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Cutoffs

Rules. As woodworker's we learn early on to follow the rules. Especially when it comes to working with power tools. And for good reason — power tools can be dangerous. So we develop a general set of rules for using them to get good results safely.

Take the router for example. One of the first rules you learn is which direction to rout — always move the router so you're pushing the bit into the workpiece. This way, as the bit digs into the wood, the router is pulled tight to the edge of the workpiece.

Routing in the opposite direction (backrouting) goes against the rule. So it must be wrong — right?

Well, not always. There are a few times when routing the "wrong" way can give you better results. When you backrout, the bit and the router are moving in the same direction, which can help eliminate chipout. However, the router may seem hard to control because the bit wants to skip along the edge of the workpiece.

Now this may sound a bit awkward and a little risky, but the fact is, you can backrout safely — if you follow a few simple rules. (It seems that even when you break the rules there are still rules to follow.)

To get the complete story on when to backrout and the techniques for doing it safely, check out the article that begins on page 8.

Terry

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from our Readers

Tips for Your Shop

Adjustable Planer Table. *These tables keep the workpiece level and well supported as it enters and leaves the planer.*

Adjustable Planer Tables

My portable planer works great for planing lumber to final thickness. The problem is the short infeed and outfeed tables make it difficult to support long workpieces.

So I built the extended infeed/outfeed tables for my planer shown in the photo above. It has a table on each side of the planer that can be easily adjusted to match the height of the planer table. The added support at both ends keeps the workpiece from dipping and virtually eliminates snipe.

Best of all, it doesn't take long to build. All you need is some ¾" plywood, carriage bolts, and nuts and washers from the hardware store.

Base. The base of the table is simply a piece of plywood made to fit on your supporting table or workbench. You'll want it wide enough to be able to mount your portable planer to the base.

Next, drill four counterbored ⅜"-dia. holes at each end of the base. Be sure to position them so they remain outside the path the workpiece needs to travel as it enters and leaves the planer. These holes will accept the carriage bolts used to support and adjust the infeed and outfeed tables.

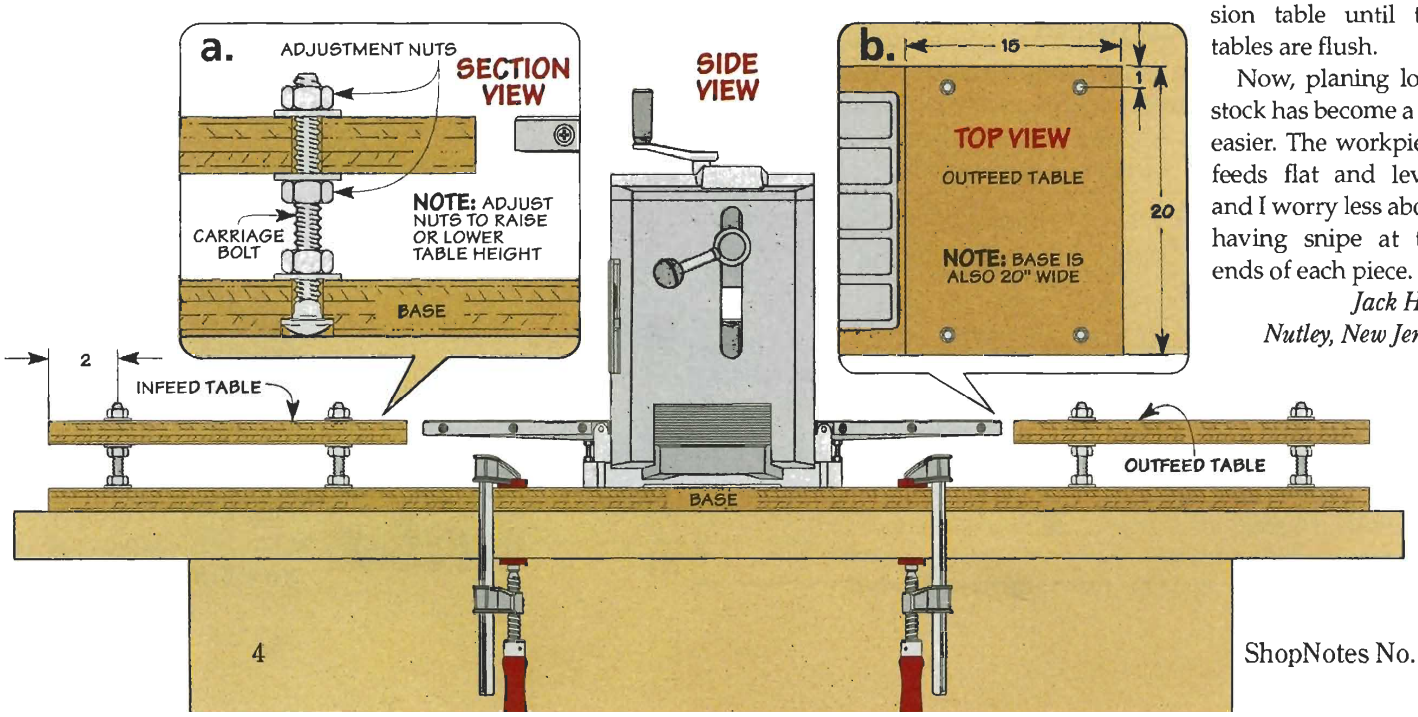
Extension Tables. The infeed and outfeed tables are made by cutting two smaller pieces of plywood and drilling holes that correspond to the holes in the base (see detail 'b' below). Then it's just a matter of adding the bolts, washers, and nuts like you see in detail 'a' below.

Now, mount your planer in the center of the base. Position it so that the tables on your portable planer are spaced evenly in the opening between the adjustable infeed and outfeed tables at each end.

Table Adjustment. Finally, you'll need to adjust the height of the infeed and outfeed tables to match the height of the planer tables. This is done by either raising or lowering the adjustment nuts at the corners of each extension table until the tables are flush.

Now, planing long stock has become a lot easier. The workpiece feeds flat and level, and I worry less about having snipe at the ends of each piece.

Jack Huff
Nutley, New Jersey



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Handy Holdfast Clamp

My workbench doesn't have holes for bench dogs. And this makes it hard to hold some pieces in place whenever I need to work on them.

To solve this problem, I made the holdfast clamp you see in the photo below. The adjustable vise-clamp allows you to hold down and quickly reposition materials of varied size, shape, and thickness. It clamps to any table or bench and can be quickly removed when you need to clear the worksurface for other work.

To make the clamp, first cut a piece of ¾" plywood to size. Then drill a series of $^{15}/_{32}$" holes about 1½" from one edge so there's room to tighten the nut below. These holes accept the bolt of the vise-clamp for repositioning the clamp.

Using the clamp is easy. Just clamp the board to a bench or table and secure the vise-clamp in one of the holes. Then adjust the tension on the handle and clamp the workpiece in place.

Serge Duclos
Delson, Quebec, Canada

Submit Your Tips

If you have an original shop tip, we would like to hear from you and consider publishing your tip in one or more of our publications. Just write down your tip and mail it to: *ShopNotes,* Tips for Your Shop, 2200 Grand Avenue, Des Moines, Iowa 50312. Please include your name, address, and daytime phone number (in case we have any questions). If you would like, FAX it to us at 515-282-6741 or send us an email message at: shopnotes@shopnotes.com. We will pay up to $200 if we publish your tip.

The Winner!

Congratulations to Jack Huff of Nutley, New Jersey. His tip on making an adjustable infeed/outfeed planer table was selected as winner of the Porter-Cable router just like the one shown at the right. His planer table is simple to build and helps minimize planer snipe.

To find out how you could win a Porter-Cable router check out the information above. Your tip just might be a winner.

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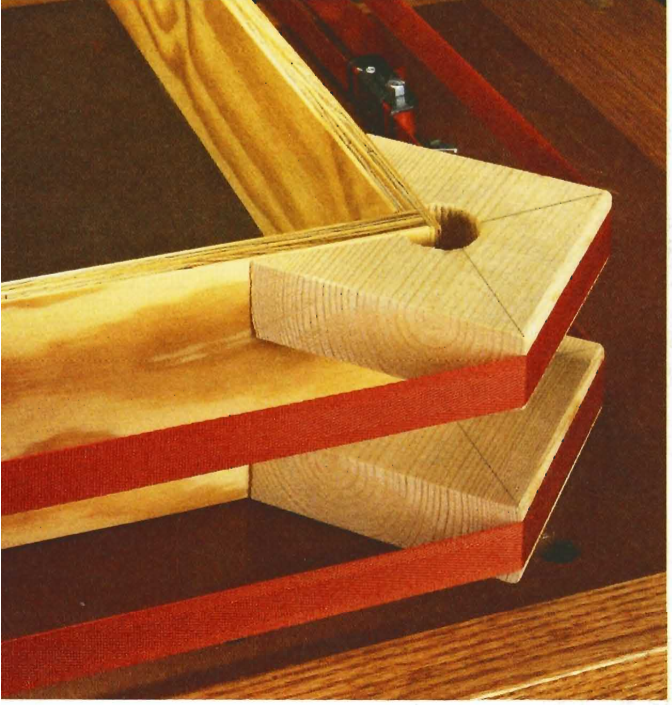


Corner Clamping Blocks

Whenever I glue up a case, it's always a challenge to spread the glue in the joint, assemble and square up the sides, and then install the clamps before the glue sets up. To make the job easier, I made large corner clamping blocks, like you see in the photo at the left, to use with band clamps.

I started with square blocks of 2x6 stock so the corner blocks would be wider than the straps of the band clamp. Then I used a 1¾"-dia. Forstner bit to drill a hole in the center of the block. This hole lets the block fit around the corner without marring the case and leaves a space for any glue that might squeeze out around the joint.

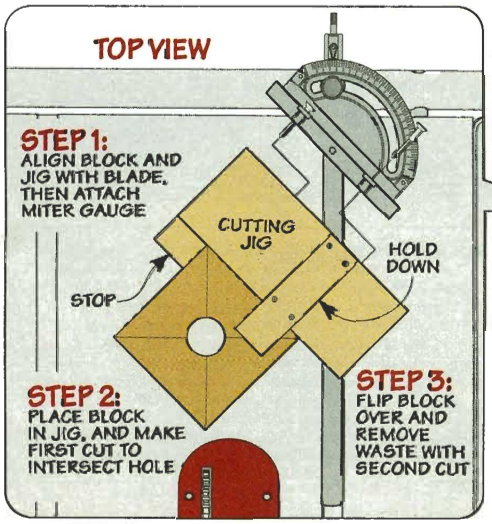
In order for the blocks to fit around the case, a 90° notch is cut. To make cutting this notch a snap, you'll need to make a simple jig (illustration and photo below). You'll use this jig and the miter gauge on your table saw to hold the corner block firmly in place while you make two cuts in the block at right angles to one another.

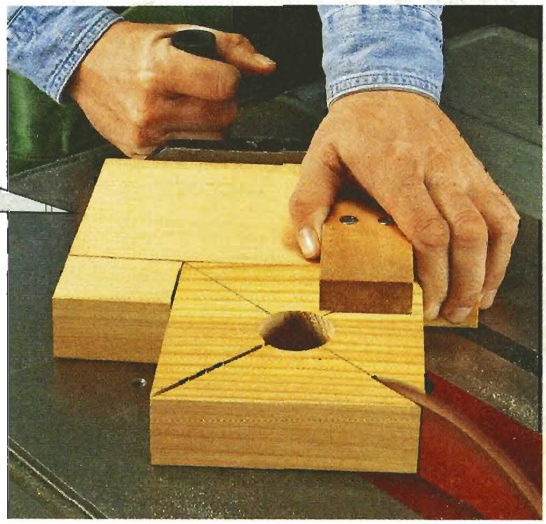
A cleat screwed to the top of the jig holds the workpiece down. And a stop block along one side keeps the workpiece in position as the cut is made on the table saw.

To make the cuts, set your miter gauge to 45°, align the block and jig to the blade, and then attach the jig to the miter gauge. Next, place the block in the jig with the wood grain parallel to the miter gauge and cut the first angle. Then flip the block over and make a second cut.

Four clamping blocks work for small assemblies. But for larger cases, you may need to use two blocks in each corner. Just position the clamping blocks at each corner and tighten the band clamp around the blocks.

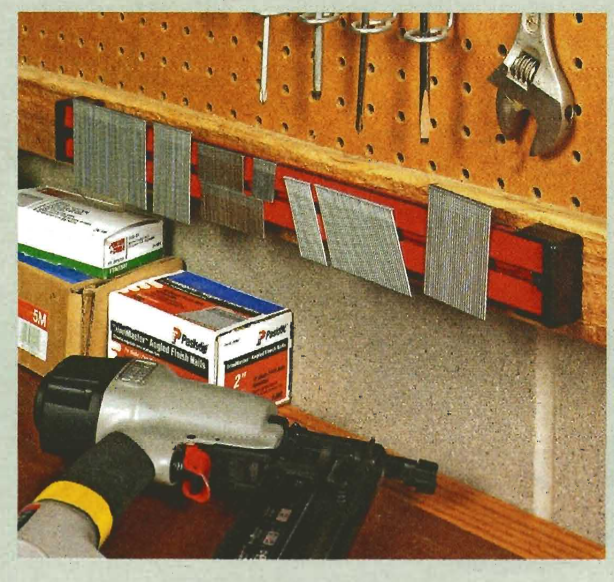
David Kirby
Toledo, Ohio





Quick Tips

►*Aaron Butler of Danville, PA, mounts a magnetic tool holder near where he stores nails for his air nailer. He uses it to hold short leftover strips of nails so its easy to load up these strips the next time he uses the nailer.*



To keep his air compressor from starting up in the middle of the night, Dale Malcolm of Kettering, OH, plugs his air compressor into a timer and sets it to shut off at 10 p.m.

Drying Rack

I don't have enough room in my shop for a separate area for finishing. This always makes it difficult to find a place to set project pieces until the finish is dry. So I built a folding rack, like you see at the right, for finishing and drying molding and other long pieces.

Since the materials I generally finish are small pieces of trim, I made the rack to sit on the top of a table. But you can size it to fit your specific finishing needs by varying the size of the leg.

Each leg is hinged at the top so it can easily be opened when needed and then quickly folded up for storage, as shown in detail 'a.' To make the rack stable when it's open, a brace with a notch at one end slips over a carriage bolt on the side. A wing nut locks the side brace securely in position.

The rack won't take long to build. I began by cutting four equal lengths of 2x2's for the legs.

Then I added some pegs to hold the material on the rack. They're made from 3/8" dowels cut to 3" lengths. The pegs are then glued into holes drilled 2" apart.

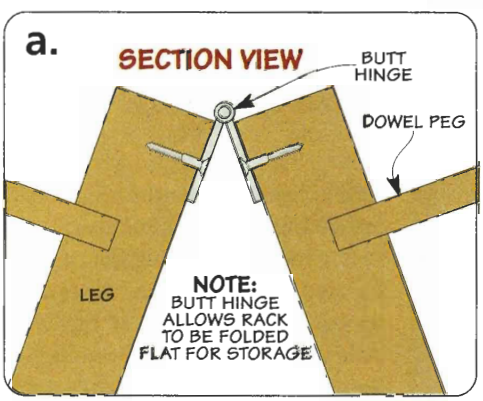
Next, join the legs together at the top with a butt hinge, as shown in detail 'a' at the right. Once the hinge is in place you can move the legs to the angle your legs will be spread apart. This makes sizing the support brace easy. Just measure the distance between the open legs at the point you'll attach the brace to find the length.

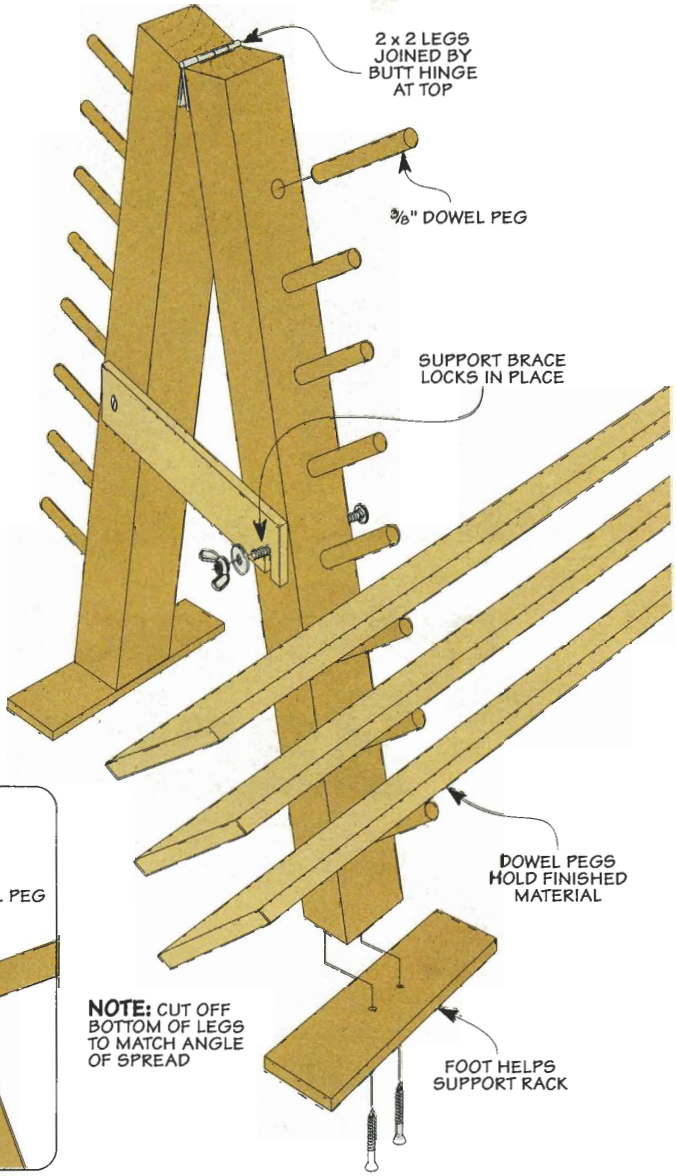
Now you can make a support brace with a notch in one end and screw it to the leg. Add a carriage bolt and a wing nut on the other leg to lock it in place.

Finally, trim the bottom of the legs so they sit flat. Then attach some feet for added support.

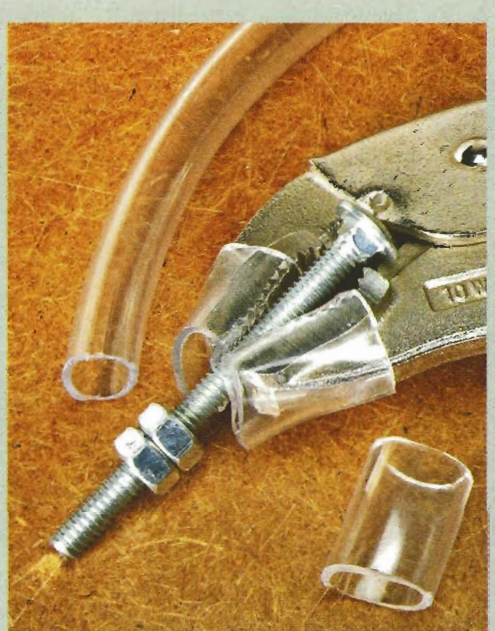
The rack is easy to use. Pieces can be finished directly on the rack or finished off the rack and then placed on the rack for drying.

Ken Peterson
Eau Claire, Wisconsin

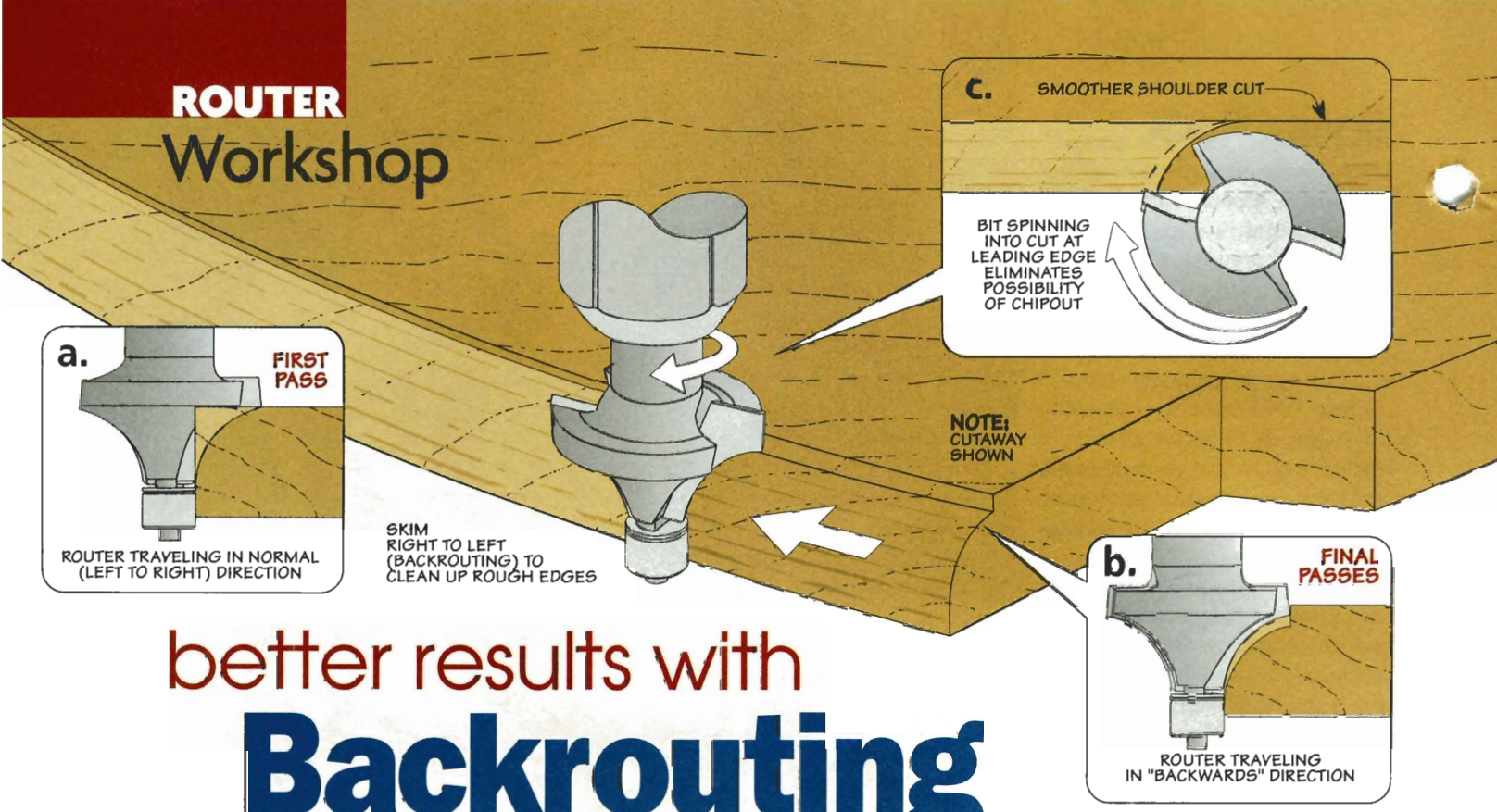




▲ **Michael Dingas** of Warner Robins, GA, uses metal foil tape used for furnace duct work and repair to tighten the fit of the miter gauge on his table saw. He applies the tape to the edge of a clean miter gauge bar and trims it with a knife.



◄ Gripping threaded hardware firmly without damaging the threads is always a difficult task. So **David Jenkins** of Phoenix, AZ, cuts small pieces of hollow tubing and slips them over the jaws of the pliers to protect the threads.



better results with Backrouting

Sometimes going the wrong way is the right thing to do.

Most woodworkers have heard of backrouting. But usually, the message is to never do it. Backrouting is when you feed a hand-held router opposite to the usual cutting direction. Instead of having to push the router into the cut, it wants to pull itself along the edge of the workpiece like a dog tugging on its leash. The result is a very difficult time controlling the router. Instead of making a smooth cut, the router may simply skip along the edge of the workpiece. If you've experienced this, you know it can be a little unnerving. But I've found that there are a couple of instances when special backrouting techniques help me get a much smoother, cleaner cut. One uses backrouting to clean up the cut at the end, the other uses a backrouting pass to start the cut.

A CRISP, MOLDED EDGE

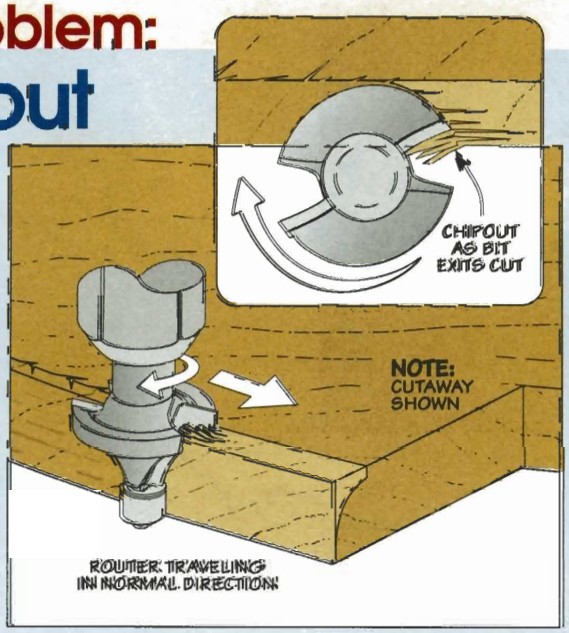
When I rout a profile on the edge of a round or oval tabletop, I want it be smooth and crisply cut. But this can be easier said than done.

The Problem. The problem is that as the router travels around the top, the grain direction is always changing. At a couple of spots you're trying to rout directly against the grain. If you're lucky, the result will just be a rough or "fuzzy" cut through this area. But often, you'll hear an ominous chipping sound over the whine of the router and be greeted by the sight of some nasty tearout (see the box at left). But fortunately, the solution can be pretty simple.

The Solution. Here is where backrouting can save the day and leave you with a crisp profile. The process I use is shown in the drawings at the top of the page. You'll begin routing the profile in the

Left to Right Problem: Minor Tearout

The drawings at right show what can happen when routing in the normal left to right direction. As shown in the detail, the cutting edge of the bit is scooping away the waste from the inside out toward the edge of the workpiece. The problem is that nothing is backing up the wood as it's being cut. The result is that as the bit exits the cut, chips are simply split loose rather than being cleanly cut. Sometimes, but not always, this is a problem.



usual way by making a light cut in the normal counterclockwise direction (detail 'a' at left). Now work down by adjusting the bit in small increments between passes. Shallow cuts should limit any tearout at this point.

When you get to where the bit will start cutting a shoulder and chipping may become a problem, hold up (detail 'b'). This is where you're going to start taking very shallow backrouting passes to complete the profile.

Start Backrouting. The reason that backrouting works is that when you're backrouting, the bit cuts into the wood differently. Detail 'c' at left shows that when you reverse the feed direction. The bit is now removing the waste from the outside-in. This means the wood being cut is always backed up by the wood behind it. The bit can shear off the wood fibers cleanly with no chance of chipout.

The key to this backrouting technique is that you want to take a *very light* bite — only about 1/32" at a time. So first lower the bit a hair and then take a firm grip on the router with both hands. Now, gently engage the edge with the bit and begin to move the router clockwise around the top. Since your cut is very shallow, you'll only feel a slight tug from the bit trying to pull the router along the edge. The weight of the router and the friction against the top will act as a good counterbalance. Once you get past the start of the cut and the slightly odd feel of moving the router "backwards," you probably won't notice much difference.

It may take three or four cuts to reach full depth, but don't be tempted to speed things up by taking deeper cuts. After several light passes, you'll be rewarded with a perfect profile.

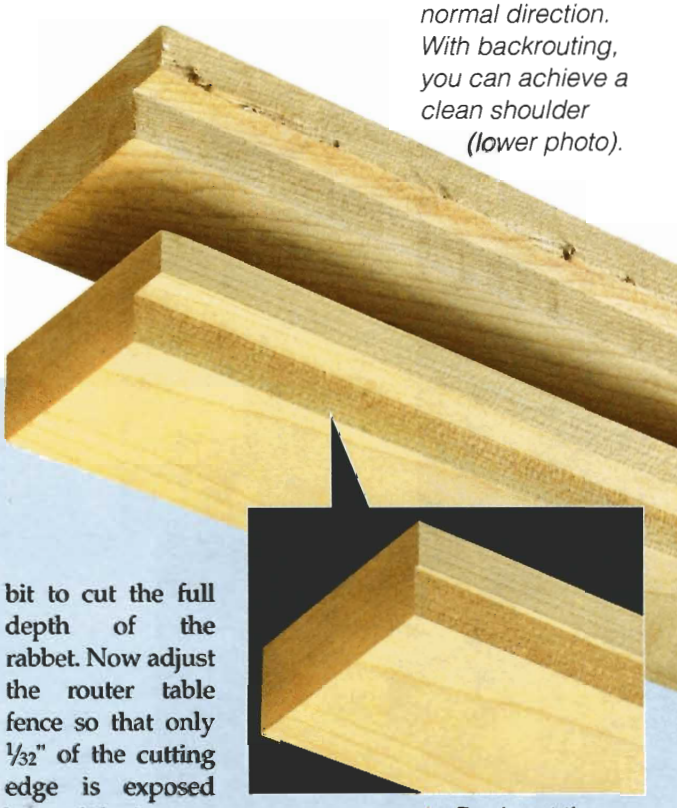
Backrouting for A Clean Rabbet

Sometimes you want the shoulder of a rabbet to be perfectly sharp and chip-free. You wouldn't want to spoil the look of a mirror or picture frame with a "rough" rabbet.

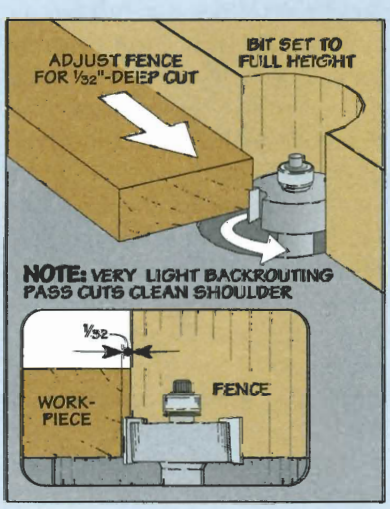
A Rough Shoulder. The router table and a rabbeting bit can be a quick way to rabbet a workpiece. But there can be a problem lurking. As you're making the cut, you begin to hear a sharp chipping noise. This is the sound of chipout along the shoulder of the rabbet as the bit exits the cut (upper photo). When you look at the workpiece, you don't see the crisp shoulder you expected. And I've found that even taking very light passes won't solve the problem.

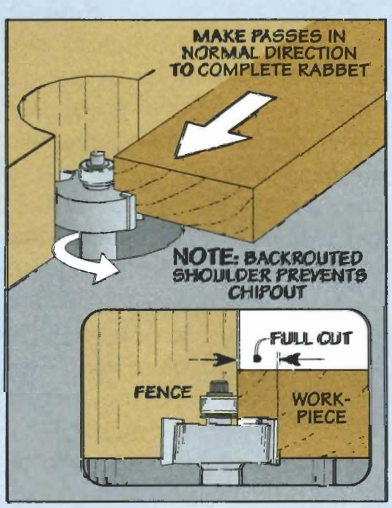
A Perfect Shoulder. Backrouting provides an easy way to guarantee a clean shoulder. Let me emphasize, this is the *only* time I'll ever backrout on the router table. And I don't use this technique on workpieces smaller than 1½"-wide. All you have to do is follow the rules and it's safe and effective.

The drawings below show how the technique works. First, raise the bit to cut the full depth of the rabbet. Now adjust the router table fence so that only 1/32" of the cutting edge is exposed beyond the fence.



