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Winter 2006

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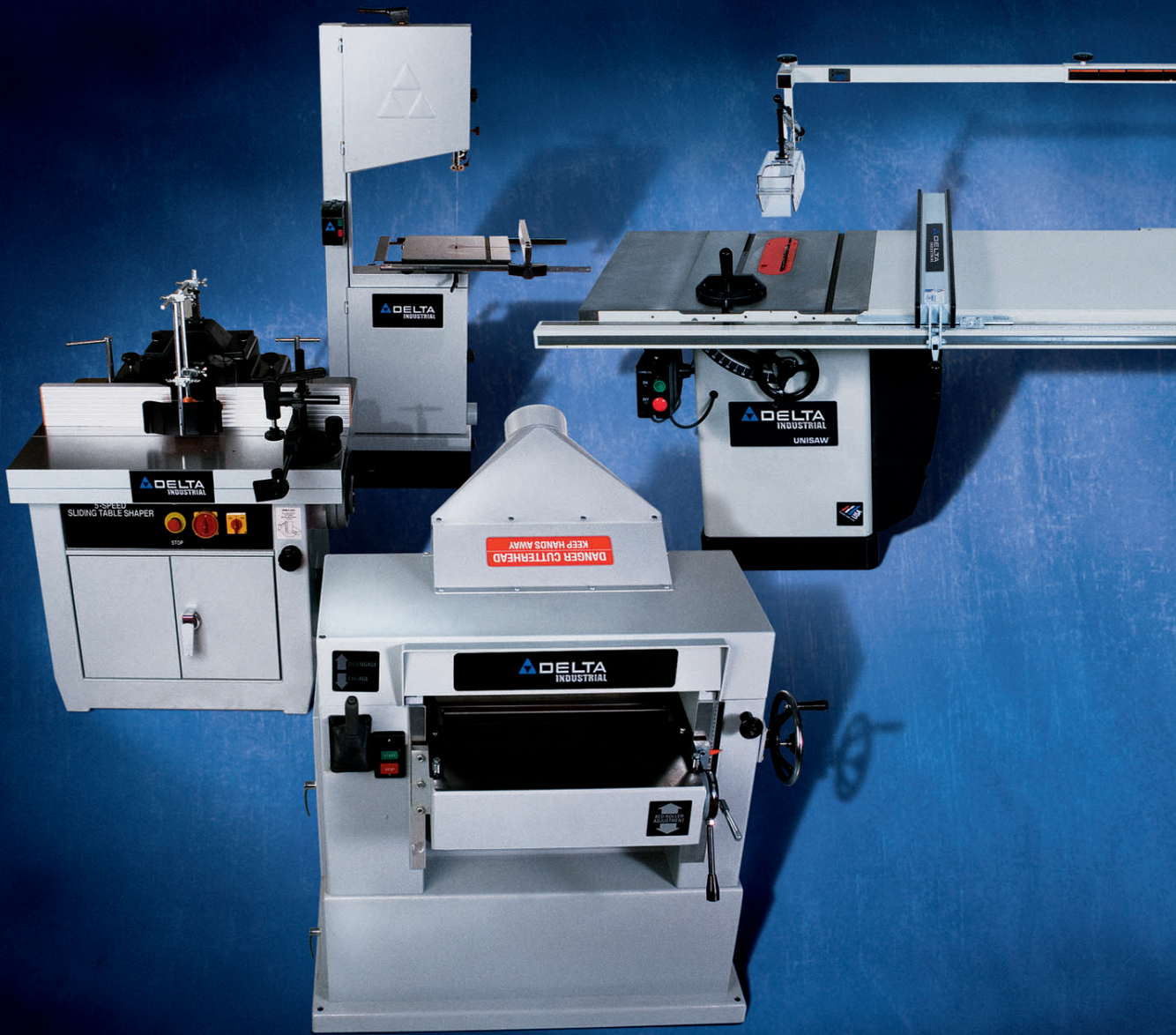
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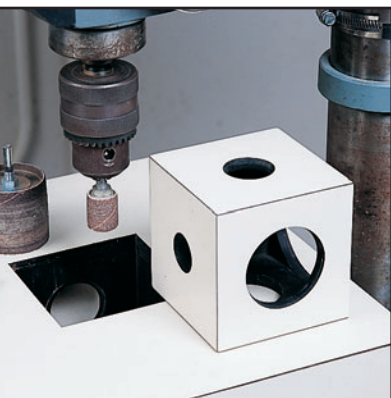
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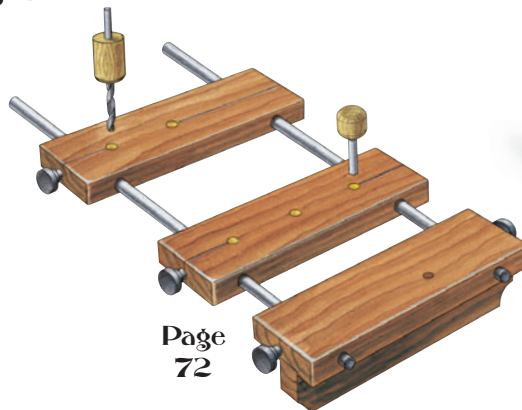
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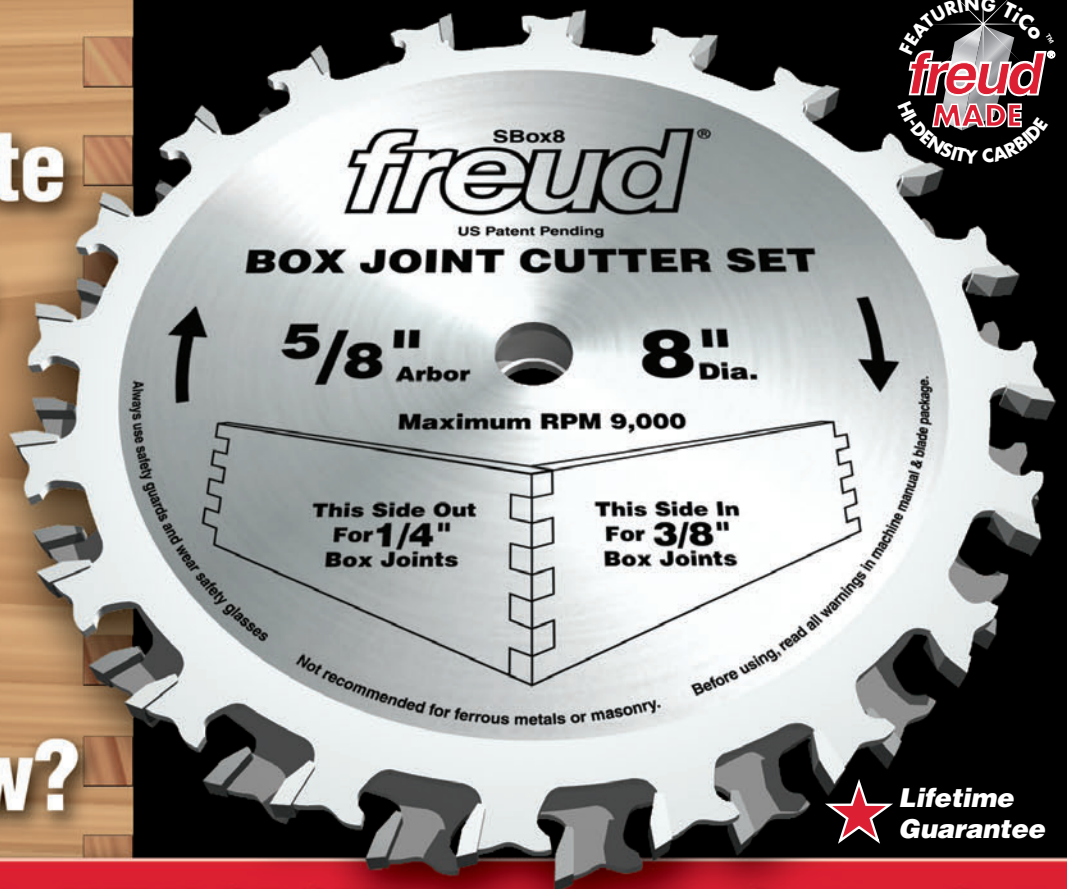
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# How Do You Create Flawless Box Joints On A Table Saw?

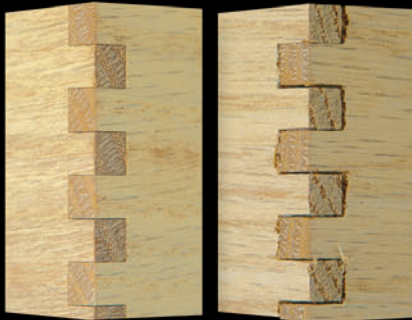


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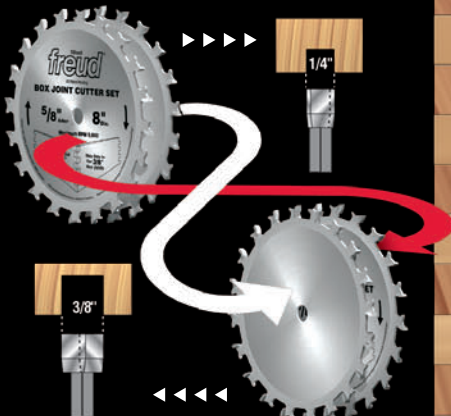
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*Woodworker's Journal* or *Today's Woodworker*

[www.woodworkersjournal.com](http://www.woodworkersjournal.com)

*Workshop Projects* is published by Rockler

Press Inc., 4365 Willow Dr., Medina, MN

55340. Single copy price, \$5.99 (U.S.); \$8.99

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Printed in the USA.

**WEB SITE:** [www.woodworkersjournal.com](http://www.woodworkersjournal.com)

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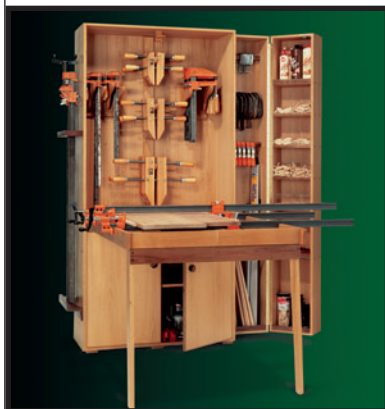
## In the Workshop "Zone"

Another long Minnesota winter is in full swing. Some folks in this part of the country would prefer to sleep the winter away, but for me things are just heating up in the shop. In fact, the harder it snows and the colder it gets, the more I enjoy hunkering down in the shop and cutting wood. Without grass to cut, a ballgame to catch or the lure of a

bass on the other end of my line, I'm more focused and creative — you could say I'm in the workshop "zone." Sleep it away? Not likely!

Maybe it's snowing where you are, too, but don't let the shop grow cold. Special Projects Editor Chris Marshall and I have assembled a great collection of workshop projects in this *Woodworker's Journal* Special Issue.

For starters, if you're in the mood for some serious building, we've got three reader-favorite fixture projects that should satisfy. Treat yourself to a *Classic Cabinetmaker's Workbench*,



complete with end vise, three drawers and a storage cabinet (page 16). If you're lucky enough to actually have too many clamps, have a look at *The Ultimate Clamping Station* on page 48. It'll keep all your assembly supplies neatly stowed in one place. There's also a *Multi-functional Routing System* on page 28 that includes built-in dust collection, a removable top and wheels for portability.

Maybe large-scale projects aren't on the menu right now. We've got some lighter fare here as well. Sometimes, all it takes are a few choice scraps to build the functional and attractive *Trapped Wedge Layout Gauge* (page 56). Or, add a custom mallet to your collection of hand tools when you build the *Dovetail Puzzle Mallet* on page 64.

We've also got a few clever jigs in this issue to help speed general machine tasks along. Editor Rob Johnstone took a time-tested cabinet shop favorite and added a few bells and whistles to design his *Router Dadoing Jig* (see page 76). Then add our *Versatile Shelf-pin Jig* (page 72), and you'll have a great tag team to build casework projects more efficiently than ever.

Finally, even sanding can have its bright side. Our *Sandpaper Caddy* on page 36 will keep your sanding disks tidy and easier to load on your sander. The *Deluxe Drum Sander* (page 60) should make shorter work of curved sanding and help you get more mileage from your drill press.

So, throw on a sweater, crank up the heater and get going. With wood-working this good, I'm in no hurry for spring.

See you in the zone,

Larry N. Stoiker







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# A Jig for All Reasons

By Chris Marshall

*When it comes to improving safety and accuracy, making tasks repeatable or expanding tool versatility, nothing beats a good jig.*

To a non-woodworker, a bin of scraps or coffee can full of odd hardware is probably fodder for next week's trash. But these sorts of tidbits are like gold nuggets to a woodworker—they're the stuff jigs are made of. While it's true that our woodworking machines are chock-full of helpful features, they only take us so far. Once you move beyond basic machine operations, jigs are virtually indispensable. Most projects involve at least one unusual or "advanced" operation that requires a bit of modified technique or machine use. When these instances come up, it's time to reach for a good jig.

## Improving Accuracy and Repeatability

If you're just starting out as a woodworker, welcome to the world of jigs—you'll probably cobble together as



Repetitive tasks, like drilling shelf pin holes, are faster and easier to carry out with a jig than by measuring and marking each hole. Plus, the jig all but eliminates measurement errors.



Ten minutes of set-up time and two sticks of scrap can turn your table saw and standard blade into an effective shaper for making cove molding. Here's a job that's impossible to do on a router table.

many jigs as you do projects (maybe even more!). That's because jigs serve numerous purposes. For one, jigs improve tool accuracy. Try cutting a circle freehand with a router, and you'll learn quickly that without a jig to guide the tool, you won't have a fighting chance. Mount the router to a long piece of scrap, use a

*continues on page 10 ...*



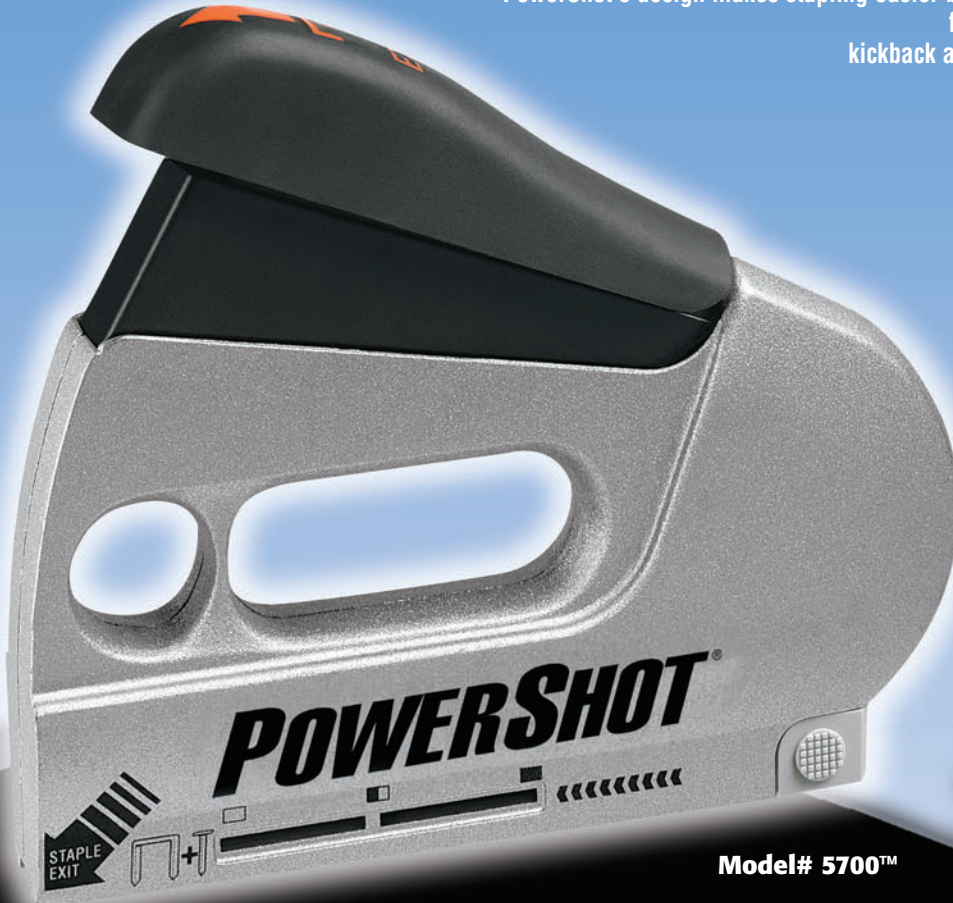
A piece of scrap and a nail turns a router into an accurate circle cutter by limiting the tool's cutting path.



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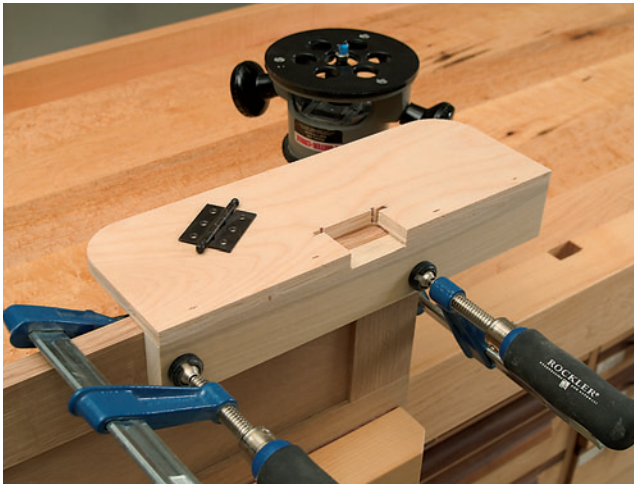
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**A piloted flush-cutting bit and a notched template make hinge mortising a breeze with a router. The jig builds repeatability and uniformity into the process.**



**A shop-made tenoning jig offers multiple advantages: it stabilizes end cuts on long workpieces, improves accuracy and keeps your hands out of harm's way. Nothing makes tenon-cutting easier.**

nail to pivot the jig on one end and—voila! Perfect circles every time with a stone-simple jig. Need to rip a straight line across a sheet of plywood with a circular saw? It's tough to do guiding the tool by eye, but clamp a piece of flat-edged stock on top and suddenly your circular saw has a reference edge to follow. It will slice a line so straight you'll think you cut it with a laser.

