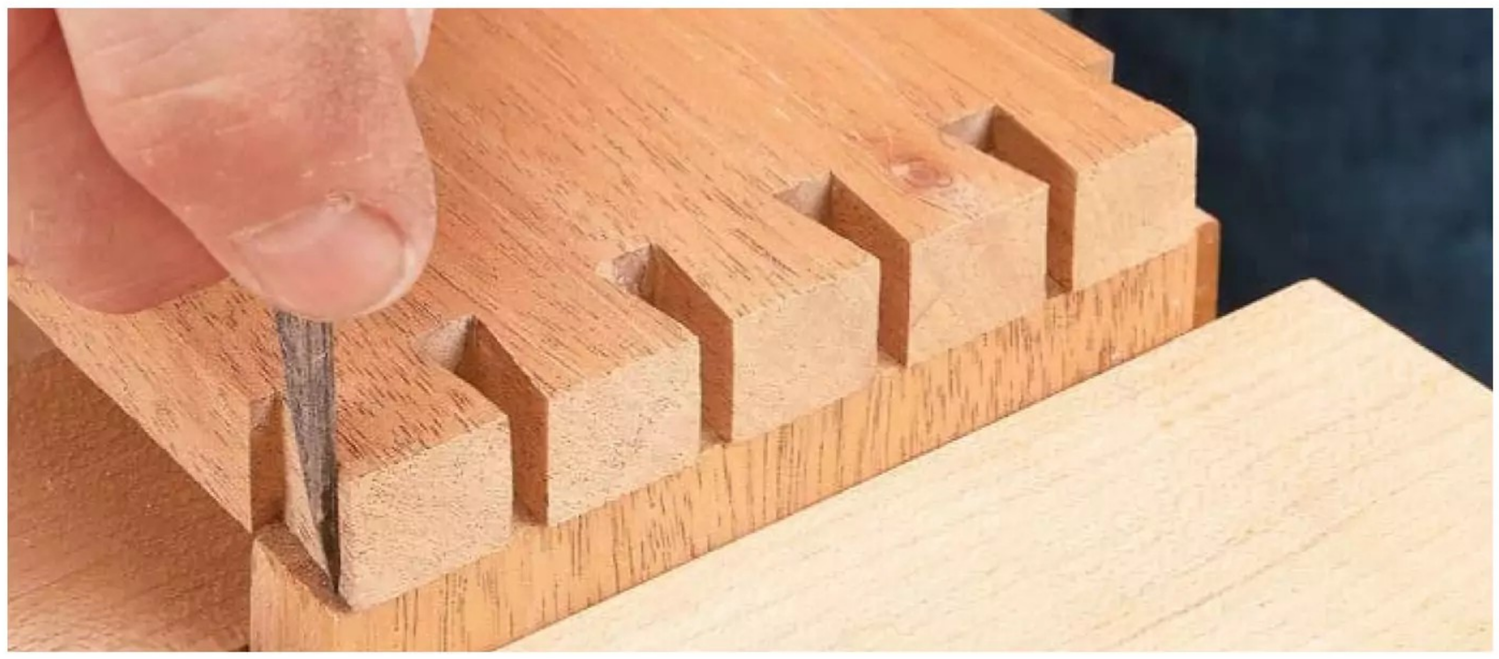


of the sled aren't too important. The main thing is to make sure the face is square to the table and fence. The face of the sled also backs up the cut to prevent tearout on the workpieces.

ROUTING THE TAILS. At this point, you can install the dovetail bit in the router and set the bit height to match the thickness of the stock. I also draw a pencil line on the router plate to match the centerline of the bit. This way, you can match the layout lines perfectly.

I start by routing the half-tails on the outside edges first. Then cut the half tails on the other end, as well. Now it's just a matter of adjusting the fence, cutting, flipping, and resetting. By flipping the workpiece side-to-side, you maintain the symmetry of the spacing. This is a quick way to take care of the tails. When you're done, you can turn your attention to the pins.

PINS. To guarantee a good fit, you'll use the tails to directly lay out the pin locations for the mating pieces. For this, clamp the pin board in a vise and lay the tail board over it. Then, trace the outlines of the tails with a marking knife, as shown in the photo above. This will give your chisel a register later.



Tail Outlines. Use a marking knife to transfer the tail positions to the pin board.

The rest of the process is covered in the photos below. It starts by marking the waste areas so you don't get disoriented and cut away the wrong side of the joint. (Believe me, it's easy to do.) I extend the layout lines down both faces of the workpieces.

To remove the waste between the pins, I use a combination of tools. You can begin by placing the workpiece in a vise and using a dovetail saw or dozuki to make the initial cuts. (You'll need to leave a bit of the knife line intact for a snug fit — you can always remove more during the fitting.) After you've completed the saw cuts, head back to the router table. This time, you'll need a straight bit in the router.

You'll work more or less by eye to align the fence as you remove most of the waste between the pins. I find this router method leaves a smooth bottom edge between the pins and leads to a gap-free joint.

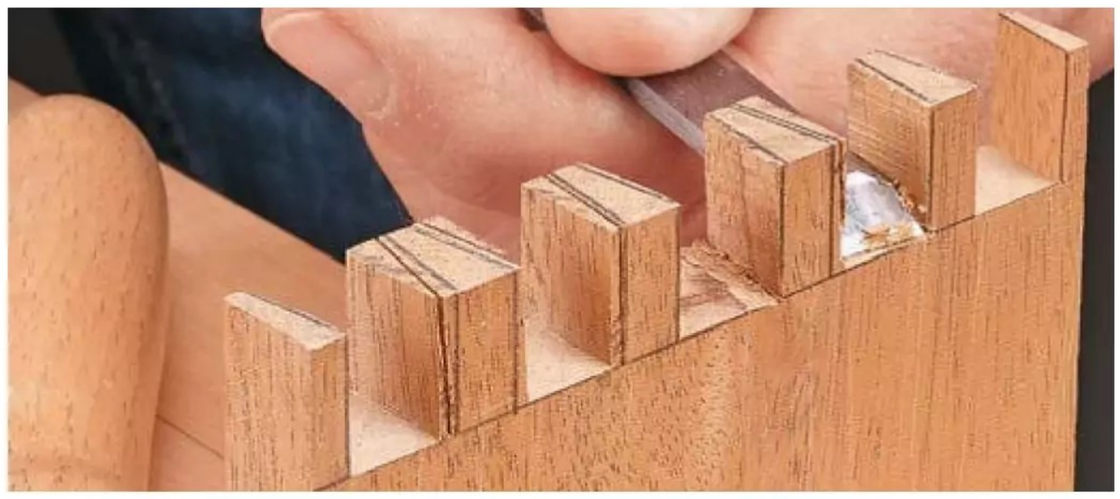
I turn to a coping saw next to begin removing the final bit of waste. All that remains is some chisel work to fine-tune the fit.

The result is a tight-fitting and attractive joint. It's the perfect solution for getting that heirloom look without all the fuss.

Color Prep-Work. By shading in the waste areas between the pins, you make it easier to line up the cuts with the straight router bit and reduce the chances for making a mistake.

Begin Cutting. Use a hand saw to begin cutting the pins. The key is to leave the knife line intact on the pins for a good fit. You can clean up any excess during the final fitting.

Remove the Waste. Install a straight bit sized to fit between the pins to remove the bulk of waste. Keep the wider side of the pins toward the bit to avoid accidentally cutting into them.



Tidy Up the Pins. The rest of the waste is easy to remove. I start with a coping saw to cut away the bulk of the material and then clean up and fine-tune the pins with a chisel.

Router Table Upgrades

One of the best ways to improve your work at the router table is to upgrade the tool itself. In this section you'll find five shop-made upgrades, including a sled, a fence, and three different router table designs to suit both the style of your shop and the work you do in it.

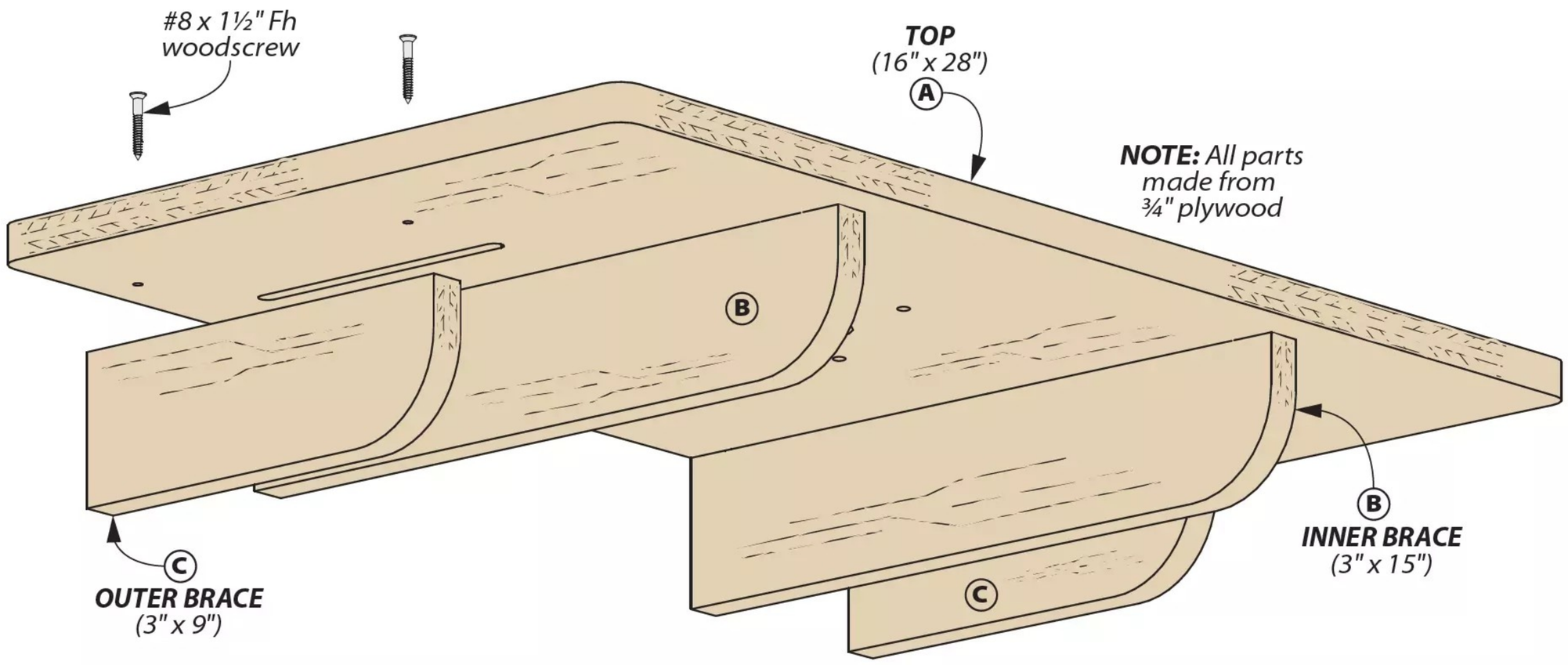
Small Shop Router Table

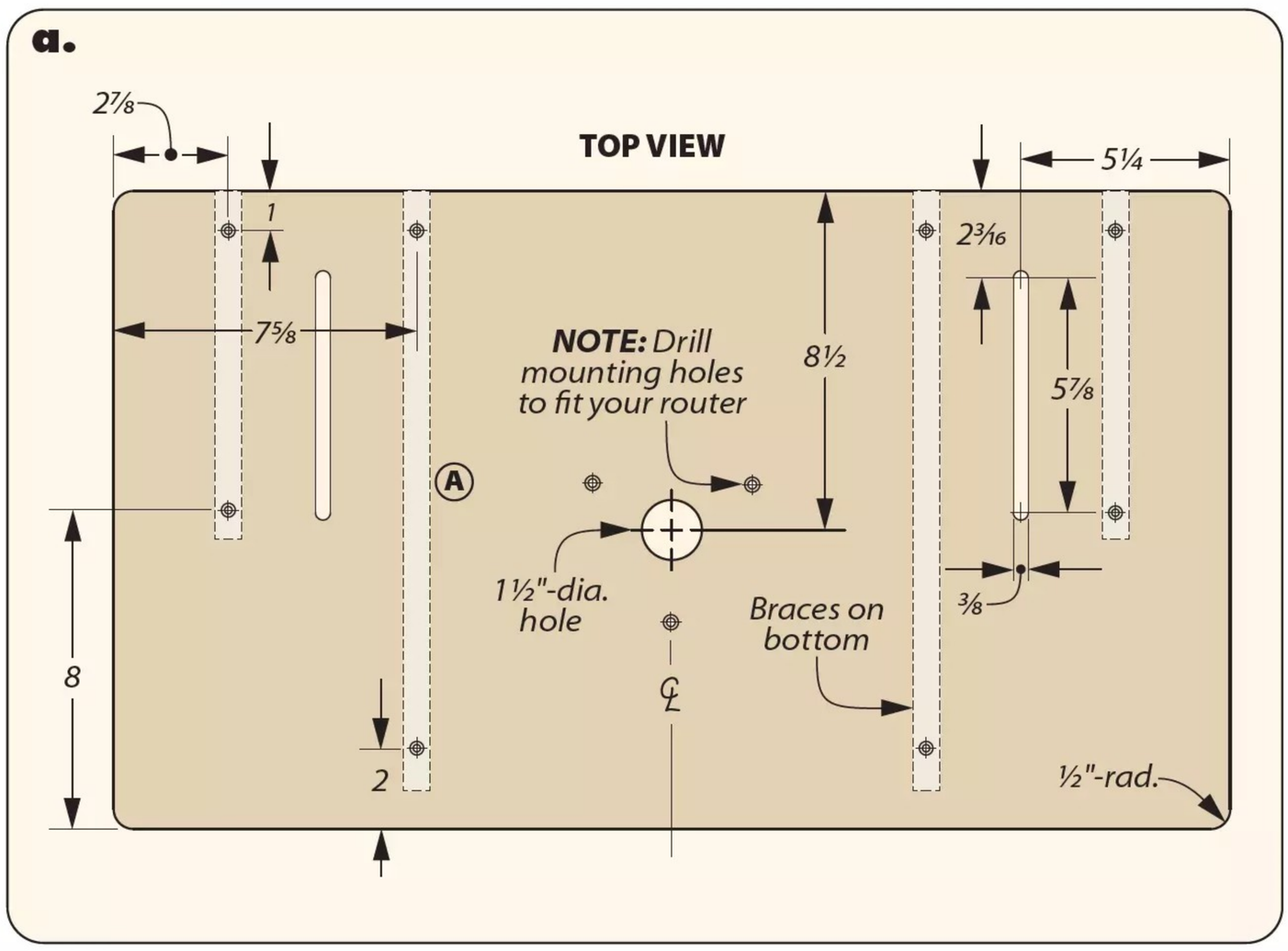
A clever, clamp-on design turns any surface into a router table workcenter.

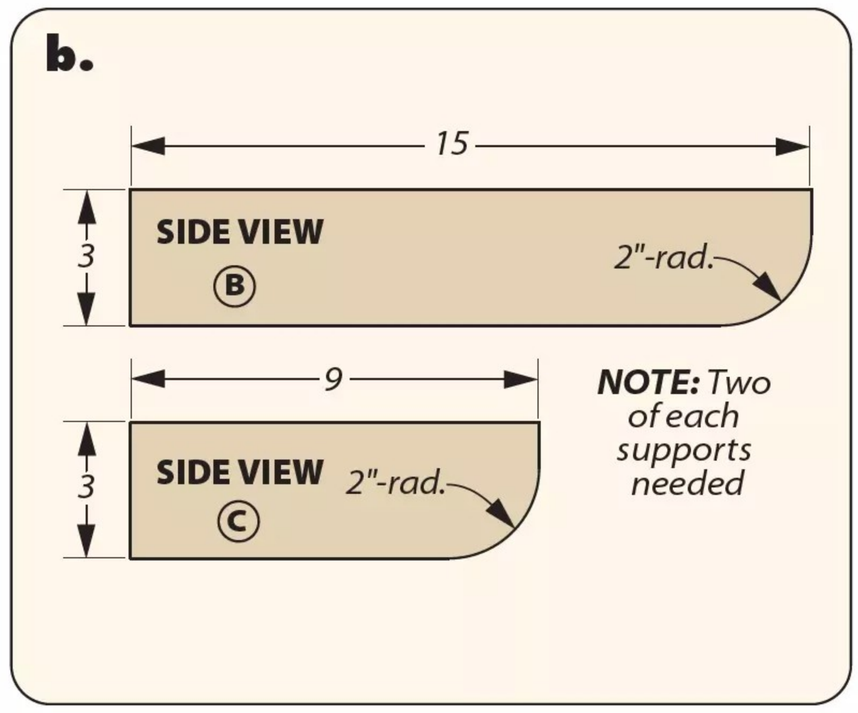
I have too much space — said no one ever. Each tool, storage cabinet, workbench, and machine has to earn its place in the shop. One common expectation is that important machines require a permanent position. The table saw, for instance, tends to be one of these machines in most woodshops. The second tier of tools can be smaller, benchtop varieties.

I fell into the permanent tool trap. A router table serves as a joinery station and shaping tool that I use in nearly every project. The catch: a standalone router table just doesn't fit in the space I have. I've tried several different options, with questionable degrees of success. Enter this candidate. Chris Fitch's design works by keeping the top generously sized. Below the surface, the support and clamping system

Clamp-on Table. A system of braces and cleats elevates the top and allows it to be secured with clamps.







makes setup speedy. A side benefit: Your router table isn't tied to a fixed location — or even to your workshop. You can take it out for site work as the need arises, which comes in handy more often than you may think.

TOP COMES FIRST

Many portable router tables skimp on the size of the worksurface. This one doesn't. For rigidity, the top is made from ¾" plywood. Baltic birch was our choice, but what's important is that the piece is flat.

Besides cutting the top to size, it's a good idea to round the corners. These will be less likely to ding your workpieces, as well as being a little gentler should you bump into the table.

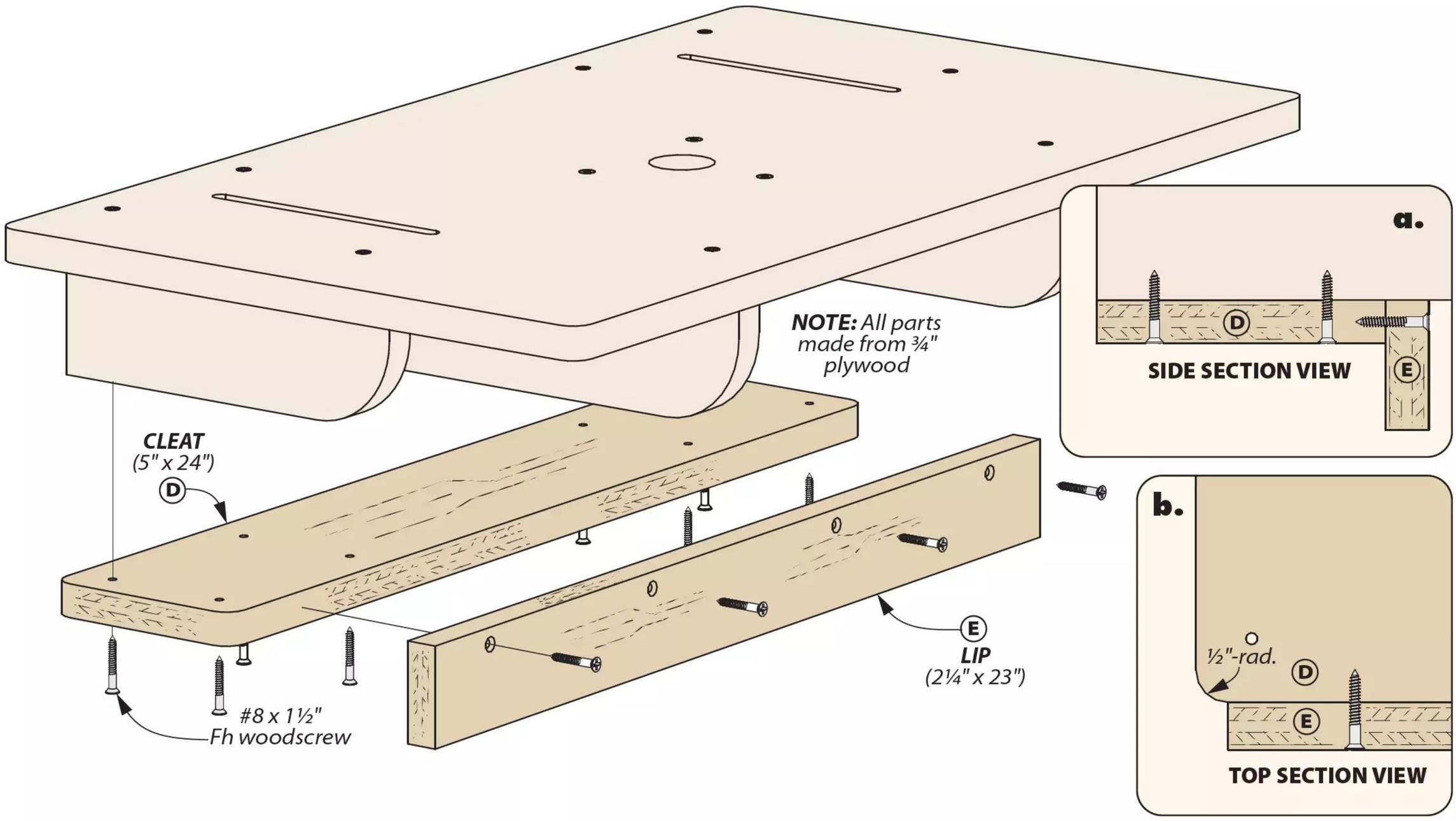
ROUTER OPENING. The agenda moves to fitting your router to the table. The first step here is to locate and drill a hole for a bit to pass through (detail 'a'). The size shown handles most bits. However, if you use a slot cutter or a large rabbeting bit, you may want to upsize this hole.

Allow me to point out that the hole isn't centered. It's offset towards the front of the table. This provides clearance for the router body from the support structure that is coming shortly.

The second part of this is to drill smaller holes to attach your router base (or a lift). I did this from the bottom side by centering the base on the hole and marking the locations of the screw holes for mounting. As you're doing this, be sure that the motor clamp faces towards the front for easy access to change the bit height.

FENCE SLOTS. A slot near each end of the top accommodates the fence, as in detail 'a.' To create slots like this, you can use a handheld plunge router with an attached edge guide. Work in several passes, lowering the bit between each pass.

BRACES. Two pairs of braces support the top from below. These are shown in the main drawing above and in detail 'b.' In addition to increasing rigidity, the braces also raise the top of the router table so it's at a more comfortable working height. The lower front corner of each brace is eased with a large radius.



A Secure Attachment

A flex-free tabletop is critical to a router table. However, there are other components that are just as important. The first one to tackle is the mounting system. Since this portable table doesn't have a base, you need a way to attach it to another surface.

The drawing above shows the parts required to clamp it down. A wide cleat is cut to size. Ease the sharp corners with an edge sander or a corner rounding router template, as in detail 'b.'

Woodscrews join the cleat to the braces. Drill two countersunk clearance holes in the cleat at each brace location. The cleat is centered on the braces side-to-side.

Don't just drive the screws in. Doing so will likely cause the screws to split the braces since they are in the "edge grain" of the plywood. Instead, clamp the cleat to the braces so it's all flush at the back (detail 'a'). Then drill pilot holes in the braces through the clearance holes.

LIP. The cleat allows you to clamp the table in place. To ensure that the table overhangs the surface enough to allow for the router, a lip is screwed to the front of the cleat. The lip is centered on the cleat, as shown in detail 'a.' The clearance hole locations are given in detail 'b.' I know this is a shop project, but careful placement provides a better look in the finished piece.

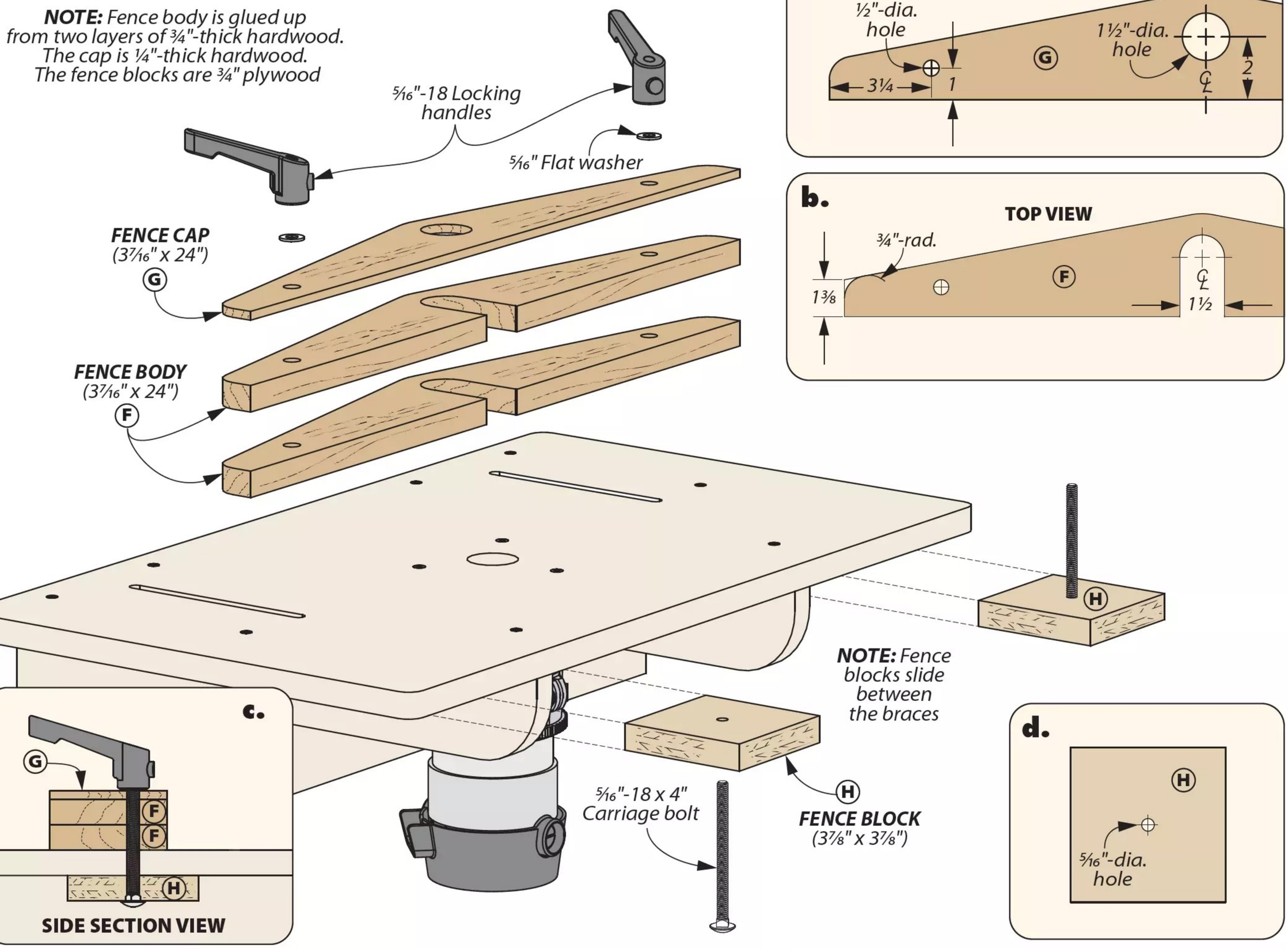
EASY ADJUSTING FENCE

A good router table requires a solid fence to match. The one shown on the next page offers the right balance of features.

FENCE BODY. The body of the fence is glued up from two layers of hardwood. Plywood would work as well, but I like the smooth edge of the hardwood compared to the laminated edges of plywood.

A rounded notch in the center accommodates a recessed router bit as well as dust collection, as you can see in detail 'b.' I drilled out the end of the notch and cut away the waste at the band saw. I smooth the edges with a file.

A thin cap layer is glued on top of the body. This piece has a hole to accept



the hose from your shop vacuum, as you can see in detail 'a' above. Size the hole for your vacuum hose. Be sure to center it over the notch you formed in the fence body.

At this stage, drill a hole at each end that matches up with the adjustment slots in the table. Locate the holes so that the bit opening in the table and fence are aligned. At the band saw, cut the tapers on the back edge of the fence, as shown in details 'a' and 'b.' These aren't strictly necessary, but they add a nice visual appeal.

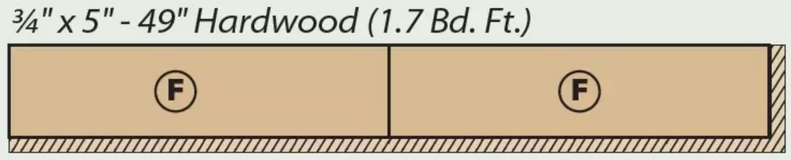
CLAMPING BLOCKS. The fence is attached to the table with carriage bolts, washers, and locking handles. The carriage bolts pass through blocks to increase the bearing surface for greater stability. When cutting the blocks to size, make sure they slide smoothly between the braces. And, just like that, you're ready to clamp this table in place and get to routing.

MATERIALS & SUPPLIES

A	Table Top (1)	¾ ply. - 16 x 28
B	Inner Braces (2)	¾ ply. - 3 x 15
C	Outer Braces (2)	¾ ply. - 3 x 9
D	Cleat (1)	¾ ply. - 5 x 24
E	Lip (1)	¾ ply. - 2¼ x 23
F	Fence Body (2)	1½ x 3 7/16 - 24
G	Fence Cap (1)	¼ x 3 7/16 - 24
H	Fence Blocks (2)	¾ ply. - 3 7/8 x 3 7/8

- (20) #8 x 1½" Fh Woodscrews
- (2) 5/16"-18 x 4" Carriage Bolts
- (2) 5/16"-18 Locking Handles
- (2) 5/16" Flat Washers

¾" x 5" - 49" Hardwood (1.7 Bd. Ft.)



¼" x 5" - 25" Hardwood (.87 Sq. Ft.)

ALSO NEEDED: *One 48"x 48" Sheet of ¾" Baltic Birch Plywood*

Router Table Sled

Easy to build and packed with features, this sled will make it simple to rout a variety of perfect-fitting joints.