▼ *A Rough Shoulder. The upper workpiece shows what can occur when routing a rabbet in the normal direction. With backrouting, you can achieve a clean shoulder (lower photo).*



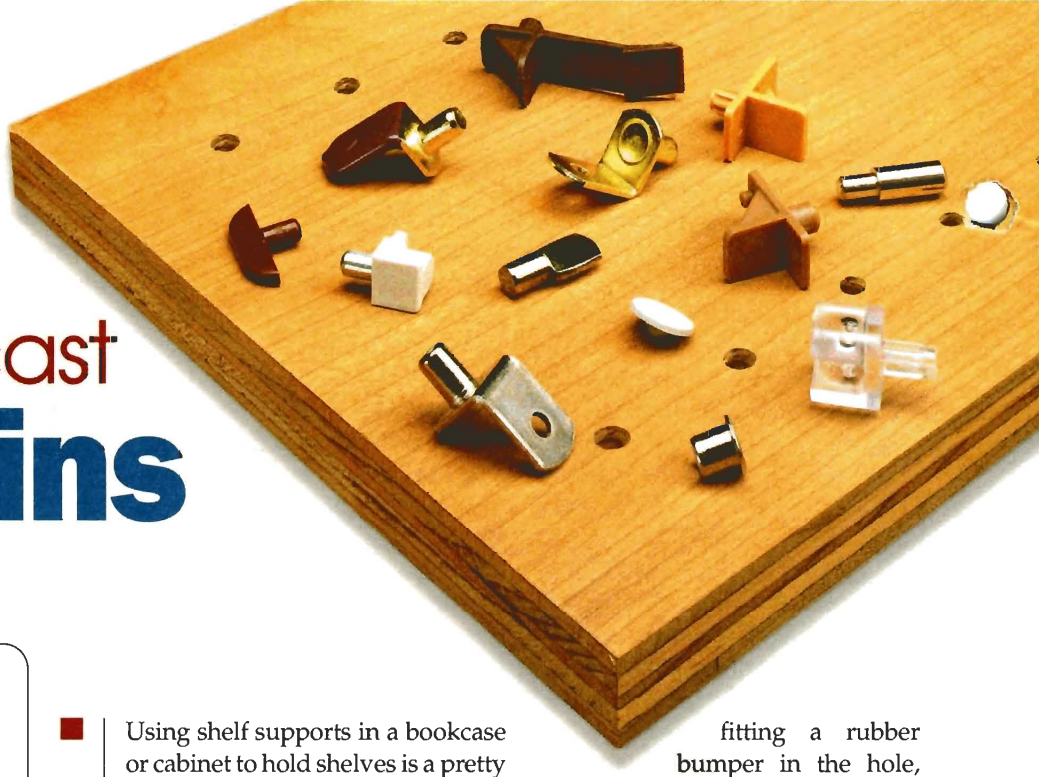


Now you're going to backrout a light scoring pass to establish a clean shoulder (left drawing). Since your feed will be from left to right you'll want to stand to the left of the bit. Just keep both hands firmly on the workpiece as you slowly slide it into the bit. You'll feel just a slight tug on the workpiece as it makes contact. Maintain steady pressure on the workpiece to force it against the fence and flat to the table. When you check the shoulder, you'll find it's chip-free.

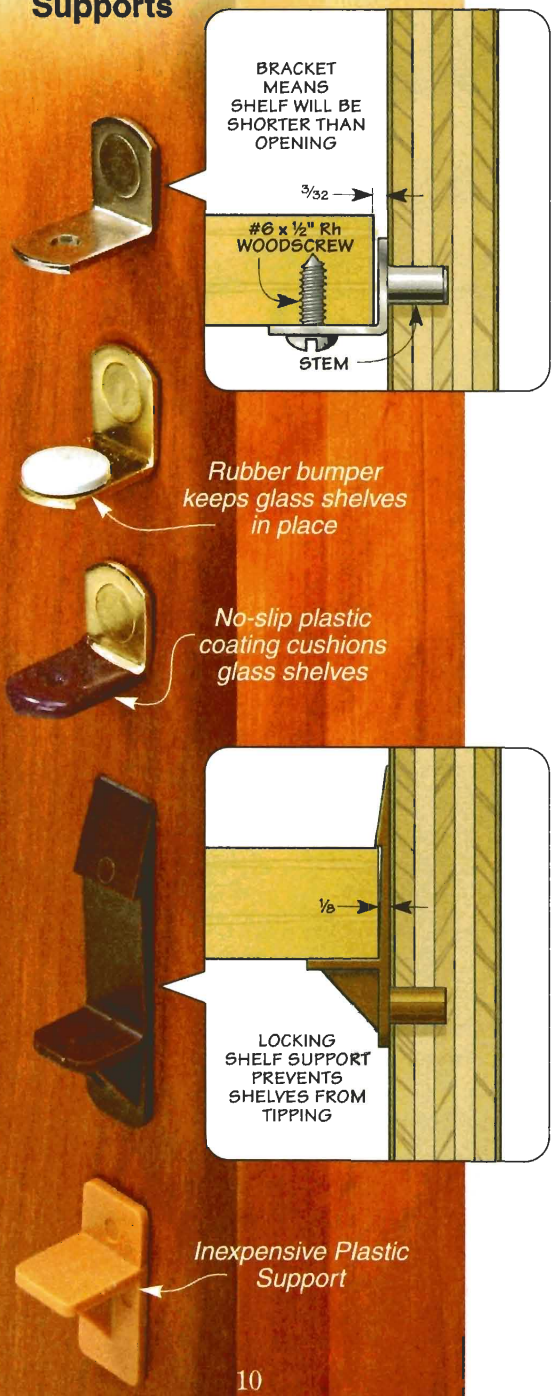
Once you've established the shoulder, complete the rabbet with normal right to left passes (right drawing). The light shoulder cut that you backrouted will prevent any chipout from occuring.

▲ *Backrout the Shoulder. A very light backrouting pass will establish a clean shoulder as shown above.*

supporting cast Shelf Pins



L-Shaped Shelf Supports



Using shelf supports in a bookcase or cabinet to hold shelves is a pretty simple solution for adjustable shelving. All you have to do is drill a few holes and insert some pins or supports. The trouble is, it's easy to just pop them in place without giving them enough thought.

But as these examples show, there are several types of shelf supports available. By matching the support to the task, you can make shelves more stable, secure, and sometimes, better looking.

L-SHAPED SUPPORTS

The first kind to look at is the L-shaped support. This is one of the most common styles, and we use them on projects all the time. They're pretty inexpensive and have large, flat tongues that won't flex or mar the shelf it's holding.

Three Uses for the Hole. A handy feature of this style of support is the hole in the tongue. As you can see in the photo and drawing at left, the hole serves two purposes. One way to use it is to drive a screw up through the hole and into a shelf. This prevents the shelf from slipping off the support when you move items around. You can also use a screw to pull a slightly warped shelf flat. This eliminates the annoying rocking sound a warped shelf makes.

Another use for the hole is shown on the second example. By fitting a rubber bumper in the hole, you can create a slip-resistant support for glass shelving.

Keeping glass shelves from slipping is also the idea behind the next L-shaped support. Here, instead of using a separate bumper, these supports are plastic coated to create a non-slip surface.

Plastic Supports. Not all L-shaped supports are made from metal, as the two lower supports show. The bottom one is pretty basic. The advantages to these are low cost and the brown color blends in better with wood shelves.

The other plastic support has a clip designed to grab a ¾"-thick shelf and prevent it from tipping. This is handy for kitchen cabinets where the contents get moved around a lot. But for it to work, you'll need to size the shelf exactly.

Sizing Shelves. There's one last thing to keep in mind when using these supports. They stick out more than you think. This is because of the bracket that's attached to the support's stem. So, the shelf may need to be almost ¼" shorter than the opening in order to fit.

It's a good idea to find out just how much space the supports need *before* cutting your shelves to size. You'll also want to consider how this gap will effect the look of the project. If the case has a face frame, as shown in the left photo, it's not a

big deal. The frame will hide the gap. But if you want a smaller gap and a tighter fit, you'll need to find another solution.

SHELF PINS

The other option for shelves is to use shelf pins like the top three examples shown in the photo at right. They allow a much tighter fit.

I turn to the first two for fine cabinets and bookcases. The reason is they're small and won't stand out as much as the L-shaped supports do. And they look a lot better in frameless cabinets. The third example is inexpensive and works great in utility cabinets.

The small bearing surface of the round pins makes shelves more prone to sliding. This usually isn't a problem with bookcases where things aren't being moved around often. But to prevent any sliding, I like to rout a notch in the bottom of the shelf, as shown in the box on the bottom of the page. This also makes the pins nearly invisible.

Specialized Supports. The next two shelf supports shown have pretty specific applications. Since you'll have to slide the shelf over the pins, neither of these pins will work on cabinets with a face frame.

The first one is a concealed support. Rather than sitting under the shelf, the support fits inside a groove cut along each edge of the shelf, as you can see in the detail.

The final support shown is designed for holding glass shelves. This one is sized for 1/4"-thick glass. The support is made of a clear plastic that doesn't stand out once the glass is in place.

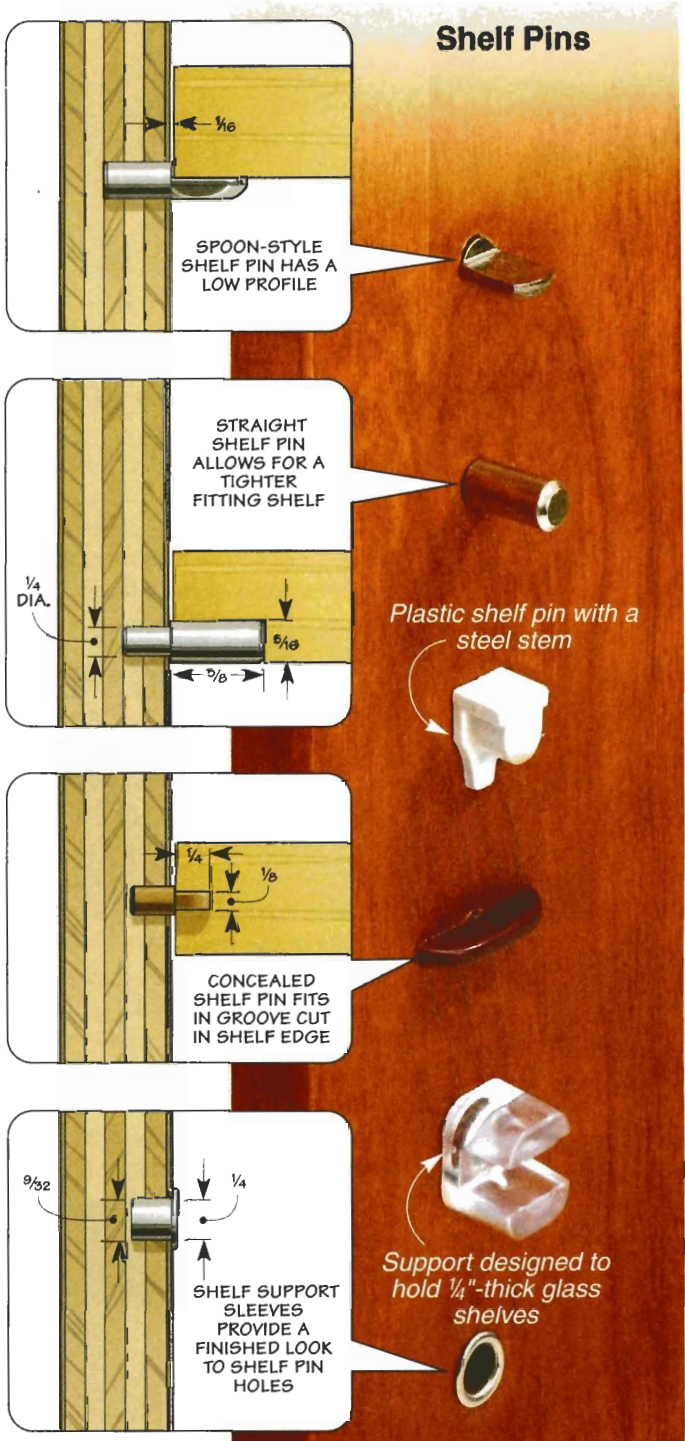
WORKING WITH SUPPORTS

No matter what type of shelf support or pin you choose to use, there are a couple of other things you'll need to consider.

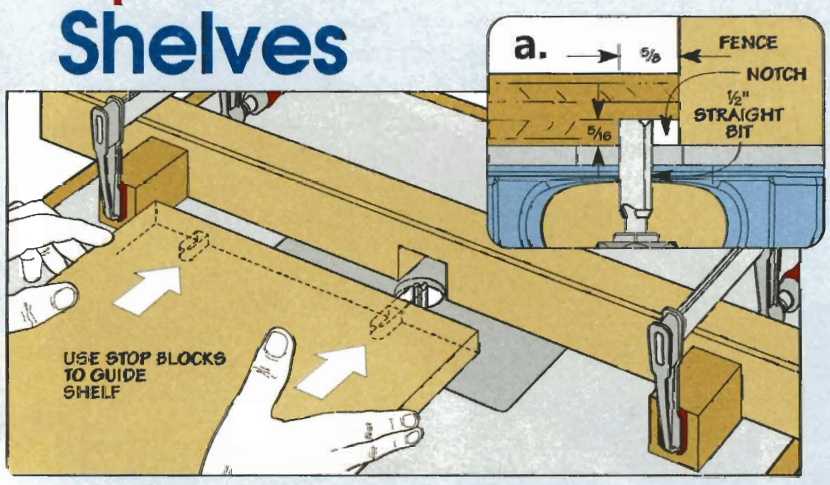
Several Sizes. The first thing is that supports and pins come in two main stem sizes — 1/4" and 5mm. (You may also run across 3/16"-dia. supports as well.)

Of the two sizes, I'll usually use 1/4"-dia. supports. They're more common and it's easier to find a matching bit to drill the holes. The smaller 5mm pins and supports are designed for use in European cabinet systems. In these systems, the shelf support holes are also used to mount the hinges.

Hole Sleeves. In some projects, like a fine display case, a row of holes can stand out like a sore thumb. While there's no way to hide them, you can make the holes look a little more finished. To do this, you can slip in a sleeve, as you can see at the bottom of the photo below. The sleeves are designed for the pins to slide into them, so you'll need to drill a slightly larger hole (9/32"-dia. for 1/4" pins). For more on drilling the holes for shelf pins, turn to the article on page 12.



Slip-Proof Shelves



▲ *To keep shelves from sliding off of the narrow, round shelf pins, I like to rout notches in the shelves for the pins to rest in. To do this, I turn to my router table. A straight bit makes a clean, flat notch. And a pair of stop blocks clamped to the fence guide the shelf.*

Shelf Pin Drilling Jigs

Accurate shelf pin holes are no problem with a jig and a self-centering drill bit.

I like to use adjustable shelves in cabinets because of their flexibility in layout. But it's all too easy to drill the shelf pin holes a little off and end up with crooked shelves. The way I prevent this is to make a drilling jig from pegboard. A fence attached to the jig registers it on the workpiece and allows me to drill the shelf pin holes pretty accurately.

The downside with a shop-built jig like this is that it usually only works a few times. After that, the bit enlarges the holes in the pegboard, throwing off the accuracy. Another drawback is that the jig has to be designed to be used *either* before or after assembly.

The solution to these problems can be found in using a commercial drilling jig. These jigs cost about $25 to $50. And after taking a look at the drilling jigs shown here, I may just put my pegboard out to pasture for good. For sources, turn to page 51.

A quick look at the photos on this page shows two examples by *Rockler* and *Woodhaven*. Both jigs look similar, and you'll end up with the same results, but they go about it a little differently. Each jig consists of two components — a drilling template and a special drill bit.

I'll talk more about the template later. For now, let's take a look at the self-centering drill bit.

SELF-CENTERING BIT

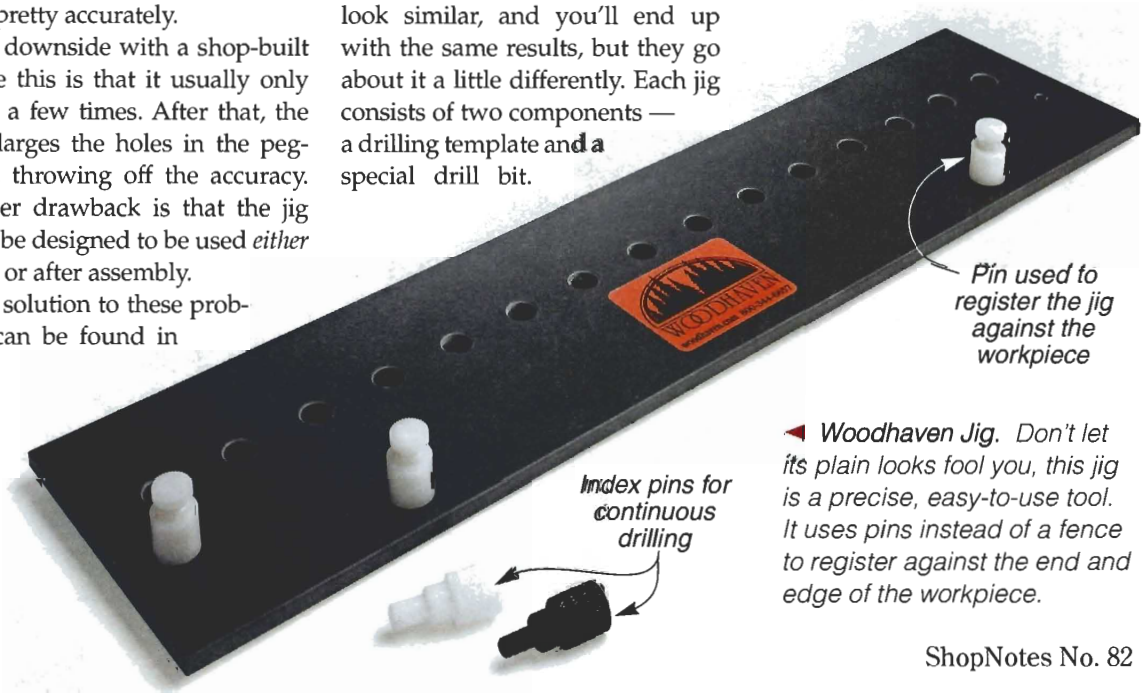
Like I mentioned earlier, one of the problems with shop-made drilling jigs is that they wear out after a few uses. And at first glance, the jigs shown here don't look that much different from pegboard jigs.

But one big difference is in how the bit works, as in the upper right photo on the next page. It never comes in contact with the template. Instead, the holes are sized to accommodate a bushing on the nose of the bits. What this means is that the holes in the jig won't wear out after repeated use.

The actual bit is housed in a spring-loaded sleeve. This sleeve centers the bit in the template. The sleeve also automatically controls the depth of the hole.

The business end of the bit is a replaceable brad point bit. And when you put all these parts together, the results are perfectly spaced holes that are clean and square time after time.

Besides durability, there's another benefit to this design. You can use different size bits with the same jig and maintain the same spacing. You can get bits for both ¼" and 5mm shelf pins as well as the slightly larger bits necessary for



◀ *Woodhaven Jig. Don't let its plain looks fool you, this jig is a precise, easy-to-use tool. It uses pins instead of a fence to register against the end and edge of the workpiece.*

drilling the holes for insert sleeves. These sleeves give a row of holes a more finished look. (For more on shelf pins, turn to page 10.)

TEMPLATE

The bits aren't the only reason why these jigs are so useful. You'll find the templates have a few handy features built in as well. In the photo at the top of the opposite page, you'll notice *Rockler's "Jig-It"* has two rows of holes in the clear template.

The two rows give you a choice of setbacks, either 2½" or 17/16". (The holes are 32mm on center.) Used along with a removeable fence, the double row of holes will give you a consistent setback on cabinets with a face frame or without a face frame.

This jig can also be used to install European-style hinges with the 17/16" setback and a 5mm bit. The hinges are designed be mounted into the shelf pin holes.

English and Metric Versions. The *Woodhaven* template is a little different. It's made from ¼"-thick phenolic and has only one set of holes. You can get an English version where the holes are 1" on center and set 1½" back from the edge. A metric version is also available with a 32mm hole spacing and a 37mm setback.

The *Woodhaven* jig has another great feature. You can use a plunge router with a ⅜" O.D. guide bushing and straight bit to create the holes a lot faster than you can with a hand drill.

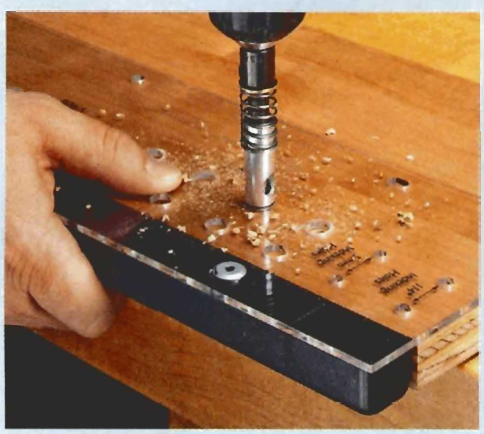
Adjustable Fence. One of the reasons I like these jigs is that they can be used either before or after assembly (box below). To do this, each jig can be registered off the edge of the workpiece.

On the *Woodhaven* jig, this is done with a set of pins that screw into the template. Two pins are used to set the jig against the edge of an unassembled piece. A third pin allows you to hook the jig over an end of the workpiece.

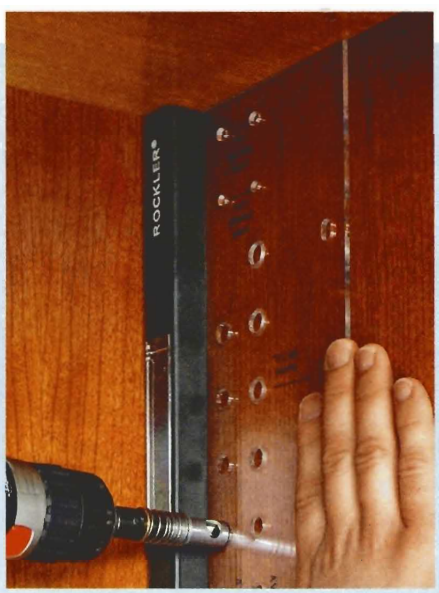
The *Rockler* jig uses a removeable fence. The fence can be bolted to either edge of the jig to make use of both sets of holes. As a bonus feature, the fence also has a pair of storage bins to hold extra bits and adjusting wrenches.

Continuous Drilling. There's one final detail of each jig that I want to point out. At each end of the *Rockler* template are a pair of indexing holes. The holes allow you slip a shelf pin through the jig and into the workpiece to continue drilling down the sides. (The *Woodhaven* jig comes with a pair of nylon indexing pins for both ¼" and 5mm holes.) This makes it easy to keep consistent spacing on larger projects like a tall bookcase (right photo below).

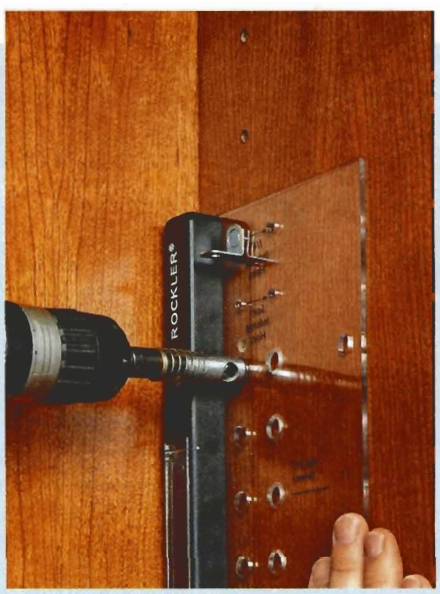
Drilling Technique: Using the Jig



▲ ***Before Assembly.*** *Use the fence to register the jig along the edge and then drill the holes with the outside row.*

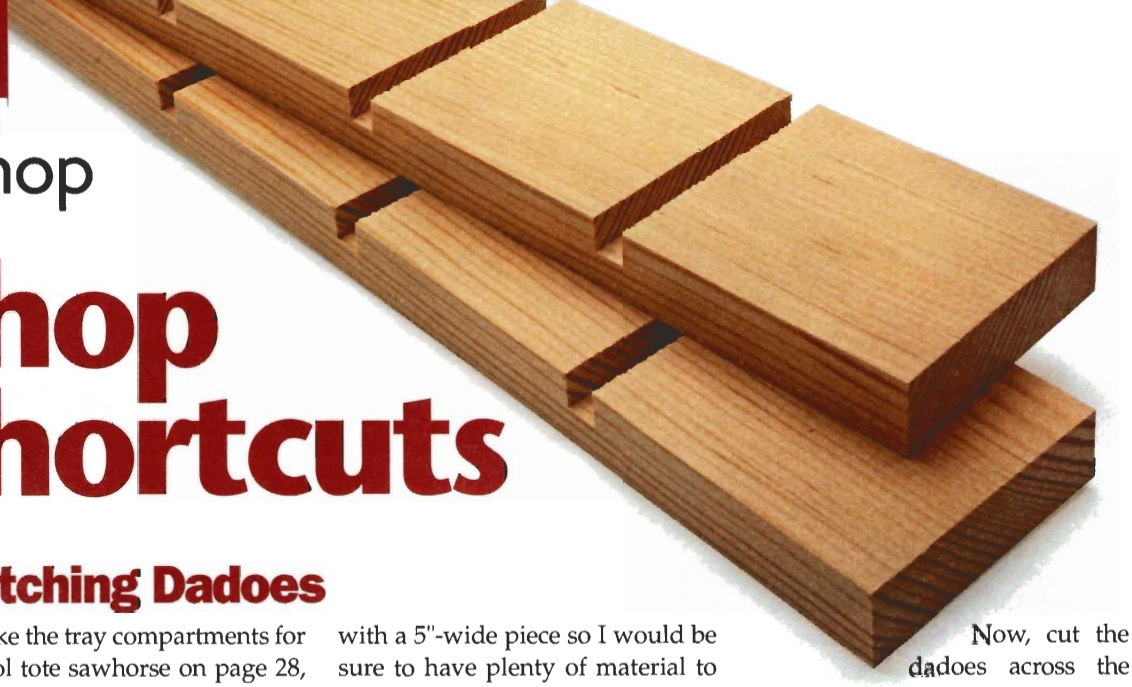


▲ ***After Assembly.*** *The edge of the jig butts against the case back and top for drilling inside an assembled case.*



▲ ***Continuous Drilling.*** *Slip a shelf pin in the indexing hole to keep drilling down the workpiece.*

Shop Shortcuts



Matching Dadoes

To make the tray compartments for the tool tote sawhorse on page 28, you'll need to cut a series of ¼" dadoes in identical locations on each of the tray sides. This can be a challenge and take a lot of time if you measure and cut each dado individually. But with a couple of simple steps you can cut a matching set of dadoes in no time.

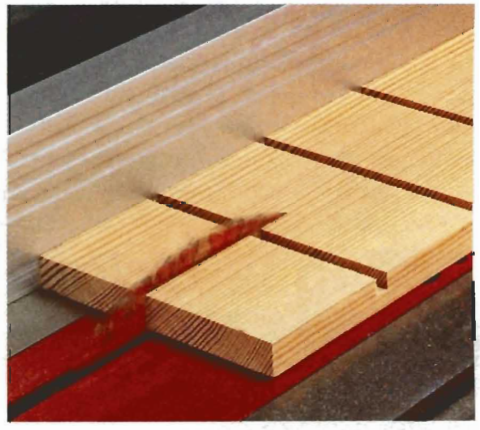
The secret is to start with an extra-wide workpiece. I began with a 5"-wide piece so I would be sure to have plenty of material to make both 2"-wide side pieces.

Next, lay out and mark the dadoes on the workpiece. Then you can set up a dado blade and the miter gauge to cut the dadoes, like you see in the left photo below.

I added an auxiliary fence to my miter gauge. This adds support to the workpiece and eliminates chipout at the back of the dado.

Now, cut the dadoes across the width of the workpiece. Since the dadoes are equally spaced, you can use the rip fence as a stop and flip the workpiece end-for-end as you work toward the center.

The last step is to rip the workpiece into the 2" widths for the tray sides (photo at right below). It's that easy to make a set dadoes on both pieces that are exactly alike.



Squaring Large Panels

Several of the larger plywood pieces for the miter saw workcenter on page 18 can be a bit of a challenge to cut on the table saw. So I cut them to size a different way. All it takes is a circular saw, a straightedge, and your router.

The first thing you'll need to do is to rough cut each panel from a sheet of plywood with your circular saw . It's important to make sure you leave about ¼" extra on all four edges so you'll have some stock to trim away.

Next, lay out a trim line along each side of the panel. Then clamp a hardboard straightedge along the layout line, as shown in Figure 1 at the right. The hardboard straightedge will guide the bearing of a pattern bit as the waste is trimmed away.

After trimming the first panel to size you can use it to help trim the other side panels. Simply clamp the panel you just cut on top of the next one. Then run the bearing of the bit along the edge of the top panel, like you see in Figure 2 at right. You now have two identical panels.

To make the double-thickness support panel, glue a trimmed panel piece on top of an oversized panel. Then you can use the router to trim the lower panel to size.

Routing a Slot

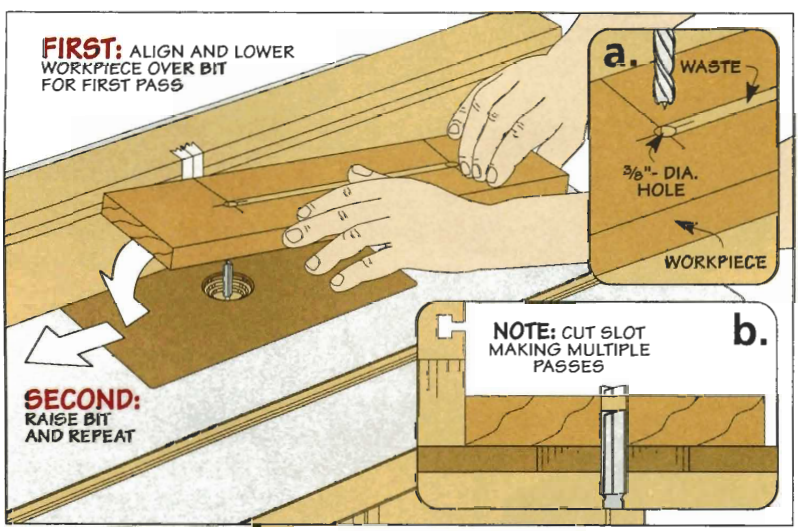
To be able to adjust the height of the tool tote sawhorse, you'll need to cut a centered slot down the length of the upright. One of the quickest and easiest ways to do this is to use the router table, like you see in the photo at right.

I started by laying out the length of the slot on the upright. Then, using a drill press, I drilled a 3/8" starter hole at one end of the layout, as shown in detail 'a' below. A second hole drilled at the other end marks the bottom of the slot.

After drilling the holes, you're ready to move to your router table to finish the slot. The first thing to do here is to mount a straight bit in your router the same size as the starter holes you just drilled.

Next, align the fence so you can drop the starter hole over the bit. Since the bit will be covered, I added a piece of tape to the fence to mark the location of router bit.

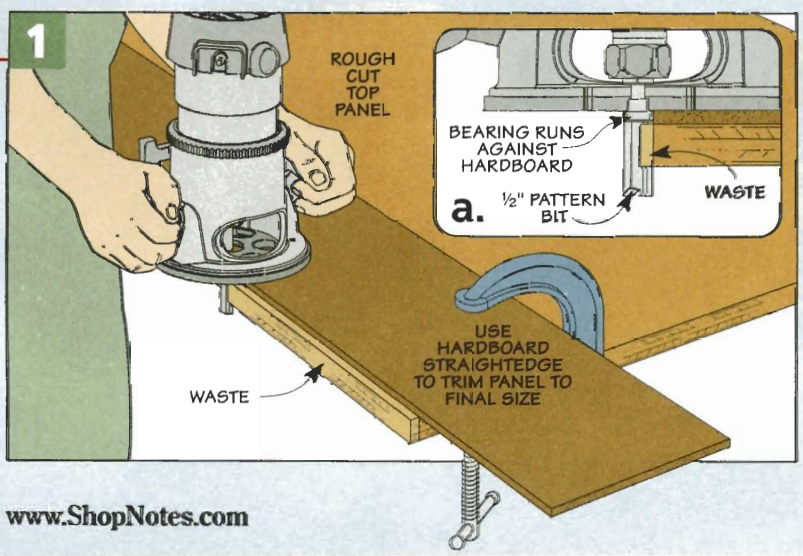
I like to remove the material in increments. So I set my router to cut a depth of 1/4". Then turn the router on and carefully lower the starter hole down over the bit, as illustrated below.

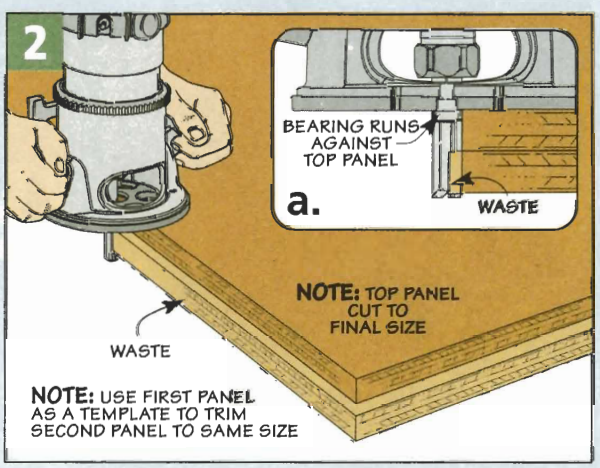


Using the layout lines as a guide, move the upright to the left along the fence. To avoid burn marks, move the upright with a constant steady motion. This will cut a shallow groove on the bottom side of the workpiece.

Stop the cut when you reach the mark on the fence or see the router bit enter the second hole. Then while holding the piece in place, turn off the router. Remove the workpiece and then make a cut on the other upright at the same depth.

Now you can raise the bit slightly, and repeat the process to deepen the slot. Continue making passes until you have cut all the way through each upright.