Along the same lines, jigs make tasks repeatable. Henry Ford taught us that repeatability is the key to improving productivity. If you've got a kitchen's worth of cabinet doors to hang, a hinge-mortising jig and a router are hours faster than the sharpest chisel in even the most skilled hand, and each mortise will be identical, thanks to the jig. Same goes for drilling shelf pin holes. Rather than measure, mark and drill each hole separately, use a scrap of pegboard clamped to the cabinet wall for a drilling jig. No guesswork or

measurement errors to flub the process up. Your drill never measured so well.

Machine-made joinery is an exercise in futility unless each step of the machining process can be carefully controlled and repeated. All it takes is a registration pin mounted to a scrap wood fence on your table saw's miter gauge to create perfectly spaced pins and slots for finger joints. Attach a fence to a piece of plywood with a slot cut in the middle and suddenly you have a simple way to make router-cut mortises for mortise and tenon joints. In both cases, jigs limit the cutting path, which improves control and makes precise repetition possible.

### **Making Tools Work Even Harder**

Aside from improving accuracy or building repeatability into the machining process, the right jig can squeeze every ounce of versatility from your tools. There's no denying that straight rip cuts are a table saw's bread and butter, but a shop-made tapering or panel-raising jig takes rip-cutting to a whole new level. Suddenly straight cuts aren't limited to workpieces laying flat or following the fence. You can even clamp a pair of fences at an angle to the blade to create a safe tunnel for milling cove moldings on a table saw. A little scrap turns a straight-cutting saw into a shaper.

In a sense, even router tables are really just oversized jigs that turn a handheld tool into a stationary machine. Here, a jig converts your router into a makeshift molding cutter, jointer and first-rate jointmaking tool. A similar bit of magic happens when you add a drum sanding station to your drill press: suddenly a hole-drilling machine morphs into a smoothing center, without taking an inch more floor space. It's sweet indeed when a few picks from the scrap bin or piece of old countertop can make a good machine even better.



**A jig doesn't have to be complex to be effective. Two scraps held together with hot-melt glue and stuck to a workpiece form an effective and safe way to secure odd-shaped stock for deep bandsaw cuts.**

*continues on page 12 ...*



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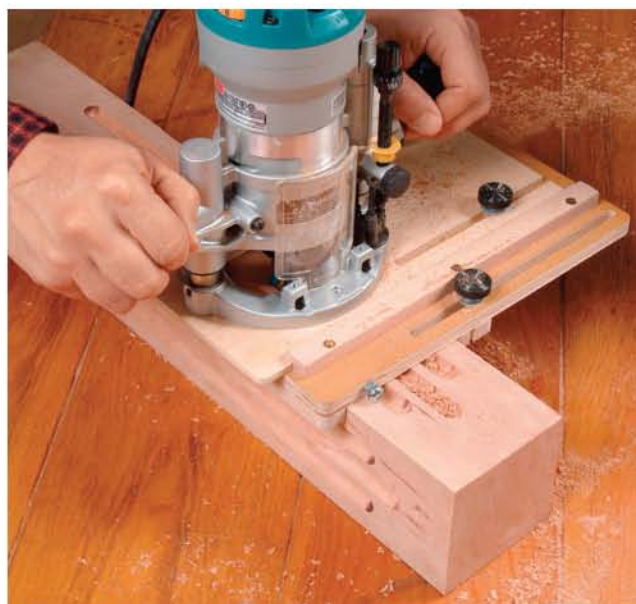


## Improving Safety

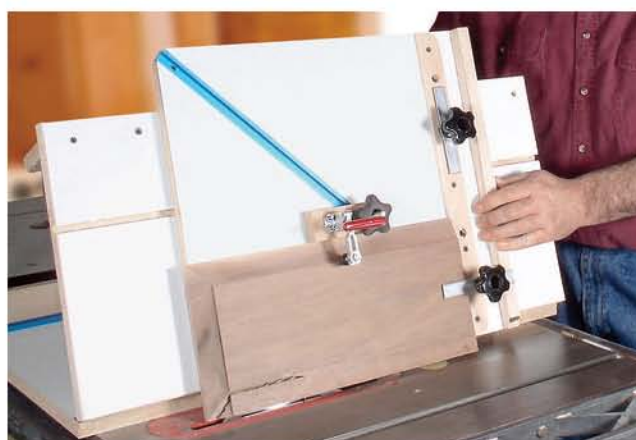
Finally, jigs can make woodworking safer. Shop-made featherboards and push sticks—really just simple jigs—help keep all ten fingers where they belong...on your hands. A crosscut sled takes the balancing act out of zipping a long piece of lumber in two. Tenoning jigs make it safe to turn the end of a workpiece into a tenon without the wood tipping willy-nilly as its bottom disappears into sawdust. Jigs help keep workpieces firmly planted, bits and blades covered and our hands and arms out of harm's way. Whenever an operation gives you the even the slightest concern about safety, think twice about its execution. If there's a way to make the task safer, it will usually involve a jig.

## What Makes a Good Jig?

Ultimately, a jig only works if its form follows its function. Sometimes, a slapdash approach is all it takes to build a serviceable jig...a flat piece of scrap and two clamps just may do the trick. Other times, you'll need to be more intentional and build your jig from a few parts or make it sturdy enough so it can be used over and over again. And then there are those "cadillac" jigs, like the variety shown on this page, that truly become projects in their own right. You know the ones...complete with special hardware, moving parts and micro-adjustability. A jig with all the bells and whistles could be a mainstay in your shop for years. We try our best in the pages of *Woodworker's Journal* to give you a good sampling of all three types of jigs. After all, woodworking just gets better with these valuable shop aids.



For exacting operations, such as routing evenly spaced fluting, you may need to build a jig that offers multi-axis cutting control. But the effort you spend designing and building the jig will be its own reward considering the money and time you'll save by improved accuracy.



Rube Goldberg-inspired? Maybe yes, but this panel-raising sled offers superior control when guiding door panels on-edge and at an angle to a saw blade. It's fully adjustable to suit a range of bevel angles.



Jigs can serve a transformational purpose for shop machines. Equipped with a finger joint jig and dado blade, a table saw becomes a precise and efficient joint-making machine.



What jigs lack in elegance or visual appeal they more than make up for in sheer utility. Nearly every shop machine and woodworking technique can be improved with the right jig.







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# Workshop Classic: A Bench You Can Rely On

*A family tradition continues with this no-nonsense maple workbench. Granddad would likely approve.*

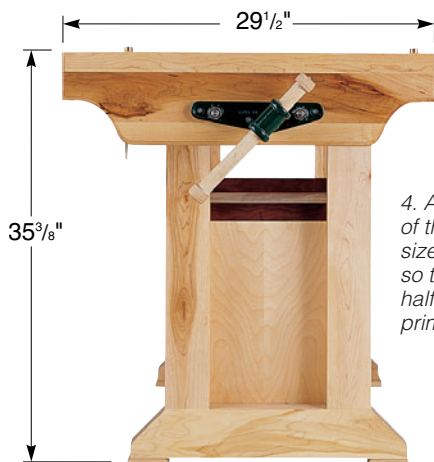
## Four Bench Building Basics:

1. If you regularly build furniture or cabinets, the space between the last bench dog and the wide open vise jaw should accommodate a standard five-foot base cabinet.



2. To ensure stability when lateral force is exerted on it, a bench should outweigh the user by about 50%.

3. One row of bench dog holes should be set in a few extra inches. This makes it a little easier to support doors, drawers and other large parts during clamping.



4. A good rule of thumb is to size your bench so that the top is half as tall as the primary user.

The worktop on regular contributor John English's grandfather's bench was a pair of railroad ties with an eight-inch gap down the middle. Granddad, who lived in Ireland, was a skilled artisan who built coaches and wagons.

John's father is pretty good with his hands, too. The bench in his Dublin workshop is better suited to the work he does — refinishing antique furniture, tuning small engines — than Granddad's would be. The three-inch-thick hardwood top rests on an iron frame, but the vise is a metalworker's and the top shows scars of butane torches, solder and even a few errant hammer blows.

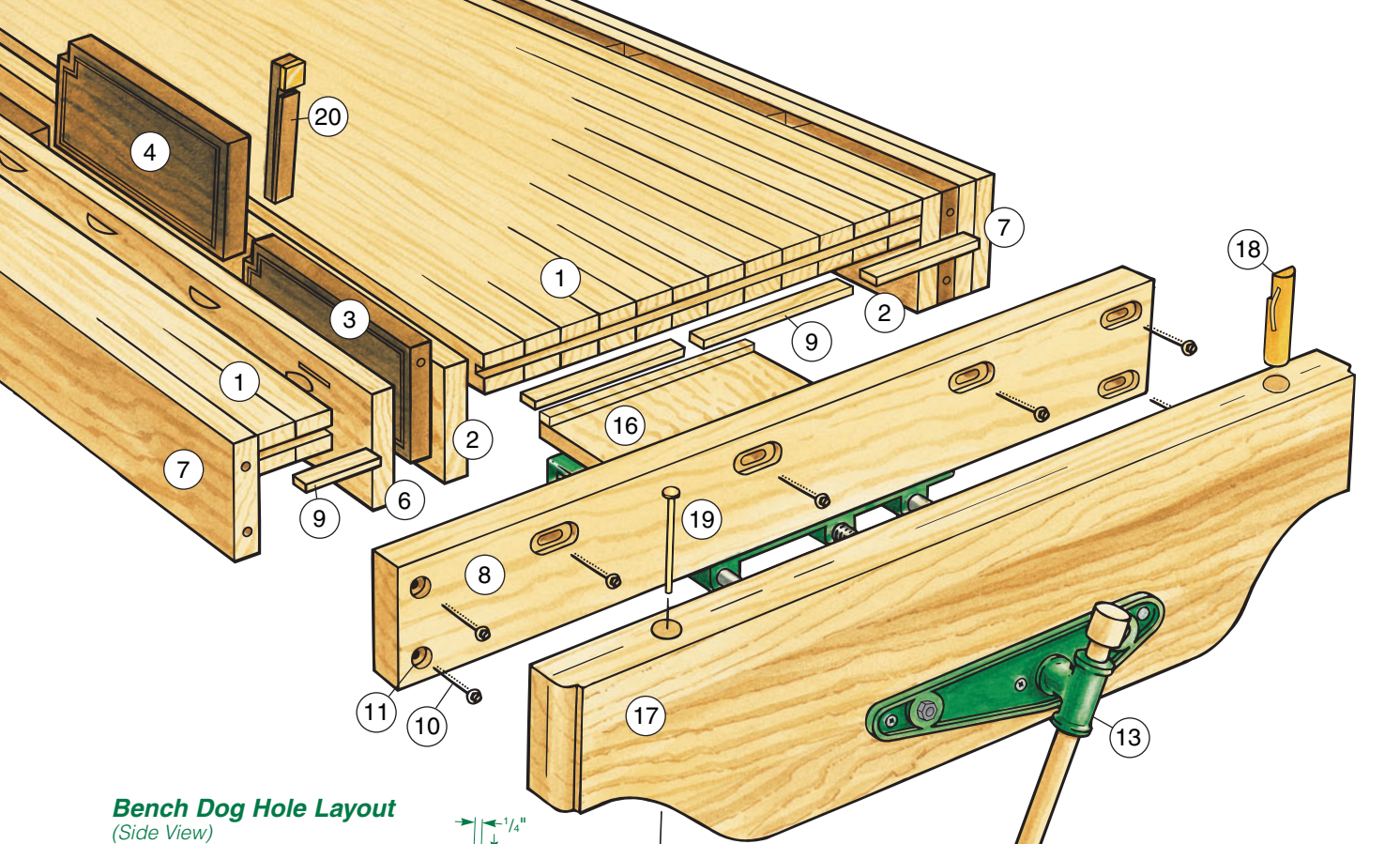
The point is that a workbench is personal — it must match both the work and the worker. Neither of the benches described above would be suitable for fine woodworking, but the model shown here is ideal for building furniture and casework. And it's easily modified to suit an individual craftsman's needs.

## Starting with a Few Design Basics

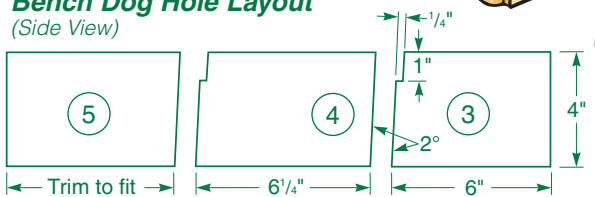
John built this workbench to fit his six-foot-tall body. The rule of thumb is to locate the worktop at half the height of the user (in this case, 35 3/8"). If you need to build it higher or lower, simply adjust the length of the legs (see the *Leg Subassembly Drawings* on page 22).

The top of the bench features two parallel rows of bench dog holes. The front row is close to the edge, but the back row is set in a few inches to help support wide subassemblies like drawers or cabinet doors. The top is large

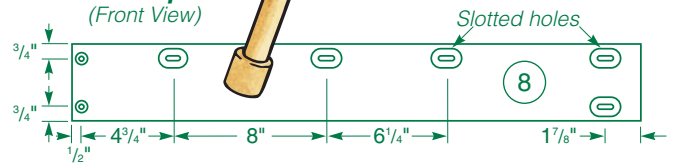




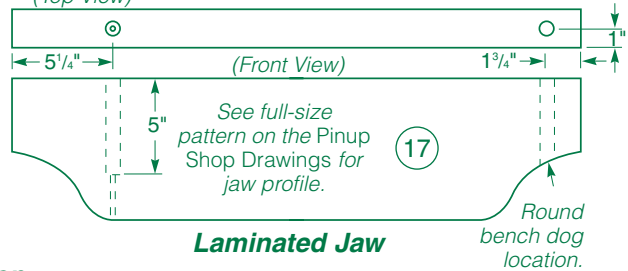
**Bench Dog Hole Layout**  
(Side View)



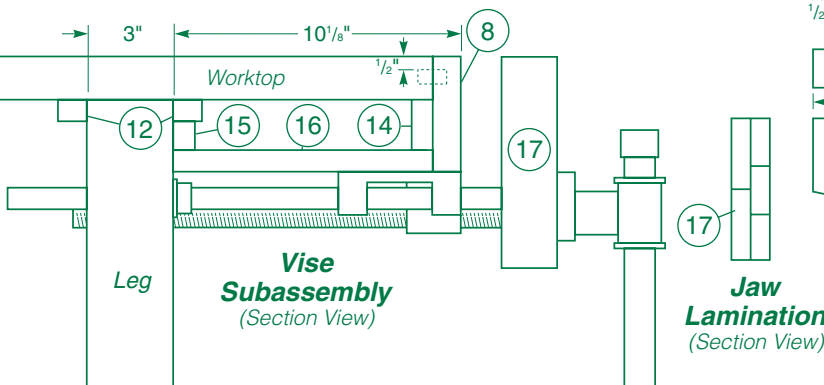
**Endcap**  
(Front View)



(Top View)



**Laminated Jaw**



**Vise Subassembly**  
(Section View)

**Jaw Lamination**  
(Section View)

## MATERIAL LIST (Top)

	T x W x L		T x W x L
1 Worktop (1)	1 1/2" x 24 1/8" x 60"	11 Washers (14)	3/8" ID
2 Inside Liners (2)	3/4" x 4" x 60"	12 Leg Cleats (4)	3/4" x 3/4" x 20"
3 First Spacers (2)	3/4" x 4" x 6"	13 Large End Vise (1)	
4 Common Spacers (14)	3/4" x 4" x 6 1/4"	14 Vise Support Endcap Cleat (1)	3/4" x 1 3/4" x 12"
5 Last Spacers (2)	3/4" x 4" x 5 1/2"	15 Vise Support Leg Cleat (1)	3/4" x 1" x 12"
6 Outside Liners (2)	3/4" x 4" x 60"	16 Vise Support (1)	3/4" x 10" x 9"
7 Worktop Sides (2)	3/4" x 4" x 60"	17 Laminated Jaw (1)	2" x 7 3/8" x 30"
8 End Caps (2)	1" x 4" x 30"	18 Round Dogs (2)	Brass
9 Spline (1)	1/2" x 1" x 30"	19 Round Dog Button (1)	3 1/2" Brass Hinge Pin
10 Lag Screws (14)	3/4" Dia. x 3 1/2" long	20 Square Dogs (2)	Steel



enough to clamp a standard five-foot-long kitchen base cabinet, with a few inches left to set down tools or hardware.

Before even sharpening a pencil for this project, make sure you have your vise and bench dogs on hand. Open the vise fully and measure the opening, then subtract the thickness of the jaw (see the *Material List* on the previous page). This is the maximum spacing you can allow between the dog holes in the bench top, but you may want to downsize a little: traditional bench builders have discovered that a space of six or seven inches works best for most projects.

### Options for a Butcherblock Top

While designing this bench, John recalled something from his days in the kitchen cabinet business: one of the most common kitchen renovations is countertop replacement, and more and more homeowners are discarding their gorgeous old solid-maple butcherblock tops. He got lucky on his third phone call: a shop in the city's historical district sold him an eight-foot-long section of 1½"-thick butcherblock for just \$10. It took only a few minutes of trimming to make the worktop (piece 1). He rough-cut the blank a bit oversized with a circular saw, after first scoring with a utility knife to help avoid tear-out.

Then John clamped on a straightedge and trimmed the top to final dimensions with a straight bit chucked in his router. During this process he cut across the grain first, then with the grain: this approach virtually eliminates blowout on the corners.

