TIPS & TRICKS
Cutting Long Parts

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Readers' Tips page 4

Rounding Edges page 10

Foam Storage page 48

Contents

Features

Departments

Tablet Case
page 18

Cutoffs

When *ShopNotes* started over 20 years ago, the main goal was to provide a resource for woodworkers who wanted to talk about shops, the tools we use, and the tips and techniques for getting the best results — regardless of the task at hand.

A lot has changed since then — the number of pages, our growing online presence, and electronic media, to name just a few. But our core mission remains the same: To supply you with the best information available so you can get the most out of your shop and the time you spend in it.

This issue has all that and more. Unfortunately, there's not enough space here to cover all the great information you'll find inside. I'll leave that for you to discover. But if you have any thoughts about how we can bring you more woodworking in the way you'd like to receive it, send me a note. I'd be interested to hear your ideas on the best way to do that — not just in print, but in your shop, online, and on-the-go.

Bryan

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from our Readers

Tips for Your Shop

THE WINNER!

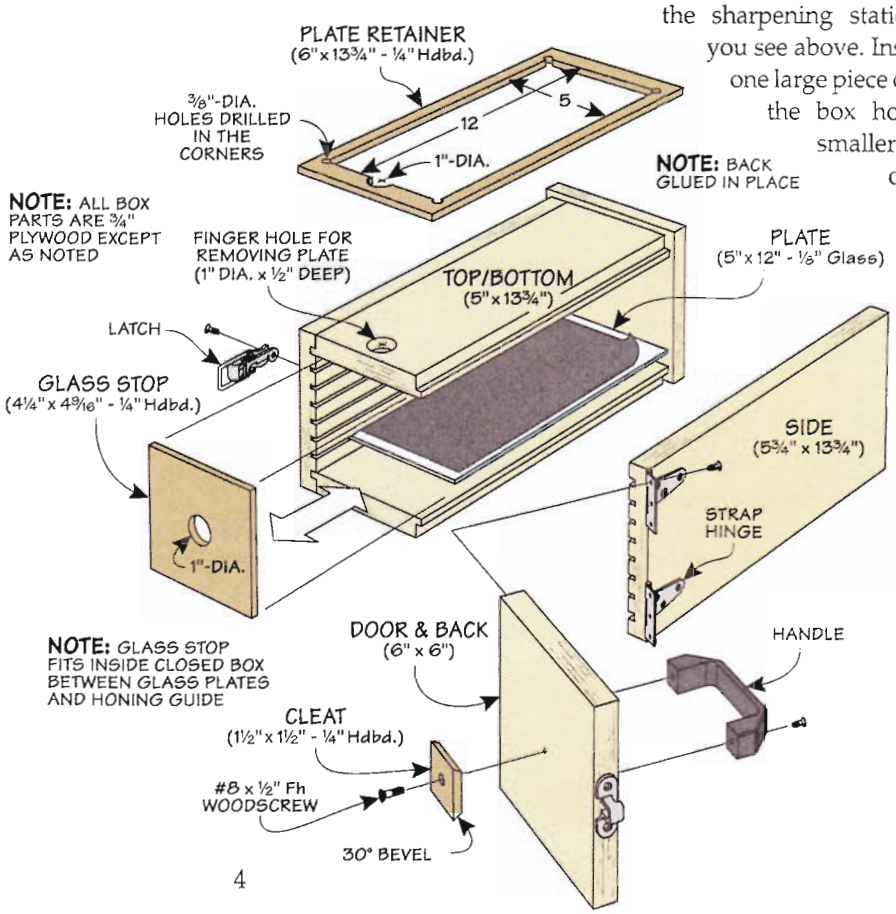
Sharpening Box

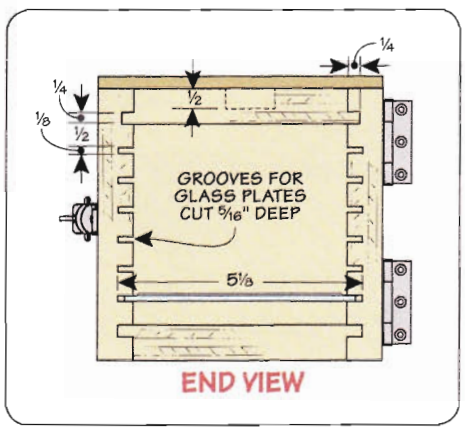
I like to use sandpaper on glass to sharpen my chisels and plane irons. But in my cramped little workshop I always had trouble finding a place for a big piece of glass. Leaning it up against the wall never felt safe, and finding a flat space big enough to use it was always difficult.

To solve these problems, I built the sharpening station box you see above. Instead of one large piece of glass, the box holds six smaller pieces of glass. Each glass plate has a different grit of adhesive-backed sandpaper attached to it. A recess in the top of the box holds the glass being used and the weight of all the glass helps keep the box from moving while sharpening.

The honing guide clamps to a cleat on the inside of the door. And a loose piece of hardboard separates the guide from the glass when the door is closed. A draw latch keeps the box closed when not in use and a handle on the door makes it easy to transport.

Jim Keller
Rapid City, South Dakota



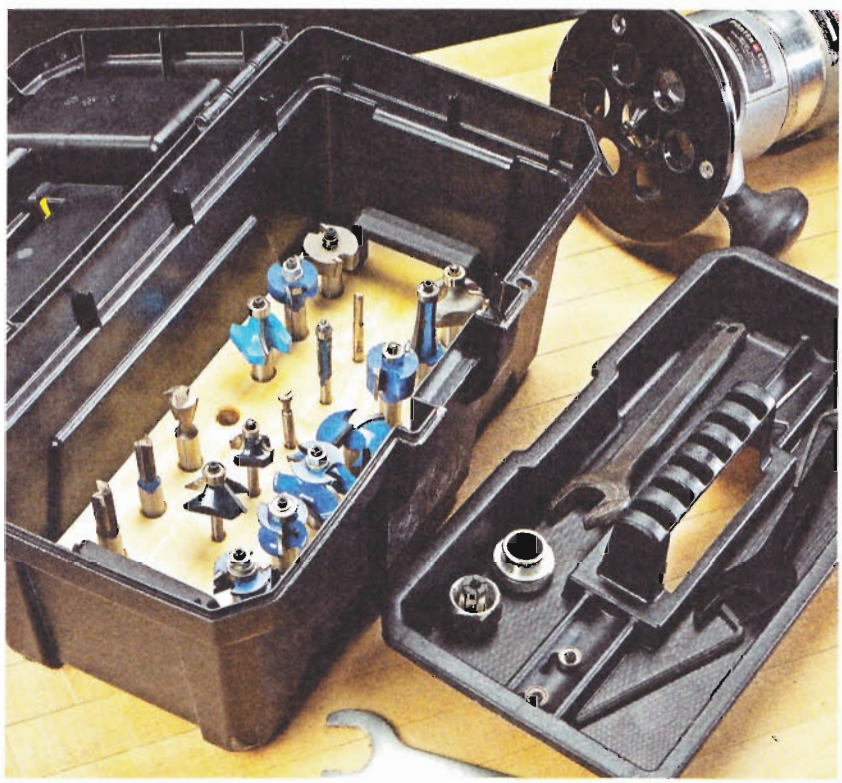


Router Bit Travel Case

Occasionally, I have projects away from my shop and need to travel with my router and bits. This can be challenging given the small size of the bits. Keeping them loose in a tool box could damage the cutting edges. But packaging each one separately can be cumbersome.

I came up with a solution that is inexpensive and keeps all of my bits and accessories together and protected from damage. It's just an inexpensive toolbox with a small scrap board fitted in the bottom. Holes drilled in the board accept bits with both ½" and ¼" shanks. My collets, wrenches, and accessories fit perfectly in the top tool tray insert.

B.W. Battin
Belen, New Mexico



Submit Your Tips Online!

If you have an original shop tip, we would like to consider publishing it. Go to

ShopNotes.com
and click on the link
SUBMIT A TIP

There, you'll be able to describe your tip in detail and upload photos or drawings. Or you can mail your tip to the editorial address shown in the right margin. We will pay up to $200 if we publish your tip. And if your tip is selected as the top tip, you'll also receive the *Porter-Cable* compact router kit shown on the right.

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Horizontal Drilling on the Lathe

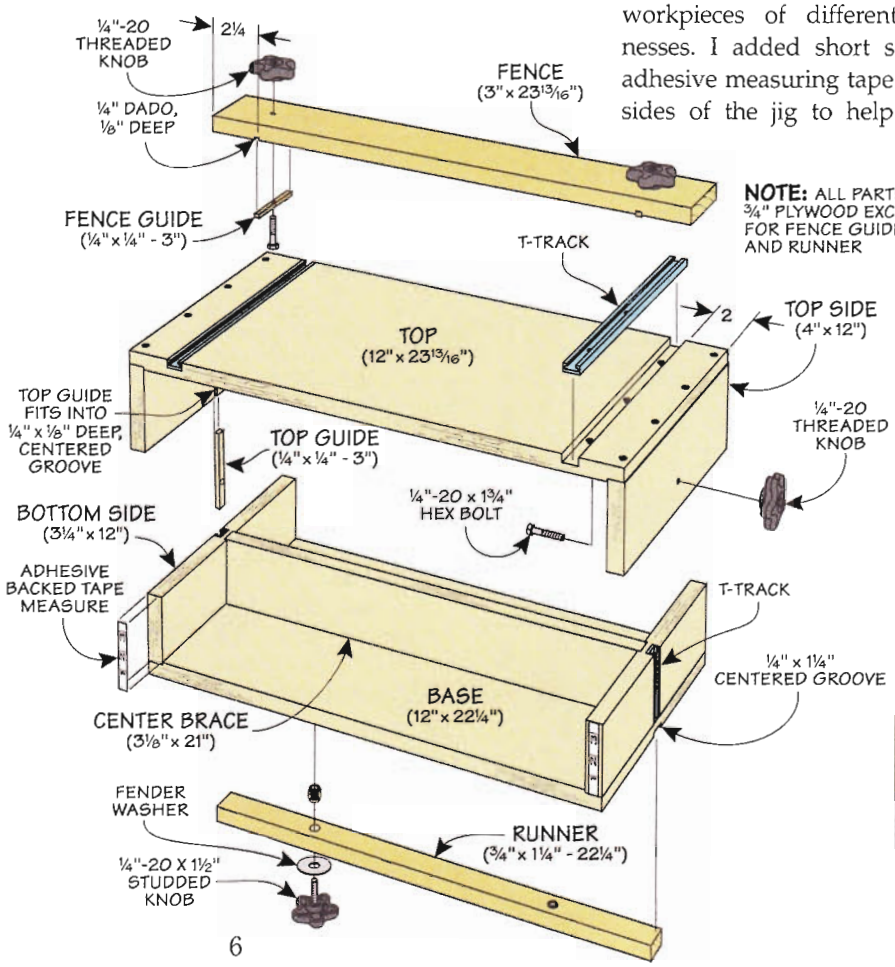
I like to use dowel joinery on some of my projects. But recently, I had a project that required drilling a lot of dowel holes in similar workpieces. Since all the holes were located in the same place on the workpieces, I came up with the jig you see above. It allows me to accurately position my workpieces so that I can quickly drill the holes with a bit chucked in my lathe.

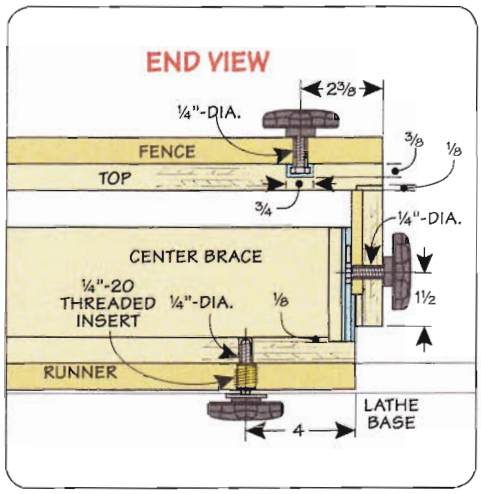
The jig attaches to the bed of my lathe with a couple of knobs and washers. And the top can be raised or lowered to account for workpieces of different thicknesses. I added short strips of adhesive measuring tape to both sides of the jig to help ensure the top is level and the holes are drilled square to the end of workpieces. Knobs on each end of the jig secure the top in place.

An adjustable fence locks into T-track that's recessed into the top of the jig. The fence allows me to position each workpiece to drill the first hole. I use a spacer block between the fence and workpiece for additional holes. The photo above shows how I do this.

The drawings here give all the details on how to build it. You may need to make some modifications to fit your lathe, though. Once the jig is built, it really is a significant time-saver.

Sanford Hill
Louisville, Kentucky





Auxiliary Fence with Hold-Down

When I'm making rip cuts at the table saw, I like to have the added security of a hold-down supporting my workpieces. This is not only safer but can help make more accurate cuts, as well.

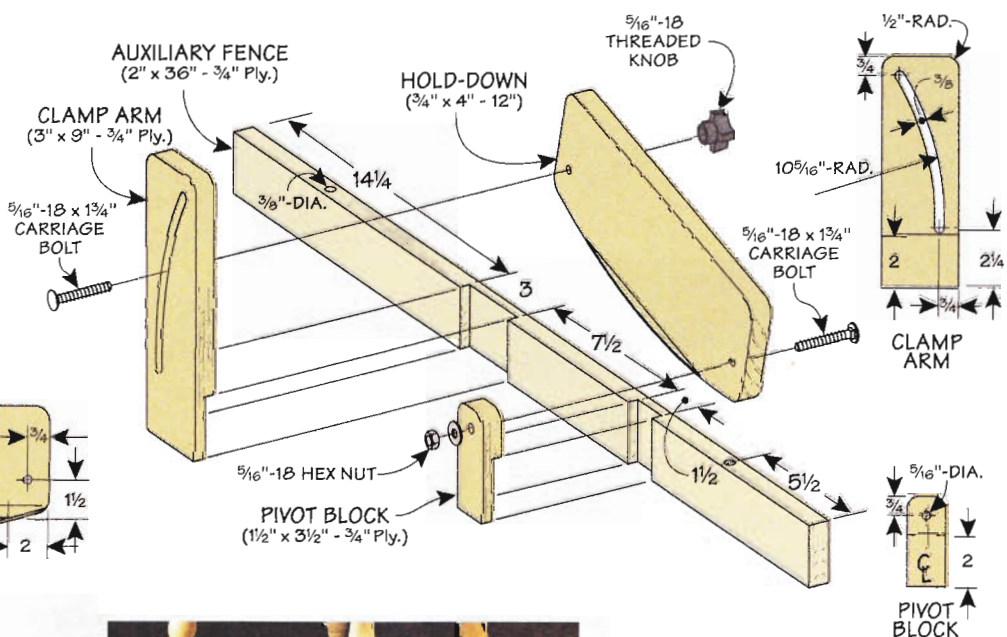
My table saw doesn't have an easy way to attach a commercial hold-down, though. That's why I decided to make my own. The photo to the right shows the solution I came up with.

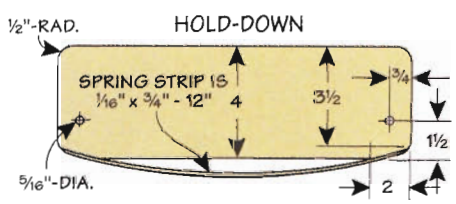
I started with a ¾" plywood auxiliary fence cut to fit my rip fence. A couple of notches cut in the back side of the fence fit a clamp arm and pivot block.

The hold-down is a hardwood piece with a bowed strip of hardwood glued to the bottom edge. I smoothed the transition between the two with a sanding block.

The corners on each piece were cut to shape at the band saw. And the slot in the clamp arm was cut with a jig saw. *Rockler's Universal Fence Clamps* (#31373) hold the assembly in place.

Tyler Smith
Ferndale, Washington





Quick Tips

▲ ***Peter Schneider*** *of Worcester, MA, uses laminate samples to quickly check the bevel on his chisels. Others are used for marking chamfers and roundovers.*

▲ *During glue-ups or other tasks that could damage his workbench,* ***Bill Wells*** *of Olympia, WA, covers the bench with a short piece of indoor/outdoor carpet.*

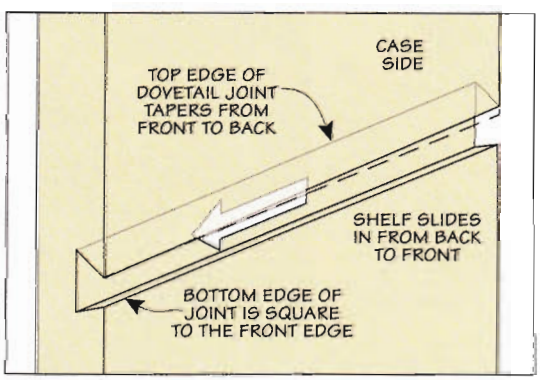
routing tapered Sliding Dovetails

Create solid assemblies that go together without glue or clamps.

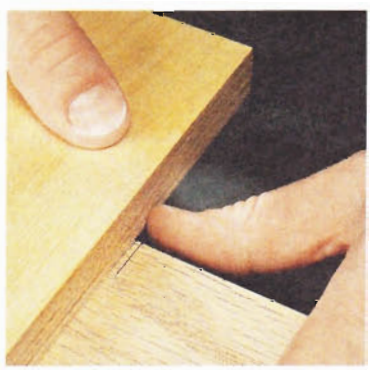
A basic dado works well for building cases. However, it requires a snug fit, and you definitely need glue and/or screws to keep the joint together.

On the other hand, a sliding dovetail lets you skip the glue bottle. The flared shoulders of the socket and tail prevent the pieces from separating. Plus, the joint automatically aligns the pieces.

There's a downside, though. Assembling a project with a typical sliding dovetail can be a real pain. There's a delicate balance involved in sizing both parts of the joint. When the fit is too tight, all the surface area in the joint creates a lot of friction. So it can be nearly impossible to slide the parts together so they're flush. When the joint is too loose, the resulting assembly will be wobbly and unreliable.



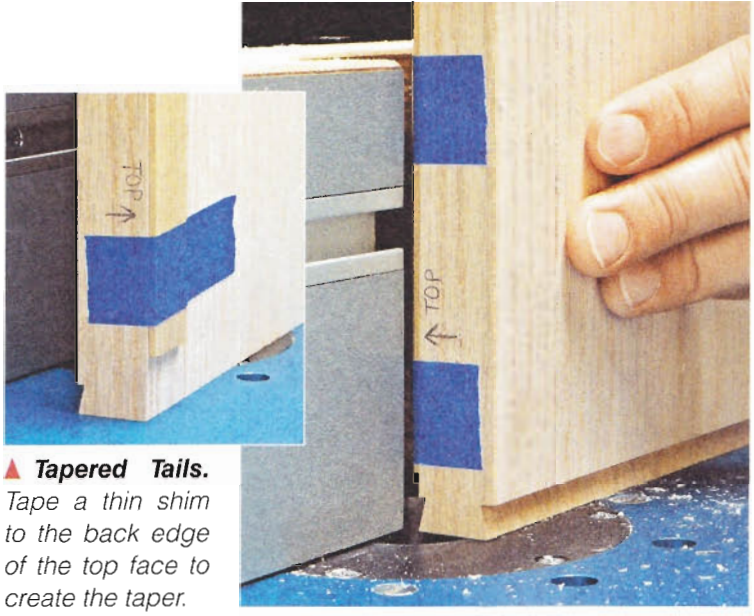
Tapered Joint. The solution is to use a tapered sliding dovetail. The difference is both the socket and the tail have a slight taper along the length of the joint, as you can see in the left drawing.



▲ ***Socket.*** *Shift the back of the edge guide and make a second pass to rout the tapered socket.*

This means that the joint won't snug up until each piece is in the correct position. Sounds tricky, right? But creating the joint is not as complicated as you may think.

I've already mentioned the two parts to this joint. The first part is the socket that's cut in the side of the case. The second part is the tail cut on each end of the shelf.



▲ ***Tapered Tails.*** *Tape a thin shim to the back edge of the top face to create the taper.*

Sockets First. I like to rout all the sockets first. Then I can turn my attention to the tails. It's much easier to trim the tails than it is to recut the sockets.

There are a couple of steps involved here. You start by routing a straight socket, as shown in the main photo on the facing page. (I rout from the front of the project to the back.) A straight-edge guide clamped to the workpiece keeps the router on track.

Taper It. A second pass with the dovetail bit creates the tapered shape. After making the initial pass, shift the back end of the guide over 1/16", as shown in the lower photo on the opposite page. The second pass creates an ever-so-slight taper. I know it doesn't sound like much, but it's all you need to ease the assembly.

Now, the Tail. That takes care of the socket. The next step is to create the mating tail. For this part of the task, install the same dovetail bit in the router table. Now you can bring the workpiece to the bit. The advantage of this setup is that the fence allows you to quickly and easily make fine adjustments for a flush fit.

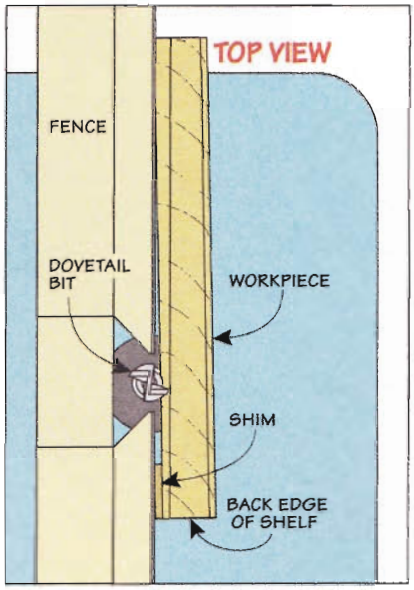
Set the dovetail bit height to match the setting you used when routing the socket. Then position the fence so only a portion of the bit is exposed.

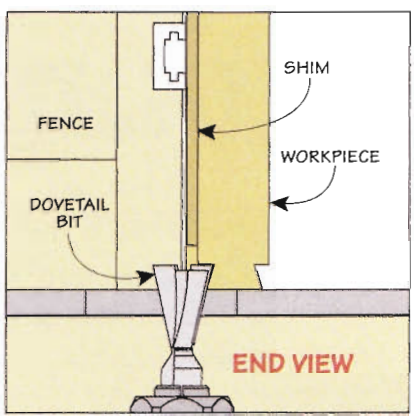
It takes two passes to create the tail. You'll stand the workpiece on end and guide it along the fence. But to create a taper, I tape a 1/16"-thick shim to the back edge of the top face of the shelf. Then make one pass on each face. This is shown in the upper left photos.

With one of the shelves, make a pass along each face then check the fit in the socket. Chances are it won't slide together completely. That's good. You want to sneak up on a good fit.

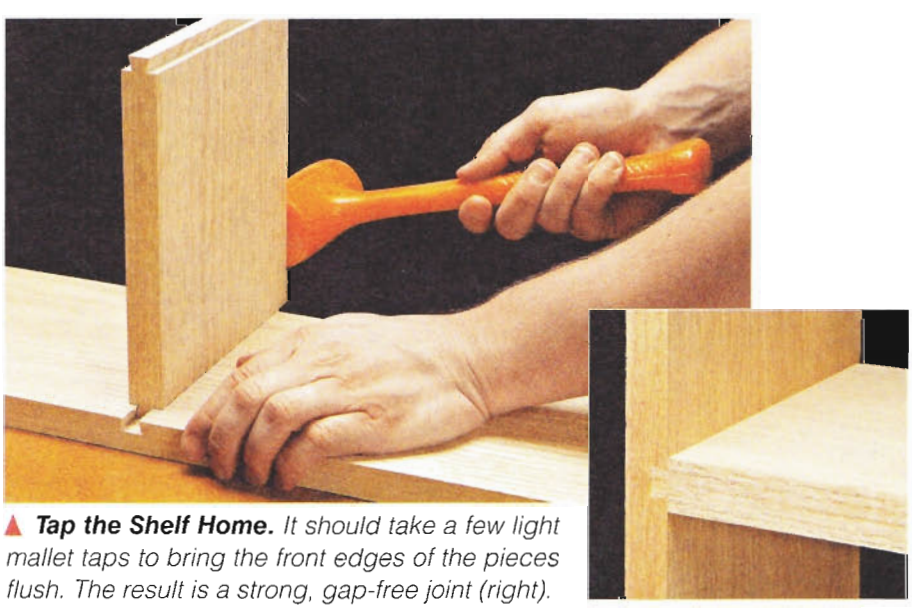
Fine-Tuning. For the next set of passes, adjust the fence away (back) from the bit just a hair. Then trim each side. A test fit here will show that you're making progress because the shelf will slide farther into the socket.

Continue this back and forth until the joint slides freely up to the last 1/2" or so. That's all you need for a perfect fit.





All it takes are a few taps from a mallet to bring the parts together so they're flush at the front. You can see this in the photos below. What you're left with is a self-aligning, rigid assembly that's still easy to take apart.



▲ ***Tap the Shelf Home.*** *It should take a few light mallet taps to bring the front edges of the pieces flush. The result is a strong, gap-free joint (right).*

hand tools for Rounding Edges

Skip the sandpaper. Instead, ease sharp corners with a few strokes using these inexpensive tools.

Easing the sharp edges of your project serves a couple of important functions. First, it encourages an admiring touch of the fingers. But more important, it helps protect the edges of your project from damage. The softened edges make dents and dings less likely. Plus, the finish you apply on the project adheres better to these softer edges.

You can always knock down the corners with sandpaper or a router. But there are a few tools that will do the job without the fuss and dust while leaving a smooth, consistent surface.

CAN-OPENER STYLE

The first style of tool I want to talk about looks like one of those old-fashioned can openers. You can see what I mean in the photo above. It features a curved end with a notch ground into the convex side. This creates a sharp cutting edge and two flat reference faces to register against the workpiece. You simply draw the tool along the edge of the workpiece to remove a thin, curly shaving and leave a rounded edge.

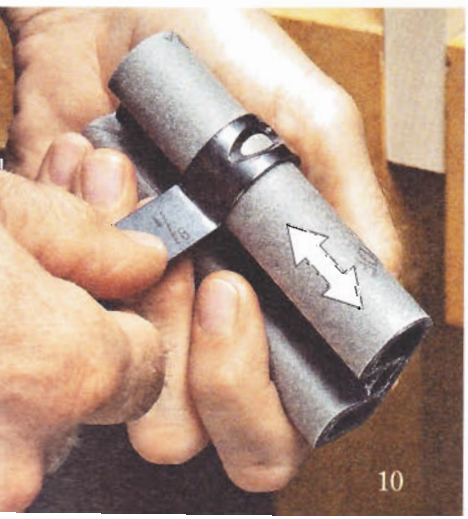
The *Veritas Cornering Tool Set* shown above includes two steel sharpeners and a handy sharpening jig. With these double-ended tools, you can form a radius of 1/16", 1/8", 3/16", or 1/4". This set is sold by *Lee Valley*.

Lee Valley also sells a pair of wood-handled radius tools to create a 1/16" or 1/8" roundover. One example is shown at left.

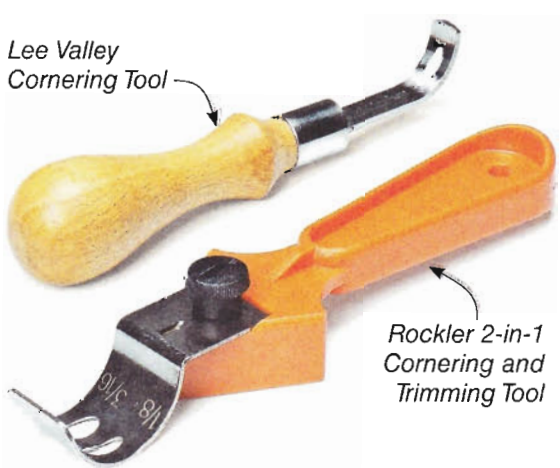
A similar style of rounding tool can be purchased from *Rockler*. It has a plastic handle and includes a curved blade to create a 1/8" or 3/16" roundover. An interchangeable flat scraper blade is also included in the package.

Tips For Use. Using this "can-opener" style of tool isn't difficult but there are a few tips I can share to help you get good results without a lot of effort.

Grain Direction. The first thing to keep in mind is the grain direction of the workpiece in relation to the cutting direction of



Touch Up. *The Veritas tools include a sharpening jig to hone the cutting edge.*



the tool. To avoid tearout, you'll want to cut in the direction of the grain instead of against it. Most of these tools can cut on either the pull or push stroke, but I find pulling the tool easier.

Start Small. These tools are designed to shave off the corner of the workpiece in shallow passes. So starting small and working your way up to the final radius yields better results.

Rocking the Blade. To start the cut, you place the notch of the tool on the corner of the workpiece. Then you "rock" the blade until the cutting edge engages the workpiece. It can take a little practice, but you'll quickly get the hang of it. Simply pull the tool toward you to shave off the sharp edge of the workpiece. Make several passes until the entire edge is smooth, and the tool is no longer making a cut.

Sharpening. To sharpen these tools, you hone the inside (concave) face of the blade, as in the lower left photo, opposite page. You can wrap sandpaper around an appropriate-sized dowel to make a hone for this task.

RADIUS PLANES

Another style of rounding tool is a hand plane (refer to Sources, page 51). You can see the two examples in the photos on this page. They each have a radius ground into the cutting edge.