With plenty of storage and a fence that extends to 8', this saw station has it all.

the complete Miter Saw Workcenter

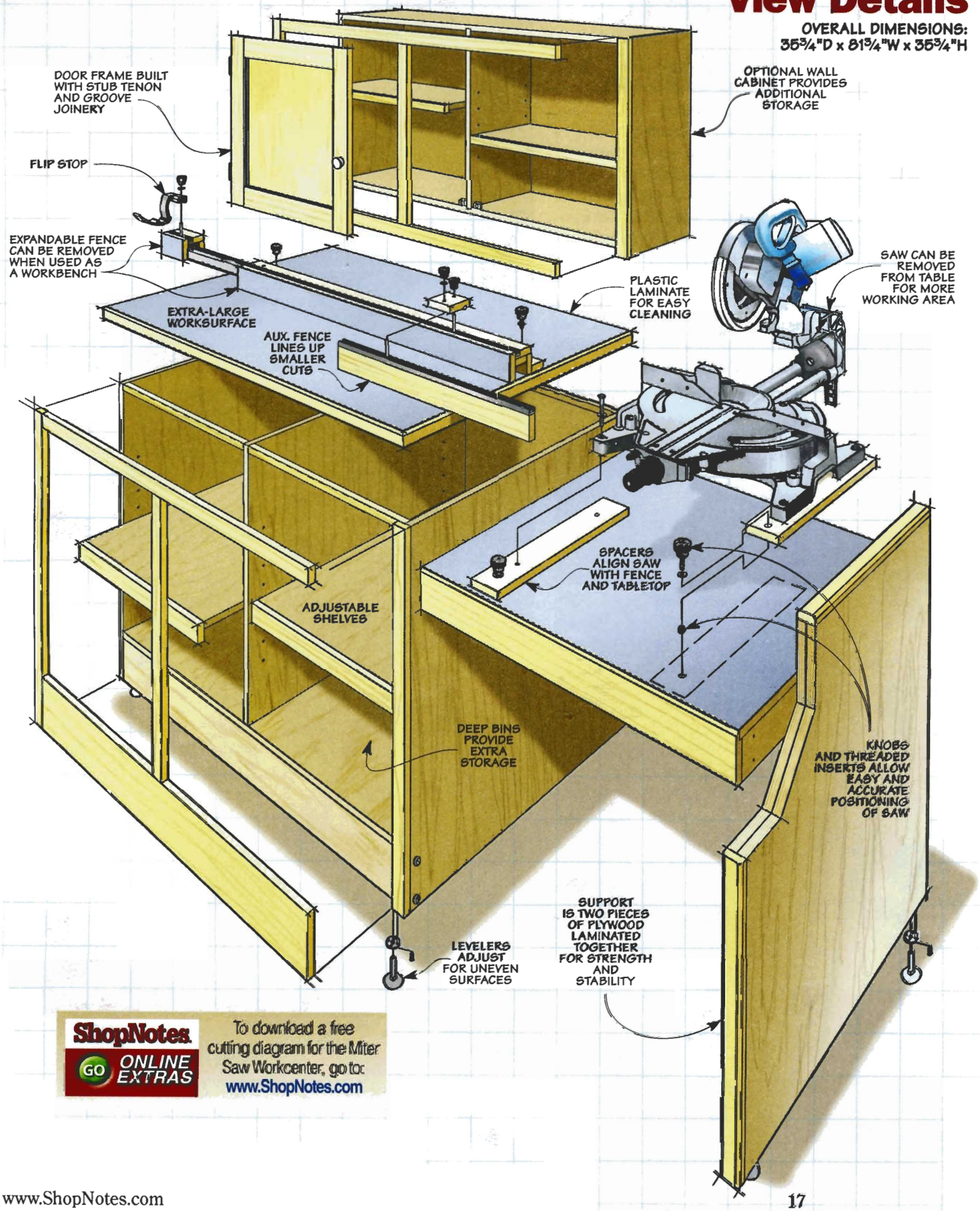
This workcenter for your sliding compound miter saw is more than just a cabinet. Just taking a look at the drawing on the next page gives you an idea of how solidly it's built. Laminate tops provide smooth surfaces to work on and easy cleanup once the project's complete. The two shelves add efficiency to the cabinet's storage capacity. And if you need even more storage, there's a matching wall cabinet.

But what's really cool about this project is the fence. It can handle the smallest cuts, yet extend out to 8'. The fence will come off if you need more room to work, and then pop right back on, aligned and ready to go when you need to use your saw.

This is one of the few projects I've seen that can truly lay claim to being worthy of the title "complete."

Exploded View Details

OVERALL DIMENSIONS:
35¾"D x 81¾"W x 35¾"H



ShopNotes GO ONLINE EXTRAS

To download a free cutting diagram for the Miter Saw Workcenter, go to: www.ShopNotes.com

building the Workcenter

I built this workcenter large enough to accommodate my sliding compound miter saw. Packed with versatility, it has lots of storage and a worksurface that can pull double-duty as a workbench when I'm not using my saw.

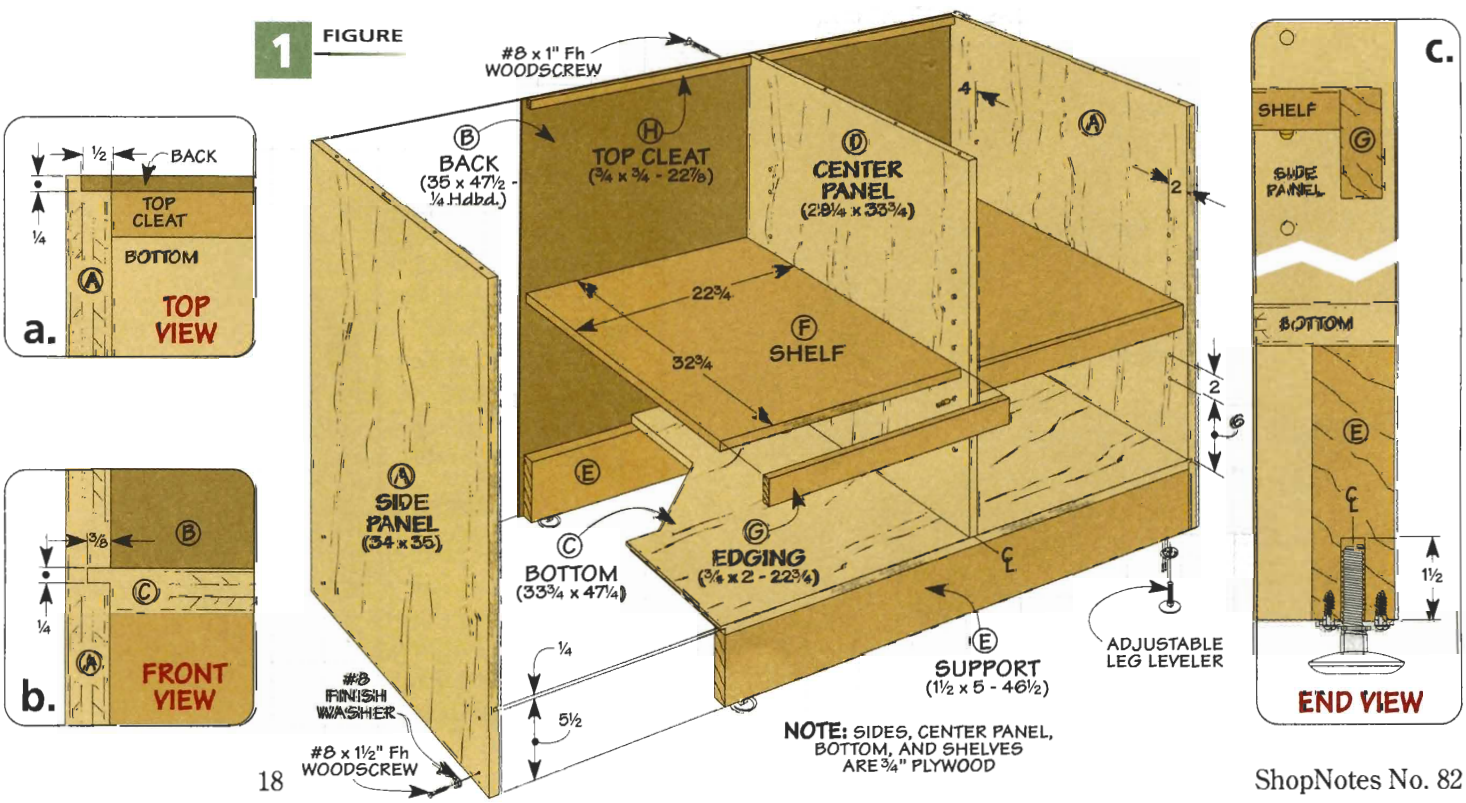
The Sides. The project is basically a large plywood box with an open front, as shown in the main photo on the right. But big doesn't mean hard to build. A quick look at Figure 1 below shows you that building the case is pretty straightforward. If the plywood panels are too large to cut on your table saw, you'll find an easy way to tackle them on page 14.

After cutting the side panels to size, there's really only two things left to do — cut dadoes for the bottom and a rabbet (Figure 1a) to hold the back. The joinery for the case can all be cut either with a hand-held router and a straight bit or with a table saw and a dado blade. Once all that's done, just cut the back and center panel to size. Finally, drill the holes for the pin-style shelf supports that will hold the adjustable shelves according to Figure 1. To maintain accuracy and spacing, I used a drilling jig. (For more information on how to use one, see the article on page 12.) With all this finished, it's time to work on the adjustable shelves.

The Bottom. The hardest part of making the bottom is cutting the tongues on the ends to fit into the dadoes of the side panels that you can see Figure 1b below. To get a tight fit in the dadoes, I clamped a straightedge to the bottom and made multiple passes with my router to sneak up on the final thickness of the tongue. And that's all there is to making the bottom. You can go ahead and put the cabinet together and square it up. Then, you can add the front and back supports to the cabinet.

Adjustable Shelves. After cutting the shelves to size, I glued wide edging to them to beef them

FIGURE 1



up and to hide the plywood edges. Then, I installed the levelers in the front and back supports, as illustrated in Figure 1c.

Top and Face Frame. Now the case is ready to have the top and the face frame added (Figure 2). The first thing to remember here is the laminate goes on the top *after* the top is screwed onto the cabinet. Be sure to countersink the screws to keep the laminate smooth.

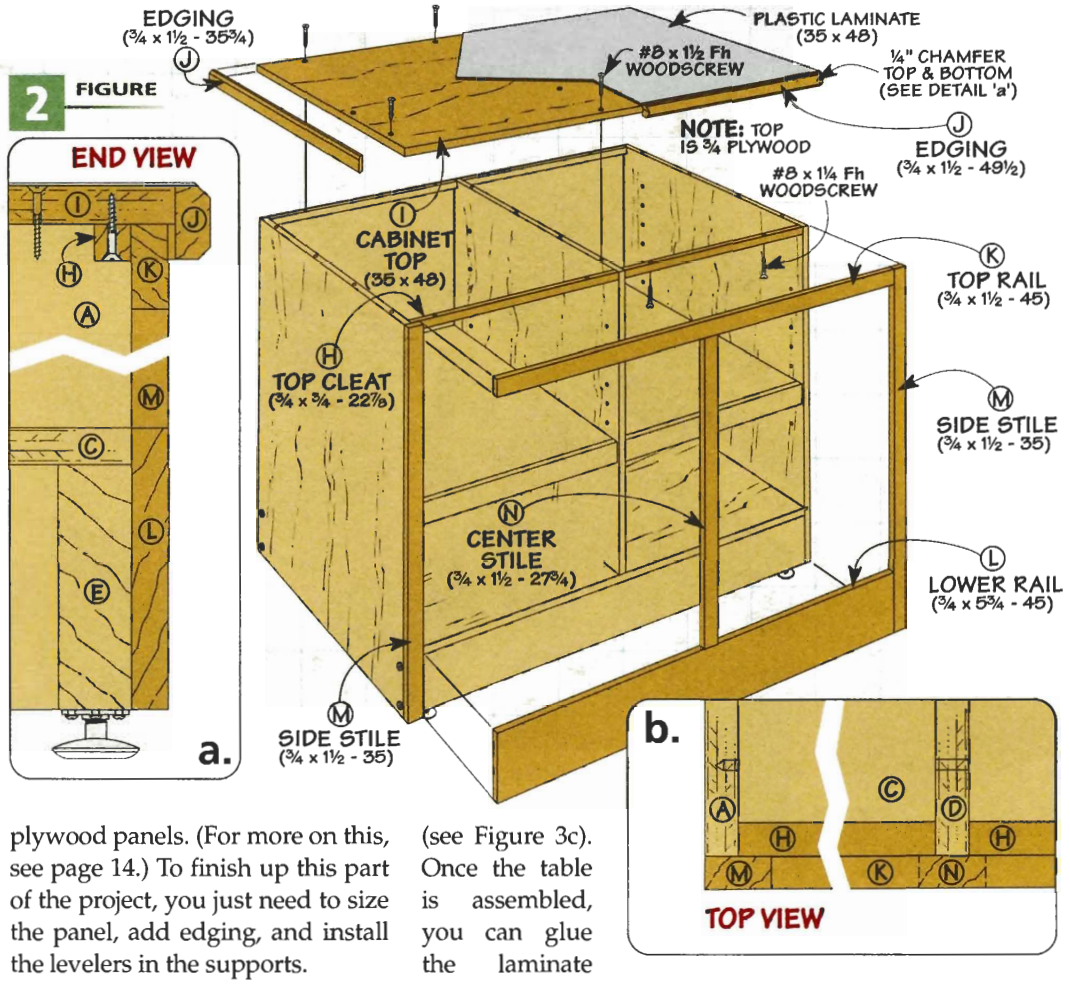
To help the assembly stay square and to add stiffness to the back, I attached cleats across the top. These cleats should be screwed into the top when it's installed. Next, screw two more cleats beneath the front of the top to support the face frame, as illustrated in Figures 2a and 2b on the right.

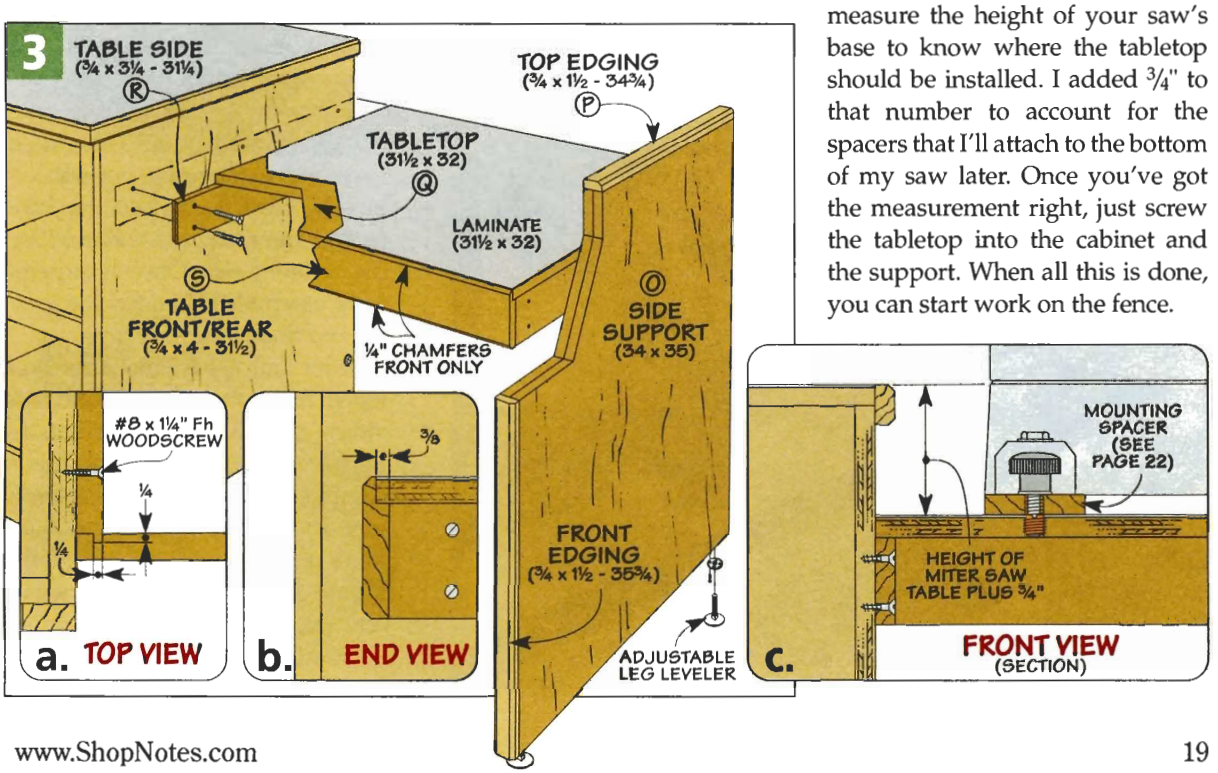
After you've installed the face frame, all that's left to do is glue the laminate down and chamfer the edge trim. Once the cabinet is complete, put it where you want it in your shop and make sure it's level. That will get pretty important when we build and install the side support and the tabletop.

Side Support. I built the side support before the saw table to make installing the table easier. The support needs to be strong and rigid, so I made it by gluing up two plywood panels. (For more on this, see page 14.) To finish up this part of the project, you just need to size the panel, add edging, and install the levelers in the supports.

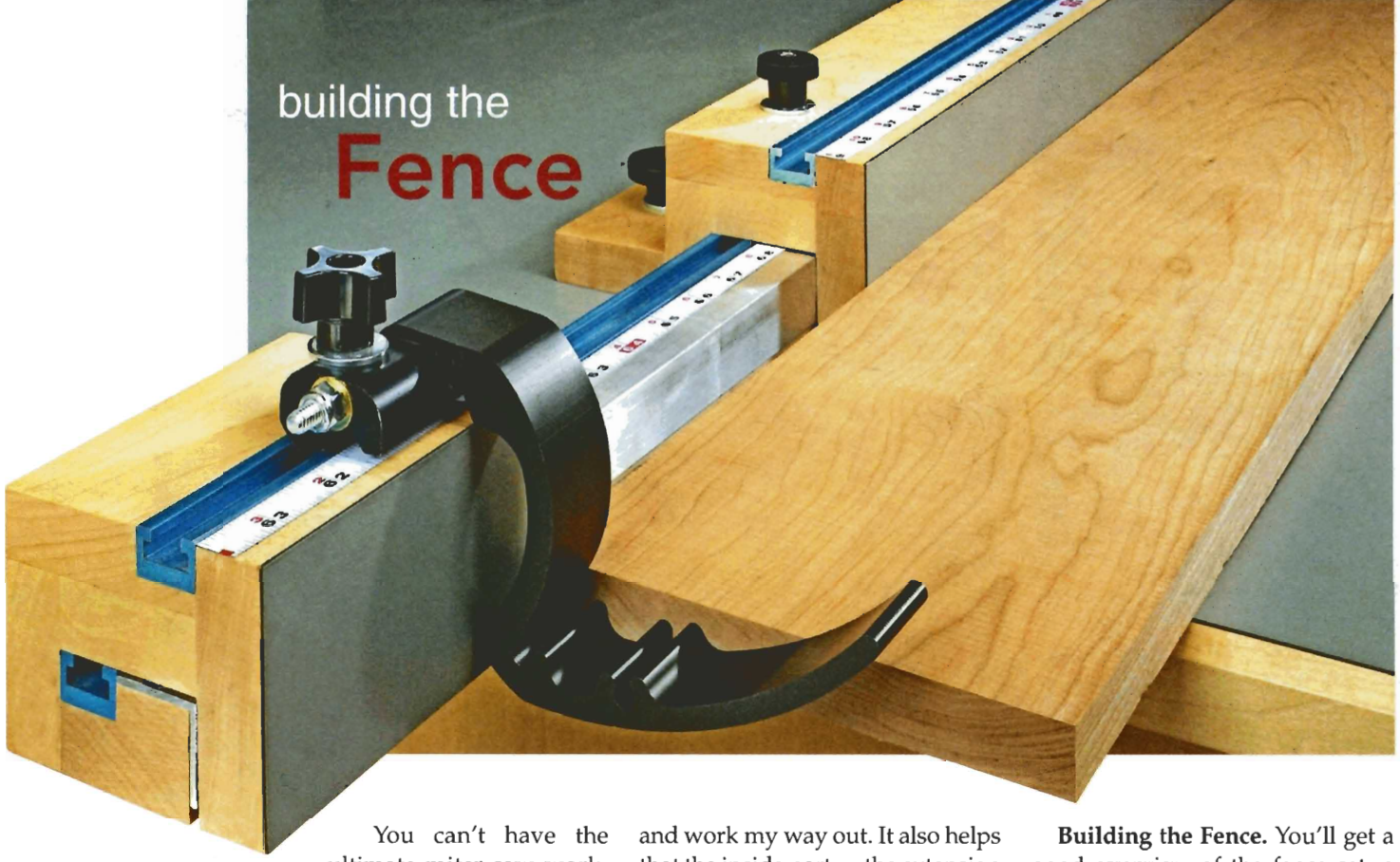
Saw Tabletop. You'll see how to build the tabletop for the saw in Figure 3. To keep everything square, I used tongue-and-dado joinery to make the box (Figure 3a) and tucked the front and back edges of the tabletop into rabbets (see Figure 3c). Once the table is assembled, you can glue the laminate down and chamfer the front edge of the tabletop to match the edges on the cabinet top.

Install the Saw Table. For accurate work, you'll want your miter saw level with the cabinet top (Figure 3c). The first thing to do is measure the height of your saw's base to know where the tabletop should be installed. I added ¾" to that number to account for the spacers that I'll attach to the bottom of my saw later. Once you've got the measurement right, just screw the tabletop into the cabinet and the support. When all this is done, you can start work on the fence.





building the Fence



You can't have the ultimate miter saw workcenter with just an ordinary fence. This one stays dead-on accurate even while extended out to 8'. And as I said before, the great thing about it is that it's designed to be taken off and put back on in the exact same place on the worksurface every time.

Start Simple. I decided the easiest way to tackle this part of the project was to start from the inside and work my way out. It also helps that the inside part — the extension bar — is the simplest to build. Look at Figure 4a to see how it goes together. One thing you'll notice is an aluminum angle running down the length of the bar. It will keep the extension bar straight and true, plus it's the best place for the self-stick measuring tape. Once the extension bar is ready to go, you can turn your attention to what surrounds it — the main fence.

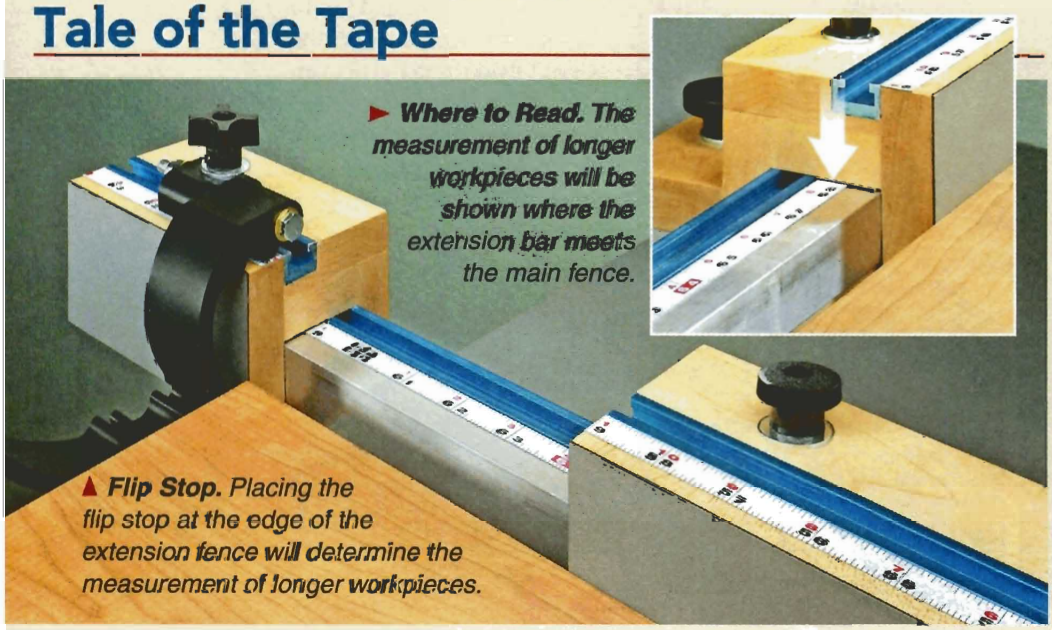
Building the Fence. You'll get a good overview of the fence setup by looking at Figure 4 again and at Figure 5. What I did was to make all the main fence parts, except for the *mounting plate*, long enough to simply cut the extension fence from the main fence when it was completed (remember to take into account the saw kerf).

To easily assemble the fence, it's important to follow a specific sequence. I started with the *fence core* because it determines the width of the rest of the fence parts. You'll want to get this right because the extension bar needs to slide back and forth easily, but not too loosely. Next, I attached the *fence back* to the *fence core*, followed by the *mounting plate*. Once those parts were assembled, I added the *fence top* and finally the *fence face*.

Now, cut away the extension fence from the main fence and attach it to the extension bar, as illustrated in Figure 4b. Once that's complete, you can glue the laminate to the face of both the main fence and extension fence. Finally, Figure 4c shows how the entire fence assembly goes together.

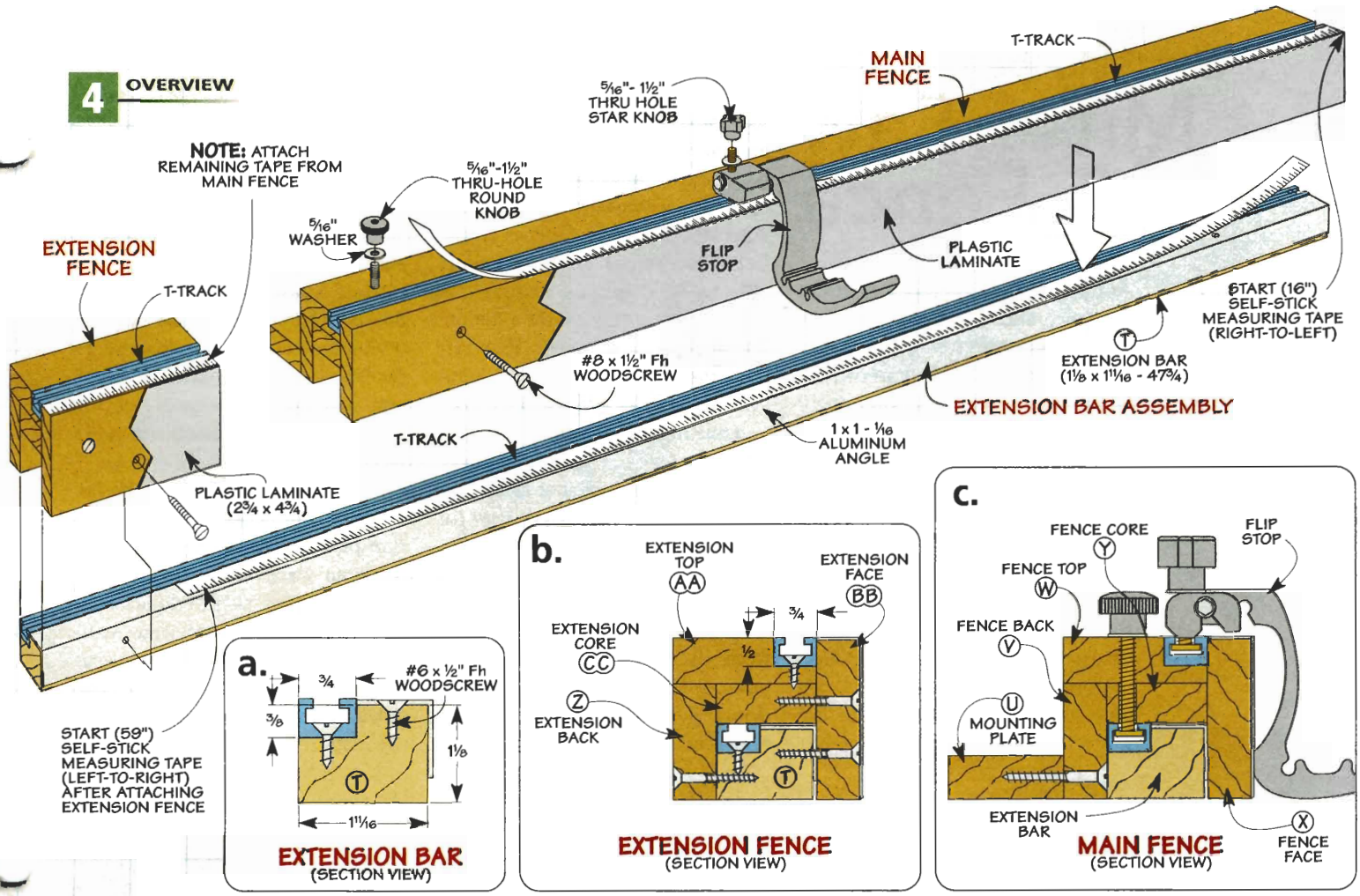
Mounting Plate. One of the best features about this workcenter is

Tale of the Tape



► ***Where to Read.*** *The measurement of longer workpieces will be shown where the extension bar meets the main fence.*

▲ ***Flip Stop.*** *Placing the flip stop at the edge of the extension fence will determine the measurement of longer workpieces.*



that the fence is completely removable, leaving you with a large worksurface when you're not using your miter saw.

And that's where the threaded inserts come in. Once you install them, you don't need to worry about realigning the fence when putting it back on the workcenter. By using the inserts and knobs to attach the fence, you can reposition the fence perfectly when you need to use it for your miter saw (see page 22 for installation guidelines). Now you're ready for one of the most important parts of this project — applying the self-stick measuring tapes onto the fence and bar.

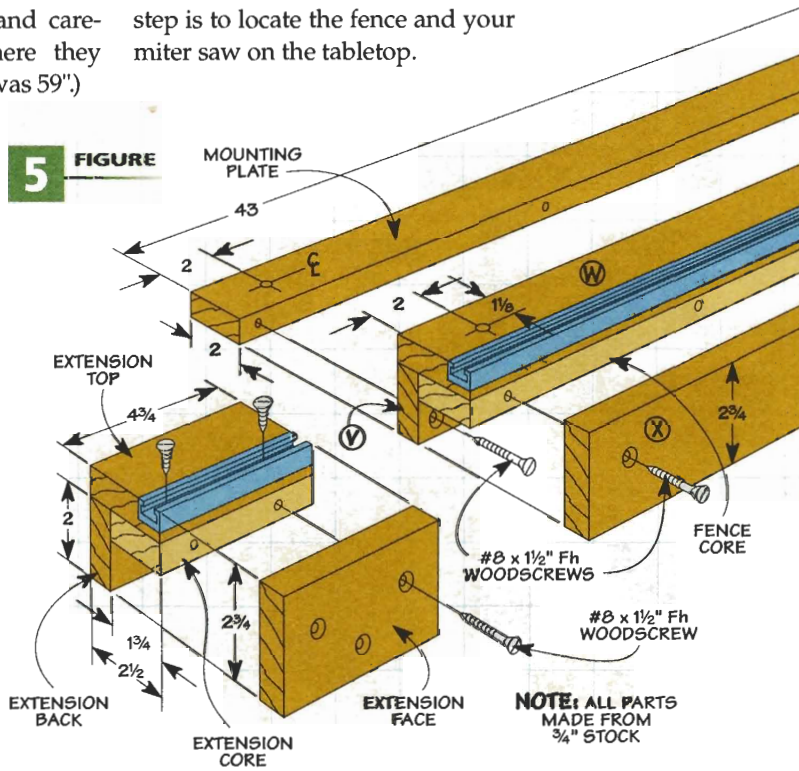
Self-Stick Tapes. Getting the measuring tapes right is important, and it isn't that hard to do.

Start by butting the extension fence up against the main fence. You'll need a self-stick measuring tape that reads from right to left. Starting at 16" at the far right of the extension fence, unroll it toward the other end of the main fence and trim the tape flush. Now go to where the extension fence butts against the main fence and carefully slice the tape where they meet. (For my fence this was 59".)

For the extension bar, you'll need a measuring tape that reads from left to right. Starting with the measurement where you cut the first tape, apply the left-to-right tape along the top of the aluminum angle. Trim the tape at the end of the bar.

Why use opposite-reading tapes? As the fence is extended, the numbers on the extension bar will increase to reflect the longer measurement. By placing the flip stop flush to the right edge of the extension fence, you can use the left edge of the main fence to accurately measure stock up to 8' in length.

That's all there is to it. The next step is to locate the fence and your miter saw on the tabletop.



attaching the Miter Saw & Fence

At this point, you're ready to install the fence and miter saw. The first step is to get your saw in place.

Saw Placement. As you can see in Figures 6 and 6a below, you'll want to attach spacers to the base of the saw. The top of the saw's base should be flush with the top of the workcenter. To get the saw table at the right height, I laid a long plywood straightedge across the entire workcenter and the saw base. Then I sized the spacers so that the saw base was level with the cabinet top.

Once the height is correct, it's time to decide exactly where the saw will sit on the workcenter table.