If you prefer to build a top from scratch, make sure the quartersawn (tight) grain is visible, and the more open, wavy plainsawn becomes the gluing surface. Glue and clamp three or four overly long pieces of ripped and jointed stock together at a time. When they're dry, glue and

**Figure 1:** The spline grooves on the endcap are stopped, while those on the ends of the top are through cuts. After routing the grooves in the top, a three-inch-wide strip is ripped off. This piece sits outside of the liners and spacers.



clamp these subassemblies together to form the completed piece. Biscuits help to line up all these edges as you clamp. After the glue dries, take the entire piece to a cabinet shop and ask them to run it through their wide drum sander, to reduce it to final thickness. Another option is to order your top glued-up and made to order at a local home center. This is a little more expensive but often results in a more secure and stable top.

### Adding the Bench Dog Holes

After trimming the top to size, chuck a 1/2" rabbeting bit in your portable router to cut the spline groove in each end of the worktop (see the *Exploded Drawings* on the previous page and as shown



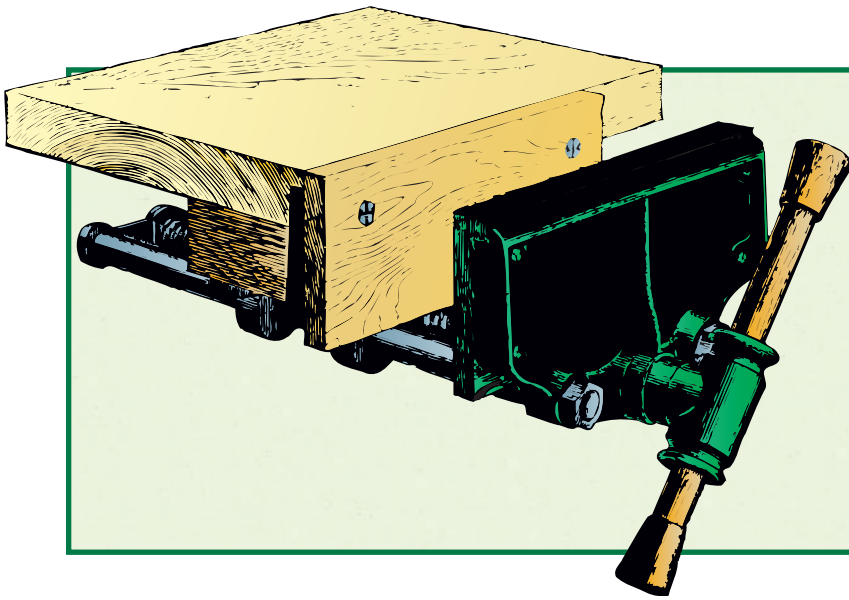
**Figure 2:** Dry-fit the bench dogs and spacers, leaving gaps that are the size recommended by the dogs' manufacturer. When everything fits, trim the final spacer to length.

in *Figure 1*, above.

Rip a 3"-wide strip off one side of the top and set it aside, then biscuit, glue and clamp the inside liners (pieces 2) in place. Place the worktop on a couple saw horses while attaching these liners, so your clamps have plenty of room to operate.

The liners need to be flush with the top of the butcherblock when it's finished, so it's a good idea to set them in place a hair proud of the top rather than shy of it.

The bench dog holes are formed when a series of spacers (pieces 3, 4 and 5) are attached to the liners. The business edges of these spacers are cut at a 2° angle (verify this angle by reading the bench dog manufacturer's instructions), and they're notched to allow the bench dogs to be stored below the worktop surface. All of these dimensions are shown on the *Elevation Drawings*, and the cuts can be made on a bandsaw. Dry-fit and mark the spacer locations on the inside liners, verifying each placement with a bench dog (see *Figure 2*). Score a shallow line about a 1/4" in from the edge on both sides of each spacer using a sharp knife or a rotary tool. This will create a glue well to limit excessive squeeze-out.



## Getting Started:

You should have the vise and bench dogs on hand before construction begins, in case you have to adjust the plan to fit the hardware. Beech and hard maple are the traditional species of choice for the frame and top, and walnut makes an excellent accent. During the course of construction you'll use a table saw, biscuit joiner, band saw, drill press, portable and table-mounted routers and a belt sander.

Attach the spacers to the inside liners with glue and clamps. When they're dry, you can glue and clamp the outside liners (pieces 6) in place. Use biscuits and glue to attach the remaining 3"-wide butcherblock strip to one of the outside liners (see the *Exploded View* on page 18 for its location), then glue and clamp the worktop sides (pieces 7) in place.

### Adding Splined Endcaps

As woodworkers well know, wood has an annoying habit of shrinking and swelling across the grain. To cope with this tendency in a large

assembly such as the worktop, the endcaps (pieces 8) are splined and attached with lag screws driven through oversized, slotted holes (see the *Elevations* on page 18 for marking the slotted hole locations).

Chuck the rabbeting bit (the one you used earlier to create grooves in the worktop ends) in your portable router and, with the workpieces held securely, create a stopped groove in each end cap. Then mark the locations of the lag screw holes in each groove.

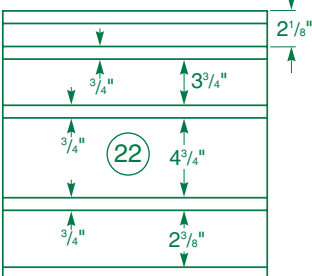
Trim splines (pieces 9) to fit around the lag screws, then move to the drill press to bore the two-step



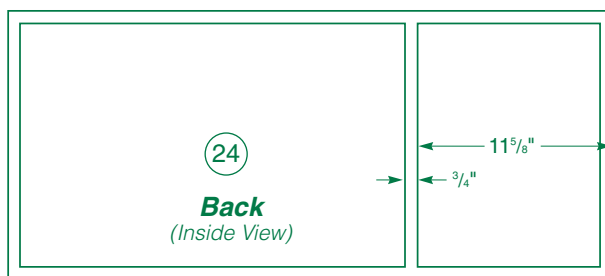
Figure 3: Use your drill press to bore two-step slotted holes in the endcaps: these will allow the benchtop to adjust to various levels of moisture in the workshop.

### Side

(Inside View)

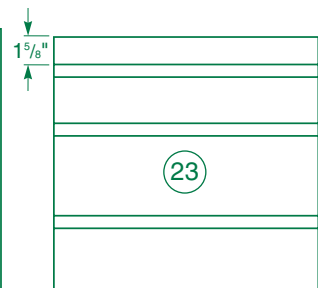


3/4"-wide by 1/2"-deep rabbet.



3/4"-wide by 1/2"-deep rabbet.

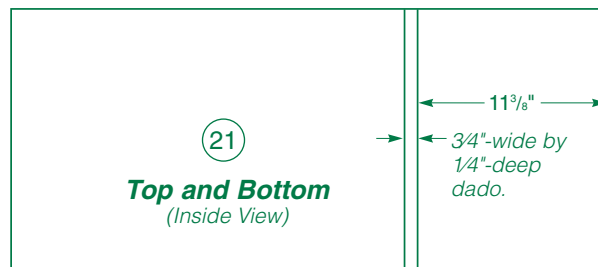
**Back**  
(Inside View)



**Divider**  
(Inside View)

### Toolbox Elevations

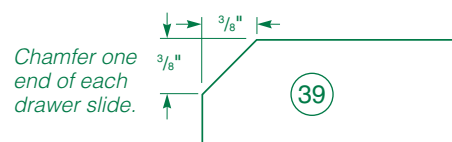
Set up your router table with a 3/4" straight bit and make multiple passes for these rabbets, grooves and dados, removing a small amount of stock with each pass.



**Top and Bottom**  
(Inside View)

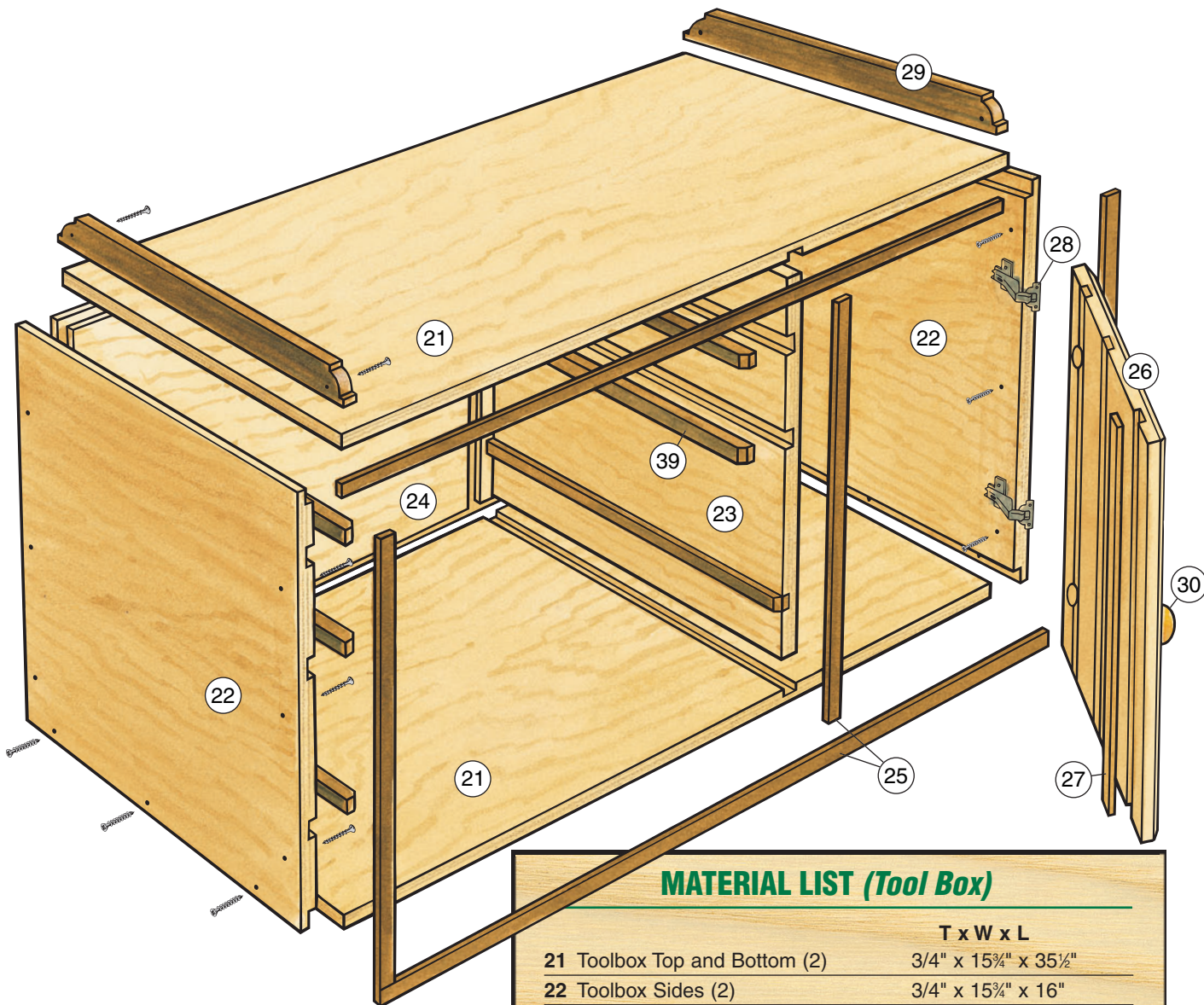
### Drawer Slide

(Top View)



Chamfer one end of each drawer slide.





### MATERIAL LIST (Tool Box)

	T x W x L
21 Toolbox Top and Bottom (2)	3/4" x 15 3/4" x 35 1/2"
22 Toolbox Sides (2)	3/4" x 15 3/4" x 16"
23 Toolbox Divider (1)	3/4" x 15" x 15"
24 Toolbox Back (1)	3/4" x 16" x 36"
25 Toolbox Trim (1)	1/4" x 3/4" x 120"
26 Door (1)	3/4" x 11 3/8" x 14 3/4"
27 Door Stiffeners (3)	1/2" x 3/4" x 14 3/4"
28 Hinges (2)	European Style
29 Toolbox Top Trimmers (2)	3/4" x 1 1/2" x 16 1/4"
30 Knobs (4)	Brass

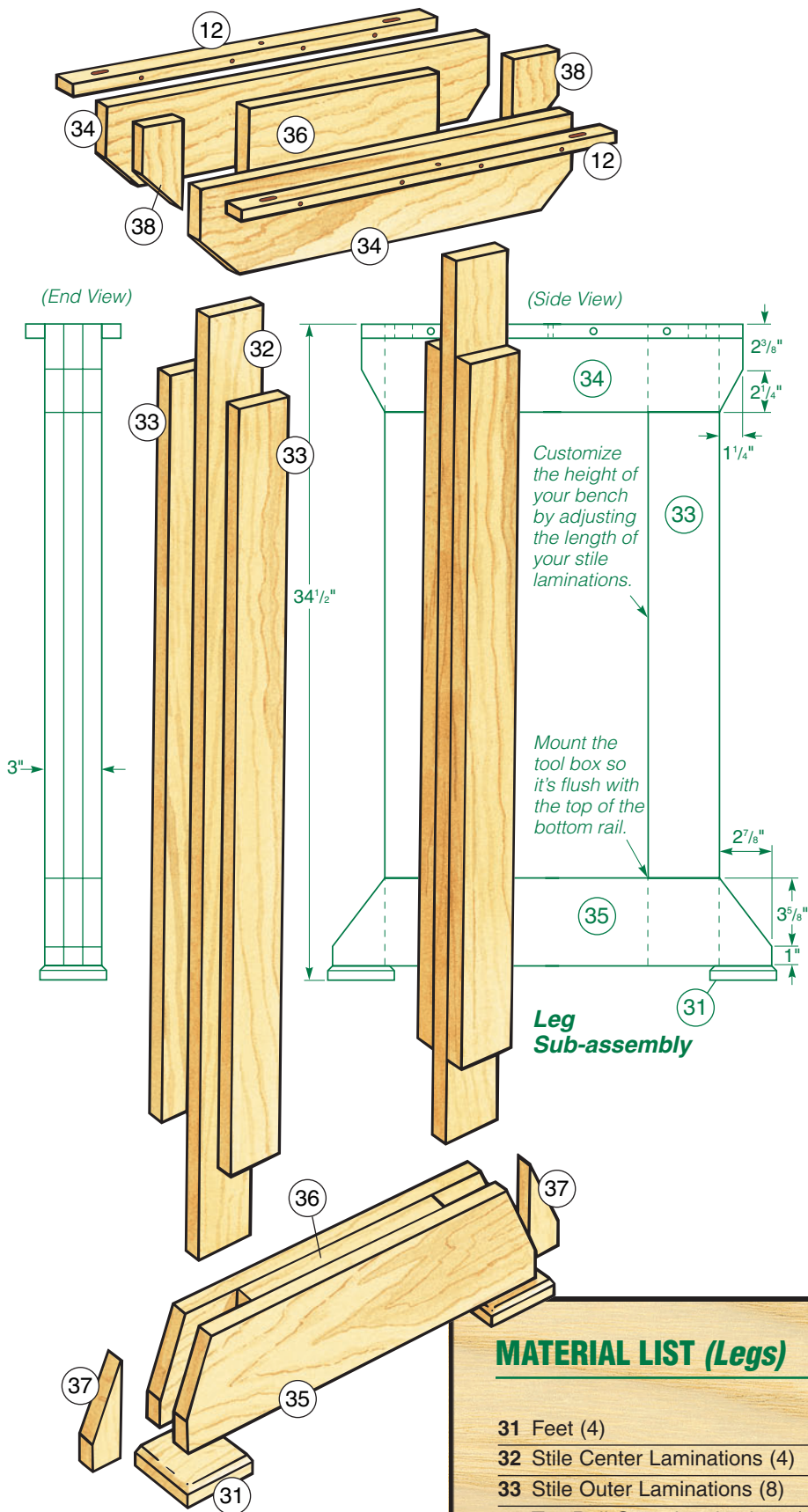
elongated and round lag screw holes, as shown in *Figure 3*. Note that the endcaps are not identical, but rather they are mirror images of one another. Use the drilled endcaps to locate pilot holes in the worktop, drill these holes, insert the splines and attach the endcaps with lag screws and washers (pieces 10 and 11). Don't glue the splines into place, otherwise the worktop could buckle or crack with changes in humidity if it's not allowed to move.

#### Brace Up for Some Brackets

Turn the benchtop upside down and mark locations for the leg cleats (pieces 12), using the dimensions on the *Section View* on page 18. You'll use these locations as a reference as you build up a support structure for the large end vise (piece 13). Screw and glue a vise support cleat (piece 14), to the endcap, located 34" up from the bottom (see the *Elevations* and *Detail Drawings* on page 18. Drill

pilot holes and screw a second cleat (piece 15) to the vise support (piece 16) at the location shown on the *Elevation Drawings*, then dry-fit the vise support to the endcap cleat and finish drilling your pilot holes. When all the screw holes have been bored, remove the screws until the legs and the laminated jaw (piece 17) are installed. At that time, you'll also address the bench dogs (pieces 18, 19 and 20).





## Building the Toolbox

Stability is perhaps the number one requirement in a workbench, so the storage area on this bench is designed to add weight and lateral stability to the legs, while also providing three drawers, a cupboard and a large shelf for tool storage.

The toolbox top, bottom, sides, divider and back (pieces 21, 22, 23 and 24) are cut from one sheet of 3/4" hardwood veneered plywood. John used birch ply, a good color and grain match for the maple in the rest of the bench, and far easier to find as a stock lumberyard item than maple ply. Use the *Elevation Drawings* to lay out rabbets on the appropriate edges of these pieces, then mill them with a 3/4" straight bit chucked in your router table. For clean and safe cuts, make several passes to mill each rabbet.