Japanese Style. The plane you see above has the ability to cut a 3/32" or a 3/16" radius. Each groove in the plane's sole registers against the corner of the workpiece and aligns with a notch in cutting edge of the blade.

This plane is designed to be used on the pull stroke. The depth of the blade can be set by tapping on the back of the plane with a mallet for a shallower cutting depth. Tap on the nose of the plane for a deeper cut.

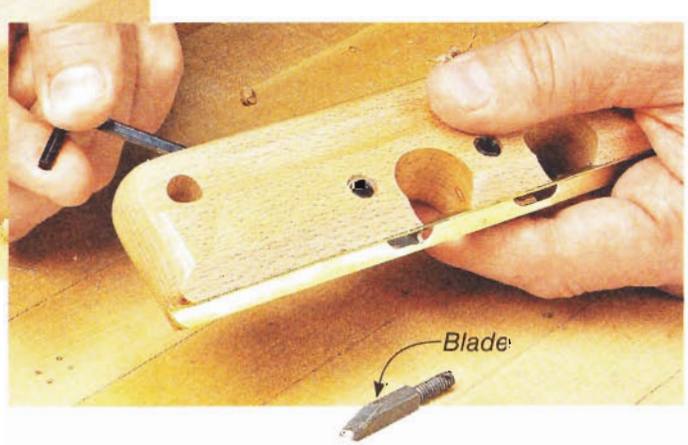
As I mentioned before, you'll want to be mindful of the grain direction on the workpiece. Make several light passes using long strokes for a consistent and smooth radius.

Dual Blade. The plane shown below has two carbide blades aligned along a grooved, brass sole. The idea is that the first blade makes a light cut with the rear blade forming the final radius.

This plane is designed to be used on the push stroke. You'll get the best results by starting with short strokes at the far end of the workpiece, then making progressively longer strokes as you move back along the edge. The final strokes along the entire edge ensure a consistent radius.

Any of these tools will do the job, but I find myself migrating to the *Veritas* tools the most. They're easy to use and provide the widest range of sizes.

▲ ***Dual Radius.*** *This Japanese-style plane is used on the pull stroke to create a roundover.*



▲ ***Two Blades.*** *The front blade makes a lighter cut while the rear blade creates the final profile (photo above). Adjust and replace blades using the included Allen key (photo at right).*

adjustable Tenoning Jig

Cutting precise tenons with perfectly smooth cheeks is a snap with this easy-to-build table saw jig.

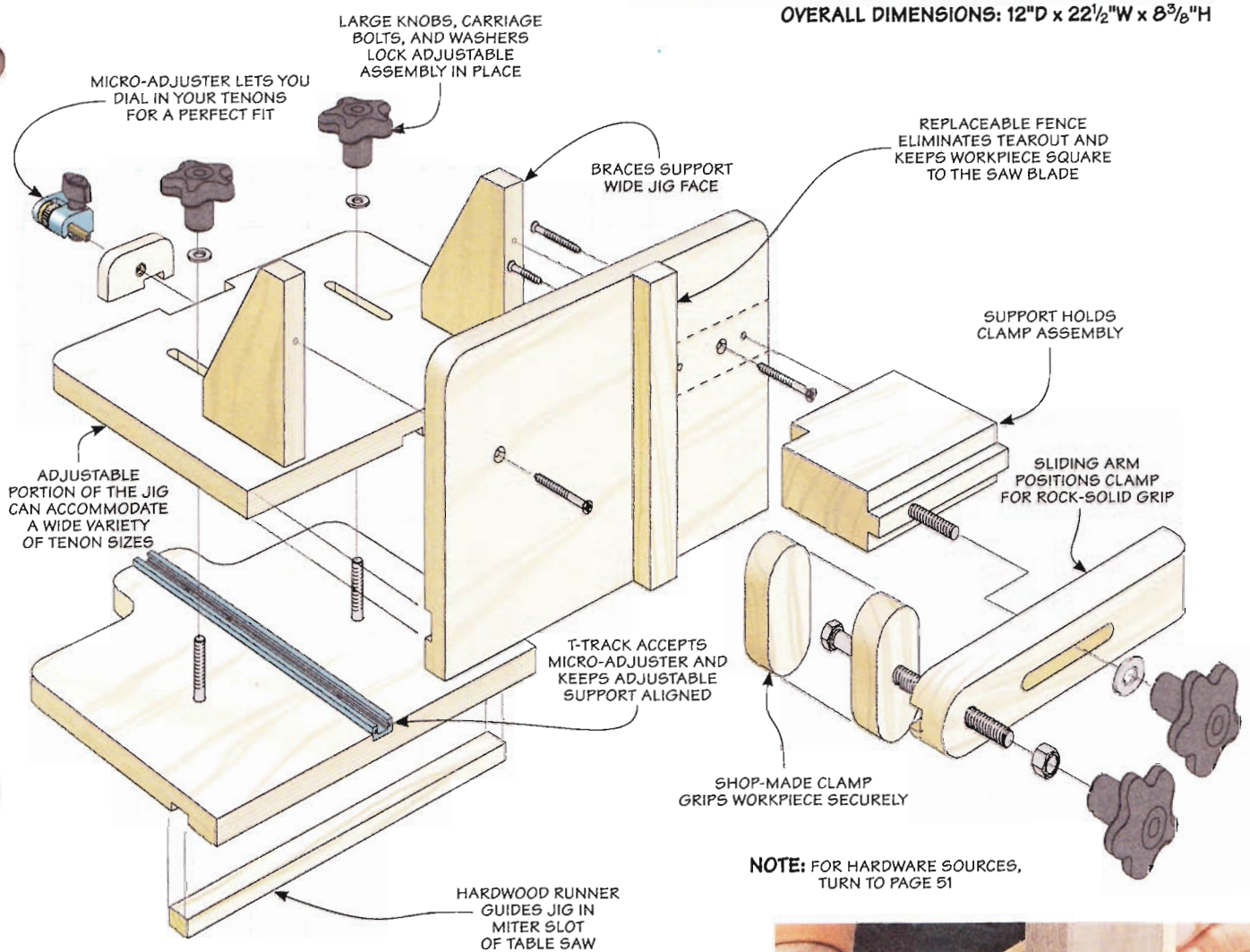
Dial It In. *A micro-adjuster lets you tweak the setup in precise amounts to create a good fit.*

A strong mortise and tenon joint depends on creating a snug-fitting tenon with smooth glue surfaces. The trouble is, tenons cut with a dado blade or a band saw usually require a little further work to attain a smooth face. But with a tenoning jig like the one shown here, you can cut perfect, ready-to-glue tenons on the table saw.

A couple features built into this jig really make it reliable and easy to use. First, the fence and integrated clamp combine to give a rock-solid grip on the workpiece. And the micro-adjuster shown in the inset photo allows you to fine-tune the tenon without any hassle. The result is a long-lasting joint whether you need two tenons or twenty.

Exploded View Details

OVERALL DIMENSIONS: 12"D x 22½"W x 8⅜"H



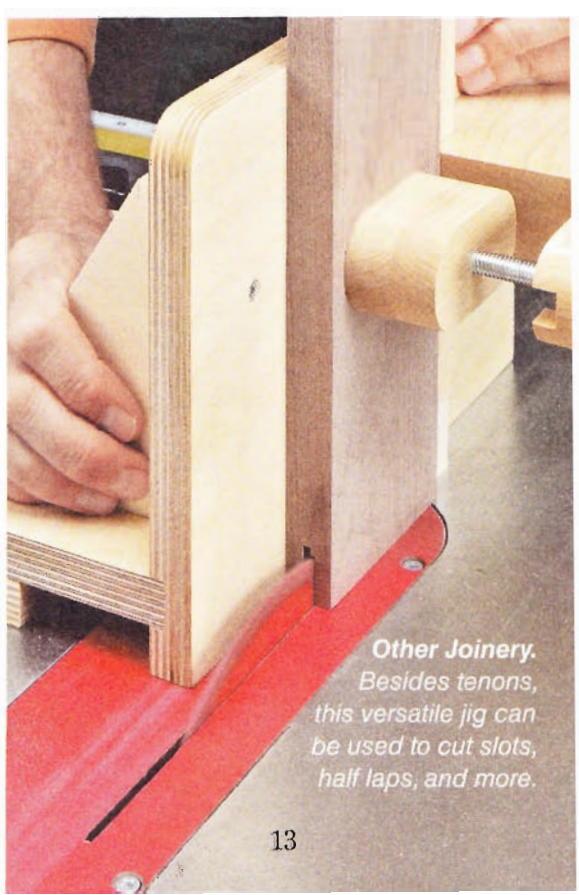
NOTE: FOR HARDWARE SOURCES, TURN TO PAGE 51

NOTE: SIMPLE CONSTRUCTION MEANS YOU CAN BUILD THIS JIG IN A WEEKEND

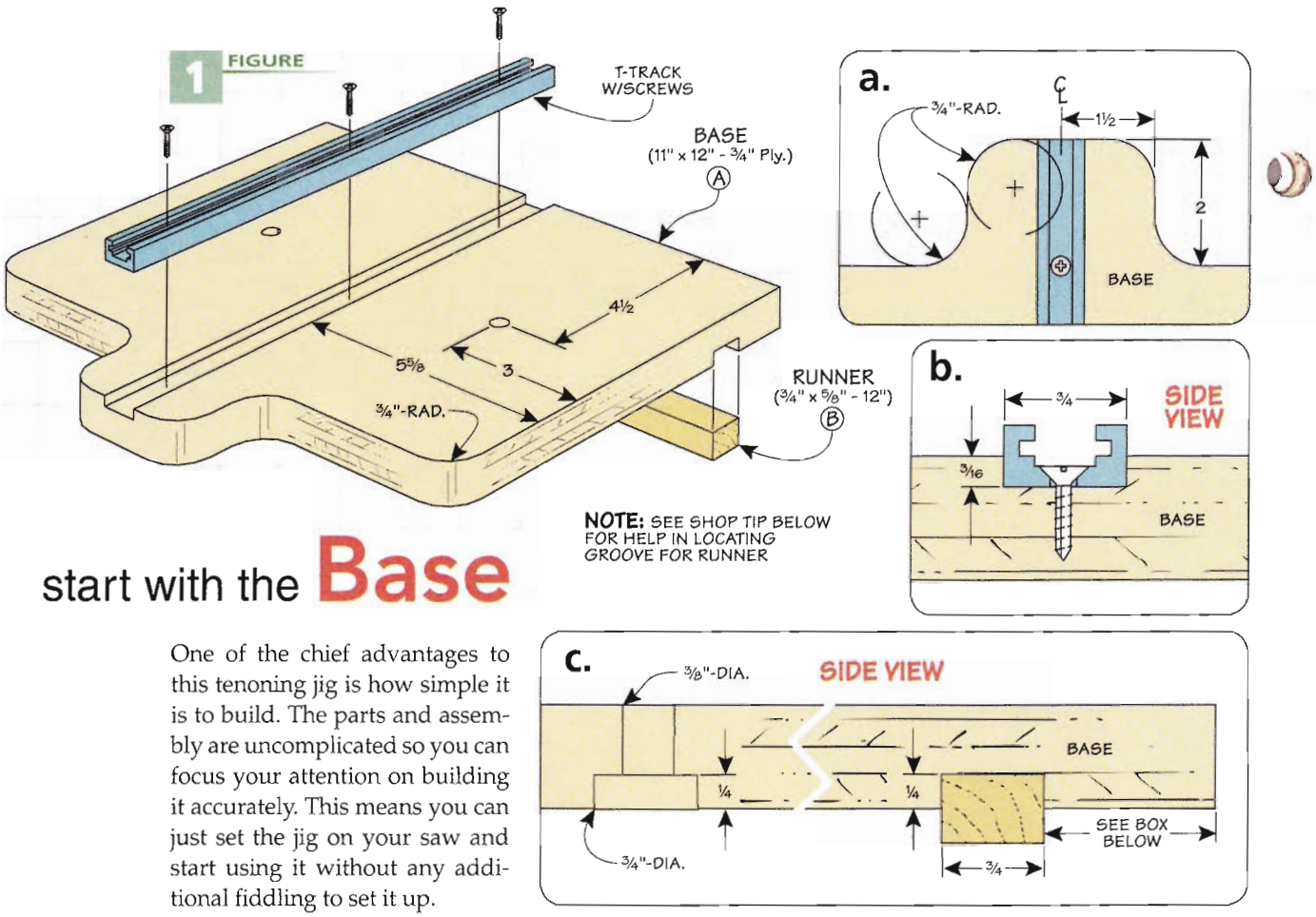
Materials & Hardware

A	Base (1)	11 x 12 - ¾ Ply.
B	Runner (1)	¾ x ⅝ - 12
C	Sliding Plate (1)	9¼ x 12 - ¾ Ply.
D	Face (1)	8 x 12 - ¾ Ply.
E	Braces (2)	3½ x 5 - ¾ Ply.
F	Block (1)	½ x 1¼ - 2½
G	Support (1)	1½ x 3⅞ - 5
H	Arm (1)	1 x 1½ - 9½
I	Clamp Pads (2)	¾ x 1½ - 3
J	Fence (1)	¾ x 1 - 8

- (1) 11"-long Aluminum T-Track w/Screws
- (2) 5/16"-18 x 2" Carriage Bolts
- (3) 5/16"-18 Through Knobs
- (3) 5/16" Flat Washers
- (4) #8 x 1½" Fh Woodscrews
- (1) Micro-adjuster
- (1) ¼"-20 Threaded Insert
- (2) #8 x 2" Fh Woodscrews
- (1) #8 x 1" Fh Woodscrew
- (1) 5/16"-18 x 3" Threaded Rod
- (1) ⅜"-16 x 5" Hex Bolt
- (1) ⅜"-16 Hex Nut
- (1) ⅜"-16 Through Knob
- (1) ⅜"-16 T-Nut



Other Joinery. Besides tenons, this versatile jig can be used to cut slots, half laps, and more.



start with the Base

One of the chief advantages to this tenoning jig is how simple it is to build. The parts and assembly are uncomplicated so you can focus your attention on building it accurately. This means you can just set the jig on your saw and start using it without any additional fiddling to set it up.

There are three assemblies that make up the tenoning jig. A base serves as the foundation of the jig and guides it along the miter slot of the table saw. An adjustable support positions the workpiece in relation to the blade to make the cut. And the clamp secures the workpiece to the face of the jig during the cut.

The Base. The first assembly is the base. It's just a small plywood panel with a hardwood runner on the bottom face. Begin by cutting a blank for the base.

Then you can get out your dado blade to add a dado and a groove (both are ¾" wide). The key thing when making these cuts is that they should be square to each other. This ensures that tenons made with the jig will have cheeks that are parallel.

The top face of the blank has a dado to accept a length of T-track, as you can see in Figures 1 and 1b. It helps locate the face of the jig in relation to the blade. It's also used as a mounting point for a micro-adjuster.

On the bottom face of the base is a shallow groove that holds the runner, as shown in Figure 1c. I do want to point out something. The location of the groove depends on the distance of the right miter slot on your saw to the blade. The shop tip at left shows you how to mark the position.

Once the dado and groove work is complete, you can cut the base to its final shape. This is shown in Figure 1a.

The base has a couple counterbored holes for carriage bolts that lock the sliding plate in place (Figure 1c). I glued the carriage bolts in place with some epoxy.

Then, you can cut and attach the length of T-track to the upper groove. Finally, cut and glue a runner in the bottom groove.

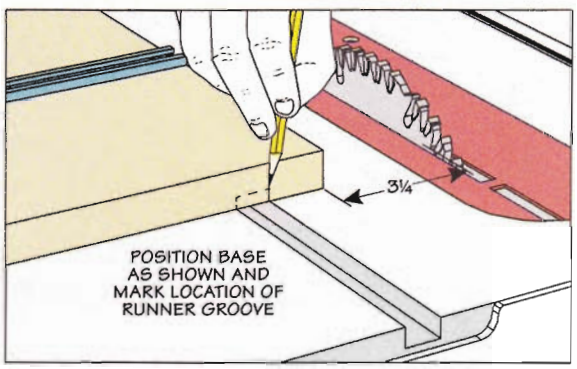
Adjustable Support. Making the adjustable support is the next task on the list. As you can see in Figure 2, it's a little more involved than the base.

It starts with a plate that has a dado that matches the one in the base. The dado fits over the exposed T-track. To keep the adjustable support aligned, aim for a smooth sliding fit without any slop (Figure 2c).

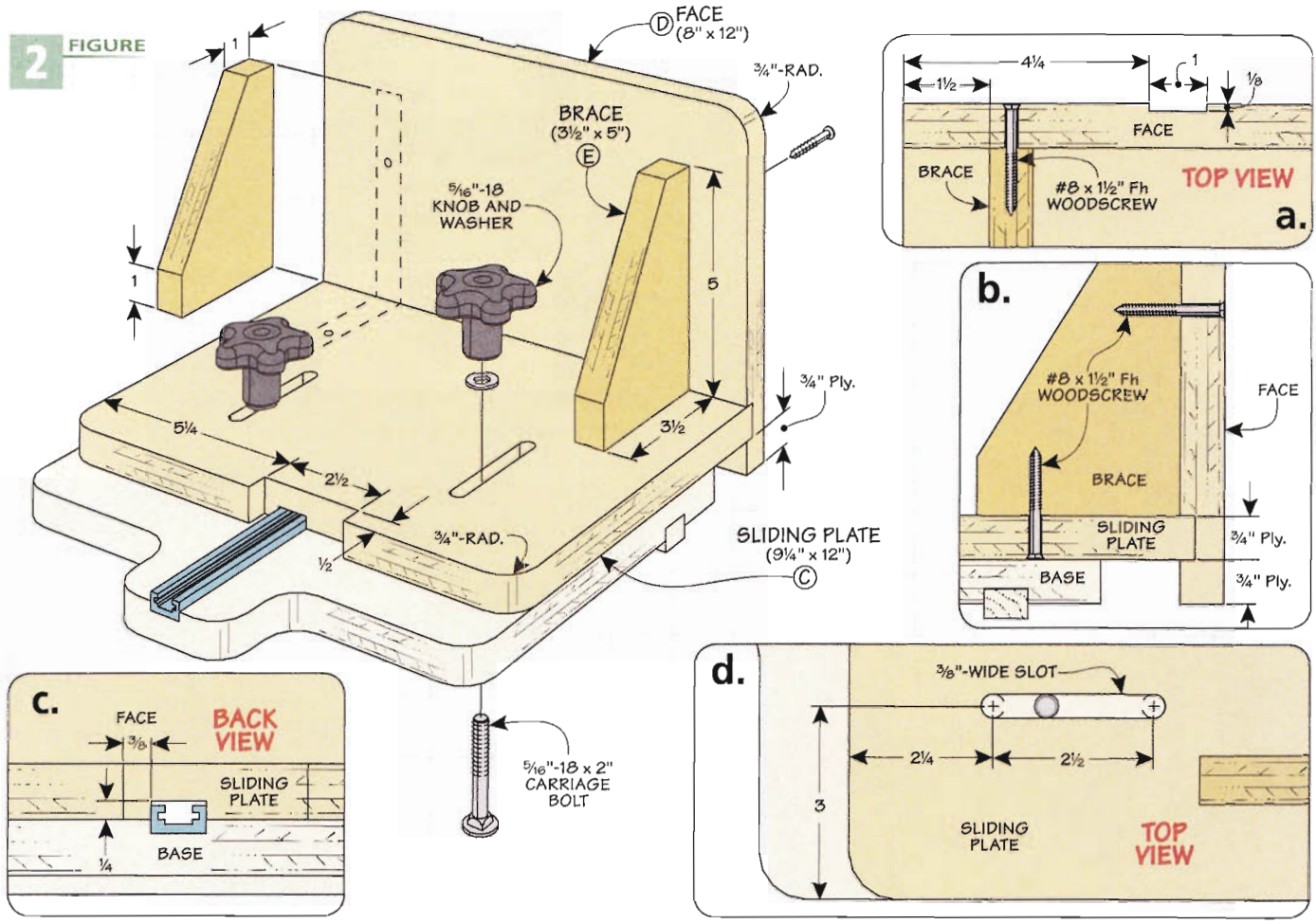
The sliding plate also has a notch on one edge to hold a small block for attaching the micro-adjuster, as in Figure 2.

Two slots are cut in the plate to accept the carriage bolts in

Shop Tip



▲ ***Setup.*** *Use the dimension above to locate the groove for the runner in the base. This calibrates the jig to your table saw.*



the base, as shown in Figure 2d. I then rounded the outer corners of the plate to match the base.

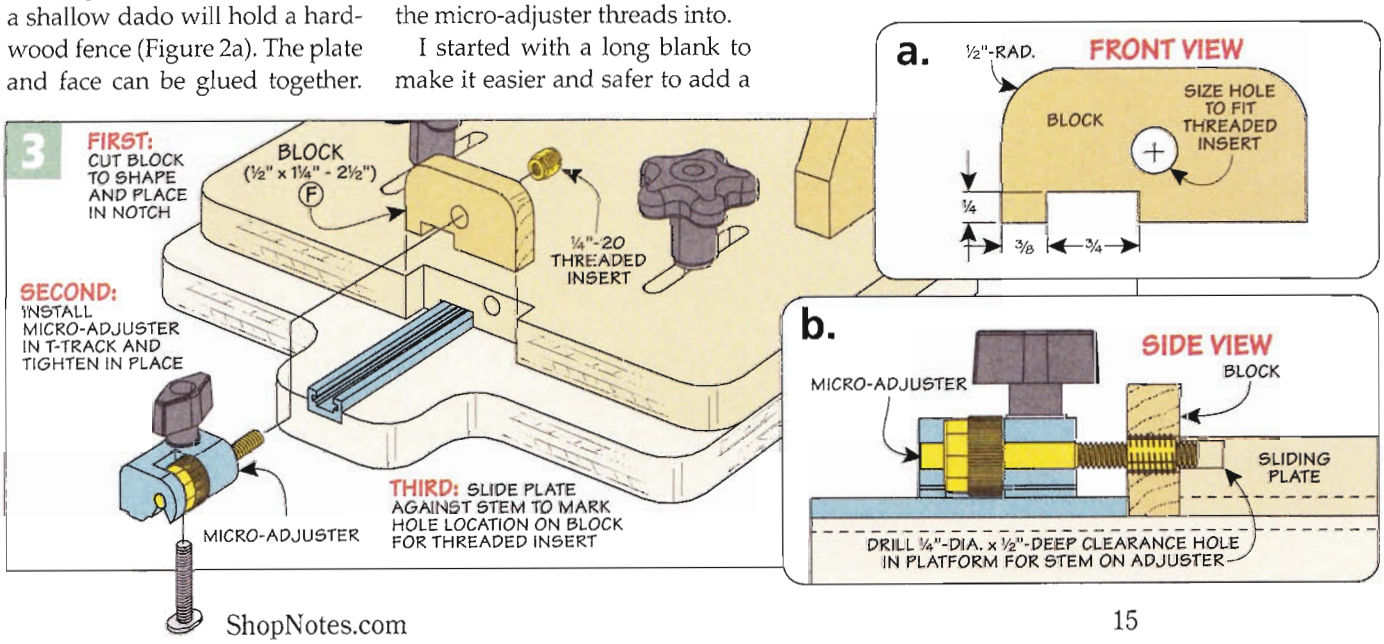
Face. You can set the plate aside for now and make the face of the jig. You'll notice it has a groove and dado cut in it.

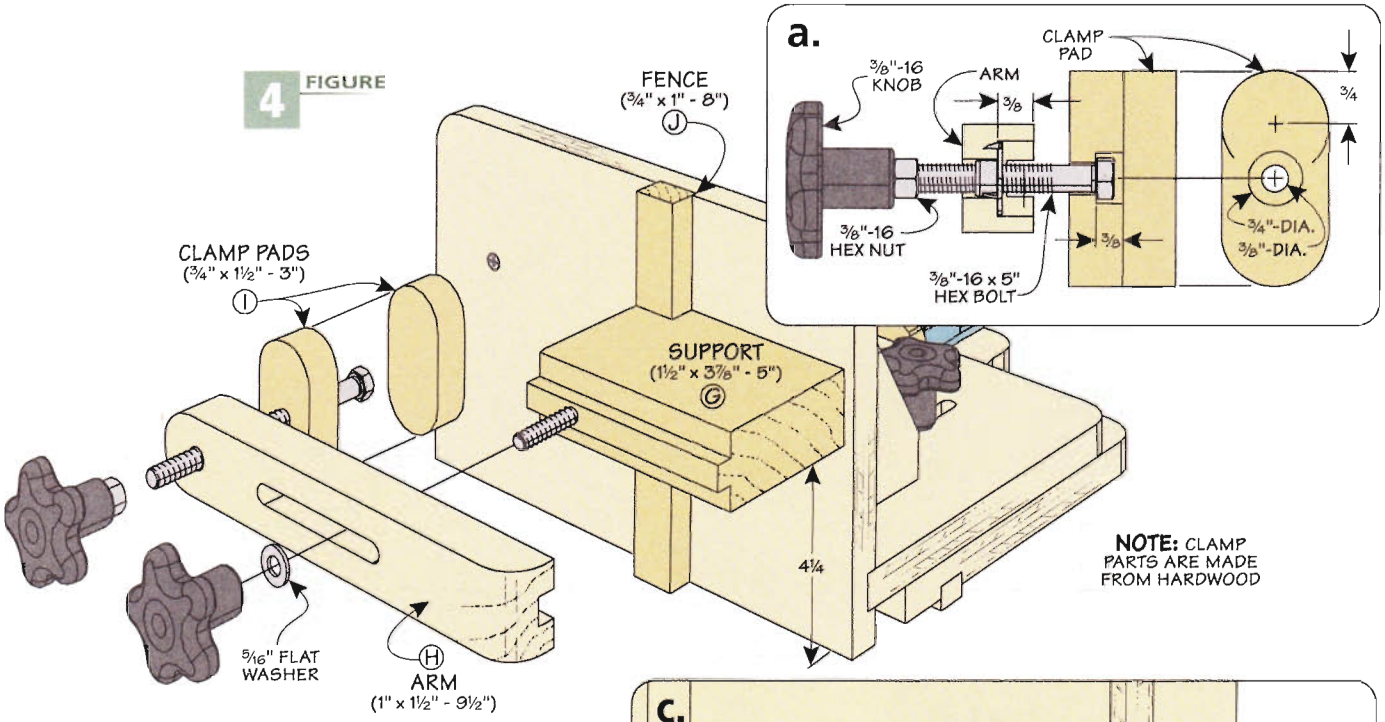
On the inner side of the face, a groove accepts the sliding plate, as in Figure 2b. On the outer side, a shallow dado will hold a hardwood fence (Figure 2a). The plate and face can be glued together. Angled braces keep the assembly rigid and square in use. They're glued and screwed in place, as shown in Figure 2b.

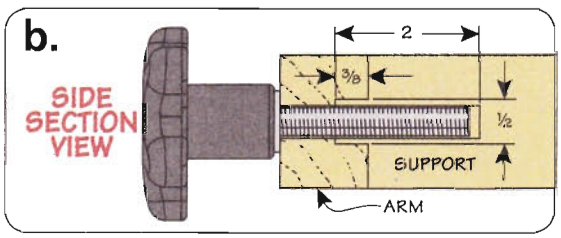
The Block. The remaining piece to add to this assembly is the small hardwood block I mentioned earlier (Figure 3). Its job is to provide a solid anchoring point for a threaded insert that the micro-adjuster threads into.

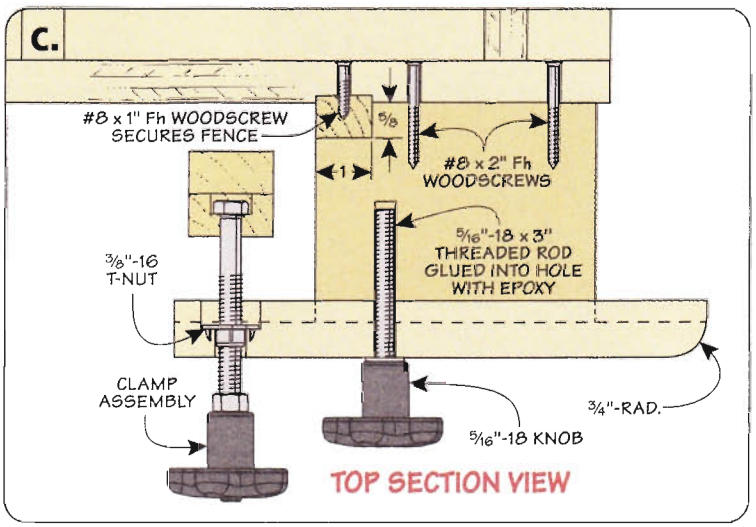
I started with a long blank to make it easier and safer to add a notch that fits over the T-track in the base, as in Figure 3a. Then I cut the block to shape and fit it in the notch without glue.