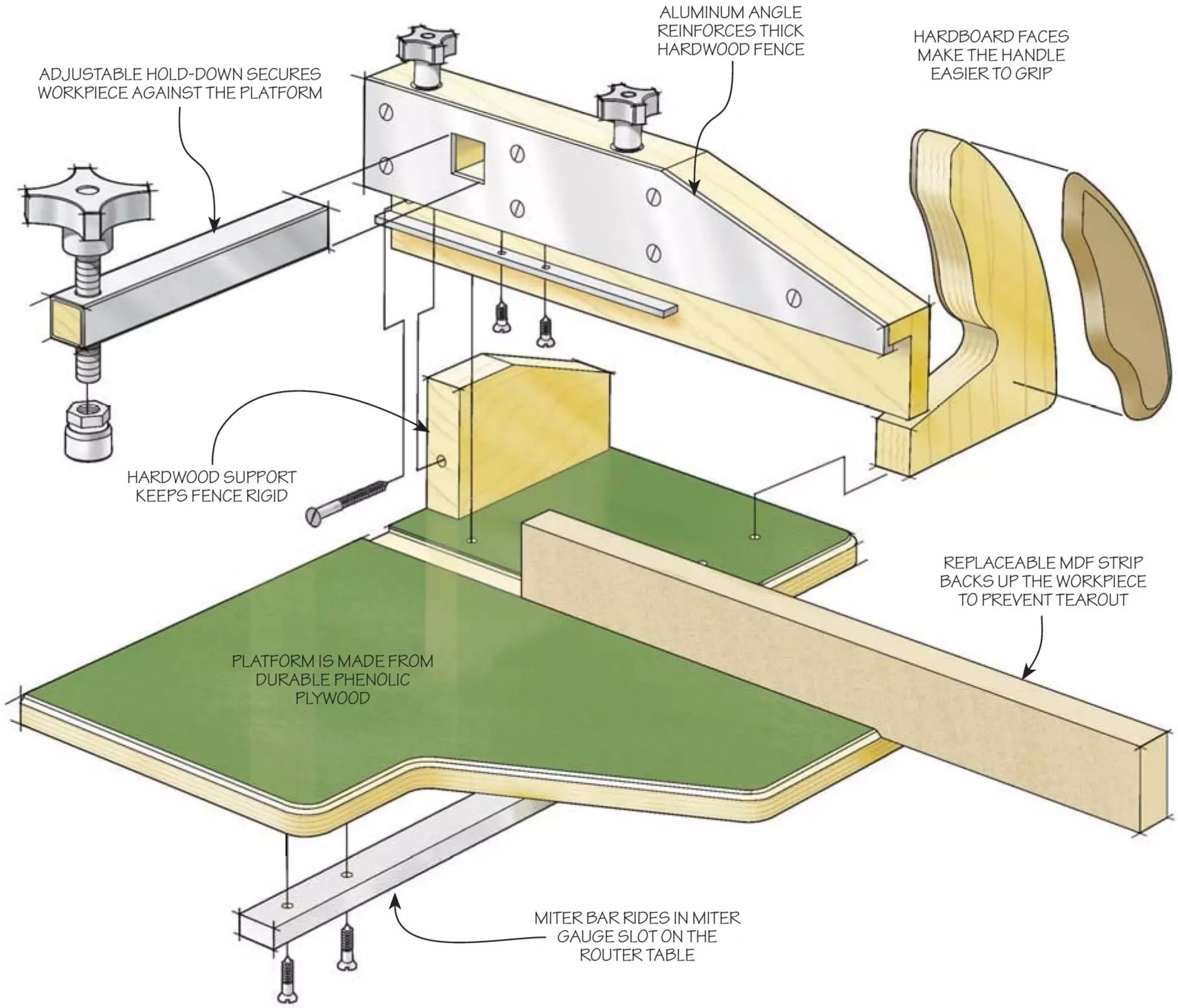
A router table is a great tool for producing tight, crisp joinery — whether you're routing grooves, tenons, or even using a specialized "rail and stile" bit set. But when any of these jobs involve routing across the grain of a workpiece, a few problems arise. The two biggest challenges are preventing tearout and keeping a narrow workpiece square with the bit.

The sled you see in the photo above meets both of these challenges. Right behind the workpiece, you'll find an MDF backing strip that supports the workpiece and eliminates the possibility of tearout.

Another thing I really like about this sled is the hold-down. It's an amazingly simple clamp that locks the workpiece firmly in place for an accurate cut.

Construction Details

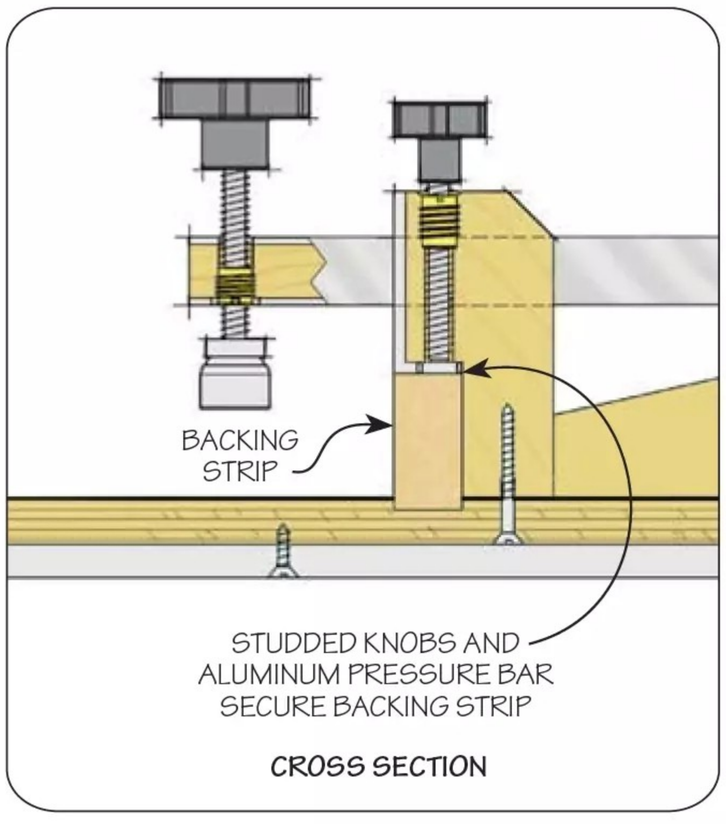
OVERALL DIMENSIONS:
13" W x 6¾" H x 15" D



MATERIALS & SUPPLIES

A	Platform (1)	11½ x 15 - ½ Ply.
B	Fence (1)	1⅝ x 3⅜ - 11⅜
C	Backing Strip (1)	1½ x 13 - ¾ MDF
D	Filler (1)	⅝ x ⅝ - 6
E	Support (1)	¾ x 2½ - 4¼
F	Handle (1)	4⅝ x 6⅛ - ¾ Ply.
G	Handle Faces (2)	6 x 4 - ¼ Hdbd.

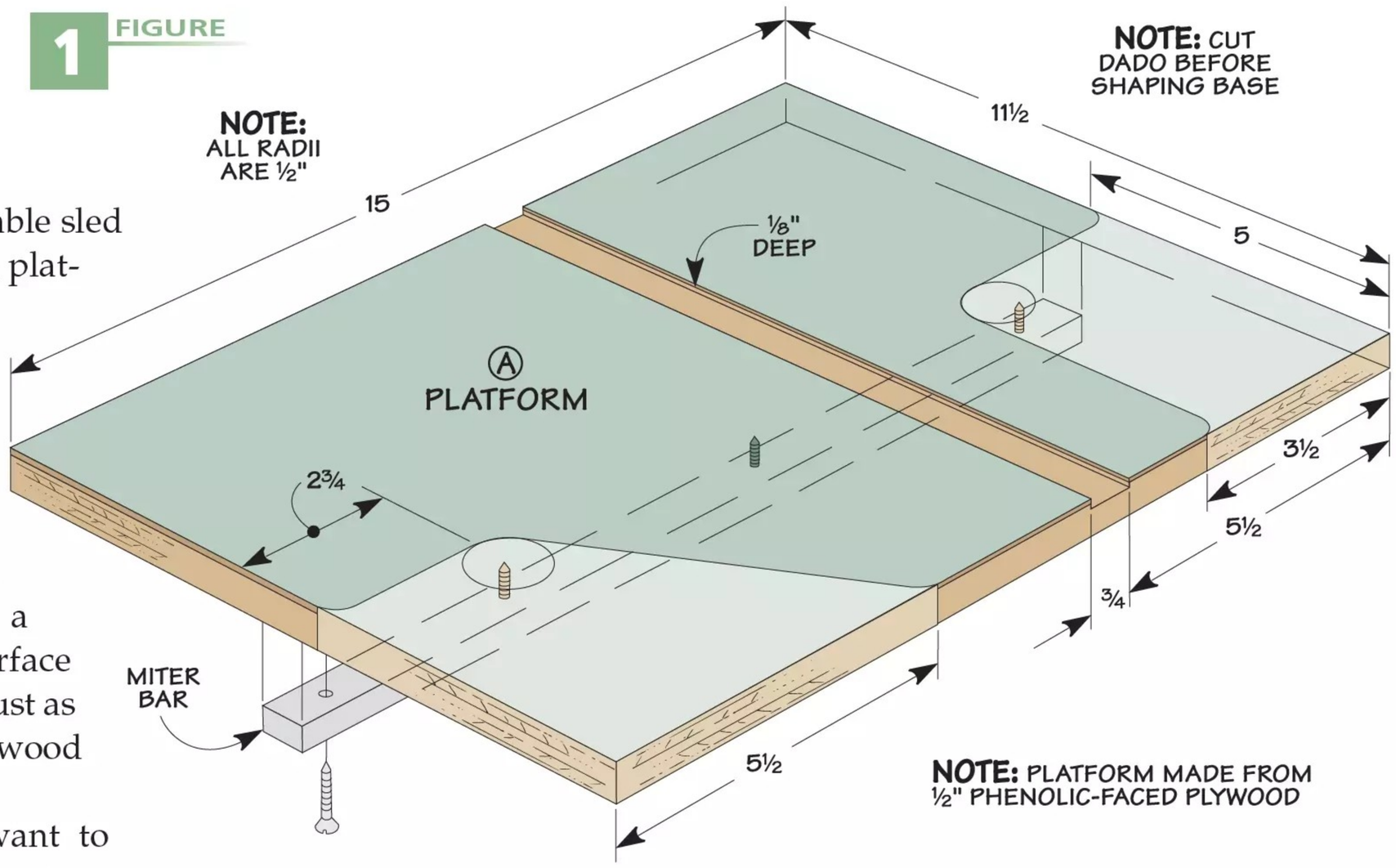
- (1) ¾" x ¾" - 6" Steel Tube
- (1) ⅜"-16 x 3¼" Threaded Rod
- (2) ¼"-20 x 2¾" Threaded Rods
- (2) ¼"-20 Aluminum Knobs
- (1) ⅜"-16 Aluminum Knob
- (2) ⅜"-16 Swivel Pads
- (2) ¼"-20 Threaded Inserts
- (1) ⅜"-16 Threaded Insert
- (9) #6 x ½" Fh Woodscews
- (2) #8 x 2" Fh Woodscews
- (7) #8 x 1½" Fh Woodscews
- (7) #10 x ¾" Fh Woodscews
- (1) 15" Miter Bar
- (1) 2" x 2" - 11⅜" Aluminum Angle (⅛" thick)



CROSS SECTION

A Plywood Platform

FIGURE 1



I began building the router table sled by making the large plywood platform. There are a few details worth taking note of when you do this.

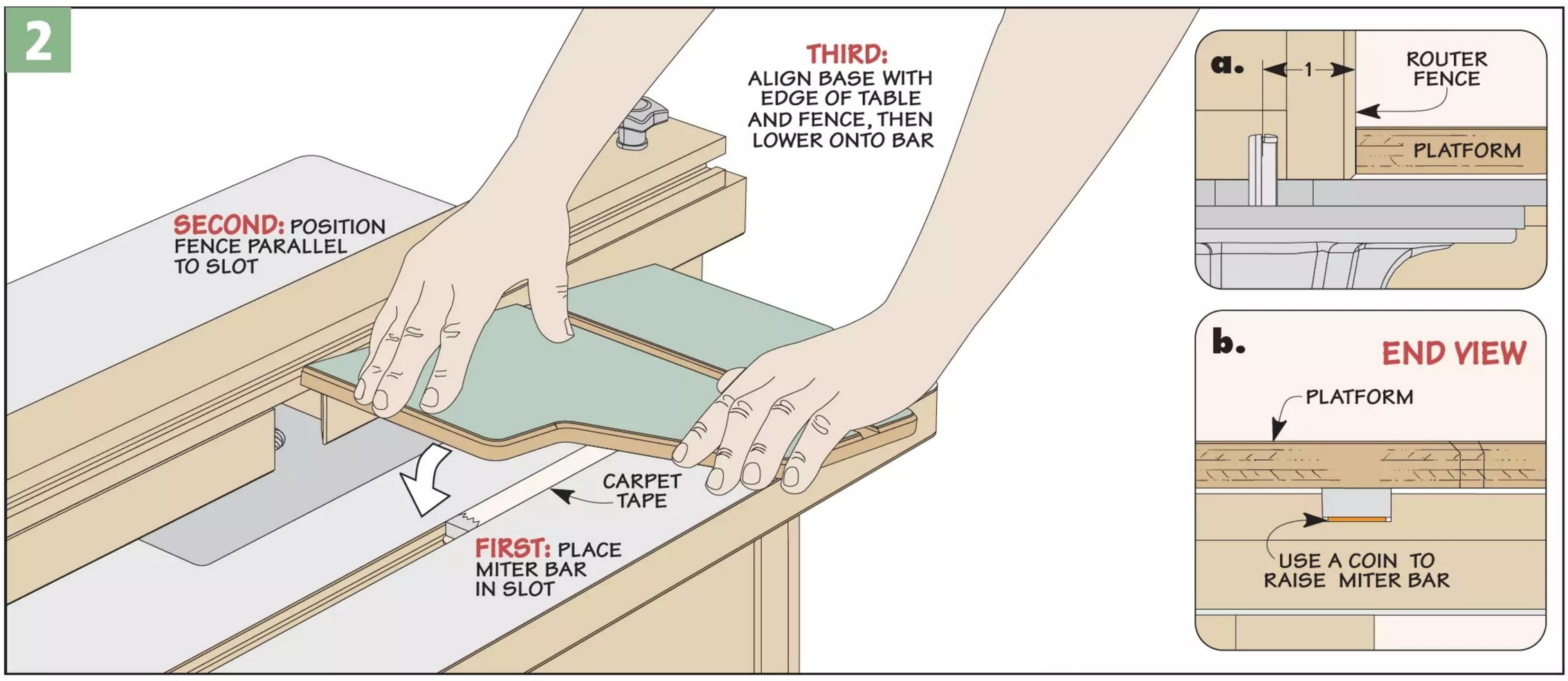
The first is the material. My choice of stock for the platform was phenolic-faced ½" plywood. This is a tough plywood and has a durable and low-friction surface that's great for jigs. You can just as easily, however, use a ½" plywood of any variety you wish.

DADO. The other detail I want to talk about is a dado that runs across the platform, as you can see in Figure 1. The dado is sized to hold a backing strip for the workpiece. It's a good idea to cut this dado while the platform is still square. Once you do so, you can shape the platform (Figure 1). You'll want to rout a chamfer on each of the top edges — except for the long side that faces the router bit.

MITER BAR. A bar that fits in the miter gauge slot of the router table guides the sled as you rout. To prevent the platform from contacting the router bit, I positioned the edge 1" away from the centerpoint of the bit and made sure it was parallel to the miter slot before screwing it in place.

To temporarily fix the position of the miter bar, you can use a strip of carpet tape. This allows you to drive the screws in place with ease. In Figure 2 below, you can see how I used the edge of the table and fence to help me position the platform properly over the miter bar.

2

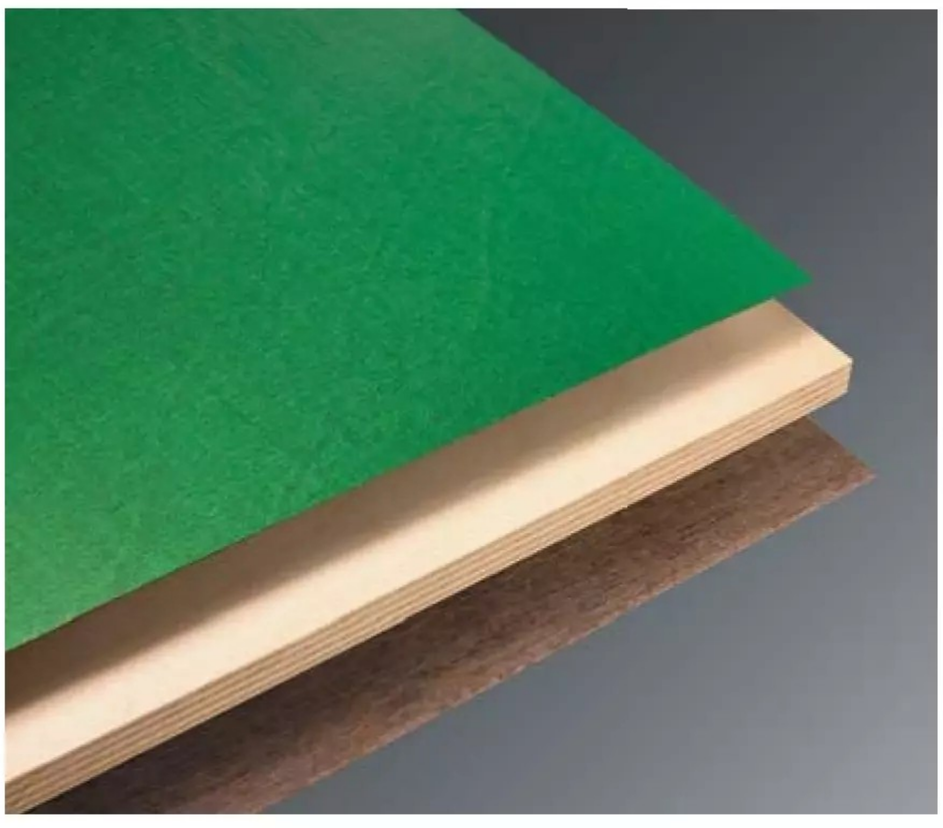


Building the Fence

With the platform of the sled complete, the next section to build is the fence assembly. The assembly starts out with three parts: the fence, a backing strip, and a hold-down, as you can see in Figures 3 and 4. The hold-down has an adjustable arm that makes it easy to secure a workpiece to the sled.

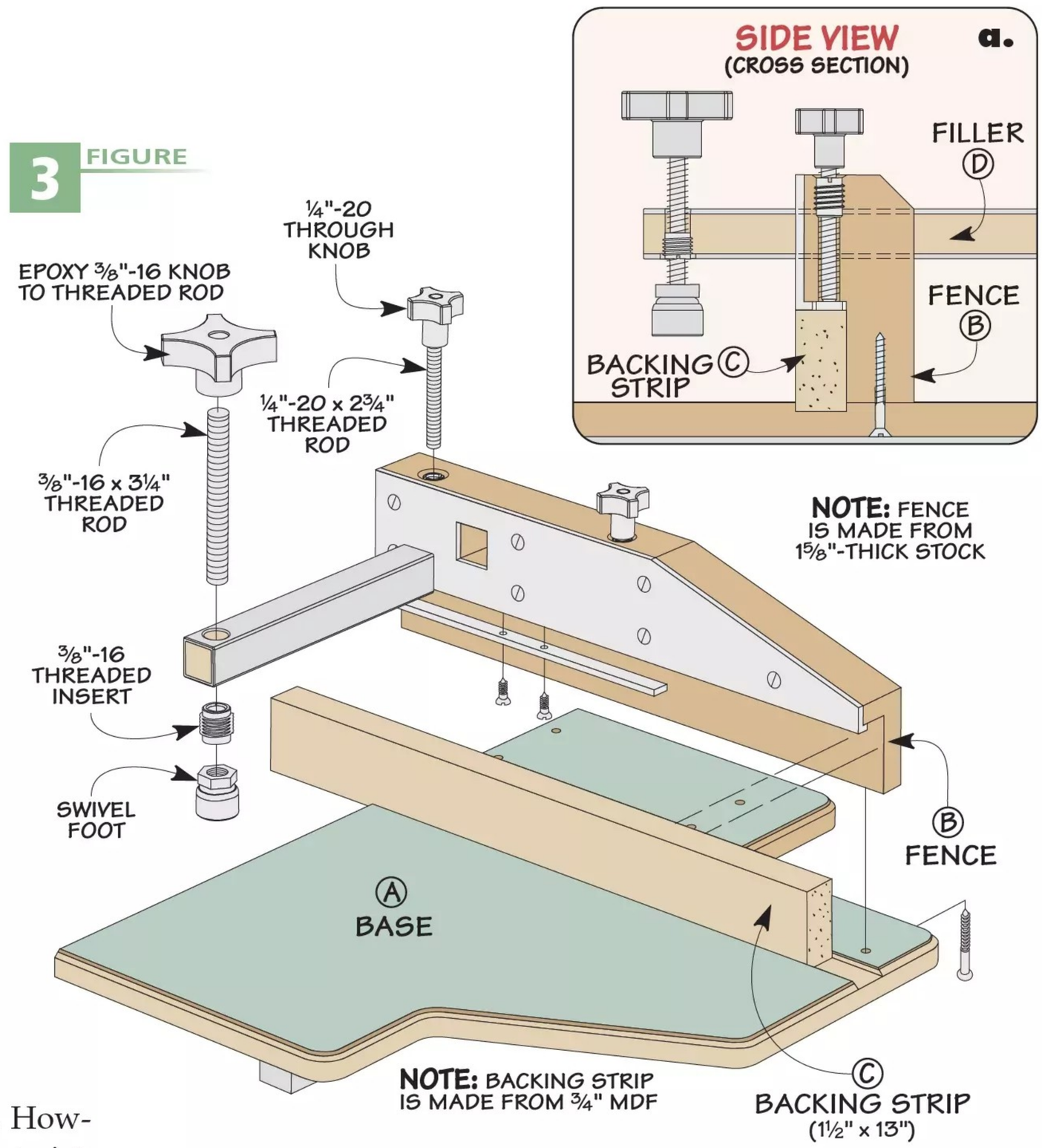
FENCE. The main portion of the fence is made from a thick, hardwood block. (It's actually two pieces that are glued together, as illustrated in Figure 4.) In the lower piece, I cut a square notch sized to fit the hold-down arm. It would have been easier to simply drill a round hole and to use a round arm on the hold-down. However, I didn't want the hold-down to rack or twist, so I used square tubing instead.

Next, I cut a wide rabbet along the bottom edge of the fence. This rabbet provides a space for the MDF backer strip. Note: Since these strips are meant to get chewed up during use, it's a good idea to make several at once.

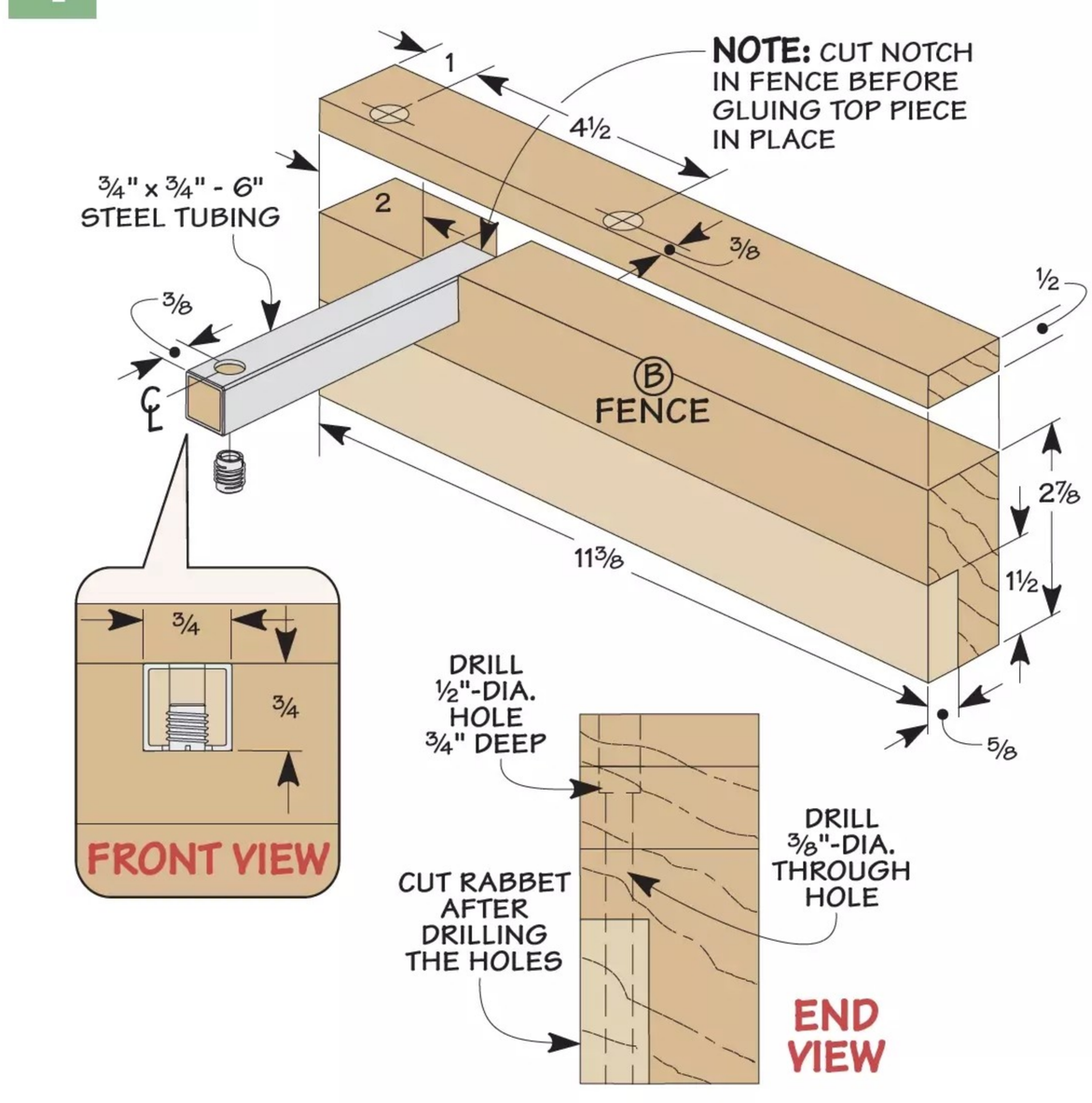


Laminated Top. If you can't find phenolic-faced plywood, ordinary plywood with laminate glued to both faces will work just as well.

3 FIGURE



4 FIGURE



HANDLE PATTERN

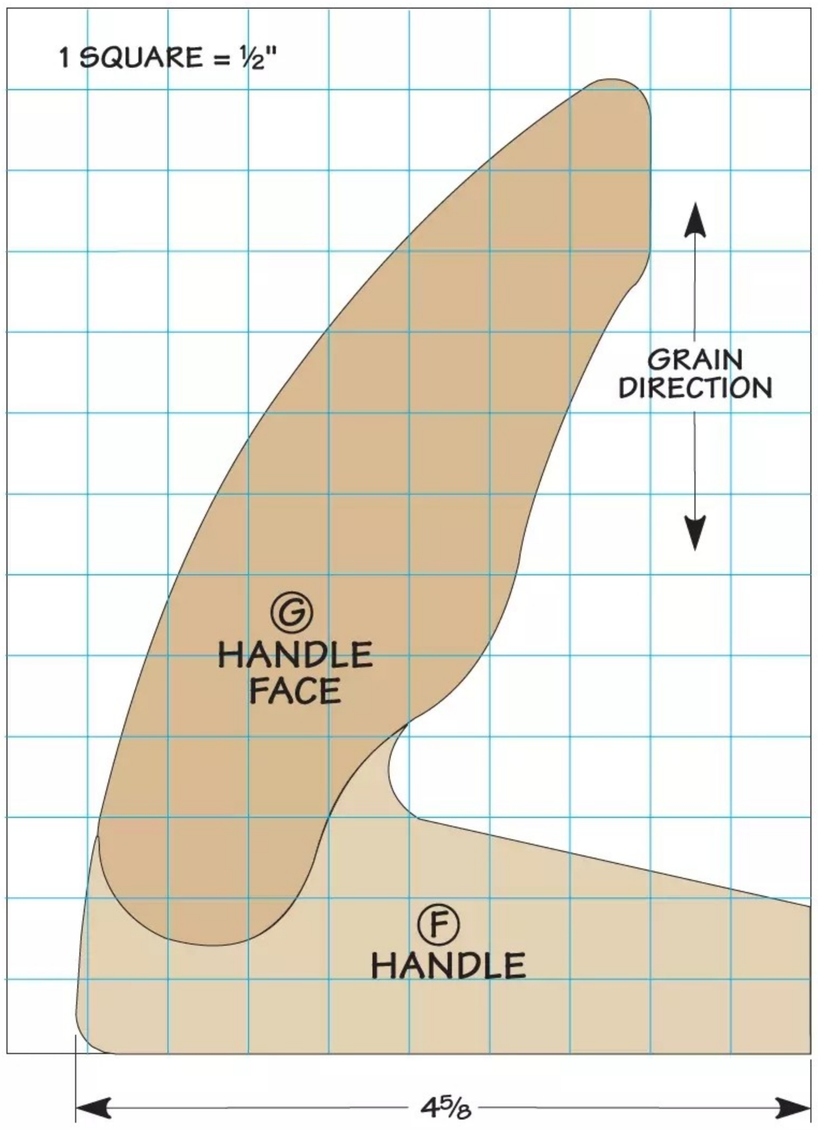
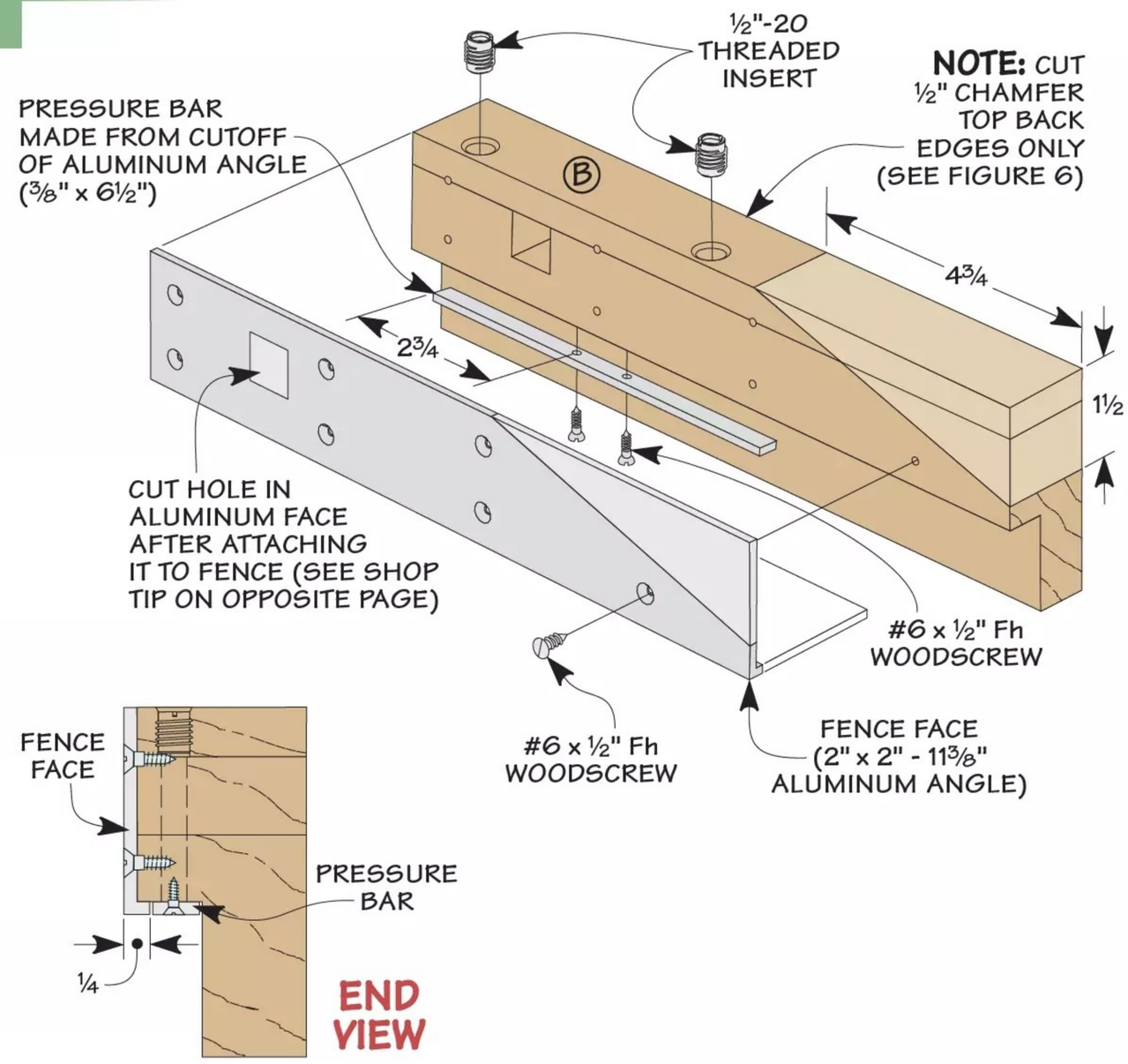