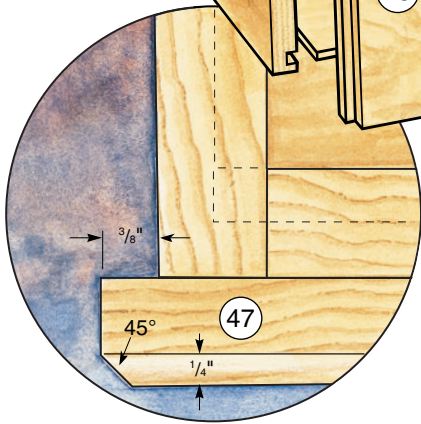
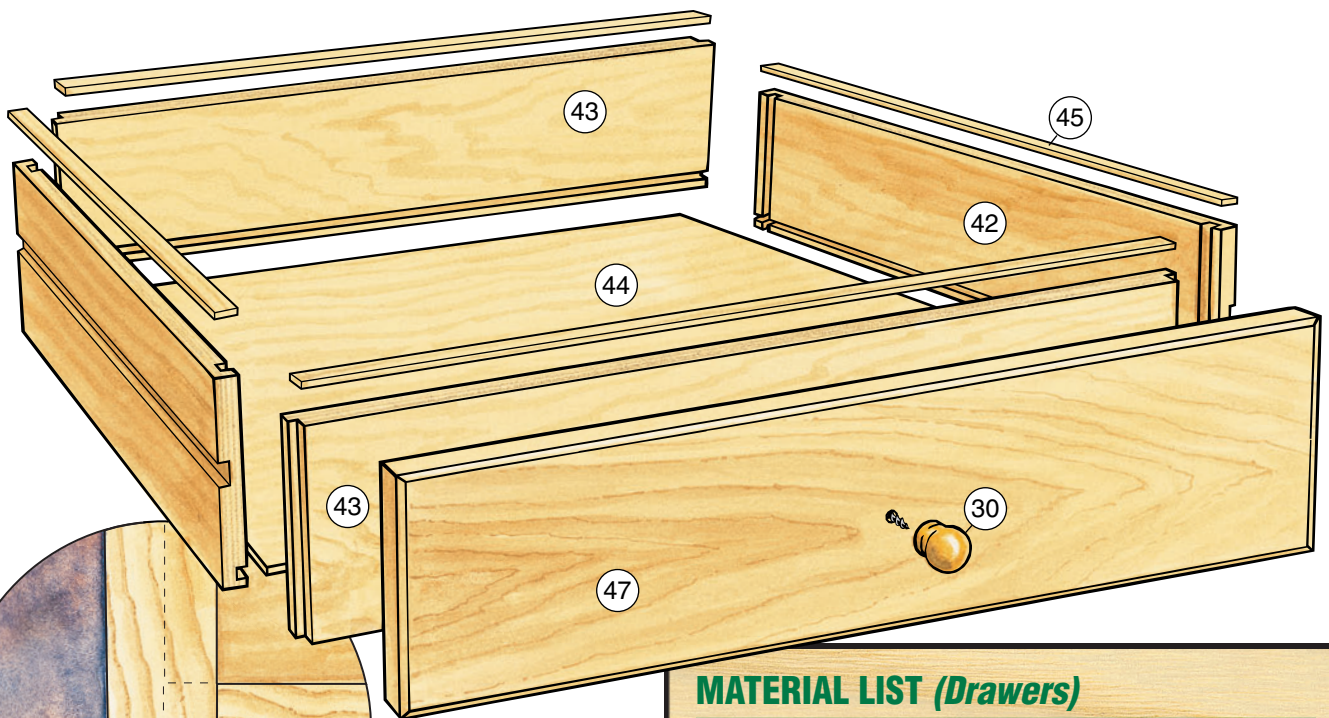
Use the same bit to plow dados for the drawer slides and divider, then glue and clamp the top and bottom to the sides. Dry-fit the back and glue it in place.

The front edges of the case are trimmed with walnut (piece 25). Apply this with glue and 3d finish nails. Set the heads and fill them after the glue dries, then scrape or plane the trim flush with the plywood. Now you need to build and install the legs before coming back to finish up the rest of the toolbox, namely the door, top trimmers and knobs (pieces 26 through 30).

## MATERIAL LIST (Legs)

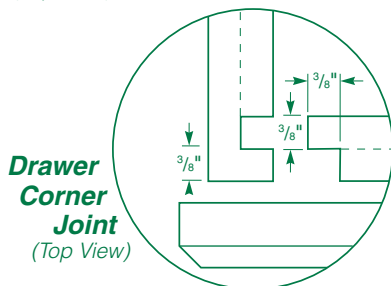
	T x W x L
31 Feet (4)	3/4" x 3 1/2" x 3 1/2"
32 Stile Center Laminations (4)	1" x 3 3/4" x 33 1/2"
33 Stile Outer Laminations (8)	1" x 3 3/4" x 24 1/2"
34 Top Rail Outer Laminations (4)	1" x 4 5/8" x 20"
35 Bottom Rail Outer Laminations (4)	1" x 4 5/8" x 23 1/4"
36 Rail Center Laminations (4)	1" x 4 5/8" x 10"
37 Foot Inserts (4)	1" x 4 5/8" x 2 7/8"
38 Top Inserts (4)	1" x 4 5/8" x 2 7/8"





**Drawer Face Location**  
(Top View)

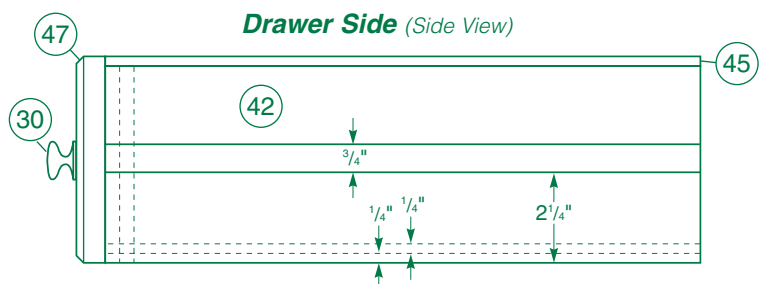
To create the drawer corner joints, use the technique described in the sidebar on page 25. Only one set up is required to make both the rabbets and dados for each corner.



**Drawer Corner Joint**  
(Top View)

### MATERIAL LIST (Drawers)

	T x W x L
39 Drawer Slides (6)	3/4" x 3/4" x 15 1/4"
40 Top Drawer Sides (2)	3/4" x 3" x 15 1/2"
41 Top Drawer Front and Back (2)	3/4" x 3" x 22"
42 Lower Drawer Sides (4)	3/4" x 5 1/8" x 15 1/2"
43 Lower Drawer Fronts & Backs (4)	3/4" x 5 1/8" x 22"
44 Drawer Bottoms (3)	1/4" x 14 7/16" x 21 1/16"
45 Drawer Trim (1)	1/4" x 3/4" x 228"
46 Top Drawer Face (1)	3/4" x 3 5/8" x 23 1/2"
47 Lower Drawer Faces (2)	3/4" x 5 3/8" x 23 1/2"



**Drawer Side** (Side View)

### Making Stile and Rail Legsets

The bench's legs are standard stile and rail construction, with a twist: both stiles and rails are built-up laminations. This allows you to assemble the legsets with mortise and tenon joinery without ever having to chop a single mortise.

After cutting all the leg parts (including the feet, pieces 31) to the sizes on the *Material List*, dry-fit the stile center laminations (pieces 32) to the outside laminations

(pieces 33): their dimensions are shown on the *Leg Elevations* on page 22. Face-glue and clamp each set of three laminations together to create four individual legs, then set them aside.

Don't be overly anxious about perfect matches or glue squeeze-out; after the glue dries, you can scrape off any excess and then joint the uneven edges.

Use the *Elevation Drawings* to lay out the top and bottom rails' outside

laminations (pieces 34 and 35), then cut these to shape on your band saw. Dry-fit these and the rail center laminations (pieces 36) to the legs, then temporarily clamp them in place. Use this setup as a template to lay out and mark the foot and top inserts (pieces 37 and 38), as shown in *Figure 4*. Trim the inserts to size on your band saw, glue and clamp each legset together and set them aside to dry.





**Figure 4:** Dry-fit the legset parts together, then use this as a template to determine the shape of the foot and top inserts.

### Attaching the Legs to the Top

Sand the worktop thoroughly, then turn it upside down. Use your drill press to create slots in one face of the leg cleats (pieces 12) and pilot holes in the other face of the piece. Attach the cleats flush to the top of the legs with glue and screws driven through the holes — not the slots. When the glue dries, attach the legs to the toolbox (flush with the top of the bottom rail) by temporarily clamping everything in place. Drill pilot holes inside the toolbox for 2" screws and, when everything is lined up, drive them home.

Round up some strong help and set the leg assembly upside-down on the underside of the worktop. Complete the assembly driving screws through the cleat slots into your predrilled holes in the underside of the work-top. This secures the legs and toolbox to the top.

### Installing the Vise

You have already made all the parts for the vise support assembly. Now, begin the vise installation by positioning the vise on its support at the location shown on the *Elevation Drawings*. Next, use the vise as a template to mark mounting holes on the support. Drill these holes (see the manufacturer's instructions), then install the cleat subassembly you made earlier with screws (see *Section View* on

page 18). You can now begin to mount the vise to the bench.

Again using the vise as a template, gently wind in the jaw until the guide rods just touch the leg rail. Mark the rod locations, and the locations of the screw holes in the guide rod bushings that come with the vise, as shown in *Figure 5*.

Remove the vise and platform, then use a Forstner bit to drill slightly oversized holes in the leg's rail assembly for the rods and screw to pass through. You may want to remove the legs and perform this step on your drill press to ensure truly vertical bores. Then screw the bushings in place.

### Forming the Laminated Jaw

There are two good reasons to use five separate boards to laminate a blank for the moveable vise jaw (piece 17): it will be more stable than a single board, and it will be far stronger. Follow the *Jaw Lamination* layout on page 18 to face-glue and clamp the blank together.

Using the *Pattern Drawing* on the *Pinup Shop Drawings*, draw and cut the jaw to shape on your bandsaw, and sand out the saw marks with a 2" drum sander. Shape the outside bottom and side edges with a 1/2"-radius guided beading bit chucked in your portable router.

To locate the holes in the jaw for the guide rods and screw, remove the screw and guide rods, clamp the jaw in place and use the vise

mounting plate as a guide to locate the three holes. Drill these holes 1/8" oversized.

Slip the laminated jaw over the guide rods and the screw, then gently wind the vise closed. Position the wooden jaw flush with the top and sides of the worktop's endcap, drill pilot holes for the mounting screws and drive them home.

### Building the Drawers

Chamfer the leading edges of the drawer slides (pieces 39), as shown on the *Elevation Drawings* on page 21, then glue them in their dadoes.

After cutting the drawer sides, fronts and backs (pieces 40 through 43) to size, use the dimensions shown on *Drawer Corner Joint Detail*, page 23, to create the locking joints on their corners (see the photo series *sidebar* on the next page). These joints are cut on the table saw. It's a good idea to make a practice joint on scrap wood to establish the saw settings before milling the actual workpieces.

Stay at the table saw to cut grooves in the inside faces of these pieces for the drawer bottoms (pieces 44), as shown on the *Exploded View Drawing*, page 23.



**Figure 5:** The vise attaches to both the endcap and vise support. With two screws holding the unit in place, establish the locations for the guide rod and center screw holes in the legs.



Glue and clamp the drawers together, checking that they're square and flat before setting them aside. When the glue is dry, trim the top edges of the plywood drawers with solid hardwood (piece 45), gluing and nailing at 6" intervals. Fill the nail holes and sand the filler flush, then install a dado head in your table saw to mill grooves in the drawer sides for the slides. Test your setup with scrap, using three pieces to represent the three drawer sizes, and make any minor adjustments needed to ensure that the drawers will slide properly. After milling, test-fit the sides in the case to be sure they slide easily.

### Building the Drawer Fronts and Door

John cut the drawer fronts and the door for his bench from a single wide board, to take advantage of a very attractive grain pattern. You may have to glue up stock for this process. Cut the faces (pieces 46 and 47) to size, then shape their front edges on the router table with a chamfering bit (see the *Elevation Drawings* for dimensions).

You can now return to the door and finish machining it. The grain pattern on John's door (piece 26) ran horizontally. To prevent cupping, he plowed three dados from top to bottom in its back and glued in three stiffeners (pieces 27). After sanding, he chamfered the door's front edges to match the look of the drawer faces.

European style hinges with a 1/4" overlay (pieces 28) are completely hidden when the door is closed. Follow the included instructions for mounting these hinges.

On your bandsaw, shape the walnut toolbox trimmers (pieces 29), then sand them smooth. Screw one to the legs at each end of the

toolbox top, to stop tools from falling off the shelf. Finally, chamfer the top and bottom edges of the feet and screw them to the legs.

### Finishing Up

Disassemble the entire bench, then sand all surfaces with 120-grit, 180-grit and finally 220-grit sandpaper. Wipe it down with a tack cloth and apply four coats of natural Danish Oil to the legset and toolbox, and an additional couple of coats to the worktop. Sand each coat except the last, using 400-grit paper, wiping it clean before and after sanding. When the finish is dry, reassemble the bench and mount the knobs on the drawers and door.

Install a pair of bench dogs (pieces 18) by using the *Elevation Drawings* to locate their holes in the top of the vise jaw. Drill the right-hand hole vertically all the way through the jaw (back up the exit area with some scrap, to avoid tear-out). Drill the left hole to a depth of 4 1/2", then use a bit extender or a long twist bit to drill a second hole in the bottom of this boring (see the *Elevation Drawings* for dimensions). This hole is for a brass pin that's actually a door hinge pin, available at most hardware stores. This pin is used as a button to push the top of the bench dog up above the surface of the jaw when you need to use it.

Pop the square dogs into their holes at this time, then fill the top drawer in the toolbox with all those project plans you'll need over the next few decades. After all, once people see the great job you did on building your workbench, they're bound to have all sorts of great ideas that will help you use it!

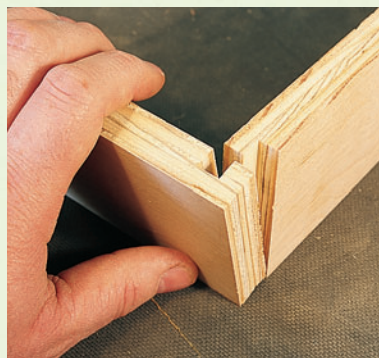
## Step-by-step drawer joinery



**Step 1:** Install a 3/8" dado head and a zero-clearance insert in the saw and cut a rabbet at the end of each drawer front and back.



**Step 2:** Without moving the rip fence, switch to the miter fence to form matching dados in the drawer sides.



**Step 3:** Dry-fit the joints and then switch to a 1/4" dado head to cut the grooves for the bottoms.



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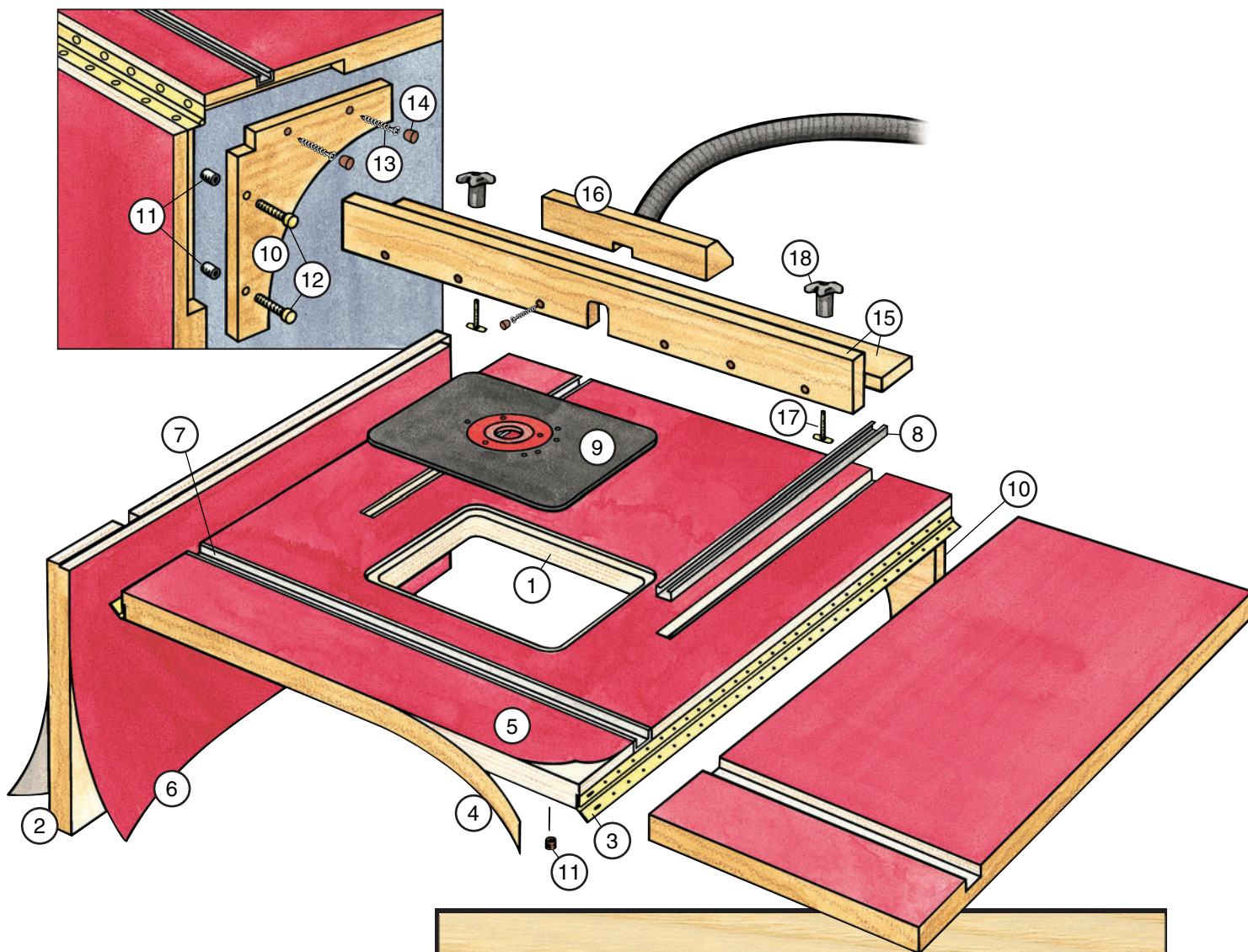


# Multi-functional Routing System

*Here's a router table — complete with its own dust collection system — that can be used with or without its base.*







If your shop has neither loads of floor space nor a central dust collection system, this multi-functional router table is for you. With its wings up, it provides plenty of support for long stock. Flip the wings down, and it rolls up against a wall for ordinary-sized routing tasks or doubles as an extra table for storage. In this mode, it only occupies a little over 4 square feet of floor space. We've designed the fence with a port to hook up to your shop vac, which should help keep your lungs cleaner. Best of all, the top comes off and becomes a stand-alone benchtop unit that you can take with you for those routing jobs outside the shop.