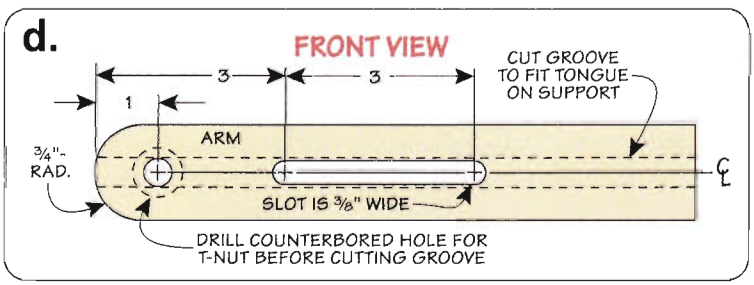
You can use the micro-adjuster to locate the hole for the threaded insert, as illustrated in Figure 3. After drilling a clearance hole in the plate for the micro-adjuster, glue the block into the notch.











adding the Clamp

The clamping system is the final portion of the tenoning jig to build. This simple assembly serves two purposes. First, it secures the workpiece to the face of the jig. And second, it holds the workpiece vertically to the saw table (front to back).

Let's start with the first purpose — securing the workpiece. A thick hardwood support extends from the front face and holds a sliding arm. The arm allows you to apply clamping pressure in just the right place based on the width of the workpiece.

On the end of the arm, a shop-made clamp presses the workpiece against the front face of the jig. The clamp's capacity will easily handle the pieces you commonly use in most furniture construction. To use the tenoning jig on larger workpieces, all you need to do is remove the arm and clamp from the support. Then secure the workpiece to the jig with a bar clamp.

Hardwood Support. The support has a tongue cut on the outer edge, as you can see in Figure 4b. This positions the arm.

To lock the sliding arm in place, I used a knob, washer, and a length of threaded rod. I glued the rod into a hole drilled in the tongue with some epoxy, as shown in Figure 4c.

The remaining detail to take note of on the support is a notch on the inner edge. It corresponds with the groove on the front face and will house the fence later on. This is shown in Figure 4c.

The support is attached to the jig with glue and long screws. Be sure to keep the support parallel to the bottom edge of the face.

Sliding Arm. The details for making the sliding arm are shown in Figure 4d. A counterbored hole

at one end accepts a T-nut for the shop-made clamp.

Then a groove can be cut along the inner face that mates with the tongue on the support. A slot is cut to attach the arm to the support with a washer and a knob. Finally, shape both ends of the arm to soften the edges.

The Clamp. The next component to make is the clamp. It's built around a long hex bolt. A pair of clamping pads capture the head of the bolt in a counterbored hole drilled in one of the pads, as illustrated in Figure 4a. This is then threaded through the T-nut in the arm. A hex nut locks a star knob on the end to make applying clamping pressure straightforward.

Fence. The other purpose of this assembly is to hold the workpiece square. This task falls to the fence. This simple strip is cut for a snug fit in the groove in the front face of the jig. In addition to holding the workpiece vertically, it also provides some tearout protection by backing up the back edge of the workpiece. This means the fence will get chewed up. When that happens, you can just slip out the old one and pop in a new one. A screw through the back side locks it in place.

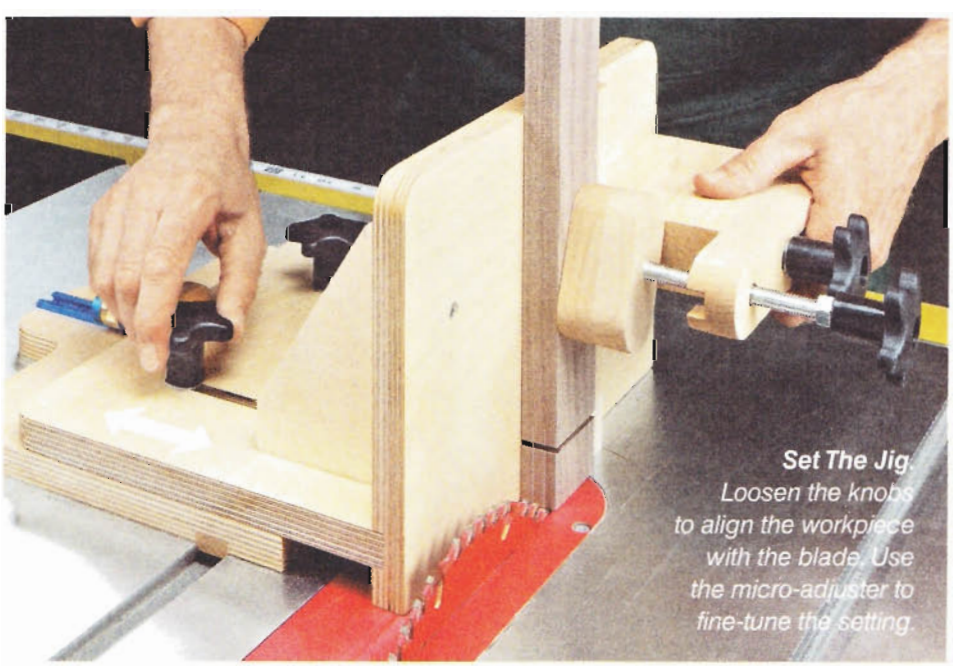
The jig is now ready for use. For tips on getting the best results take a look at the box below.

Using the Jig

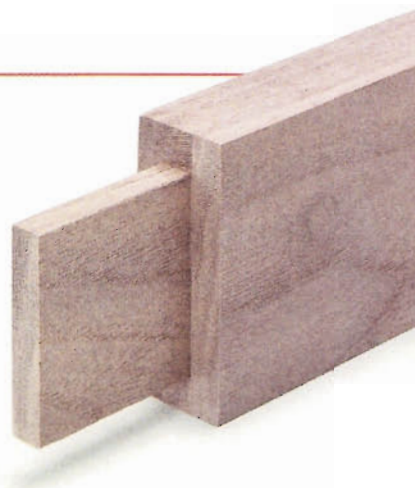
Using the tenoning jig is pretty straightforward. Before putting it on the saw, I like to lay out the tenon on my workpiece. Then I'll cut the four shoulders using the miter gauge to guide the piece.

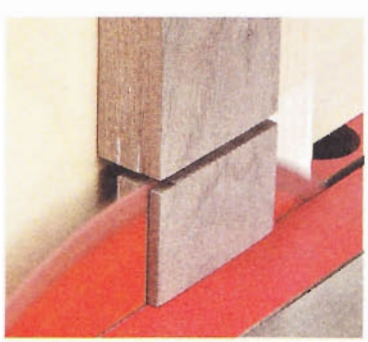
From there, I clamp the workpiece to the jig, centering the clamp pad on the part (right photo). Loosen the knobs on the adjustable support and roughly position the workpiece with the blade, as in the lower photo. I make a test cut and sneak up on the fit. To fine-tune the position of the jig, you can use the micro-adjuster. Once everything is set, you can cut the cheeks. Finally, follow the same steps to cut the ends of the tenon.

Clamp The Workpiece. *Center the clamp pad on the workpiece and tighten down the knob to lock the piece in place.*

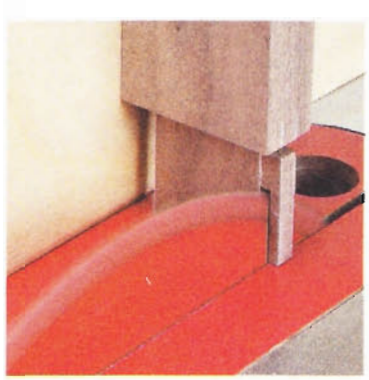


Set The Jig. *Loosen the knobs to align the workpiece with the blade. Use the micro-adjuster to fine-tune the setting.*





▲ ***Cheeks First.*** *Make test cuts to dial-in the jig setting so the tenon matches the mortise.*



▲ ***Edge Cuts.*** *Use the same steps to cut the end cheeks of the tenon for a snug fit.*

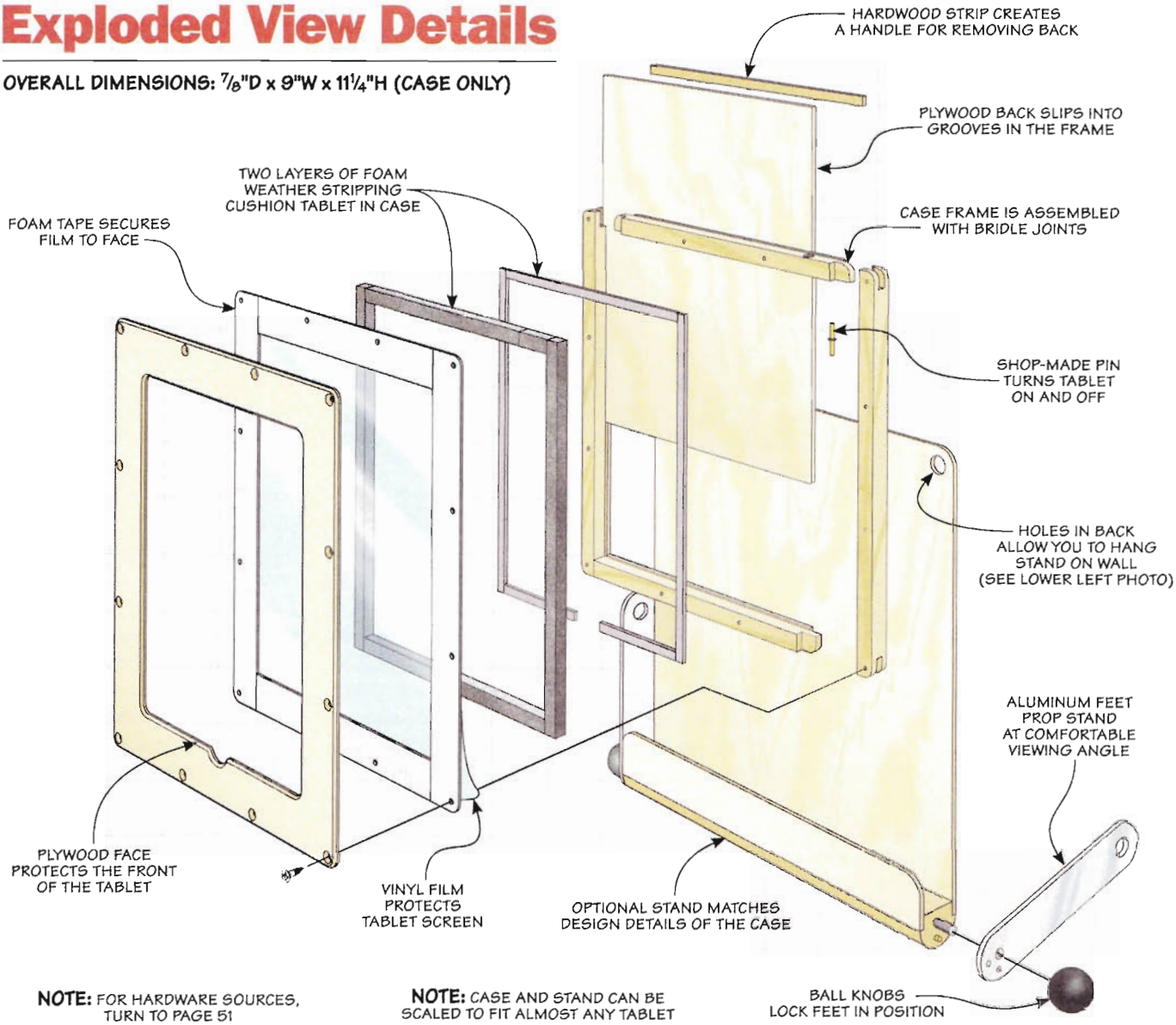
shop-ready Tablet Case

This easy-to-build case and stand protect your tablet computer so you can take it with you to the shop.

I wouldn't exactly call my tablet computer a power tool. But it has become a handy addition to my workshop, whether it's for displaying plans, watching a video on a new technique, or simply playing music. To protect the tablet from dust or dings, I made the case and stand you see here. The tablet slips in and out quickly without affecting your ability to use all the features. Better still, making one is a good way to spend a few hours in the shop.

Exploded View Details

OVERALL DIMENSIONS: 7/8"D x 9"W x 11¼"H (CASE ONLY)



NOTE: FOR HARDWARE SOURCES, TURN TO PAGE 51

NOTE: CASE AND STAND CAN BE SCALED TO FIT ALMOST ANY TABLET

▲ ***On the Wall.*** *Holes in the back of the stand allow you to hang the tablet on the wall and out of the way.*

▲ ***Rugged.*** *A rigid frame and vinyl screen cover protect your tablet from dust and damage in the shop.*

Materials & Hardware

A	Stiles (2)	¾ x ½ - 11¼
B	Rails (2)	¾ x ½ - 9
C	Cover (1)	9 x 11¼ - ⅛ Ply.
D	Case Back (1)	8¼ x 10⅞ - ⅛ Ply.
E	Handle (1)	⅛ x ½ - 7 15/16
F	Stand Bottom (1)	1 x 1⅛ - 11¼
G	Stand Front (1)	11¼ x 13⅜ - ⅛ Ply.
H	Stand Back (1)	11¼ x 12¼ - ⅛ Ply.
I	Feet (2)	1 x 6 - ⅛ Aluminum Bar

- (3) ⅛"-dia. x 1" Brass Rod
- (1) #4 Brass Washer
- (1) ⅜" x 7/16" x 36" rgh. Weather Stripping
- (1) ⅛" x ¼" x 36" rgh. Weather Stripping
- (1) 1"-wide x 38" rgh. Foam Tape
- (1) 12" x 12" 20-gauge Vinyl Sheet
- (12) #6 x ½" Fh Woodscrews
- (2) ¼"-20 x 2" Threaded Rod
- (2) ¼"-20 x 1¼"-dia. Ball Knobs

building the

Tablet Case

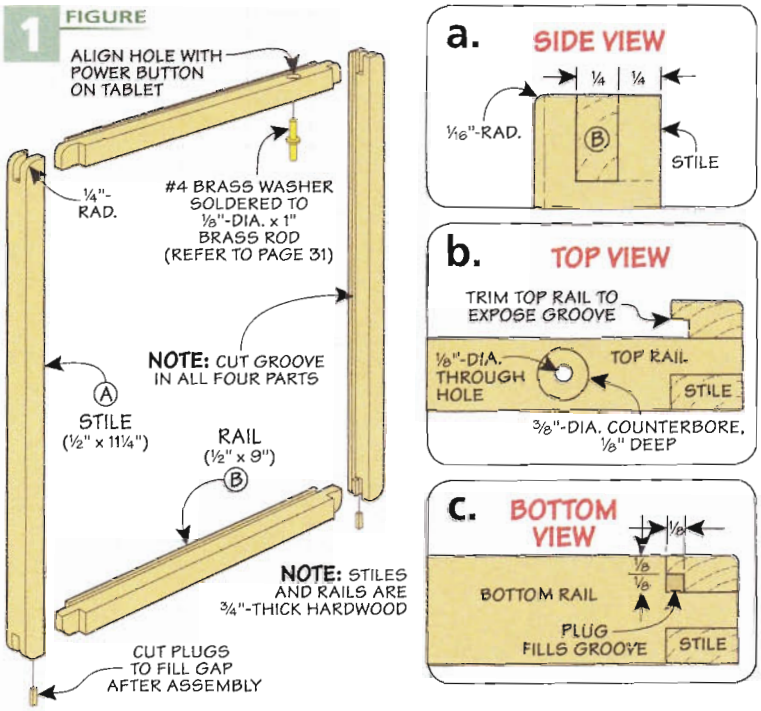
The case consists of a hardwood frame with an applied plywood cover. A plastic film on the cover protects the screen but still allows for touch control.

Grooves in the frame accept a slip-in back panel. Inside the case, two foam strip borders provide a snug, cushioned fit for the tablet. One layer wraps around the tablet. The second layer cushions the front of the tablet so that as the back slides in place, the tablet is held securely. A close look at Figures 1 and 2 gives you a good idea how this works.

Sizing the Case. The case shown here is designed to fit a second and third generation *iPad*. But you can modify the size to fit other tablets. The opening of the frame should be $\frac{5}{8}$" wider and longer than the tablet dimensions. This gives the tablet a snug fit.

The depth of the frame consists of the thickness of the tablet, plus a $\frac{1}{8}$"-thick layer of foam, and the groove for the slip-in back.

Frame. Making the frame is the starting point of the construction.



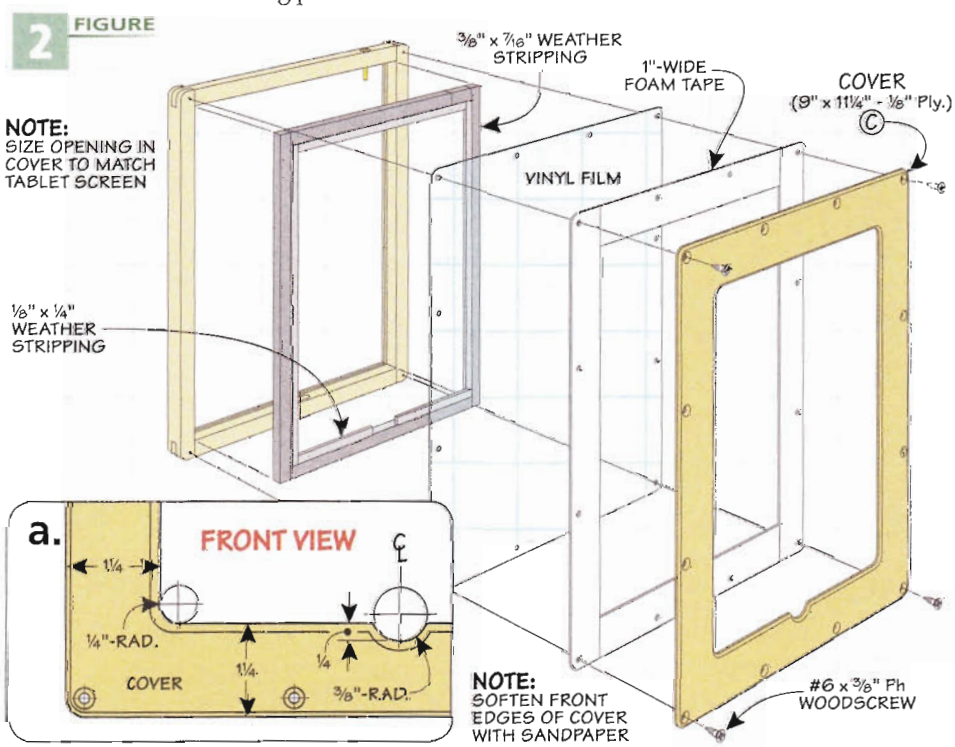
The corners of the frame are joined with bridle joints (Figure 1a). Before cutting this joint, you need to cut a $\frac{1}{8}$" kerf in all four pieces to hold the back.

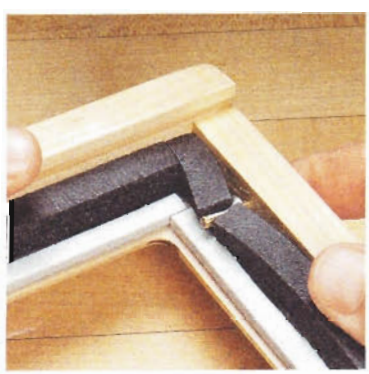
From there, you can cut the bridle joinery. This involves cutting a centered open mortise on each end of the stiles. Then cut matching tenons on the rails.

A couple of details require some attention before the frame can be assembled. The first is drilling a counterbored through hole in the upper rail. The hole is centered over the power button on the tablet. It holds a pin so you can turn off the tablet while it's in the case. You can find the details for making the pin in Shop Short Cuts on page 31.

The other detail is to provide an opening for the back. To do this, I trimmed the upper rail to create an opening to slide the back into the frame, as in Figure 1b.

Frame Assembly. You can now glue the frame together. You'll need to make small plugs to fill the exposed grooves on the lower stiles. Once the clamps come off, you can soften the corners with a radius and sand a round over on the back edges.





▲ ***Power Button.*** *Cut the weather stripping to provide access for the power button pin.*

Cover. From here, I moved on to making the cover of the case. It's cut from a piece of ⅛" plywood and sized to match the frame, as shown in Figure 2. A cutout is sized to match the screen on the tablet. (I added a rounded notch to provide access to the home button.) To make the cutout, I drilled holes in the corners (and for the notch). Then it's simply a matter of connecting the dots with a scroll saw. After rounding the corners and sanding the edges smooth, I sanded matching roundovers on the inner and outer edges.

On the back face of the cover, I attached a piece of clear vinyl with foam tape. The trick is keeping the vinyl tight. To do this, I taped an oversize piece of vinyl to some MDF, pulling the vinyl taut. Then I applied foam tape to the cover and flush with the edges. I pressed this onto the vinyl. A craft knife made quick work of trimming the vinyl even with the cover. This assembly can is screwed to the frame.

Foam Liners. Inside the frame, you can attach strips of ⅜" weather stripping foam. As I mentioned earlier, an inner layer of ⅛" foam cushions the front of the tablet. Figure 2 and the photo on the opposite page show how the strips are arranged.

Back. The final piece is the back. This panel is cut to fit the grooves in the frame. A thin hardwood strip serves as a handle for removing the panel (Figure 3).

VERSATILE STAND

You could use the case on its own, but I added a stand to prop up the tablet on my bench or hang it on the wall. Figure 4 shows how the stand is made. Begin by cutting a hardwood bottom. The thickness of the bottom is equal to the thickness of the case plus two layers of ⅛" plywood.

Rout a roundover on the lower edge to soften the bottom (Figure 4b). Next, you can cut a pair of rabbets to accept the front and back. There are a pair of holes in each end of the bottom. One holds a threaded rod. The other houses an index pin that registers an aluminum foot.

The corners of the front and back are rounded to match the case. A set of holes in the back lets you hang the stand on a wall.

The feet can be set in two positions. The upright position allows the stand to hang on the wall. You can also flip the feet down to prop the stand on a bench. They're cut from aluminum and drilled to match the threaded rod and pin holes in the bottom. Ball knobs lock the feet in place (Figure 4a).

I sprayed the case and stand with lacquer. When it's finished, you can slip the tablet into the case and put this high-tech tool to work in your shop.

FIGURE 3

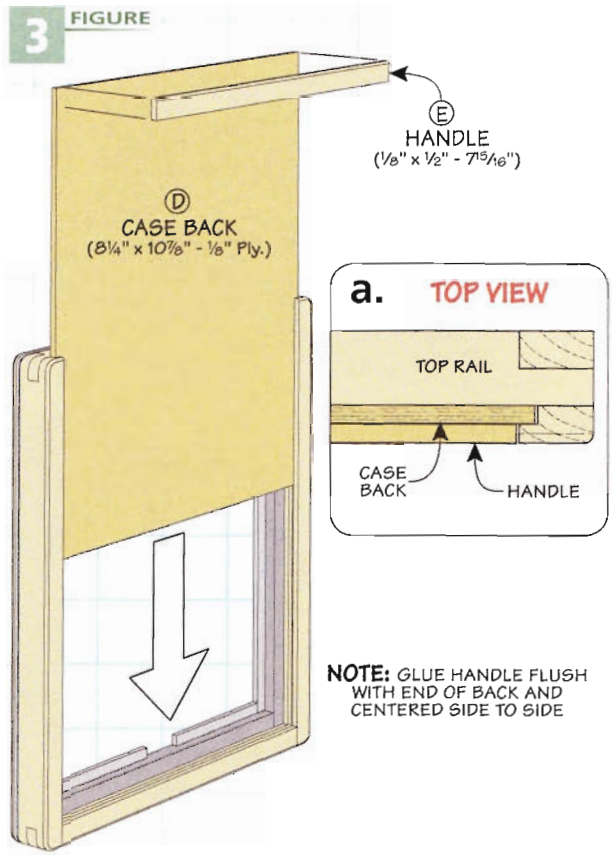
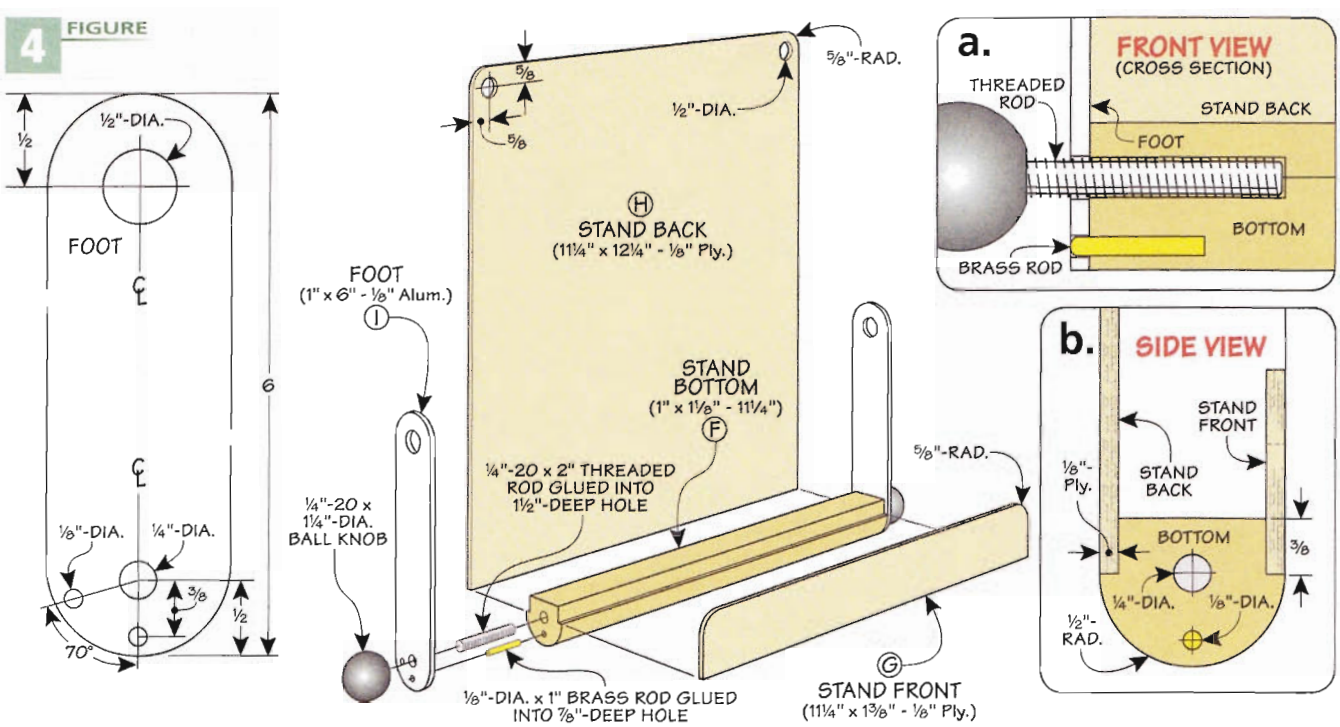
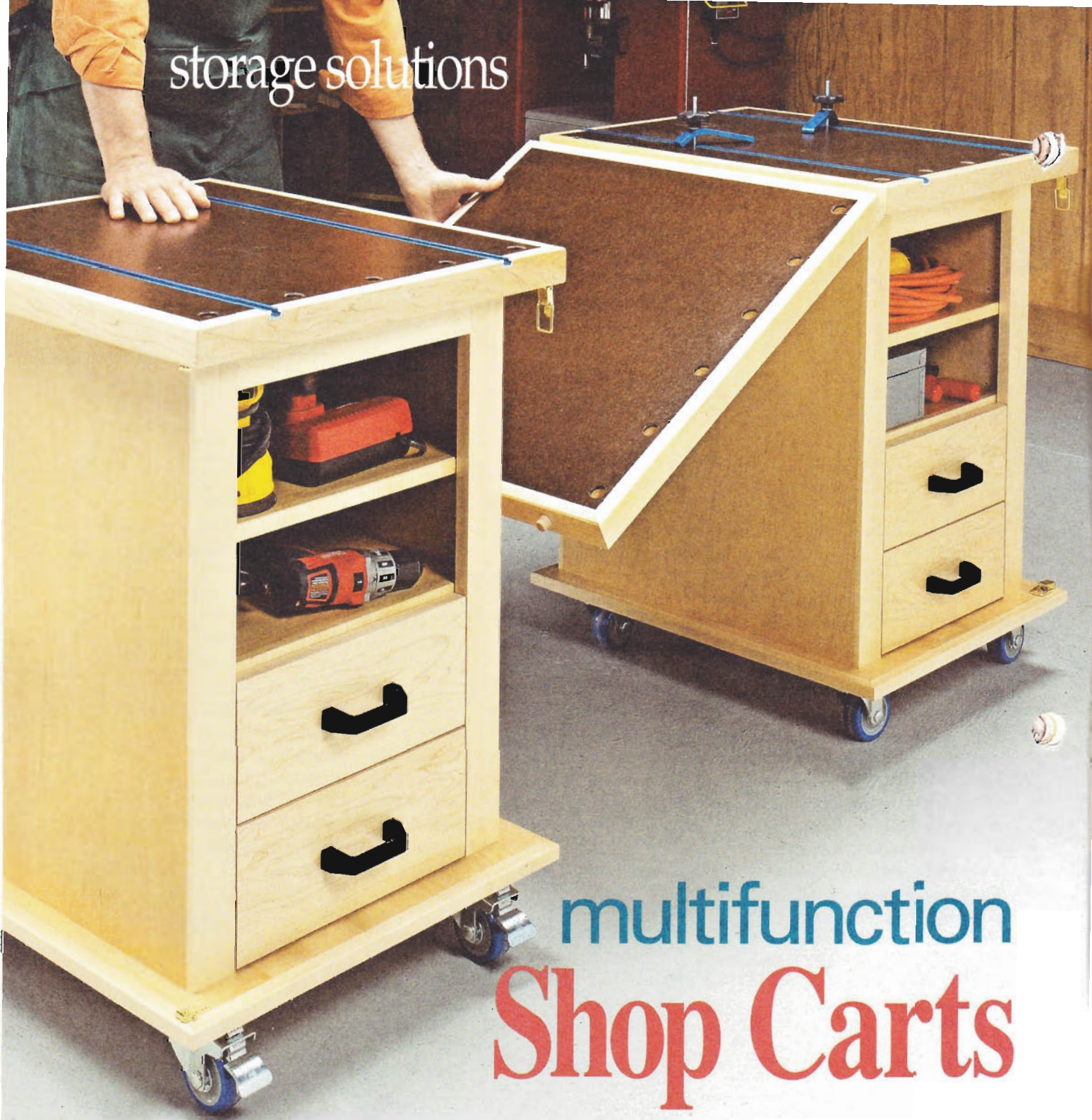