FIGURE 5

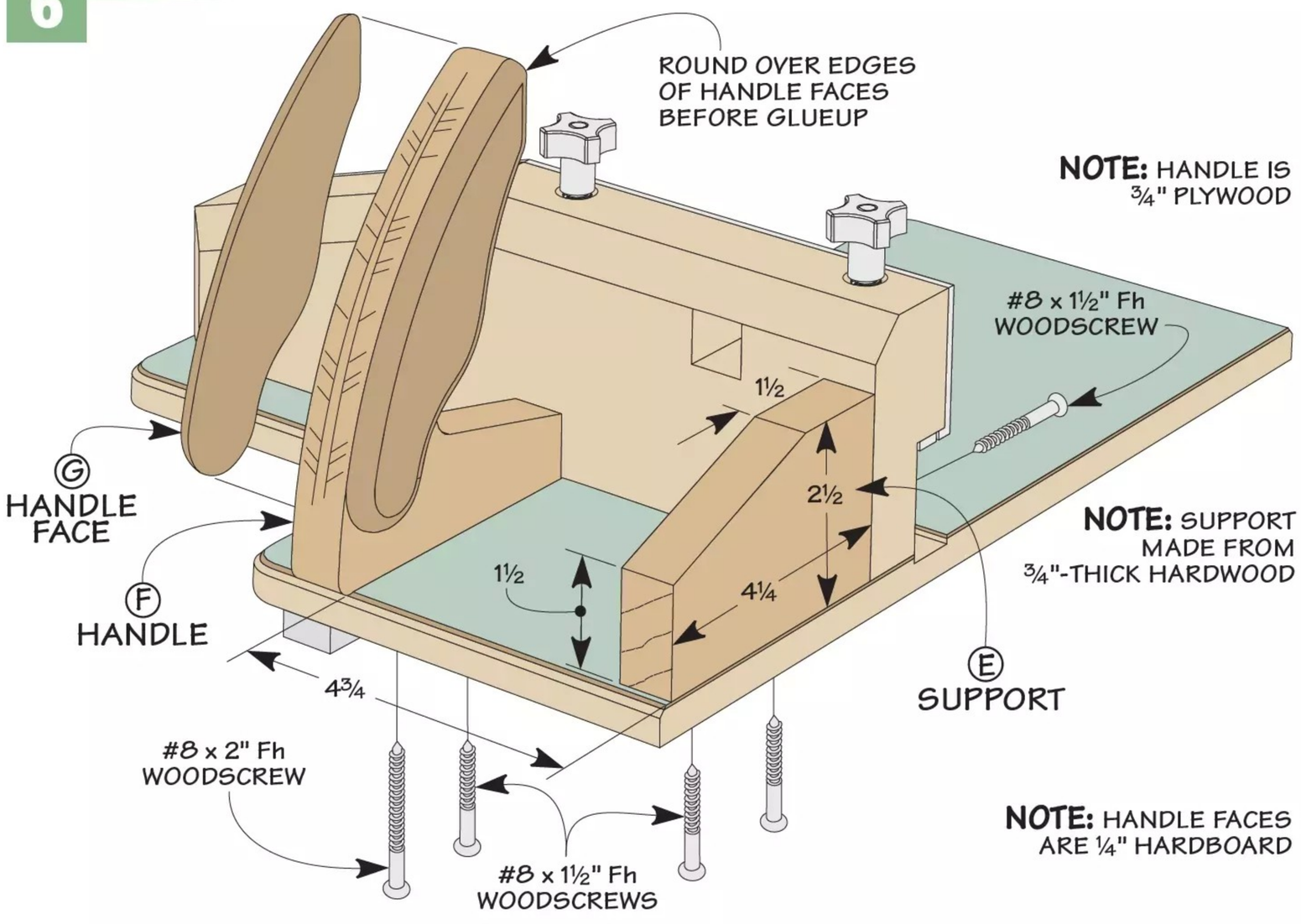


Finishing the **Fence**

The thick, hardwood fence is pretty rigid. But tightening the hold-down exerts a lot of upward pressure, which could split the body of the fence. To prevent this from happening, I reinforced the fence with an aluminum face. This piece is cut from a section of aluminum angle. I trimmed off one side of the angle at the table saw, so all that was left was a narrow lip, as shown in Figure 5.

The question now is, how do you make a square hole in the face for the hold-down arm? This is accomplished by a straightforward, two-step process. After attaching the face, I drilled a starter hole in the aluminum, as shown in the upper photo on the opposite page. Then, at the workbench, I used a file to square up the hole, like you see in the middle photo. The sides of the hole in the fence guide the file for a flush fit.

FIGURE 6



PRESSURE BAR. There are just a few steps left to complete the fence. From the cut-off section of the aluminum angle, I made a pressure bar. This will lock the backing strip in position, as illustrated in Figure 5. A pair of knobs are mounted in threaded inserts on the fence to force each end of the pressure bar down. Doing this will hold the backing strip tight.

Two other details — a gentle angle and a chamfer — are all that's left, as shown in Figures 5 and 6. And then, you can screw the fence to the platform.

SIMPLE HOLD-DOWN. One of the handiest features of the router table sled is the hold-down. And part of what makes this piece so useful is how simple it is. It is just an arm made from a piece of

square tubing. At one end of the arm is a clamp, as shown on page 69, in Figures 3 and 3a.

The hold-down slides easily through the hole in the fence to adjust the position. Then, as soon as you tighten the clamp, it locks into place effortlessly.

Because of the pressure generated by the hold-down, I wanted to make sure the arm wouldn't bend or flex. So, I made it out of a piece of steel tubing. To provide a solid anchoring point for a threaded insert that's used to tighten the clamp, I cut a filler to fit inside the tubing. This is glued into place with epoxy. To complete the hold-down, glue a knob to a piece of threaded rod using epoxy. Then finally, twist a swiveling foot on the other end.

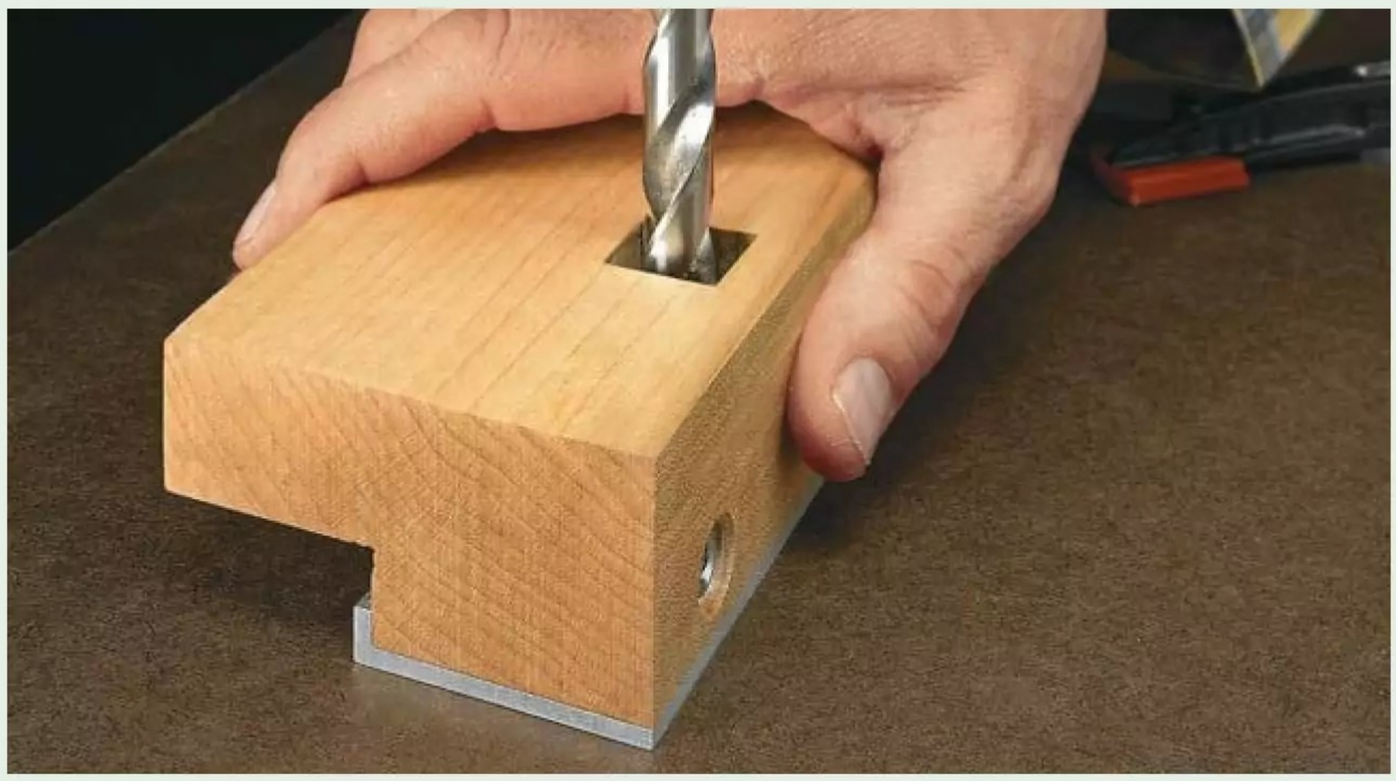
SUPPORT. At this point, there are just two parts remaining to complete the sled — a support and a handle. The aluminum face I mentioned earlier will keep the fence from splitting. But I also want to prevent the fence from tilting out of its square position during use. So, in order to do that, I added a support piece behind the fence (Figure 6).

HANDLE. To finish up the project, I made a plywood handle and attached it to the sled behind the fence. The handle has a pair of hardboard "cheeks," which gives it a more comfortable grip.

The sled is now ready to be used. In the box below, you'll find a few helpful set-up tips, so you can get the best results with your router sled.

Shop Tip

A Square Hole. To complete the hole in the fence face, first drill out the waste (top photo). Then, file it flush with the fence (bottom photo).

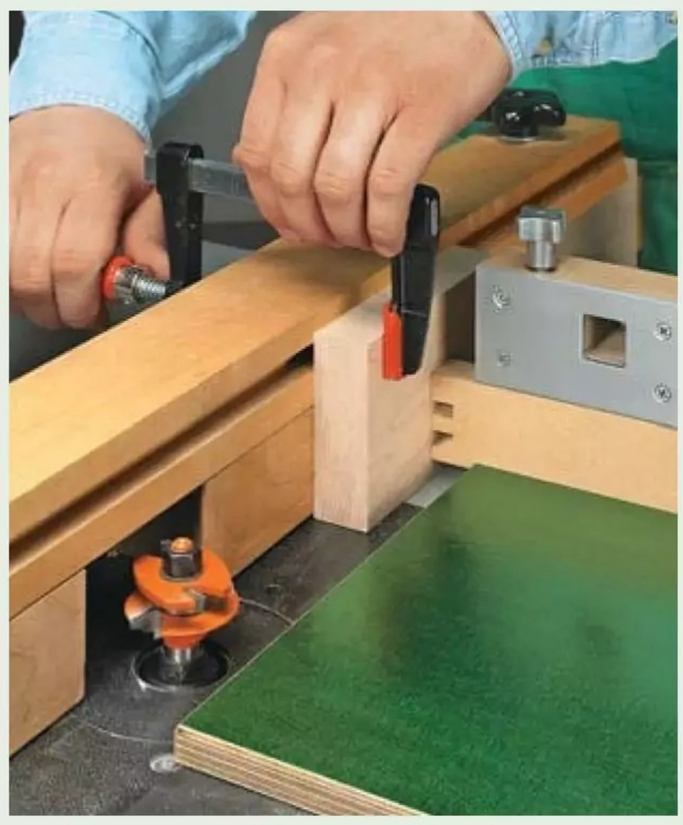


Set-up Tips

For the best results when using the router sled, you just need to follow a simple, two-step process — setting the backing strip and then adjusting a stop block.

Set the Backing Strip. After aligning the backing strip with the bit, plunge it into the spinning bit. When it touches the bearing, lock the strip down.

Stop Block. I clamped a stop block to the router table fence using the backing strip as a guide. This makes positioning your workpiece quick and easy.



Dust-Free Router Fence

A router table has to be one of the most frequently used tools in our shop. From cutting joinery to shaping edges and corners, there are many things that a router table excels at. Unfortunately, one of those things is also making a mess. Router bits kick up a lot of dust and chips, especially if you're using something like an ogee bit or cutting joinery for a case. As a solution, Chris Fitch and Marc Hopkins (our Creative Director and Shop Manager, respectively) designed this router table fence. Their focus was to create a reliable fence that could be adapted to any router table and dust collection system.

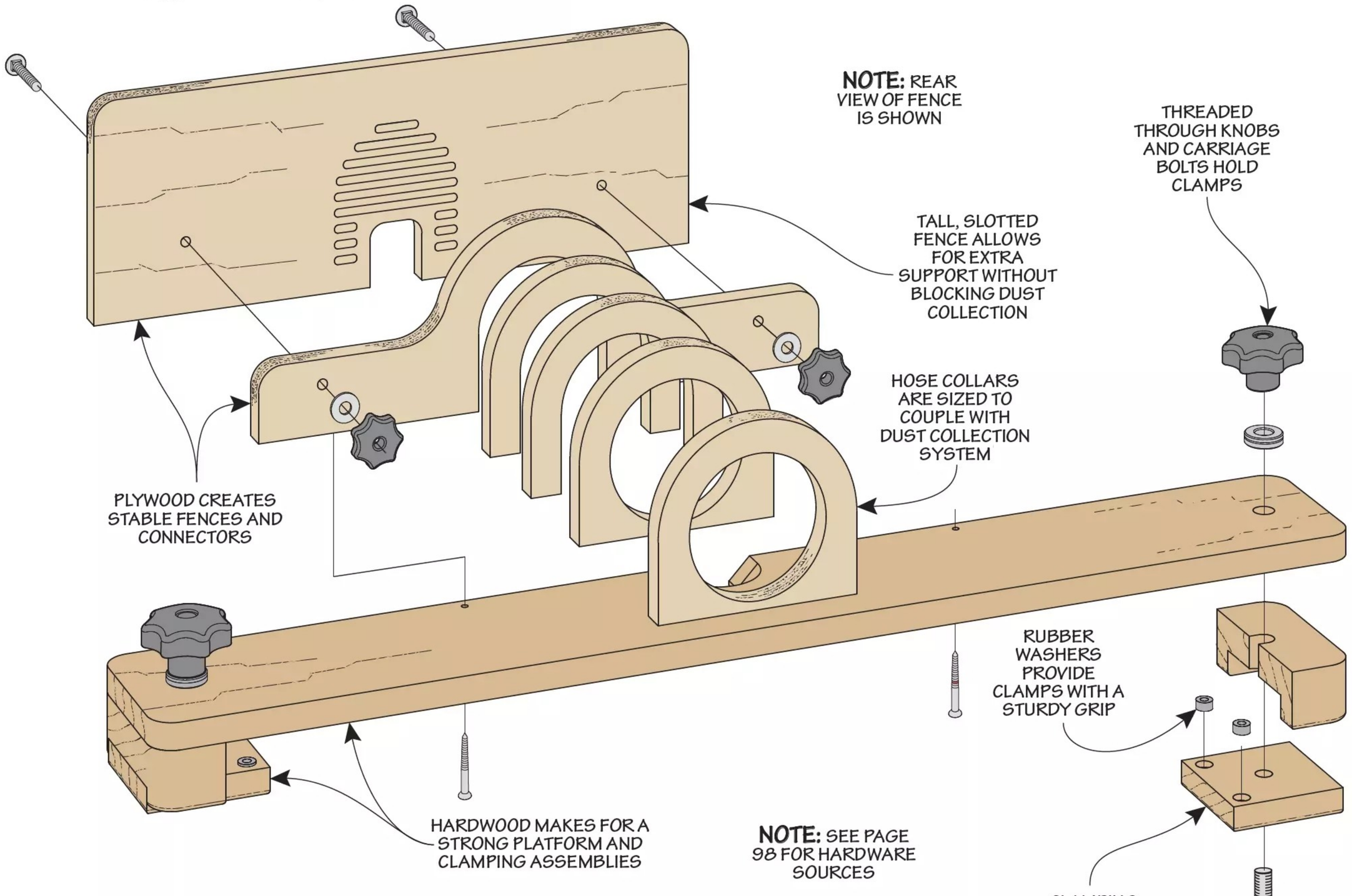
As you can see on the next page, it's a relatively simple design that puts function over form. Hardwood and plywood combine to utilize the strengths of both materials. The hose collars and clamping assemblies can be resized to fit the needs of your shop. An optional fence is even included that provides extra support depending on the operation. And, despite its practicality, we've added a few visual flairs — it'll be used every day, so a little attention to aesthetic goes a long way.

Collection Coupler. A couple of shop-made hose collars on the back side of the fence allow you to attach your dust collection directly for debris-free routing.

Construction Details

OVERALL DIMENSIONS:

36" W x 9 3/16" H x 5 3/4" D



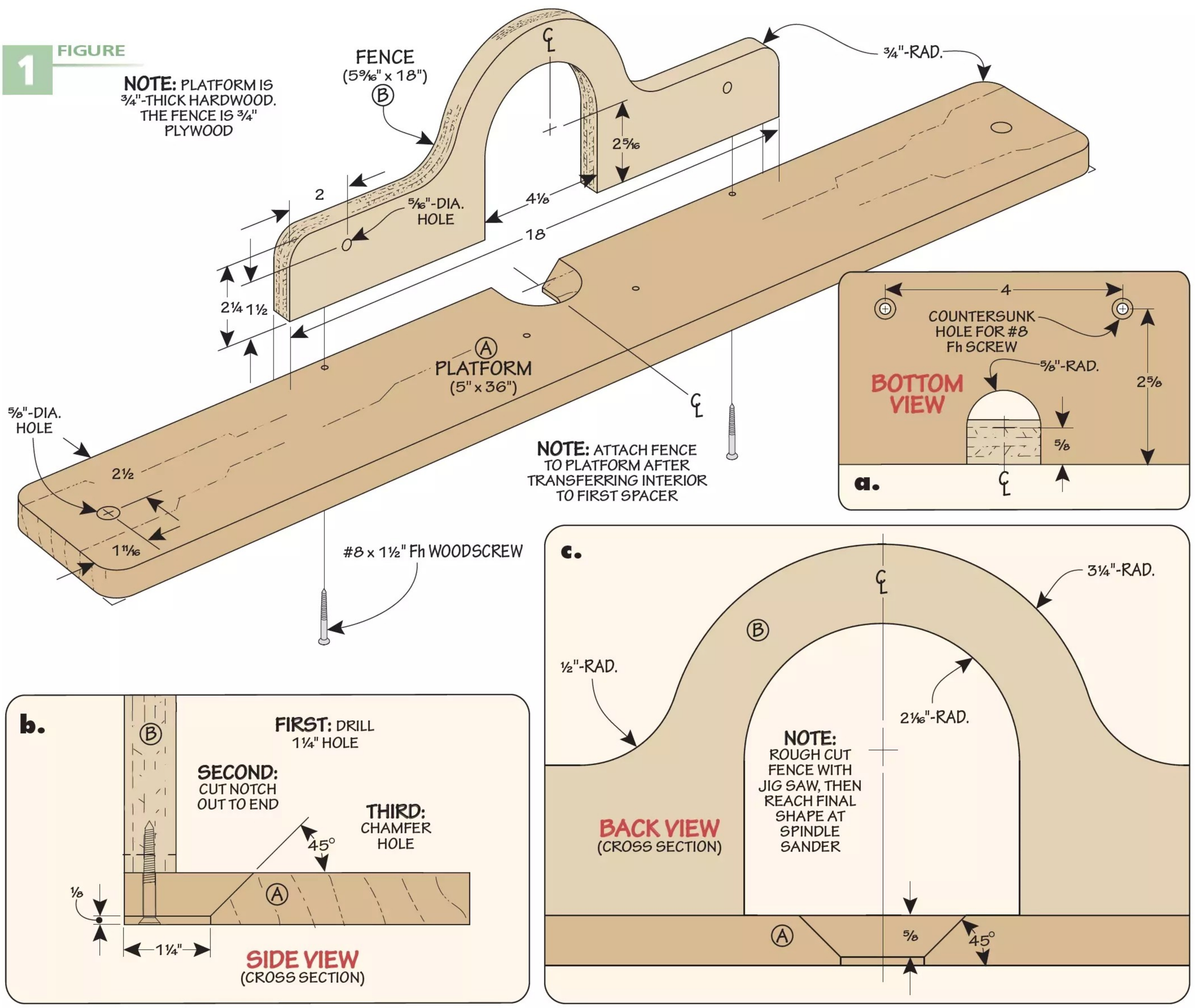
Auxiliary Fence Attachment. The tall auxiliary fence can be attached to provide additional support for larger workpieces while still allowing dust and chips to be sucked clear.

MATERIALS & SUPPLIES

A	Platform (1)	3/4 x 5 - 36
B	Fence (1)	5 9/16 x 18 - 3/4 Ply.
C	Spacers (2)	5 5/16 x 6 - 3/4 Ply.
D	Hose Collars (2)	5 5/16 x 6 - 3/4 Ply.
E	Clamp Steps (2)	1 11/16 x 5 - 2
F	Clamp Feet (2)	3/4 x 3 1/2 - 3 1/2
G	Tall Fence (1)	7 x 20 - 3/4 Ply.

- (4) #8 x 1 1/2" Fh Woodscrews
- (2) 1/2"-13 x 3 1/2" Carriage Bolts
- (5) 1/2" I.D. Leveling Washer
- (2) 1/2"-13 Threaded Through Knobs
- (4) 1/2" O.D. Rubber Cushioning Washers
- (2) 5/16"-18 x 2" Carriage Bolts
- (5) 5/16" I.D. Flat Washer
- (2) 5/16"-18 Threaded Through Knobs

1 FIGURE



Beginning with the Base

The best place to begin this router fence is at the base assembly. A hardwood platform (maple specifically) is a sturdy start to the project, which will be followed by a plywood fence (Baltic birch was my choice here). As you can see in Figure 1, there's a bit of shaping to be done, but the first step is planing down the platform and cutting it to size.

PLATFORM. The art above shows the size of my platform. You'll want your platform to be 4" longer than the width of your router table. This will leave room along each end for the clamps.

With the sized workpiece in hand, head to the drill press first. There are three holes to make at this point, which you can see in Figure 1. First I made the two holes at either end of the platform to accept the bolts for the clamping assemblies later on. Using a stop and a fence ensures that these holes have the same location on either end.

BIT NOTCH. Once these are in place, I used a Forstner bit to drill a hole near the center of the workpiece, establishing the radius shown in Figure 1a. To turn this into a notch for the bit, I used a jig saw to remove the remaining waste, followed by a flush-trim bit guided by a scrap board stuck down with double-sided tape to clean up the edge.

Finally, you'll need to create the chamfer on the notch (shown in Figures 1b and 1c). I routed this using a 45° chamfer bit, simply running the bearing along the perimeter of the notch from above.

ROUNDED CORNERS. Use a compass to mark out the radiused corners shown in Figure 1. I removed most of the waste at the band saw, then finished the radii on the edge sander.

FENCE. Next up on the docket is the fence. After sizing the plywood blank, take some time to lay out the final shape. Figures 1 and 1c show the different radii and their heights. Mark out the clearance holes on either end as well. These will accept carriage bolts to attach the tall auxiliary fence. Before shaping, drill out those clearance holes at the drill press.

Shaping the fence is easier than it seems. Begin by rough-cutting the fence to shape using a jig saw, then finish the shaping at the spindle and edge sanders.

ASSEMBLY. With the fence shaped, you can do the first assembly of this project.

Glue and screws will get the job done here. However, I recommend you wait a moment before attaching the fence — you'll see why.

SPACERS & HOSE COLLARS

With the base and fence constructed, it's time to provide a hook-up to your dust collection, which means adding a set of spacers and hose collars.

SPACERS. Two spacers separate the fence from the hose collars. After cutting the blanks (Figure 2), scribe the layout onto one blank. The first will act as a template for the second to ensure they're identical. When scribing the interior of this blank, use the fence's interior as a pattern. (After that, feel free to attach the fence to the platform.)

Now you can cut the blank to rough shape. The jig saw or the band saw work well, and (as with the fence) the final shape can be sanded.

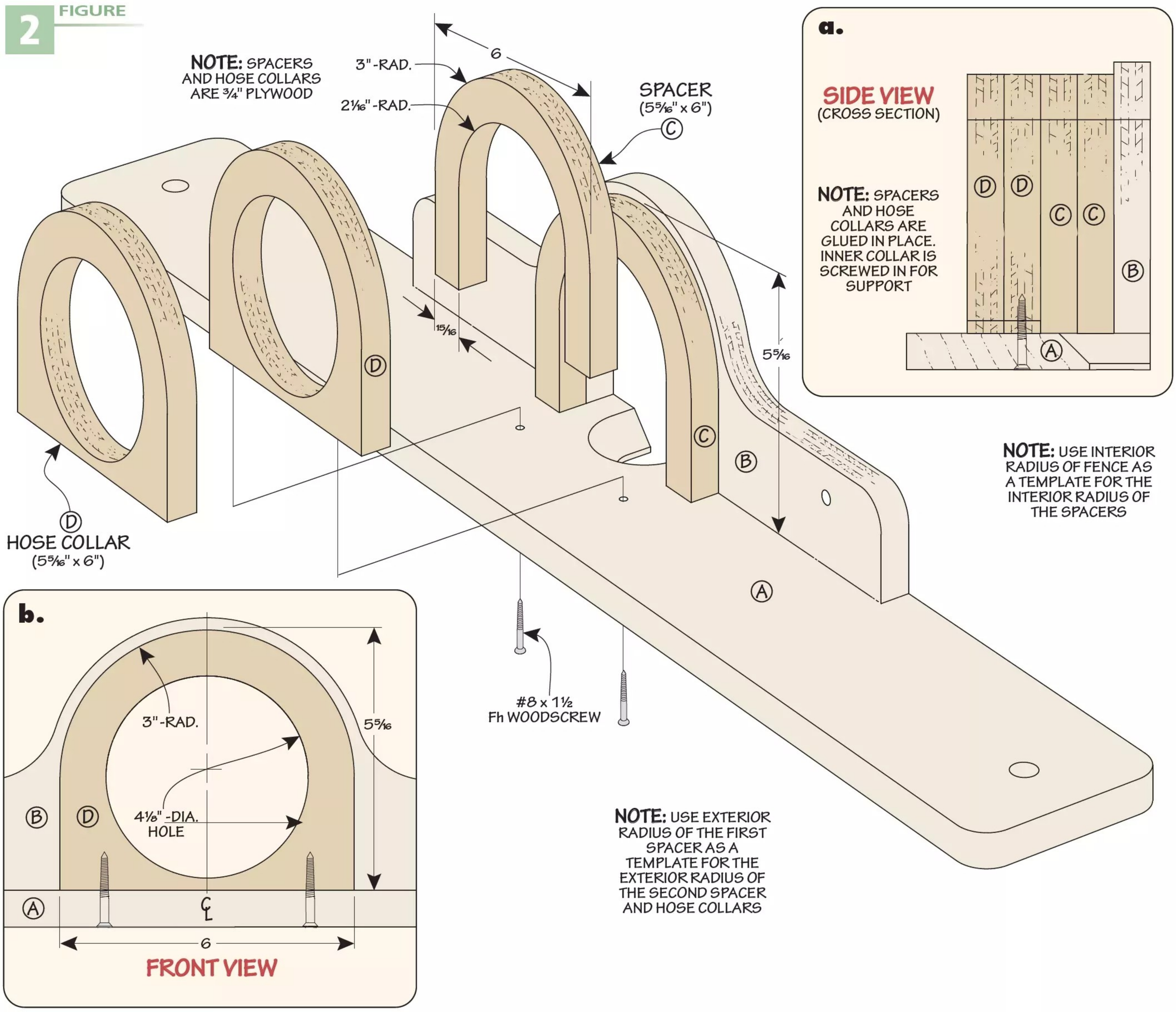
With the first spacer shaped, trace it onto the second blank. Rough cut it, then tape it to the first spacer and rout it to final shape with either a flush-trim bit or pattern bit.

HOSE COLLAR. The hose collars are quite similar to the spacers. After sizing the hose collar blanks, lay out the hole for your hose (Figure 2b). We have a high CFM hose with a 4" diameter, but the holes on your hose collar may need to be different. Cut the hole while the blank is still square so you can use your fence at the drill press. A wing cutter works best for a circle of this diameter.

With the hole made, move on to the exterior of the hose collars. I followed the same method I used for the second spacer, first rough cutting the collars, then attaching a spacer to use as a template for routing the final shape.