## MATERIAL LIST (Top)

	T x W x L
1 Tabletop (1)	1½" x 26" x 26¼"
2 Wings (2)	1½" x 26" x 12"
3 Piano Hinges (2)	1½" x 26"
4 Edging (2)	1½" x 8' Plyedge
5 Tabletop Laminate (2)	1/40" x 26¼" x 26½"
6 Wing Laminate (4)	1/40" x 26¼" x 12¼"
7 Miter Gauge Track (1)	1/2" x 1" x 26¼"
8 Fence T-track (2)	1/2" x 13/16" x 15½"
9 Router Base Insert (1)	1/4" x 9" x 12"
10 Gussets (2)	3/4" x 8" x 8"
11 Threaded Inserts (8)	1/4"-20
12 Brass Knurled Knobs (4)	1/4"-20
13 Screws (36)	#8 x 1½"
14 Plugs (36)	3/8" Dia.
15 Fence Face and Brace (2)	3/4" x 3" x 26¼"
16 Dust Collection Port (1)	2" x 2" x 9"
17 T-slot Bolts (2)	5/16"-18 x 1½"
18 Star Knobs (2)	5/16"-18





**Figure 1:** The router table insert rests on a rabbet that holds it flush with the tabletop. Follow the instructions that come with your plate for cutting this opening and rabbet.

the laminate flush with the edges of the tabletop and wings. Repeat the process on the top surfaces. This time, set the router bit height so the bearing clears the hinge rabbets.

### Adding Tabletop Hardware

Now that your tabletop and wings are laminated, you can start machining for the hardware that guides the fence and miter gauge. The first step is to install the piano hinges that hold the wings, then lay the entire assembly on a flat workbench. Secure it to the bench with clamps, then install a 1" straight bit in your router (if you don't own a 1" bit, make several passes with a smaller one). Refer to the *Pinup Shop Drawings* for the location of the miter gauge groove, then clamp a fence in place and rout this groove across all three panels at the same time. That way, you'll be sure they line up.

Install the miter gauge track (piece 7) in the tabletop next, but don't install track in the wing grooves or the gauge will get stuck. Drill countersunk holes for screws to hold the track in place, then slip the miter gauge from your table saw into the track and tighten the screws until it slides easily without extra play.

The T-tracks for the fence (pieces 8) are installed in a similar fashion. Cut the grooves according to the locations given in the *drawings*, then screw the tracks in place. The last hardware element in the top is the table insert (piece 9). Follow the instructions that come with your insert plate for cutting the rabbet (shown in *Figure 1*) that holds it in the tabletop.

### Making the Tabletop Core

To ensure that this tabletop stays flat, we built the core from two layers of Finnish birch plywood. However, a less expensive high-density fiberboard (the same material used by cabinet shops for countertops) would also work, and so would ordinary 3/4" MDF.

Begin by gluing and clamping two sheets of 3/4"-thick core stock (26" x 50 1/2" — large enough to make pieces 1 and 2) together, exerting enough pressure on the center of the panel to ensure good adhesion. One way to do this is to screw the two panels together. Screw from the bottom up with 1/4" screws after drilling clearance holes through the bottom sheet. The screws will pull the two plates together. Use a straightedge to check that the assembly is flat. After the glue has dried, cut the top and wings to size on your table saw. Then reset your fence and blade height to create the rabbets for the hinges (pieces 3) on the four inside edges (see the *Pinup Shop Drawings*).

Glue and clamp hardwood tape (piece 4) to all the edges of the three panels except the ones to which the hinges will be screwed. Sand the tape flush with the top and bottom.

### Laminating the Tabletop

Each piece of laminate in the *Material List* on page 31 (pieces 5 and 6) is deliberately oversized by 1/4". This is because you'll be using your router to trim it to the correct size after it has been applied to the top and wings.

If you used screws to glue up the tabletop, fill any depressions and sand the filler flush. Then spread a coat of contact adhesive on the bottom surface of each wing and the tabletop, following the adhesive manufacturer's directions. (Note: Laminating the bottom surfaces will ensure that the tabletop will stay flat.) Apply a similar coat to the relevant pieces of laminate. When the cement is dry to the touch, lay dowels or thin sticks every six inches along the plywood, then position the laminate on top of these spacers. Remember, you'll only get one shot at lining up the laminate — contact adhesive is unforgiving.

When you're happy with the positioning, begin removing the spacers from the center. Work your way toward the ends, pressing the laminate down firmly as each spacer is removed. Use a roller to roll the entire surface once all the spacers are removed, then use a laminate-trimming bit in your router to cut



**Figure 2:** Gussets that are mortised into the back of the tabletop allow the top to be converted into a portable benchtop unit.



### Adding Portability

To use the tabletop as a stand-alone unit, the wings serve as legs. They are secured in position with a pair of gussets (pieces 10) that are mortised into the back of the tabletop like hinges are mortised into doors. These mortises (see the *drawings*) are cut with a router equipped with a straight bit (after removing the piano hinges), then cleaned up with a chisel. A matching mortise is then cut in the back of each wing.

Bore holes in each wing for the threaded inserts (pieces 11), and in each gusset (see *Figure 2*, above) for the knurled knobs (pieces 12). The *drawings* locate the holes for the inserts plus the screws and plugs (pieces 13 and 14) that anchor the gussets to the tabletop. To secure the wings in the down position, pass the brass knobs through the holes in the gussets and screw them into the inserts.

### Making the Fence

Use straight hardwood stock to make the fence face and brace (pieces 15), then cut a hole in the middle of the face (see *drawings*) for router bits before screwing and gluing the two pieces together. Counterbore the screw heads (they'll be plugged later), then make the dust collection port (piece 16), a block of wood (see *Pinup Shop Drawings* for profile) with a hole drilled in it at an angle: Use a hole saw or Forstner bit that matches the diameter of your shop vac hose fitting. Screw, but don't glue, the port to the back of the fence behind the hole: You may need to replace the fence face sometime in the future.

The fence is secured to the tabletop with two T-slot bolts (pieces 17) and a couple of star knobs (pieces 18). This hardware also allows you to easily move and set the fence.

### Building the Base Cabinet

Even though it becomes a portable, self-contained unit, the tabletop subassembly is designed so it can rest on a mobile base cabinet. This base's two sides (pieces 19) are rabbeted on their top, bottom and back (see the *drawings* for locations and dimensions), and these are easy cuts to make on your table saw.

The cabinet back (piece 20) is milled next. The only machining here is a rabbet along the top edge and a large hole (see the *drawings*) that will allow air to reach your shop vac if you stow it in the cabinet and the router cord to exit the cabinet. If you already have a dust collection system, all you'll need is a hole large enough to accept your cord's plug. If not, the hole can be cut with a jigsaw after first drilling out the four corners. Finish up by sanding any jagged edges left by the saw.

After you have cut the top, shelf and bottom (pieces 21, 22 and 23) to size, return to your jigsaw to cut the

hole in the top (see *drawings*) for your router. You also need to drill a hole in the back of the shelf for your router's power cord. Note: If you decide not to install wheels on your cabinet, the bottom should be the same size as the top.

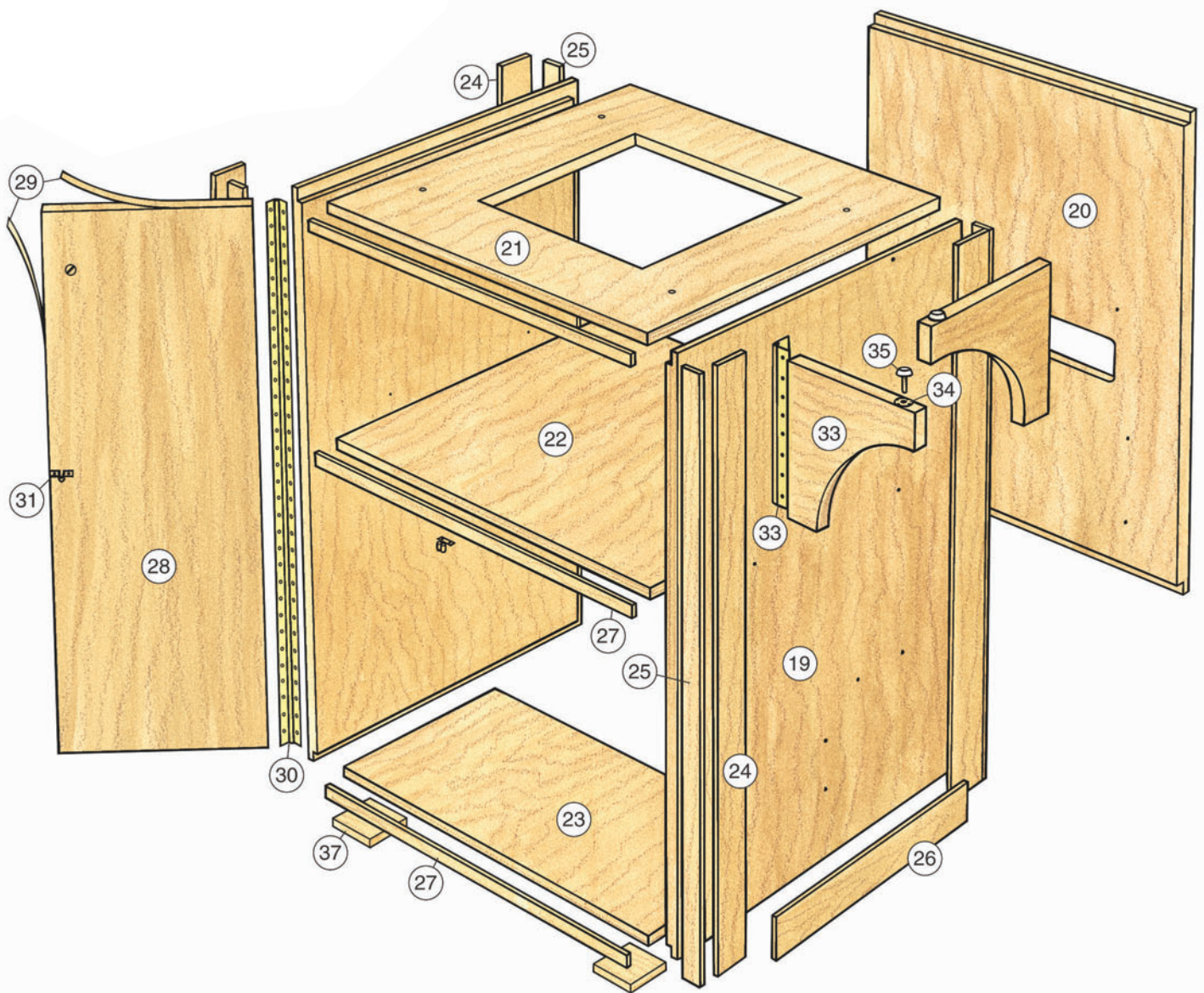
You can now assemble the top, bottom and shelf to the sides and back, using glue and 1½" screws. The screw heads should be sunk ¼" below the surface in ¾"-diameter counterbores that are drilled with a Forstner bit (for clean edges and a flat bottom).

### Adding Some Trim

There's something about a well-built shop fixture (a fine European workbench, for example) that brings pleasure to the most mundane woodworking tasks — even sanding! That's why we suggest you trim out the router table's base cabinet, giving it a frame-and-panel look. The trim pieces are simply cut and jointed to size, then applied to the cabinet with glue and clamps.

The trim pieces must be applied in a specific order so that everything fits perfectly. Begin by attaching the side stiles (pieces 24), followed by the front and back stiles (pieces 25), the side rails (pieces 26) and the edging (pieces 27).





## MATERIAL LIST (Base)

	T x W x L		T x W x L
19 Base Sides (2)	3/4" x 23 7/8" x 32 1/2"	29 Door Edging (2)	3/4" x 96" Tape
20 Base Back (1)	3/4" x 23" x 32 1/2"	30 Door Hinges (2)	1 1/2" x 30 3/4" Piano
21 Base Top (1)	3/4" x 23" x 23 1/2"	31 Door Catches (2)	Double Roller
22 Base Shelf (1)	3/4" x 22 1/4" x 21 15/16"	32 Door Knobs (2)	1 1/2" Dia.
23 Base Bottom (1)*	3/4" x 23" x 13"	33 Gatelegs (4)	3/4" x 9" x 8 3/8"
24 Side Stiles (4)	3/8" x 2 3/4" x 32 1/2"	34 Threaded Inserts (4)	5/16"-18
25 Front & Back Stiles (4)	1/4" x 1" x 32 1/2"	35 Gateleg Levelers (4)	3/8" x 1 1/8"
26 Side Rails (2)	3/8" x 2 3/4" x 18 3/8"	36 Gateleg Hinges (4)	1 1/2" x 9" Piano
27 Edging (3)	1/4" x 3/4" x 22 1/4"	37 Cabinet Feet (4)	1/4" x 2" x 2"*
28 Doors (2)	3/4" x 11" x 30 3/4"		

*If you decide not to install the wheel system, the bottom should measure 23" x 23 1/2".*



**Figure 4:** The router table's fence incorporates a dust collection port. Your shop vac hose should friction-fit to this hole.



### Making the Doors

Flush doors (pieces 28) are simple to make and have a low profile. To build them, cut plywood panels to the correct dimensions and apply pressure-sensitive hardwood tape (piece 29) to all four edges (see *Figure 3*). Sand the tape flush, then dry-fit the hinges (pieces 30), the catches (pieces 31) and the door knobs (pieces 32). Locations for all of these can be found on the *drawings*. Once all the screw holes have been started, you can remove the hardware until after the cabinet has been finished.

### Adding Gatelegs to Support the Top

When working with long stock, this router table's two extension wings are invaluable. However, it's essential that the wings are lined up in the same plane as the tabletop. To ensure that they are, two pairs of gatelegs (pieces 33) support them when they're in use.

To make these gatelegs, begin by transferring their shape from the *drawings* onto your plywood stock, then move to your drill press. Bore a hole in the top of each blank for a threaded insert (pieces 34). These inserts will house plastic leveler glides (pieces 35) that will allow you to make fine adjustments to the height of the wings. Boring holes for them is a lot easier to do now, before the gateleg profile is cut. That's the next step, and it's done on your bandsaw. Then use a drum sander in your drill press to refine the bandsaw cuts.

Install the gatelegs with 9" lengths of piano hinge (pieces 36). The locations for these hinges can be found on the *drawings*. Once they're in place, attach 1/4"-thick feet (pieces 37) to the four corners to keep the bottom of your cabinet off the floor.

Wrap up the base by gluing plugs in the screw counterbores. Trim these with a chisel and sand them flush.

The same four brass knurled knobs that hold the wings in position when the router system is being used on a benchtop are also used to secure the top to the base. Drill holes through the top of the base, then bore four corresponding holes in the underside of the top for the threaded inserts (pieces 11). This ensures that you'll get a steady, safe and non-moving surface.

### Building the Wheel Assembly

To make the table mobile (so it can be pushed against a wall and moved out when needed), we added a pair of wheels (pieces 38). However, if you decide that you don't need this option, just skip the rest of this section and move on to "Wrapping Up".

The wheel system we devised lets you tip the router table away from you to engage the wheels, then toward you to disengage, using the stepped slots cut in the axle frames (pieces 45). It's enclosed by the lower shelf (piece 39) and a support (piece 40). These are cut to size, then the leading edge of the shelf is trimmed with an oak strip (piece 41). Cut and build the wheel assembly using the *Pinup Shop*

*Drawings* and the *Exploded View Drawing* on the next page as guides. Assemble the axle, wheels, washers and clips, then build the wooden assembly. You'll need to hacksaw a pair of shallow grooves into the axle at both ends for locking the pair of clips that hold each wheel in place.