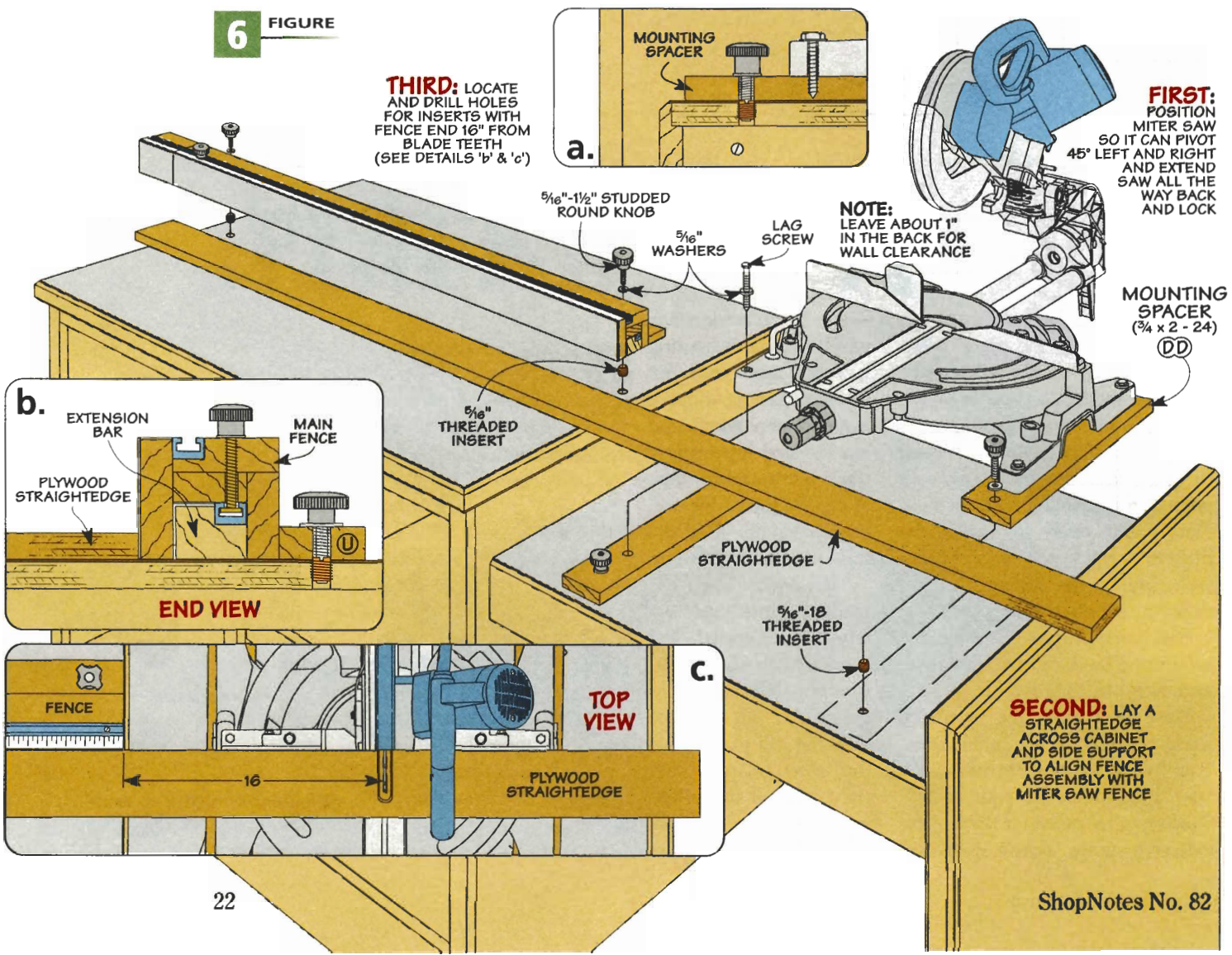
To check for clearance, I pushed the saw all the way back on its slider and moved the saw from front to back and from every angle. I also used a carpenter's square to make sure the saw's fence was as square as possible to the workcenter. Once the saw is where you want it, you can clamp it and mark the locations for the threaded inserts that will hold the spacers. With that done, you can work on placing the fence.

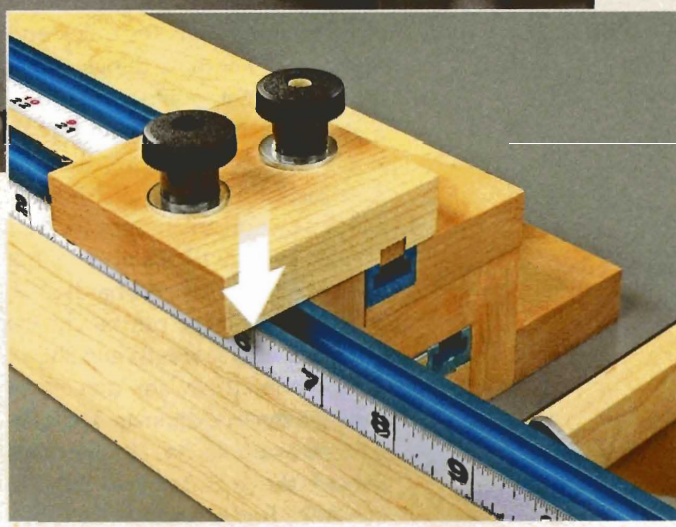
Locating the Fence. To help you locate the fence, lay the straightedge across the entire cabinet again, but this time, make sure it's against the saw's fence, as in Figure 6c. Position the straightedge, then put the cabinet's fence in place alongside it. Carefully slide the straightedge from just under the saw blade, so you can lock your miter saw in the down position. At this point, go ahead and clamp the straightedge onto the cabinet to keep it still while you're maneuvering the fence.

Next, look at the measuring tape you attached to the fence earlier. The number at the far right edge of the fence is the distance that edge should be from the teeth of the saw blade. So, just slide the fence along the straightedge until the number on the tape matches the distance to the saw blade. Once they're equal, you can mark the spots for the threaded inserts that will attach the fence to the top.

Final Installation. You're on the home stretch now. Just remove the clamps, straightedge, saw, and fence to drill the holes for the inserts. All that's left to do is install the inserts, secure everything with studded knobs, and you're ready to go. However, I opted for one more detail to make even smaller measurements on my workcenter.

6 FIGURE





adding an auxiliary fence and

Stop System

Sometimes I need to cut a lot of workpieces that are shorter than the distance from this fence is to the saw blade. To help me with this, I built the auxiliary fence that you see in the main photo above.

Making the Fence. A quick look at Figure 7 below shows how the auxiliary fence is built. You'll notice the T-track is installed along the top edge of the auxiliary fence, not set in rabbets like on the main fence.

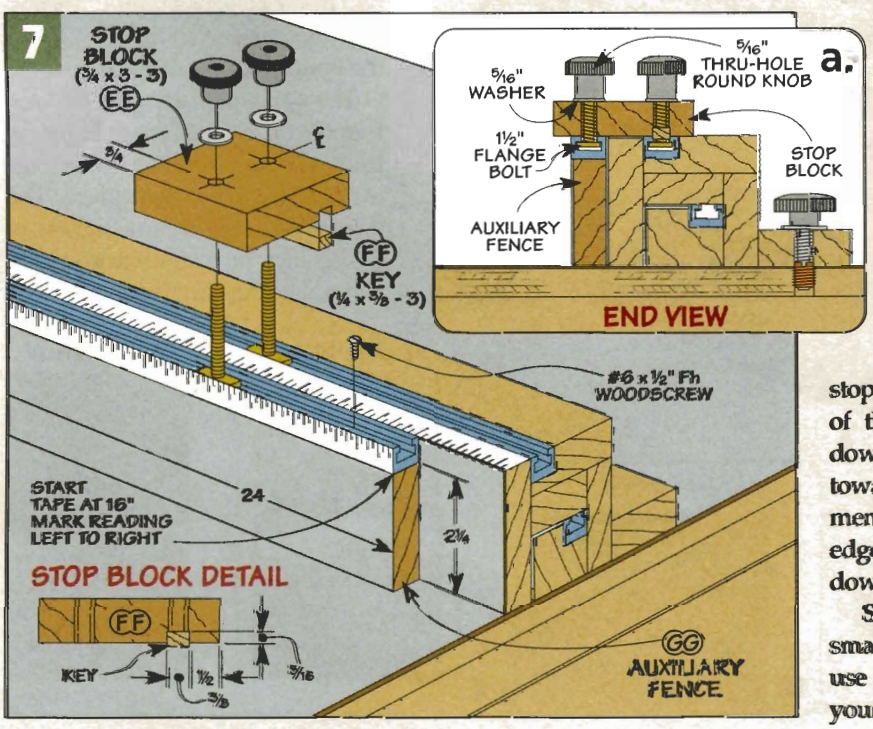
Building the Stop Block. The auxiliary fence is held alongside the main fence by a stop block, as you can see in Figure 7. Not only does it straddle the main and the auxiliary fences, but it also has a key to keep the stop block square (see inset in the Figure 7). Figure 7a shows how it all fits together.

Taping the Fence. Again, the key to accurate cuts is the placement of the measuring tape. The distance between the main fence and the saw blade should be the first number showing on the tape you applied to the main fence. So, take the leftover left-to-right tape from the extension bar and snip it at 16". Starting from the right edge of the auxiliary fence, apply the tape along the side of the T-track and work your way to the left. You'll "run out" of tape before you run out of fence, but don't worry. The extra fence will keep the auxiliary fence stable when you need to make the smaller cuts.

To use the auxiliary fence, place the front edge of the stop block even with the front edge of the main fence and tighten it down. Then slide the auxiliary fence toward the blade until the measurement you want lines up with the edge of the stop block. Tighten it down, and you'll be set to go.

Safety Note: When making smaller cuts with your miter saw, use the saw's holddowns, and not your hands, to hold the workpiece.

▲ *Stop Block. Placing the stop block on the front edge of the main fence ensures accurate sizing of small workpieces.*



building the Wall Cabinet

The miter saw workcenter is a great shop cabinet because it provides a large worksurface, plus a lot of storage as well. But I still needed a place to store items for quick and easy access. For those things, I built the wall cabinet shown here.

Building the Case. A quick peek at Figure 8 below shows that the construction for this wall cabinet is just like the construction for the base cabinet on page 18. It's made out of the same plywood and hardwood, and all the joinery can be cut the same as well (Figures 8a and 8b).

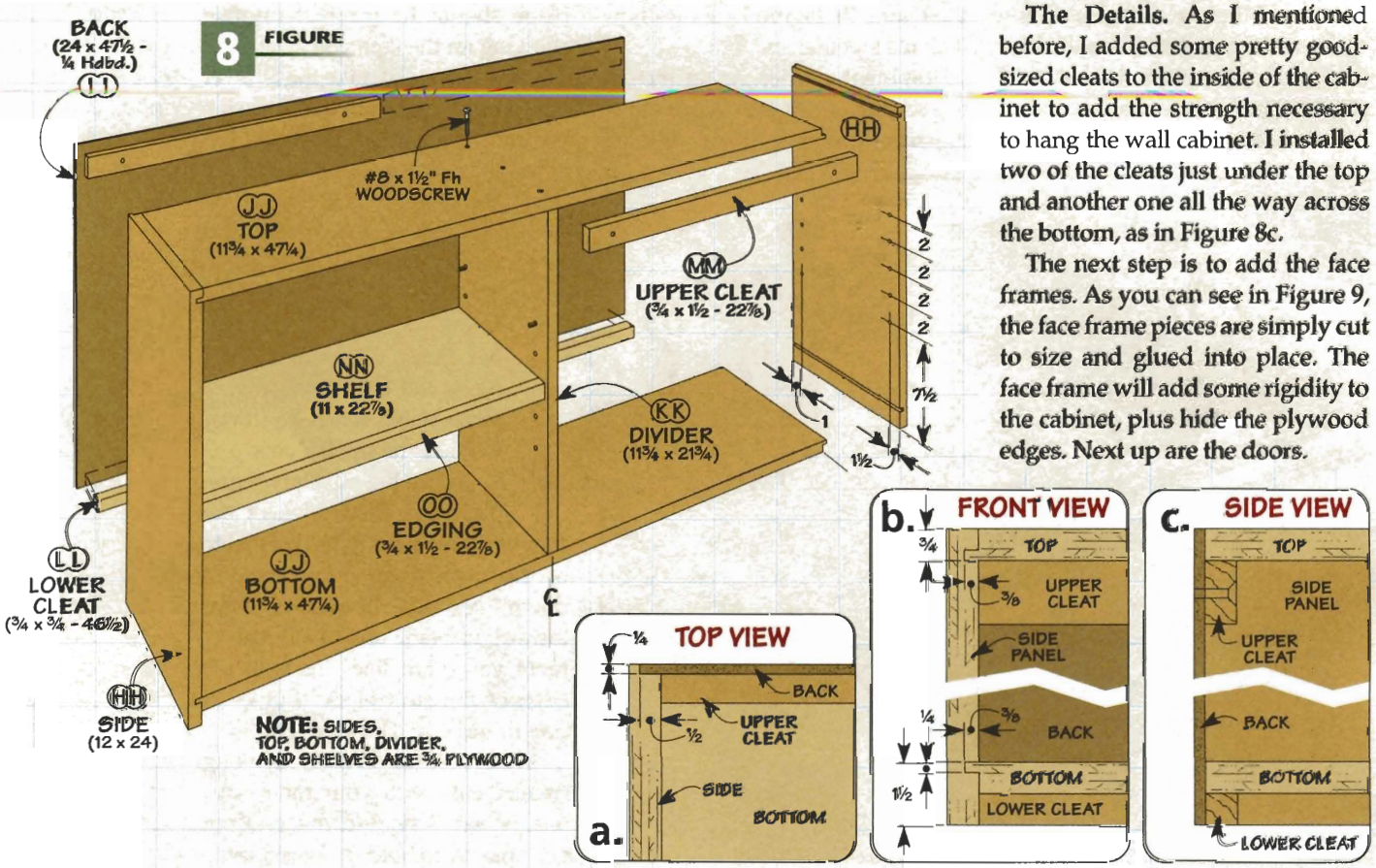
However, there are differences between the two cabinets. This cabinet, for example, has stouter cleats that are designed to allow the cabinet to be hung. And the back laps over the top and bottom, unlike the back of the base cabinet, which is recessed all around. (The back is rabbeted into the sides, however.) Once you cut out all the parts and drill the holes, you can go ahead and assemble the case. While the glue is drying, you can start working on the adjustable shelves.

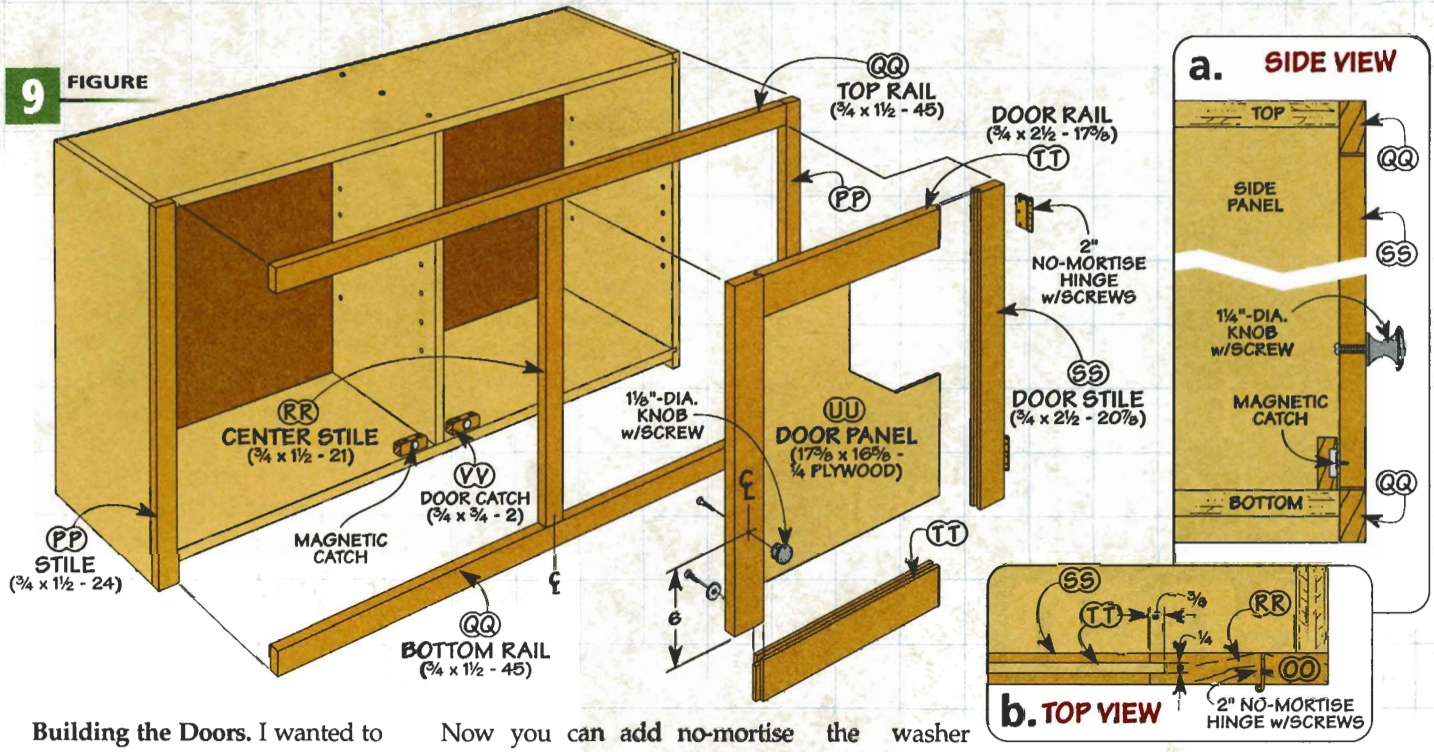
Making the Shelves. The shelves for the wall cabinet are simply smaller versions of the shelves for the base cabinet. I made three shelves (two for one side of the cabinet and one for the other) to have a little more flexibility.

The Details. As I mentioned before, I added some pretty good-sized cleats to the inside of the cabinet to add the strength necessary to hang the wall cabinet. I installed two of the cleats just under the top and another one all the way across the bottom, as in Figure 8c.

The next step is to add the face frames. As you can see in Figure 9, the face frame pieces are simply cut to size and glued into place. The face frame will add some rigidity to the cabinet, plus hide the plywood edges. Next up are the doors.

FIGURE 8





Building the Doors. I wanted to enclose the compartments for a cleaner look, so I added simple framed-panel doors. Before the final assembly, you can measure the door diagonally to ensure they're square. They're built using tongue-and-groove joinery, with panels glued in for strength. For clearance, I allowed for a 1/16" gap between the edges of the doors and face frame.

Now you can add no-mortise hinges to the doors and face frame and install a cabinet knob on each door, as you can see in Figure 9a. After that's done, all that's left to do to finish up is to make a couple of door catches, like you see in the inset photo on the opposite page.

I inserted the magnets into wood "frames" I made and then installed them. The magnets will grab onto the washer and flathead screw installed inside the cabinet doors, as in Figure 9a.

Now you're ready to hang the wall cabinet above the workcenter. Combined with the base cabinet, this miter saw workcenter should provide plenty of storage and plenty of sawdust-making opportunities for years to come.

Materials & Hardware

CABINET		
A	Side Panels (2)	34 x 35 - ¾ Ply.
B	Back (1)	35 x 47½ - ¼ Hdbd.
C	Bottom (1)	33¾ x 47¼ - ¾ Ply.
D	Center Panel (1)	29¼ x 33¾ - ¾ Ply.
E	Supports (2)	1½ x 5 - 46½
F	Shelves (2)	32¾ x 22¾ - ¾ Ply.
G	Shelf Edging (2)	¾ x 2 - 22¾
H	Top Cleats (4)	¾ x ¾ - 22⅞
I	Top (1)	35 x 48 - ¾ Ply.
J	Edging (1)	¾ x 1½ - 122 (rgh)
K	Face Frame Top Rail (1)	¾ x 1½ - 45
L	Face Frame Lower Rail (1)	¾ x 5¾ - 45
M	Face Frame Side Stiles (2)	¾ 1½ - 35
N	Face Frame Center Stile (1)	¾ x 1½ - 27¾
SAW TABLE		
O	Side Support (1)	34 x 35 - 1½ Ply.
P	Side Support Edging (1)	¾ x 1½ - 72 (rgh)
Q	Tabletop (1)	31½ x 32 - ¾ Ply.
R	Table Sides (2)	¾ x 3¼ - 31¼
S	Table Front/Rear (2)	¾ x 4 - 31½
FENCE/MOUNT/STOP SYSTEM		
T	Extension Bar (1)	1⅛ x 1¹⁄₁₆ - 47¾
U	Mounting Plate (1)	¾ x 2 - 43
V	Fence Back (1)	¾ x 2 - 43
W	Fence Top (1)	¾ x 2½ - 43
X	Fence Face (1)	¾ x 2¾ - 43
Y	Fence Core (1)	¾ x 1¾ - 43
Z	Extension Back (1)	¾ x 2 - 4¾
AA	Extension Top (1)	¾ x 2½ - 4¾
BB	Extension Face (1)	¾ x 2¾ - 4¾
CC	Extension Core (1)	¾ x 1¾ - 4¾
DD	Mounting Spacers (2)	¾ x 2 - 24
EE	Stop Block (1)	¾ x 3 - 3
FF	Key (1)	¼ x ⅜ - 3
GG	Auxiliary Fence (1)	¾ x 2¼ - 24
WALL CABINET/DOORS		
HH	Side Panels (2)	12 x 24 - ¾ Ply.
II	Back (1)	24 x 47½ - ¼ Hdbd.
JJ	Top/Bottom (2)	11¾ x 47¼ - ¾ Ply.
KK	Divider (1)	11¾ x 21¾ - ¾ Ply.
LL	Lower Cleat (1)	¾ x ¾ - 46½
MM	Upper Cleats (2)	¾ x 1½ - 22⅞
NN	Shelves (3)	11 x 22⅞ - ¾ Ply.
OO	Edging (3)	¾ x 1½ - 22⅞
PP	Stiles (2)	¾ x 1½ - 24
QQ	Top/Bottom Rails (2)	¾ x 1½ - 45
RR	Center Stile (1)	¾ x 1½ - 21
SS	Door Stiles (4)	¾ x 2½ - 20⅞
TT	Door Rails (4)	¾ x 2½ - 17⅞
UU	Door Panels (2)	17⅞ x 16⅝ - ¼ Ply.
VV	Door Catches (2)	¾ x ¾ - 2

- (1) 24" T-Track
- (2) 48" T-Tracks
- (2) 1½" Flange Bolts
- (1) 2½" Flange Bolt
- (1) Flip Stop
- (4) ⅝" x 1½" Studded Knobs
- (3) ⅝" Through-Hole Knobs
- (22) #8 x 1½" Fh Woodscrews
- (27) #8 x 3" Fh Woodscrews
- (20) Shelf Supports
- (1) 3' x 8' Laminate
- (2 pr.) 2" No-Mortise Hinges
- (2) 1¼" Round Knobs w/Screws
- (1) 12' Left-to-Right Self-Stick Measuring Tape
- (1) 12' Right-to-Left Self-Stick Measuring Tape
- (1) 1" x 1" x 48" Aluminum Angle (⅛" thick)
- (4) ⅝"-18 Threaded Inserts
- (6) Levelers
- (7) ⅝" Washers
- (8) Finish Washers
- (13) #6 x ½" Fh Woodscrews
- (2) ½" Rare Earth Magnets w/Cups and Screws
- (2) ⅝" Steel Washers w/Screws

HANDS-ON Technique

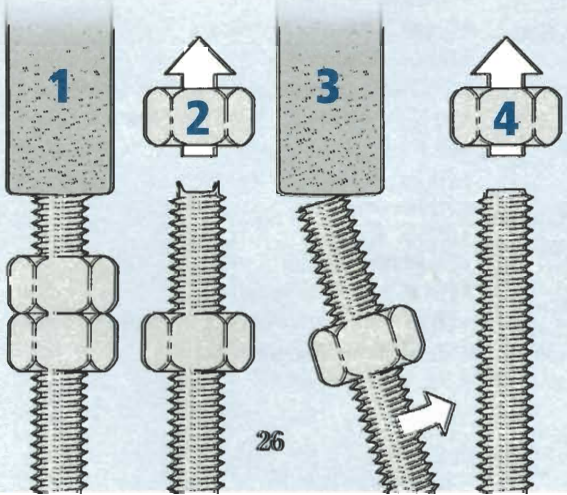
get the most from your Bench Grinder

A few simple techniques turn this basic tool into a shop workhorse.

A bench grinder might be one of the most under-appreciated tools in the shop. I use mine to handle a lot of the simple metalworking chores that come up almost daily. Each job is different and has its own technique. So here's a look at how to tackle a few common tasks.

Step-by-Step: Clean Threads

After grinding (Step 1), the nuts on the threaded rod allow you to easily re-cut the threads. First, one nut is removed to draw the burr outward (Step 2). Then, a light rotation against the wheel will take most of this off (Step 3). Finally, the second nut will clean up any leftovers, as in Step 4.

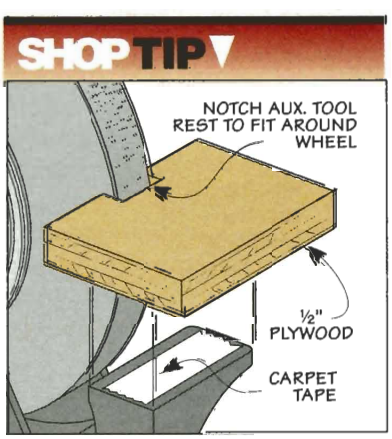


ROUND STOCK

I find that a lot of my work at the grinder is done on round stock. Simple tasks like cleaning up the cut end of a section of threaded rod, bolt, or round rod.

Threaded Rod. Using threaded rod almost always involves hacking off a section, taking it to the grinder to square up the rough end, and then re-establishing the threads. The photo above shows how I approach the job.

Setting Up. First, you'll notice the auxiliary tool rest attached to the grinder tool rest. As you can see in the drawing below, it's just a small piece of ½" plywood notched to fit around the wheel and then carpet-taped in place. This gives you a lot more surface to work on and better control of the workpiece.



Next, I thread two nuts onto the section of rod I want to grind and tighten them together. This will allow you to quickly repair the threads at the end of the rod after you're done at the grinder.

Now, before you start grinding, check the position of the tool rest. It should be adjusted so that you're grinding straight toward the center of the wheel. And then finally, I top off the water can that sits beside the grinder. You'll find that a quick dunking helps control the heat buildup as you grind.

The Grind. After turning on the grinder, begin by slowly feeding the rod straight into the wheel. You don't need to use a lot of force. Let the grinding wheel do the work for you. When the end looks flat, back the rod away from the wheel, rotate it a bit and slide it up to the wheel. Do this several times until the end looks smooth and square.

The final step is where the two nuts on the rod come into play to

clean up the threads. Just follow the sequence shown in the box at the bottom of page 26.

Round Rod. Squaring the rough cut end of a section of round stock is even simpler and the setup is the same. With a firm grip on the rod, feed it straight into the wheel. Then slowly spin the rod against the wheel until it's smooth and square.

Roll a Chamfer. The right photo shows how to follow up with a slight chamfer on the end. I used this technique on the aluminum rod used in the marking gauges on page 32. Using a 45° reference line on the tool rest as a guide, lightly rotate the rod toward the wheel. Keep the rod turning at a steady rate and you'll end up with a smooth, even chamfer.

SQUARE BAR STOCK

The cut end of a section of bar stock usually isn't a pretty sight — rough, jagged, and often nowhere near square. But if you take a look at Figure 1, you'll see how to make it right in short order.

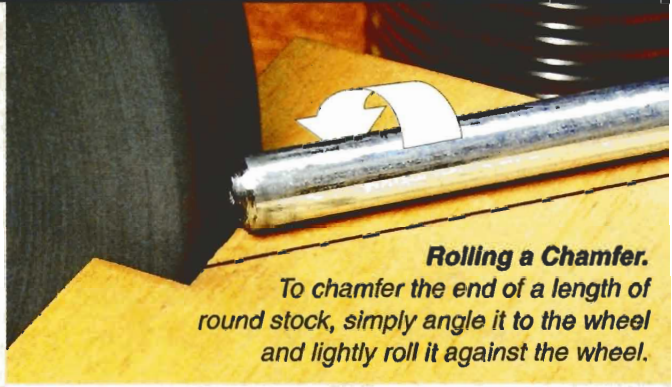
Here, the tool rest is set close to the wheel for good support. With the bar flat on the tool rest, slide it into the wheel, and start grinding at the "high" spots.

Keep the bar moving side-to-side as you grind. Here again, this helps control heat buildup. I like to flip the bar and grind from both sides to keep the bar square through its thickness (Figure 1a).

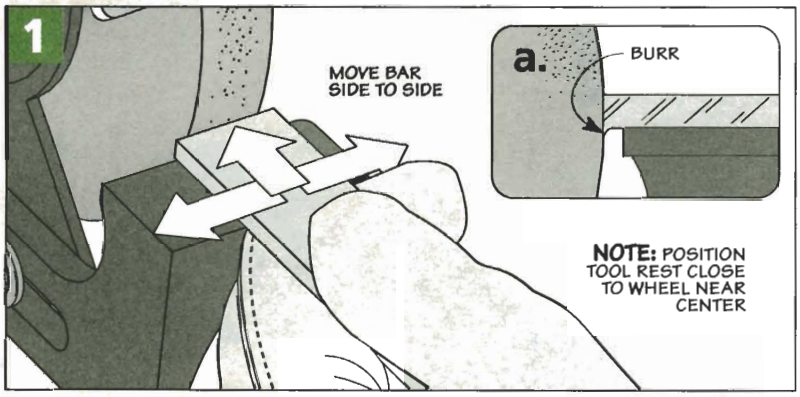
Now a Chamfer. Figure 2 shows how to soften the edges of bar stock with a chamfer. To do this, the tool rest is backed away from the wheel and set low. This allows you to angle the bar stock upward and grind on the upper part of the wheel. You'll have good control and a clear view of the work.

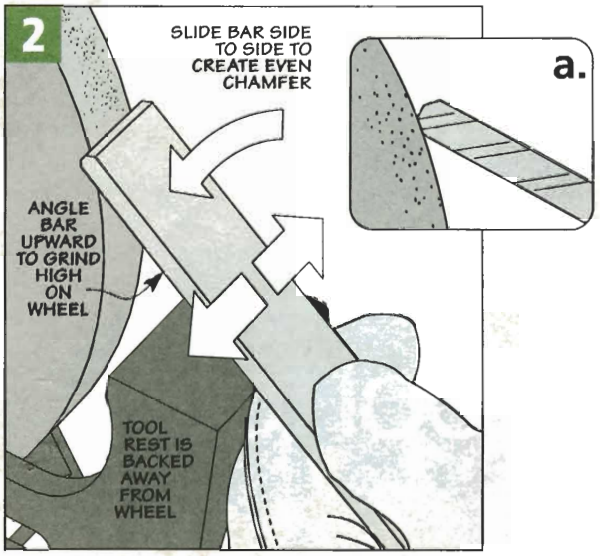
Lay the bar on the outer edge of the tool rest and then slowly tip it forward into the wheel. When you contact the wheel, begin sliding the bar side-to-side across the wheel to create an even chamfer across the edge. When the chamfer is completed, flip the bar over and grind the opposite edge using the same spot on the wheel. This ensures the chamfer angles match.

The techniques here are pretty basic. But mastering the basics is what leads to great results and makes the work a little easier.



Rolling a Chamfer. *To chamfer the end of a length of round stock, simply angle it to the wheel and lightly roll it against the wheel.*





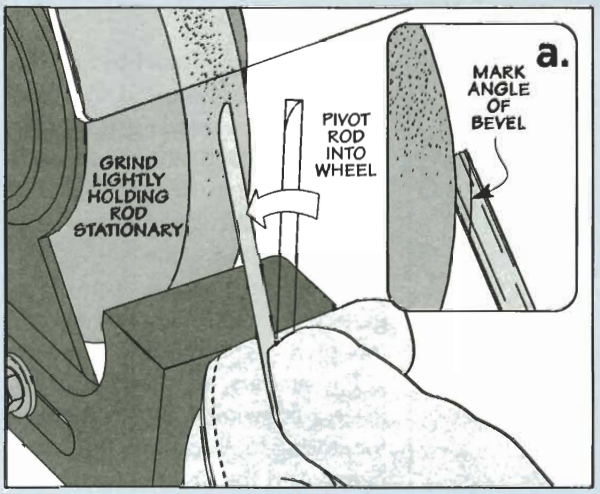
Small Stuff:
A Sharp Bevel

When making the cutter for the marking gauges on page 32, I had to grind a bevel on a section of round bar stock. The drawings at right show you how to do this.

Start by marking a guide line on the rod for the 30° bevel. Here, the tool rest is set close so that you can angle the rod sharply upward and grind high on the wheel.