FIGURE 4





multifunction Shop Carts

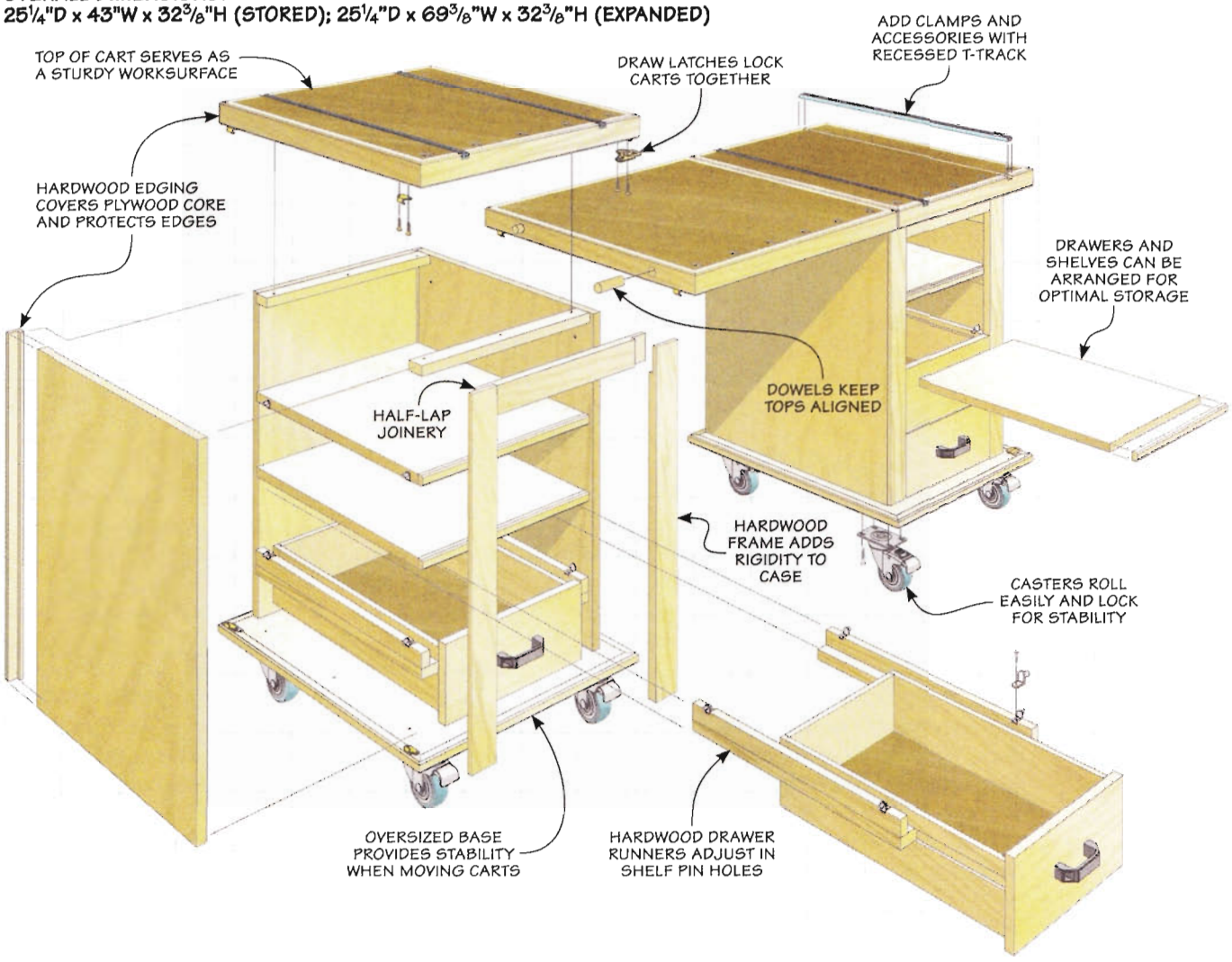
This handy pair of roll-around carts link together to form a large assembly table for your shop.

Whether your shop is in a corner of your garage or some other small area, making the most of the space available is the key to a comfortable workplace. Two factors always come into play for me; having enough storage for small tools and accessories, and finding room on my workbench when I'm in the middle of multiple projects.

The solution for me was the carts you see above. They're sturdy, easy to build, and work great separately or joined together with simple latches. There's even a drop leaf that expands the work surface. Locking casters on both carts make it easy to store them out of the way when not in use. And best of all, there's storage for your often used tools.

Exploded View Details

OVERALL DIMENSIONS:
25¼"D x 43"W x 32⅜"H (STORED); 25¼"D x 69⅜"W x 32⅜"H (EXPANDED)



Materials & Hardware

CASES

A	Back Panels (2)	16 x 25⅝ - ¾ Ply.
B	Back Panel Edging (4)	¾ x 1 - 25⅝
C	Side Panels (4)	21⅝ x 25⅝ - ¾ Ply.
D	Stiles (4)	¾ x 2 - 25⅝
E	Rails (2)	¾ x 2 - 16½
F	Top Mounting Cleats (4)	¾ x 1½ - 16½
G	Bases (2)	20 x 23¾ - ¾ Ply.
H	Base Side Edging (4)	¾ x ¾ - 25¼
I	Base Front/Back Edging (4)	¾ x ¾ - 21½

TOPS

J	Top Core (2)	20 x 23¾ - 1½ Ply.
K	Top Veneer (2)	20 x 23¾ - ¼ Hdbd.
L	Top Side Edging (4)	¾ x 1¾ - 25¼
M	Top Front/Back Edging (4)	¾ x 1¾ - 21½

DROP LEAF

N	Leaf Core (1)	24⅞ x 23¾ - 1½ Ply.
O	Leaf Veneer (1)	24⅞ x 23¾ - ¼ Hdbd.
P	Leaf Side Edging (2)	¾ x 1¾ - 25¼
Q	Leaf Front/Back Edging (2)	¾ x 1¾ - 26⅜

SHELVES/DRAWERS

R	Shelves (6)	16⅜ x 20⅜ - ¾ Ply.
S	Shelf Edging (6)	½ x ¾ - 16⅜
T	Drawer Fronts/Backs (8)	½ x 4½ - 12⅝
U	Drawer Sides (8)	½ x 4½ - 20¾
V	Drawer Bottoms (4)	12⅞ x 20¼ - ¼ Hdbd.
W	Drawer False Fronts (4)	¾ x 5¾ - 13⅜
X	Drawer Runners (8)	¾ x 1 13/16 - 20⅞
Y	Runner Supports (8)	¾ x 1⅛ - 20⅞

- (2) ⅝-dia. x 1⅝" Dowels
- (30) #8 x 1½" Fh Woodscrews
- (8) 3" Locking Swivel Casters
- (40) #10 x ¾" Ph Woodscrews
- (32) #10 Washers
- (4) Drawer Pulls
- (1) 48" T-Track Hold-Down Kit
- (3) 36" T-Track
- (24) #6 x ¾" Fh Woodscrews
- (28) Shelf Supports
- (1) 1½" x 24" Piano Hinge
- (6) Common Draw Catches

Reduced Footprint. *Switch the placement of the carts and latch them together for compact storage.*

start with the Case

What I really like about these carts is that they're both built exactly the same. That makes construction fairly straightforward.

Each cart starts as a simple, open-front case. Stiles and a single top rail attach to the front of the case to provide support. And a pair of cleats are used to attach the top. The over-sized base matches the size of the top and provides stability while rolling the cart around your shop.

Even though these carts are for the shop, I wanted them to also be visually appealing. That's why hardwood edging is used throughout the construction to hide and protect the plywood edges.

BASIC CASE

The construction of the case is simple, but there are a few unique components worth pointing out. Let's start with the back panel.

You can see in Figures 1 and 1a that after cutting the panel to size, you attach two strips of hardwood edging. This serves two purposes. In addition to covering the plywood edges, it also mimics the stiles on the front.

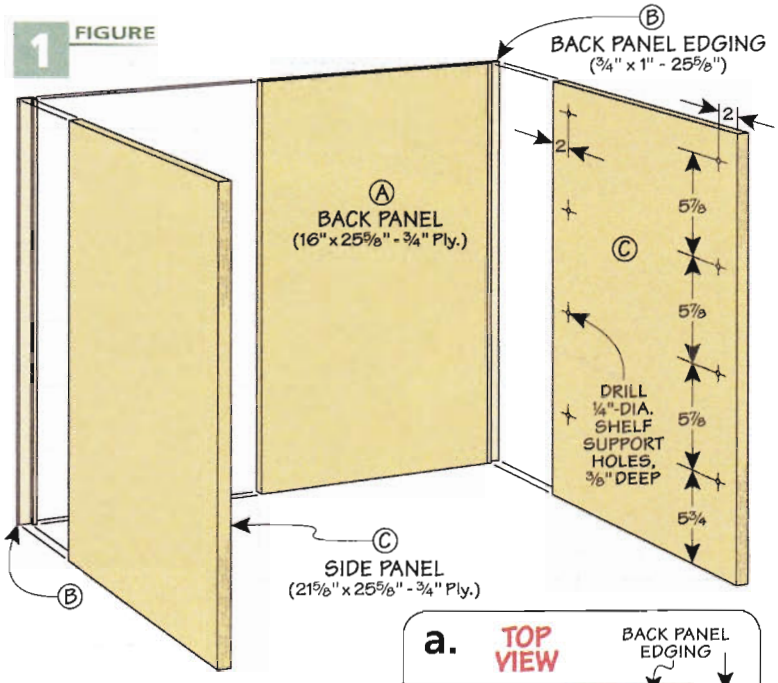
I cut the edging to size and glued each piece to the edges one at a time. I've found this to be the simplest way to keep the pieces in place while positioning the clamps. And once the hardwood edging is attached, you can cut the rabbet in each to fit the plywood sides.

The drawers and shelves for the cart are supported by the sides. So once you cut the plywood pieces to size, you're ready to drill the holes for the shelf supports you'll use later. Then you can glue up the back and sides.

Stiles. The stiles are a little different in that they are rabbeted along their outside edge to wrap around the sides. And they are also half-lapped to fit the width of the top rail. Figure 2a shows what I mean. The rabbets are the same as those on the back edging, so you can use the same setup to cut them.

Rail. The top rail rounds out the main components of the case and fits between the sides. The length of the rail should match the distance between the rabbets on the back panel. And the half lap at each end should match the stiles so that the face of the rail meets flush with the face of the stiles when assembled.

FIGURE 1



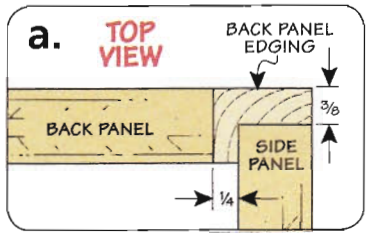
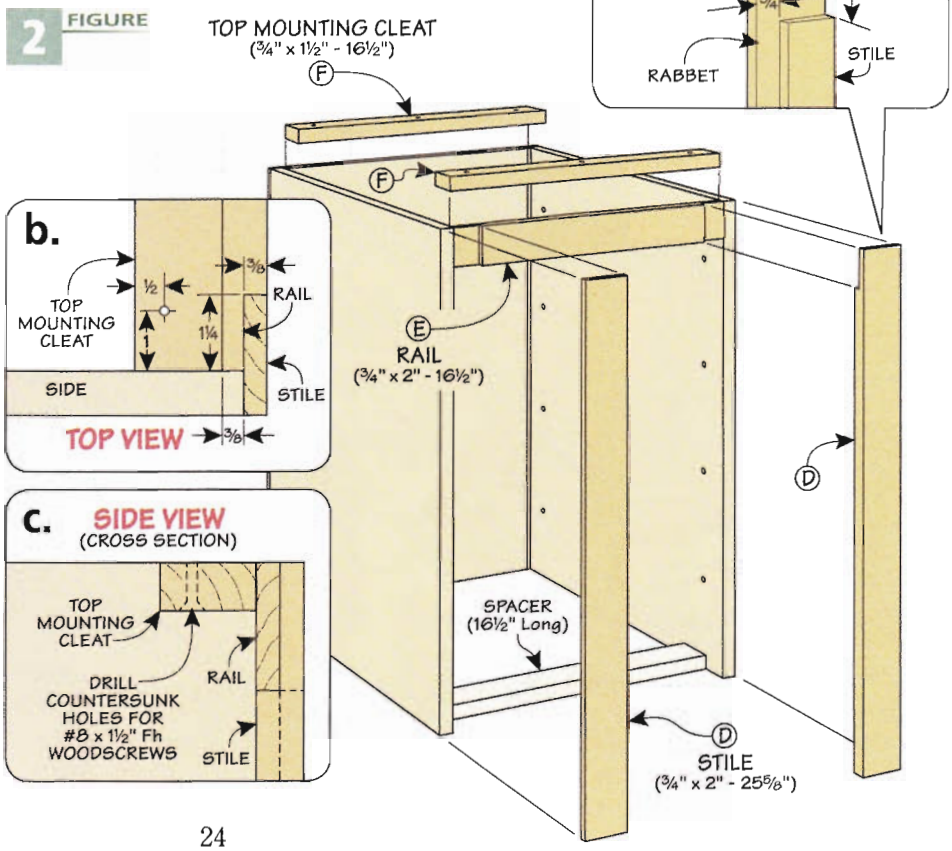


FIGURE 2



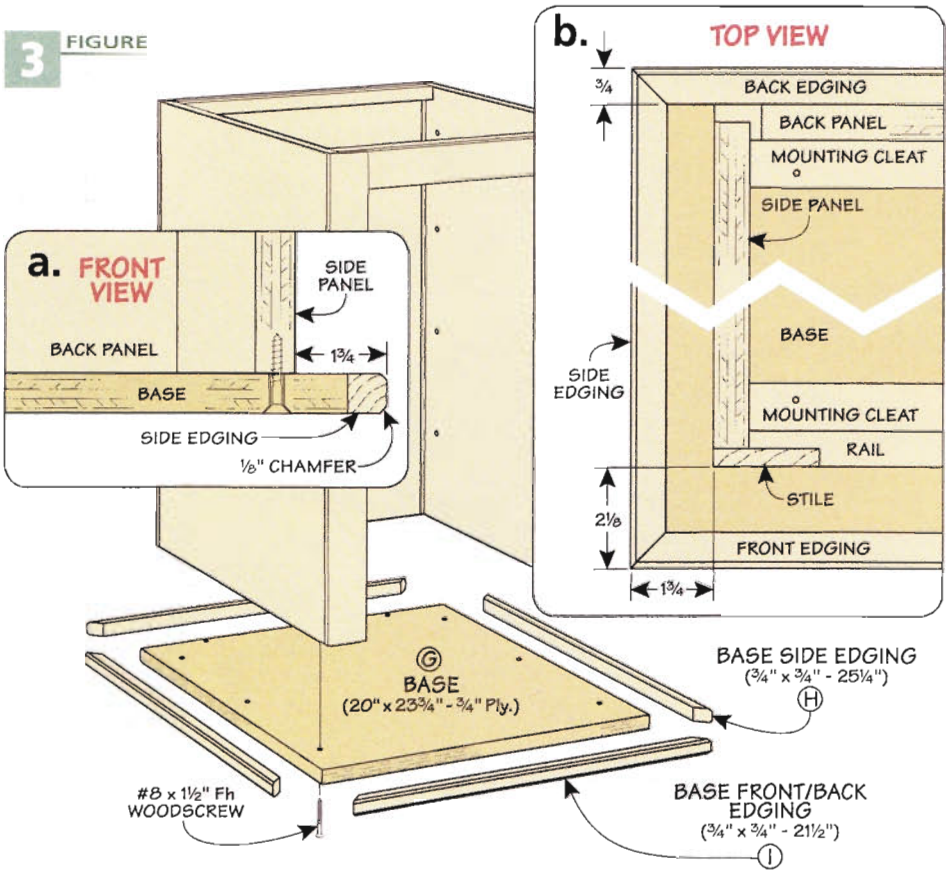
Assembly. It can be a little tricky gluing together an open-front case without a bottom rail. But there is an easy way to keep everything square.

You can see in Figure 2 on the opposite page that I used a spacer at the bottom, front edge of the case. It's just a piece of scrap cut the same length as the rail. It will help keep the bottom of the case square with the top while you glue and clamp all of the parts in place.

Cleats. You'll attach the top later, but now is a good time to add the hardwood cleats that will be used to secure the top. They're simple hardwood strips with countersunk pilot holes drilled through them.

Make sure that the countersinks are positioned at the bottom of the cleats when you glue them in place. The screws will be inserted from underneath. See Figures 2b and 2c on the facing page.

FIGURE 3



BASE

The carts are designed to be moved frequently. So it's important to have a sturdy base that will prevent tipping. The base for these carts fits that bill perfectly.

Building them won't take long either. The base for each cart is constructed from ¾" plywood and wrapped with hardwood edging. Figure 3 above shows how this goes together.

Start by cutting the plywood base panel to size and drilling pilot holes that you'll use to attach the base to the case. Then you can concentrate on the edging.

Edging. Just like with the edging on the back panel, it's best to glue up opposite sides separately. So start by cutting the edging to size for the front edge and for one of the sides. After cutting the miters, glue and clamp both parts in place.

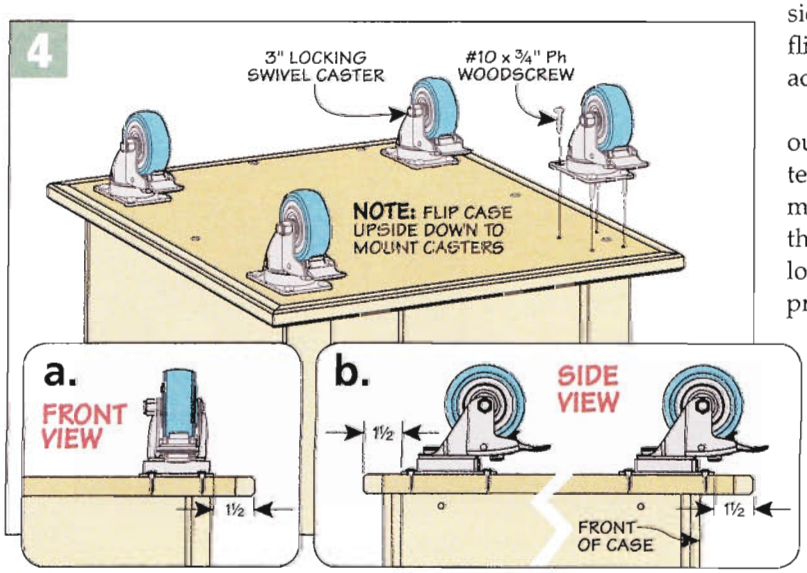
Keep an eye on the position of the edging. It can tend to shift while clamping. Once the glue dries, do the same for the back edge and remaining side.

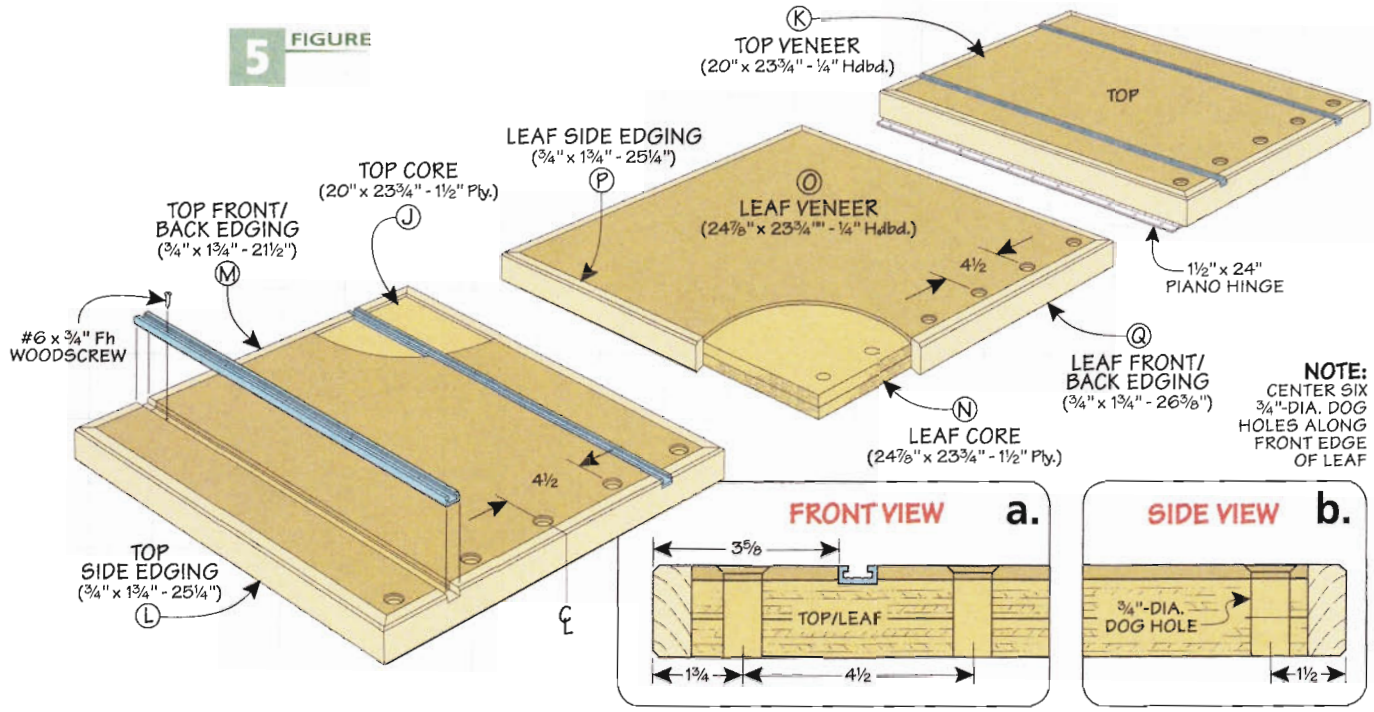
A slight chamfer around the top and bottom edges of the base eases them a bit so they're less prone to chip or splinter.

Attach Base & Casters. The base is secured in place with screws driven through the bottom of the base and into the case sides (Figure 3). So it's easiest to flip the case upside down and adjust the base into position.

One important detail to point out is that the base is not centered over the case. This is to match the position of the top that you'll build next. Take a look at Figure 3b above for the proper location.

Since the assembly is already upside down, now is a good time to attach the casters. Figures 4a and 4b show where each caster should be positioned on the base. When you're done, flip the case over and lock the casters in place.





building the Top & Drawers

The versatility built into the tops is what really sets these carts apart. To start with, they are constructed from two layers of ¾" plywood topped with a layer of ¼" hardboard. This sturdy, laminated assembly is then wrapped with hardwood edging.

A row of dog holes drilled along the front edge and recessed sections of T-track make it easy to add accessories and hold downs. When you add in the leaf, you really complete the picture.

TOP & LEAF

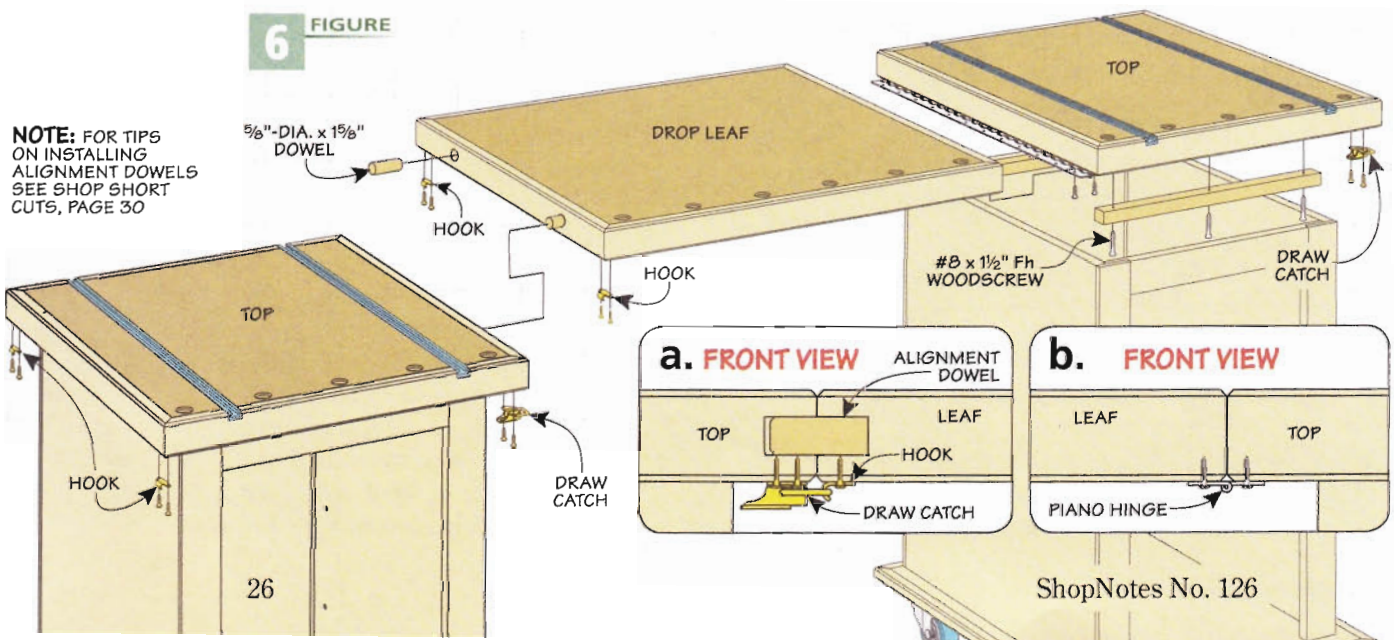
The laminated assemblies for the tops and leaf go together easily. But I do have a tip to share since it's almost impossible to get a lamination to line up perfectly. Instead of cutting each layer to final size, start with slightly oversized pieces. Then after the glue dries, you can trim the entire assembly to final size.

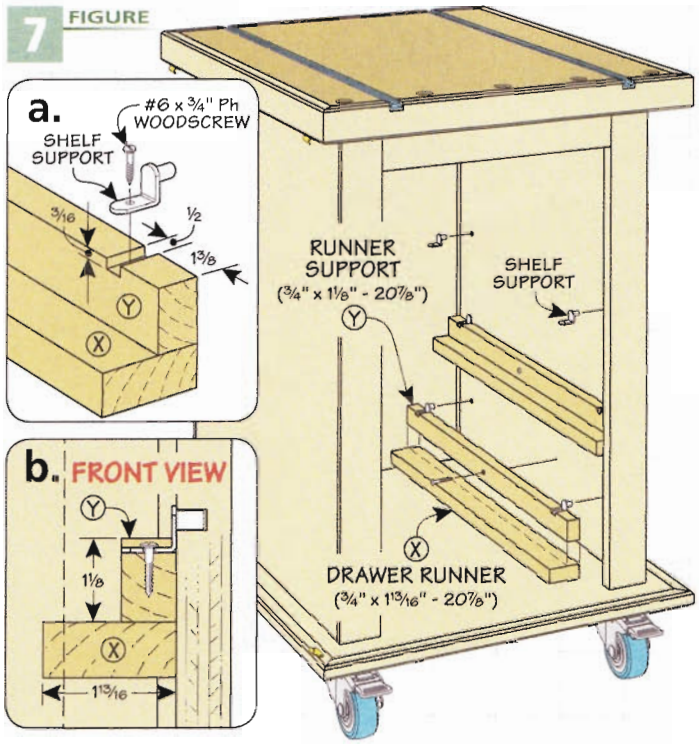
The edging goes on the same way as for the base. Start with the front and one side. Then move on to the back and remaining side. Soften the edges by adding chamfers.