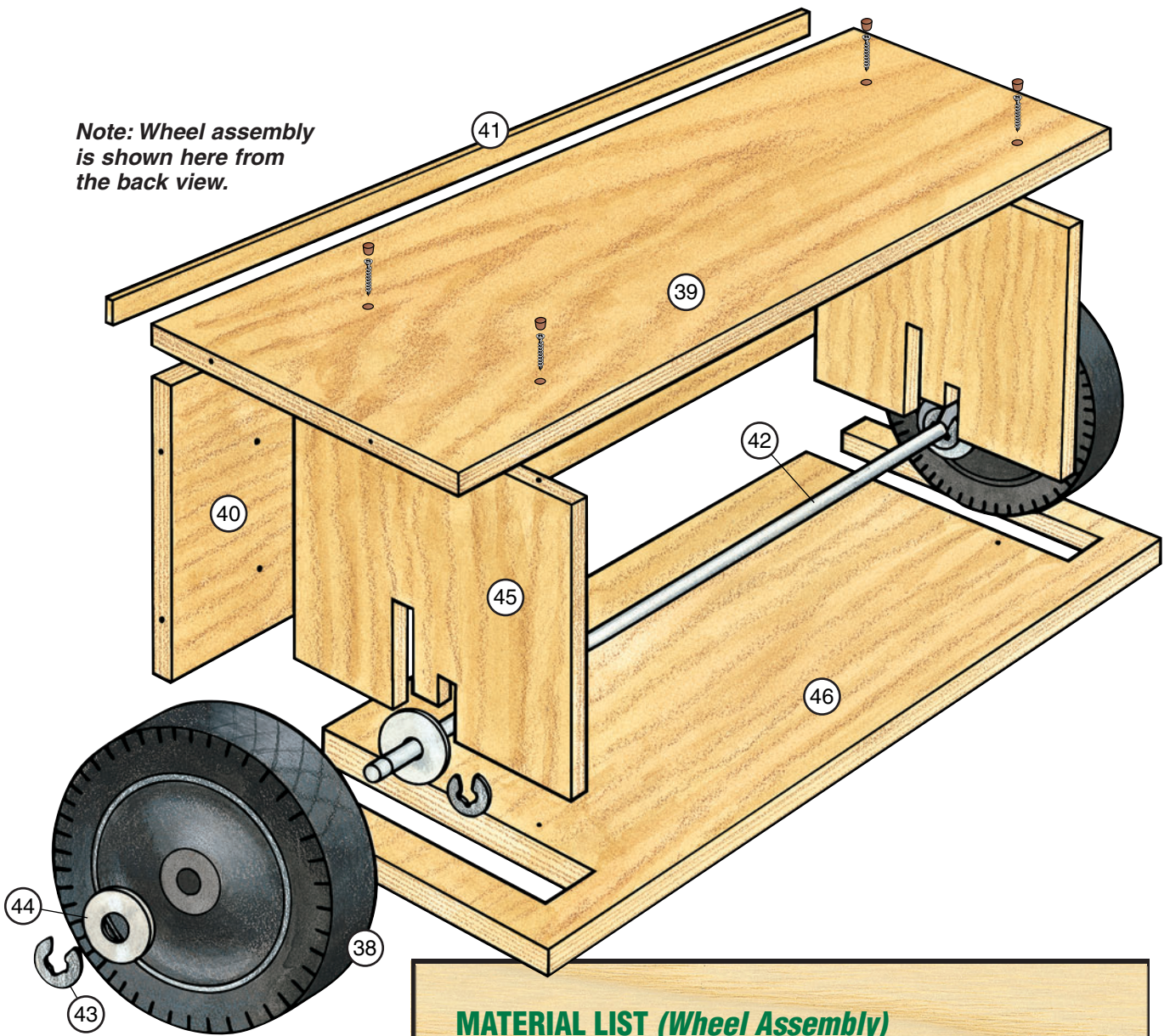
To mount the assembly in the cabinet, position it so the bottoms of the wheels are even with the cabinet feet when the axle is resting in the shorter stepped slots in the axle frames. Drive countersunk screws through the cabinet sides into the lower shelf and lower shelf support. Plug these screw holes in the base.



**Figure 3:** Apply pressure sensitive hardwood tape to all four edges of the base unit's plywood doors, then sand the tape flush. Sand carefully to keep from sanding off the plywood surface veneer.



**Note: Wheel assembly is shown here from the back view.**



### MATERIAL LIST (Wheel Assembly)

	T x W x L
38 Wheels (2)	8" Dia.
39 Lower Shelf (1)	3/4" x 22 1/4" x 10 1/4"
40 Lower Shelf Support (1)	3/4" x 22 1/4" x 9"
41 Lower Shelf Edging (1)	1/4" x 3/4" x 22 1/4"
42 Axle (1)	1/2" x 22" Steel Rod
43 Axle Clips (4)	1/2" I.D. Spring Clips
44 Axle Washers (4)	1/2" I.D. x 2" O.D. Fender
45 Axle Frames (2)	1/2" x 9 3/4" x 9"
46 Wheel Retainer Panel (1)	3/4" x 23" x 10 1/2"

### Wrapping Up

After all the assembly is accomplished, you're ready to finish the cabinet. We sprayed the base and tabletop edging with four coats of lacquer, sanding between coats.

Mount your router to the insert plate you've selected for your project. It probably comes either drilled to fit your router or with instructions for drilling the holes yourself. If not, remove the baseplate from your router and use it as a template for locating the countersunk screw holes in the insert plate. Attach the router to the insert plate with screws and drop it into place.

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# Sandpaper Caddy

*If finding a specific grit sandpaper in your sandpaper drawer is a frustrating chore, here's an easy way to bring some order to the chaos.*



The alignment blocks don't just store the disks, they make it easy to center them on your orbital sander: just press down. The dust extraction holes line up every time.

A reader once submitted this handy caddy design, which is basically an embellishment of a simple alignment block for installing orbital sanding disks on a sander (see *photo*, above). By making several of these alignment blocks (pieces 1) for each of the grits you use, all you need is a case to store them in. Suddenly that drawer is much less cluttered!

The concept here is simplicity itself: dowels on a board line up the holes on a sanding disk with your sander's pad. To install a disk, slip the orbital sander over the guide pins (pieces 2) of the appropriate block and press down. Lift off the sander and you're ready to sand. The critical dimension on these blocks is the location of the guide pins. Follow the *Elevation Drawing* on the next page and use one of your sanding disks to verify the layout marks. Make a cardboard template and use it as a guide for locating the pins.

The holes in the faceplate of the sander and the sanding disks are 3/8". Using 5/16" dowels for the pins allows for some slight misalignment but still provides a good match between the holes in the paper and the dust extraction openings in the pad. Make enough storage blocks for the various grits you use. Five should cover it, for

60, 80, 100, 150 and 220 grits.

Once you've made the alignment blocks, build the storage cabinet shown in the *Exploded View*. It simply consists of an open-faced rectangular box with a series of runners that hold the different alignment blocks.

Rather than fabricating the sides (pieces 3) individually, cut a board 13" wide by 10 7/8" high. Use 1/4" hardboard for the sides. Glue the five runners (pieces 4 and 5) in place at their proper locations (see *Elevation Drawing*). After the glue dries, cut the assembly in half vertically and trim each half to width to make two identical case sides. Cut the top, bottom and back of the cabinet (pieces

6 and 7) to size, and glue them to the cabinet sides, starting with the top and bottom. Make the back from hardboard. Pin the joints with brads or finish nails to hold them in place while the glue dries. To identify the grit of the paper stored on each block, attach a label to each. They're quick to make on a computer.

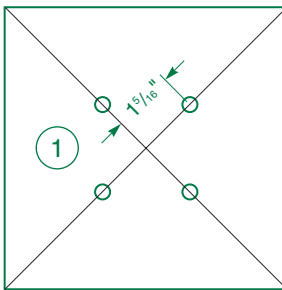


This handy sanding caddy holds five grit's worth of sanding disks. Use the blocks to mount disks on your sander and to make each grit easy to find.



### Alignment Block

(Top View)



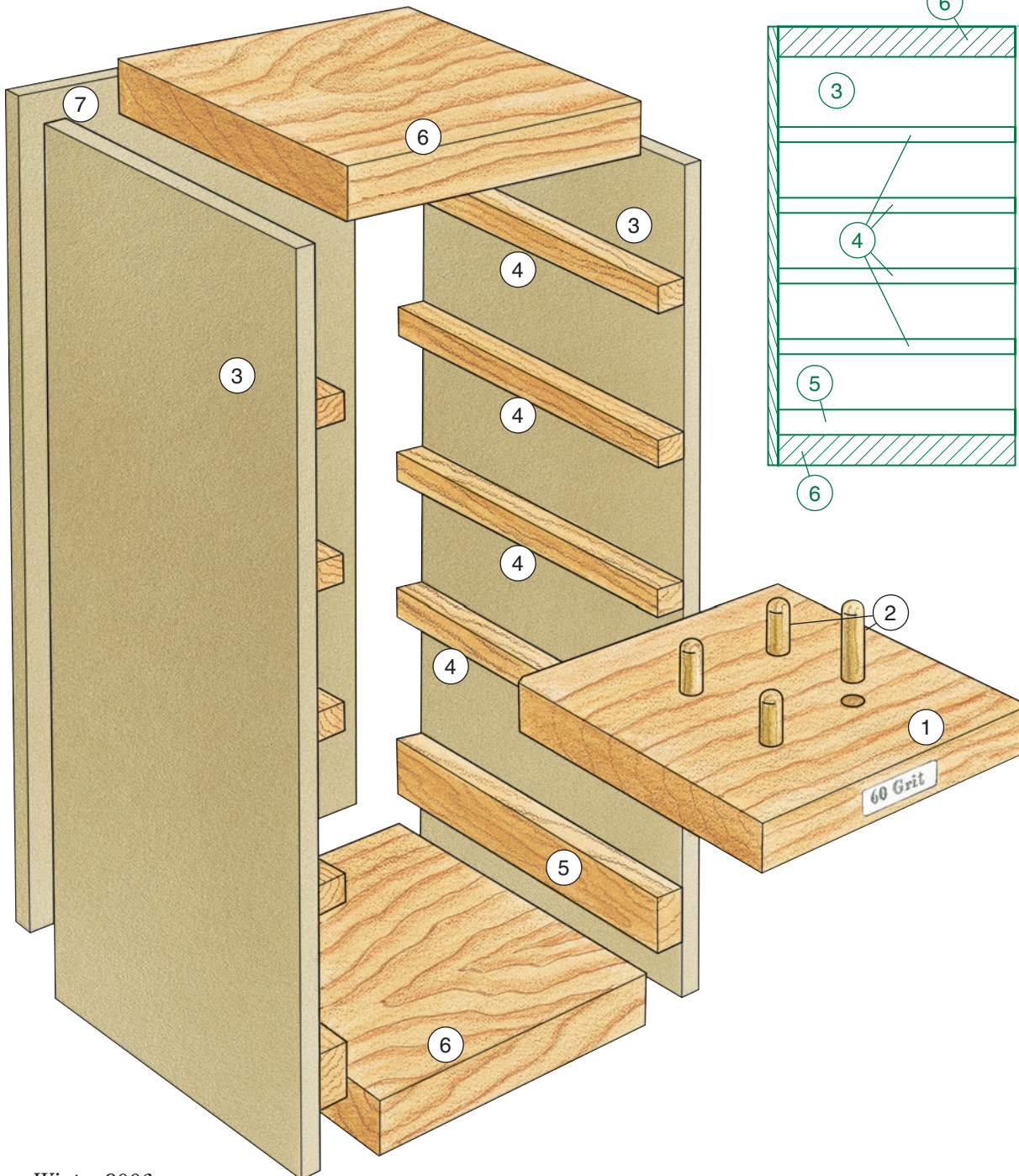
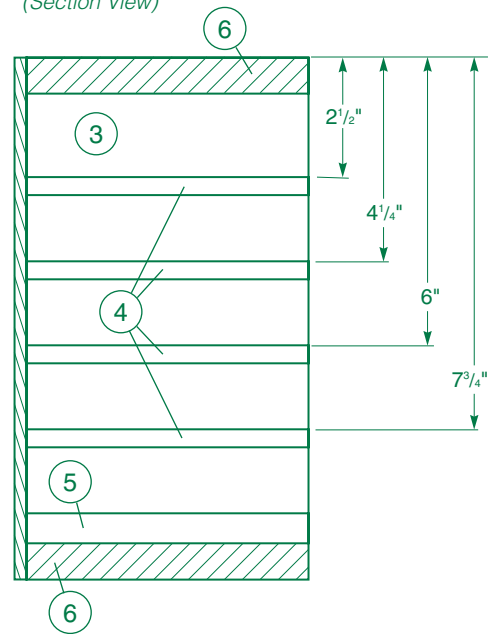
Note: The easiest way to locate the pin holes is to draw the layout lines shown at left, then lay a disk in place and rotate it until four of the holes intersect the lines. Or measure out from the center as shown.

### MATERIAL LIST

	T x W x L
1 Alignment Blocks (5)	3/4" x 5 7/8" x 5 7/8"
2 Guide Pins (20)	5/16" Dia. x 1 1/4"
3 Sides (2)	1/4" x 5 7/8" x 10 7/8"
4 Middle Runners (8)	3/8" x 3/8" x 5 7/8"
5 Bottom Runners (2)	3/8" x 5/8" x 5 7/8"
6 Top/bottom (2)	3/4" x 5 7/8" x 5 7/8"
7 Back (1)	1/4" x 6 3/8" x 10 7/8"

### Storage Cabinet Side

(Section View)





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<b>Kreg Tool Company</b> 800-447-8638 <a href="http://www.kregtool.com">www.kregtool.com</a>	<b>pg. 69</b>	<b>Wood-Ply Lumber Corp.</b> 800-354-9002 <a href="http://www.woodply.com">www.woodply.com</a>	<b>pg. 35</b>
<b>Laguna Tools</b> 800-234-1976 <a href="http://www.lagunatools.com">www.lagunatools.com</a>	<b>pg. 7</b>	<b>WoodRat Precision Joinery Machines</b> 011-44-1458-832744 <a href="http://www.woodrat.com">www.woodrat.com</a>	<b>pg. 69</b>
<b>Leigh Industries</b> 800-663-8932 <a href="http://www.leighjigs.com">www.leighjigs.com</a>	<b>pg. 13</b>	<b>Woodturners</b> 877-603-9663 <a href="http://www.woodturners.on.ca">www.woodturners.on.ca</a>	<b>pg. 82</b>
<b>LRH Enterprises</b> 800-423-2544 <a href="http://www.lrhent.com">www.lrhent.com</a>	<b>pg. 74</b>	<b>Woodworker's Source</b> 800-423-2450 <a href="http://www.woodworkerssource.net">www.woodworkerssource.net</a>	<b>pg. 35</b>



**Workbench**

**Laminated Jaw**

**17**

**Top Trimmer**  
*(Front View)*

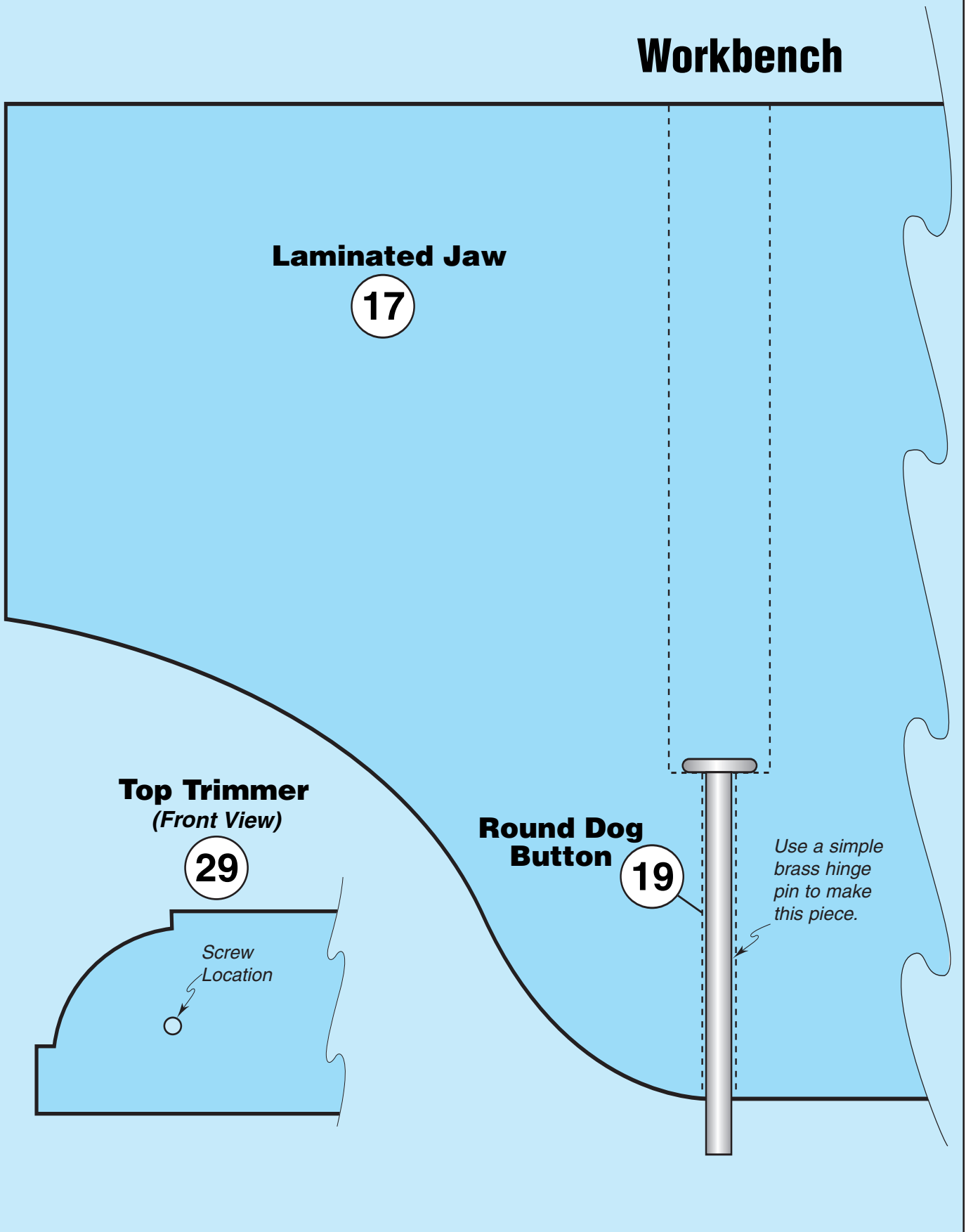
**29**

Screw  
Location

**Round Dog  
Button**

**19**

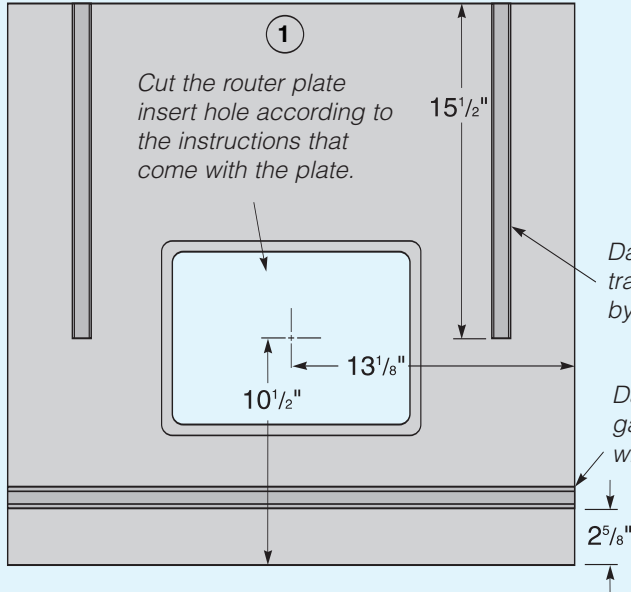
*Use a simple  
brass hinge  
pin to make  
this piece.*