The rod is held against the outer edge of the tool rest and then pivoted into the wheel. Just use gentle pressure, holding the rod in one spot on the wheel. You want to keep heat buildup at the tip to a minimum, so go slow, dip it often, and check your angle.

The finished bevel will have a slight hollow from the round wheel. But a couple of passes over a stone will remove the burrs, flatten the bevel, and leave you with a "knife-sharp" tip.



tool tote Sawhorses

Sawhorses are "must-haves" for working in and around the shop. But it can be a hassle getting sawhorses, tools, and other materials to where you're working. Plus, it can be a real challenge to keep everything organized while you work.

A quick look at the photo above gives you an idea of how these tool tote sawhorses provide a solution.

For starters, the sawhorse features a convenient bin in the base for storing tools, clamps, and other items. And the divided upper tray is a great place to keep often-used hardware and hand tools organized and within easy reach.

But here's the best part — you can adjust the top of the sawhorse up and down. So no matter what you're working on, the sawhorse can be set to a comfortable working height.

And when you're ready to pack up and move on, the sawhorse and its contents are easy to carry. Just slide the top down to enclose the upper tray, and then grab the convenient handhold (see inset photo).

Compact Carry-All. *The top of the sawhorse slides down to enclose the upper tray and makes for easy carrying.*

Finally, don't let the narrow profile of the sawhorse give you any concern about its stability. A set of swing-out feet ensures the sawhorse will be stable no matter what type of job you have to do.

Building the Base. As you can see in Figure 1, building the main part of the base isn't all that difficult. It's nothing more than a pair of ends connected by a solid wood bottom and two sides.

To guide the top of the sawhorse straight up and down as you adjust the height, there's a wide groove cut in the outside face of each end. I set my dado blade up as wide as possible to minimize the number of passes it would take to cut the groove.

To connect the bottom of the base to the ends, you'll need to cut a dado on the inside face of each end. This dado is located ¾" up from the bottom edge to provide clearance under the sawhorse for the feet that are added later. Just be sure to size the dado to fit the ½"-thick bottom.

There are only a couple things left to do to complete the ends. First, you'll need to cut a slight taper along the outside edges. And second, drill a counterbore on the inside face for the T-nut that's used to lock the top in place (Top View.)

Connect the Ends. To connect the ends together, there's a bottom piece and a pair of sides, like you see illustrated in Figure 1.

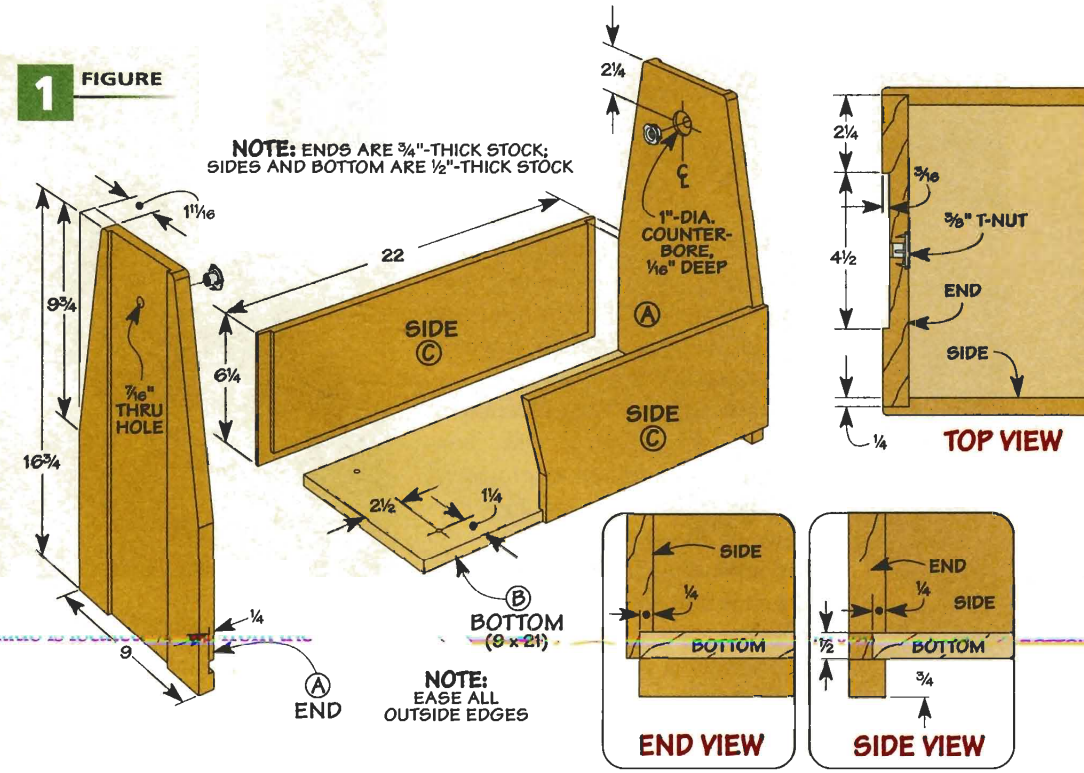
The bottom fits into the dadoes cut in the ends. But before you glue the bottom in place, drill a hole in each corner for adding the feet once the base is assembled.

Then, to prevent the sawhorse from racking side to side and create a storage compartment in the base, I added a pair of tall (wide) sides. They're rabbeted to fit inside the ends and bottom, as in Figure 1.

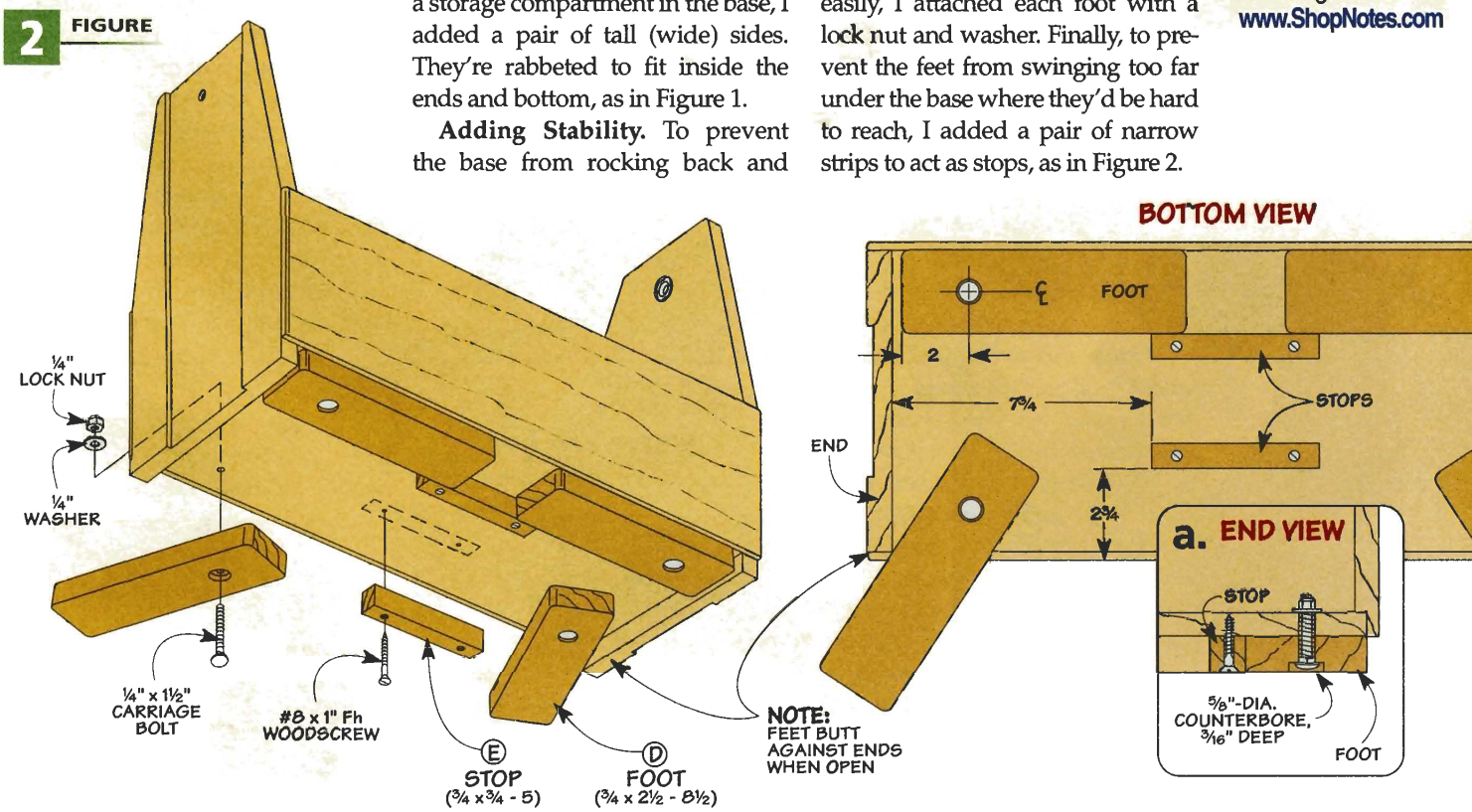
Adding Stability. To prevent the base from rocking back and forth no matter what I was working on, I added a set of feet (Figure 2). The feet act like outriggers to stabilize the sawhorse.

After cutting the feet to size, round the corners slightly and then drill a counterbored hole at one end to accept a carriage bolt. To ensure the feet stay secure, yet still swing easily, I attached each foot with a lock nut and washer. Finally, to prevent the feet from swinging too far under the base where they'd be hard to reach, I added a pair of narrow strips to act as stops, as in Figure 2.

1 FIGURE



2 FIGURE



ShopNotes GO ONLINE EXTRAS

To download a free cutting diagram for the Sawhorses, go to: www.ShopNotes.com

adjustable, organized

Tray & Top

Divide & Conquer. *Removable dividers allow you to organize the upper tray to suit your tools and hardware.*

With the base of the sawhorse complete, you're more than halfway done. All that's left to do is add the upper storage tray and the adjustable top.

Start with the Tray. I started by adding the tray to the base assembly. In addition to providing storage, it also forms a solid bridge between the ends. This makes the sawhorse more stable by preventing the ends from flexing back and forth once the adjustable top is added.

The tray is nothing more than a pair of narrow sides and a hardboard bottom. They're sized to fit snugly between the ends of the sawhorse, as in Figure 3.

A series of dadoes in the tray sides accept a set of hardboard dividers. The dividers keep hardware and other small items organized for quick and easy access.

Cutting matched dadoes can be a challenge. But if you start with an extra-wide workpiece, it's easy. For more on this, turn to page 14.

Once the dadoes are complete, you can cut a groove along the bottom edge of each piece to accept the bottom of the tray.

The tray is simply screwed between the sides of the sawhorse, so it's flush with the top of the ends. The only tricky part about doing this is locating the screws. You can see in Figure 3a how I angled the screws slightly to avoid interfering with the bottom corner of the groove in the ends of the sawhorse.

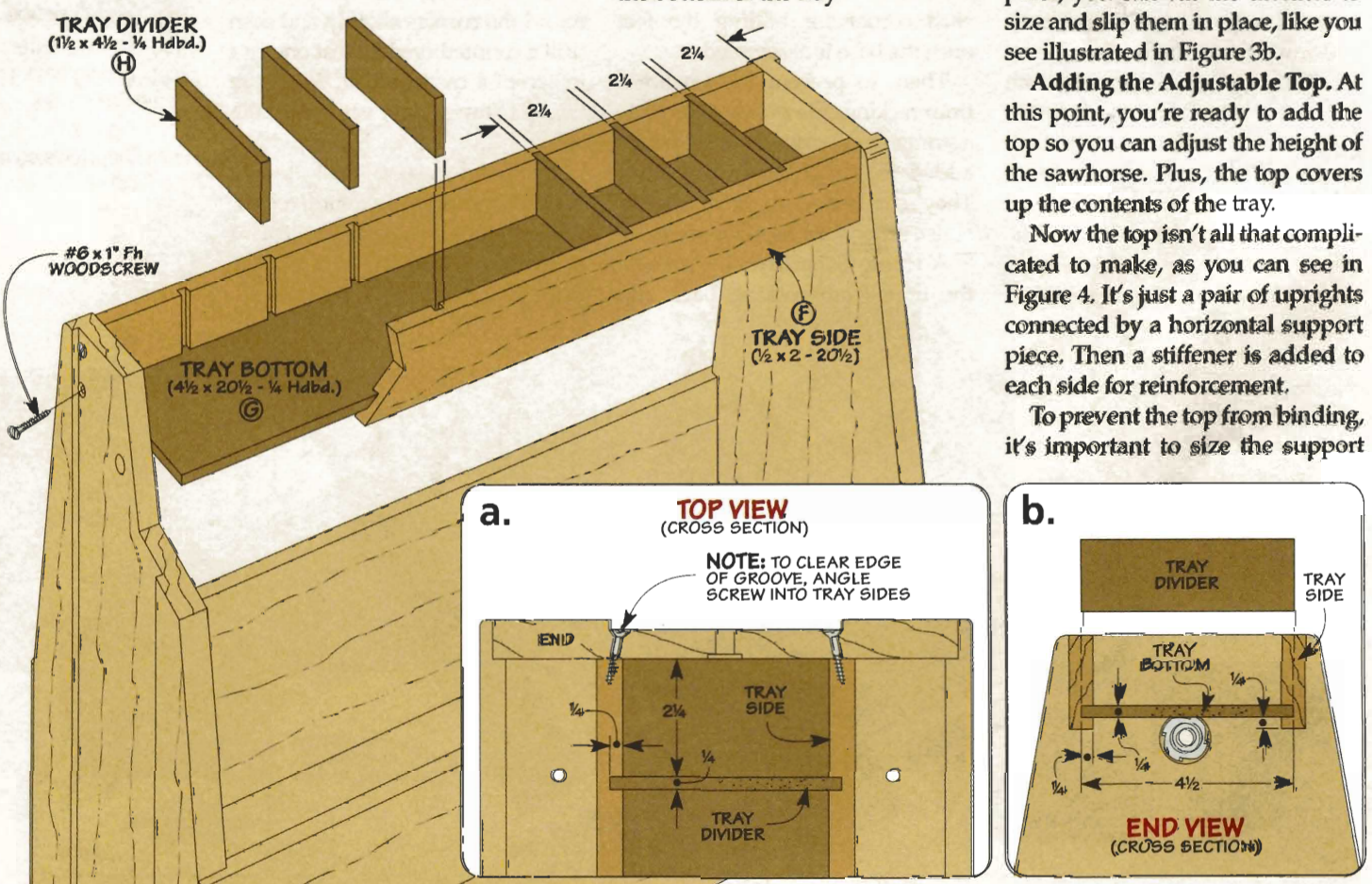
Once the tray is screwed in place, you can cut the dividers to size and slip them in place, like you see illustrated in Figure 3b.

Adding the Adjustable Top. At this point, you're ready to add the top so you can adjust the height of the sawhorse. Plus, the top covers up the contents of the tray.

Now the top isn't all that complicated to make, as you can see in Figure 4. It's just a pair of uprights connected by a horizontal support piece. Then a stiffener is added to each side for reinforcement.

To prevent the top from binding, it's important to size the support

FIGURE 3



piece correctly. To do this, measure the distance from the bottom of one end groove to the bottom of the other. Then add the thickness of the two uprights.

After cutting the support piece to final size, I formed a handhold for carrying the sawhorse. To do this, I cut a pair of short slots in the support and then rounding over the top *and* bottom edges (Figures 4 and 4a).

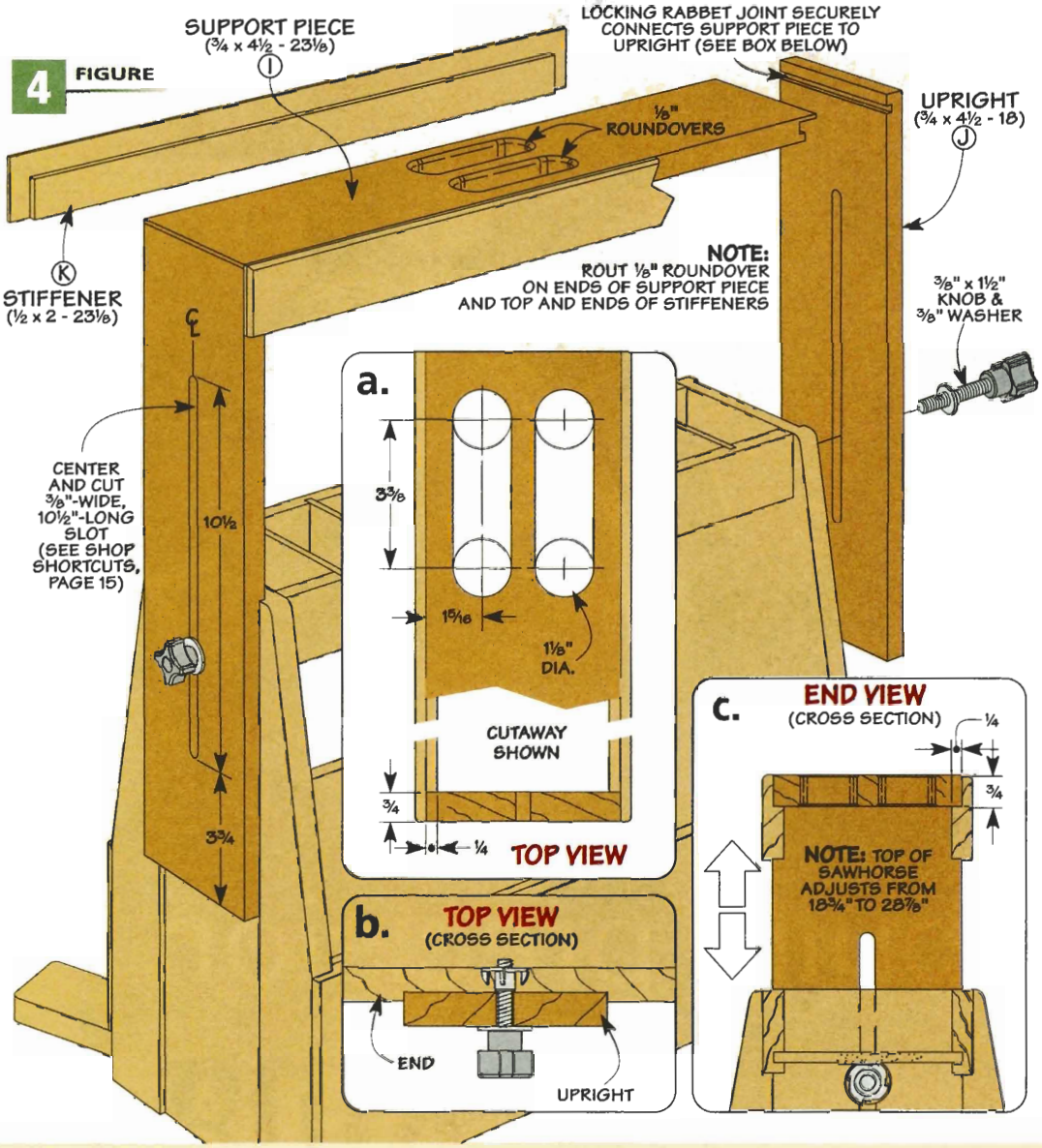
Once that was complete, I cut the uprights to size and then cut the slots that allow you to adjust the height of the sawhorse. For more on how I did this, turn to page 15.

Strengthen the Top. Since you'll be carrying the sawhorse (and any contents) by the support piece, it's important for the entire top assembly to be solid. I accomplished this by doing two things.

First, I used a locking rabbet joint to connect the support and uprights (see box below). And second, I added a pair of stiffeners (Figure 4.) Just be sure to rabbet the stiffeners so they end up flush with the tray sides.

After easing the outside edges of the top (Figure 4), you can attach the top (Figure 4b). After applying a couple coats of finish, you're ready to throw in a few tools and supplies and get to work.

FIGURE 4

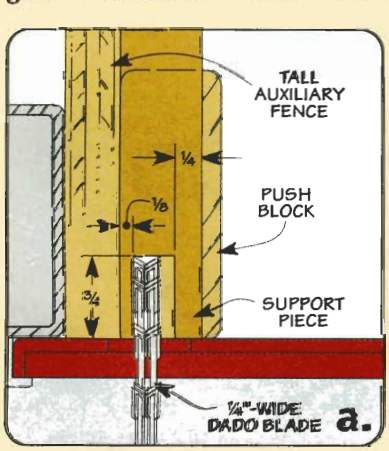


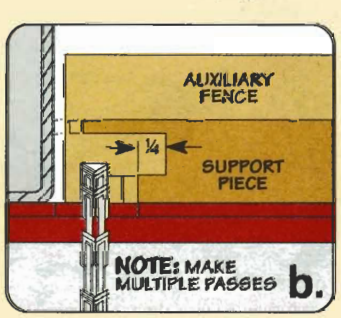
Locking Rabbet Joint

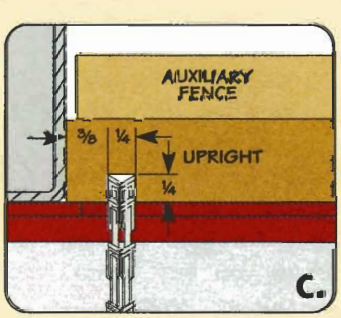
There are a couple reasons I used a locking rabbet joint (see drawing at far right) to connect the support to the uprights. First, it provides a great mechanical "lock." And second, the extra glue surface ensures a solid, long-lasting joint.

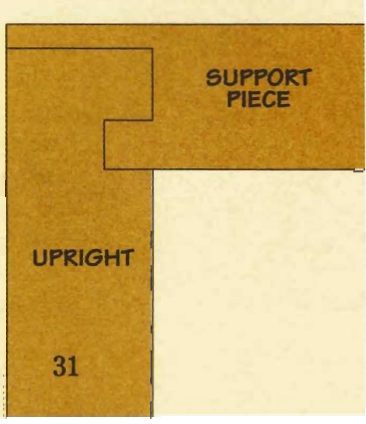
I started cutting the joint by making a couple passes with the support over the dado blade. In detail 'a' you can see all the required measurements. What's important is that the depth of cut matches the thickness of the upright. Using a push block ensures a clean cut without any chipout. Once the slot along the ends is complete, you can trim the bottom face to create a tongue, as in detail 'b.'

Finally, to complete the joint, cut a dado near the top of each upright to fit. The measurements for this are shown in detail 'c.'

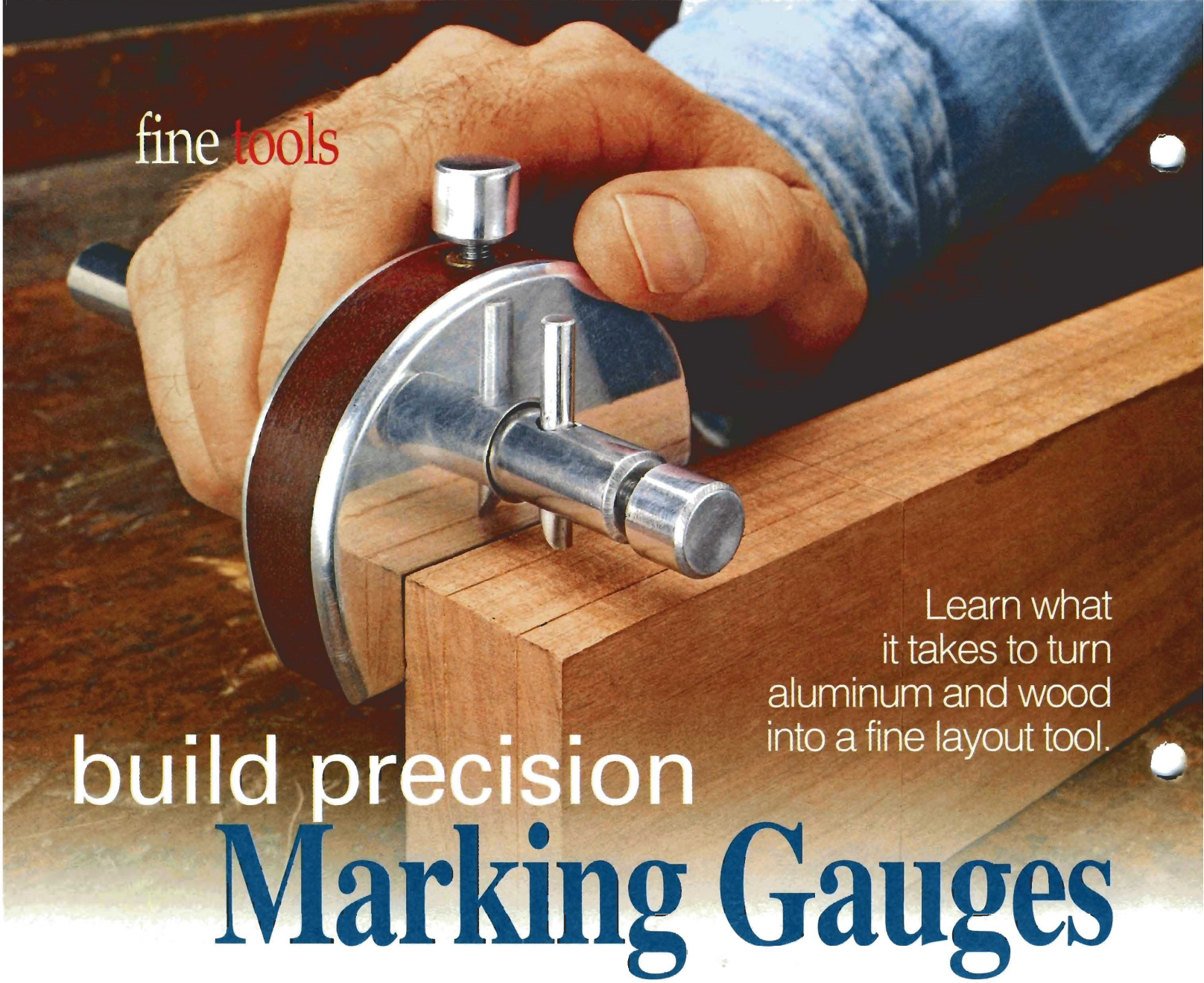








▼ *Locking Rabbet. A solid connection and lots of glue surface make a locking rabbet a strong, long-lasting joint.*



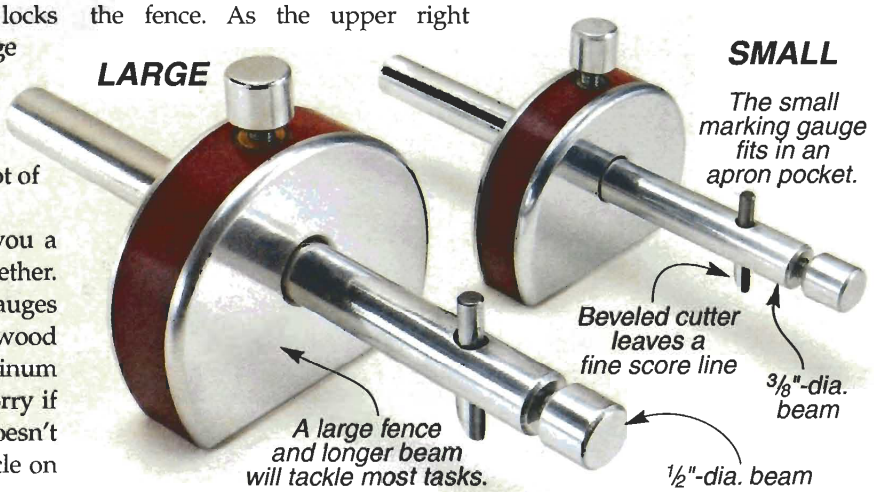
Learn what it takes to turn aluminum and wood into a fine layout tool.

build precision Marking Gauges

A marking gauge is a great layout tool that uses a cutter to score a fine line that's more precise than a pencil line. It's very basic — a beam that holds a cutter and a fence that locks in place and rides along the edge of a workpiece. The simple design also makes it a great tool to build yourself. And, as you'll see, it won't take a lot of time or materials, either.

The photo at right gives you a good idea of how they go together. I made a pair of marking gauges from a small piece of hardwood and a few pieces of aluminum sheet and rod. And don't worry if the aluminum you buy doesn't look like the photos; the article on page 36 will show you how to bring out a bright, mirror polish.

Fence Sandwich. I started making the marking gauge with the fence. As the upper right drawing on the opposite page shows, it's a sandwich consisting of two aluminum faces glued to a hardwood core. I chose a dark,



dense hardwood for the core because it will help hide the glue lines and will hold a threaded insert without stripping. The fence starts out as a square blank. To cut the aluminum sheet down, I used my table saw and a carbide blade.

Since ordinary wood glue won't stick to the aluminum, I used polyurethane glue. Polyurethane glue expands and foams as it cures, so I made sure to clamp the blank securely, as in the left photo below.

Shaping the Fence. The next step is to cut the blank to the shape shown in the patterns below. To do this, I sanded off the glue squeeze-out and headed to the band saw to make the cut (middle photo).

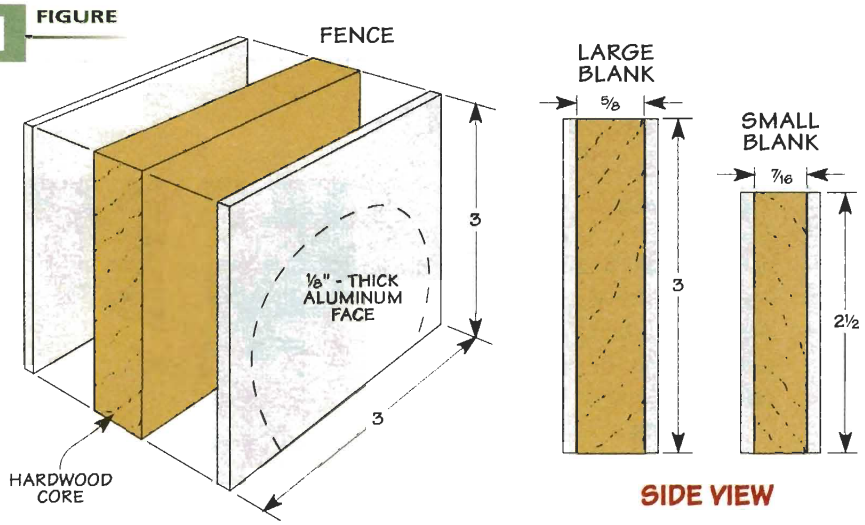
You'll need to keep the teeth lubricated to prevent them from getting overheated. For this, I used cutting wax (photo on the bottom of the page). The wax sticks to the blade better than oil, which means I don't have to reapply it as often. It also prevents the aluminum from gumming up the teeth. After cutting, the edges of the fence can then be sanded smooth.

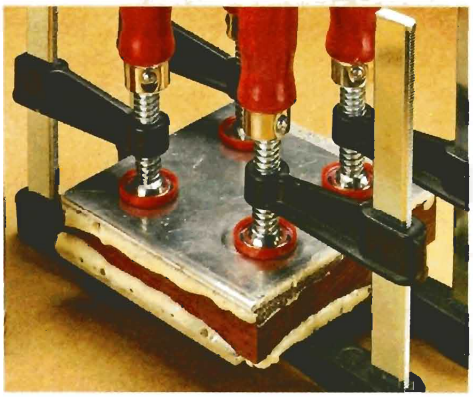
Drilling the Beam Hole. There are just two shaping steps left. The first is to drill a hole in the center of the blank for the beam (right photo below). Again, a little wax will make the process smoother.

To keep the workpiece from catching on the bit, I clamped it to an auxiliary fence and set the drill press to its lowest speed. The edges of the hole can then be eased with a countersink bit.

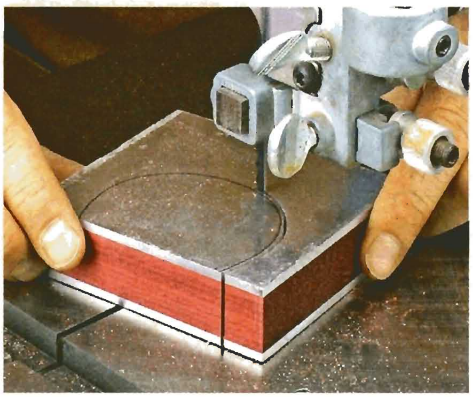
The final shaping step is to rout a ⅛" roundover on all the edges. A carbide bit will handle the aluminum with no trouble. And I used a rubber-bottomed grout pad to keep my fingers safely out of the way while routing.