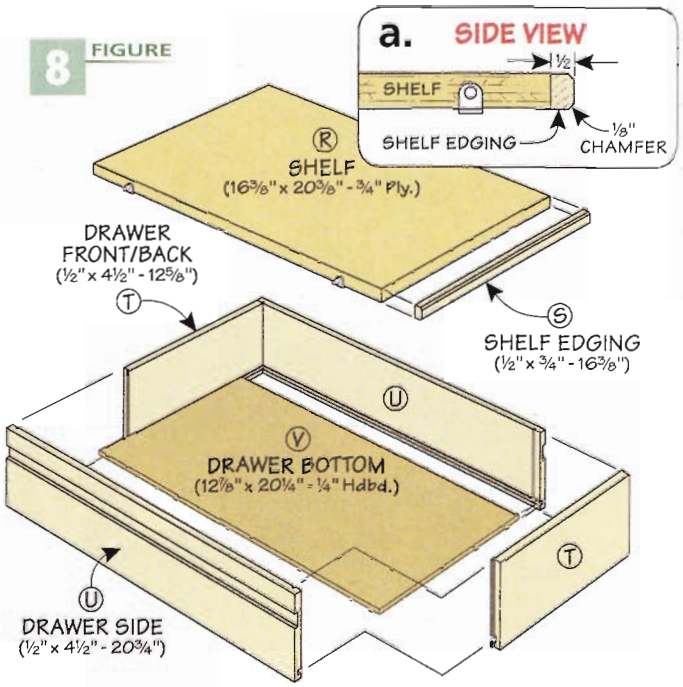
Since the tops are small enough to handle easily, I drilled the dog holes at the drill press then added the chamfer with a hand-held router. The grooves for the T-track can be cut with a dado blade at the table saw (Figures 5 and 5a).

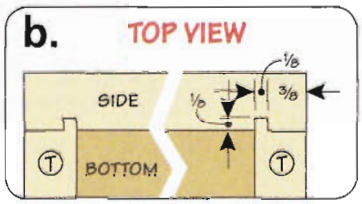
Assembly. Secure the tops with screws through the cleats in the case. Locate each on its case in the same position as the base.

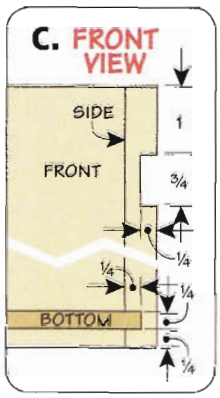
At this point, you need to drill two holes in the right edge of one of the tops and in the left edge of the leaf (Figure 6). Then glue short dowels into the holes in the leaf.











These will be used to align and support one side of the leaf. See Shop Short Cuts on page 30 for an easy way to drill the holes.

The opposite side of the leaf is attached to the other cart with a piano hinge. Figure 6b has the details. Draw catches located under the top of the left-side cart and under the leaf will keep the leaf and the carts together.

I also added draw catches under the top of the right-side cart and at the base of each cart. This allows you to fasten both carts together without the leaf. The photo in the right margin shows how this works.

DRAWERS & SHELVES

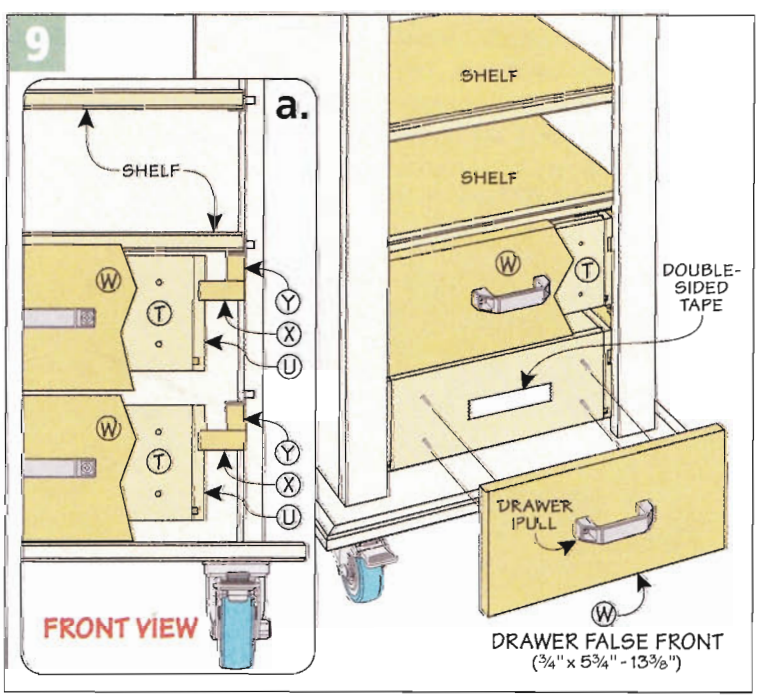
Each cart can hold up to four drawers or shelves. I made four of each so that I could mix and match their locations in each cart. The drawers are made using standard joinery, but there's a wide groove running the length of the outside face of each drawer side (Figure 8c). These grooves fit the drawer runners as shown in Figure 7.

Before cutting the false fronts for your drawers to final size, locate the drawer runners in the case using shelf pins. A screw through the shelf pins and into the notches cut in the top of each drawer runner will position them correctly.

With the drawers closed, attach your false fronts with double-sided tape. Adjust the fit of the fronts as necessary before attaching them with screws.

Shelves. For easy access to some of my tools, I also made four shelves. Each is just ¾" plywood cut to size with a strip of hardwood edging glued along the front edge. The shelves are supported by shelf pins or rest upon the top of a drawer runner if directly over a drawer as in Figure 9a.

Whether you make just one or several of these carts, I think you'll find them to be a valuable addition to your shop. You may even find room for another project.



▲ ***Options.*** *The drawers and shelves can easily be arranged to fit your needs.*

cutting Wood Threads

A handy kit and this simple technique are all it takes to add a unique twist to your next project.

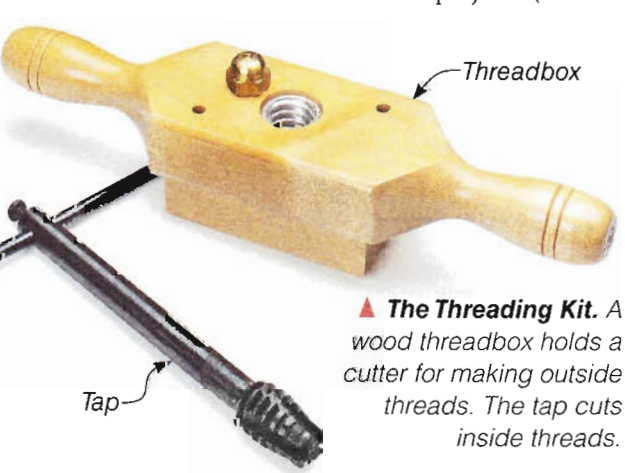
There's something about a project with screw threads cut into the wood that makes you want to pick it up to give it a try. Wood threads add a classic, finely crafted touch to just about any project, whether it's a handscrew, an adjustable-height stool, or even a toy.

Wood threads are surprisingly strong and straightforward to make. And with an inexpensive threading kit, you can make fun and functional projects. (Refer to sources on page 51.) If you've ever tapped and cut threads in metal, then the technique for creating threads in wood will seem familiar. The tools you need are shown in the lower left photo.

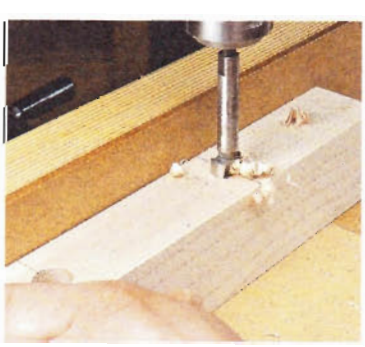
A steel tap cuts the internal threads in a pre-drilled hole. The other part is a large threadbox that has a V-shaped cutter for forming threads around a dowel.

Getting Started. I like to start by tapping the internal threads. In a nutshell, you drill a through pilot hole, then cut the threads with the tap. However, I want to mention a few key details.

The size of the pilot hole is important to the function of the threads in use. For the threading kit I used, the size of the pilot hole is $\frac{1}{8}$" smaller than the size of the threads. For example, the $\frac{3}{4}$" tap requires a $\frac{5}{8}$"-dia. pilot hole. A Forstner bit in the drill press will ensure a clean, square hole.



▲ ***The Threading Kit.*** *A wood threadbox holds a cutter for making outside threads. The tap cuts inside threads.*



▲ ***Pilot Hole.*** *At the drill press, drill a pilot hole with a Forstner bit. Then chamfer the edges.*

▲ ***Lubricate.*** *Apply a little oil to the pilot hole to reduce friction while tapping threads.*

The second detail is to ease the top edge of the hole with a small chamfer. This serves two purposes. First, the slight taper makes it easier to get the tap started squarely and to cut the threads. Second, it prevents the tap from tearing out the wood.

As with metal, tapping threads in wood generates a lot of friction. So before you pick up the tap, apply a coat of oil to the pilot hole. (Boiled linseed oil or mineral oil are good choices.) The oil makes turning the tap easier.

Tapping Threads. Now you can tap the threads. What's critical here is starting the tap square to the workpiece. This will seem tricky because the tap may catch and wobble a bit on the first few turns. But don't worry — once you have it started, you can adjust it slightly so it's perpendicular.

As you turn the tap, back it off a bit after every few rotations to clear the chips. On deep holes, you may want to apply more oil if the going gets tough.

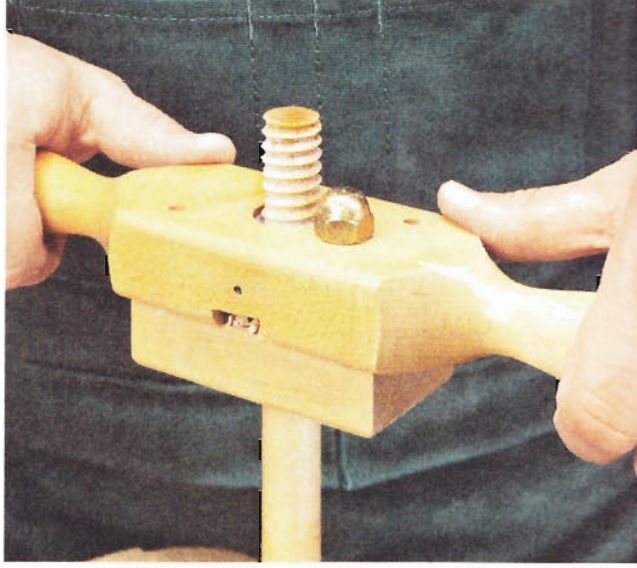
When you've completed the hole, you can either back the tap out or remove the handle and slide the tap out from the bottom. I like to run the tap through one or two more times to clear away debris and clean up the threads.

External Threads. At this point, you can set the tapped piece aside and create the external threads. This step differs a little from cutting threads in metal because the cutter in the threadbox is adjustable. Most of the time, the cutter is set correctly, right out of the box. However, it's a good idea to cut a sample to test the fit in the tapped hole. I aim for a fit that feels a little loose. Too tight and the threads can be hard to operate and squeak loudly.

Choosing Dowels. The next step is choosing a dowel. Factory-made dowels can often vary in size and may not be perfectly round. Take your time in selecting round, straight dowel stock (right margin photo). Here's a tip. Take the lower block off the threadbox and use that as a gauge to check the dowel. The dowel should slip through the block easily.

The type of wood is important, as well. Smooth, tight-grained hardwoods make the best threads. I prefer maple or birch.

Cutting Threads. Cutting the outer threads is similar to forming the inside threads. Here again, I wipe a coat of oil on the dowel and let it sit a bit to penetrate. Then I clamp an extra-long dowel firmly in a vise and set the threadbox over the top. Begin turning the threadbox, applying gentle pressure, as shown in the upper right photo.



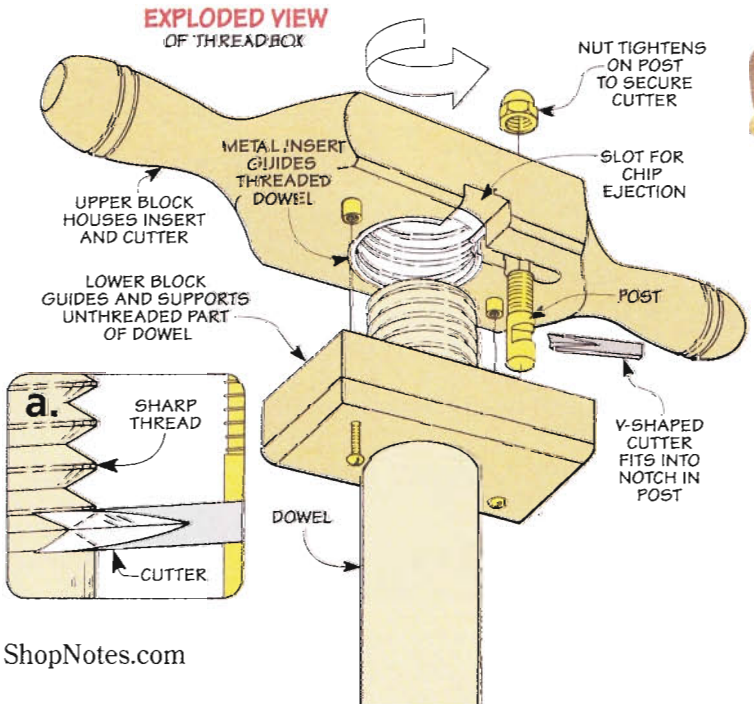
▲ ***External Threads.*** *With gentle downward pressure, rotate the threadbox clockwise to cut the threads around a dowel.*

As before, back off the threadbox every turn or two to clear the chips.

After you reach the final length, back the threadbox to the top end. I usually run the threadbox down one more time, again using gentle pressure. I find this clean-up pass leaves the thread faces smoother and better-fitting.

Applying a film finish to the threads may end up making the threads feel gummy in use. Instead, I just rub on a little wax. The result is a classic look you're sure to turn to again.

▲ ***Dowels.*** *Select dowels that are perfectly straight and round.*



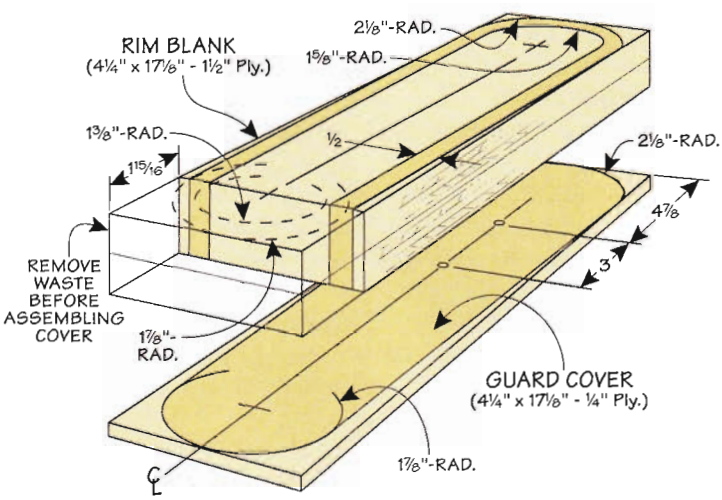
▲ ***Shop-Made Tools.*** *You can use a threading kit to make tools like carving vises and handscrew clamps.*

Shop Short Cuts

Belt Guard

The belt guard for the sander (page 32) is made up of two parts: a rim and a cover. The rim starts as two layers of plywood glued together. Then I cut it to shape at the band saw and sanded it.

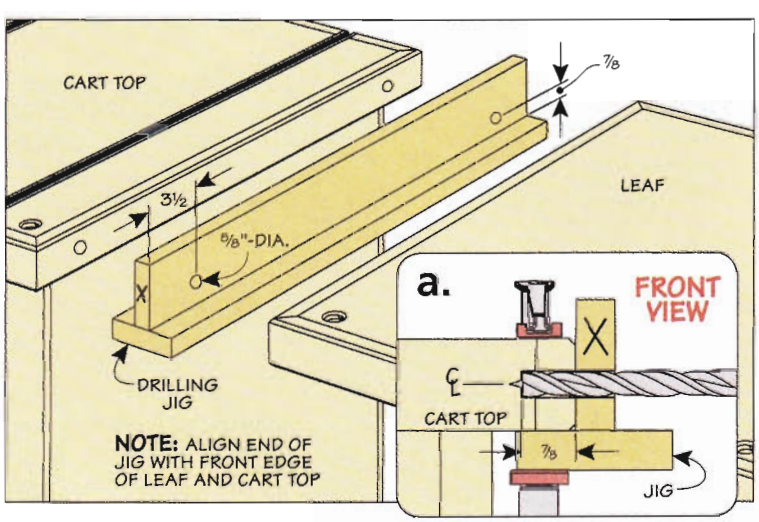
The cover is made from ¼" plywood. After laying out the profile, I glued the blank to the rim. Place the assembly face-down on the band saw and cut close to the outline. After final sanding, round over the edges.



Dowel Holes

Dowels support and align the leaf for the shop carts (page 22). For the top and leaf to line up perfectly, the holes in both have to be positioned accurately.

I made a jig to help out. It's just two pieces of hardwood glued together to make a "T." Two holes drilled at the drill press are used to guide the drill bit. A mark on one end of the jig reminds me to align that end with the front of both the leaf and cart top.



Making Rollers

The rollers for the belt sander on page 32 aren't hard to make. It starts with cutting six square blanks from ¾" Baltic birch plywood. The boxes below step you through the process.

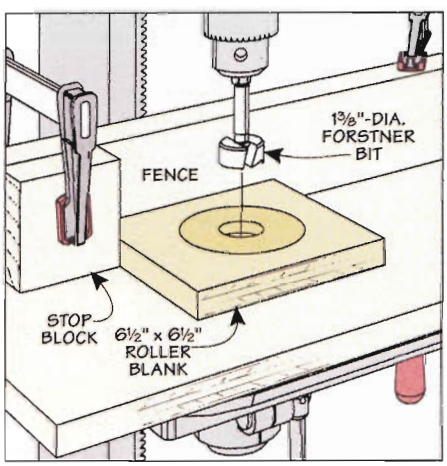
Idler Roller. I started with the top idler roller. It features a counterbore on each end for the bearings. I drilled the counterbore in a pair of blanks first.

Now, a circle cutter makes quick work of cutting six disks from the blanks. During glueup, a long ¼"-dia. bolt serves as a guide to keep each set of three disks aligned while the glue dries. The only thing to remember the counterbored disks face outward on the idler roller. The bolt is then used to chuck the assembly into the drill press for final shaping and sanding.

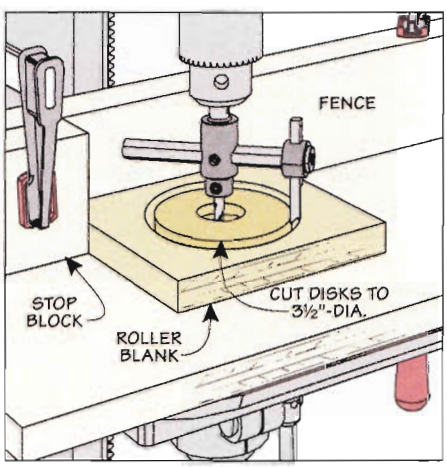
The shaping process is shown in the photo at right. I used files and sandpaper to make everything smooth. Then I formed a slight (about 1/32") camber to help the abrasive belt stay centered on the rollers during operation.

After shaping, you can enlarge the center holes. The drive roller has a ½"-dia. hole to fit snug on the drive shaft with a set screw you'll install. The idler roller's center hole is enlarged to ⅝" for shaft clearance. This ensures the bearings engage the shaft.

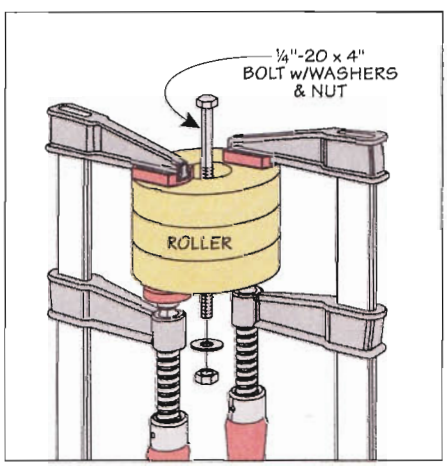
▲ ***Final Shaping.*** *Use files and sandpaper to create a smooth surface. A slight camber helps the abrasive belt track properly on the rollers.*



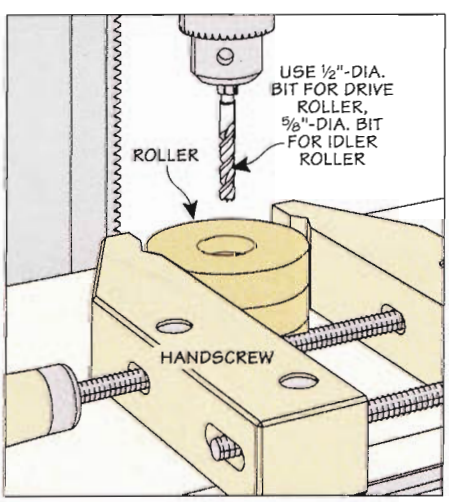
▲ ***Bearing Counterbores.*** *In two of the square blanks, drill a counterbore for the bearing centered on the blank.*



▲ ***Cut Disks.*** *With the blank firmly against the fence and stop, cut out a disk from each of the six blanks.*



▲ ***Glue & Clamp.*** *Using a long ¼" bolt as a guide, glue up three disks, add a washer and nut, then apply clamps.*



▲ ***Shaft Holes.*** *Center the roller on the drill press to enlarge the holes (⅝"-dia. on the idler, ½"-dia. on the drive roller).*

shop-made Button

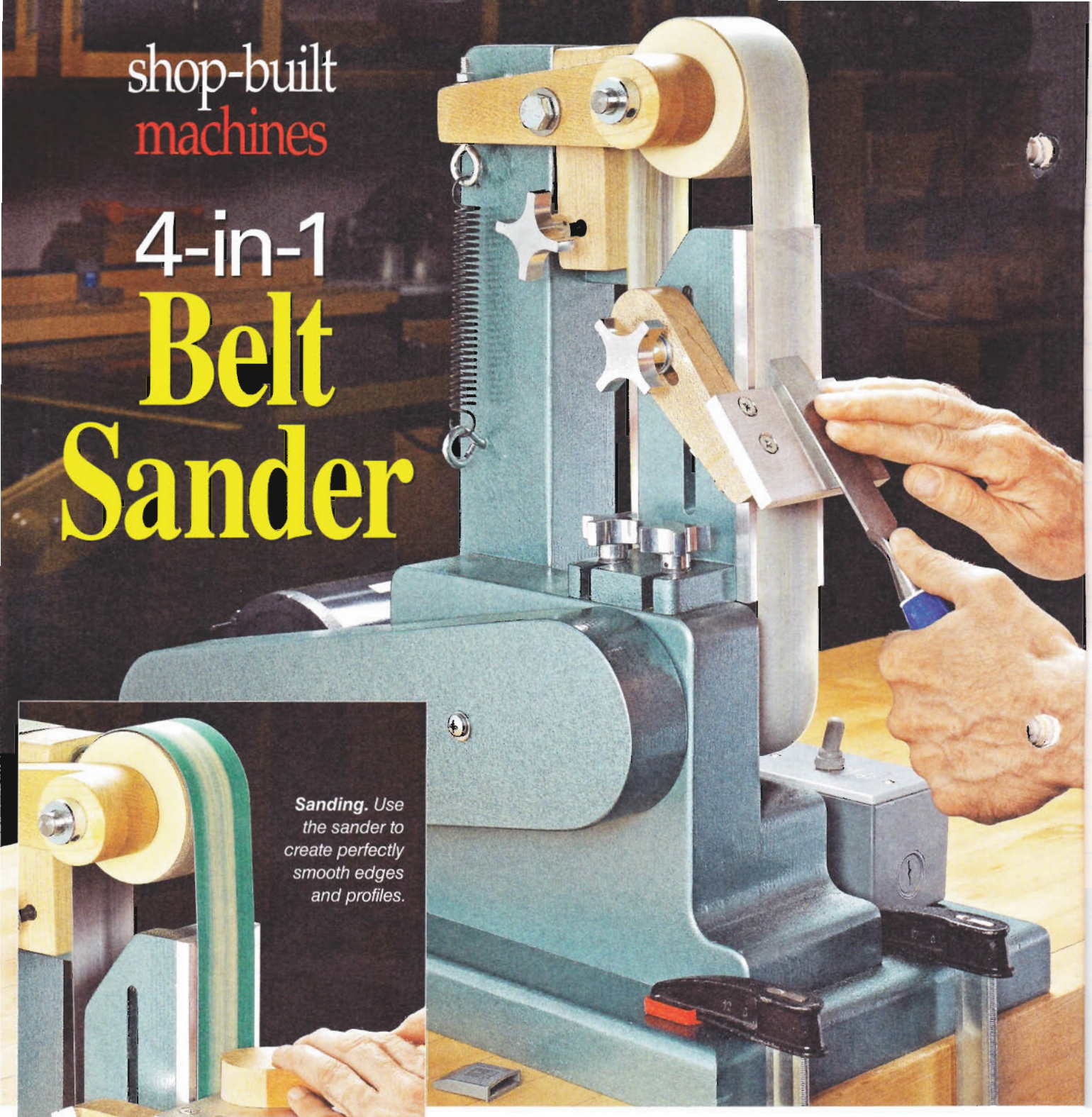
The power button for the tablet case on page 18 turned out to be easy to make. I used a short length of brass rod. A brass washer soldered to the rod traps the button between the frame and the foam liner.

With such small pieces, the soldering takes just a minute or two. I clamped the rod in the vise so the washer would be set at the proper position. Then it was just a matter of applying flux and heating it with a torch until the solder flowed.

▲ ***Soldering.*** *A quick soldering job creates a power button for the tablet case (below).*

shop-built machines

4-in-1 Belt Sander



Sanding. *Use the sander to create perfectly smooth edges and profiles.*

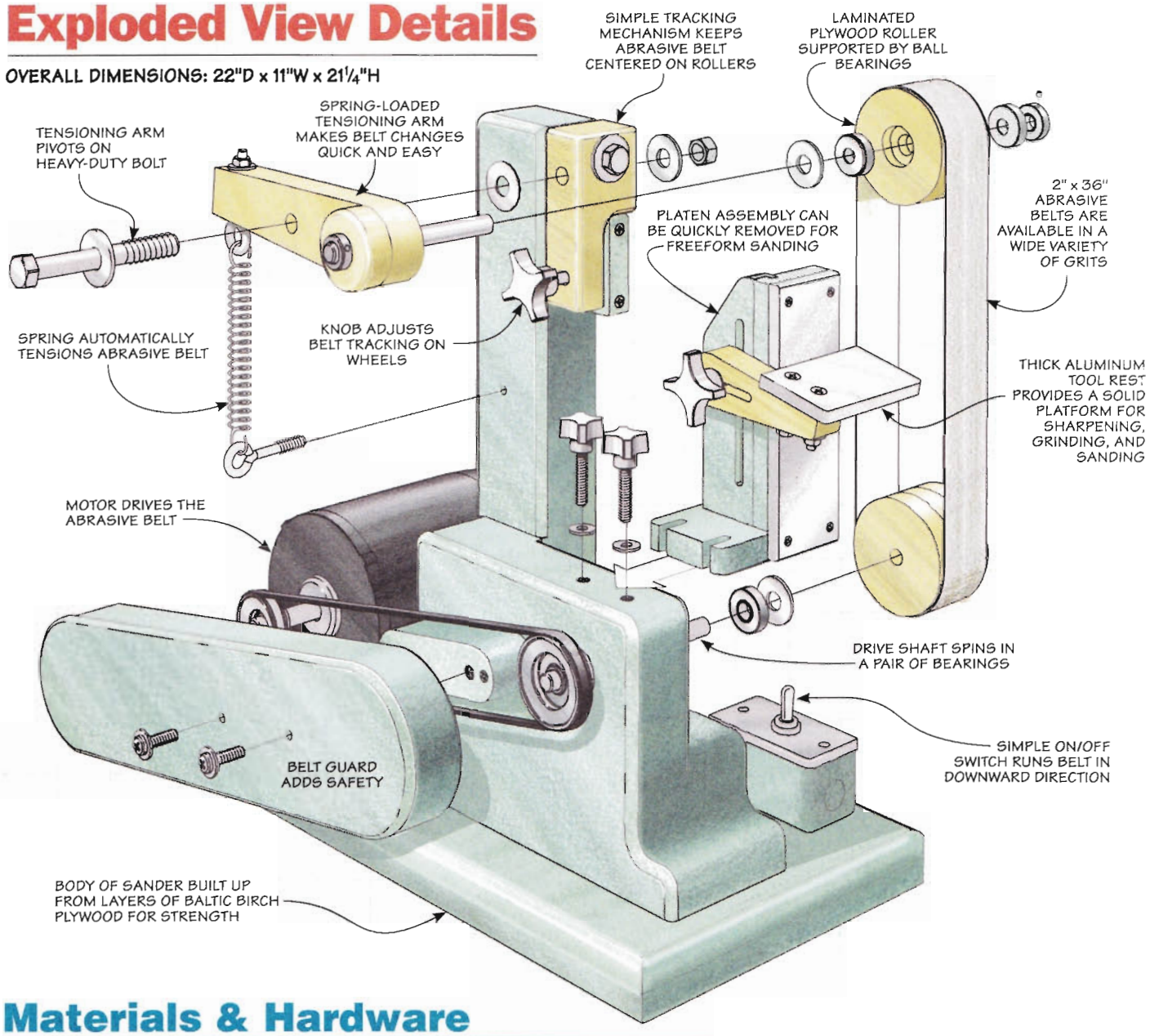
Grinding, sharpening, shaping, and sanding — this easy-to-build machine does it all.

For any small shop, getting one tool to perform multiple tasks saves space and makes your shop time more efficient. The belt sander you see above is a great solution for a wide variety of jobs for working with metal and wood.