# Technical Drawings *Multi-functional Routing System*

**Tabletop**  
(Top View)



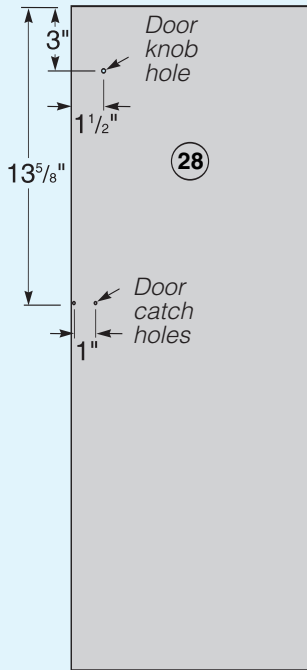
## Supplies

### Multifunction Router Table

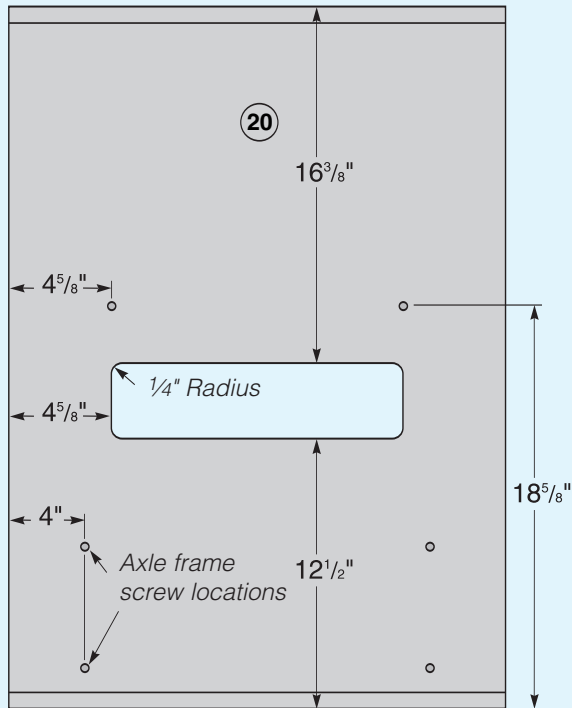
- $1\frac{1}{2}''$  x 36" Piano Hinges (2 required) ...#19283
  - Birch Plyedge Roll (2 required) .....#10991
  - $5/16''$  5-Star Knobs (2 required) .....#23812
  - $1/4''$ -20 Threaded Insert .....#28803
  - Aluminum T-Track (2 required) .....#20054
  - Router Bit Guard .....#67157
  - $1/4''$  Knurled Knob .....#99615
- Please call for current pricing - 800-610-0883

Dadoes for fence T-tracks are  $3/4''$  wide by  $3/8''$  deep.

Dado for miter gauge track is  $1''$  wide by  $1/2''$  deep.

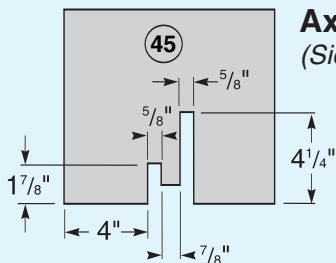


**Door**  
(Back View)

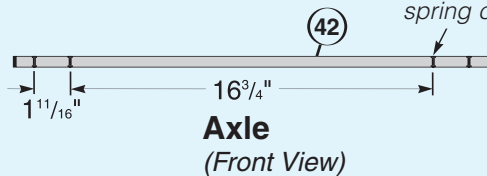


**Base Back**  
(Front View)

Use a hacksaw to cut shallow grooves for spring clips.



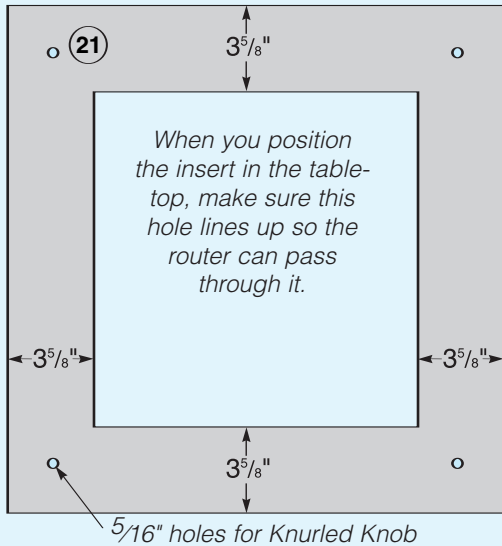
**Axle Frame**  
(Side View)



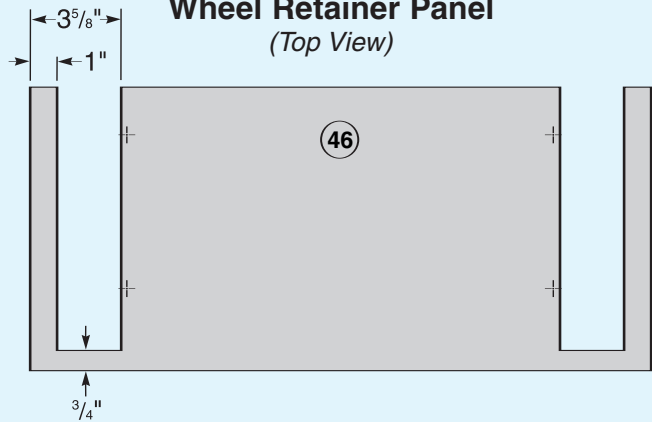
**Axle**  
(Front View)

# Technical Drawings *Multi-functional Routing System*

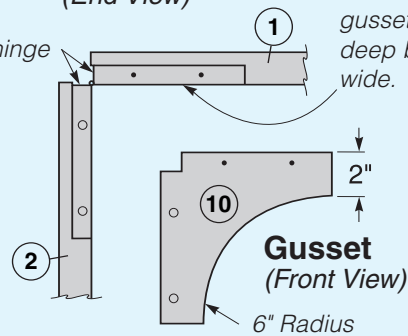
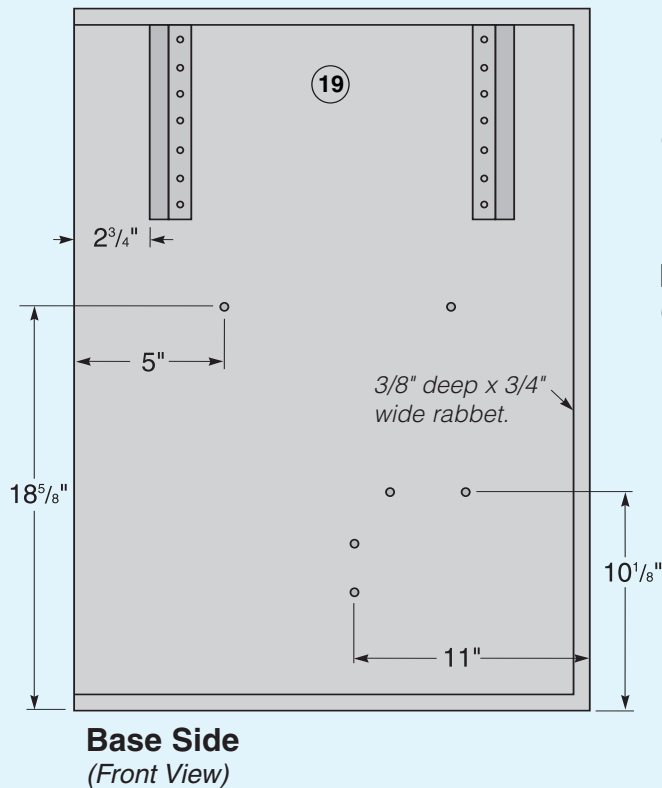
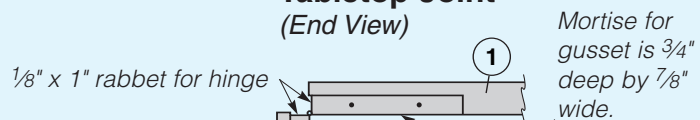
**Base Top**  
(Top View)



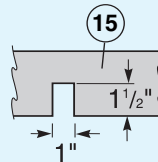
**Wheel Retainer Panel**  
(Top View)



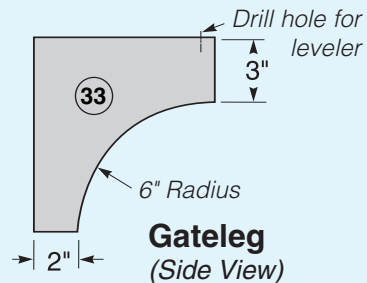
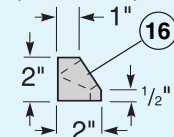
**Tabletop Joint**  
(End View)



**Fence**  
(Front View)



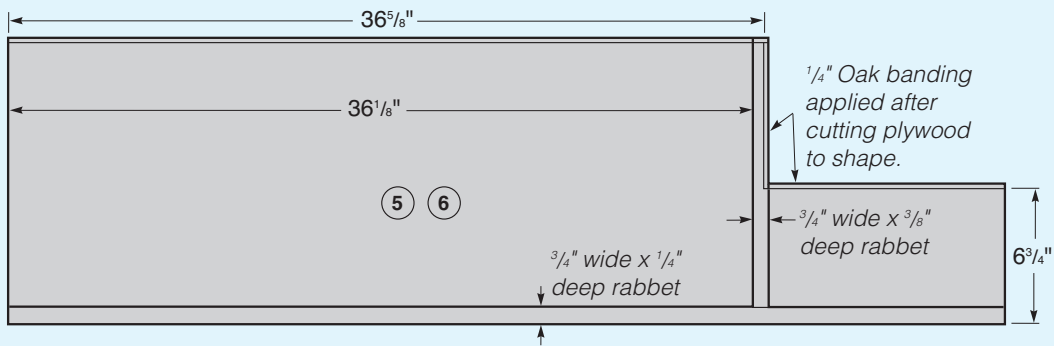
**Dust Port**  
(End View)



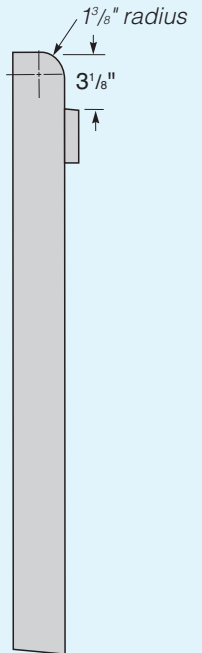




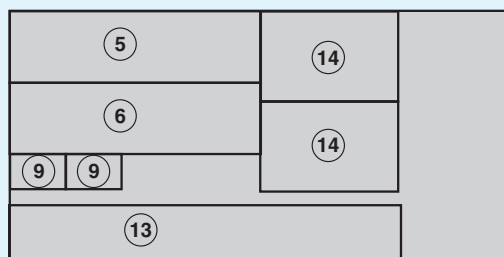
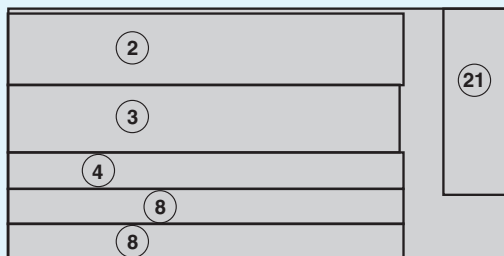
### Top and Bottom Elevation



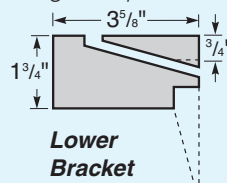
### Clamping Table Leg Elevation



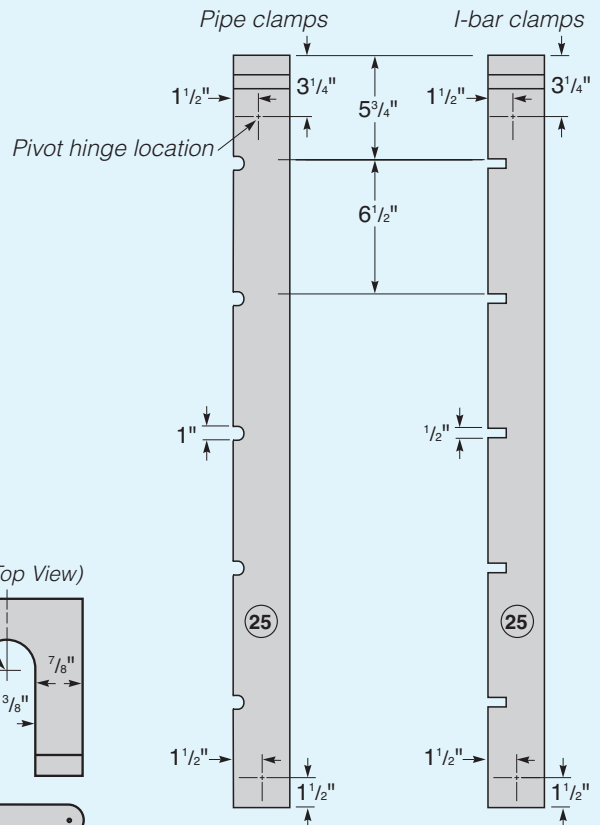
### Plywood Cutting Layouts



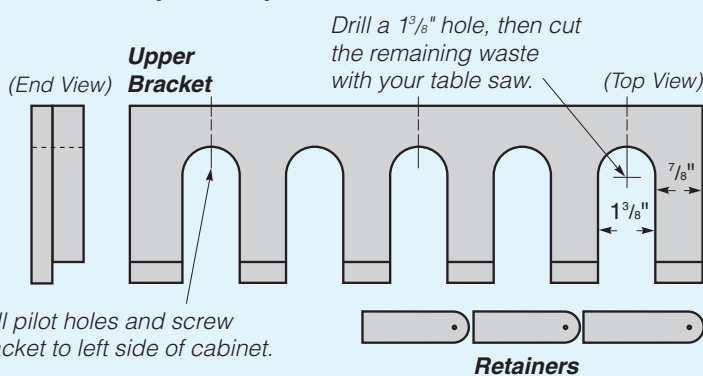
Cut out wedge, then trim one corner of wedge square. Rabbet main block and glue wedge into place.



### Frame Side Elevations



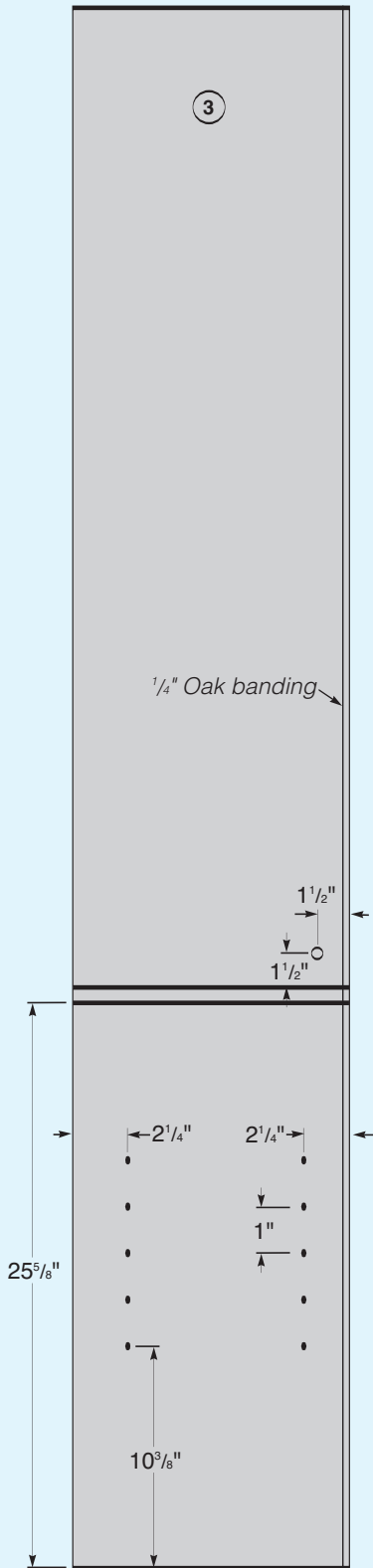
### Pipe Clamp Fixture Elevations



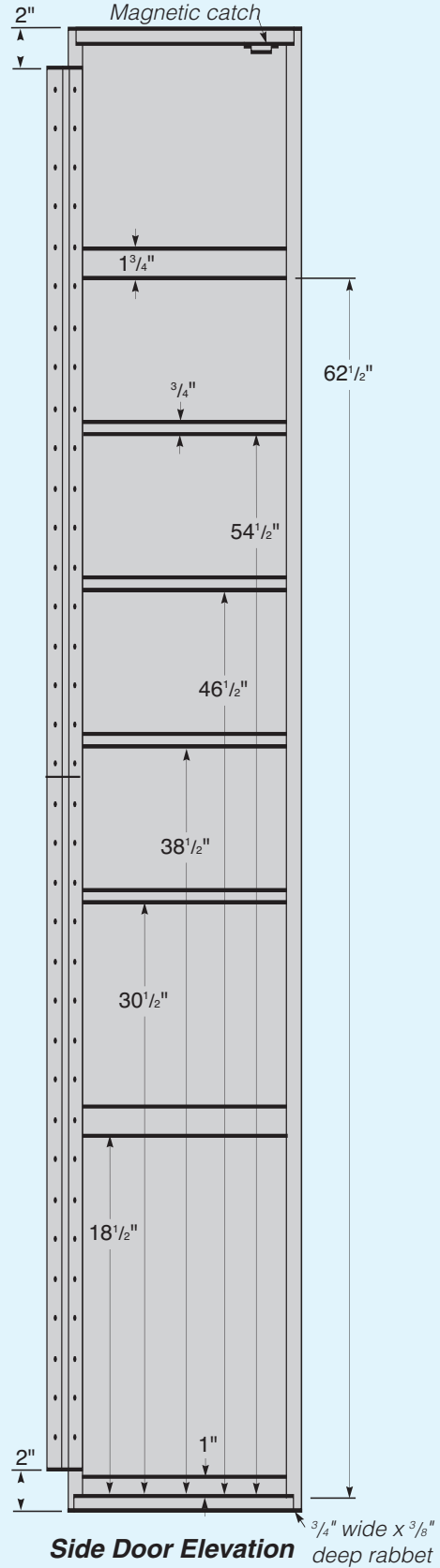
Drill a 1<sup>3</sup>/<sub>8</sub>" hole, then cut the remaining waste with your table saw.