FIGURE 1



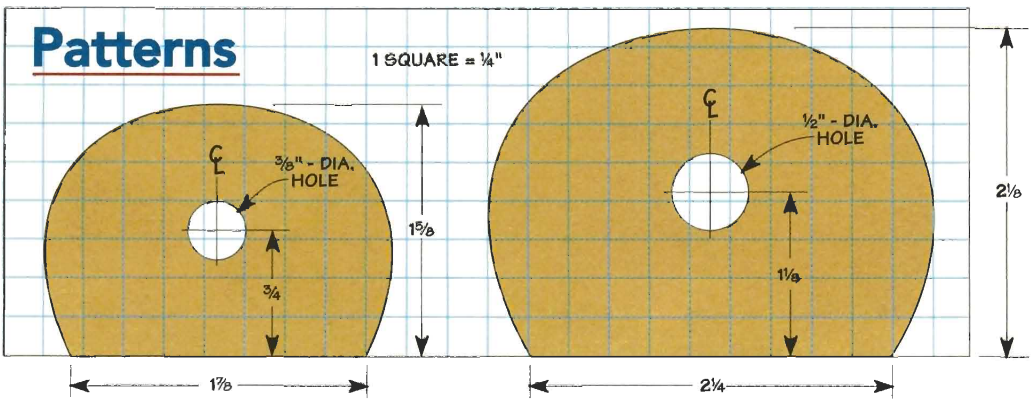


▲ *Aluminum Sandwich.* Use plenty of clamps and polyurethane glue to join the aluminum faces to the hardwood core.



▲ *Cut to Shape.* A band saw with an ordinary 3/16"-wide blade makes cutting the fence to shape a breeze.

▲ *Drill Slowly.* To keep the fence from catching on the bit, clamp it to an auxiliary fence and use a slow bit speed.



▼ *Cutting Wax.* Use a little cutting wax to keep the blades and bits from gumming up and overheating.

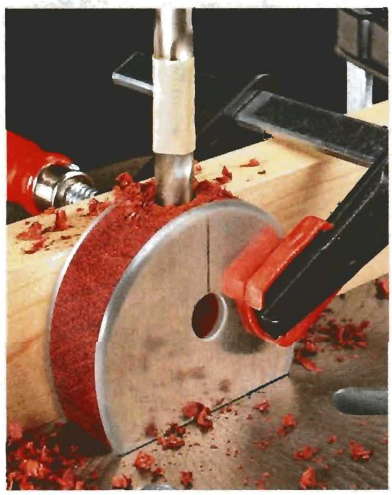
securing the fence to
the Beam

At this point in the process, the fence is nearly complete. All that's left is to add a studded knob that locks the fence in place on the beam. After that, you'll move on to making the beam, a couple of knobs, and the cutting pin.

Installing a Threaded Insert. A simple way to secure the fence to the beam is to use a threaded insert and a knob. To do this, I first drilled a hole in the top, as you can see in the first photo at right.

An important thing to keep in mind when installing a threaded insert is to keep it square. I've found that using the drill press with the *power off* is a foolproof way to do the job. The right photo shows how it's done.

The fence is now ready to accept the knob. I made matching knobs from the same aluminum rod used for the beam. You can see the details in the box on page 35. To prevent the end of the threaded knob from gouging the beam, I cut a wood plug from a dowel and slipped it into the hole in the face.



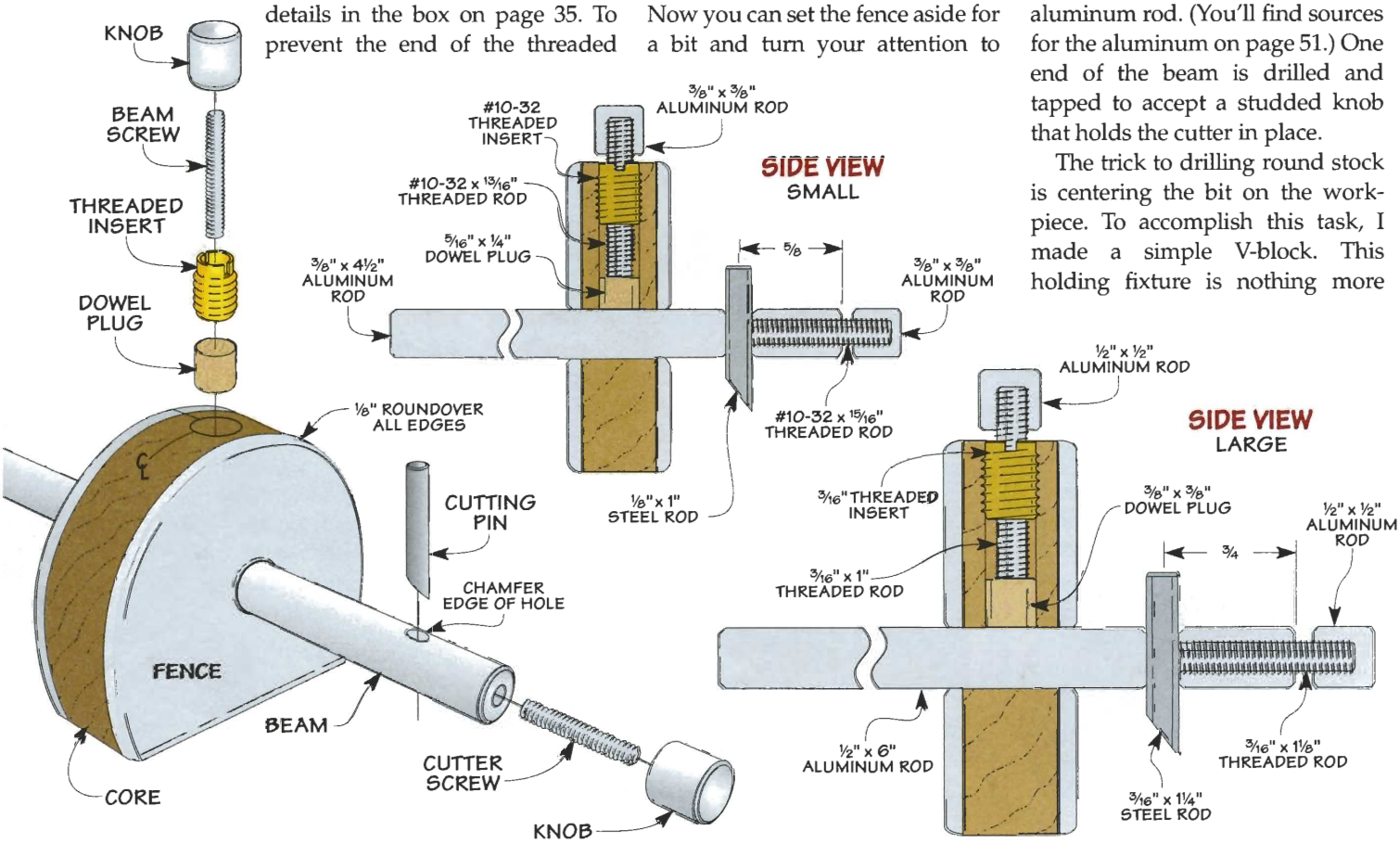
▲ *Drilling the Fence. Secure the fence and drill a hole in the top to the hole in the face of the fence.*

▲ *Threaded Insert. After drilling the hole, use the drill press to drive in the insert into the fence.*

MAKING THE BEAM

Now you can set the fence aside for a bit and turn your attention to making the beam. The beam itself is pretty simple. It's just a piece of aluminum rod. (You'll find sources for the aluminum on page 51.) One end of the beam is drilled and tapped to accept a studded knob that holds the cutter in place.

The trick to drilling round stock is centering the bit on the workpiece. To accomplish this task, I made a simple V-block. This holding fixture is nothing more



than a board with a V-shaped groove cut down the center. I used it both for the end drilling and top drilling sequence shown below.

End Drilling. One end of the beam is drilled and tapped for the knob that holds the cutting pin in place. What you're looking for here is to center the hole on the end of the aluminum dowel.

To see how I did this, take a look at the left photo below. With the aluminum rod chucked in the drill, you can rotate the drill press table and V-block so that the rod rests in groove in the block.

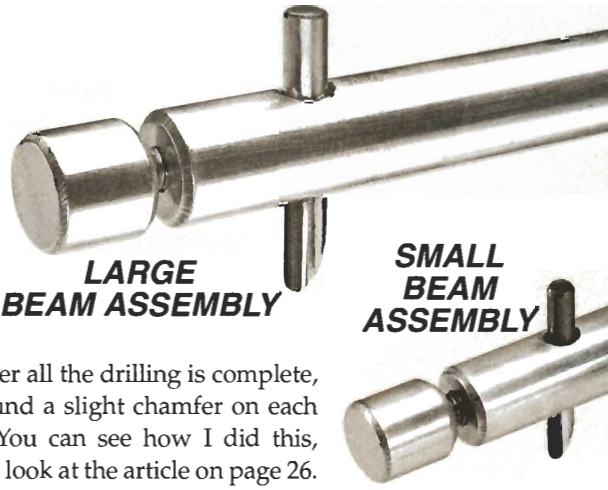
The dowel can then be loosened from the drill, lowered, and clamped to the V-block. This centers the workpiece on the bit for drilling (middle photo). To keep the bit cool and help remove waste, I used little oil (*Tap Magic*).

Tapping Threads. After the hole has been drilled, the next step is to tap the threads, as you can see in the right photo. Twist the tap into the hole until it starts to bind. Then back off the tap about a half turn. Then you can continue tapping. Again, a little oil will keep things moving smoothly.

The Cutting Pin. The final step in the process is to drill an intersecting hole in the beam for the cutting pin. You can see in the lower left photo how the V-block comes into play here. The pin is nothing more than a short piece of steel rod with a bevel ground on one end.

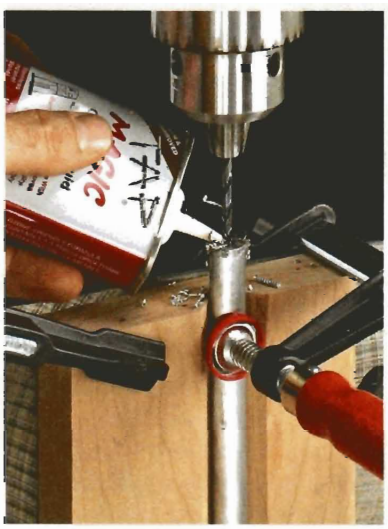
After all the drilling is complete, I ground a slight chamfer on each end. You can see how I did this, take a look at the article on page 26.

Finally, you slide the beam into the fence and install the knobs, and the marking gauge is pretty much ready for use. But since the aluminum still looks a little shabby, I took a little time to clean it up and protect it. The process is described in the article on the next page.



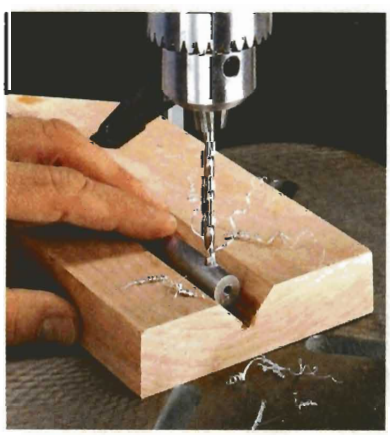
▲ *Cutting Pin. A short piece of steel rod is beveled to serve as the cutting pin. It's held in place by a shop-built threaded knob.*

▲ *Aligning the V-Block. Chuck the aluminum dowel in the drill press to set the table and V-block in place.*



▲ *Cutting Oil. A light cutting oil helps cool the bit and remove debris while drilling.*

▲ *Tapping Threads. After drilling the hole, leave the beam clamped in the V-block for tapping threads.*

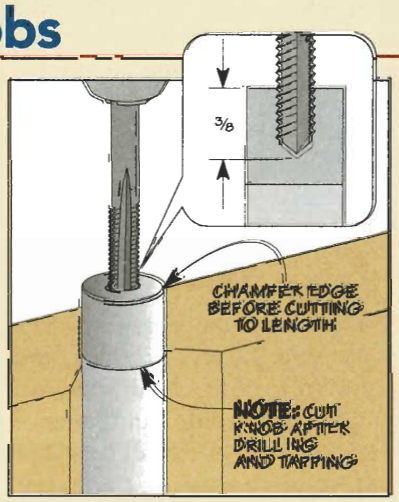


▲ *Cutting Pin Hole. Rotate the drill press table square to the bit and drill the hole for the cutting pin.*

Shop-Built Knobs

Making the two, small knobs for the marking gauge can be a bit of a challenge. The solution is to work with an extra-long workpiece for the steps shown in the three photos above. Before cutting each knob to length, I chamfered one end. (The other end is chamfered after assembling the knob.)

The threaded portion is a short piece of threaded rod. It's glued in place with some epoxy.



▲ *Matching Knobs. The knobs are made just like the beam. Then a threaded stud is glued in place.*

HANDS-ON Technique

Putting the Shine on Aluminum

A few, simple steps are all it takes to turn aluminum parts from dull to gleaming.

When making the marking gauges on page 32, you'll notice right away that the aluminum you buy doesn't have the same shine as what you see in the photos. Straight from the store, aluminum can look pretty rough. The faces and rod can have a lot of grooves and scratches from the manufacturing process.

To take it to the next level, you'll need to follow a simple, three-step process that will bring out a long-lasting, mirror polish. And with a project this small, it doesn't take a lot of time to get some pretty impressive results, as the finished example in the photo above shows.

SANDING

The first step in the process is to eliminate the heavy grooves and scratches. To do this, I start with plain old silicon-carbide sandpaper. If there are deep scratches, I'll use 180-grit first, then work up to 220-grit. You want to attach the sandpaper to a flat surface and sand in one direction until all the deep scratches are gone and the surface is smooth.

There's one thing you'll want to note. Make sure to apply even pressure as you sand to keep the sanded face flat and parallel to the back face. Otherwise, you can end up with a wedge-shaped piece.

As for the routed edges of the fence, I've found the roundover bit leaves a pretty smooth edge. But you may spot a slight rippling effect. A few passes with the sandpaper will quickly take care of this before moving on to the next step.

Sanding Round Parts. When it comes to sanding the beam and knobs, I used a slightly different approach. A quick way to sand them smooth is to chuck them in the drill press and lightly hold the paper to the workpiece as it spins.

The final "sanding" I do is with an abrasive (*Scotchbrite*) pad. A "fine" or "extra-fine" pad cleans up the scratches left by the 220-grit paper and leaves the surface dull.

BUFFING

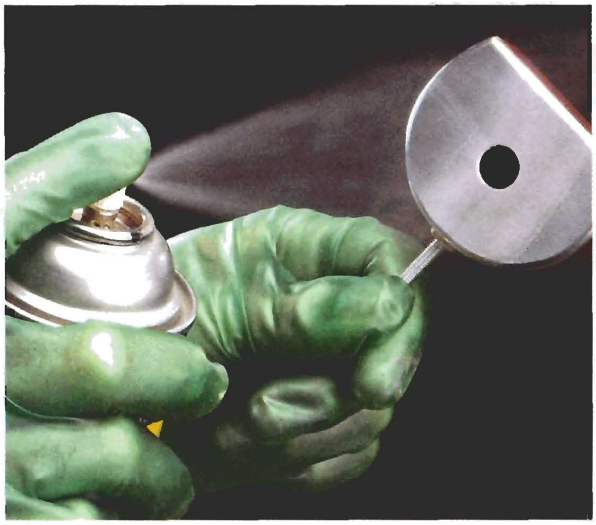
The next step will bring the finish from dull to a mirror-like shine. For this, I use a buffing wheel mounted in the drill press (photo below).

Polishing Compound. What makes this work is the polishing compound that's applied to the edge. Since I wasn't removing a lot of deep scratches, I used two different "grits" of polishing compound. I first used "tripoli" and then ended with "white rouge." (To find out where to get these supplies, turn to page 51.)

Before getting started, you want to make sure that the buffing wheel is spinning *with* the direction of the

Buffing Wheel. A buffing wheel mounted in the drill press makes quick work of bringing aluminum to a shine.

▲ *Clean the Surface.* *Mineral spirits and a painting prep cleaner remove the buffing residue and help the lacquer finish adhere to the workpiece.*



▲ *Protect the Shine.* *A piece of threaded rod and a stop nut make a great handle when spraying lacquer on the fence of the marking gauge.*

stitching. Otherwise, the wheel can unravel. You should also use a separate wheel for each compound. Any tripoli contaminating the white rouge step could leave noticeable scratches. Going along with that, I like to wipe down the workpiece between each step.

Getting Started. With the wheel in place, you can start up the drill press and "charge" the wheel with compound. To do this, press the bar of compound against the wheel until the edge of the wheel is "buttered" with a thick coat. (Be sure to wear eye protection and an apron.)

Now you're ready to start buffing. Lightly move the workpiece around against the wheel. The friction generated will cause the compound to "melt" as it cuts. When it does, back off the piece and wipe away the compound to check your progress. This will also keep the part from getting too hot and burning the compound.

When you have an even sheen from the tripoli, you can move on to the white rouge. The buffing is complete when the aluminum is bright and shiny.

FINISHING

The final step in the process is to protect the surface from getting scratched. But before you can apply a finish, you'll need to clean off any remaining buffing residue.

I did this by first wiping down all the parts with mineral spirits. Then I used an automotive painting prep cleaner, like you see in the left photo above. Since any leftover compound can cause the finish to peel, don't worry about overdoing this step.

All that's left is to apply three coats of automotive lacquer (right photo above). This type of lacquer is harder and more resistant to scratches and chips than woodworking lacquer. The result will be a fine-looking tool that'll stand up to everyday use.

Supplies:
Buffing & Polishing Kit

An inexpensive, all-in-one solution to setting up for buffing and polishing aluminum (or any metal or plastic for that matter) is to pick up a buffing and polishing kit like you see in the photo at right.

I found this one at a local home center. It comes with three sizes of buffing wheels, an arbor to mount the wheels in your drill press, and four sticks of polishing compound (emory, tripoli, white rouge, and red rouge). The bars of compound in the kit were smaller than the bars I purchased separately.

Since the wheels are pretty small (the biggest one is 4" dia.), you'll want to use a slower drill press speed to avoid overheating the workpiece. There's only one seam in the stitching, which means the wheels are softer than the wheel shown in the photos on the opposite page. This means it will cut a little slower. If you haven't done much buffing, a slower cut can help you get the hang of it easier. And having a choice of wheel sizes makes the kit pretty versatile. The kit only costs about $15. If you only plan on do buffing and polishing metal occasionally, it's a great deal.

15 of our favorite tips for Sanding Success

Here's what you need to know to guarantee great results — in less time — the next time you sand.

Let's be honest — no one likes to sand. If you took a vote around our shop, sanding would show up at the bottom of the list of our favorite things to do — right down there with sweeping up the floor.

But if you want a really great-looking project, sanding is a necessary evil. The good news is that you can minimize the chore of sanding *and* get great results. So how do you do this? Simple. Take a look at the sanding tips, tricks, and techniques that follow. They're used just about every day in our shop to guarantee sanding success.

A few of the tips help by getting the process started on the right foot. And others give you handy hints on getting the results you want in less time. Finally, you'll find a few tricks for solving some of the more challenging sanding tasks you may run across.

1 When to Stop

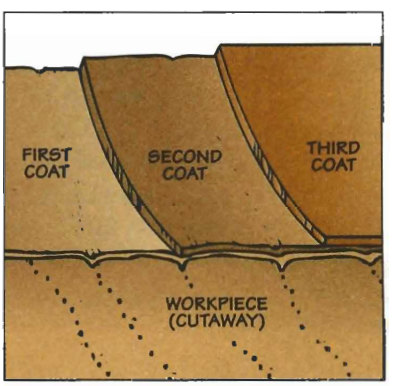
Before you start sanding, it's a good idea to know when to stop. To determine my stopping point, I keep a couple things in mind.

Staining. The first thing to think about is whether you're going to stain the project. With a pigment stain, the stain sits in the pores and scratches in the surface. So the finer you sand, the smaller the scratches and the lighter the final color.

Finish. The other factor that determines how fine to sand is the finish you use. Basically, the thicker the finish, the less you have to sand.

An oil finish will soak in instead of building up on the wood. So instead of feeling the finish, what you end up feeling is the surface of the wood. So I typically sand the wood to 220-grit. And then I wet sand the finish coats with 320-grit to end up with a very smooth surface.

For a finish that builds up on the surface, like varnish or polyurethane, a smooth finish is the key. So I only sand the wood to about 150-grit. After applying a few coats of finish (and sanding in between), you won't be able to see or feel any scratches in the surface.



2 Checking Your Progress

The dust that builds up as you sand will make the surface of a workpiece *feel* smooth. But what's more important is how the surface *looks* — and that can be hard to determine with dust hiding the surface.

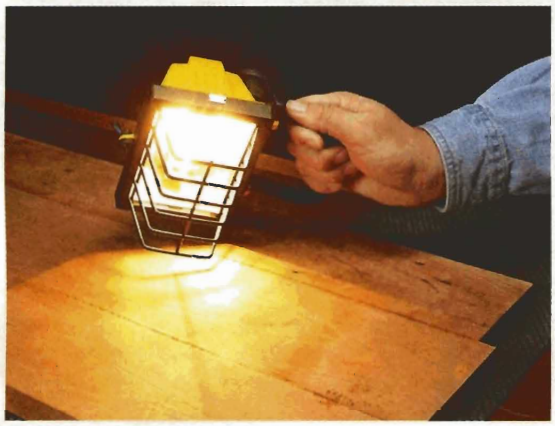
To check your progress, use a brush and shop vacuum to remove all the dust. This also picks up any loose pieces of abrasive that can mar a project by leaving behind their own telltale scratches.

3 Revealing the Surface

Even if you check your progress as you work, it's still easy to miss a stray scratch here and there. And a small "glueprint" can be hard to see even with a thorough cleanup.

To avoid these problems, I turn to my finishing cabinet and pull out a can of mineral spirits. Wiping down the surface of the workpiece with a rag soaked in mineral spirits will reveal stray glue smudges. Since the smudge won't absorb any of the mineral spirits and darken like the wood, the excess glue will stand out. Plus, scratches tend to show up better so you can see them.

As an added benefit, the mineral spirits acts like a cleaner, pulling sanding dust off the workpiece. I make it a habit to wipe down the entire project just before I apply a finish. This removes any remaining dust and cleans off any oil from my hands that may affect the finish.



4 Task Lighting

You can't check your work if you can't see it. And that's even more true when it comes to sanding. If you don't get a good look at the surface of the wood as you work, you may discover a scratch, dent, or glue spot you missed when it's too late — after the finish is dry. But there's an easy solution to this.

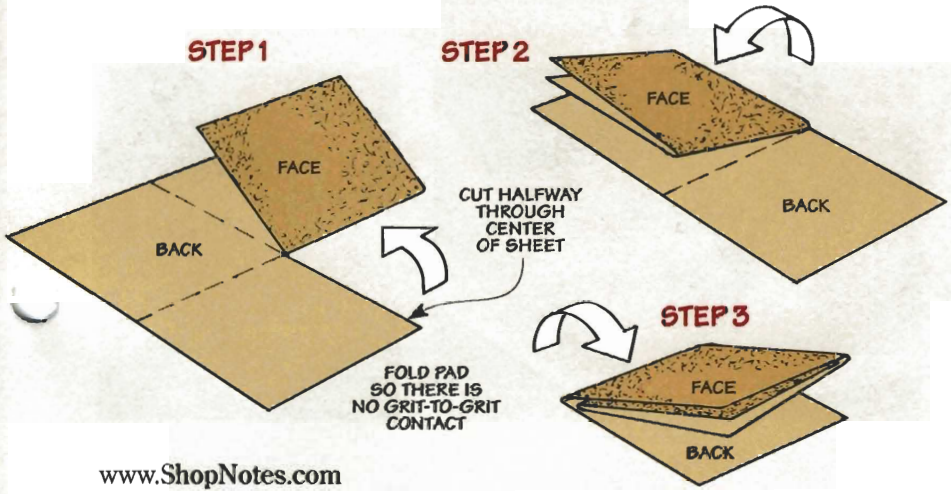
I always make sure to have plenty of light whenever I sand. But not overhead light. What works best is task lighting that comes across the surface at a low angle (see photo). This creates shadows so that any ridges, dips, and scratches stand out, allowing you to sand them away before it's too late.

5 Sanding Pad

One of the problems you run across when using folded sandpaper is wearing out the unexposed surface because the grit rubs against itself. To avoid this problem, you can cut your sheet of sandpaper into quarters and then fold each one into a pad that eliminates the grit-to-grit contact, as detailed below.

Folding the pad this way also works great when sanding on the lathe. With the four layers of insulation, your fingers stay comfortable.

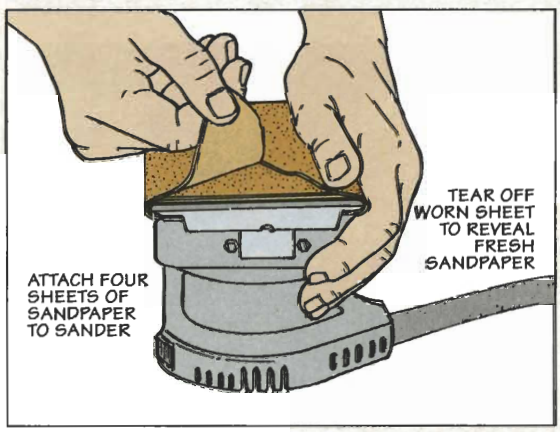
To fold the pad, first make a single cut to the center of the sheet. Then follow the steps shown below. To expose a new surface, simply refold the pad.



6 Multiple Layers

Using a finish sander is a quick and easy way to take some of the drudgery out of sanding a project. But having to stop work to change the sandpaper as it wears out can be a hassle.

If you have a finish sander that uses clips to hold the sandpaper in place, try putting four layers on the sander at the same time. When one layer wears out, all you have to do is rip it off and you're ready to go again, as shown below.

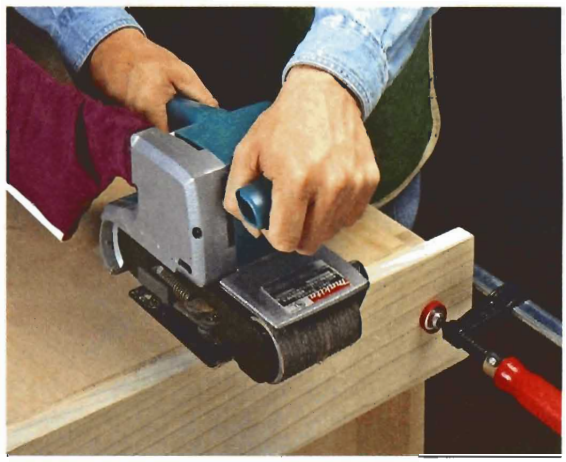


7 Protecting an Edge

When I have to do a lot of serious sanding, I like to use my belt sander. But the problem is having all that speed and power at my fingertips. It's all too easy to sand too much — especially at the edge of a project where you can easily round over a corner without thinking.

An easy solution to this problem is to clamp a scrap piece across the end of the surface you're sanding, like you see in the photo at right. The important thing here is to clamp the scrap level with the edge. Then as you sand near the edge, the scrap supports the sander.

If you go too far and the belt sander tips, the scrap piece is all that gets rounded over, not the project. This "sacrificial" support works great for sanding dovetail pins and tails flush, as well as projects with box joints that stand proud.

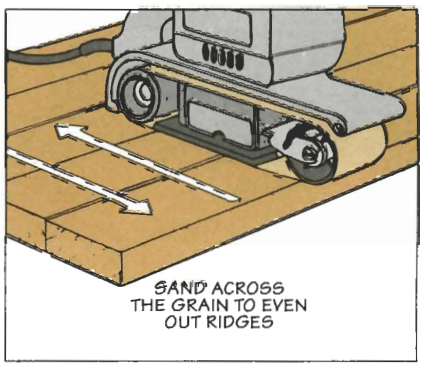


8 Flattening a Panel

The old adage, "Always sand with the grain," is good advice — and it's best to follow it most of the time. But, there are times when it's better to sand *across* the grain.

For example, whenever you glue up a panel, the odds are a couple of the joints won't be perfectly flush. You can sand with the grain to even things out. But this is a slow, tedious process — even with a belt sander. And there's a tendency to create dips and valleys along the length of the panel as you do this.

Instead, I'll start by sanding *across* the grain, like you see at right. But I don't sand any more than necessary to level the surface. Remember, you'll still have to sand out the cross-grain scratches later by sanding with the grain.



9 Spiral Twist

I keep a number of different diameter dowels on hand for sanding small coves and contours. To make this work, you need to smoothly wrap the sandpaper around the dowel.

In the photo below, you see a handy way to do this by taking a narrow strip of self-adhesive sandpaper and spiralling it around the dowel. An added plus — I find it's easier to change the sandpaper since it doesn't stick against itself.

10 Use a Reference Surface

Evening up the edges of a project or sanding the narrow edge of a workpiece is a real challenge. It's all too easy to tip or roll your sanding block and round over an edge.

To solve this problem, you can use a flat reference surface (or two) to sand some of your projects.

The cast iron top of a table saw is perfect for maintaining a straight, square edge on a project. All you have to do is stick a few pieces of self-adhesive sandpaper to the top and you're ready to even up the edges of a box or drawer, like you see in the left photo below.

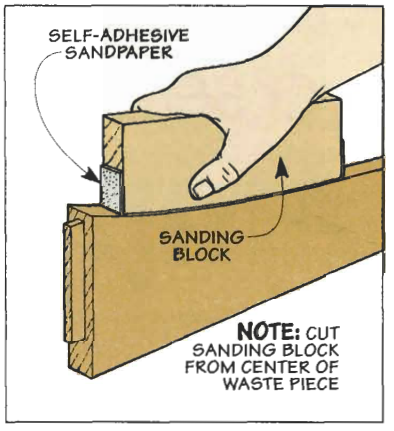
If you're working with a thin piece, you can slide the rip fence over and use that as a guide. The fence keeps the workpiece square to the table and prevent it from tipping, as in the right photo below.

11 Sanding Arcs

Whenever I lay out an arc on a workpiece, I know I'll be cutting it to rough shape with my band saw or jig saw. And that always leaves a roughsawn edge that has to be sanded smooth. This can be even more of a challenge than sanding a straight edge.

A flat sanding block doesn't work well because you can't make contact with the entire edge of the curve. And it's difficult get good results sanding the edge by hand with a small piece of sandpaper.

The nice thing is, the solution is as close as the piece of waste you just cut free from the workpiece. Since the waste piece matches the radius of the workpiece, all you need to do is cut a small section of the waste from the center to create a sanding block. This block will perfectly match the curve of the workpiece, like you see in the illustration shown above.



12 Cove Sanding Block

Flat sanding blocks work great for most of the sanding I have to do. But occasionally, a flat sanding block just won't work for the surface I'm working on.

Whenever I have to sand an odd-shaped workpiece, like a piece of cove molding, I like to match the sanding block to the shape. To do this easily, you can make a custom sanding block from a piece of rigid foam insulation.

To make the block, start by tracing the profile on one end of the foam, as in the left photo below. Once that's complete, cut the foam to rough shape on the band saw, staying just outside the layout line. (You can also use a hand saw to shape the block.)

Finally, to "fine-tune" the shape of the block, stick a piece of sandpaper on the piece of cove molding and then sand the foam to match (right photo below). At this point, you have a perfectly matched sanding block. So all you need to do now is attach a piece of sandpaper to the foam block and you're ready to sand the cove molding.

13 Flexible Sander

The "soft" corners of the sanding block I use for most of my sanding makes it impossible to sand into the corners of a project, like a frame and panel door.

To solve this problem, I like to use a flexible steel scraper as my sanding block. You can trim the sandpaper flush with the edges and get right into the corner of a project, as shown below.

14 Sanding Mats

There's nothing more frustrating than sanding a project on your benchtop and then turning it over to find a scratch or dent. It's often the result of a wood chip or dried glue blob stuck to the bench.

Avoiding this problem is just a matter of using a carpet mat to protect your work. I picked up a couple at a local grocery store for about a $1 apiece.

15 One Final Tip

One last thing. It's easy to put off sanding to the very end. The problem is that once you've assembled the project or cut a piece to final size, the sanding becomes much more difficult.

For example, I like to sand glued-up panels flat before I cut them to size. This way, I don't have to worry about rounding over my final edge. And sanding the aprons and legs of a table before you glue them together is a whole lot easier.

So start sanding right after you cut the first workpiece, you'll save time and get better results.

getting a grip on a set of Shop Clamps

Buying clamps can be a big investment. Here's what to buy first and why.

Until you start shopping for clamps for your workshop, it's difficult to appreciate how expensive a wall full of clamps can be. So before you take out a mortgage on the shop, you really need to think about what type of clamps you really need and what you should get first when you're just starting out.

What you see on these pages are my choices for buying a starting set of clamps. And the nice thing is you can do it in stages. Is it going to answer all your clamping needs? Probably not every one. But I'm sure it will get you off on the right foot.

The complete set is divided into three groups that build on each other. The first group includes basic clamps. The second one adds more capability and power. And finally, the third group rounds things out by addressing assembly challenges the first two groups can't handle. For a list of sources for these clamps, turn to page 51.

A BASIC SET OF CLAMPS

The workhorse clamps in my shop are the bar clamps you see in the photo above. These clamps are often called F-clamps due to their shape. And I've used them on just about every project I've ever built.

The cast iron jaws on the *Bessey* clamps I prefer are stout and sturdy. And the screw features large, square Acme threads, which are stronger than the conventional V-threads on a lot of clamps. The beefy, wood handle allows you to get a good, solid grip.