The best feature of the belt sander is its simplicity. A motor drives the abrasive belt around two wheels. Built-in tracking adjustment and automatic tensioning keep the belt in line. And belt changes take about ten seconds. What more could you want?

Exploded View Details

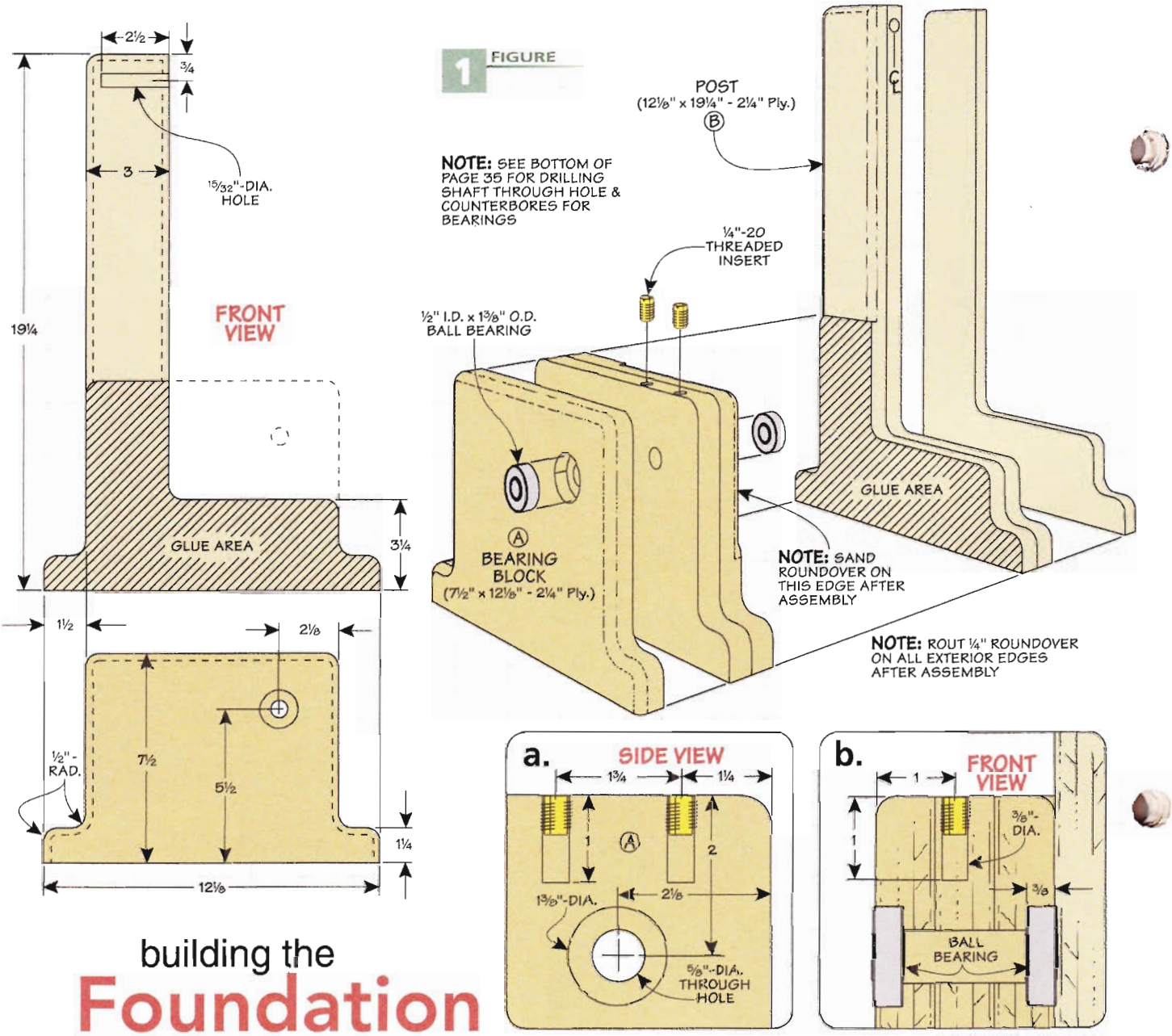
OVERALL DIMENSIONS: 22"D x 11"W x 21¼"H



Materials & Hardware

A	Bearing Block (1)	7½ x 12⅛ - 2¼ Ply.
B	Post (1)	12⅛ x 19¼ - 2¼ Ply.
C	Base (1)	11 x 22 - 1½ Ply.
D	Tracking Stop Block (1)	¾ x 1½ - 2½
E	Tracking Arm (1)	1½ x 2¼ - 5
F	Tension Arm (1)	1 x 2 - 7⅝
G	Shaft Block (1)	¾ x 2-dia.
H	Rollers (2)	3½-dia. - 2¼ Ply.
I	Platen Base (1)	3 x 4½ - ¾ Ply.
J	Platen Brace (1)	2¼ x 7 - ¾ Ply.
K	Platen Back (1)	2½ x 7 - ¾ Ply.
L	Platen (1)	2½ x 7¾ - ⅜ Alum.
M	Tool Rest Arm (1)	1 x 1½ - 5¼
N	Tool Rest Block (1)	¾ x 1⅛ - 2
O	Tool Rest Table (1)	2½ x 4 - ⅜ Alum.
P	Guard Mounting Block (1)	1½ x 1½ - 5
Q	Guard Rim	4¼ x 15⅜16 - 1½ Ply.
R	Guard Face	4¼ x 17⅛ - ¼ Ply.

- (4) ½"-I.D. x 1⅜" O.D. Ball Bearings
- (4) ¼"-20 Threaded Inserts
- (4) ¼" x 3" Lag Screws
- (2) #8 x 2½" Fh Woodscrews
- (2) 5/16"-18 T-Nuts
- (1) 5/16"-18 x 1¾" Studded Aluminum Knob
- (1) ½"-13 x 4" Hex Head Bolt
- (2) ½" x 1½" O.D. Fender Washers
- (6) ½" Flat Washers
- (1) ½"-13 x 4½" Hex Head Bolt
- (1) ½"-13 Lock Nut
- (1) ¼"-20 x 2" Eye Bolt
- (1) Screw Eye (½" I.D., 3/16" wire dia.)
- (15) ¼" Flat Washers
- (3) ¼"-20 Hex Nuts
- (1) 3" x .625" O.D., .063" wire dia. Ext. Spring
- (1) ½"-dia. x 36" Drive Shaft
- (2) ½" I.D. Shaft Collar
- (1) ¼"-20 x 1½" Set Screw
- (1) 2½" O.D. 3L-section V-Belt Pulley, ½" Bore
- (1) 2" O.D. 3L-section V-Belt Pulley, ½" Bore
- (1) 5/16"-18 x 3" Studded Aluminum Knob
- (1) 5/16" Flat Washer
- (2) ¼"-20 x 1½" Fh Machine Screws
- (2) ¼"-20 x 1¾" Studded Aluminum Knob
- (3) #8 x 1½" Fh Woodscrews
- (4) #6 x ¾" Fh Woodscrews
- (1) ⅓-HP, 1725-RPM Motor
- (1) 34" 3L-section V-Belt
- (1) 16-gauge Cord Set w/3-Prong Plug
- (1) Weatherproof Electrical Box w/Blank Cover
- (3) #8 x ⅝" Sheet Metal Screws
- (2 ft.) ½" Flexible Metal Conduit
- (1) ½" Conduit Clamp
- (2) ½" Flex. Conduit Connectors w/Bushings
- (3 ft.) Black 14-gauge Insulated Copper Wire
- (1) 15-amp. Toggle Switch
- (1) Rubber Boot for Toggle Switch
- (2) ¼"-20 x 1" Ph Machine Screws
- (4) ¼" x 1" Lag Screws



building the Foundation

The body of the sander is made up of a bearing block and post (Figure 1). These components need to be strong and solid, so they're glued up from layers of Baltic birch plywood. Then you'll shape each of these sections separately, glue them together, and fasten them to a plywood base.

Bearing Block. The first thing to do is cut three blanks that make up the layers of the bearing block. After gluing them up, you can drill out the inside corners and head to the band saw to cut the assembly to final shape. Then sand the edges smooth.

Threaded Inserts. The platen assembly you'll add later is fastened to two threaded inserts in the top of the bearing block. It's easiest to drill and install these now before moving on. Figures 1a and 1b provide the details for the inserts and the bearings you'll work on next.

Drilling. The shaft bearings fit into counterbores on either side of the bearing block. The box at the bottom of the next page shows how to drill the shaft and bearing holes while keeping them centered and aligned.

Bearing Installation. Now you can install the bearings. They should be a press fit in the counterbores, but if you find the bearings fit a little loose, you can shim them with a piece of a plastic shopping bag. Stretch the plastic over the counterbore, press the bearing in place, and trim away the excess plastic.

Post. Next, you can turn your attention to the post assembly. Gluing up and shaping the three layers of plywood follows along the same lines as before. Here, you can use the shape of the lower part of the bearing block as a guidline for shaping the base of the post assembly.

Before gluing the bearing block and post assembly together, there's one more hole to drill. Figure 1 shows the location of the pilot hole for a ½"-dia. bolt.

This bolt serves as the anchor for the abrasive belt tracking mechanism. You'll tap the threads inside this hole later.

Glue-Up. The bearing block and post assemblies can come together now. The only trick is to keep the bottom, front, and rear faces flush. A few strategically placed clamps can help.

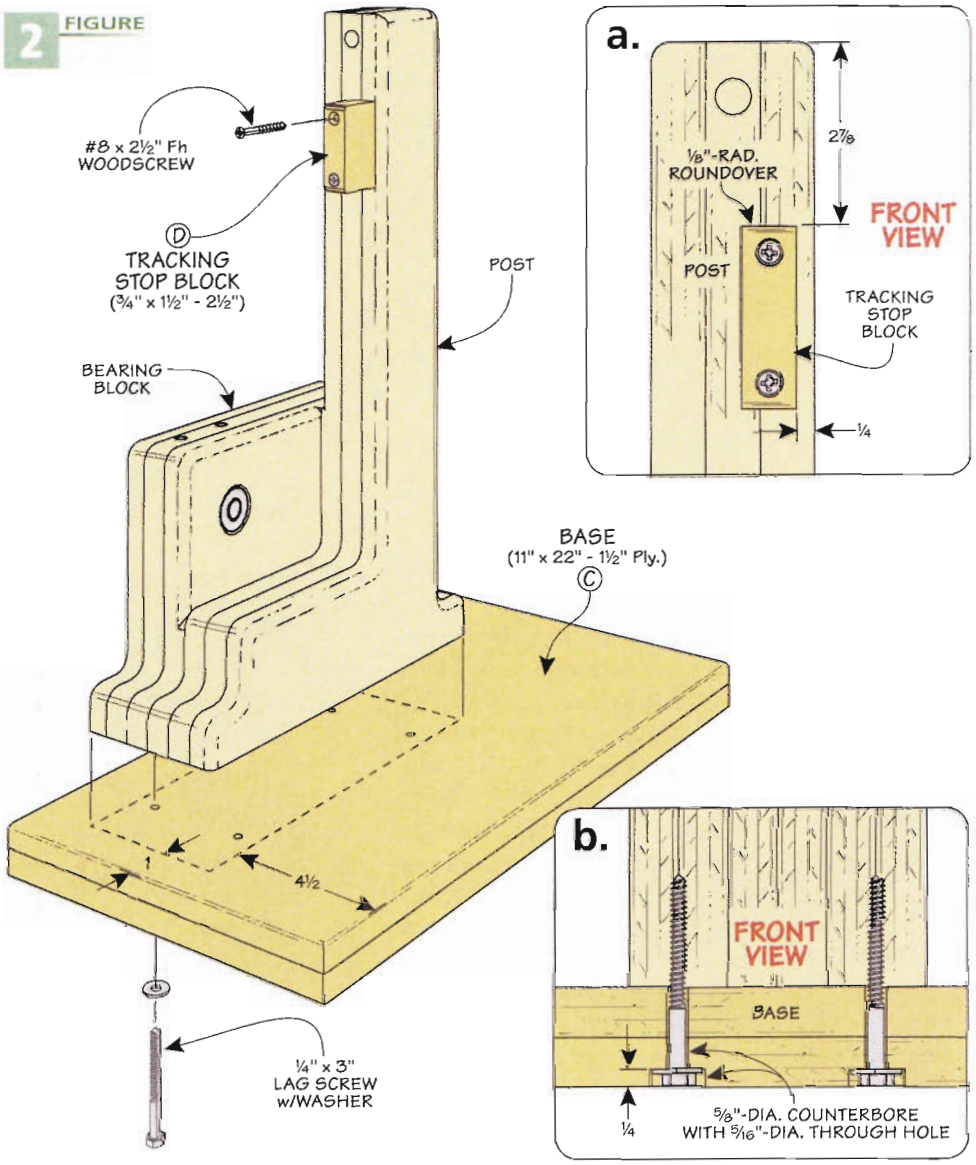
Roundovers. To give the sander a "cast iron" look when painted, I routed roundovers on the outside edges of the assembly. But before painting it, I added a plywood base.

Base. In Figure 2, you can see the simple base I made for the sander. It's large enough to accommodate the motor and switch box, plus provide some clamping area to attach it to my benchtop during use.

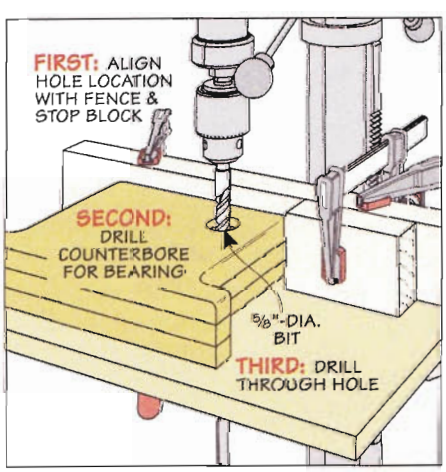
Once you glue up the plywood, cut the base to size and round over the top edges. Lag screws installed in counterbores from the bottom hold the sander securely to the base (Firgure 2b).

Tracking Stop Block. Before painting the assembly, I installed a hardwood block to the post (Figure 2a). It's part of the tracking assembly you'll start to work on after sanding, priming, and painting the body of the sander.

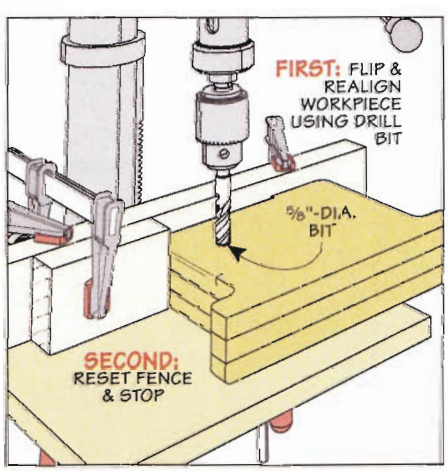
FIGURE 2



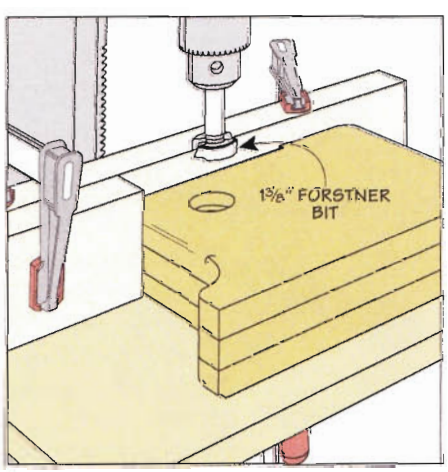
Drill Bit Counterbore Alignment



▲ ***Shaft Hole.*** *Set the fence and stop block to locate the hole. Drill a ⅜"-deep counterbore then the ⅝" through hole.*



▲ ***Alignment.**** *Flip the workpiece and align it with the drill bit before resetting the stop block and fence.*



▲ ***Second Counterbore.*** *Switch out the bit to drill the counterbore for the bearing on the opposite side.*

adding the Mechanism

While the paint is drying, you can start to work on the mechanics of the sander. For me, this is the fun part. You'll start by finishing up the tracking mechanism. Then you'll add the tensioning assembly and finally, the pair of rollers for the abrasive belt.

Tracking. If you take a look at Figure 3, you can see how the tracking assembly goes together. The first step is to tap the hole for the pivot bolt. For this, I simply filed some grooves in the bolt, as shown at left. The grooves help cut the threads for a secure hold.

Tracking Arm. The tracking arm is the hardwood P-shaped block you see at right. After shaping it, there are a few holes to drill. And there's a shallow counterbore to accommodate a T-nut, as in Figure 3b. You can attach the tracking arm and related hardware following the illustration in Figure 3.

Tensioning. The tensioning mechanism keeps the abrasive belt in tension during use. It builds on the tracking assembly by attaching to the tracking arm.

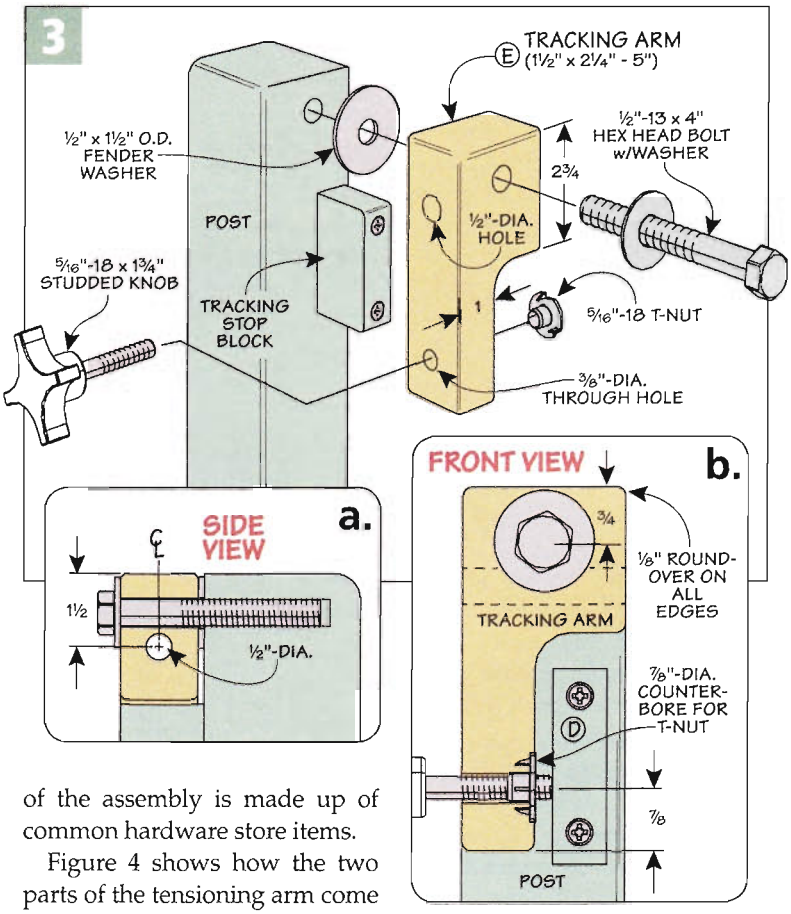
The tension arm and shaft block are two parts you'll need to make for this assembly. The rest of the assembly is made up of common hardware store items.

Figure 4 shows how the two parts of the tensioning arm come together. I made the shaft block first, then glued it to a blank for the tension arm. This way, the shaft block serves as a guide when shaping the arm.

Step over to the drill press to drill the three through holes. One is used for the idler shaft. The middle hole is for the pivot bolt that attaches to the tracking arm and allows the tension arm to swivel. The vertical hole and counterbore at the small end of the arm are used to attach the spring that applies the tension.

Tensioning Assembly. Following the drawings in Figure 4, you can attach the tensioning arm to the tracking arm. You'll need to drill a pilot hole in the post for a screw eye that holds

▲ ***Thread Tap.*** *File grooves in the end of a bolt to cut threads in the plywood post.*



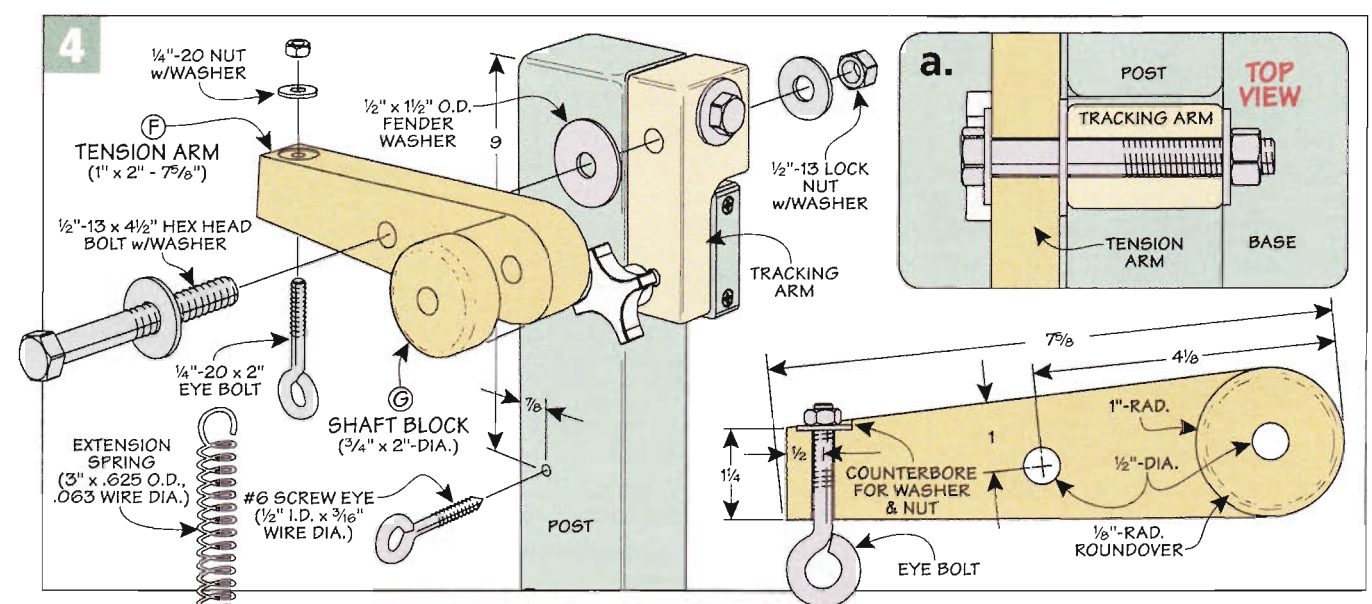
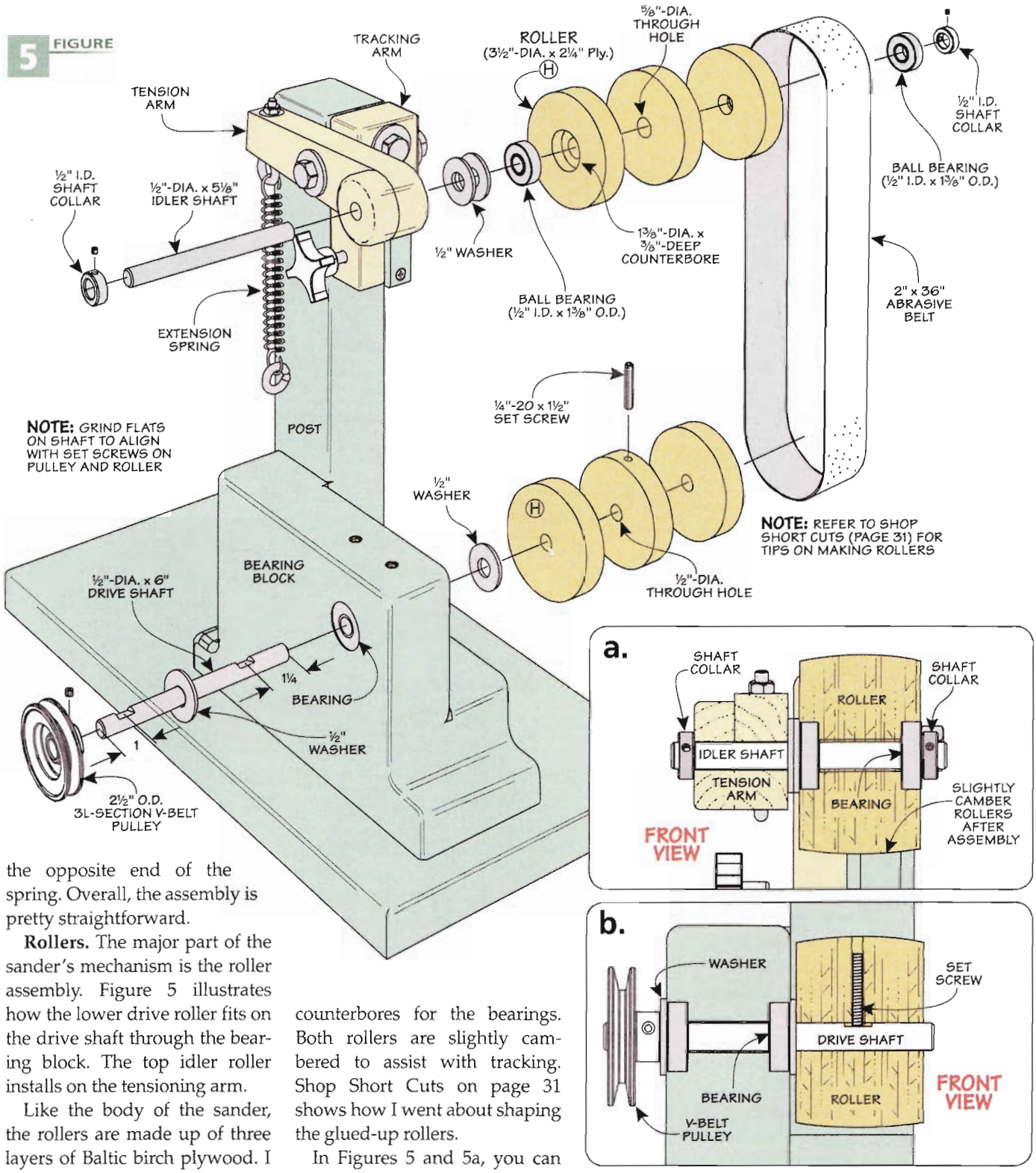


FIGURE 5



the opposite end of the spring. Overall, the assembly is pretty straightforward.

Rollers. The major part of the sander's mechanism is the roller assembly. Figure 5 illustrates how the lower drive roller fits on the drive shaft through the bearing block. The top idler roller installs on the tensioning arm.

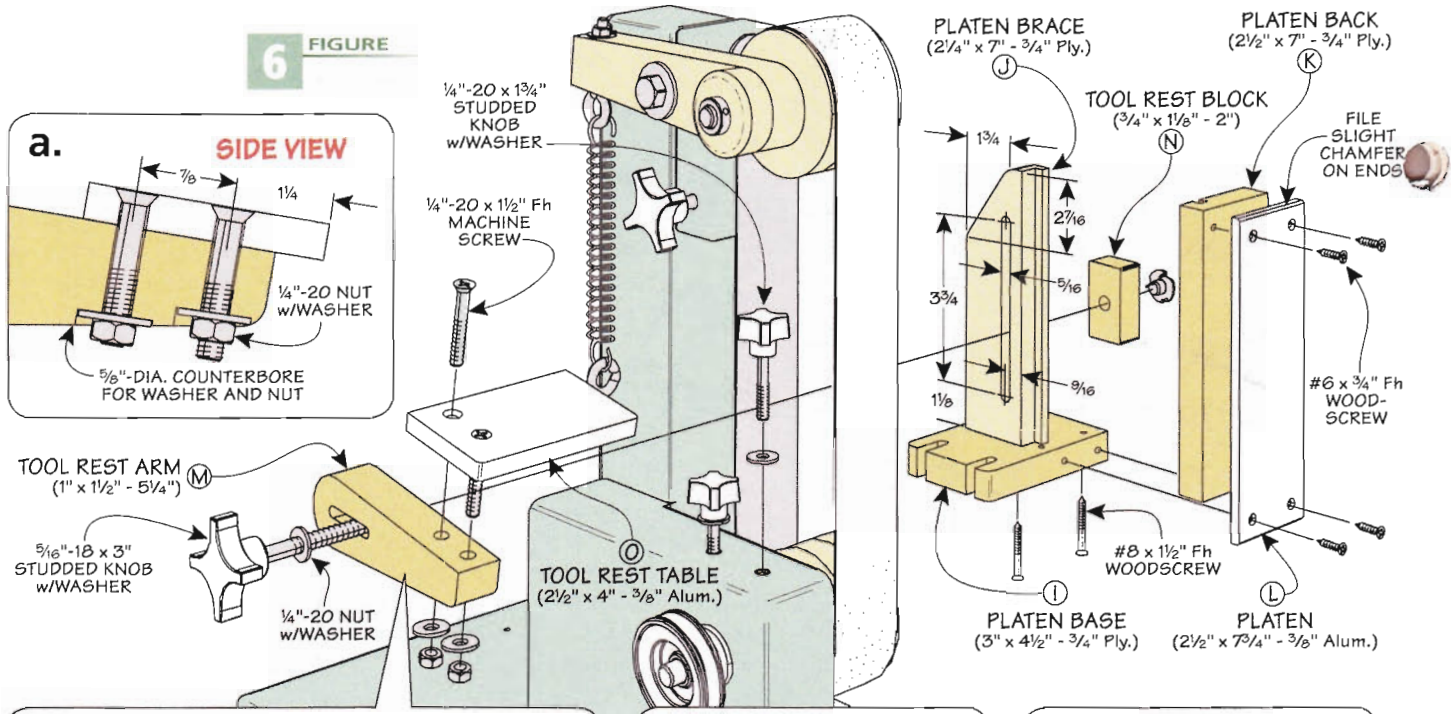
Like the body of the sander, the rollers are made up of three layers of Baltic birch plywood. I started with square blanks. It's easier to accurately drill the bearing counterbores in the top roller before assembly. Then you can cut out the disks, glue the layers together, and drill the oversized through hole for the shafts. You'll do the final shaping with files and sandpaper on the drill press.