GLUEUP. With all the pieces made, it's time for the glueup. I began by gluing the spacers and hose collars together, using their outside edges for alignment. Once dry, I attached them to the fence. Since the interiors of the fence and spacers are identical, you can use them to ensure proper placement. Glue will keep these parts in place, but (as you can see in Figure 2a) I added a couple screws for extra stability. After the glue dries, sand the insides and outsides so all pieces are smooth and flush.

FIGURE 2



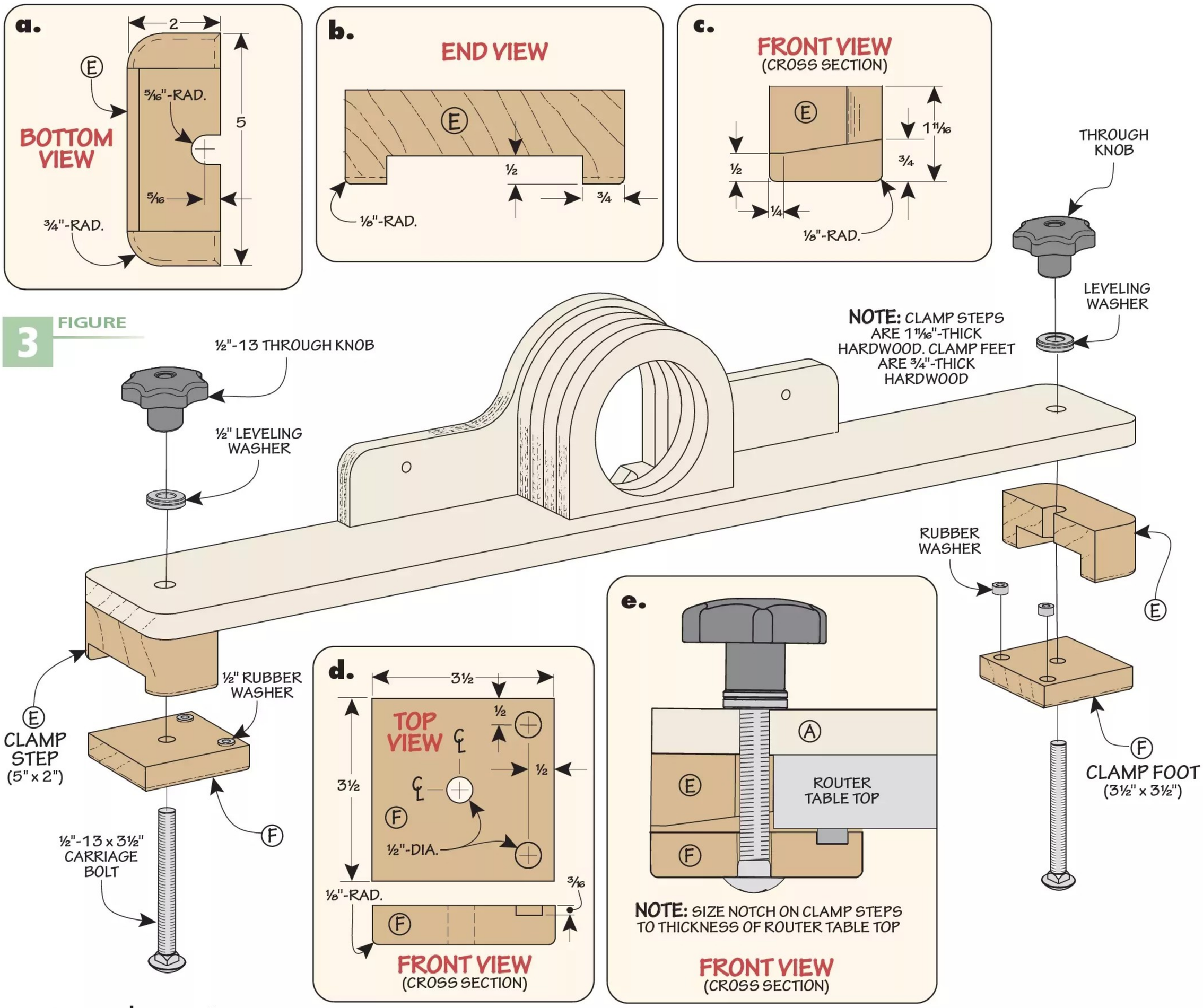


FIGURE 3

A Sturdy Pair of Clamps

The router fence you have now could be perfectly functional — an F-clamp on either end will hold it fast to your router table. However, we thought this fence deserved something more, which is why we added the built-in clamping assemblies you see above.

CLAMP STEPS. The clamping assemblies consist of two pieces, and the clamp steps are the best starting point. These are glued up from two ¾"-thick pieces of maple, then planed to thickness. Take a look at Figures 3b, 3c, and 3e above. What you see is sized for our router table, but you may need to go thicker or thinner for your table.

After determining the size of the blanks and cutting them, you'll need to drill the out holes to accept the carriage bolts at the drill press (Figure 3a). After drilling, notch out those holes at the band saw as you see above.

SLOPED STEP. In order to achieve the clamping action, the clamp feet will need to act as a lever, pulled up by the carriage bolt. To do this, the interior of the clamp step has a slightly sloped dado underneath, as in Figure 3c. These sloped undersides were easy enough with the right method at the table saw.

I used a crosscutting sled to guide the workpieces and a narrow scrap to lift the step slightly (about ¼" x ¼"). I used a thin strip of double-sided tape to secure the scrap to the sled, then set the workpiece on the scrap, which held it at a slight angle. From there, I cut either edge of the dado, then nibbled away the waste in between with one kerf at a time. Once it was sized, I flattened the end of the slopes with a few strokes using a file.

CLAMP FEET. The clamp feet are simple. Once cut to fit the notches in the steps, head to the drill press. Drill out a clearance hole in their centers for the carriage bolts, as well as the two recesses to hold rubber washers (Figure 3d).

The steps and feet are nearly done. Finish them by routing a slight roundover along their bottom edges (Figures 3b and 3d).

ATTACHING THE CLAMPS. Finally, it's time to attach the clamping assemblies. Begin by gluing the clamp steps underneath the base. Don't worry about the corners yet — once dry, you can use a pattern

bit to rout the corners of the clamp steps flush to the radiused base corners. Insert the rubber washers into the clamp feet and attach the feet using the bolts, leveling washers, and knobs.

TALL FENCE

You can use the fence as it stands for small parts and bits. However, there's one more addition we made to this fence: the tall, auxiliary option you see below. By adding this tall fence you can get more support for your workpiece while still maintaining more than adequate dust collection.

A TALL FENCE. After cutting the tall fence to size as shown below, take some time to lay out the locations of the clearance holes, vent slots, and router bit notch The locations of these are shown in Figure 4a below. Then, take the workpieces over to the drill press. All of those additions will begin with a series of holes drilled here.

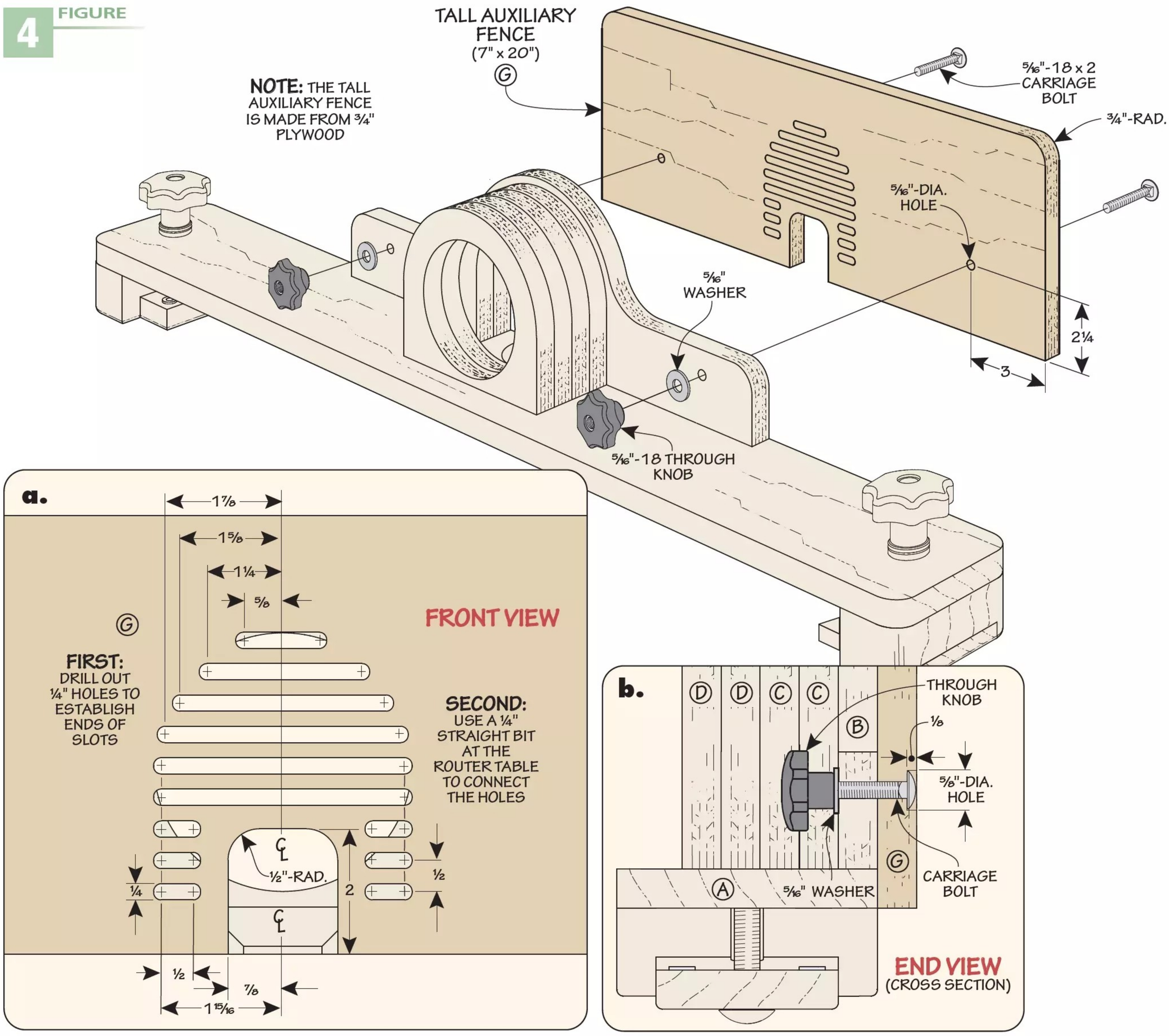
BOLT HOLES. First, two holes need to be made to match the holes in the fence. Mark these directly, and after drilling them out, be sure to add a counterbore. This allows the carriage bolts to seat fully (Figure 4b), keeping the heads out of the way while you rout.

BIT NOTCH. Second comes the notch for the bit. Use a Forstner bit to drill two holes and establish the radiused corners of the notch for the router bit. A Forstner bit makes a perfect radius, and you can cut the remaining waste on the notch free with a jig saw, cleaning up the edges with a router, flush-trim bit, and an edge guide, as we've done before on this project.

VENT SLOTS. Third, you'll need to drill out a series of ¼" holes to establish the ends of the vent slots. To ensure consistency on either side of a slot, I recommend using a fence and stop. After you've drilled these out, use a ¼" straight bit in the router table to connect the holes and complete the vents. This makes for a great excuse to try out the router fence you just built.

Lastly, round over the upper corners of the tall fence. Like the clamp feet, this fence is attached with carriage bolts and knobs whenever you need it. With that, your new router fence is complete, and ready to be put to work.

FIGURE 4



GO 2 Online Extras

Additional tips for routing out the insert plate can be found at:
Woodsmith.com/magazine/sip

Combination Router Table

A flip-up top adds a new angle to table routing. The result is a unique, two-in-one workstation for the ultimate in shaping and joinery.

Installing a router upside down in a router table is a surefire way to upgrade any workshop. The versatility of a router table opens up new options for improving the fit and finish of your projects.

However that isn't the only way to get more from a router. A router mounted horizontally offers some big benefits for certain tasks, like creating raised panels and cutting mortises and tenons.

Taking advantage of each of the configurations doesn't mean you need two separate tools. The top of this router table flips up to convert from a standard router table to a horizontal table in just a few seconds.

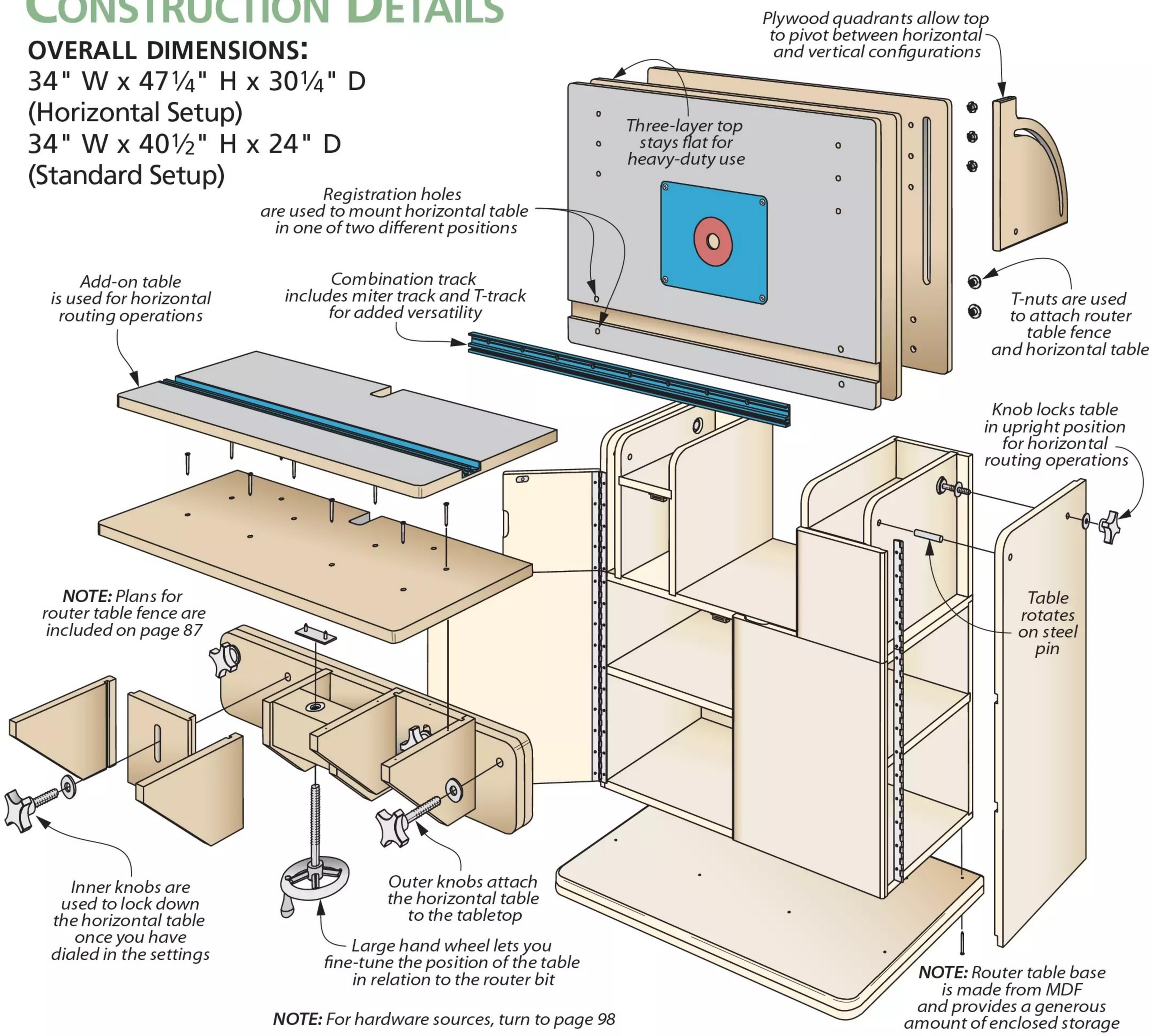
VERSATILE ACCESSORIES. To support the workpiece in the horizontal mode, you replace the fence with the adjustable table shown in the photo above. That's all you need for most shaping tasks.

An add-on mortising jig makes setting up and cutting mortises a breeze, as shown in the middle photo on the next page. Both of these accessories stow away neatly in the storage space below the top.

Despite its size, building this router table is straightforward and breaks down into easy-to-manage components. You'll end up with a combination machine that expands the capabilities of your router.

Construction Details

OVERALL DIMENSIONS:
34" W x 47¼" H x 30¼" D
(Horizontal Setup)
34" W x 40½" H x 24" D
(Standard Setup)

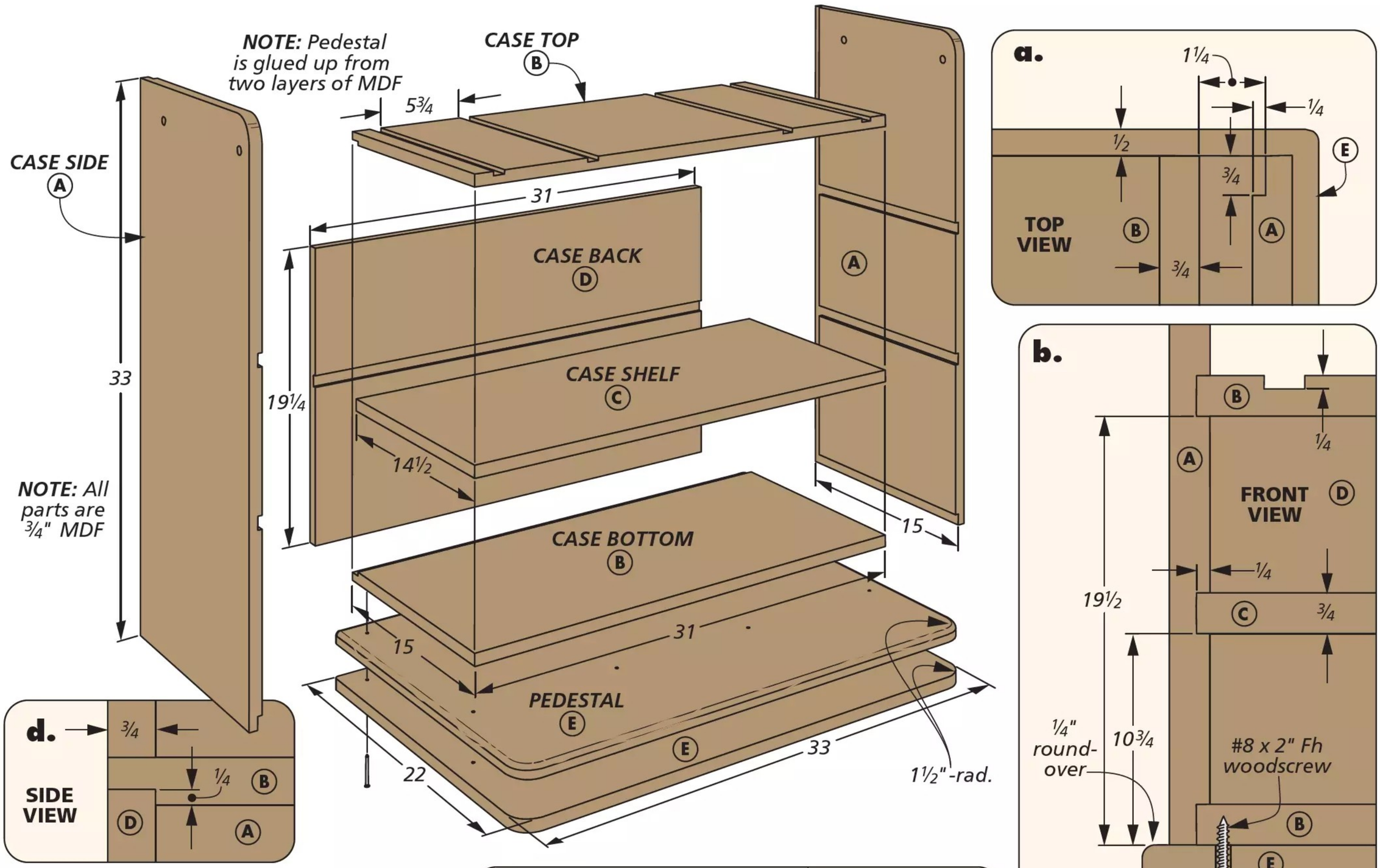


NOTE: For hardware sources, turn to page 98

Table & Fence. A large, thick table and a simple, adjustable fence tackle most router table tasks with ease.

Horizontal Cutting. The add-on mortising jig and stops make cutting smooth, accurate mortises a walk in the park.

Router Storage. The storage area below holds the router table accessories or other gear you need to organize.



Rock-Solid Case

A router table that can be configured for horizontal or vertical use requires a sure-footed stance both when routing and while making the transition from one mode to the other. That job falls to the case and pedestal of the router table.

The case uses two approaches for creating stability. First, the overall structure of the case creates a wide footprint that provides a good balance no matter how the router table is set up. This large case also lets you sneak in some storage space for the accessories that are added later.

The choice of materials also plays a role in how well the case works. I used MDF here. And if you've ever lifted a sheet of MDF, you know why it can make a case feel more solid. The mass of MDF offers a nice side benefit, as well. It helps dampen vibration from the router.

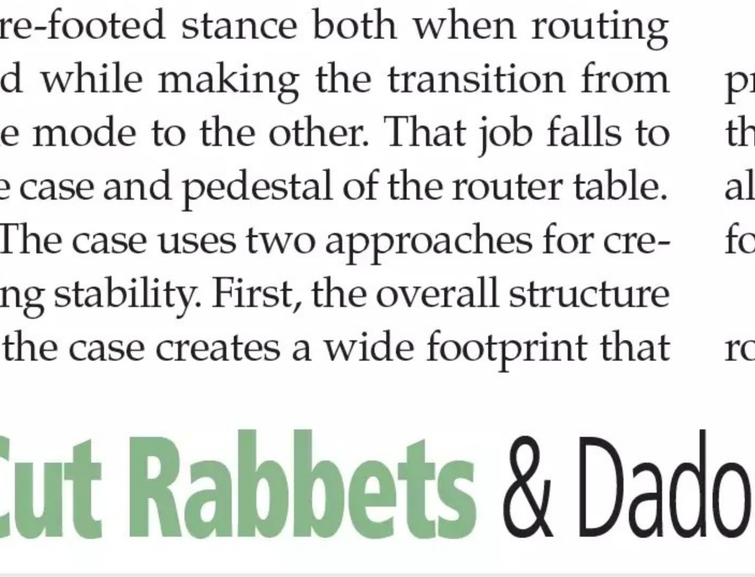
SIMPLE CONSTRUCTION. The drawing above shows how the case is assembled. Rabbets and dadoes join the parts together.

But this isn't your typical square box case. The sides extend well above the top. This open space is used primarily for housing the parts that allow the tabletop to change positions.

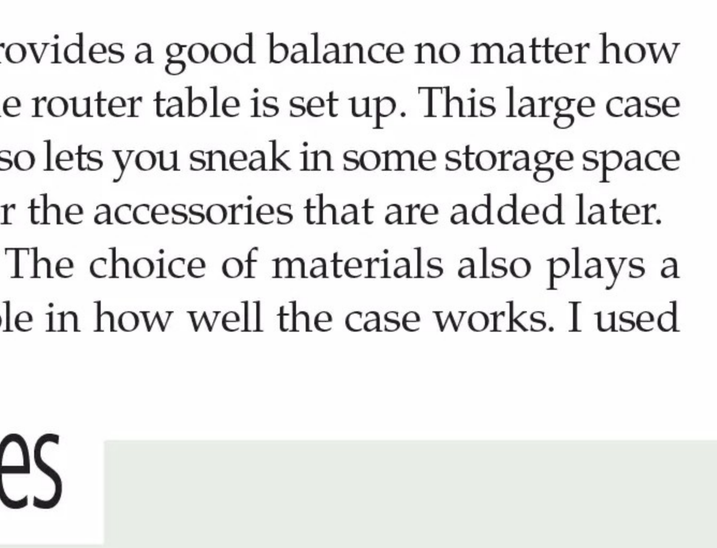
Figures 1 and 2 highlight the methods for cutting rabbets and dadoes at the table saw. These details help anchor parts together and increase the glue surface for each joint. You put this setup to use in cutting the joints in the sides to accept the top, bottom, shelf, and back.

In addition, the top and bottom are rabbeted to capture the case back. A set of dadoes in the top anchor two smaller assemblies shown on the next page. A groove in the back panel allows it to interlock with the shelf.

Cut Rabbets & Dadoes



Rabbets. An auxiliary fence allows you to position the fence alongside the dado blade without damaging the rip fence.



Dadoes. Take your time to size the dado blade to match the thickness of the MDF for snug-fitting joints.

A FEW DETAILS. Before the glueup, I drilled holes in the sides that serve as the hinge and locking points for the tabletop. I also relieved the upper corner of the sides with a radius (detail 'c,' previous page) so the top can pivot freely.

ADD A PEDESTAL. After assembling the case, create the pedestal. It's made up of two layers of MDF and extends out in front of the case to improve balance, primarily when the table is set up for horizontal operations.

CASE WRAP UP

The open, upper portion of the case is where you'll turn your attention to next. Here, you need to add two small assemblies next to the case sides, as shown in the drawing at right. These offer additional storage. The space between them will house the router.

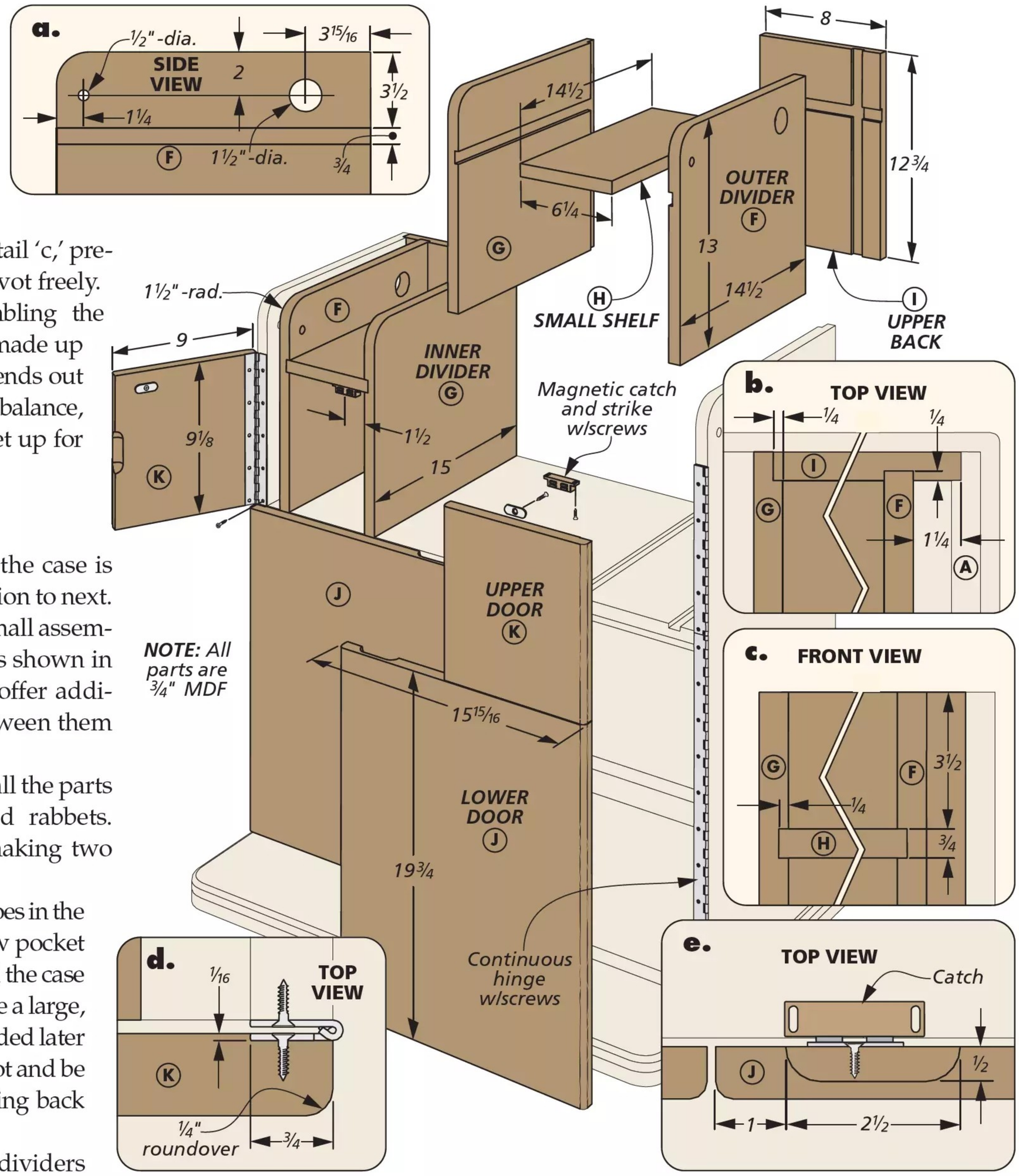
FAMILIAR JOINERY. Here again, all the parts are joined with dadoes and rabbets. Keep in mind that you're making two mirror-image assemblies.

The dividers fit into the dadoes in the case top. This creates a narrow pocket between the outer divider and the case side (detail 'b'). This will house a large, arc-shaped plywood panel added later that allows the tabletop to pivot and be locked in place. An overlapping back panel encloses the space.