All these features ensure the clamp will handle the most demanding tasks you're likely to run across. Yet they work just fine for assembling small projects. And as a nice touch, the plastic protector pads attached to the jaws help prevent any marring of your workpiece.

To handle the assembly of a wide range of projects, it's best to have a few different lengths on hand. In the set shown, there are four clamps in three different sizes — 6", 12", and 24". You can expect to pay about $150 for this set.

ADDING SOME LENGTH

As I mentioned, the set of bar clamps shown will go a long way toward meeting your needs. But if you plan to glue up narrow boards into wider panels, or assemble a carcase for a cabinet, you'll want to add some longer clamps to your collection. And that's where pipe clamps and aluminum bar clamps come into play.

Pipe Clamps. The pipe clamps I like to use are the ones you see on the opposite page. These pipe clamps are the kind where you buy the jaw assembly and then attach a length of ½" or ¾" black iron pipe. (The heavy-duty ¾" *Pony* assembly with a 36" pipe will cost about $18.)

Since the pipe is separate, you can make the clamps any length you'd like. As a matter of fact, to make a "new" clamp, all you have to do is buy a new piece of pipe and swap out the old one. Or you can buy an inexpensive coupler and join shorter lengths of pipe together to create one long one.

Pipe clamps do have one drawback — they weigh quite a bit. That's not a problem if you're gluing up a panel on the top of your workbench. But they can be a bit cumbersome to handle if you're assembling a project on the floor of your shop.

Lightweight Length. So if I have a large assembly task to take care of, I rely on a set of long aluminum bar clamps. You can see these at the top of the opposite page.

These sturdy aluminum bars are hollow and lighten the weight of the clamp considerably. So you aren't likely to struggle with them while assembling a project — even if the clamps are fairly long. (I like the 48" length for the work I do.)

Like pipe clamps, aluminum bar clamps do have a drawback. They're a little more expensive than pipe clamps — around $90 for a set of four 48"-long clamps. But I think they're worth the money.

LET'S SPECIALIZE

There are times when you'll run across a tough clamping job that requires something a little more specialized than bar or pipe clamps. That's when a third set of clamps comes in handy — band clamps, C-clamps, and spring clamps.

Flexibility. Band clamps are a must-have for those assembly tasks where you just can't figure out how to make a "straight" clamp work, like a mitered picture frame.

The band clamp I use (see lower right photo) is nothing more than a long cloth strap that feeds through a metal ratchet assembly. After wrapping the strap around the project, you simply tighten it down with the built-in ratchet.

Putting on the Squeeze. When I really need a lot of clamping pressure, especially in one spot, C-clamps are my choice. I have a set of four 2" and two 3" clamps like the ones you see in the photo below.

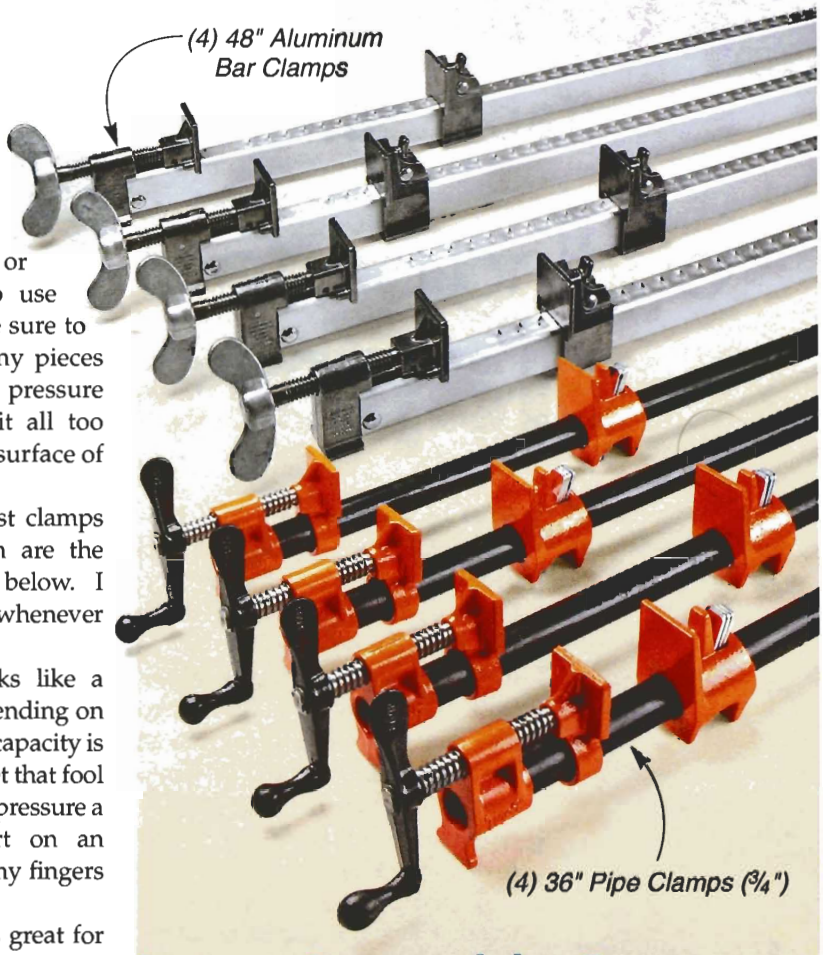
I use C-clamps any time I have to hold metal parts in place for drilling or assembly. You can also use them with wood. Just be sure to protect the surface of any pieces you clamp. The serious pressure you can apply makes it all too easy to put a dent in the surface of your workpiece.

Spring Power. The last clamps to add to the collection are the spring clamps shown below. I reach for a spring clamp whenever I need an extra "hand."

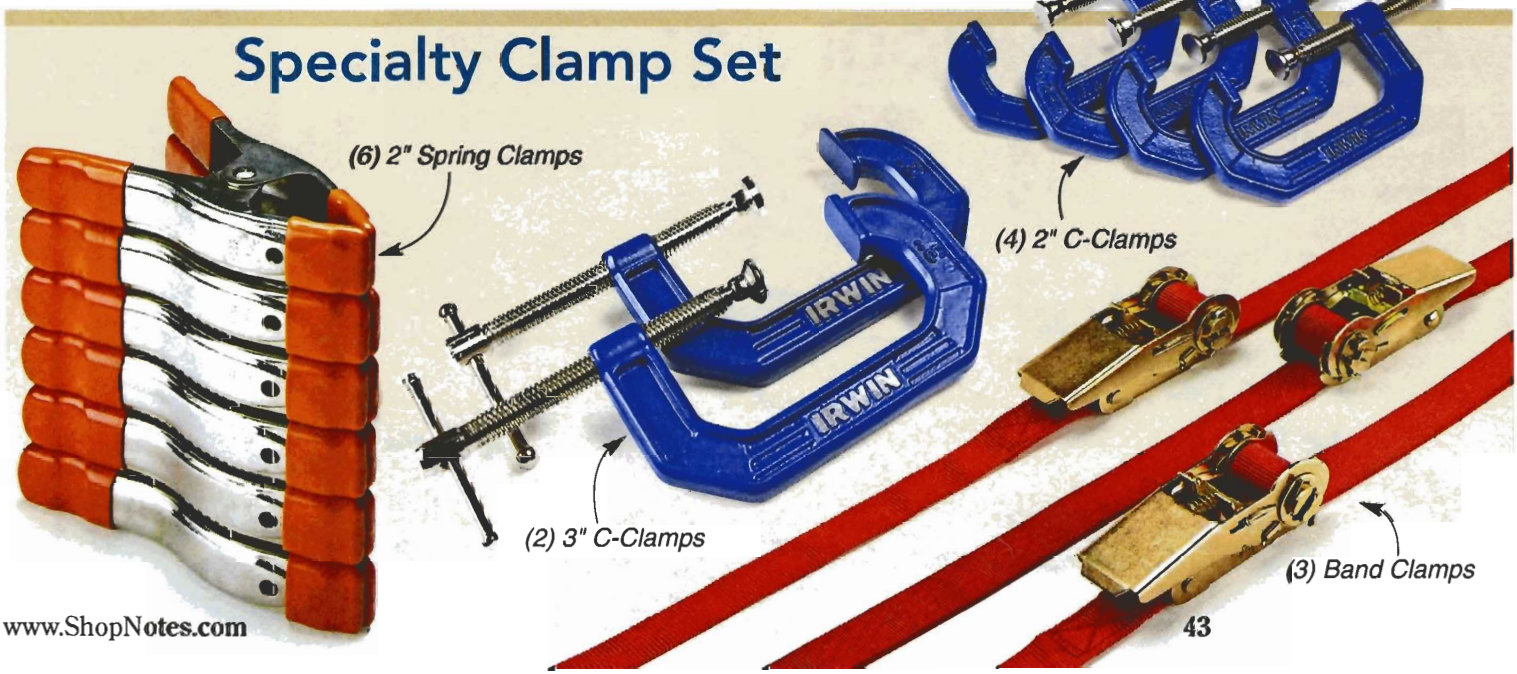
A spring clamp works like a giant clothespin. So, depending on the size of the clamp, the capacity is fairly limited. But don't let that fool you about the amount of pressure a spring clamp can exert on an assembly. (I've pinched my fingers enough times to know.)

A spring clamp works great for holding a stop block in place on a fence. Or to keep a small workpiece right where it needs to be until the glue dries. These clamps are inexpensive (about $3 apiece), so "spring" for a set of six 2" clamps when you get the chance.

Summing It Up. Buying clamps can be expensive. But the sets shown here allow you to build your collection over time. As I mentioned, the first two groups each cost $150 - $160. Adding in the specialty clamps will tack on another $100. Overall, it's a great set of clamps that will handle almost all your needs — and on a tab that won't break the bank.

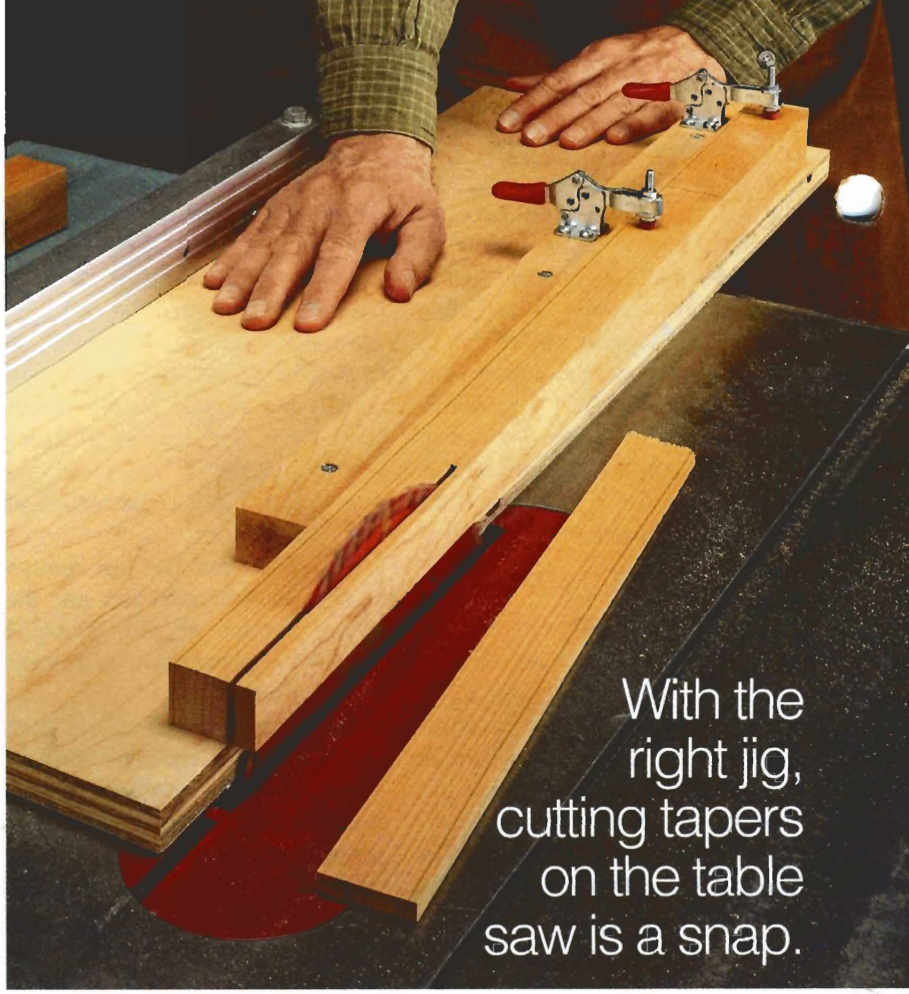


Long Assembly Set



Specialty Clamp Set

cutting perfect Tapers



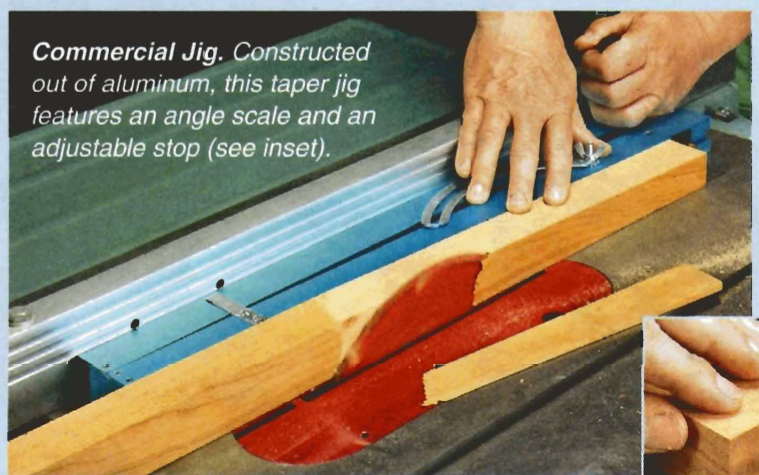
Most of us spend a lot of time tuning up our table saws to get dead-on straight cuts that are perfectly parallel with the rip fence. So the idea of using a table saw to make a tapered cut might seem a little strange. But in reality, tapered cuts are just straight cuts at an angle. The trick is to hold the workpiece at the *correct* angle for the taper you want. And all you need to do this is a taper jig.

Adjustable Jigs. When it comes to taper jigs, the first thing many woodworkers think of is a jig like the ones shown in the box below. This type of jig has two arms that are hinged at one end. You simply adjust the spread of the arms to suit the taper your project calls for. The rip fence is used to guide the jig past the saw blade.

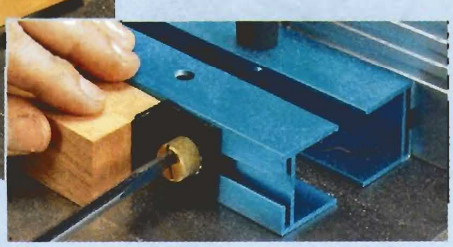
The advantage of this style of jig is that it's adjustable, so you can use it over and over to cut tapers of different angles. But there are a few drawbacks as well. Since the workpiece isn't fastened to the jig, you have to hold it against a stop at the back of the jig while pushing the entire assembly forward. So you're pushing and pulling at the same time, which can feel awkward.

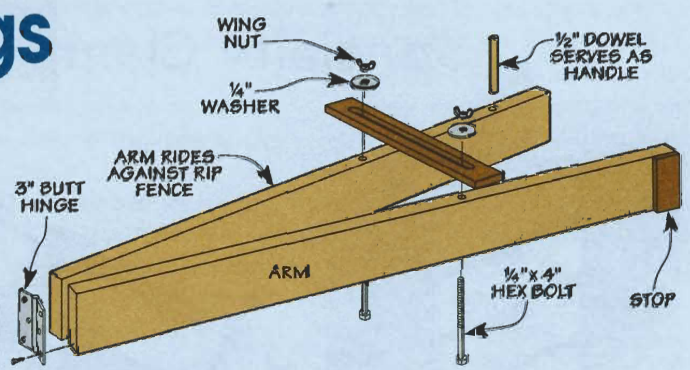
But the main reason I don't care for this style of jig is that if you're tapering a leg or narrow workpiece, it's hard to hold onto the workpiece and keep your fingers a safe distance away from the blade

What's Available:
Adjustable Taper Jigs



Commercial Jig. *Constructed out of aluminum, this taper jig features an angle scale and an adjustable stop (see inset).*





▲ ***Shop-Made Jig.*** *You can build your own taper jig out of a few scraps, a hinge, and a handful of other hardware.*

(see photo in box on the bottom of the opposite page).

Fixed Angle Jigs. Most of the time I prefer to just make a simple, one-time-use taper jig that is suited to the task at hand. (Take a look at the jig in the main photo on the opposite page for an example.)

The design of the jig you use will depend on the size and shape of your workpieces. But it doesn't have to be complicated. All it has to do is hold the workpiece at the correct angle while you cut the taper.

Usually, I just make a simple sled with a fence and a stop (see drawing at right). The fence holds the workpiece at the correct angle, and the stop prevents it from moving. Since the workpiece rides on top of the jig, all you have to do is push the jig forward.

Construction. There are a couple of tips to follow when making taper jigs. First, I like to make the base of the jig wide enough so that I have a safe place to put my hands while using the jig.

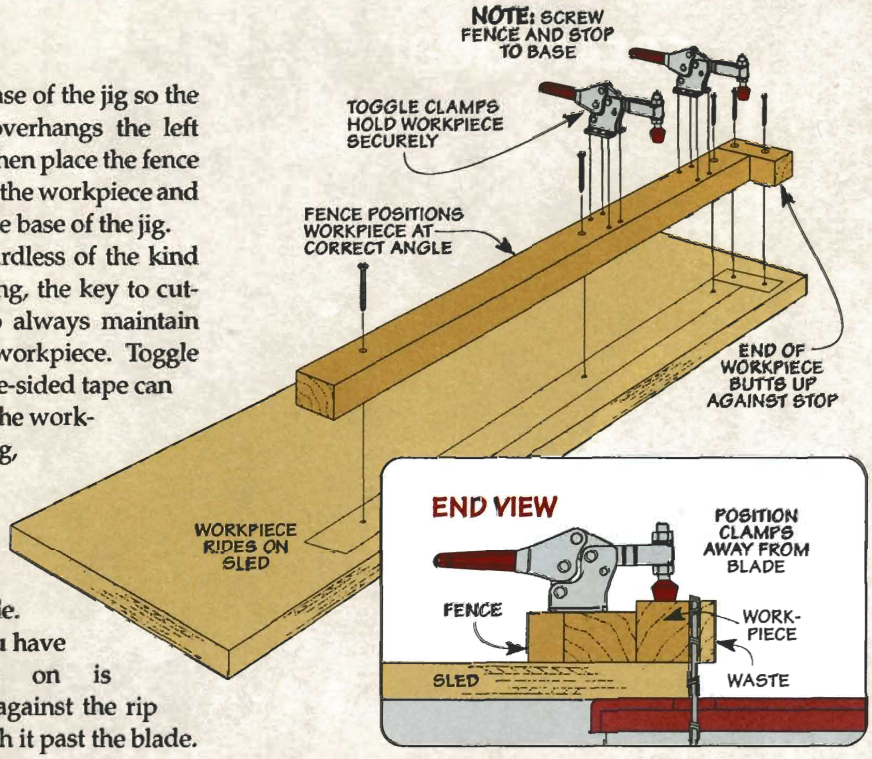
Second, when making the jig, I position the fence so the taper on the workpiece lines up with the edge of the jig. This way, the bottom of the workpiece is supported as the blade exits the cut.

To do this, simply lay out the taper on your workpiece and then place it on the base of the jig so the waste portion overhangs the left edge of the jig. Then place the fence and stop against the workpiece and screw them to the base of the jig.

Control. Regardless of the kind of jig you're using, the key to cutting tapers is to always maintain control of the workpiece. Toggle clamps or double-sided tape can be used to hold the workpiece to the jig, which allows you to keep your hands a safe distance from the blade. This way, all you have to concentrate on is keeping the jig against the rip fence as you push it past the blade.

Sometimes, there's no convenient way to secure the workpiece to the jig. You simply have to hold it against the stop. In these cases, I usually prefer to locate the stop at the leading end of the jig. That way, you are pushing the workpiece against the stop as you slide forward past the saw blade. This feels safer to me than trying to hold the workpiece against a stop.

Finally, if you're tapering a workpiece on all four faces, you'll need to take some extra steps, as shown in the box below.

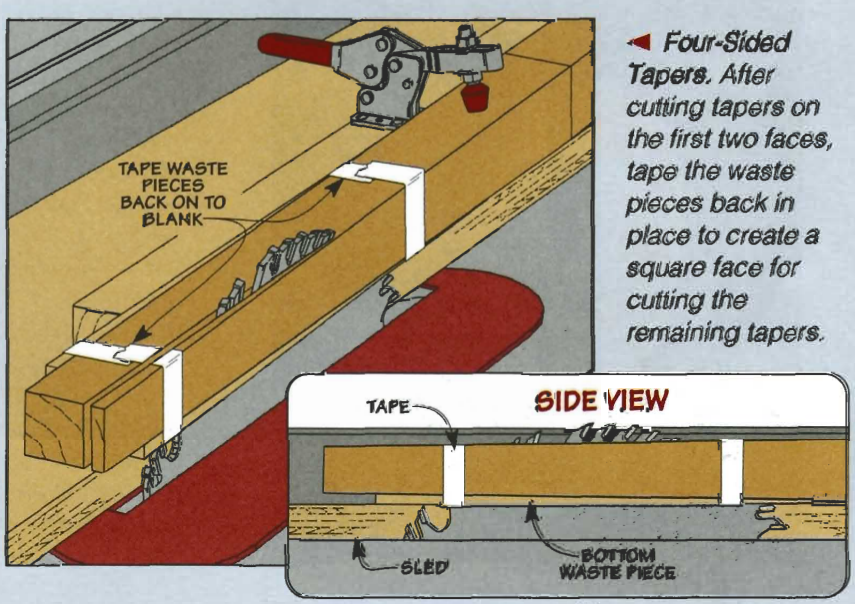


◀ *Hold-Down. Toggle clamps hold the workpiece securely, allowing you to keep your fingers clear of the blade.*

Technique: 4-Sided Tapers

Cutting a taper on one or two faces of a workpiece is pretty straightforward. But if you're cutting tapers on all four faces (like on a table leg, for example), you have a bit of a challenge. After cutting away the waste on the first two faces, you no longer have a straight edge to place against the fence of the jig to cut the remaining two tapers.

Depending on the type of jig you're using, there are a couple of ways to deal with this problem. One of the simplest is to first tape the wedge-shaped waste pieces back on to the two tapered faces of the workpiece. Then cut the remaining two tapers. (Because of the kerf, you will have to move the wedges down a bit on the workpiece as shown in the drawings.) This way, you maintain the original square shape of the blank.



◀ *Four-Sided Tapers. After cutting tapers on the first two faces, tape the waste pieces back in place to create a square face for cutting the remaining tapers.*

wind it up right with Cord Reels

Are your extension cords always a mess? Cord reels can help you clean up the tangle.

Using an extension cord in the shop is almost inevitable. The problem — no matter how carefully you coil up the cord and put it away, it always seems to end up in a tangled mess. And spending time undoing the mess means spending less time working on a project.

To avoid this problem, you might want to add a cord reel to your set of "tools." A cord reel is just a storage "box." It simply keeps a cord perfectly coiled so it's ready to use — without any tangled mess.

Cord Reel Styles. Cord reels come in two styles. The first is a fixed (mounted) unit that you can attach to a ceiling or wall, like the ones you see above and at left.

The other style of cord reel is portable, like the ones you see in the margin on the opposite page. With a portable cord reel, you can have a power cord in your shop, in the house, and wherever you need one. (For sources, turn to page 51.)

Depending on the features, cord gauge, and style, cord reels vary quite a bit in cost (from $10 portable models to $100 fixed reels). So how do you decide what you need?

FIX IT IN PLACE

In my shop, it's important to get an extension cord out quickly and easily when I need it. And then be able to put it away just as fast.

Auto-Lock & Retract. That's the reason I mounted a retractable cord reel in the center of my shop ceiling. An adjustable stop at the end of the cord (see photo) keeps the plug within easy reach. Simply pull the cord out to where you need it and it automatically locks in place. It's like pulling down a window shade.

But there's something even better. When you're done, just give the cord a little tug and the spring-loaded reel automatically retracts the cord into the case quickly and easily. In fact, it's so fast, it's a good idea to control it by hand so the cord doesn't whip around.

Added Features. Another handy feature on some cord reels is they'll often have a "triple tap" at the end of the cord, as in the photo above. So you can plug in up to three tools without having to deal with the hassle of swapping cords around while you work.

The tap can even be lighted to let you know the reel is plugged in. And if you should overload the cord, some reels have protection built right in. So you can reset the unit after removing the load from the cord.

Even though you can plug in up to three tools, you're not going to want to run all of them at the same time. The main reason is most fixed cord reels (like the one at left) contain 14-gauge cords designed for medium-duty. If you need a heavier-duty model, consider the *Luma-Site* reel with a 12-gauge cord, as shown in the main photo.

The WonderWinder. Most fixed reels come with the extension cord built in. To make use of an extension cord you already have, take a look at the cord reel above.

Although it looks a little unconventional, the *WonderWinder* is a handy little cord reel. Once you're done with the cord, simply crank the handle (you can mount it for left or right-hand use) and wind the cord back into the mesh basket underneath. The reel comes with two wall-mounts, so you can just "pop" it off the wall and use your cord in another location.

PORTABLE POWER

The fixed cord reel in my shop sees a lot of use. But if I'm working around the house or even out in the yard, I want to be able to take my extension cord with me. So I also have a portable cord reel, like the ones at the right, when I need a little extra "reach" away from the shop.

Wind It Manually. One downside of a portable cord reel is it doesn't have an automatic retract feature. So you'll have to wind the cord back into the reel by hand. Now that's usually not a big deal, but it's something to consider if the cord reel has 100' of cord on it.

Like most fixed reels, these portable models feature multiple outlets. But here, the outlets are built into the face of the reel, like you see at right.

Most of the cords on these units are designed for light to medium duty. So you have to be sure not to overload the reel trying to use more than one tool at a time. Or even a single tool that draws a lot of power.

One last choice. If you'd like a portable reel for an extension cord you already have, check out the box below. It features a unique portable cord reel I'm going to be using in my workshop.

Light-Duty. *This cord reel is compact and lightweight. So it's fine for light-duty use around the home and shop.*

Medium-Duty. *A longer (100'), 14 gauge cord makes this reel the perfect choice when the nearest outlet is a long distance away.*

A Portable Pail: RAP-100 QuickWinder

One of the more interesting cord reels I've run across is shown at the right. It's the *RAP-100* from *Reel-A-Pail, Inc.* At first glance, the reel looks more like a typical drywall bucket. But it's what's on the inside that makes it work like a charm.

A cord mount slipped inside the bucket allows you to quickly and easily wind up a cord using the fold-down knob. I was amazed at how little time this took. And unwinding the cord is just as smooth. You can install the cord so either the plug or outlet will roll out right behind you as you walk away.

The bucket is attached to a solid base that you can mount to a wall or bench if you'd like. But I find that keeping it portable makes it easy to use anywhere I need it.

The *RAP-100* is part of the *QuickWinder Reel System.* This system features reels that will hold up to 1600' of any type of corded product (depending on the diameter of the cord). So you can store and use anything in the reel, from rope and wiring, to air hoses and communication cabling.

The *RAP-100* goes for about $55. For sources, turn to page 51.

Hoist systems for the home raise storage solutions to new heights.

add storage with Lift Systems

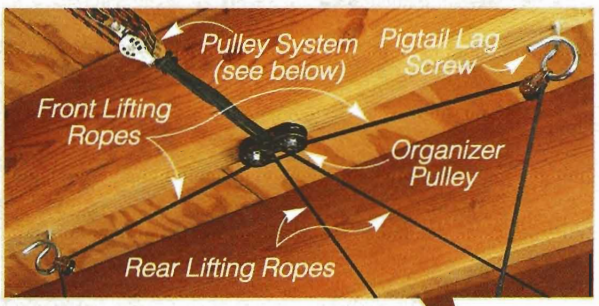
Ever stand in your garage or basement, look at all your stuff, and wonder where you're going to put it all? The answer is, "Just look up."

Home-storage solutions are moving off the floor, past the walls, and onto the ceilings of shops and garages. And with ceilings in the typical new garage averaging 11' high, that's a lot of space that could be put to good storage use. One popular lift system is the *ProStor HeavyLift* (in box on opposite page) and the other is the *Harken Hoister*.

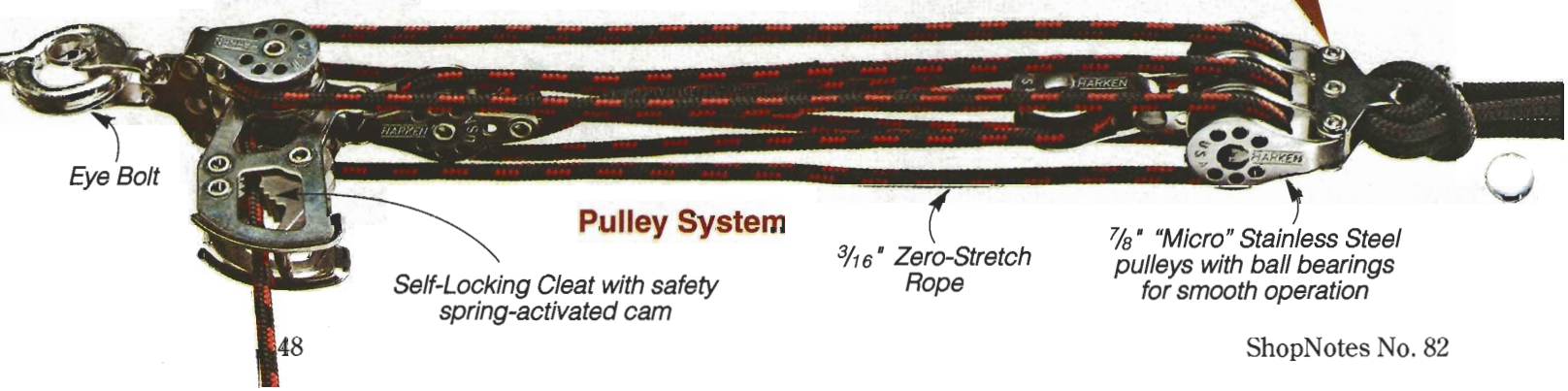
Block-and-Tackle. The *Hoister* features a block-and-tackle system of ropes and pulleys, like you see below. The photo may look a little intimidating at first glance, but don't worry. The system comes already assembled for you. All you have to do is follow the simple instructions. First, install the pigtail lag screws into the ceiling trusses or rafters. Then thread the ropes through the corresponding pulleys, as you can see in the photo on the right. You can plan on spending about two hours putting it together and fine-tuning it.

Small, Yet Strong. The first thing you'll notice when you get the *Hoister* is how small it is. But, in this case, small doesn't mean cheaply made. The pulleys are about the same diameter of a quarter. And the ropes are skinnier than a No. 2 pencil. Yet this system is designed to raise and lower as much as 200 lbs. worth of stuff just by pulling a single rope.

So, how can it be so strong? All the metal parts are made out of stainless steel. The pulleys turn on ball bearings for smooth operation. The hoisting rope is secured by a self-locking cleat that prevents the load from falling if the rope is acci-



8:1 Mechanical Advantage. *The Hoister's pre-assembled pulley system makes it easy to lift loads.*



dentally released. In fact, the only reason to tie it off is to get the rope off the floor and out of the way.

Mechanical Advantage. If 200 lbs. sounds like a lot of weight, *Harken* has built "mechanical advantages" into its lift systems. For example, the four-point system pictured on the opposite page has an 8:1 mechanical advantage. That's like lifting a grown man with the same effort you'd use to pick up a toddler.

Another example is the single-point *Hoister* pictured at the right. Its maximum weight capacity is 45 lbs., and it has a mechanical advantage of 2:1. Imagine lifting a 40-pound bag of dog food, and having it feel like it weighs only 20 lbs. Now, let's look at other available configurations for the *Hoister*.

Configurations. The *Hoister* comes in configurations with one, two, and four attachment points. All configurations use straps to lift the loads, but you can also build a simple, shop-built platform for the four-point system to store several smaller items together, like the one shown in the main photo on the opposite page. (The instructions for the platform are included in the package and are available online).

I've already mentioned the single-point system above. It's the perfect setup for storing bicycles, wheelbarrows, or stepladders. The two-point *Hoister* has a maximum load of 60 lbs. and a 3:1 mechanical advantage. It's designed for such items as kayaks, extension ladders, and removable car seats.

The four-point *Hoister* comes in four weight categories, up to 200 lbs. — not enough to lift your riding lawn mower but plenty to store a number of bicycles for the winter. Another feature is that it will lift loads evenly, no matter how the weight is distributed.

Harken has *Hoister* models for ceiling heights up to 16'. The only real concern here is that the distance from the organizer pulley (inset photo at bottom of opposite page) to the wall must at least equal the lifting distance. That ensures there's enough rope to lift the load all the way to the ceiling. And if your garage ceiling is high enough, you can simply drive underneath the *Hoister*, wrap the straps around your canoe, lift it right off your car or pickup, and leave it hanging there until springtime.