The lower drive roller follows a similar technique without the counterbores for the bearings. Both rollers are slightly cambered to assist with tracking. Shop Short Cuts on page 31 shows how I went about shaping the glued-up rollers.

In Figures 5 and 5a, you can see that the drive roller is held onto the drive shaft with a long set screw. I drilled a pilot hole just large enough to engage the threads on the screw.

Roller Assembly. The only thing left to do before final assembly is file a couple of flats on the drive shaft. The set screws on the drive pulley and roller contact these flats.

The upper idler roller and shaft are held in place with a couple of shaft collars with set screws. It's not necessary to grind flats on the idler shaft for these. Just make sure the set screws are tight before moving on. In the end, the two rollers should be aligned to keep the abrasive belt tracking properly during use.



adding final Details

Most of the mechanics of the sander are complete. But there are a few other items you'll need to add. The first is a platen assembly with a tool rest. The second (and most important) is the motor and drive belt. Finally, you'll add a belt guard.

Platen. The platen assembly provides a flat surface to support the belt for sharpening tools like chisels. But the base of the platen assembly is slotted for easy removal to allow freeform sanding of rounded surfaces.

The assembly is made up of a plywood stand with a thick aluminum face that acts as the platen (Figure 6). The brace locks into the back with a tongue and groove joint. The brace is slotted to provide adjustability for the tool rest arm and table.

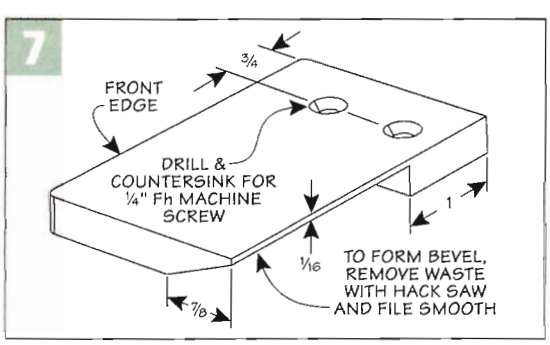
Tool Rest. The tool rest is a simple assembly consisting of an arm, aluminum table, and clamp block. This assembly attaches through the slot on the platen assembly, as in Figure 6.

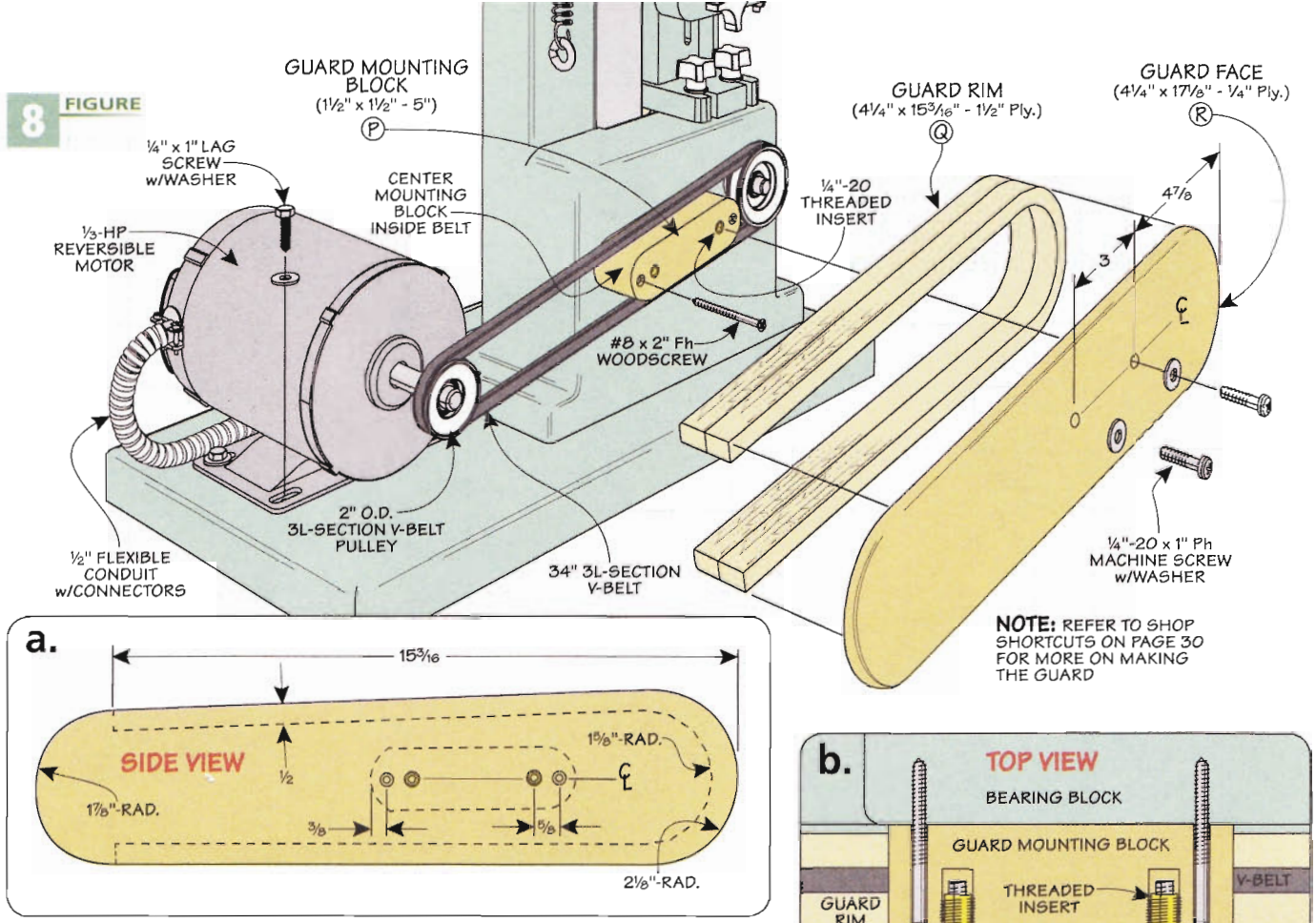
Cutting and shaping the tool rest arm is pretty straightforward. To create the slot, I drilled overlapping holes and cleaned the slot with chisels and a file.

Aluminum Table. The tool rest table is made from the same material as the platen. But there's a little shaping you'll need to do, as you can see in Figure 7.

I cut the blank to length and then put it in a vise to create the stopped bevel on the underside. This bevel provides clearance to allow the edge of the table to adjust close to the abrasive belt for maximum support for tools when sharpening.

To cut the bevel, I used a hack saw to remove most of the waste. A little work with files brings it to final shape. Drill a pair of countersunk holes for the machine screws used to attach the table to

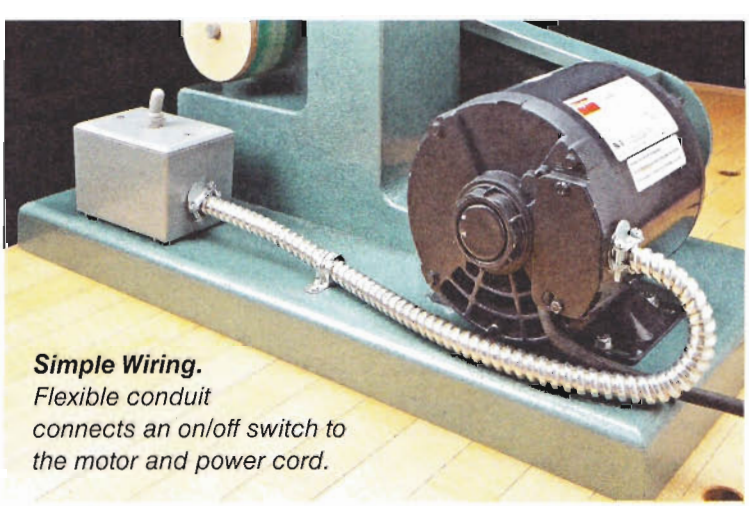




the arm. You can use these holes to mark and drill the through holes in the arm. Make the small clamping block and attach the assembly to the platen brace, as shown in Figure 6c.

Motor & Switch. Finally, you're at the stage where you can add the motor, wiring, and switch. You can see what it all looks like in the photo below. You'll want to have the drive belt in hand and pulley installed on the motor shaft. This helps you position the motor for proper tension on the belt.

The power cord is wired into the motor housing. Flexible conduit connects a switch box with a simple on-off toggle switch. The exterior-grade switch box cover has a gasket to keep out dust and moisture. I added a rubber boot to the toggle switch to keep it protected, as well. The motor is wired so that the abrasive belt travels in the downward direction at the tool rest.



Simple Wiring. *Flexible conduit connects an on/off switch to the motor and power cord.*

Belt Guard. The last thing to do is add a belt guard. It's made from a 1½"-thick plywood rim and ¼" plywood face. Figure 8 shows you how it's constructed. After gluing up two layers of plywood, I cut the inside shape of the rim first. Then I glued on an oversized plywood face and cut the guard to final shape at the band saw with the face down.

To attach the guard, I made a thick hardwood mounting block. It has a pair of threaded inserts for attaching the belt guard. The block is simply screwed to the sander, and the guard gets attached with a pair of screws.

Final Steps. To install an abrasive belt, pull down on the tension arm and slip the belt onto the rollers. Turn on the sander, then adjust the tracking to keep the belt centered. I'm sure you won't have any trouble putting the sander to use.

SAFETY NOTE
If you're not comfortable performing electrical work, consult with a licensed electrician.

dealing with Twisted Lumber

Straight, flat, and square stock is critical to a successful project. A few basic steps is all it takes.

When I purchase lumber for a project, I do my best to pick boards that are as straight as possible. But sometimes I'll find the "perfect" board, except for a slight cup, bow, or twist. There are even times when a board will develop a twist after it's been cut to length. And without a flat reference face, it can be very difficult to cut parts to size, get square edges, or cut accurate joinery that fits together precisely.

▲ ***Twisted Lumber.*** *A few passes on the jointer will remove the "proud" corners of a twisted board and leave a flat face ready for planing.*

With a jointer and the right technique, however, twisted boards can be made flat. I'll share a few tips that you can use in your shop.

TAMING THE TWIST

You can determine if a board has a twist by laying it across a flat surface like a workbench and seeing if it rocks from corner to corner. The board may also be cupped or bowed, but eliminating the twist is the first step towards a usable workpiece.

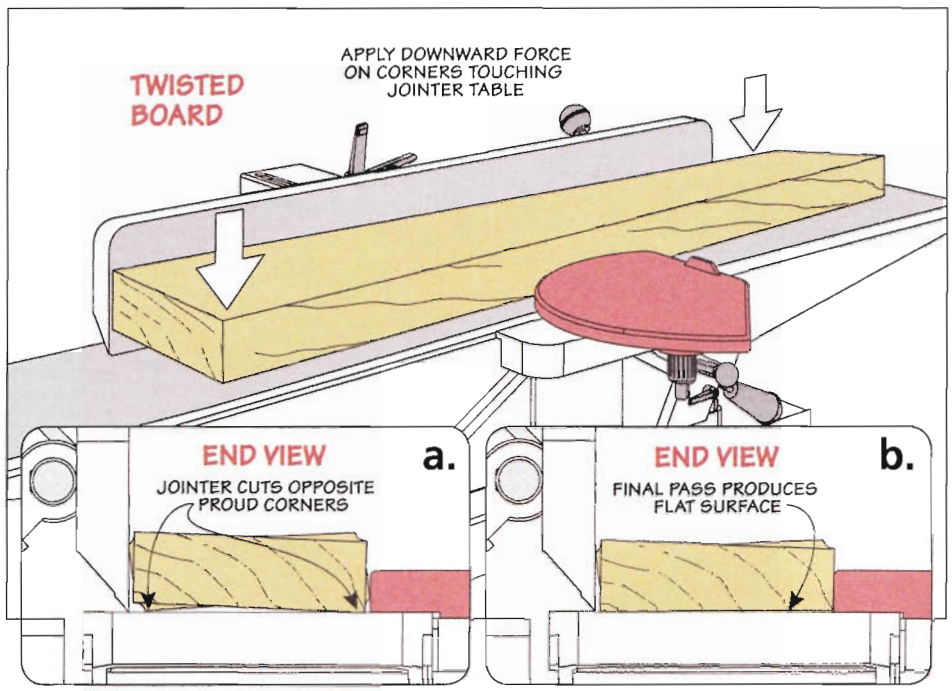
Prep. To eliminate the twist, you'll identify and work on flattening the "proud" corners. Before removing any waste, however, consider how to maximize your material so that the board will still be thick enough to use for your workpiece once the twist has been eliminated. Because if you immediately start removing the waste, you may end up with a board that's too thin for your project.

One way to maximize the thickness of the workpiece is to cut it to rough length before removing the twist. This is

because for a board with consistent twist along its length, the overall amount will be less in a shorter workpiece.

As a result, you have a lot less waste to remove in order to eliminate the twist. This saves both time and material. The drawings in the box below show what I mean. An additional benefit is that a shorter board is much easier to handle on the jointer.

Determining how much thickness you'll end up with isn't difficult. You can see in the photos on the opposite page that I've drawn layout lines to show the final thickness of the board. The box at the bottom of this page shows you an easy way to do this.



THE TECHNIQUE

Twisted stock is difficult to work with because only two corners of the workpiece are in contact with the jointer tables during the cut. The key is applying pressure only at these corners. The drawing above right shows the details of how to do this.

This can be easier said than done, however. The board will still have a tendency to rock. Just use firm, but gentle pressure. And use the fence to help stabilize the workpiece.

Start by making slow passes while keeping the board steady. With each pass, you'll bring more surface area into contact with the jointer. When the board lies flat, a final, full-length pass or two will leave you with a straight surface. You can then take it to your planer to flatten the opposite face.

Hopefully, you won't have to go through this much effort for all your lumber. But it's a great way to salvage expensive hardwood and minimize what ends up in the scrap bin.

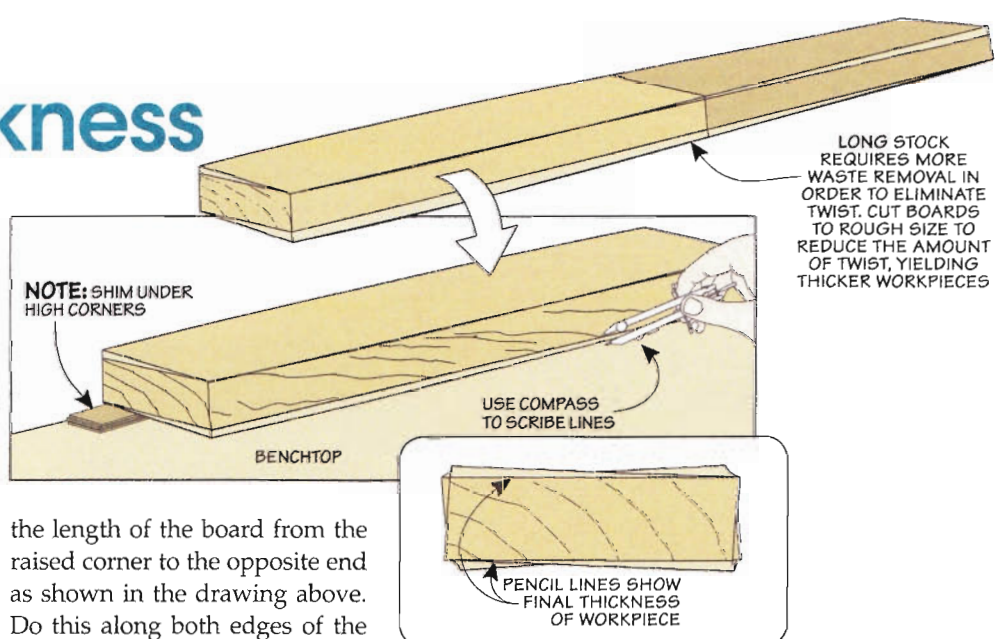
determine Final Thickness

Eliminating twist from a board reduces its overall thickness. So it makes sense to determine the maximum thickness you'll get from flattening a board, before you start removing the waste. You don't want to end up with a board that's too thin for your project.

An easy way to do this is with a compass. Start by placing shims under the raised corners of the workpiece so that it rests on your workbench without wobbling. Both corners should be shimmed the same height off the bench. This measurement is the amount of twist over the length of the board.

Set your compass to this measurement and scribe a line along the length of the board from the raised corner to the opposite end as shown in the drawing above. Do this along both edges of the workpiece, then connect the lines across the ends of the board.

Flip the board over and repeat this process for the opposite face. The resulting lines on the end of the board will give you a rough idea of the final thickness. Keep in mind that additional final planing and sanding will further reduce the overall thickness of the workpiece.



5 must-have Jigs

Get more accurate cuts and repeatable performance from your tools with the help of a few simple jigs.

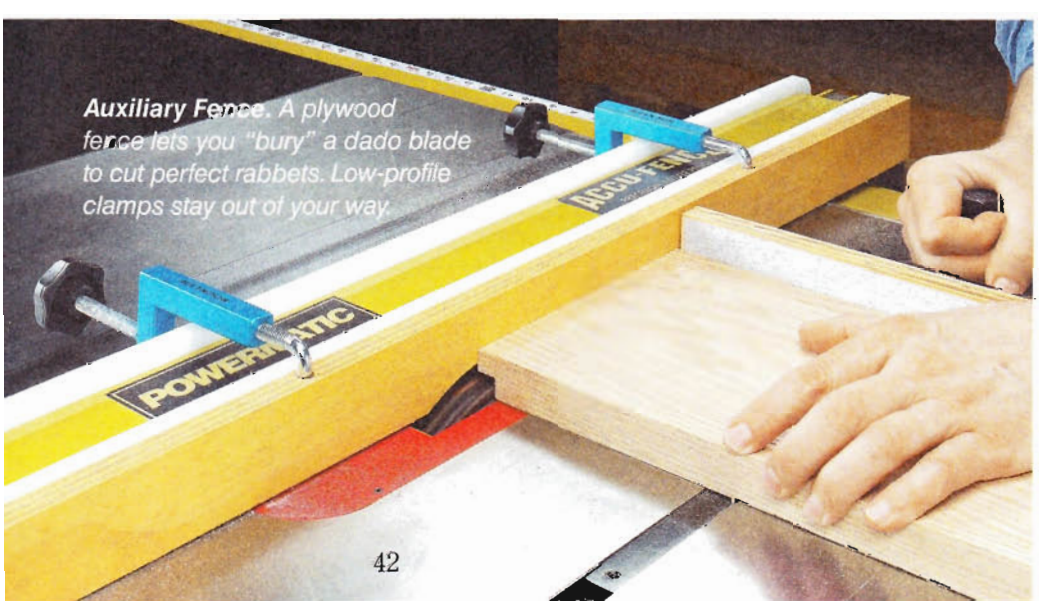
I've made quite a few jigs over the years. Some were one-time jigs for a specific project. Others are used almost every time I'm in the shop. These go-to jigs are simple to make and designed to work as extensions of your power tools. In just one afternoon, you can make all these jigs and add them to your shop arsenal.

MITER GAUGE FENCE

Most woodworkers use a miter gauge when making crosscuts at the table saw. But the small face of most miter gauges provides very little support for your workpiece.

The simple solution is to attach an auxiliary fence. You can see in the photo above that a piece of ¾" plywood is all you need. I added adhesive-backed sandpaper to the face of the fence to help keep my workpieces from shifting during a cut.

A small chamfer cut along the bottom edge of the fence provides room for dust relief. And a stop block clamped in place helps with repeat cuts.



Auxiliary Fence. *A plywood fence lets you "bury" a dado blade to cut perfect rabbets. Low-profile clamps stay out of your way.*

AUXILIARY RIP FENCE

In addition to cutting workpieces to size, I also use my table saw for joinery. And one of the joints that I make most frequently is a rabbet.

Typically, I use a dado blade to cut rabbets. But to do this, part of the blade needs to be "buried" in a wood auxiliary fence, as in the photo at left. Just cut a ¾" plywood fence to fit your saw and drill a couple of holes for the clamps. I attached the fence with a pair of *Universal Fence Clamps* from *Rockler* (Item #31373).

CROSSCUT SLED

The miter gauge that comes with most table saws and an auxiliary fence is fine for crosscutting narrow pieces. But if you try to use it to crosscut a wide panel, you'll quickly discover what a challenge it is.

When the fence is pulled back from the table it can rock back and forth in the slot or bump into the edge of the table saw top when making a cut.

That's why I like to use a crosscut sled when cutting large panels. The large, flat base of the sled is stable and provides support for wide panels. A pair of runners guides the sled and the workpiece smoothly through the saw. And a fence on the trailing edge of the sled ensures that every cut will be square.

► ***Crosscut Sled.*** *Make your table saw more versatile and more accurate at the same time with a crosscut sled. Whether you're cutting a small workpiece to final length or squaring up the end of a large panel, you can be certain it will be perfectly square.*

DUAL EDGE GUIDE

Sometimes it's easier to use a circular saw to cut a full sheet of plywood than it is to balance the sheet on the table saw. And a shop-made edge guide makes using a circular saw more accurate, see photo below. But this dual-sided edge guide has the added benefit of also doubling as a router guide.

It's made from a piece of ¼" hardboard screwed to a narrow plywood fence. (I made mine 4½' long for crosscutting a full sheet of plywood.)

The trick to making the jig is to start off with an extra-wide base. After attaching the fence, trim both sides of the base. One side is trimmed with a circular saw and the other with a router and a straight bit. To use the jig, just place the edge of the base on your layout line and clamp it in place.

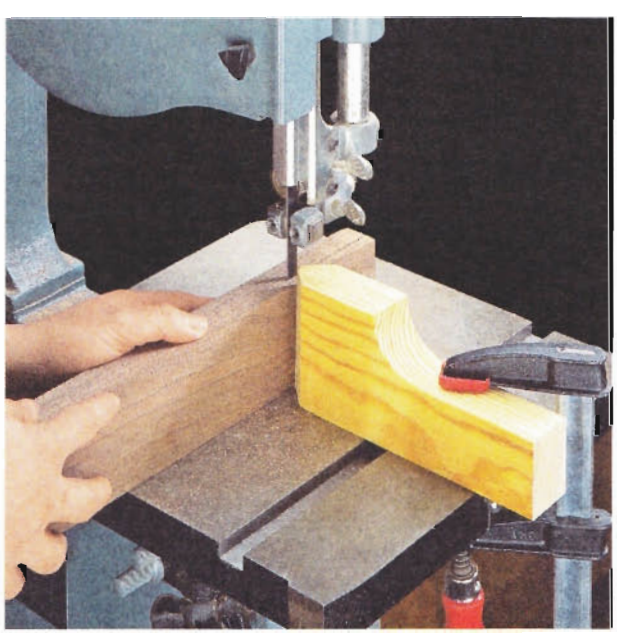
BAND SAW PIVOT BLOCK

A band saw is a great tool for resawing thick lumber into thinner stock. But because most band saw blades have a tendency to "wander," controlling a cut can be difficult.

One solution is to use a simple guide block (photo below.) The nice thing about this block is that the single point of contact allows you to pivot the workpiece as you push it through the saw, adjusting for the direction the blade is wandering.

You can see that none of these jigs are difficult to make. But they each work so well that I wouldn't want to be without them. Make a set for your shop and I think that you'll agree.

▲ ***Plywood Edge Guide.*** *A shop-made edge guide makes using a circular saw more accurate. The opposite edge of the jig doubles as a router guide.*



▲ ***Band Saw Pivot Block.*** *This guide block allows you to pivot the workpiece as you push it through the blade to compensate for any drift.*

simple, precision Straightedges

These traditional tools can improve the performance of your tools and give you better results.

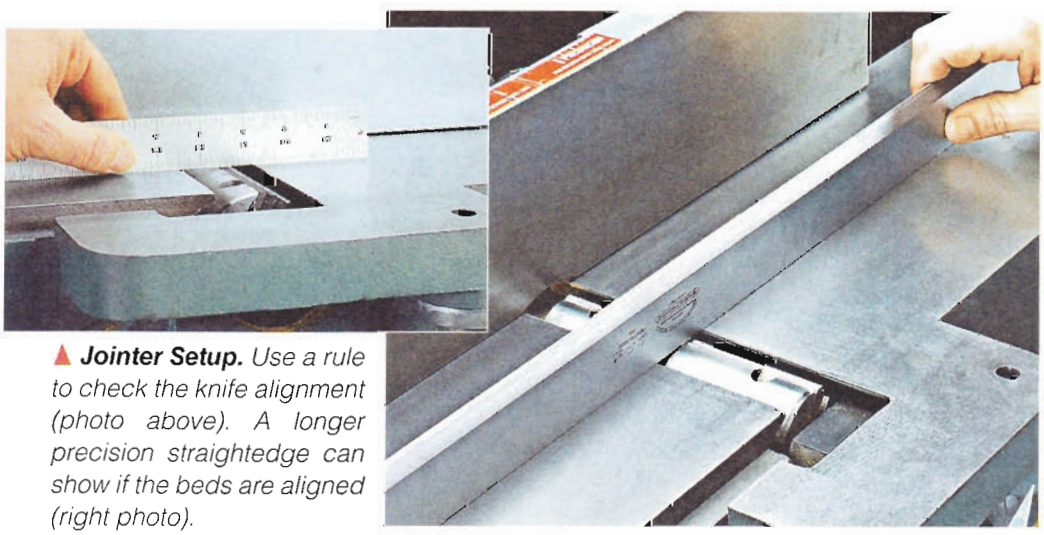
Routers, chisels, table saws, and hand planes get a lot of attention when putting together a basic set of woodworking tools. However, some less obvious tools are often overlooked. A good example of this is straightedges.

Choosing a straightedge can be a bit subjective. So it isn't easy to recommend a specific tool or even a "basic set." Instead, I like to divide straightedges into three categories: rules, precision, and special-purpose (upper photo).

I suggest having one from at least two categories to handle the widest range of tasks. The photos on these pages highlight common uses for straightedges, though the uses overlap some. Which straightedge you choose depends on the type of work you do and the level of accuracy required for the task. Chances are, you have at least one already.

Rules. The straightedge you probably already own is just a rule or scale. A good quality rule is remarkably straight (within a few thousandths of an inch over its length). Since I usually have a 6" or 12" ruler nearby, these are the straightedges I turn to most often.

With a quick glance, I can check if a board is flat or determine whether the joints on a frame are aligned. You can even use them to check the setup of shop tools.



▲ ***Jointer Setup.*** *Use a rule to check the knife alignment (photo above). A longer precision straightedge can show if the beds are aligned (right photo).*

Precision Straightedges. A rule works fine as a Jack-of-all-trades straightedge. But when you need to dial up the accuracy, turn to a precision straightedge. The two examples shown in the middle of the main photo on the facing page are made for the task.

They're ground flat to the highest level of precision (accuracy within a couple ten-thousandths of an inch). These tools are thicker, so they won't flex in use.

The best straightedges are hardened steel, but they can be expensive. A precision ground aluminum straightedge is a more affordable option. Keep in mind that the price goes up dramatically as the length increases. A 24" or 36" model is a good choice.

▲ ***Level Plates.*** *Making sure the insert plate is level results in more accurate cuts and prevents a piece from catching.*

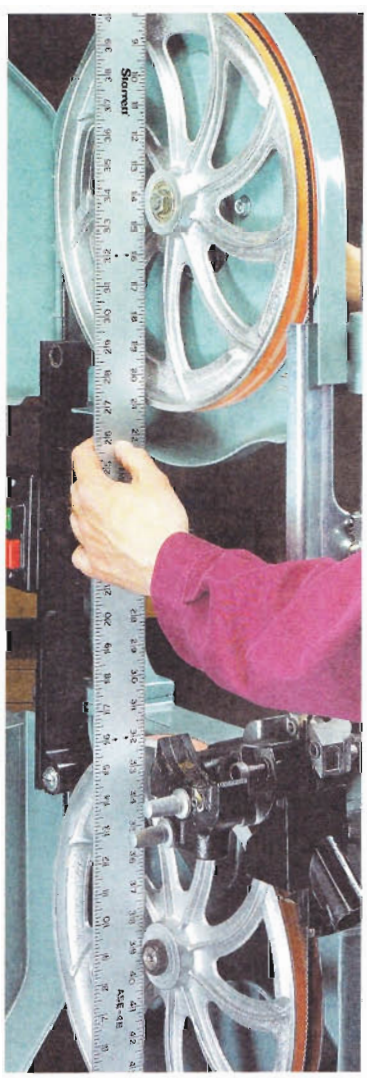
Check for Flatness. *Lay a straightedge across a panel to find and mark the high spots.*

Setting up and tuning woodworking machinery is where a precision straightedge really shines. The longer length creates a more accurate reference edge for ensuring tables are flat or assemblies are perfectly aligned.