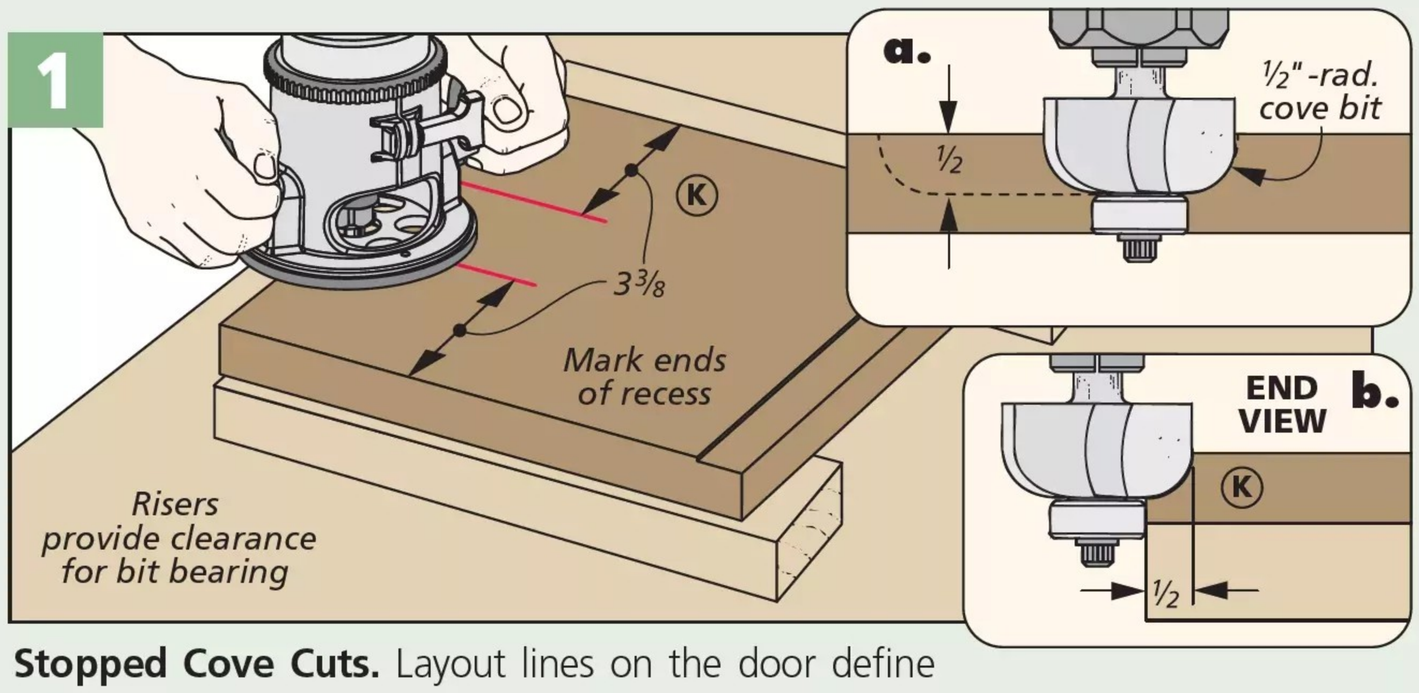
DRILL SOME HOLES. The outer dividers have holes that line up with the holes in the case sides. I used the holes in the sides and a drill bit as guides for marking the locations in the dividers. Then I drilled the holes at the drill press. Take note in detail 'a' that the rear hole is larger to allow for better access to install the table locking hardware later on.

ADD DOORS. The storage areas are enclosed with slab doors. The hinge side of each door has a shallow rabbet to hold a continuous hinge. The box at right shows how to create low-profile pulls. Soften the outer edges using a roundover (details 'd' and 'e'). The doors are held closed with magnetic catches.

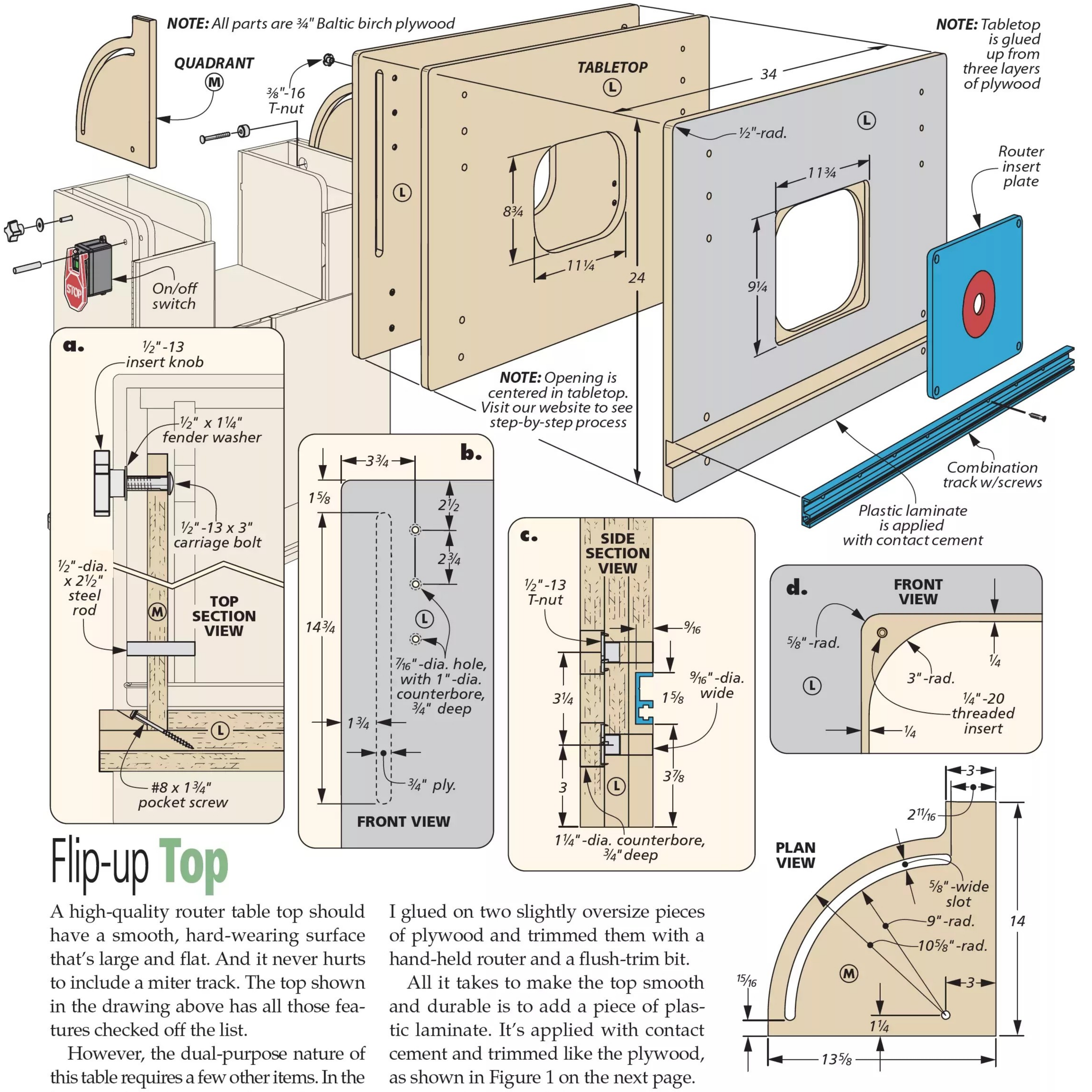
Before moving on to the top, I painted the case after sealing the edges of the MDF and applying a coat of primer. You can find the color I used on page 98.



Cut Recessed Door Pulls



Stopped Cove Cuts. Layout lines on the door define the size of the pull recess. While it may be tempting to rout the profile in a single pass, it's best to work down to final depth in two passes.



Flip-up Top

A high-quality router table top should have a smooth, hard-wearing surface that's large and flat. And it never hurts to include a miter track. The top shown in the drawing above has all those features checked off the list.

However, the dual-purpose nature of this table requires a few other items. In the horizontal routing setup, the top becomes a vertical mounting surface for the router and an auxiliary table. So it needs to stand up to the changing loads. This top also needs a secure connection to the tilting mechanism for long-term reliability.

HEAVY-DUTY CONSTRUCTION. The starting point for meeting all those requirements is laminating the top from three layers of Baltic birch plywood. To make the top, I cut one piece of plywood to final size and shape. Then, one at a time, I glued on two slightly oversize pieces of plywood and trimmed them with a hand-held router and a flush-trim bit.

All it takes to make the top smooth and durable is to add a piece of plastic laminate. It's applied with contact cement and trimmed like the plywood, as shown in Figure 1 on the next page.

ALL IN THE DETAILS. With the top in hand, it's time to start adding details. The first is drilling several sets of counterbored holes from the bottom (back) face, as shown in details 'b' and 'c.' The holes hold T-nuts that are used to attach the router table fence and the horizontal table.

I want to point out that there are two different sizes of T-nuts used. So the holes and counterbores are different, as well. Drill the counterbore for the T-nut first using a Forstner bit. Then use the center point to drill the through hole. It's a good idea to have solid backing below the table to prevent chipping the plastic laminate as the drill bit exits the hole.

VERSATILE MITER TRACK. Next up on the list of details is cutting a groove to hold a commercial miter track. The one I selected is a combination track that includes a miter track and a T-track. The thing to keep in mind is that the track is wider than a dado blade. So you need to make the cut in multiple passes, as in Figure 2.

A LONG MORTISE. The top is connected to the table with a pair of curved plywood quadrants. For a solid connection, the quadrants fit into long mortises cut in the underside of the top. To determine the location of the mortises, center the top on the case and mark the top where it lines up with the pockets in the case.

Figure 3 shows a good method for making the mortises. A straightedge guides a hand-held plunge router. I used a plywood bit to ensure a good fit between the plywood and the mortise. The mortise is ¾" deep, so you need to rout it in several shallow passes.

A ROUTER INSERT PLATE. Back on the top face of the router table, you need to create an opening for the router insert plate. This is a little different than a typical opening. Since the table is designed to tilt upright, the insert needs to be anchored to the top so it doesn't fall out.

The insert plate I used has countersunk holes in the corners. Machine screws and threaded inserts lock the insert plate in place, as shown in detail 'd' on the previous page. To create the opening, I used a pair of templates (Figure 4). The full process is detailed at *Woodsmith.com/magazine/sip.*

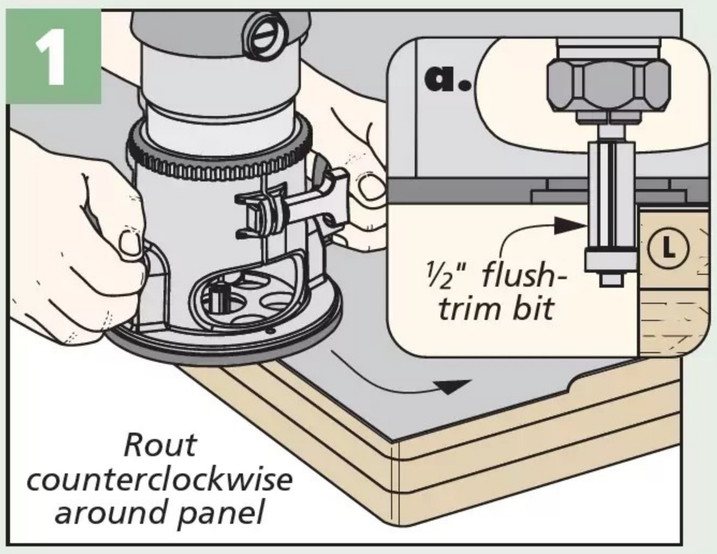
MAKING QUADRANTS. The work on the tabletop is complete at this point. So you can turn your attention to making the quadrants. These have a curved edge and a slot that's used to lock the tabletop in either working position. One edge of the quadrant is glued into the mortise in the underside of the tabletop.

Lay out the overall shape of the quadrant on a square plywood blank. Be sure to include the pivot hole, the curved slot, and the "ear" along one edge, as in the plan view on the previous page.

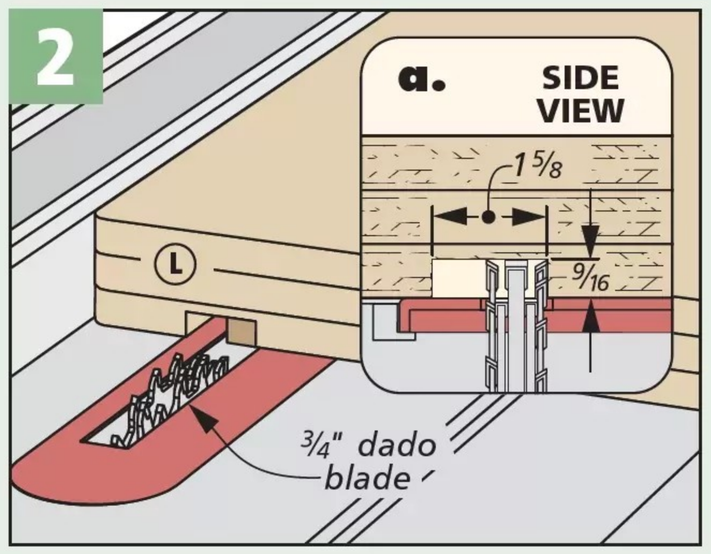
A jig saw makes quick work of cutting the quadrant to rough shape. Then I used a router with a simple hardboard trammel to clean up the edge, as shown in Figure 5. The trammel has a second pivot hole that's used to rout the slot.

After rounding over the outside edges (Figure 6), you can glue the quadrant in place. I used pocket screws to reinforce the joint, as in Figure 7. The tabletop is ready to be installed on the case using the hardware shown in detail 'a' on the previous page.

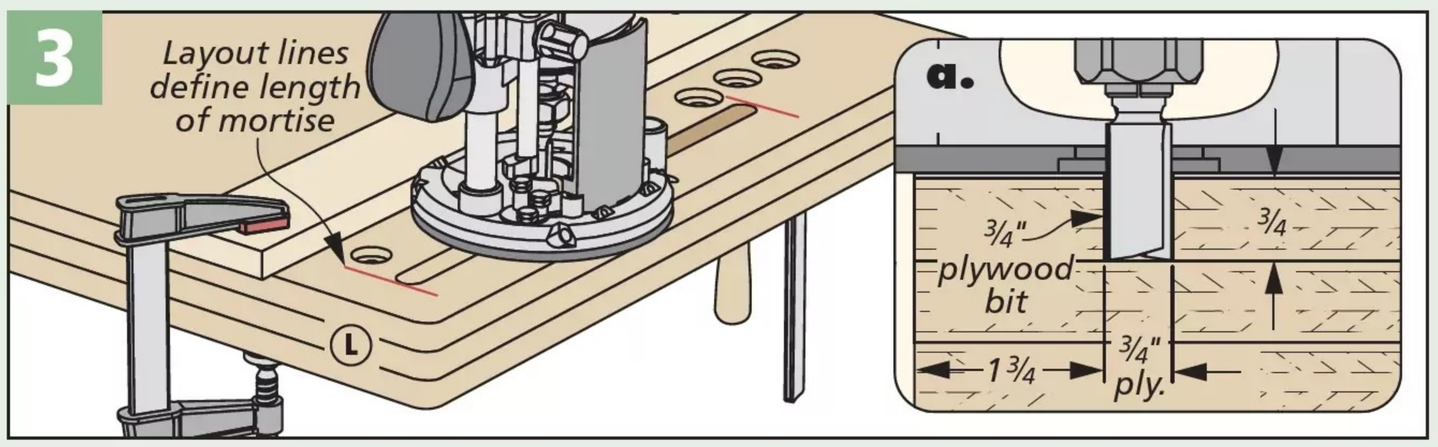
Tabletop Details



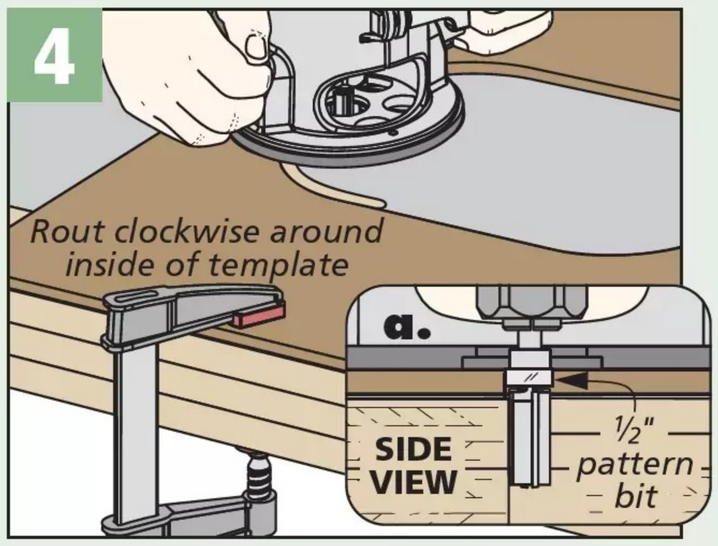
Trim It Flush. Applying an oversize piece of laminate is easier to line up. Trim it flush with a router.



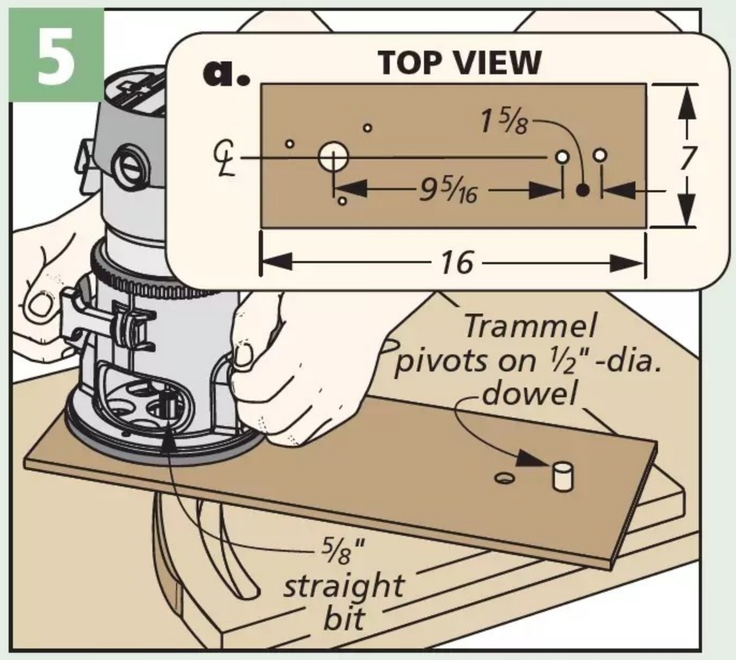
Cut a Track Groove. Fine-tune the rip fence to cut a groove that forms a snug fit with the miter track.



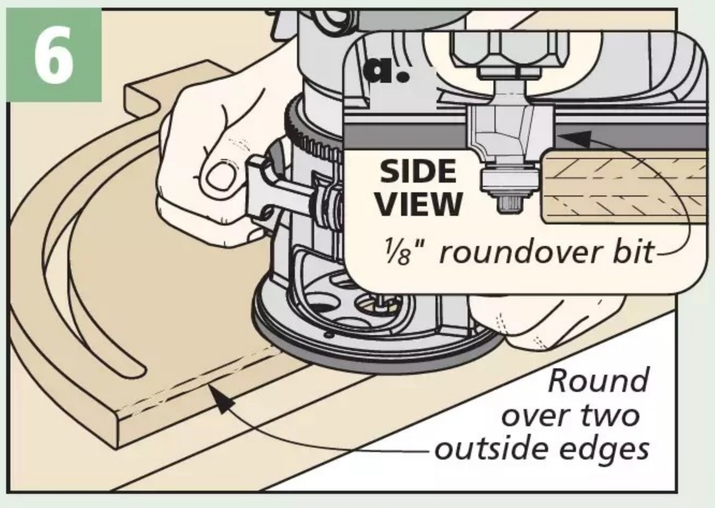
Rout a Long Mortise. Clamp a long straightedge to the table so the router bit aligns with the layout marks. To prevent overtaxing the router and bit, rout the mortise in several passes, moving from left to right along the guide.



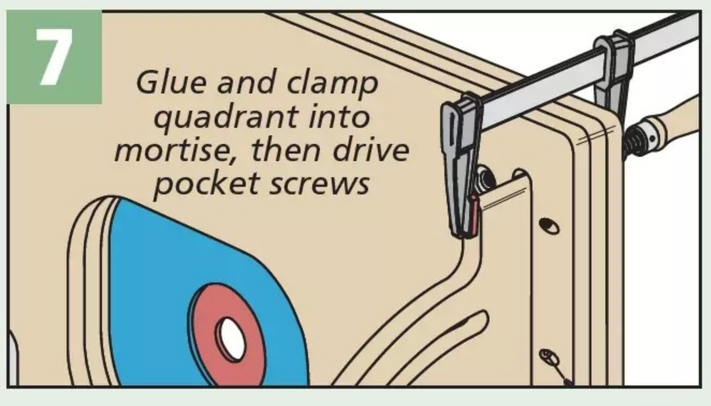
Two Templates. Visit *woodsmith.com/magazine/sip* to see how templates guide a router to create a stepped opening.



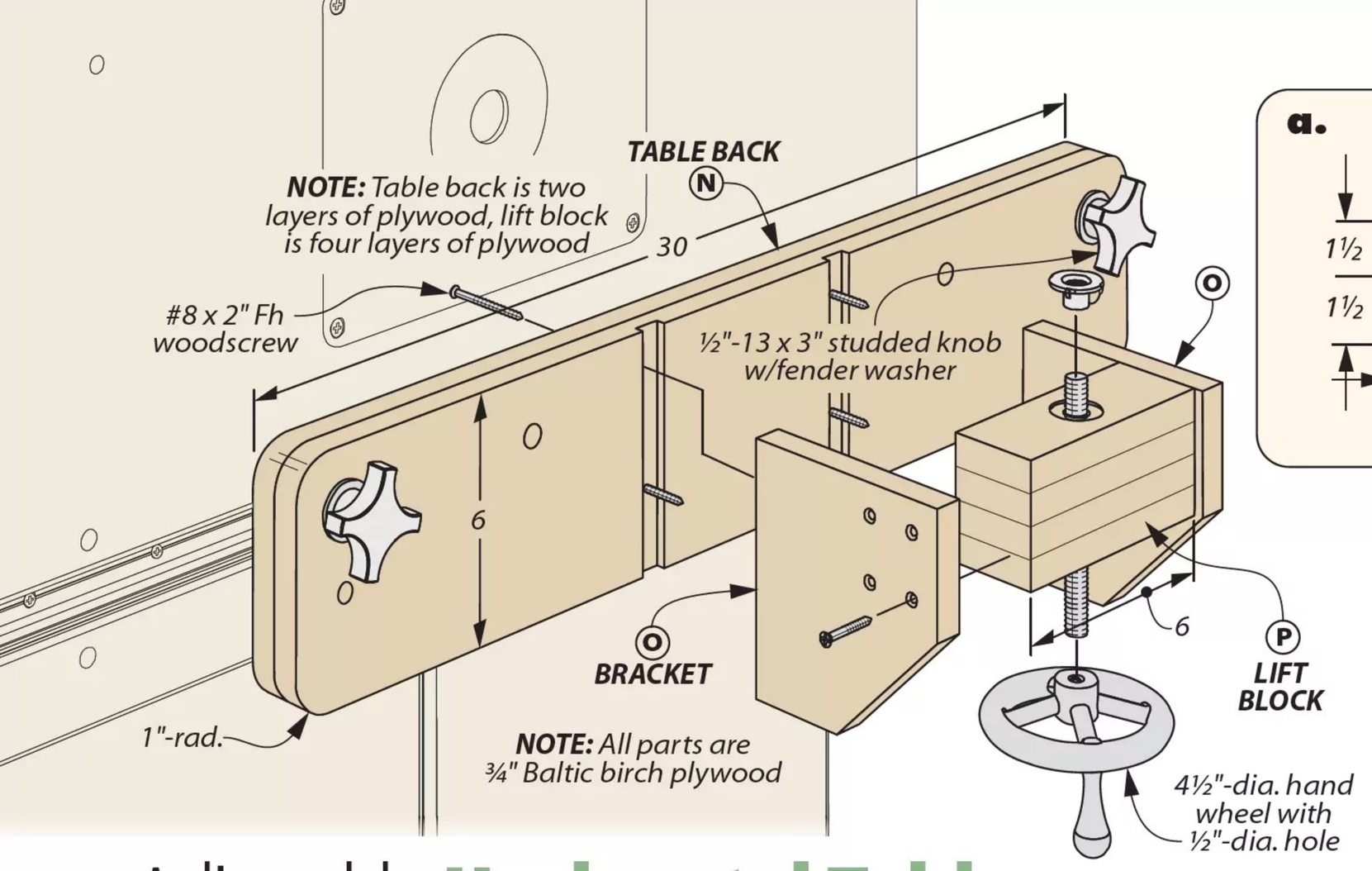
Make a Trammel. The two pivot holes in the trammel are used to shape the quadrant and cut the slot.

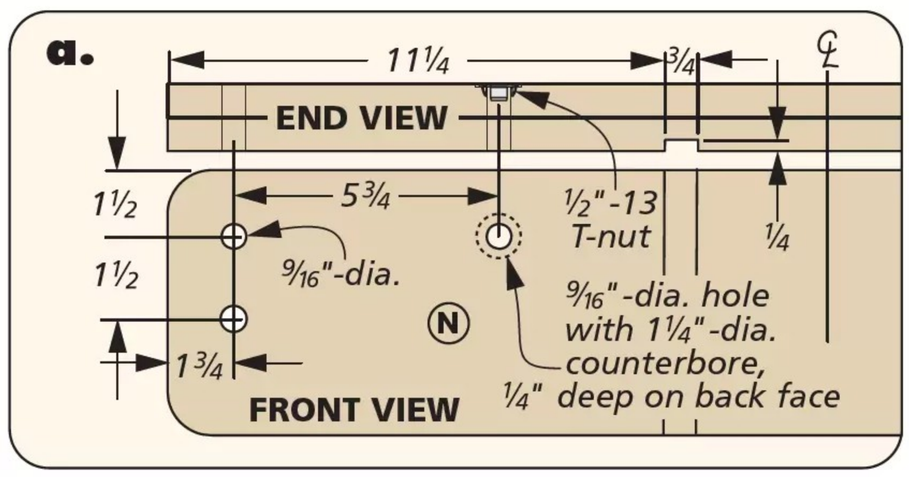


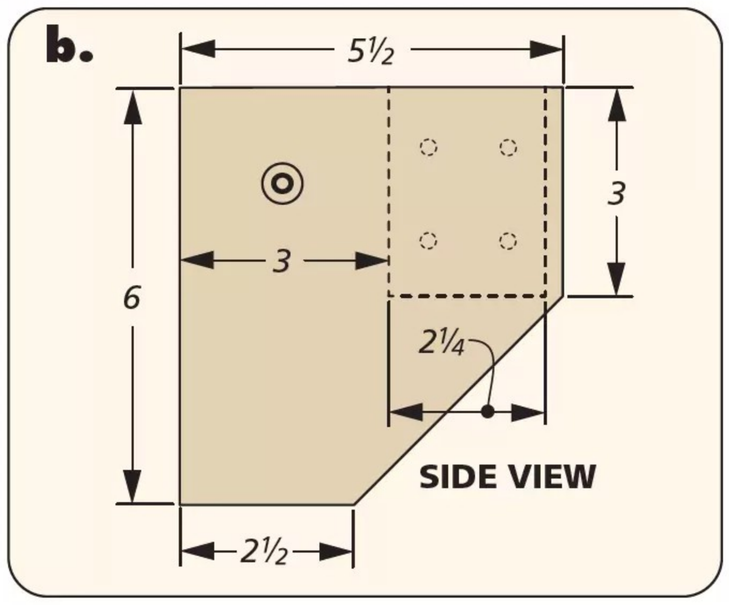
Ease the Edge. A slight roundover softens the edges of the quadrant and prevents splintering.

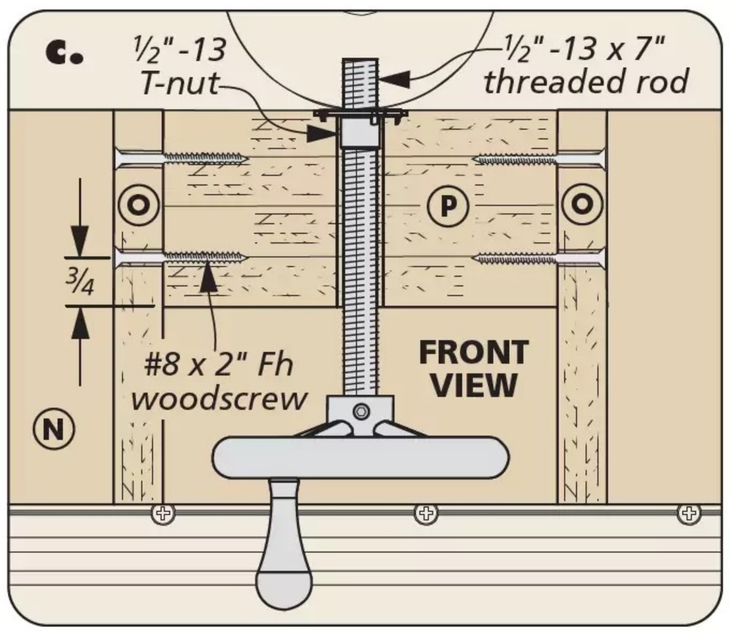


Reinforcements. Pocket screws augment the glue joint where the quadrant connects to the tabletop.









Adjustable Horizontal Table

Completing the case and tabletop gives you a fairly standard router table. To take advantage of the flip-up top, there needs to be some kind of support for the workpiece. That's where you'll be focusing your attention next.

The horizontal table consists of two primary assemblies: a fixed back and an adjustable table. The back is used to mount the table to the vertical tabletop in one of two positions. This is done with the T-nuts that were installed earlier. A hand wheel lets you fine-tune the height of the table in relation to the router bit.

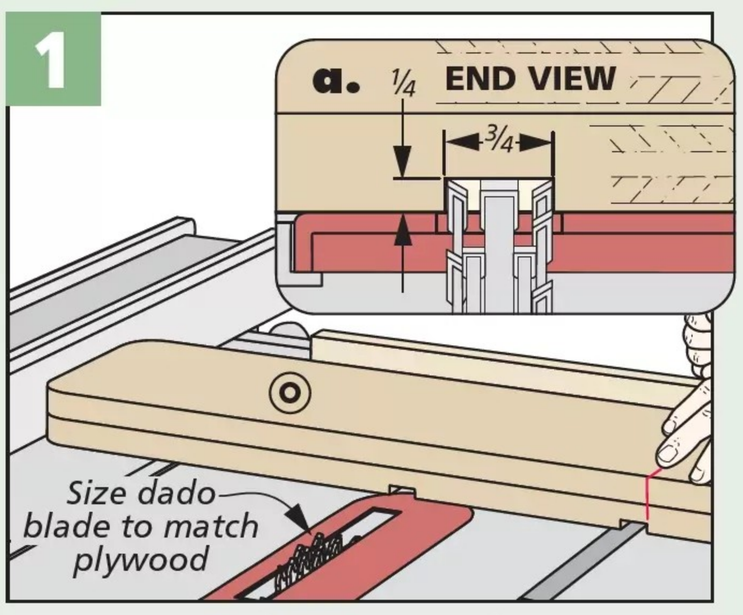
A SOLID BACK. The table back is made of two layers of plywood. I softened the corners with a radius. A pair of dadoes in the face hold the hand wheel assembly (Figure 1 below). The dadoes are sized to match the thickness of the Baltic birch plywood. The back has two sets of holes drilled in it (detail 'a'). One is used with studded knobs to lock into the tabletop. The other set incorporates T-nuts, as you can see in the upper right drawing. These secure the table height once you have it dialed in.

HAND WHEEL ASSEMBLY. Attached to the table back is the hand wheel assembly. This includes two brackets and a lift block. The brackets are cut from square blanks that have the lower corners beveled, as in detail 'b.' This detail provides greater access to operate the hand wheel. The brackets are glued into the dadoes in the table back and flush with the top edge. Screws driven in from behind further strengthen the joint (main drawing above).