Planning. If you're thinking the *Hoister* could solve some of your storage problems, there are a few planning questions to answer. First, you'll need to decide what you want to store and figure out how much those items weigh. Second, take a look at the possible storage area. Will the *Hoister* fit where you want it to? And will your garage door still open?

Smaller Items. *The Hoister one-point configuration is perfect for tight areas and light loads.*

Third, how high do you need to lift the items to get them out of the way? And the final thing to determine is how wide are the items you want to store? You don't want them hanging off the sides and falling.

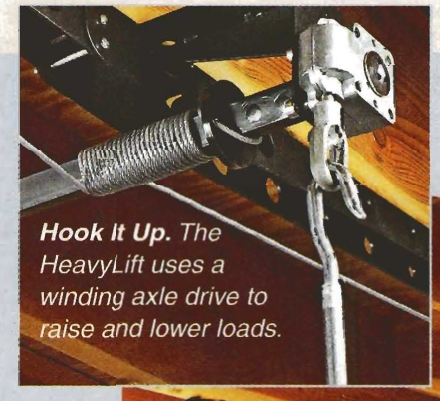
All priced under $200, the several configurations of the *Hoister* can take advantage of storage space that would otherwise be wasted. It literally takes home storage to new heights.

ProStor HeavyLift

Another popular hoist system for home storage is the *ProStor HeavyLift*. Taking a different approach, it uses cables and a winding axle as its lift system. The axle locks automatically and won't raise or lower without the winding axle actually being turned.

It comes with its own 4' x 4' lightweight steel platform and attaches to the ceiling with heavy-duty steel support beams. The cables are easy to adjust, and the eyebolts attaching the platform to the cables allow for additional leveling.

The *HeavyLift* takes less overall ceiling space than the *Hoister*, and installation was easy. However, the one drawback was that the hand crank became harder to turn and would unhook itself under heavier loads.



Hook It Up. *The HeavyLift uses a winding axle drive to raise and lower loads.*

▼ *Crank It Up. The HeavyLift comes with its own platform and uses heavy duty steel beams to support heavy loads.*

Q&A

questions from
Our Readers

Woodworkers always seem to be concerned about the bevel angle when sharpening woodworking chisels. Is the angle of the blade really that important?
Bruce Charlton
Turlock, CA

finding the The Right Angle for your chisels

Selecting the bevel angle for any cutting tool is always a trade-off between durability and ease of cut. This is especially true when it comes to woodworking chisels.

Blade Sharpness. The ability of a chisel blade to cut through wood is determined by the sharpness of its cutting edge. This edge is formed where the back surface of the blade meets the bevel of the blade (see detail below).

But sharpness isn't the only important thing in a cutting edge. You want it to be durable as well.

Durability. The type and quality of the steel in a blade affects the ability of the blade to stay sharp. But it's also determined by the amount of steel that's located directly behind the cutting edge.

This thickness determines how well the cutting edge is supported and how much impact the blade is able to absorb. This means that chisels meant for different jobs need different bevel angles.

Most chisels, like those in the photo at the top of the page, come from the manufacturer with a predetermined bevel angle. This gives you a starting point, but you'll usually need to do some sharpening and create a bevel angle that's right for the job the chisel is meant to do.

Bench Chisel. The type of chisel I use the most is my bench chisel with a bevel angle of 25°. It's a general-purpose chisel so the angle is balanced to give you the best of both worlds. This way you get the easy cutting ability of the lower angle and the durability of a more steep bevel angle.

Paring Chisel. There are times I need to make finely controlled cuts. To do this, I need to be able to push the chisel by hand through the wood with little resistance.

A paring chisel with its low bevel angle works best for this work. There's less resistance against the edge as it cuts the wood and minimal stress on the blade.

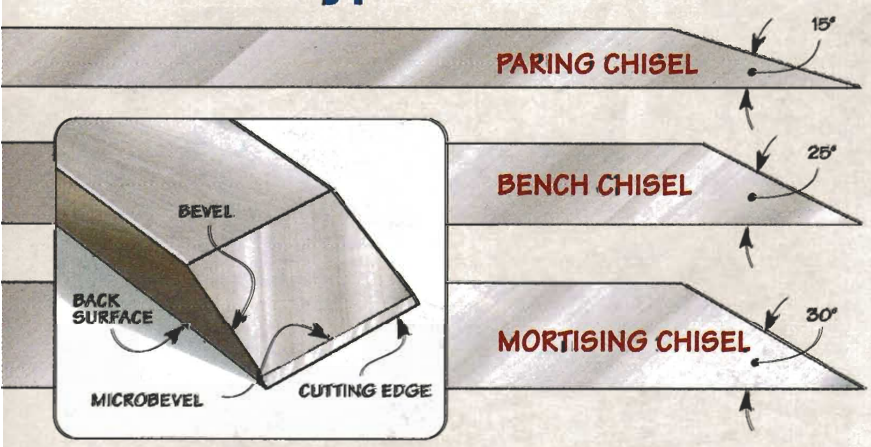
Mortising Chisel. On the other hand, sometimes heavy cuts, like cutting through dense wood, or making an end grain cut is called for. For this kind of work, I turn to my mortising chisel with its high bevel angle (see illustration below).

The steeper angle places more metal behind the cutting edge. So it's able to absorb more impact without dulling or breaking. They have reinforced handles so they can be used with a mallet to drive them through the cut.

Microbevel. One way to add some of the benefits of a steep bevel angle to your chisel is to add a secondary angle, or microbevel (see inset at left). Rather than sharpening the entire bevel, you simply increase the angle slightly at the very edge. Eventually, you'll need to reshape the bevel and add a new microbevel to the edge.

So any way you cut it, having the right angle on your chisel makes the work go a lot easier.

Chisel Types



Sources

SHELF PINS & GUIDES

You can find shelf pins and supports at most home centers and several of the sources listed in the margin.

The *Woodsmith Store* and *Rockler* carry the clear plastic drilling guide featured on page 12, along with a variety of drill bits to fit the jig.

Woodhaven carries two versions of a ¼"-thick phenolic drilling guide. One is set up for holes on 1" centers and the other is 32mm on center. *Woodhaven* also carries self-centering drill bits to use with the jig, as well as guide bushings and spiral bits, if you'd rather use your router to make the holes.

MITER SAW WORKCENTER

There's quite a bit of hardware required to build the miter saw station (page 16). The basic items can be picked up at most hardware stores and home centers. But there are a few that you'll probably need to order.

The *Woodsmith Store* carries the flip stop (456390), the 24" and 48" T-track (456306, 456112), and the 12'-long, self-adhesive measuring tapes (273739, 273740).

Rockler carries the flip stop (21341) and T-track (21739, 21753), along with the 1½" and 2½" flange bolts (83311, 33939), no-mortise hinges (28688), 1¼" round knob (43131), shelf supports (30437), and levelers (24315).

The other knobs you'll need are from *Reid Tool*. The part number for the 5/16" x 1½" knob is DK-22. And the number for the 5/16" through-hole knob is DK-82.

TOOL TOTE SAWHORSE

You can probably get all the hardware you need for the tool tote sawhorses on page 28 locally. But if you have problems finding the knobs, *McMaster-Carr* has one you can use (5993K42).

MARKING GAUGES

For the marking gauges on page 32, *Small Parts, Inc.* has the ⅛"-thick aluminum sheet (SMA-125-B) you'll need. They also carry the ⅜"-dia. aluminum rod (ZRA-06-12) and the ½"-dia. rod (ZRA-08-12).

McMaster-Carr carries similar material along with the wax (1009K22) used to coat the band saw blade before cutting the aluminum.

The *Woodsmith Store* has buffing wheels (220770) and the polishing compounds (362247). Finally, most auto parts stores have products for cleaning and protecting aluminum.

CLAMPS

The clamps featured in the article on page 42 are available at woodworking stores and some of the mail-order sources at right. If you're looking for a convenient way to put a set of clamps together for your shop, the *Woodsmith Store* has packaged the clamps into the three sets detailed in the article.

CORD REELS

You can find light-duty fixed and portable cord reels at most hardware stores, home centers, and a couple of the sources in the margin.

If a heavier-duty model (shown in the main photo on page 46) is more to your liking, you can order one from *Puckett's* by asking for the *Luma-Site* (04820). A similar reel (03K51.05) is available from *Lee Valley*.

For the *WonderWinder*, contact *Lee Valley* or *Griot's Garage*. And the *RAP-100* can be ordered from the *Woodsmith Store* or *Reel-A-Pail*.

LIFT SYSTEMS

The *Harken Hoister* lift systems featured on page 48 are available directly from the manufacturer (see margin). You'll need to know the lift height and weight requirements to select the correct model. Prices range from $36 to $170. Their website also lists local retailers.

The *ProStor HeavyLift* (PHL-1R) is available from *Racor, Inc.* for about $180. *Racor* carries a number of other storage systems you might want to take a look at as well.

MAIL ORDER SOURCES

Similar project supplies may be ordered from the following companies:

Woodsmith Store
800-444-7002
WoodsmithStore.com
Buffing Wheels & Compounds, Clamps, Flip Stop, Self-Adhesive Measuring Tapes, T-Track, Shelf Pin Drilling Guide, RAP-100 Cord Reel

Rockler
800-279-4441
www.rockler.com
Clamps, Flange Bolts, Flip Stop, Hinges, Knobs, Levelers, Self-Adhesive Measuring Tapes, Shelf Supports, Shelf Pin Drilling Guide, T-Track, Taper Jig

Reid Tool
800-253-0421
www.reidtool.com
Knobs

Griot's Garage
800-345-5789
www.griotsgarage.com
Cord Reels

Reel-A-Pail
www.quickwinder.com
Cord Reels

McMaster-Carr
630-833-0300
www.mcmaster.com
Aluminum Rod & Sheet, Cord Reels, Cutting Wax, Knobs

Lee Valley
800-871-8158
www.leevalley.com
Cord Reels

Woodhaven
800-344-6657
www.woodhaven.com
Shelf Pin Drilling Guide, Taper Jig

Puckett Tools & Equip.
800-544-4189
www.pucketttools.com
Cord Reels

Small Parts, Inc.
800-220-4242
www.smallparts.com
Aluminum Rod & Sheet

Harken Inc.
262-691-3320
www.hoister.com
Harken Hoister

Racor, Inc.
800-783-7725
www.racorinc.com
ProStor HeavyLift

Scenes from the Shop

Marking Gauge. *It isn't often that you can craft a fine tool in just an afternoon. But with a little time, a scrap of hardwood, and some aluminum rod and sheet stock, you can create your own pair of fine marking gauges, like the one shown above. The article that begins on page 32 will take you step-by-step through the process of making and assembling the marking gauge. And when that's complete, you can turn to page 36 for information on polishing the aluminum to a mirror-like finish, as in the inset photo at right.*

ShopNotes

Cutting Diagram

tool tote

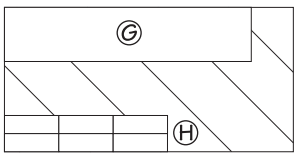
Sawhorses

Materials & Hardware

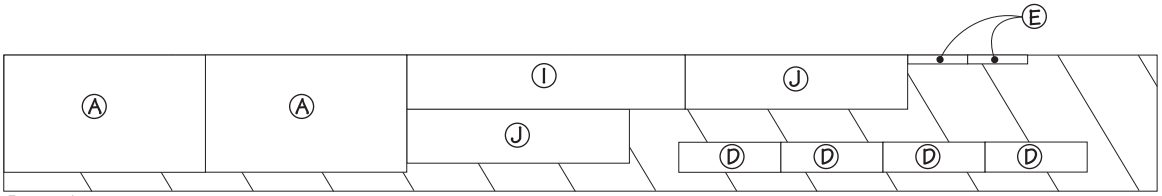
A	Ends (2)	¾ x 9 - 16¾
B	Bottom (1)	½ x 9 - 21
C	Sides (2)	½ x 6¼ - 22
D	Feet (4)	¾ x 2½ - 8½
E	Stops (2)	¾ x ¾ - 5
F	Tray Sides (2)	½ x 2 - 20½
G	Tray Bottom (1)	4½ x 20½ - ¼ Hdbd.
H	Tray Dividers (6)	1½ x 4½ - ¼ Hdbd.
I	Support Piece (1)	¾ x 4½ - 23⅛
J	Uprights (2)	¾ x 4½ - 18
K	Stiffeners (2)	½ x 2 - 23⅛

*(Material and Hardware for one (1) Tote)

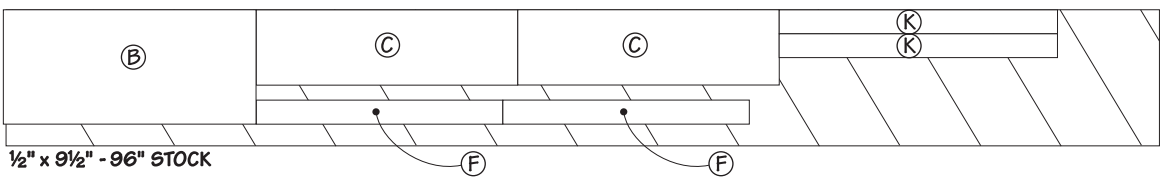
- (4) ¼" x 1½" Carriage Bolts
- (4) ¼" Lock Nuts
- (4) ¼" Washers
- (2) ⅜" T-Nuts
- (2) ⅜" Washers
- (2) ⅜" x 1½" Studded Knob
- (4) #8 x 1¼" Fh Woodscrews
- (4) #6 x 1" Fh Woodscrews



12" x 24" - ¼" HARDBOARD



¾" x 9½" - 96" STOCK



½" x 9½" - 96" STOCK

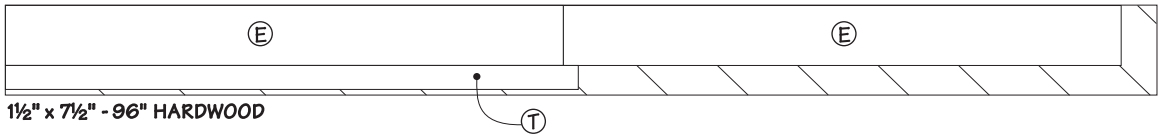
ShopNotes Cutting Diagram

the Complete Miter Saw Workcenter

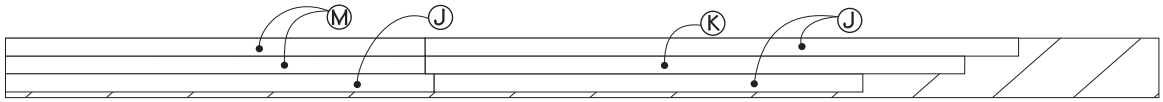
Materials

CABINET		
A	Side Panels (2)	34 x 35 - ¾ Ply.
B	Back (1)	35 x 47½ - ¼ Hdbd.
C	Bottom (1)	33¾ x 47¼ - ¾ Ply.
D	Center Panel (1)	29¼ x 33¾ - ¾ Ply.
E	Supports (2)	1½ x 5 - 46½
F	Shelves (2)	32¾ x 22¾ - ¾ Ply.
G	Shelf Edging (2)	¾ x 2 - 22¾
H	Top Cleats (4)	¾ x ¾ - 22⅞
I	Top (1)	35 x 48 - ¾ Ply.
J	Edging (1)	¾ x 1½ - 122 (rgh)
K	Face Frame Top Rail (1)	¾ x 1½ - 45
L	Face Frame Lower Rail (1)	¾ x 5¾ - 45
M	Face Frame Side Stiles (2)	¾ 1½ - 35
N	Face Frame Center Stile (1)	¾ x 1½ - 27¾
SAW TABLE		
O	Side Support (1)	34 x 35 - 1½ Ply.
P	Side Support Edging (1)	¾ x 1½ - 72 (rgh)
Q	Tabletop (1)	31½ x 32 - ¾ Ply.
R	Table Sides (2)	¾ x 3¼ - 31¾
S	Table Front/Rear (2)	¾ x 4 - 31½
FENCE/MOUNT/STOP SYSTEM		
T	Extension Bar (1)	1⅛ x 1¹¹⁄₁₆ - 47¾
U	Mounting Plate (1)	¾ x 2 - 43
V	Fence Back (1)	¾ x 2 - 43
W	Fence Top (1)	¾ x 2½ - 43
X	Fence Face (1)	¾ x 2¾ - 43
Y	Fence Core (1)	¾ x 1¾ - 43
Z	Extension Back (1)	¾ x 2 - 4¾
AA	Extension Top (1)	¾ x 2½ - 4¾
BB	Extension Face (1)	¾ x 2¾ - 4¾
CC	Extension Core (1)	¾ x 1¾ - 4¾
DD	Mounting Spacers (2)	¾ x 2 - 24
EE	Stop Block (1)	¾ x 3 - 3
FF	Key (1)	¼ x ⅜ - 3
GG	Auxiliary Fence (1)	¾ x 2¼ - 24
WALL CABINET/DOORS		
HH	Side Panels (2)	12 x 24 - ¾ Ply.
II	Back (1)	24 x 47½ - ¼ Hdbd.
JJ	Top/Bottom (2)	11¾ x 47¼ - ¾ Ply.
KK	Divider (1)	11¾ x 21¾ - ¾ Ply.
LL	Lower Cleat (1)	¾ x ¾ - 46½
MM	Upper Cleats (2)	¾ x 1½ - 22⅞
NN	Shelves (3)	11 x 22⅞ - ¾ Ply.
OO	Edging (3)	¾ x 1½ - 22⅞
PP	Stiles (2)	¾ x 1½ - 24
QQ	Top/Bottom Rails (2)	¾ x 1½ - 45
RR	Center Stile (1)	¾ x 1½ - 21
SS	Door Stiles (4)	¾ x 2½ - 20⅞
TT	Door Rails (4)	¾ x 2½ - 17⅜
UU	Door Panels (2)	17⅜ x 16⅝ - ¼ Ply.
VV	Door Catches (2)	¾ x ¾ - 2

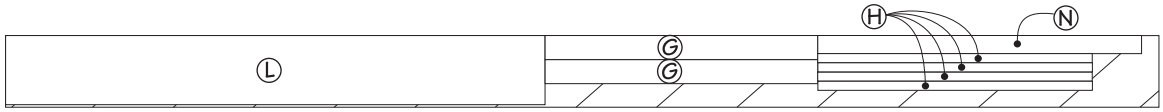
CABINET



1½" x 7½" - 96" HARDWOOD



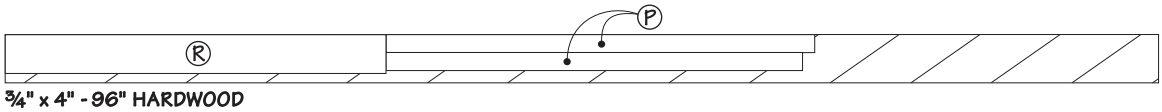
¾" x 5" - 96" HARDWOOD



¾" x 6" - 96" HARDWOOD

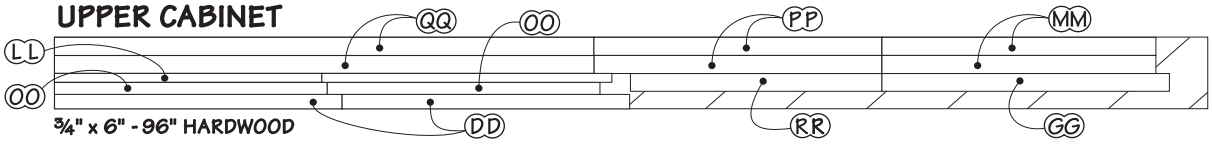
SAW BASE and SUPPORT

¾" x 5" - 96" HARDWOOD



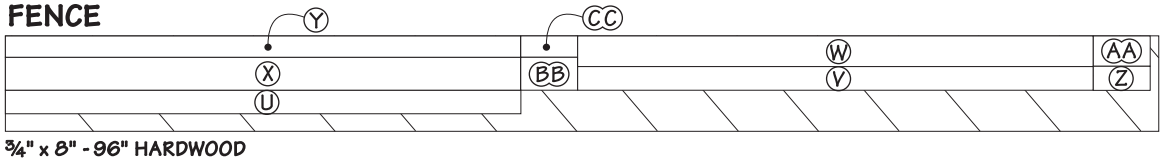
¾" x 4" - 96" HARDWOOD

UPPER CABINET



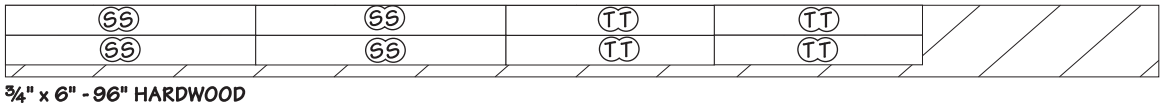
¾" x 6" - 96" HARDWOOD

FENCE

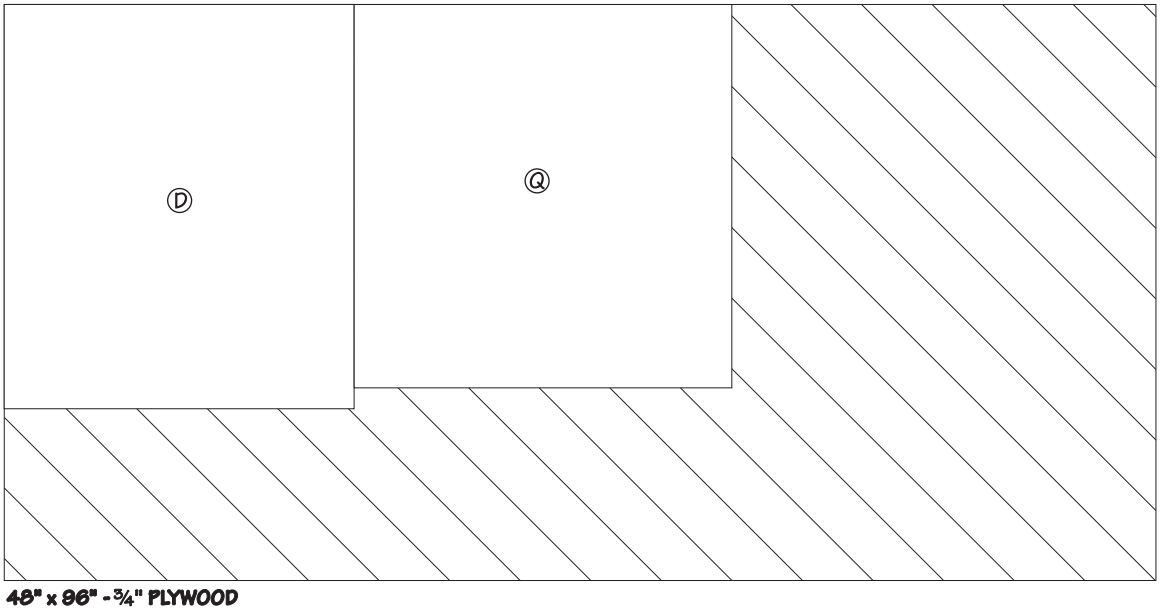


¾" x 8" - 96" HARDWOOD

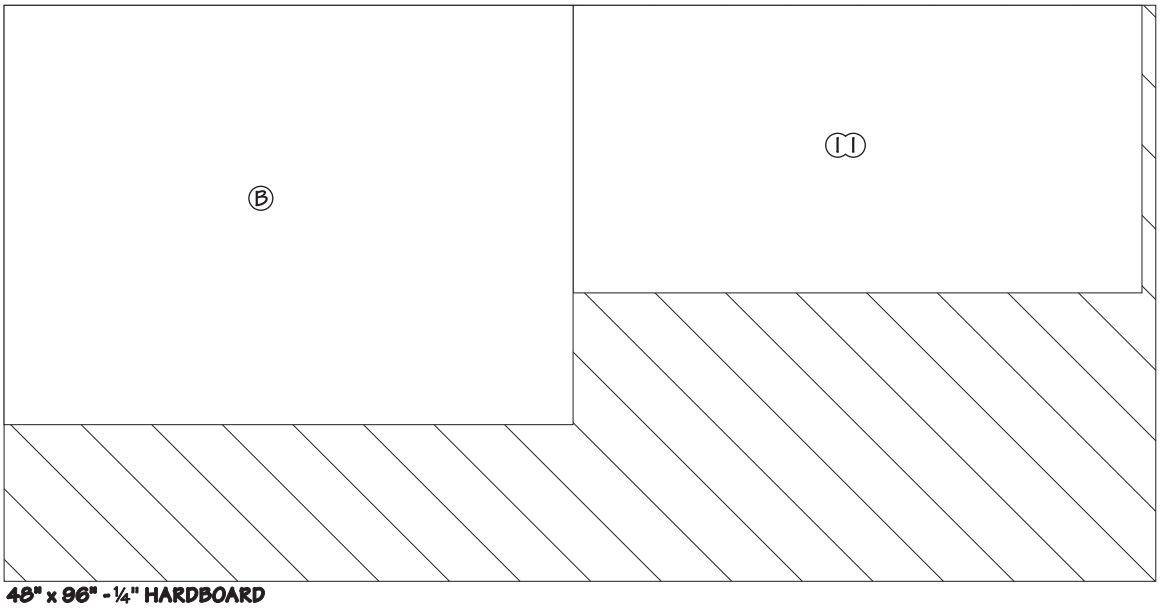
DOORS



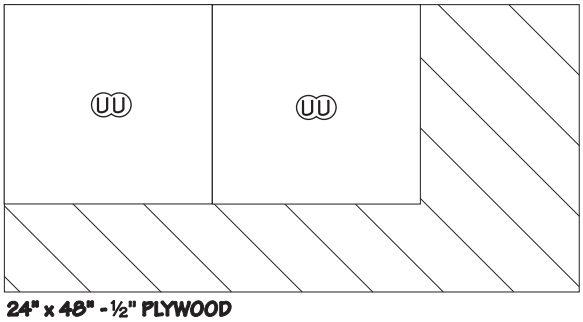
¾" x 6" - 96" HARDWOOD



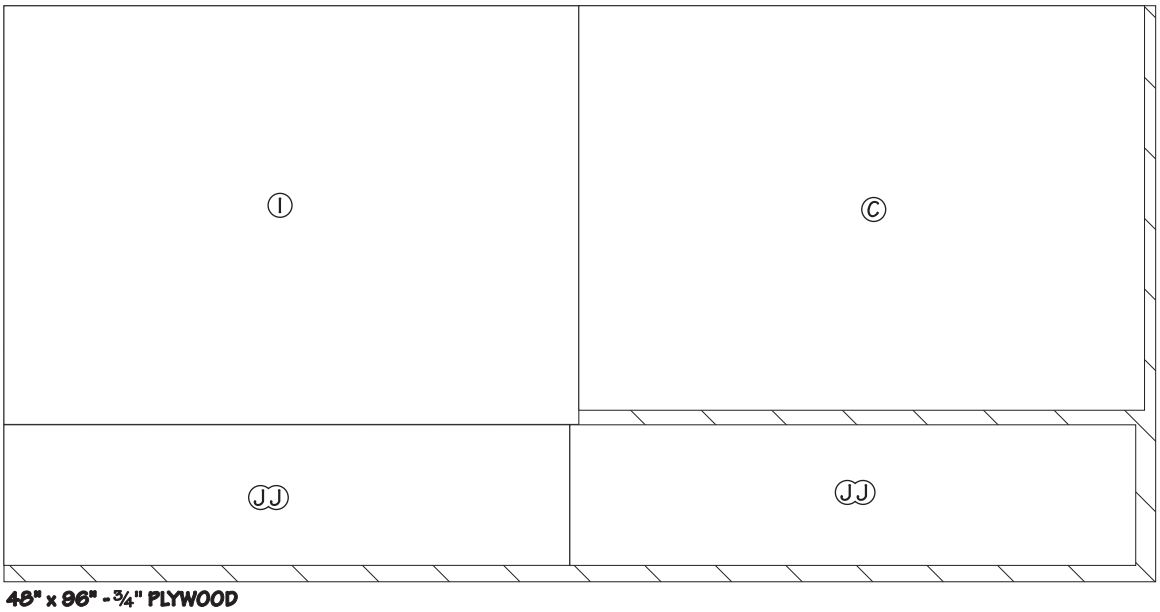
48" x 96" - ¾" PLYWOOD



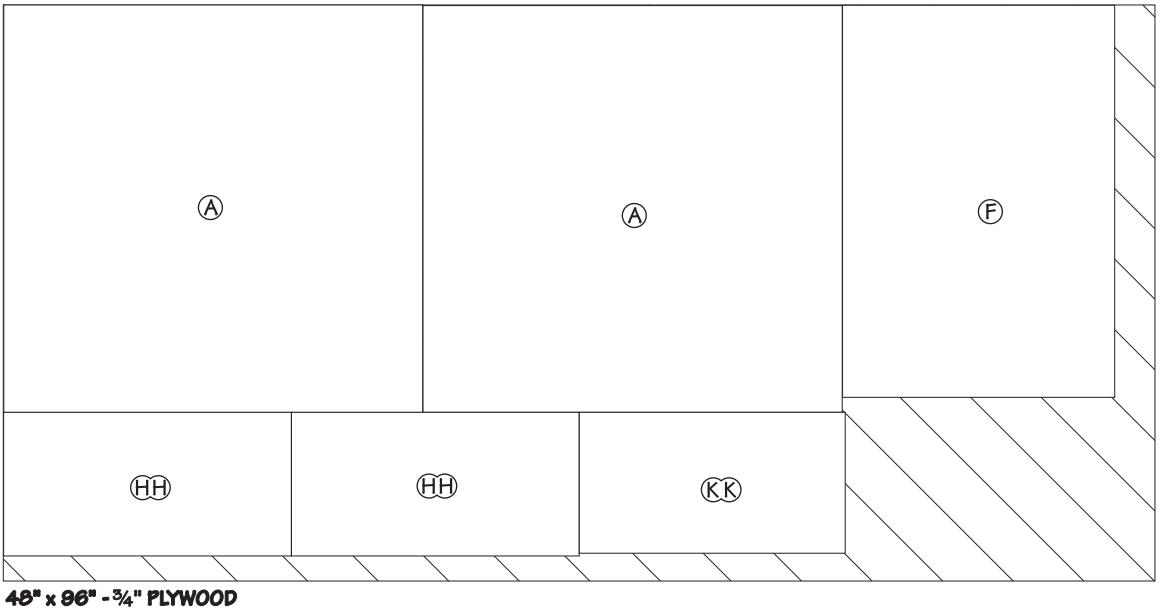
48" x 96" - ¼" HARDBOARD



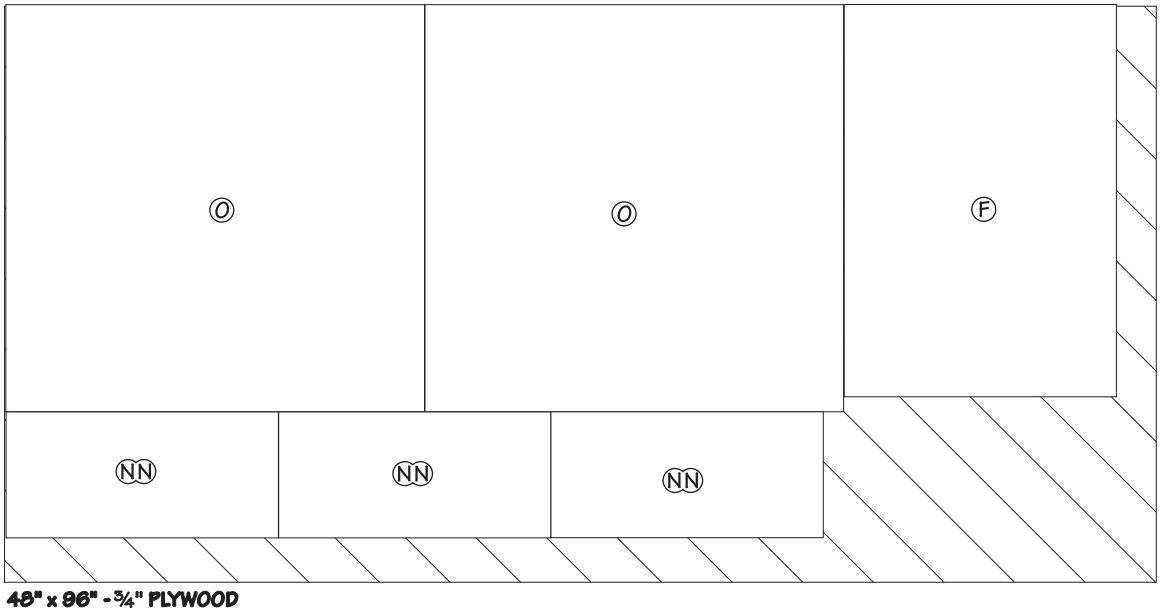
24" x 48" - ½" PLYWOOD



48" x 96" - ¾" PLYWOOD



48" x 96" - ¾" PLYWOOD



48" x 96" - ¾" PLYWOOD