Special Purpose. The final category is a bit of a catchall. In general, this is the tool to reach for when the other two types fall short. One situation is shown in the lower left photo. Another example is making sure the front faces of a cabinet are aligned. In these situations, extreme accuracy isn't necessary. In fact, I made a long straightedge by carefully jointing a piece of hardwood.

Maintenance. Simple as they are, straightedges are precision tools. So the care you show them will help them stay accurate over the long haul. Limiting drastic temperature and humidity swings will prevent wood straightedges from distorting.

The best way to store your straightedges is to hang them up. Finally, resist the temptation to use your straightedges for unintended purposes. Then you can rely on these versatile tools to improve your work.



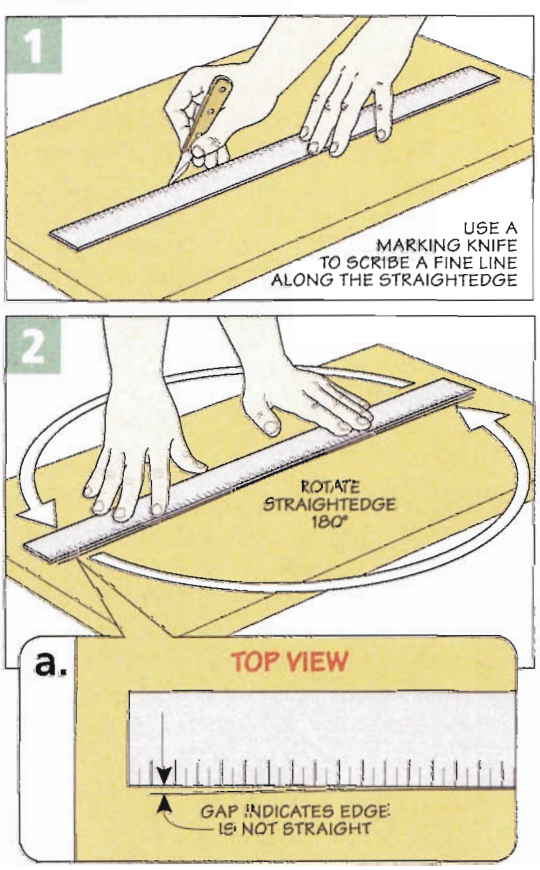
▲ ***Wheel Alignment.*** *A 48" aluminum ruler is a handy, inexpensive straightedge.*

is your straightedge Straight?

Straightedges are only effective if the edge is truly straight. The trouble is that it's impossible to know just by looking along the edge.

So how can you determine if your straightedge is straight? Here's a quick test. Place the straightedge on a piece of MDF. The smooth, consistent surface provides better visibility. Then scribe a line down one edge with a marking knife. (Or draw a line with a mechanical pencil.) Now rotate the straightedge 180° and hold the same edge of the tool against the line you just marked.

Any variation along the line indicates a high or low spot. You can plane a wood straightedge to correct any errors. Then recheck the line. On an aluminum or mild steel straightedge, file or sand the edge. Take it easy. Remove only a small amount of material at a time, then recheck. Remember, the error you see is doubled.



MASTERING THE Table Saw

secrets to Cutting Long Stock

Follow these top-notch tips and techniques for accurate cuts on long workpieces.

Crosscutting and ripping long stock on the table saw can be cumbersome. But there are steps you can take to do the job without a lot of hassle.

CROSSCUTTING

When I start on a project, I try to cut all the parts to rough length first. You can do the job safely at the table saw with the right setup. Trying to manhandle a 10-ft. board on the table saw can be challenging, however. Here are a few techniques I use to make the job go a little smoother.

Fence & Blade. The first step to success is to install a quality crosscut blade, as shown in the photo below. Plus, it's always best to remove the rip fence before making a cut. You don't want a stray piece getting caught between the fence and blade, possibly causing kickback.

Rough Cut First. I like to initially cut the piece to rough length first, leaving myself an extra inch or two. Then I come back later and make the final cuts on the shorter workpiece.

Workpiece Support. One key to controlling the workpiece is providing good support during the cut. You can see the setup I use in the photo above.

I use a long auxiliary fence on the miter gauge. This helps keep the workpiece from skewing as you move it across the table.

Another key is providing some "outboard" support at the side of the saw for the opposite end of the workpiece. The goal is to keep the workpiece flat on the table throughout the cut.

For this support, you can use a cart or other tool surface that's the same height as your saw. To build the handy, shop-made support I use, see the box at the bottom of the opposite page.

Under Control. To keep the workpiece under control, it helps to clamp it to the auxiliary miter gauge fence. Then you're ready to turn on the saw.

Feed the workpiece through the blade at a steady rate and then turn off the saw before returning the miter gauge to its starting position. This allows you to remove the workpiece and cutoff without fear of contacting the spinning blade.

RIPPING

Ripping long stock has its own challenges. But by following a few simple guidelines, it can be an easy and safe task.

Fence & Blade. Before getting started, take the

The Right Blade. *Choose a blade appropriate for the task to get the best cut.*

time to set up your rip fence and remove the miter gauge. Install a good-quality rip blade. I find the popular glue-line rip blades yield a smooth cut. See the photo at the bottom of the opposite page.

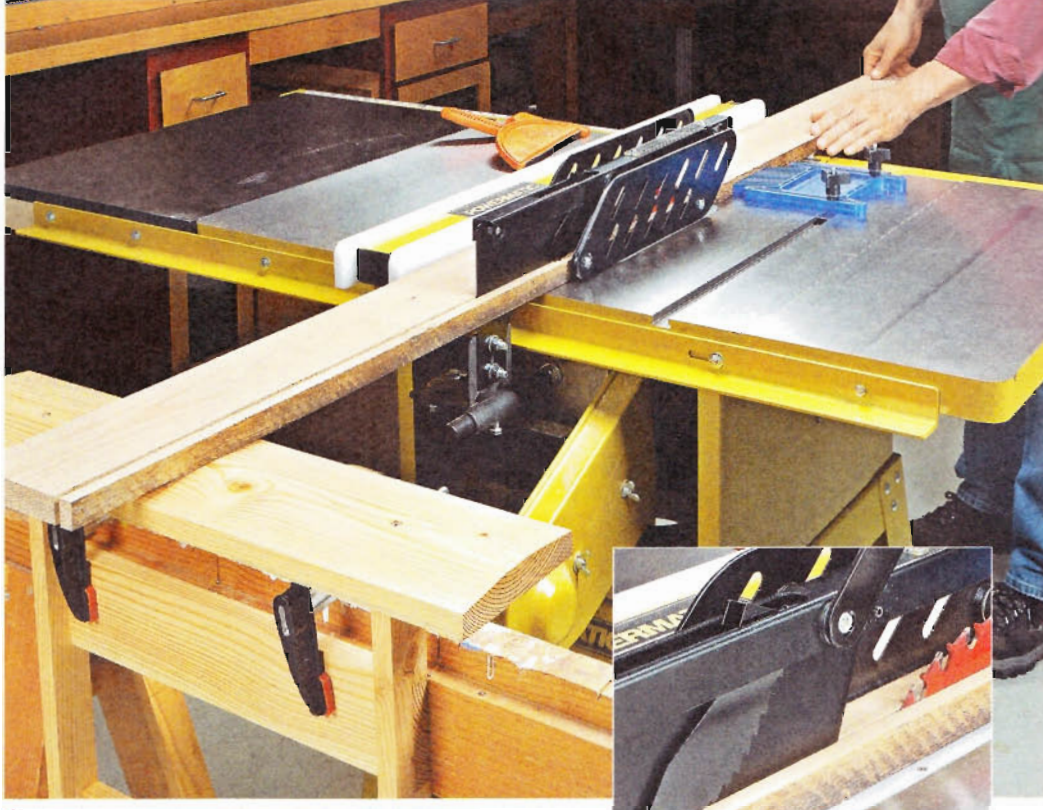
You'll definitely want to use a splitter or riving knife, as shown in the photos at right. If you don't have one, you can make one for your table saw insert or purchase an after-market splitter.

A splitter makes the ripping operation safer. The fixture prevents kick-back by keeping the workpiece from "pinching" the blade. And it also helps keep the workpiece from creeping away from the fence during the cut.

Outfeed Support. When ripping a long workpiece, it needs to be supported as it exits the saw's table. You can see how this works in the photos at right.

You'll want to make sure the workpiece contacts your outfeed support without catching. If the outfeed support is too far away from the saw, the sagging workpiece could catch, forcing you to stop and make adjustments. And that can ruin the smooth cut.

Technique. For successful rip cuts, there are a couple of other tips I want to mention. The first is to start the cut with the straight edge of the workpiece firmly against the rip fence.



▲ ***Ripping Long Stock.*** *For the smoothest edge, ensure the workpiece is fully supported throughout the cut, especially as it exits the saw table.*

▲ ***Splitter.*** *Using a splitter or riving knife helps prevent kickback.*

A featherboard can lend a hand here, as long as the edge is fairly straight. Otherwise, steady hand pressure is needed to keep the board against the fence.

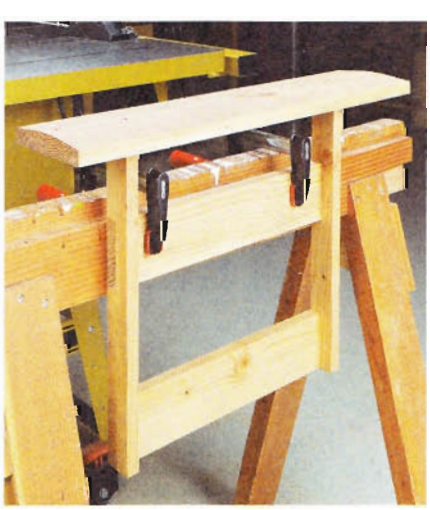
Maintain a slow, consistent feed rate during the cut. As you slide the board through, keep an eye on the opposite end to make sure it engages the outfeed support. At the end of the cut, use a push stick to keep your hand safely away from the blade. Push the workpiece all the way through the blade, then turn off the saw. Wait until the blade stops spinning to retrieve the workpiece and remove the waste.

Better Results. With these simple steps, your cuts will be right-on and your workpieces more accurate. In the end, the results of your efforts will stand out in your project.

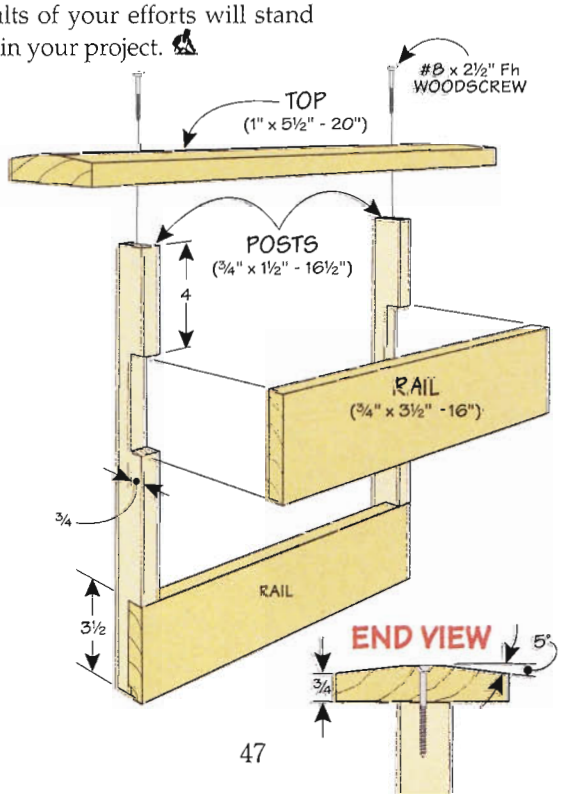
shop-built Support

The support you see at right is simple to make and is perfect for supporting long workpieces at the table saw. The beveled edges catch the workpiece to smoothly guide it during the cut.

The drawing at right shows you how the support goes together. As you clamp the support to a sawhorse, make sure the top of the support is even with the surface of your table saw before cutting the workpiece.



▲ ***Outfeed Support.*** *Supporting the workpiece can be as easy as using this handy shop-made support.*



organizing with Foam

End the clutter in your shop with these unique foam products.

Shop time is more enjoyable when all of your tools have a home. So when a product comes along to help in this regard, I have to take a look. *Kaizen Foam* sold by *FastCap* is a new product that's ideal for the task.

Kaizen is a Japanese word that loosely translates to "improvement." In manufacturing, it's a process of making small changes to improve a process or product. One of the keys is making sure everything has a place.

As shown at left, *Kaizen Foam* is made up of several layers. The idea is that you arrange the tools, trace an outline around them, then create a pocket, or recess, by removing one or more layers.

Making Cutouts. The first thing to do is cut the foam to the overall size of the drawer or storage space. The foam cuts easily with a knife or table saw.

Take a little time to lay out the items on the foam (lower left photo). Once you're happy with the layout, you're ready to mark the foam in preparation for making the cutouts.

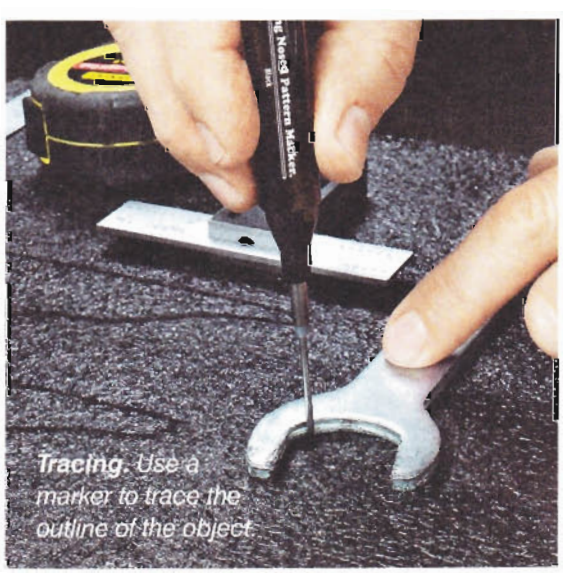
To trace the outlines of the items on the foam, *FastCap* has a unique, long-nose marker they recommend for this task. It fits tight against the tool for an accurate layout (right photo below).

Making the Cuts. Creating the recess for each item is a two-step process. You first cut the outline and then excavate the foam.

When cutting the outline, it's best to cut inside your traced line (upper left photo, opposite page). This ensures that the tool will nestle snugly in the recess. Cut as deep as needed to allow the item to sit at the desired depth.

▲ ***Kaizen Foam.*** *The product is available in three thicknesses to suit your needs.*

▲ ***Arranging Tools.*** *After cutting the foam to its final size, take some time to lay out your tools for the easiest access and organization.*



Tracing. *Use a marker to trace the outline of the object.*

▲ ***Cut Out the Recess.*** *A utility knife with a narrow blade works best to cut through the foam. Stay to the inside of the line for a snug fit.*

▲ ***Dig & Peel.*** *Dig your finger down to the desired depth, then work to peel back the foam. Come back and pinch away excess material.*

Digging It Out. The next step involves removing foam to create the recess. It's not an exact process and it takes a little practice to get the hang of it. Start by digging your finger under one corner. Just keep working your finger under the foam and peeling it out. You can see how it's done in the right photo above.

Once that's done, pinch away any high spots and test the fit of the tool. If you need to go a little deeper, just repeat the process. For thin items like metal rules, all you need to do is cut a slit to match the length of the tool.

Finger Notches. When some of your items are pressed into their respective recess, they can be a little difficult to remove. But there's an easy way to create finger notches (photos below).

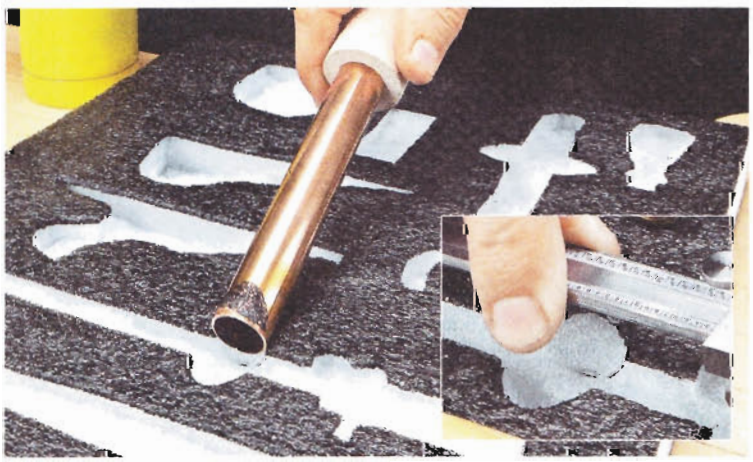
I made a special tool to melt the foam to create the finger notches. It's simply a short piece of copper pipe mounted in a wood handle.

All you need to do is heat the end of the pipe with a torch. It doesn't take much heat to melt the foam, so go easy. Once the pipe is hot, lightly press the tool into the foam, then slide it up and away to create a smooth notch.

Versatile. *Kaizen Foam* comes in three different thicknesses (roughly ¾", 1⅛", and 2¼"). It's available in three color variations (white, black, or black-on-white). I like the black-on-white scheme because it becomes obvious when an item is missing, as in the main photo on the opposite page.

Router Bits. While *Kaizen Foam* is great for organizing most tools, there are a couple of other products that work better for storing router bits. The box below gives you all the details.

To find these products, refer to Sources on page 51. The end result is an organized shop with a place for everything.



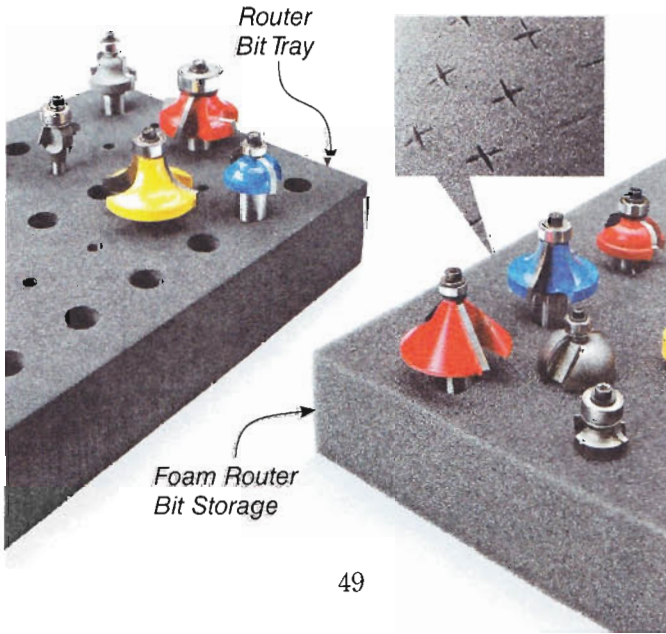
▲ ***Finger Notches.*** *Some tools that rest flush with the foam's surface can be hard to grasp. Use a heated copper pipe to melt away the foam to form recesses for your fingers.*

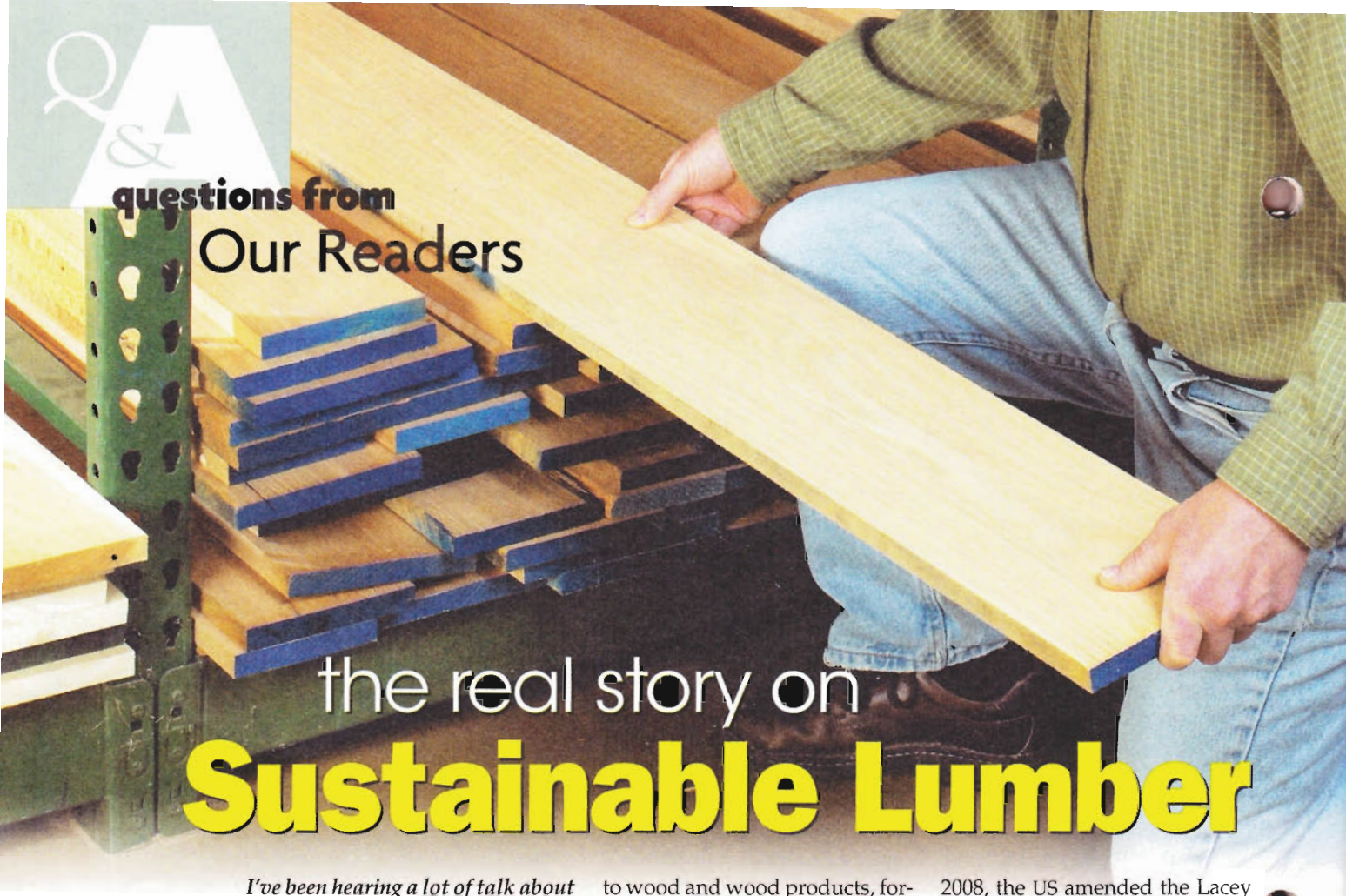
foam inserts for Router Bits

One of the hazards of storing router bits loosely in a drawer is damage to the cutting edges. A couple of easy storage solutions are shown below. Both are sold by *Rockler*.

The *Router Bit Tray* on the left is made from dense foam and stores up to thirty ½"-dia. shank bits and twenty ¼"-dia. shank bits.

The *Foam Router Bit Storage* on the right is made from foam much lighter in density than the tray. It has X-shaped slits cut into it (inset photo) to accommodate router bits of any shank size.





Q&A

questions from
Our Readers

the real story on Sustainable Lumber

I've been hearing a lot of talk about sustainable wood recently. What does this mean?

Patrick Coleman
Chicago, IL

In the most basic definition, sustainable wood (sometimes referred to as sustainable lumber or timber) refers to wood that's been harvested in a manner that supports the environment and the surrounding population. This matters because in addition to wood and wood products, forests provide food, fuel, shelter, employment, recreation, habitats for wildlife, and many other important benefits.

This has a particular impact on woodworkers. Many wood species, such as Brazilian rosewood and Cuban mahogany, have been harvested nearly to the point of extinction.

A major concern in some countries is illegal logging, which can contribute to deforestation. This affects not only the forest and surrounding communities, but also impacts the ability of legitimate forest industry operations to compete in the market.

According to a 2012 report by the *World Bank*, every two seconds illegal loggers clear-cut an area of forest the size of a football field. And it is estimated that in some countries, 90 percent of all the logging activity is illegal.

Significant steps have been taken to tackle this problem in the US. As part of the Food, Conservation, and Energy Act of 2008, the US amended the Lacey Act. Originally signed into law in 1900 to prohibit illegal trade in wildlife and plants, this new amendment makes it illegal to trade in lumber and wood products made from illegally harvested timber. This includes any lumber or wood products imported into the US.

This means that significant steps are being taken to help make sure that wood purchased from reputable sources was not harvested illegally. And it's good news for woodworkers because it ensures the protection of endangered wood species so they continue to be available.

Despite these efforts, concerns still exist that illegal lumber is entering the country. To combat this and other concerns, organizations such as the *Forest Stewardship Council* were created. Read more about the *FSC* in the box to the left.

With a foresight to help sustain forests, there is hope that woodworkers will continue to have access to quality wood.

Forest Stewardship Council

The *Forest Stewardship Council* was established in 1994 to promote responsible forest management. As of December 2011, more than 400 million acres of forest around the world have been certified.

Forest products with the FSC logo (above) have been certified to FSC standards to ensure forests are protected for future generations. For more information, visit their website at FSC.org.

Sources

Most of the materials and supplies you'll need to build the projects are available at hardware stores or home centers. For specific products or hard-to-find items, take a look at the sources listed here. You'll find each part number listed by the company name. See the right margin for contact information.

The *Woodsmith Store* in Des Moines, Iowa is an authorized *Rockler* dealer. They carry many of the hardware items used in our projects. And they ship nationwide. Their customer service representatives are available for your calls from 8am – 5pm Central Time, Monday through Friday.

RADIUS TOOLS *(p.10)*

- **Lee Valley**
  - *Veritas Tool Set* 05K50.30
  - *Lee Valley Tool Set* 05K50.65
  - *Japanese Plane* 44P03.01
- **Rockler**
  - *Radius Plane* 20472
  - *2-in-1 Cornering Tool* 29831

TENONING JIG *(p.12)*

- **Rockler**
  - *5/16" Star Knobs* 23812
  - *3/8" Star Knob* 23820
- **Kreg Tool**
  - *Mini-Trak* KMS7507
  - *Micro-Adjuster* KMS7215

TABLET CASE & STAND *(p.18)*

- **Amazon**
  - *3/8" Foam Tape* B001AV310E
  - *1/8" Foam Tape* B000BQRQA0
  - *1" Foam Tape* B00004Z4A8
  - *Vinyl Sheet* B0046JBG4U
- **McMaster-Carr**
  - *Ball Knobs* 61095K42

MODULAR CARTS *(p.22)*

- **Rockler**
  - *48" T-track with clamps* ... 25736
  - *36" T-track* 26420
  - *1/4" Shelf Supports* 33860
- **Reid Supply**
  - *Pull Handles* KHO-5
- **Lee Valley**
  - *3" Casters w/Brake* 00K21.31

WOOD THREADS *(p.28)*

- **Woodcraft**
  - *3/4" Threading Kit* 12T14

BELT SANDER *(p.32)*

You can find a wide variety of 2" x 36" abrasive and polishing belts from *ECON Abrasives*. The sander was painted with *Rust-Oleum Hammered Verde Green* paint.

- **Applied Industrial Tech.**
  - *Ball Bearings* MA3040318
- **McMaster-Carr**
  - *Ball Bearings* 2780T59
  - *1/2" Shaft* 1346K19
  - *2" V-Belt Pulley* 6245K514
  - *2 1/2" V-Belt Pulley* 6245K315
  - *Extension Spring* 3114T111
  - *2 1/2" x 3/8" Alum.* 8975K469
  - *Solid V-Belt* 6190K43
  - *Switch Boot* 70205K29
- **Reid Supply**
  - *1/4"-20 x 1 3/4" Knob* AKA-1
  - *5/16"-18 x 1 3/4" Knob* AKA-3
  - *5/16"-18 x 3" Knob* AKA-4
- **Drillspot.com**
  - *1/3-HP Dayton Motor* 81866

GREAT GEAR *(p.48)*

- **FastCap**
  - *Kaizen Foam* ..... varies
  - *Marker* ..... Long Nose Marker
- **Eagle America**
  - *High Density Foam* 499-5004
  - *Low-Density Foam* 499-5002

MAIL ORDER SOURCES

Woodsmith Store
800-444-7527

Rockler
800-279-4441
rockler.com

Amazon
Amazon.com

Applied Industrial Technologies
877-279-2799
applied.com

Drillspot
720-204-3660
drillspot.com

ECON Abrasives
800-367-4101
econabrasives.com

Eagle America
800-872-2511
eagleamerica.com

FastCap
888-443-3748
fastcap.com

Kreg Tool
800-447-8638
kregtool.com

Lee Valley
800-871-8158
leevalley.com

McMaster-Carr
630-600-3600
mcmaster.com

Reid Supply
800-253-0421
reidsupply.com

Woodcraft
800-225-1153
woodcraft.com

Scenes from the Shop

Here's one machine that can nearly do it all — sanding, grinding, sharpening, and shaping. Best of all, you can build it in your shop without spending a fortune. Detailed plans start on page 32.

Combine this tenoning jig and your table saw to create smooth, perfect-fitting tenons in minutes. Build it this weekend using the step-by-step plans that begin on page 12.