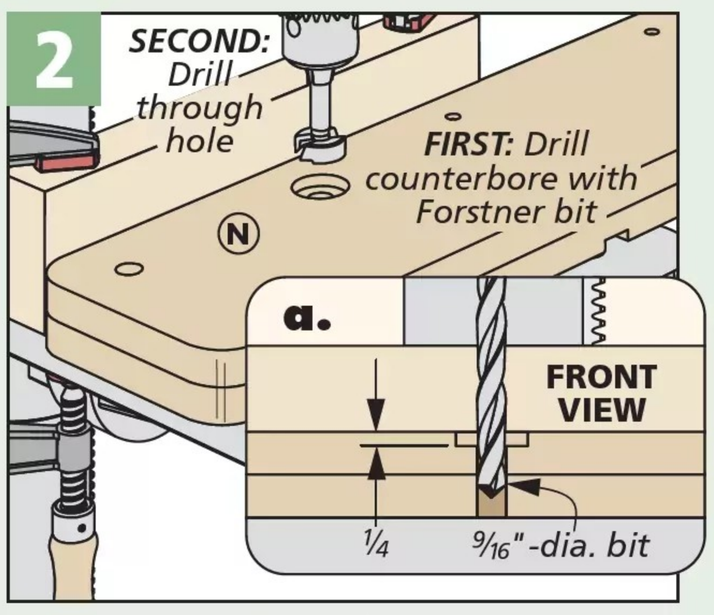
Sandwiched between the brackets is the lift block (detail 'c'). It's glued up from four layers of plywood. Size the block so that it's a snug fit between the brackets.

At the drill press, drill a counterbore for a T-nut and then the through hole to accommodate the threaded rod for the hand wheel. This is shown in detail 'c.' I drove long screws through the brackets and into the block for a solid connection. The hand wheel is attached to a length of threaded rod using a set screw. Thread the rod into the T-nut in the lift block.

Dadoes & Counterbore Holes



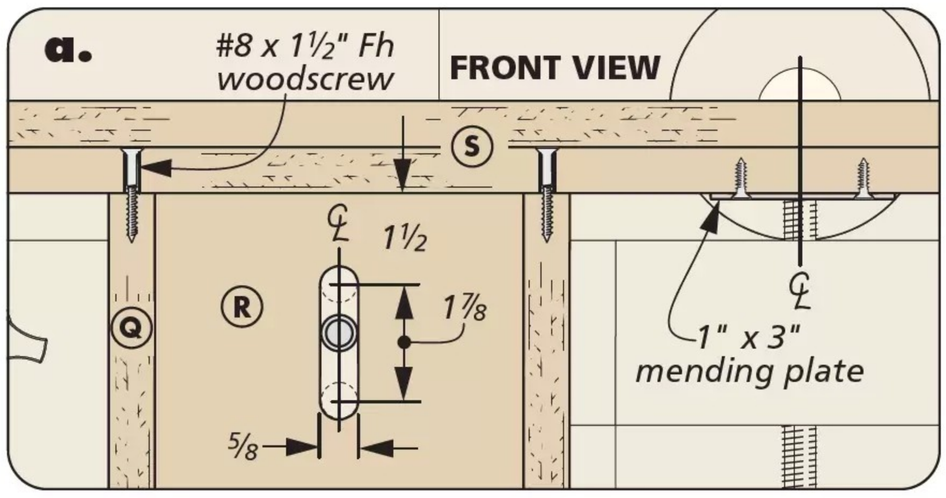
A Pair of Dadoes. The dadoes are centered on the overall length of the table back. The rip fence acts as a stop.

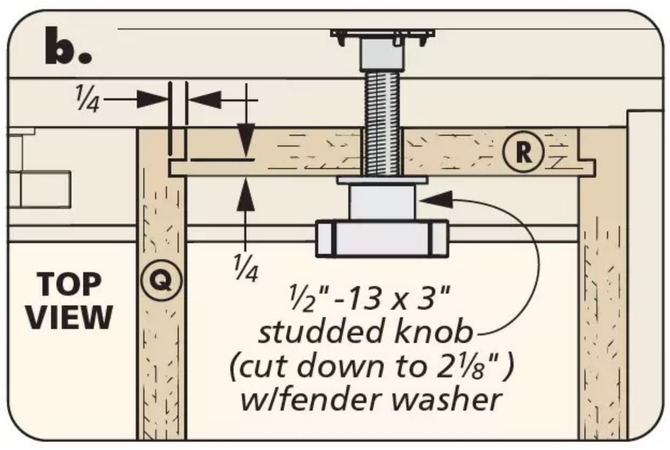


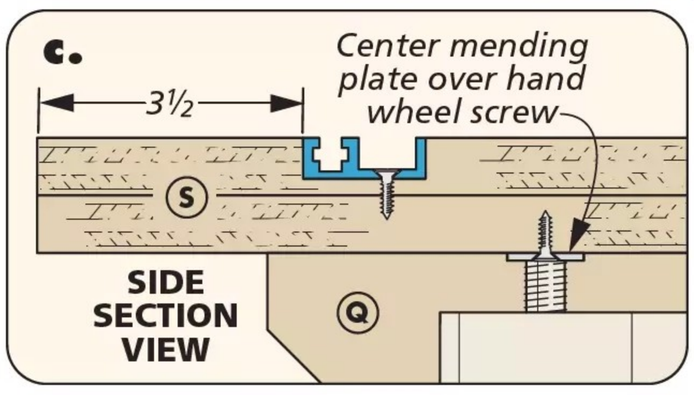
More T-Nuts. Drill the counterbore so that the head of the T-nut is just slightly below the surface.

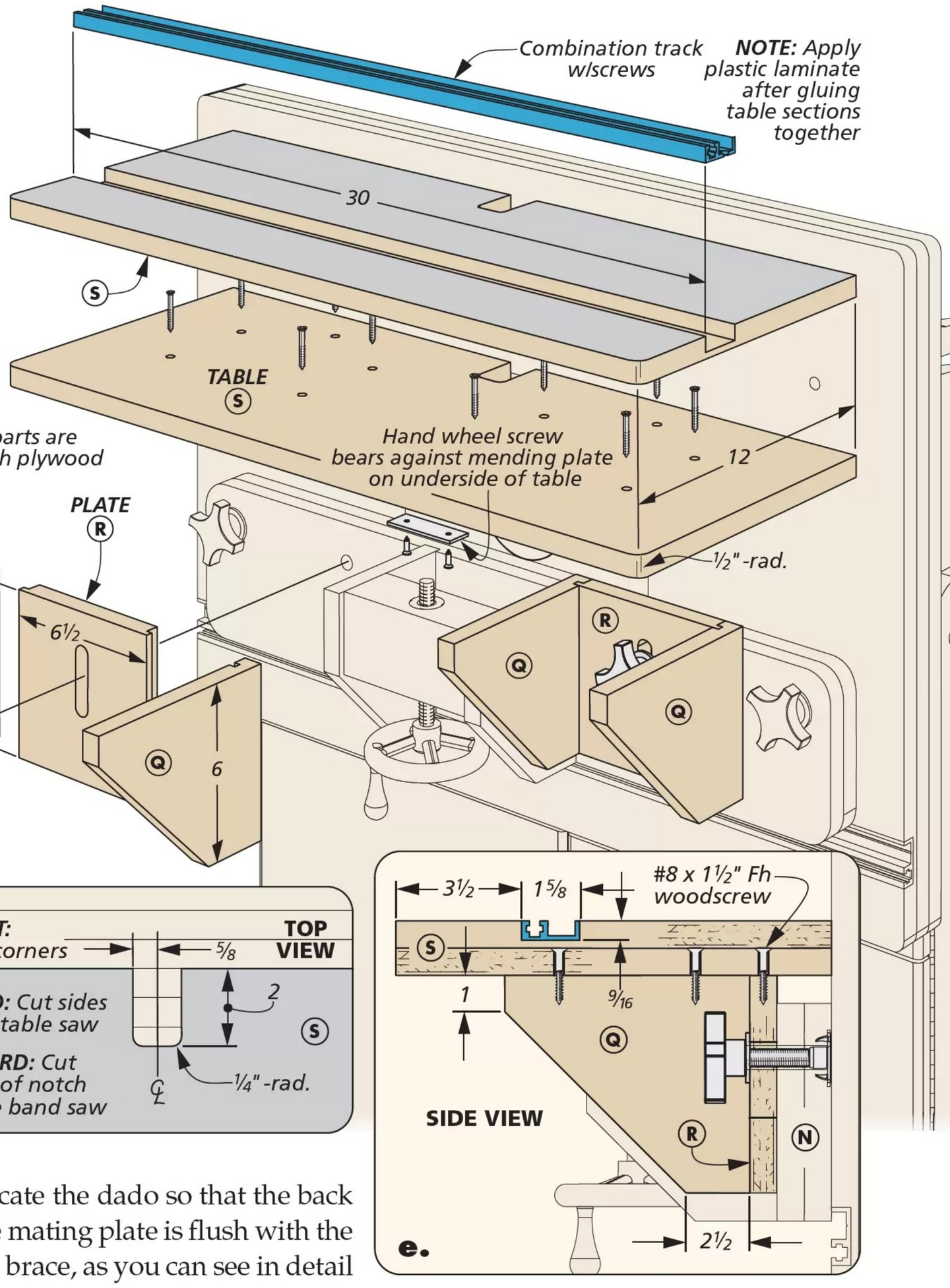
ADJUSTABLE TABLE

The second part of the horizontal table is the adjustable portion, as









shown above. Here you have a double thickness table and two sets of braces with plates that join the table to the back assembly. The construction is straightforward, but there's a definite order to the process to get the best results.

MAKE THE BRACE & PLATE. I began by making the two brace and plate sub-assemblies. The braces are similar to the brackets you just made (main drawing and detail 'e'). The difference is a tongue and dado joint that runs along the back edge, as illustrated in the drawing below. Locate the dado so that the back face of the mating plate is flush with the end of the brace, as you can see in detail 'b' above. Cut a rabbet along each side of the plate to form a tongue that fits into the dadoes in the braces. The other detail that you need to add is a centered slot, as shown in detail 'a.' This accepts a studded knob and washer. The knob threads into the T-nut in the table back.

NOW THE TABLE. A common theme with this project is creating strength by doubling up the thickness of critical components. And the top of the horizontal table is no exception. But I did things a little differently here. The table is screwed to the braces, but I didn't want the screws to show through the top face.

To do this, I cut the lower layer of the table to final size and shape, including the router bit notch, as shown in detail 'd.' Attach this layer to the braces with screws, as shown in the details 'a' and 'e.'

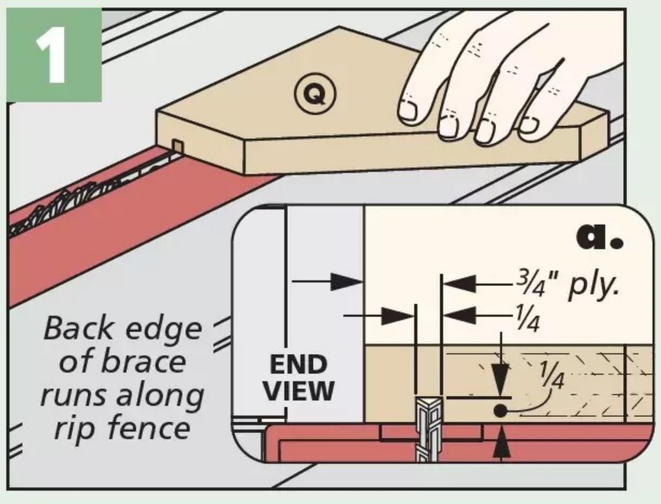
You know the routine by now: Once the first layer is in place, the second layer can go on. Like before, start with a slightly oversized piece. Cut a notch for the bit and use that to align the second layer over the first while you glue the upper layer of plywood in place.

Trim the second layer of plywood flush, then add the plastic laminate just as you did on the tabletop. (You'll have to remove the table from the tabletop to trim the edges flush.) Be sure to trim around the inside of the router bit notch, as well.

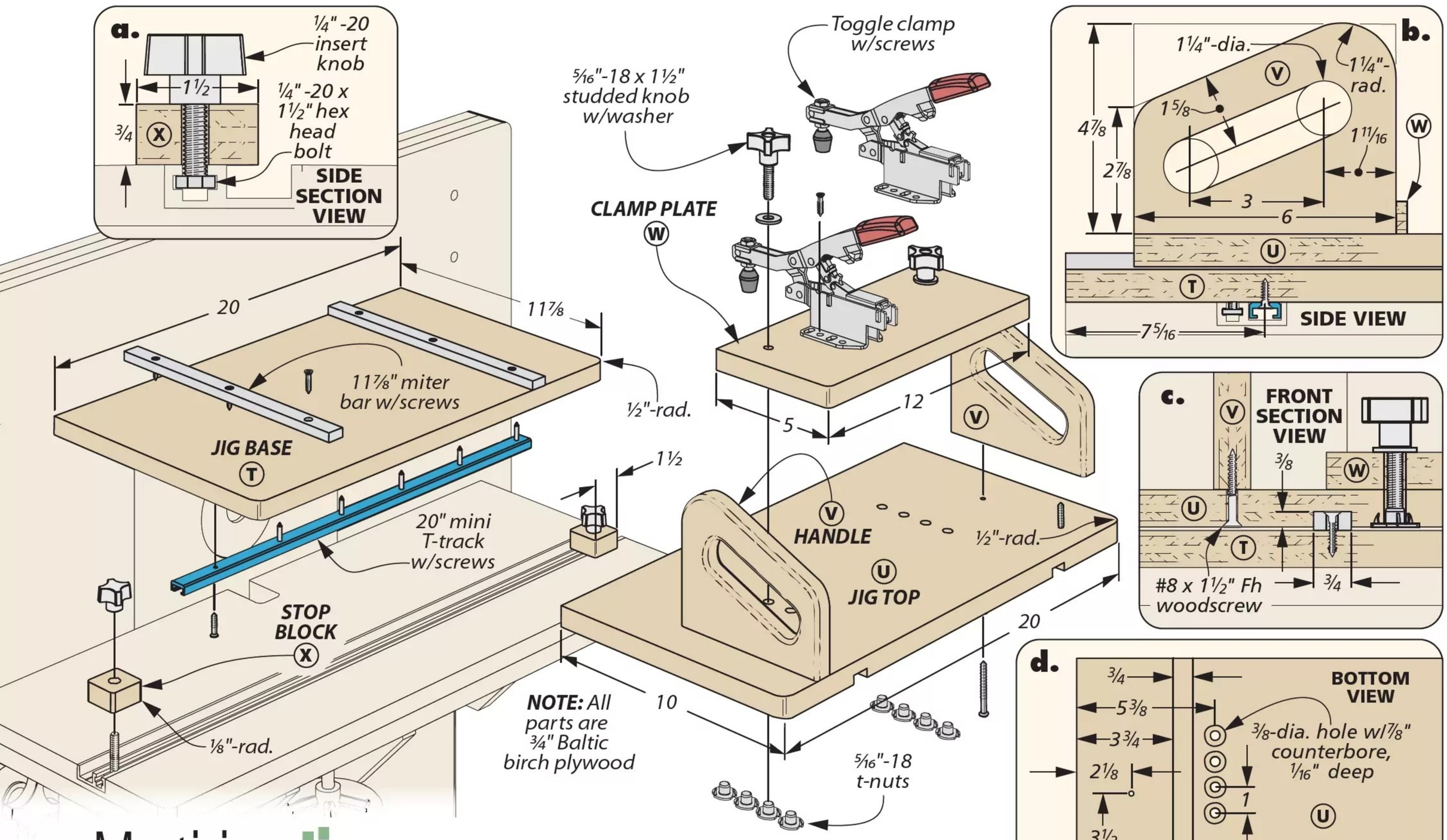
Complete the work on the top of the horizontal table by taking a trip over to the table saw. Here, you cut a groove to accept the same combination track that's installed in the main tabletop. You can find the location for the groove in detail 'e.'

There's one final bit of hardware to add to the table before reattaching it: the mending plate. This serves as the bearing surface for the hand wheel screw.

How-To: Dado



Tongue & Dado Joint. The first step is cutting the dado. Then size the mating tongue for a snug fit.



Mortising Jig

Routing mortises is an ideal operation for a horizontal router. In this configuration, you have much better visibility of the bit. What you need, though, is a way to secure and guide the workpiece while making the cut. The solution is the jig shown here.

The workpiece is clamped to the jig with stout toggle clamps. Runners in the base and top of the jig constrain the motion in and out and side to side. Stops installed in the table help make it easy to rout consistent mortises. And two large handles give you better control and keep your hands well clear of the bit.

THE BASE FIRST. The base is a piece of plywood. On the bottom face, a length of mini T-track serves as a runner, as shown in detail 'b.' What's important here is that it gets installed parallel to the edge of the base. This is what guides the jig side to side down the length of a mortise.

On the top face of the base are a pair of runners that I cut from a commercial miter bar, as you can see in detail 'c.' These mate with dadoes cut in the bottom face of the mortising jig top. The bars control the in-and-out motion of the jig when cutting a mortise to its final depth.

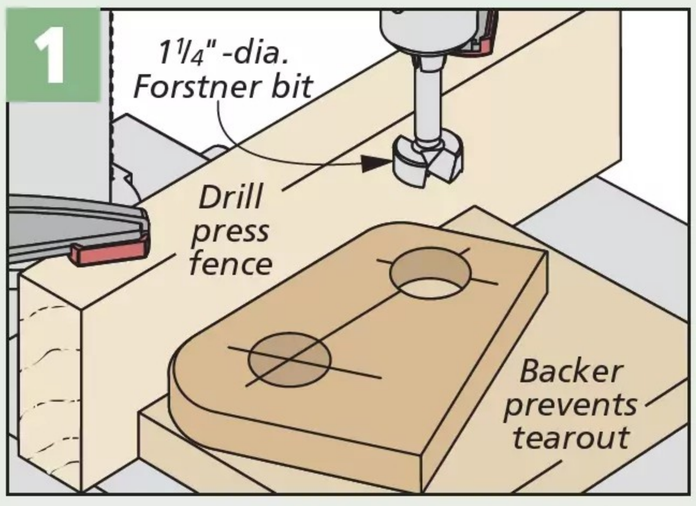
ADD THE TOP. In addition to the dadoes I just mentioned, the jig top has four sets of T-nuts installed in the bottom face. The T-nuts are anchor points for the toggle clamp assembly.

Detail 'b' shows the dimensions for the handles screwed to the jig top. Create the hand holds by drilling out the ends with a Forstner bit (box at left). After cutting away most of the waste with a jig saw, smooth and straighten the edges with files and a little hand sanding.

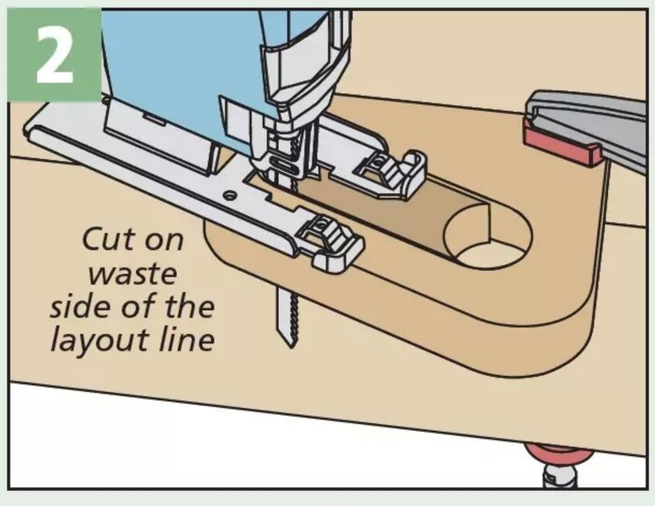
The toggle clamps are fixed to an adjustable plate. Depending on the size of your workpiece, locate the plate in one of four locations on the top using studded knobs and washers (detail 'c').

The last thing to do is make a pair of square stop blocks. These lock into the

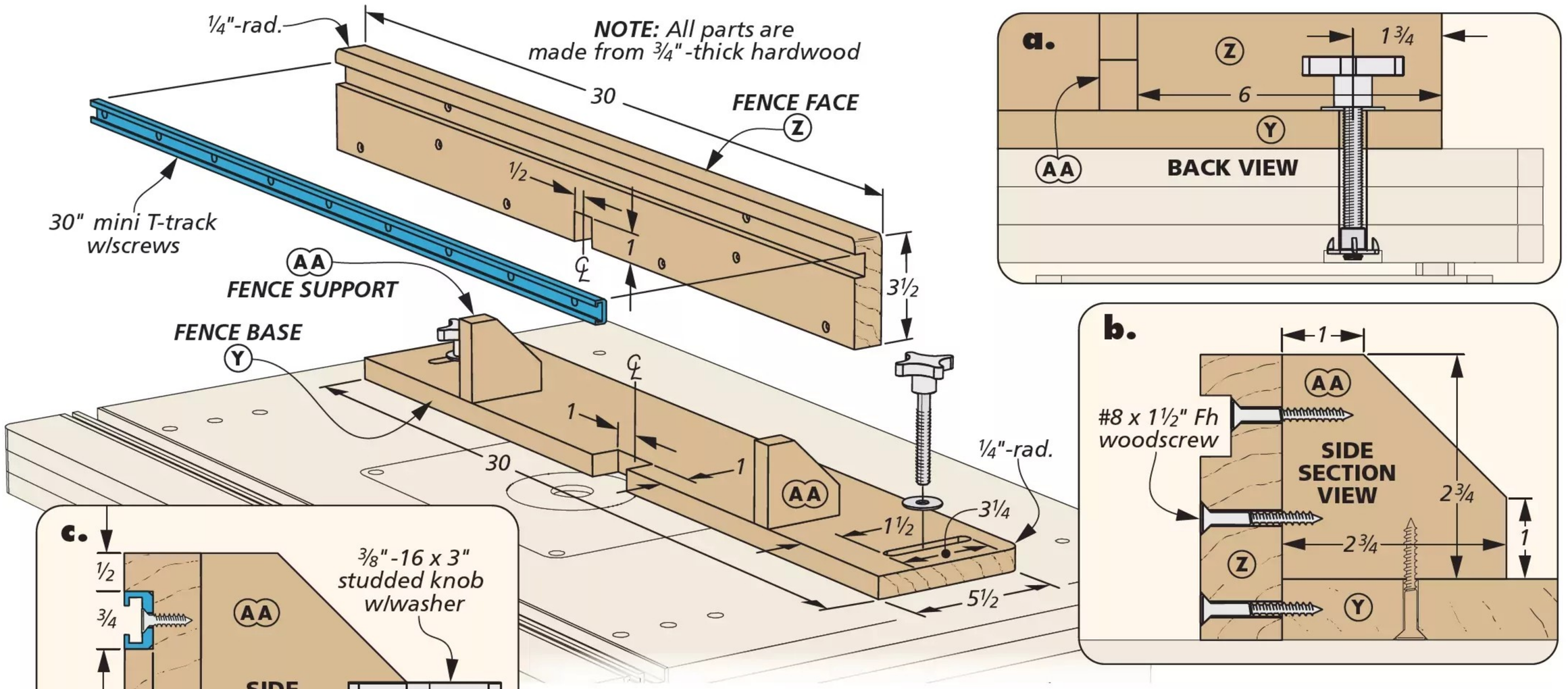
Shape a Hand Hold



Drill out the Ends. Use a Forstner bit in the drill press to create a smooth radius at each end of the hand hold.



Rough out the Waste. A couple of quick jig saw cuts remove most of the waste between the holes.



T-track in the horizontal table with hex bolts, washers, and knobs, as shown in detail 'a' on the previous page.

ROUTER TABLE FENCE

The focus so far has been on making the horizontal routing configuration. But in order to use the standard setup, you'll need a solid, sturdy fence.

SIMPLE CONSTRUCTION. The drawing above reveals that a good router table fence can be simply built. This one is an L-shaped assembly consisting of a base and face beefed up with some supports.

The base is a length of hardwood with a centered notch to allow a router bit to be recessed inside. Near each end of the base is a short slot that's used to adjust the position of the fence in use. The fence is attached to the table with washers and studded knobs that thread into the T-nuts along the back of the tabletop, as shown in details 'a' and 'c.'

The hardwood face has a groove cut in it to accept T-track. The final parts to make are the supports, which you can see in detail 'b' above. Once they're cut to shape, the fence can be assembled with glue and screws. The key is keeping the fence face square to the base as the parts come together.

That wraps up the project, and the router table is ready for use. Be sure to locate the router table in a prominent place in your workshop. With all the practical features it has, it's bound to see a lot of use for years to come.

MATERIALS & SUPPLIES

A	Case Sides (2)	¾ MDF - 15 x 33
B	Case Top/Bottom (2)	¾ MDF - 15 x 31
C	Case Shelf (1)	¾ MDF - 14½ x 31
D	Case Back (1)	¾ MDF - 19¼ x 31
E	Pedestal (1)	1½ MDF - 22 x 33
F	Outer Dividers (2)	¾ MDF - 13 x 14½
G	Inner Dividers (2)	¾ MDF - 13 x 15
H	Small Shelves (2)	¾ MDF - 6¼ x 14½
I	Upper Backs (2)	¾ MDF - 8 x 12¾
J	Lower Doors (2)	¾ MDF - 15 15/16 x 19¾
K	Upper Doors (2)	¾ MDF - 9 x 9⅛
L	Tabletop (1)	2¼ ply. - 24 x 34
M	Quadrants (2)	¾ ply. - 14 x 13⅝
N	Table Back (1)	1½ ply. - 6 x 30
O	Brackets (2)	¾ ply. - 6 x 5½
P	Lift Block (1)	3 ply. - 2¼ x 6
Q	Braces (4)	¾ ply. - 6 x 7½
R	Plates (1)	¾ ply. - 6 x 6½
S	Horizontal Tables (2)	¾ ply. - 12 x 30
T	Mortise Jig Base (1)	¾ ply. - 11⅞ x 20
U	Mortise Jig Top (1)	¾ ply. - 10 x 20
V	Handles (2)	¾ ply. - 4⅞ x 6
W	Clamp Plate (1)	¾ ply. - 5 x 12
X	Stop Blocks (2)	¾ ply. - 1½ x 1½
Y	Fence Base (1)	¾ x 5½ - 30
Z	Fence Face (1)	¾ x 3½ - 30
AA	Fence Supports (2)	¾ x 2¾ - 2¾

- (4) Magnetic Catches
- (2) ½"-13 x 3" Carriage Bolts
- (2) 1½" x 36" Continuous Hinges
- (6) ½" x 1¼" Fender Washers
- (14) #8 x 2" Fh Woodscrews
- (2) ½"x 2½" Steel Rods
- (2) ½"-13 Insert Knobs
- (1) Power Tool Switch
- (6) ½"-13 T-Nuts
- (6) ⅜"-16 T-Nuts
- (2) 36" Combination Tracks
- (1) Router Insert Plate
- (4) ¼"-20 Fh Machine Screws
- (4) ¼"-20 Threaded Inserts
- (8) #8 x 1¾" Pocket Screws
- (2) 48" Mini Tracks
- (2) ⅜"-16 x 3" Studded Knobs
- (2) ⅜" x 1" Fender Washers
- (36) #8 x 1½" Fh Woodscrews
- (1) 1" x 3" Mending Plate
- (2) #6 x ½" Fh Woodscrews
- (4) ½"-13 x 3" Studded Knobs
- (1) ½" x 4½" Hand Wheel
- (2) ½"-13 x 7" Threaded Rod
- (2) Toggle Clamps
- (2) 5/16"-18 x 1½" Studded Knobs
- (2) 5/16" Washers
- (1) ⅜" x ¾" - 30" Miter Bar
- (8) 5/16"-18 T-Nuts
- (2) ¼"-20 x 1¾" Hex Bolts
- (2) ¼"-20 Insert Knobs

ALSO NEEDED: *Two 49" x 97" sheets of ¾" MDF*
Two 60" x 60" sheets of ¾" Baltic birch plywood
2.5 bd. ft. of ¾"-thick hard maple (parts Y, Z, and AA)

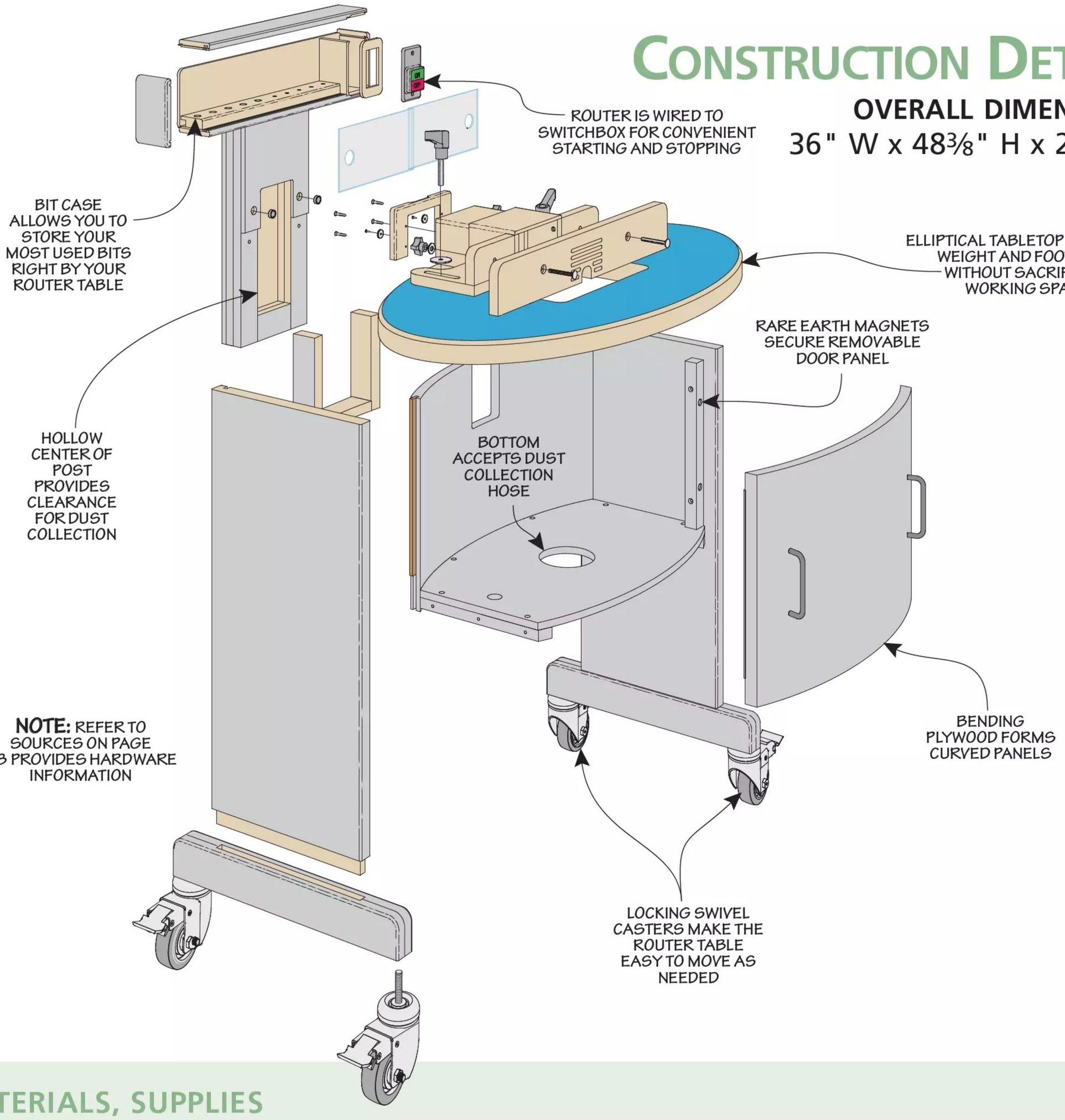
Retro Futurist Router Table

Without a doubt, the router table is one of the most useful tools in the shop. It also happens to be one of the easiest tools to make in your shop. As a result, it's the kind of thing you can design to suit your own taste in particular.

That's where this design began. Our creative director, Chris Fitch, was inspired by a shaper he used in his younger years which had an elliptical top. In practical terms, the top offered nearly the same amount of worksurface while reducing the weight and footprint in the shop. In terms of aesthetic, it evoked a Space Age feel, a style both futuristic and nostalgic — and which sparked the other choices you see here. Of course, that doesn't mean Chris had his eye solely on visuals. In this router table you'll find not only a unique look, but also a bevy of valuable features sure to prove useful in your shop.

Construction Details

OVERALL DIMENSIONS:
36" W x 48⅜" H x 21½" D



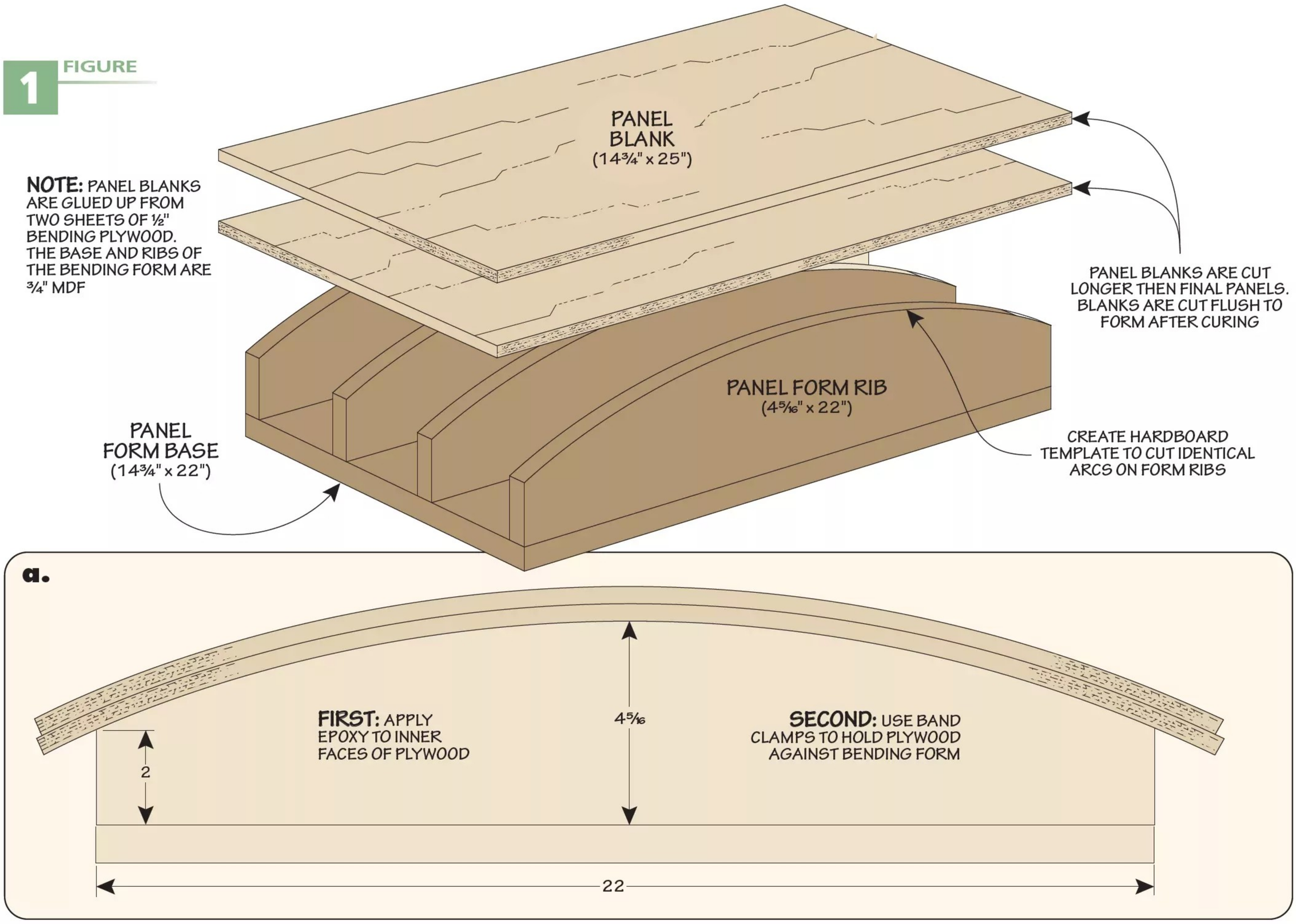
NOTE: REFER TO SOURCES ON PAGE 98 PROVIDES HARDWARE INFORMATION

MATERIALS, SUPPLIES

A	Feet (2)	2½ x 18 - 1½ Ply.
B	Side Panels (2)	12 x 27½ - 1 Ply.
C	Lower Cleats (2)	¾ x 1 - 10¾
D	Curved Cleat (1)	¾ x 3½ - 20
E	Upper Cleats (2)	1 x 1 - 10¾
F	Bottom Panel (1)	14 13/32 x 22 - ½ Ply.
G	Back Panel (1)	14¾ x 22 - ¾ Ply.
H	Case Magnet Bars (2)	1 x 1 - 12¼
I	Front Panel (1)	14¾ x 22 - ¾ Ply.
J	Panel Magnet Bars (2)	9/16 x 1 - 12
K	Tabletop (1)	20 x 36 - 1½ Ply.
L	Fence Bases (2)	5 x 6 - ¾ Ply.
M	Fence Flanges (2)	2½ x 5 - ¾ Ply.
N	Fence Chute Sides (2)	3¼ x 4 - ½ Ply.
O	Fence Chute Top (1)	4 x 6 - ¼ Ply.
P	Fence Face (1)	3½ x 22 - ¾ Ply.
Q	Fence Coupler Top (1)	4¾ x 5 - ¼ Ply.
R	Fence Coupler Sides (2)	3 x 4¾ - ½ Ply.
S	Fence Coupler Plate (1)	3¾ x 7 - ½ Ply.
T	Post Back (1)	8 x 21¼ - ¼ Ply.
U	Post Front (1)	8 x 8½ - ¼ Ply.
V	Long Post Fillers (4)	2 x 17¼ - ¾ Ply.
W	Short Post Fillers (6)	2 x 4 - ¾ Ply.
X	Post Chute Sides (2)	7¼ x 1¾ - ¾ Ply.
Y	Post Chute Bottom (1)	3¼ x 6½ - ¾ Ply.
Z	Bit Case Sides (2)	3 x 5 - ½ Ply.
AA	Bit Case Top/Btm. (2)	3 x 19¼ - ½ Ply.
BB	Bit Case Divider (1)	2¾ x 4¼ - ½ Ply.
CC	Bit Holder (1)	2⅛ x 16½ - ¾ Ply.
DD	Bit Case Back (1)	4½ x 19½ - ¼ Ply.
EE	Switchplate (1)	2⅝ x 4½ - ¼ Ply.
FF	Dust Scoop Top (1)	7¼ x 16¾ - ¼ Ply.
GG	Dust Scoop Sides (2)	3 x 8⅝ - ½ Ply.
HH	Dust Scoop Back (1)	3¾ x 7 - ½ Ply.

- (21) #8 x 1½" Fh Woodscrews
- (10) ½" O.D. Magnet Cups
- (2) ¼" x ¾" - 14¾" Hardboard Splines
- (10) ⅜" Rare-earth Magnets
- (10) ½" Magnet Washers
- (2) 4" Pull Handles
- (4) 3" Locking Swivel Casters
- (6) ⅜"-16 Threaded Inserts
- (2) ⅜"-16 Adjustable Handles
- (2) ⅜" I.D. Washers
- (2) ¼"-20 x 2¼" Carriage Bolts
- (2) 1¼" I.D. Washers
- (8) #8 x 1¼" Fh Woodscrews
- (2) #10 x 2½" Fh Woodscrews
- (1) 3/32" x 12 - 12" Acrylic Panel
- (1) Single Phase Switchbox
- (1) 16/3 Power Cord
- (1) Electrical Outlet
- (1) Electrical Box
- (1) Outlet Cover
- (1) 0.9mm x 48" - 96" Laminate Sheet
- (1) Router Lift
- (1 set) Insert Plate Levelers &

FIGURE 1



Curved Panels

Before digging into the actual build of this project, there's one thing to take care of first: making the curved blanks. These will become the back panel and the removable front panel (next page).

Each one of these is made from two layers of bending plywood. The plies on this kind of plywood are all oriented in the same direction, allowing them to bend across the grain. Two laminations (held together by epoxy) will then form one rigid panel once cured. To ensure they cure at the right arc, I created a bending form.

CURVED FORM. The bending form was constructed from MDF, and is composed of a base with four supporting ribs. To cut the ribs, I made a template from a piece of hardboard with the arc shown in Figure 1a. After scribing the arc, I cut the template to shape at the band saw and cleaned it up at the edge sander. The ribs were cut at the band saw initially and cleaned up by routing with a pattern bit, using the template to register the bearing. (Hold on to this template, BTW.) After cutting the ribs, they can be glued to the base.

When cutting the sheets to size, I left them extra-long (you can see the dimension I used above). As Figure 1a shows, the edges of the two sheets won't line up due to the curvature, so they'll need trimming down later.

I applied epoxy to the inner faces of the two sheets and laid them together on the form. Band clamps are ideal here, but curved cauls can suffice. Epoxy takes some time to cure — I give it 24 hours.

After the blank has cured, remove the clamps, then trim the edges to final size at the table saw. The form is the same size as the final panels, so you simply need to cut the ends flush to it. I used double-sided tape along the ribs to ensure the plywood stayed secure.

A CURVED CASE TO MATCH

With that bit of preparation done, it's time to begin the actual router table. I worked from the bottom up, which meant starting at the feet.

FEET. The feet are glued up from two pieces of plywood. Once dry, cut them to size, then head to the drill press. As you can see in Figure 2 on the next page, the feet join to the side panels with a long tongue and mortise. I removed most of the waste for the mortises using a Forstner bit at the drill press, cleaning up the crests and corners with a chisel. The upper corners of the feet are radiused as well, which I did by marking them with a compass, roughing them out at the band saw, then finishing them up at the edge sander.

SIDE PANELS. Moving on up, the side panels come next. After sizing them, head to the table saw to cut stopped grooves along the back edge, the clean them up with a chisel. The grooves and a pair of splines are used to attach the curved back we made earlier. A dado blade creates the tongues for the mortises in the feet. Once those are complete, glue the feet onto the side panels.

CLEATS. A series of cleats attach to the side and back panels. The lower and

upper cleats are easy — once cut to size, cut miters on their ends at 24° so they'll sit flush against the panels (Figures 2a and 2b).

When it comes to the rear cleat, start by cutting a blank according to Figure 2 (this accounts for the width before shaping). The curve on this piece matches the back panel, meaning you can use the same template you used to make the form ribs to lay out the curves here. I rough shaped the workpiece at the band saw and cleaned up the inner curve at the spindle sander.

BOTTOM PANEL. Next came the cabinet bottom. I began by drilling out the pilot holes to screw the panel down to the cleats, then used a Forstner bit to make the 1" hole for the power cord. The hole at the center (which accepts your dust collection system) is larger, so I made it using a router and a trammel. I shaped the front and back edges next. This is done the same as before — band saw first, then a pattern bit guided by the template. After those arcs are shaped, screw the lower cleats and curved cleat to the bottom of the panel. You can then trim the back edge of the curved cleat flush to the bottom panel.

BACK PANEL. Now to utililize the first of the curved panels. I started with the slots for the splines. These will match up with the ones in the side panels, and I used a slot-cutting bit at my router table to create them. In order to keep these panels from tipping during the cuts, I cut a few pieces to fit underneath using the arc template, taping them in place afterward.

The cutout at the top of the panel is for dust collection and the power cord, and is only be visible from within the cabinet so perfection isn't necessary here. After laying it out, clamp the form and cut it with a jig saw, then sand the edges smooth.

SOME ASSEMBLY REQUIRED. At this point, I recommend joining the two side assemblies by gluing up the back panel between the sides (Figure 2a). Next, screw in the upper cleats, then add the bottom panel.

Now it's time for the magnet bars. The only thing of note on these are the holes along one edge of each bar to accept the magnet cups. After you've drilled those out, install the cups and attach the magnet bars to the side panels with woodscrews.

FIGURE 2

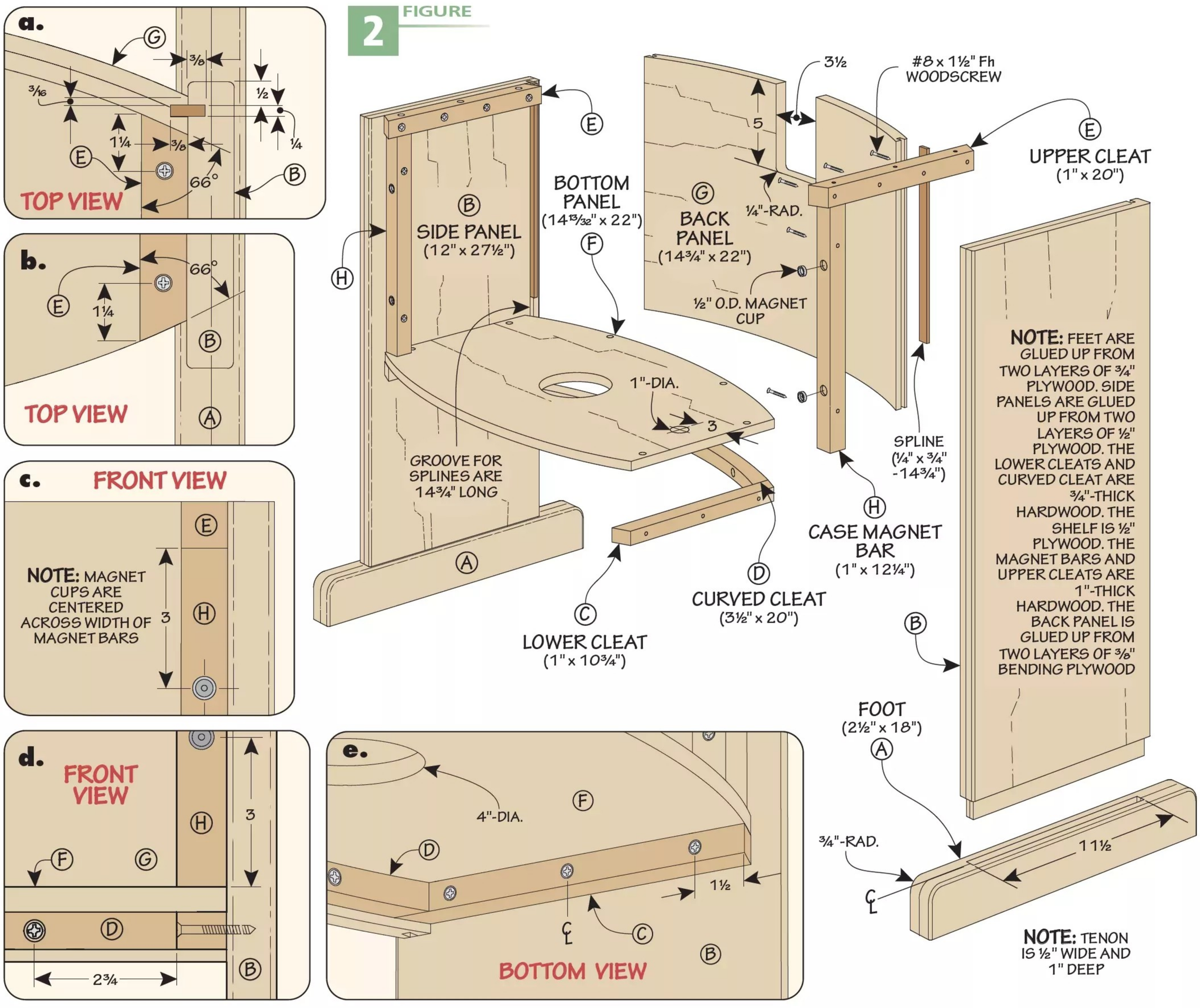
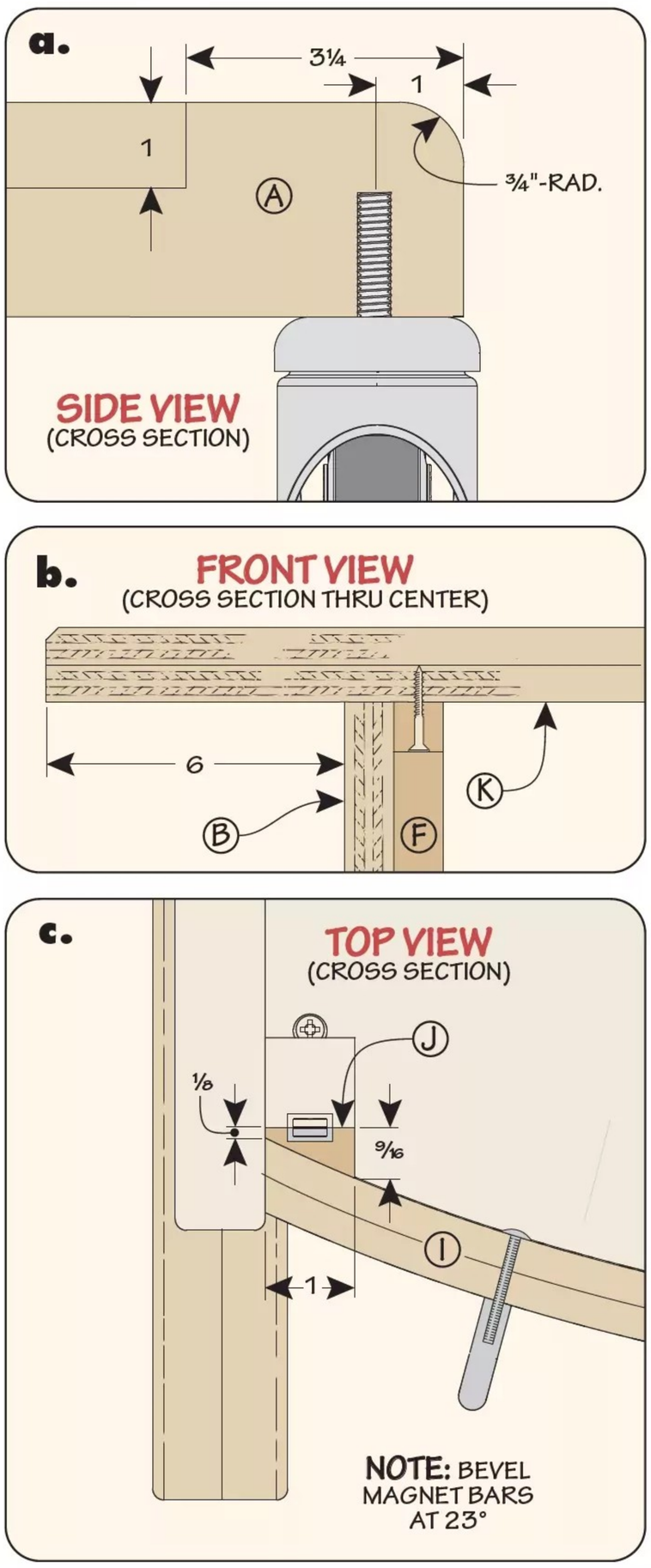
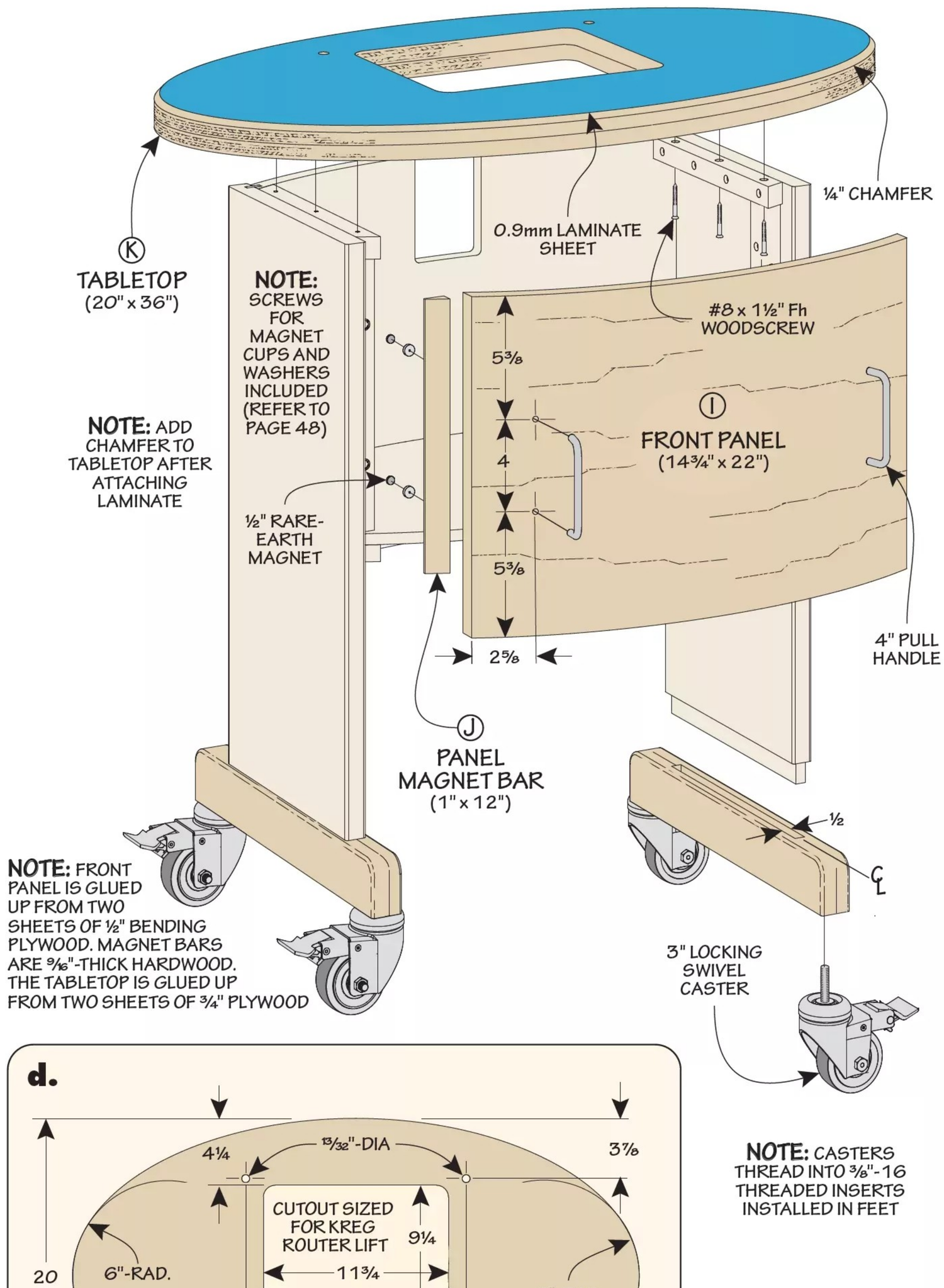
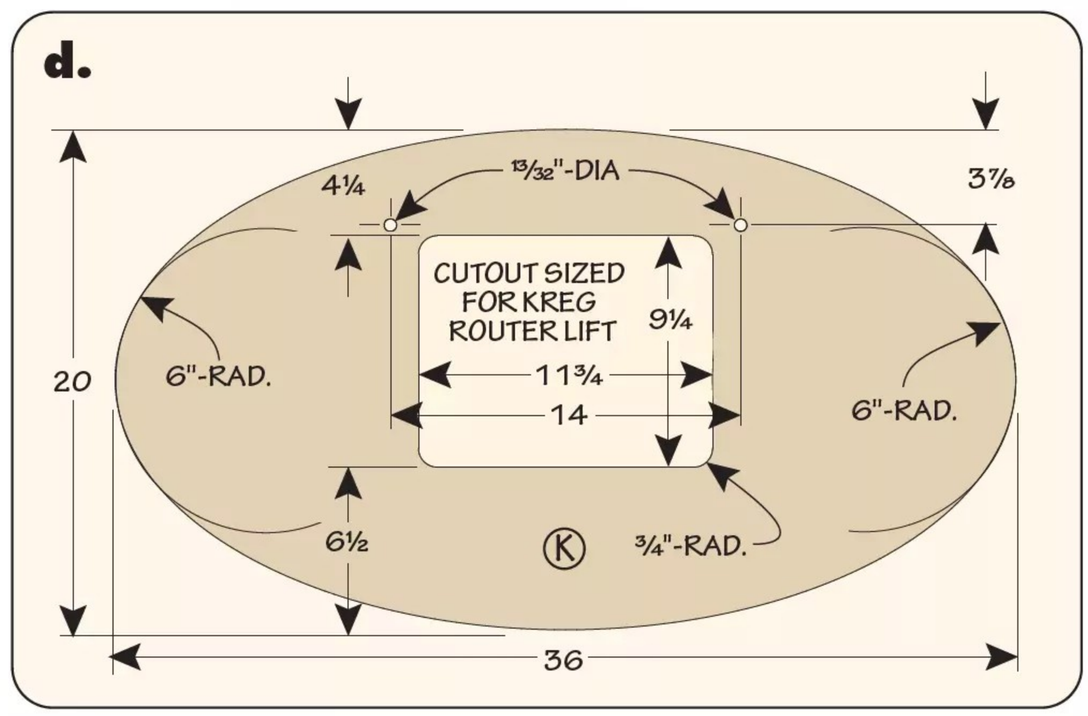


FIGURE 3







Closing Up the Case

There are two big things left to close up the case. First, the other curved blank will be used to create the front panel. That'll be followed by adding the elliptical top you see above.

FRONT PANEL. The front curved panel on this router table cordons off the interior of the case. It's fully detachable, connecting to the rest of the table with a few magnets. The magnets are held in bars that match up with the ones in the case and are face-glued to the panel. After cutting these to size, make the recesses for the magnets. To ensure they line up, mark directly off of the bars of the case. As you can see in Figure 3c above, the bars also have angled faces to fit against the panel's curve. After cutting those, glue the bars to the front panel.

TABLETOP. To cap off the cabinet, we'll need the table itself. I first glued up two sheets of plywood, trimming them a little over the final size once dry. The next thing I did was attach a sheet of laminate to the tabletop (Figure 3) to ensure workpieces will have a smooth ride while routing. I used contact cement to join the two. Once dry, I began working on the cutout for the router lift (shown in Figure 3d).

I first established the radiused corners of the cutout using a Forstner bit. This also provided clearance so I could remove most of the waste with a jig saw. I cleaned up the edges afterward with a pattern bit in my router, guiding it with a straightedge.

ELLIPTICAL SHAPING. That addresses the inside; now for the perimeter. I created a template to guide me in making one half of the ellipse at a time, using the dimensions shown in Figure 3d. After making the template, cut most of the waste free at the band saw, finishing

the edges by routing with a pattern bit. Flip the template and repeat for the second side. Once shaped, I added a chamfer to ease the edges and help prevent the laminate from chipping in the future. Finally, a series of screws driven through the upper cleats secures the tabletop to the cabinet.

FENCE ASSEMBLY

Although the top completes the table, the entire vision here is far from finished. The next item is a vital part of any router table: the fence.

FENCE BASES. Two bases hold the fence to the table. After sizing them, drill out two holes in each to establish the ends of a slot (Figure 4b). These slots accept adjustable handles that thread into the table's inserts. Remove most of the waste with a jig saw, then rout between the holes using a pattern bit and a straightedge.

Finally, I shaped their perimeters. This shape provides clearance when backing up the fence and isn't vital to get perfect, so they can be cut on the band saw and finished at the edge sander.

FLANGES & CHUTE. I made a pair of fence flanges next. These pieces only need to have a hole drilled in their centers and their outer corners rounded off.

I followed those pieces with the dust chute, which is composed of two sides and a top. After cutting them to size, rout a roundover across the upper edges of the top (Figure 4c). With those cut, you can now assemble the rear parts of the fence, as in Figure 4.

FENCE FACE. The final part of the fence assembly is the face. The face has a series of slots to aid in dust collection, plus a notch to accommodate the router bit. After cutting it to size, I first drilled out a series of holes. These established the ends of the slots (Figure 4a). After making them, I routed the slots from hole to hole and laid out the notch for the bit inside them. I cut most of the waste for this notch free with a jig saw, then cleaned it up with a ½" spindle at the spindle sander.

A counterbored hole near each end secures the face to the back assembly with carriage bolts, washers, and star knobs. After those were in place, I sanded the radii on the corners of the face at the edge sander, then attached the face to the assembly.

To seat the assembly, begin by locating the holes for the threaded inserts based on the holes in the fence bases. Drill those out, then tap in the threaded inserts. Seat the table by threading the adjustable knobs into the inserts.

4 FIGURE

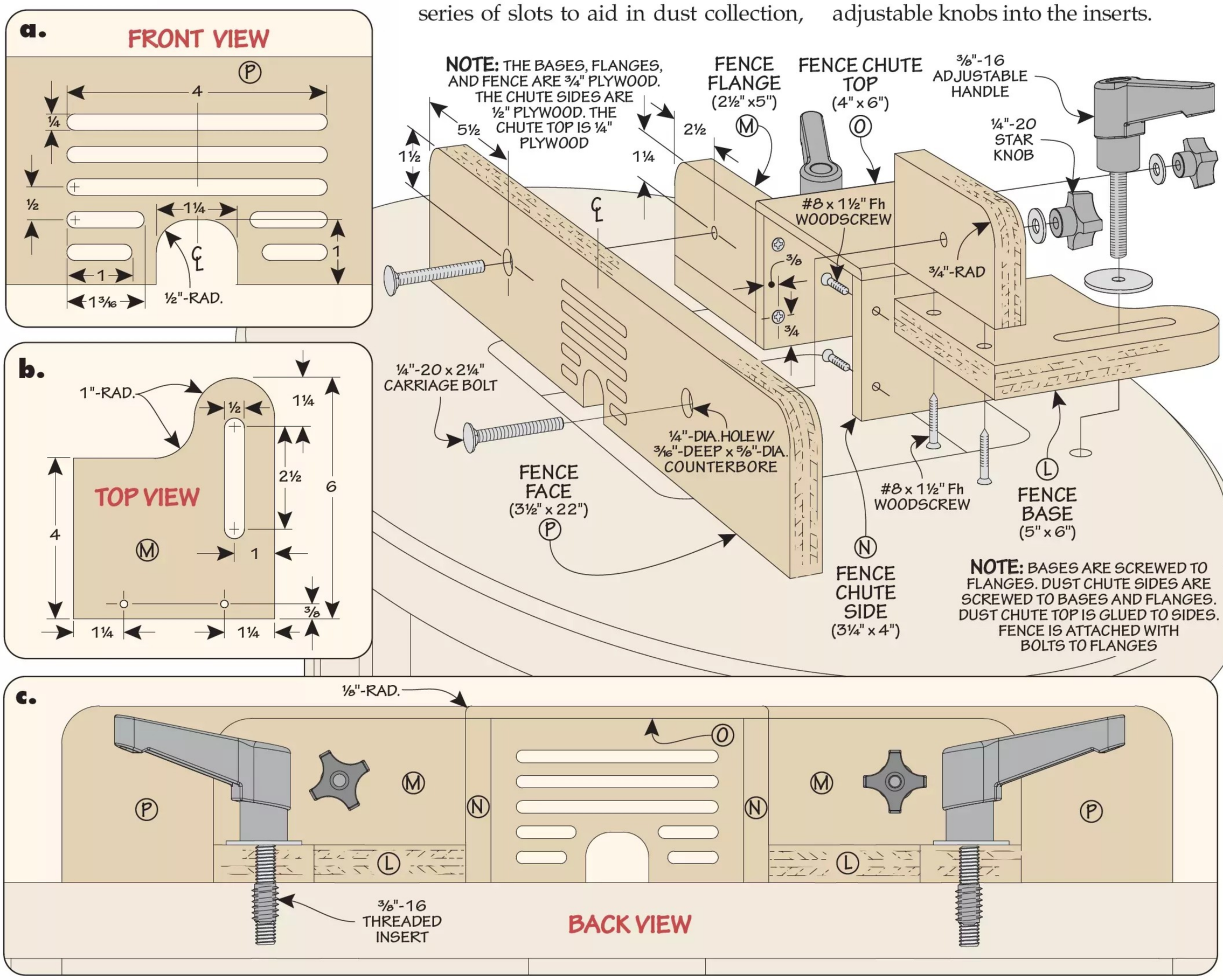
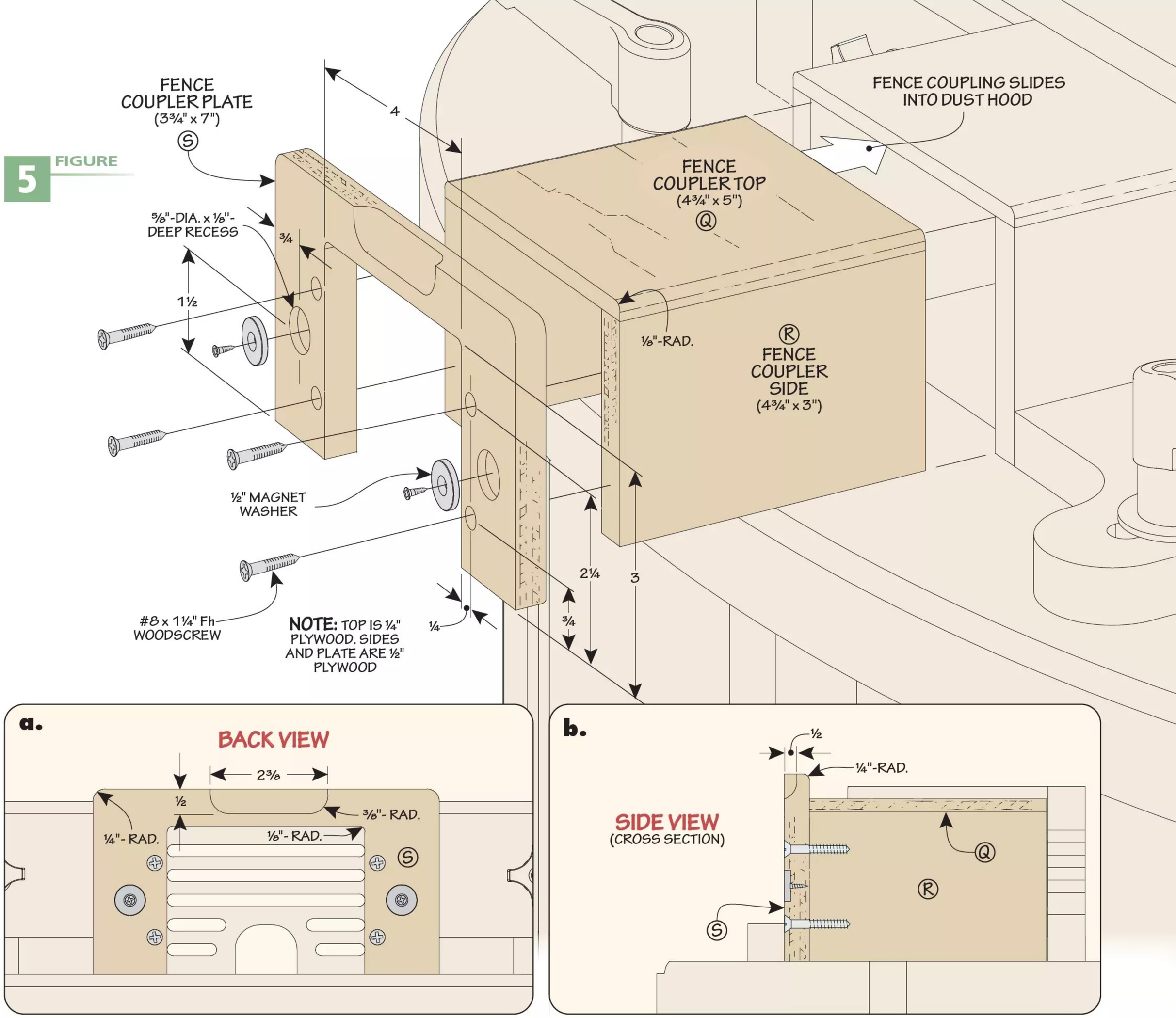


FIGURE 5



A Dust-collectiong Coupler

Routers kick up a lot of chips. To keep the waste clear is where the parts you see on this page come in.

FENCE COUPLER. The assembly above together with the hollow post we'll make on the next page will create an integrated dust collection system. This set of pieces connects to the post via a pair of magnets and to the fence by sliding into the fence's dust chute. As such, it's important to make the pieces fit snugly in the chute.

TOP & SIDES. I began this portion with the top piece of the coupler. I recommend sizing this directly based on your fence chute to account for any variance. Once sized, rout roundovers on the upper edges. These will ease the fit into the fence chute.

Next come the sides. Once again, I recommend sizing these directly to fit into the chute. Once they're cut, you can glue them to the top.

COUPLER PLATE. The last part of the coupler is the plate (Figures 5a and 5b). After sizing it, I went to the drill press to make the pilot holes and the recesses for a pair of rare-earth magnets. I also took the time to drill out two holes to establish the corners of the cutout.

Next was a trip to the router table. There's a cove on the back of the plate that acts as a pull when removing the coupler from the post. The cove is stopped, so I clamped a pair of stops to my router table fence at the starting and ending positions. Using a cove bit, I flipped on the router, carefully slid the piece into the bit against the first stop, then routed to the second one.

The last tasks on the plate were to round the hard edges and make the cutout for the chips and dust. I started by marking the radii on the upper corners with a compass, then sanding them down at the edge sander. I followed that by routing roundovers along the front edges, adding a softer look to this part that matches the rest of the table.

Finally came the cutout. As we've done a few times before on this project, I removed most of the waste with

a few cuts at the band saw, followed by some cleaning with a pattern bit and a straightedge. I finished the coupler by installing the magnets and screwing the plate to the rest of the assembly.

A HOLLOW POST

With the coupler made, it now needs something to couple to. The post accomplishes two things. First it forms a channel to draw chips from the fence down into the cabinet where they get pulled to the dust collector. Second, the post will provide a mast for the bit housing and power switch assembly that we'll construct next.

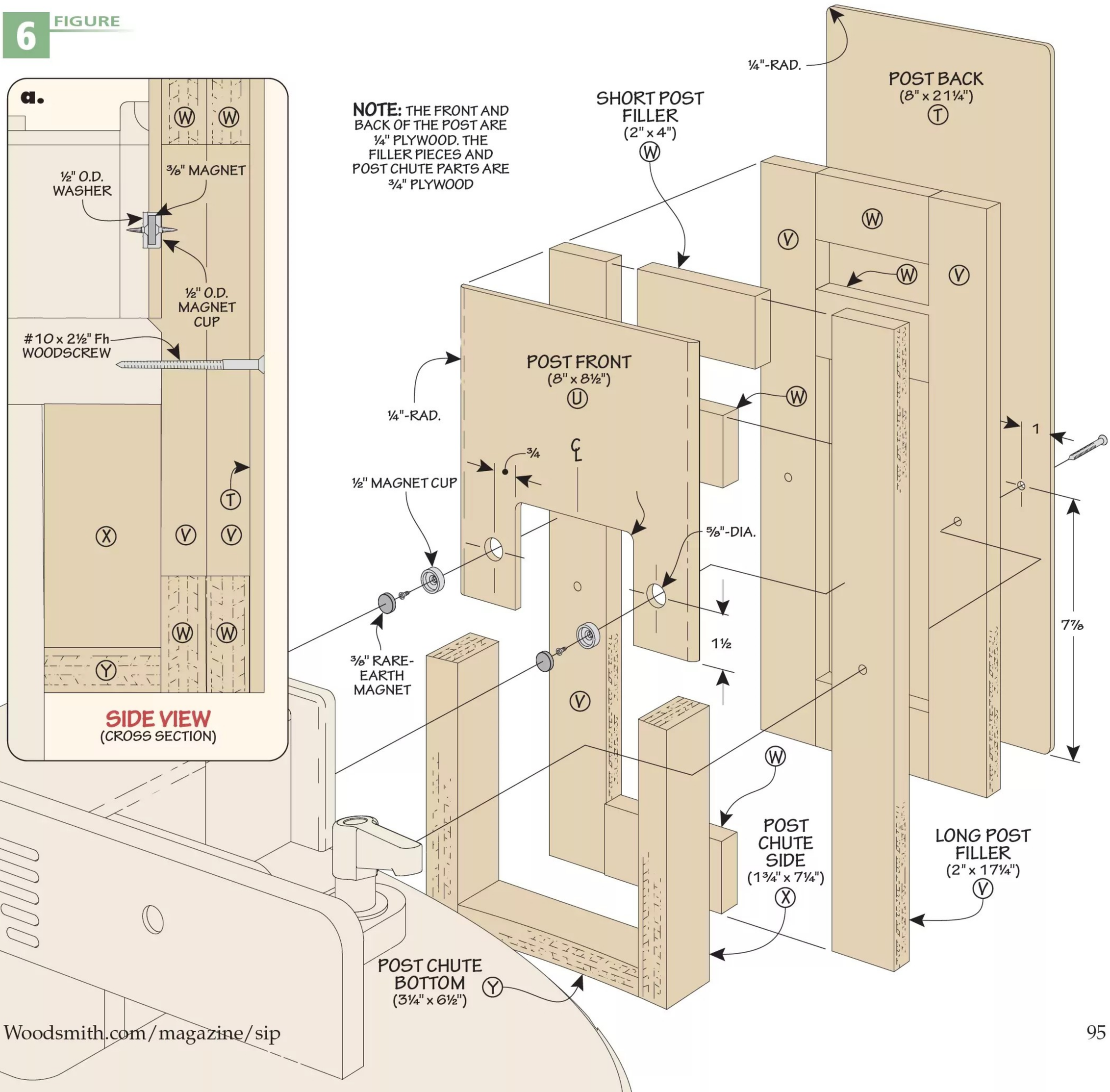
BACK & FRONT. To begin the post, I cut the front and back pieces to size. After cutting the back to size, it needs to have its corners sanded round. The post front is slightly more involved. Two holes for the magnet cups match the spacing of the washers on the fence coupler plate, allowing the two to click together. After drilling these out, I softened the edges with a roundover. Then I cut an opening to allow dust and chips to pass through, as shown in Figure 4.

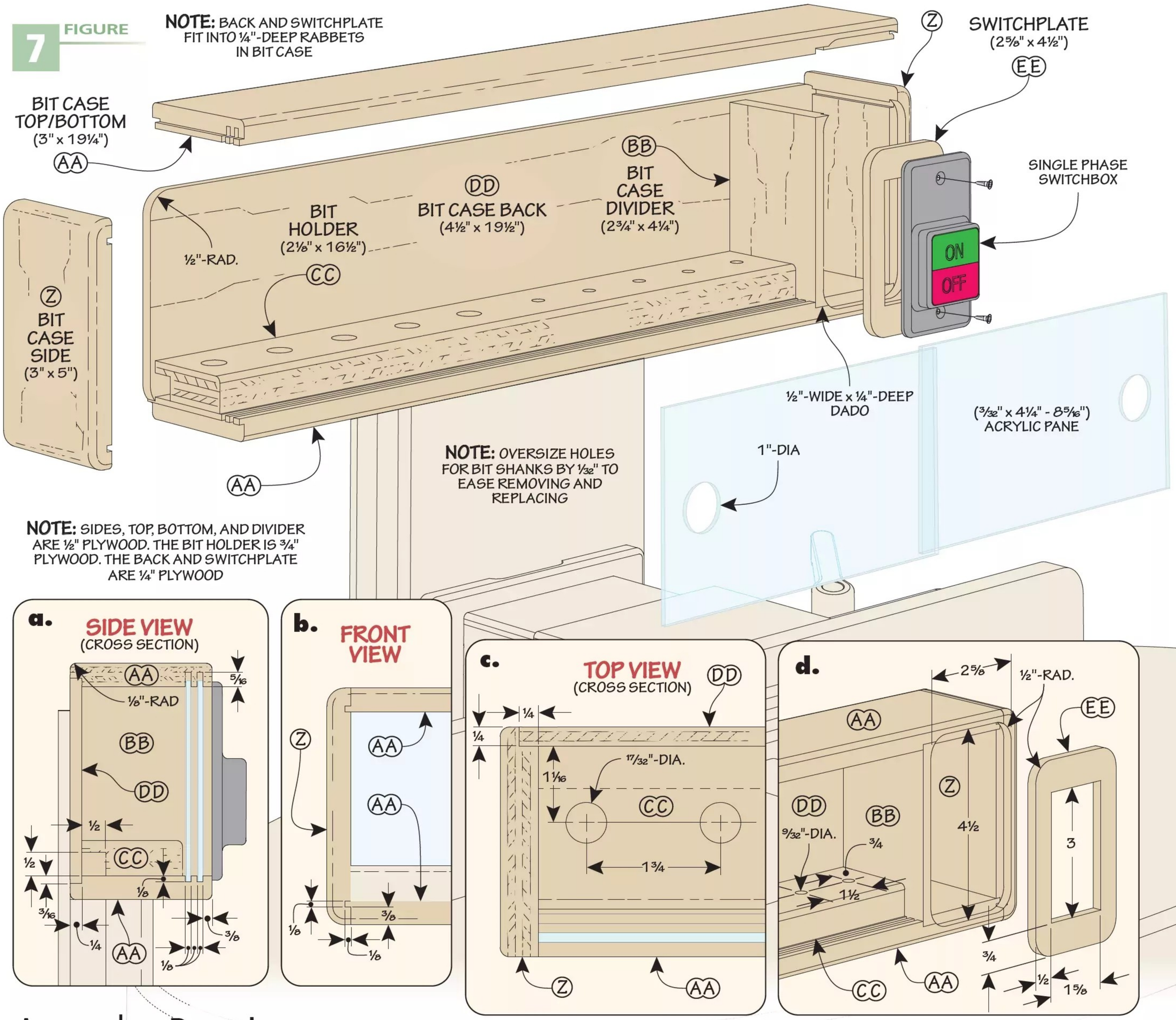
POST FILLERS. A set of fillers sit between the back and the front, and they come in two varieties. First are the long ones that make up the sides of the post, followed by the small filler pieces that fit in between them.

POST CHUTE. The last part of the post is the chute. There's not too much going on with these pieces, but you do need to shape them to match the curvature of the back panel. Bevel the edges of the sides at 24°. For the chute bottom, I once again brought back the curved template to scribe on the arc, then shaped it at the band saw and edge sander.

POST ASSEMBLY. The post parts are simply glued together, but don't do this all at once. Start by gluing the first layer of fillers to the back, followed by the next layer, then finally the front and the chute. Wooden handscrew clamps work well on beveled pieces like these. After installing the magnets in the post front, the entire assembly can be attached to the tabletop via a pair of long woodscrews, as you can see in Figure 6a.

6 FIGURE





Atop the Post is a Bit Case

The most eye-catching feature of this router table is the bit case and power switch shown in Figure 7. The case holds a few bits protected and close at hand. The top-mounted switch increases safety and ease of use.

CONSTRUCTING A CASE. The case consists of two sides, a top, a bottom, and a back. Tongue and dado joints connect the parts as shown in Figure 7b. This joinery can be made by cutting a few narrow dadoes and a couple rabbets at the table saw. While you're there, cut a dado in the top and bottom for a divider.

The case features acrylic doors to protect the bits. The doors fit into stopped grooves cut in the top and bottom (Figure 7a). I used a plunge router with an attached edge guide for these. At this point, you can glue up the case.

After assembly, there are some additional router tasks ahead. First up is to round over each of the corners.

Next you'll run into one of those tasks where you need a router table to make your router table. This can be as simple as attaching your router to a piece of plywood. Install a rabbeting bit and rout a rabbet on the back of the case, as in Figures 7a and 7c. Don't bother squaring up the corners; the corners of the back will be sanded to fit.

With that step complete, it's time to cut and install the small divider in the dadoes. Take note of the notch shown in Figure 7a to allow a power cord to pass through. The divider creates a smaller compartment for a power switch. The front of the compartment is covered with a switchplate. It sits in a rabbet cut just the same way as the rabbet for the case back (Figure 7d).

Size the switchplate and round the corners to fit the opening. The plate has an opening to house a power switch, as in Figure 7d.

WRAP IT UP. Just a few pieces are left to complete the case. Cut the back and round the corners. A bit holder fits inside the case. A rabbet on the bottom

aligns with the notch in the divider for cord clearance, as in Figure 7a. Hold off on installing these two parts until you have the switch wired up.

WIRING & MOUNTING. In order to thread the power cord, you need to drill a hole in the case bottom. The case gets glued to the top of the post. Once that's in, feed the cord through the right side of the bit case, through the notch in the divider, and down through the post and into the cabinet. Wire up the switch and attach it to the switchplate. Secure the bit holder over the cord. At this point, you can install the back.

A SCOOP!

There's a lot that you can do with the fence setup I discussed earlier. However, not all tasks require the fence. Working with curved parts is just one example. The problem here is that the chips generated by the bit spray all over the shop. We went through a lot of effort to create a solid dust collection setup for this table. To avoid squandering the opportunity, Chris designed a clip-on scoop to gather the chips into the opening in the post (Figure 8 below). Yes, it resembles the air intake on an old muscle car.

A TRAPEZOIDAL ASSEMBLY. Four pieces make up the dust scoop. I started with the scoop top, cutting the initial blank to size and laying out the shape according to Figure 8a. The band saw followed by the edge sander took care of the actual shaping here. Once I was happy, I routed a slight roundover across the upper front and side edges (Figure 8).

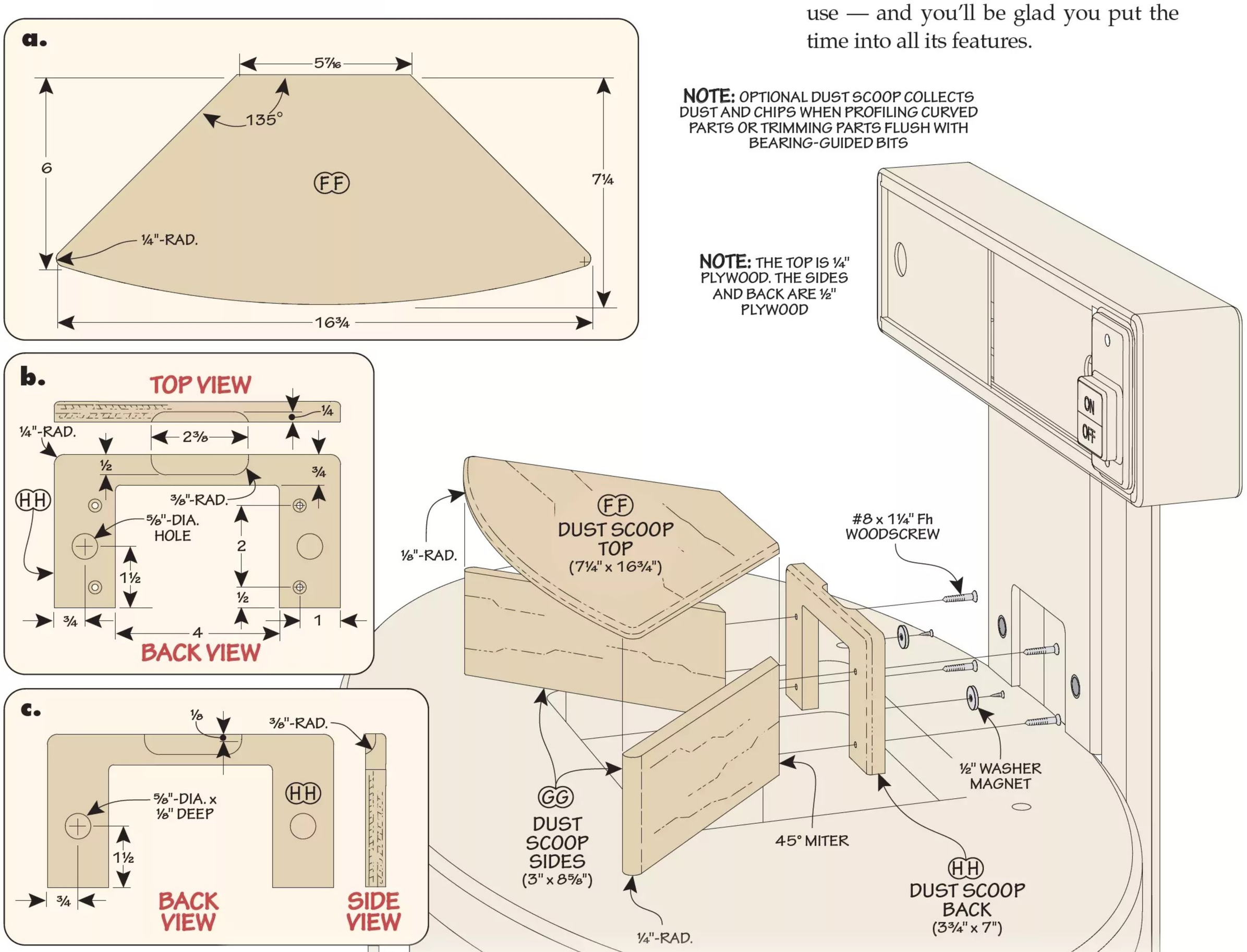
The sides came next. After sizing, I mitered their rear ends to splay with the sides of the top after assembly. By contrast, I rounded their fronts by routing a roundover on each side of them.

Last came the back of the scoop. This part is a repeat of the coupler plate you made earlier (page 40). To reiterate, after cutting it to size, you'll need to drill out the holes for the magnets, the screws, and the corners of the cutout. Then rout the stopped cove and remove the waste from the cutout.

To complete the dust scoop, screw the back to the sides and install the magnet washers. Follow that by gluing on the top and easing the edges.

FINISHING TOUCHES. With that, the router table is complete. Of course, there's still the matter of finishing. You can find the paint we used on page 48. An oil-based wipe-on finish protects the bare surfaces. Although hot rods usually get pampered, this one begs to be put to use — and you'll be glad you put the time into all its features.

8 FIGURE



Router Table Workshop Vol. 2 **Sources**

MAIL ORDER SOURCES

Amana Tools
631-752-1300
amanatool.com

Benjamin Moore
855-724-6802
benjaminmoore.com

Formica
800-367-6422
formica.com

Freud
freudtool.com

Grizzly
800-523-4777
grizzly.com

Harbor Freight
harborfreight.com

Infinity Cutting Tools
877-872-2487
infinitytools.com

Kreg Tool
800-447-8638
kregtool.com

Magnate
800-827-2316
magnate.net

McMaster-Carr
mcmaster.com

MLCS
mlcswoodworking.com

Panolam
877-726-6526
panolam.com

Reid Supply
800-253-0421
reidsupply.com

Rockler
rockler.com

Woodcraft
800-225-1153
woodcraft.com

Woodline USA
800-472-6950
woodline.com

Woodpeckers
woodpeck.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.

ROUTER SPEED (P. 8)

- **Harbor Freight**
  Speed Controller 59386

5 MUST-HAVE TRIM BITS (P. 36)

- **Amana Tool**
  Flush-Trim Bit 47124
  Pattern Bit 45460
  Extra-Long Flush Trim Bit . . .47126
  Dado Bit 45460-S
- **MLCS**
  Clean-Out Bit. 5382
- **Freud**
  Combination Bit. 50-509
- **Woodpeckers**
  Spiral Downcut Bit . . .US5200FTD

STRAIGHT & SPIRAL BITS (P. 38)

The router bits shown in the article were purchased from *Woodpeckers* and *MLCS*. Straight, shear, and spiral bits also are available from several of the other manufacturers listed in the right margin.

4 UNIQUE ROUTER BITS (P. 40)

- **Infinity Cutting Tools**
  Mini Mega Set. 00-693
  Slot Cutter Set 00-236
- **Amana Tool**
  InTech Bits . . . . . Varies
  Countersink Screw Slot. 55230
  Flat Screw Slot. 55232

BULLNOSE PROFILES (P. 44)

Bullnose profile router bits are available from a variety of the retailers listed at right, including *Woodpeckers*, *MLCS*, and *Lee Valley*. You can visit *Amana Tool*'s website to find out where to purchase the roundover bits with the Ultra-Glide radius bearing.

ROUNDOVER & BEAD BITS (P. 46)

- **Amana Tool**
  Roundover Bit 49518
  Beading Bit. 49604
  Point Cut Roundover 56123-M
- **Lee Valley**
  Edge Beading Bit 16J4301

TONGUE & GROOVE (P. 48)

Many of the suppliers in the margin will be able to supply you with ¼"-dia. and ½"-dia. straight bits. The rabbeting bit is made by *Amana Tool* (49302). Slot cutters are available from a number of manufacturers in a variety of sizes as well. My recommendations are the ones from *Amana Tool*, *Infinity Cutting Tools*, and *Rockler*.

DRAWER JOINTS (P. 52)

- **Rockler**
  Single-Tongue 22637
  Large Single-Tongue. 31202
  Double-Tongue 92123
- **Lee Valley**
  Single-Tongue. 16J7672
  Double-Tongue 16J7662

CROWN MOLDING (P. 54)

- **Magnate**
  Large Classic Cove Bit, 1" 3941
  Large Classic Cove Bit, 1½" . . .3944
  Large Classic Cove Bit, 2" 3942
- **MLCS**
  Horiz. Molding Bit, 1¾" 7873
  Horiz. Molding Bit, 2½" 7875
  Horiz. Molding Bit, 2¾" 7876
- **Woodline USA**
  Horiz. Molding, 1¾" . . . WL-1991
  Horiz. Molding, 2¼" . . . WL-1992
  Horiz. Molding, 2¾" . . . WL-1993

SMALL SHOP ROUTER TABLE (P. 62)

There's a strong case for just putting the router table to work as soon as you attach the fence. The other option shown in the article has our now-standard satin lacquer finish. This offers protection and makes the project appealing for photos. There are other options: A coat of wax on the top creates a low-friction surface. You could even apply plastic laminate.

- **McMaster-Carr**
  Quick Clamp Handles . . . 6385K31

ROUTER TABLE SLED (P. 66)

For the router table sled on page 66, I used a miter bar from *Kreg Tool* (KMS7303), but any metal or wood runner will work. *Woodcraft* carries the phenolic-faced plywood.

- **Reid Supply**
  Large Knob STT-8T
  Small Knob STT-2T
- **McMaster-Carr**
  Swivel Pad 8955A13

ROUTER TABLE FENCE (P. 72)

As a shop accessory, finish is optional on this router fence. That said, we used a bit of lacquer for the classic shine and protection against dings.

- **McMaster-Carr**
  ½"-13 Carriage Bolts. . .90185A144
  ½" Leveling Washers . .91944A470
  ½"-13 Through Knobs . . .7921K64
  ½" Rubber Washers . . .90131A626
  ⅝"-18 Carriage Bolts. .90185A114
  ⅝"-18 Through Knobs . .7921K62

COMBO ROUTER TABLE (P. 78)

The case of the router table was painted with *Benjamin Moore*'s Calm Cream (Eggshell Finish).

- **McMaster-Carr**
  ½"-13 Insert Knob. 6042K81
  ½"-13 T-Nuts. 90975A033
  ⅜"-16 Studded Knob. . . .62215K56
  Mending Plate. 1030A15
  ½"-13 Studded Knob. . . .62215K58
  4½" Hand Wheel. 6033K71
  ⅝"-18 Studded Knob. . .62215K53
  ¼"-20 Insert Knob. 6042K77
- **Rockler**
  Magnetic Catch 40332
  Power Tool Switch. 20915
  Dust Collection Port. 21528
- **Kreg Tool**
  Combo Trak KMS7448
  Router Plate. PRS3038
  Mini T-track. KMS7509
  Jig & Fixture Bar. KMS7303
- **Lee Valley**
  Toggle Clamp. 17F7202
- **Panolam**
  Laminate (Maritime Gray) . S6027

RETRO ROUTER TABLE (P. 88)

After building the router table, I chose to paint the cabinet (excluding the tabletop of course), the post, and the bit case with "Feather Gray" from *Benjamin Moore*. For wiring the switchbox to your router, you'll need a 16/3 power cord, an outlet, an electrical box, and a cover. These can be found in the electrical sections of most home improvement stores.

- **Rockler**
  ⅜"-dia. Magnets . . . .GRP10713_1
  ½" O.D. Magnet Cups. 39783
  ½" Washers 38348
- **McMaster-Carr**
  3" Locking Casters. 2384T28
  4" Pull Handles 6195A41
  ¼"-20 Star Knobs 5993K22
  ⅜"-16 Adj. Handles 6305K67
- **Kreg**
  Router Lift PRS5000
  Insert Plate Levelers. PRS3040
- **Formica**
  Matrix Blue Laminate 8795
- **Grizzly**
  Single-Phase Switchbox D4157

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