Drill pilot holes and screw bracket to left side of cabinet.

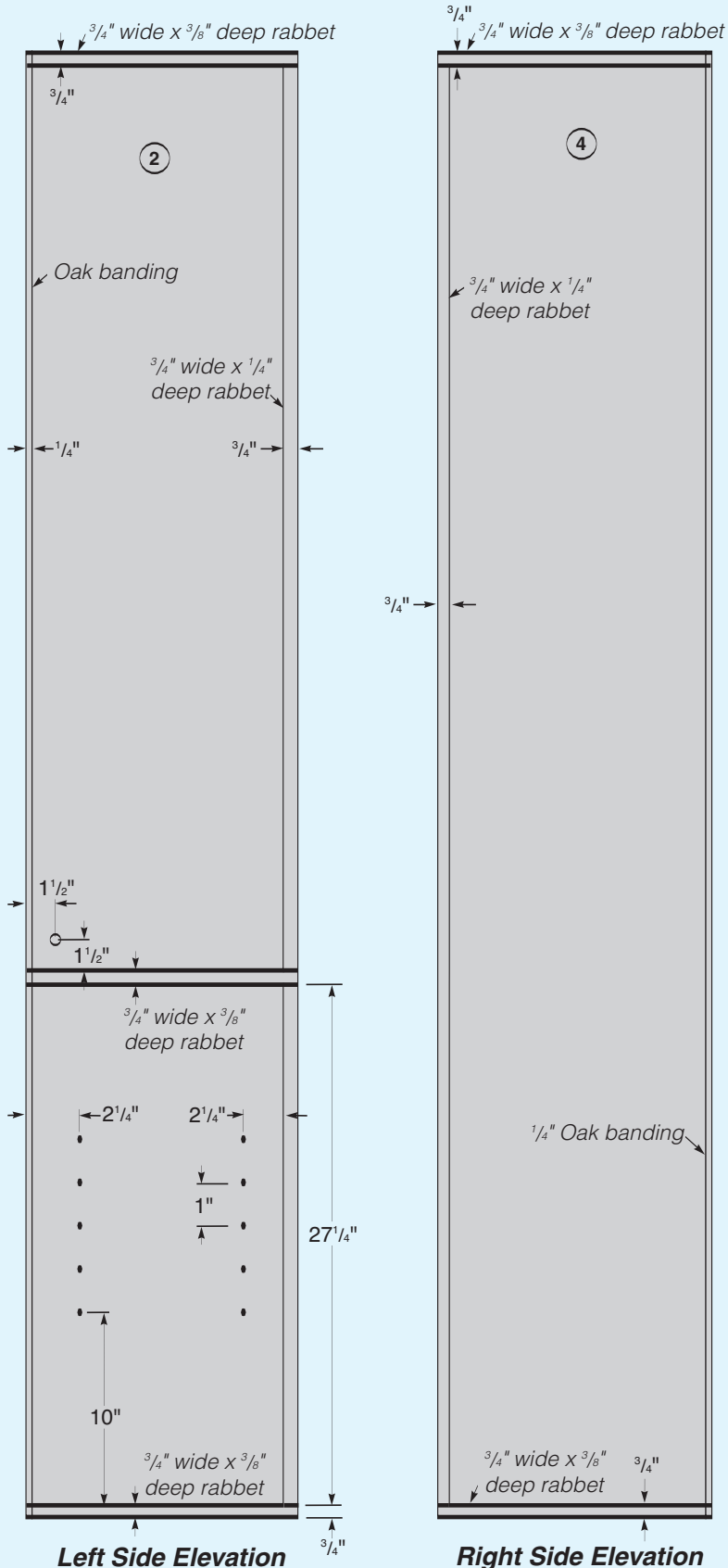




**Divider Elevation**



**Side Door Elevation**



### Supplies

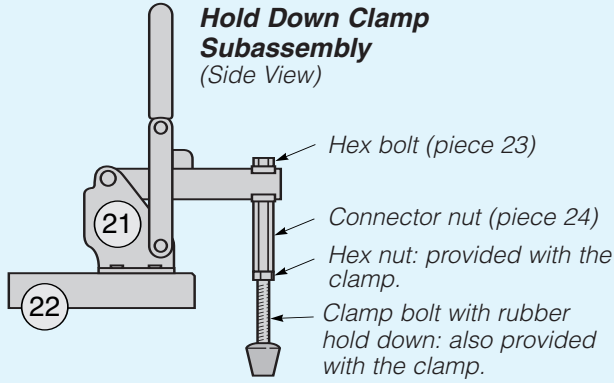
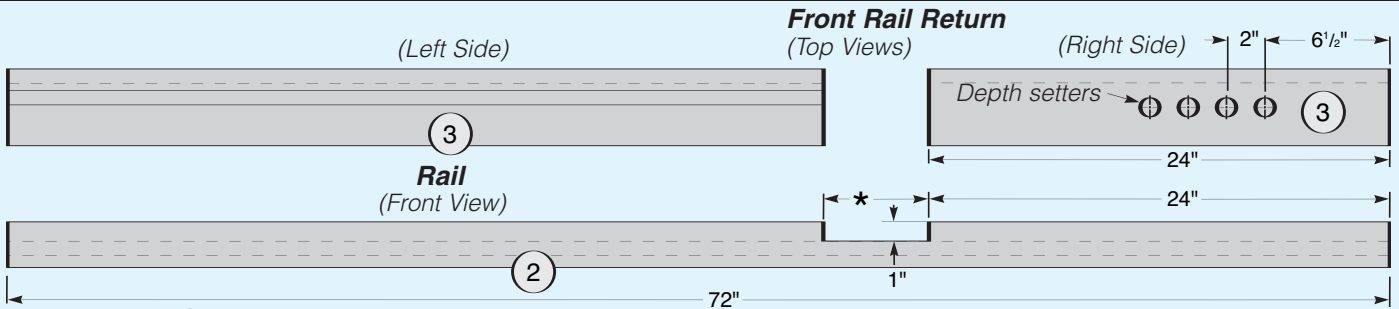
#### Clamp Caddy

- $1\frac{1}{2}$ " x 36" Piano Hinge (4 req.).....#19283
- $\frac{3}{8}$ " Oak Plugs (1 pack req.).....#20842
- $\frac{3}{8}$ " Walnut Plugs (2 packs req.)....#20875
- $1\frac{1}{4}$ " Wood Knobs (2 required).....#23101
- Magnetic Catches (3 required) .....#26559
- Brass Shelf Supports (1 pack req.) ..#30437
- Glider Hinges (2 required) .....#51243

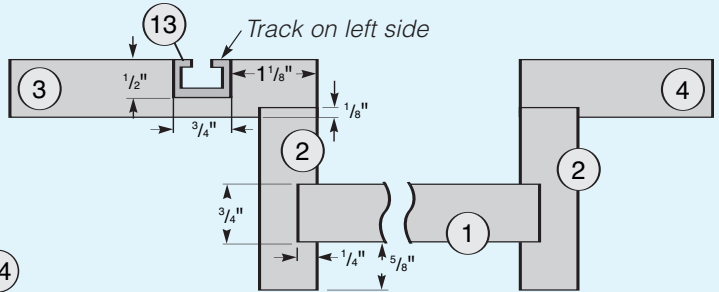


# Technical Drawings

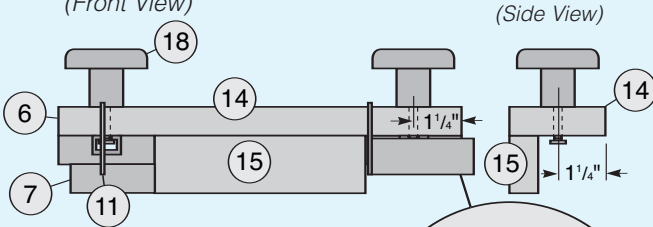
## Router Dadoing Jig



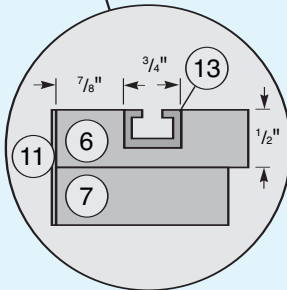
### Front and Back Rail Subassembly Detail



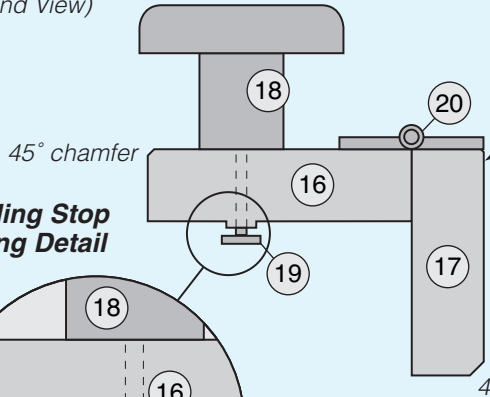
### Centering Stop (Front View)



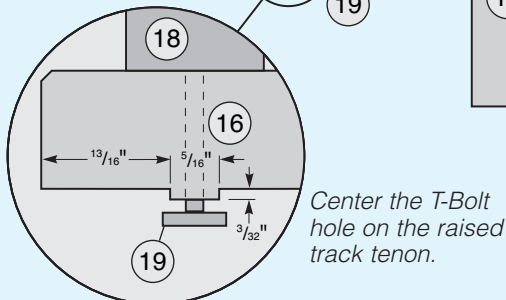
### Guide and Under Rail Detail (Section View)



### Flip-up Sliding Stop (End View)



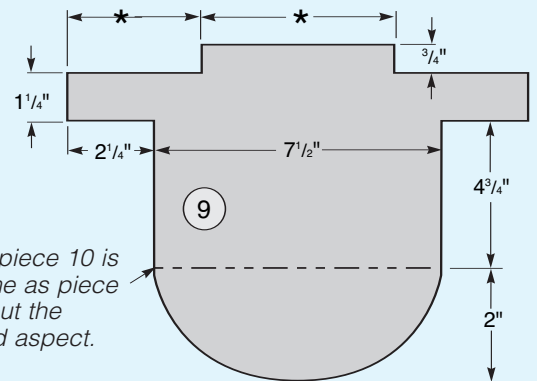
### Sliding Stop Machining Detail



The fixed stop is identical to the flip-up stops: simply glue piece 17 to piece 16 in the exact orientation shown at left.

45° chamfer

### Router Rest (Top View)



**NOTE:** piece 10 is the same as piece 9, without the rounded aspect.

\* These measurements are determined by the size of your router.

## Supplies

### Dado Routing Jig

Star Knobs (5 required).....	#23812
Aluminum T-Tracks (3 required).....	#21753
T-Slot Bolts (5 required).....	#83311
Post Clamp.....	#29179
Walnut Plugs (1 pack req.).....	#20875
1 1/2" x 36" Piano Hinge.....	#19283

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## 10 GAUGE FRAMING NAILERS

Uses stick-fed nails from 2" to 3-1/2" L, 0.113" to 0.131" diameter

- Narrow nose for accurate placement
- Safety trigger
- Anti-jam magazine

Operating pressure: 100 PSI; Air inlet: 1/4" x 18 NPT; Wt.: 8-8/10 lbs.

### 28 DEGREE NAILER

ITEM ~~\$189<sup>99</sup>~~ **\$179<sup>99</sup>**  
94000-0KTA

### 34 DEGREE NAILER

ITEM ~~\$189<sup>99</sup>~~ **\$179<sup>99</sup>**  
93099-0KTA

CENTRAL PNEUMATIC Professional

SAVE 70%



## 20 OZ. GRAVITY FEED SPRAY GUN

- Best mix of paint and air pressure
- Uses most oil based paints
- Adjustable fan pattern and volume control

Required air supply: 1-3 HP compressor; Required air pressure: 50-60 PSI; Air consumption: 14 CFM; Output: 200-300 CCs per minute; Nozzle size: 1.5mm; Cup capacity: 0.6ML; Air inlet: 1/4"-18 NPS

ITEM ~~\$49<sup>99</sup>~~ **\$14<sup>99</sup>**  
47016-6KTA  
Catalog and Internet Only

CHICAGO Electric Power Tools

SAVE 50%

## 1/4" TRIM ROUTER

High-powered, lightweight tool delivers impressive wood-trimming power. Cutting depth adjusts easily for accurate cuts every time. Includes straight guide. Standard 1/4" collet accepts most router bits.

- 110V, 2.4 amp motor
- 28,000 RPM maximum speed
- 2-1/2 lbs. tool weight

ITEM ~~\$39<sup>99</sup>~~ **\$19<sup>99</sup>**  
44914-2KTA

## 3 PC. STRAIGHT ROUTER BIT SET

Includes 1/4", 3/8" and 1/2", straight bits (2 flutes). C2 tungsten carbide tips, 1/4" shanks.

ITEM ~~\$4<sup>99</sup>~~ **\$4<sup>99</sup>**  
46396-0KTA

CENTRAL MACHINERY

## 10" DELUXE TABLE SAW WITH STAND

Get this heavy duty floor model table saw for the price of a bench top unit. Comes with a heavy duty all steel stand, miter gauge assembly, push stick, extension wing, blade removal tool, dust collection port and blade guard.

2.5 HP, 120 volt, 15 amp, 4500 RPM, Cutting capacity: 3" @ 90°; 2-1/2" @ 45°; Arbor: 5/8"; Arbor tilt: 0° - 45°; Table size: 25-3/4" L x 16-1/4" W, Extension wing: 9-3/4" L x 16-1/4" W, Miter gauge scale: 30° to 60° left & right, Miter gauge groove: 5/8" slot, Dust collection port: 2-1/4" I.D., Overall dimensions: 38-1/2" L x 35-5/8" W x 29-1/4" H, Weight: 75 lbs.

ITEM ~~\$149<sup>99</sup>~~ **\$149<sup>99</sup>**  
91484-1KTA

SAVE 60%



## ROUTER SPEED CONTROL

Get better results and longer bit life when routing tough woods, plastics, even aluminum. Plug your router into the control unit and you instantly have a variable-speed tool. Works with any universal AC/DC brush type motor, 15 amps and under. Will not work with soft or slow start motors.

ITEM ~~\$24<sup>99</sup>~~ **\$9<sup>99</sup>**  
43060-7KTA

CENTRAL MACHINERY

SAVE \$90

## 2 HP INDUSTRIAL DUST COLLECTOR

Powerful 2 HP dust collector creates a dust-free working environment. Develops over ten times the suction of most shop vacuums. Works with a 4" hose to pick up large chips from jointers, saws, shapers & planers. Hose sold separately.

- Locking casters
- Single stage
- Lockable on/off toggle switch
- Motor: 2 HP, 110V, 14 amps, single phase; Filtration: 30 micron; Bag capacity: 70 gal.; Hose inlet: 4"; Overall dimensions: 75-1/2" H x 33" L x 22" W; Shipping weight: 145 lbs.

ITEM ~~\$249<sup>99</sup>~~ **\$159<sup>99</sup>**  
45378-5KTA

CHICAGO Electric Power Tools

## 18 VOLT CORDLESS COMBO PACK

Includes TWO 18V batteries, quick charger and carrying case.

### 3/8" VARIABLE SPEED REVERSIBLE DRILL/DRIVER

Six torque settings, variable speed reversible.

- 3/8" Jacobs® keyless chuck
- Speed range: 0-900 RPM
- 5-3/8" CIRCULAR SAW
- Amps: 1.3
- Speed: 2400 RPM
- Arbor: 10mm
- Bevel capacity: 50°

### HEAVY DUTY RECIPROCATING SAW

- Variable speed trigger
- 7/8" stroke
- 0-2800 RPM

ITEM ~~\$119<sup>99</sup>~~ **\$119<sup>99</sup>**  
45803-2KTA

## 6 PC., C2 CARBIDE KITCHEN DOOR & DRAWER BIT SET

Make custom kitchen cabinetry, raised panel doors, table tops and drawer assemblies with these specially selected bits.

- C2 carbide tips
- Fully shielded bearings
- Raised panel bit specs: 1-1/2" profile width; 5/8" cutter height; 3-1/2" cutter dia.; Stile & rail bit: 7/16" profile width; 7/8" cutter height; 1-3/4" cutter dia.; Reverse glue joint bit: 1/2" profile width; 1-1/4" cutter height; 1-3/4" cutter dia.; Drawer lock bit: 7/16" profile width; 1/2" cutter height; 1" cutter dia; 8000 max. RPM; 1/2" shanks

ITEM ~~\$59<sup>99</sup>~~ **\$29<sup>99</sup>**  
90011-4KTA

CENTRAL PNEUMATIC

SAVE \$70



## 2 HP, 4 GALLON PANCAKE COMPRESSOR

Low profile stability on rooftops. Excellent for contractors and roofers. Includes pressure switch on @ 80 PSI and pressure switch unloader @ 115 PSI; and recommended maximum pressure: 125 PSI

- 115V, 60 Hz • 3450 RPM • 5.2 SCFM @ 40 PSI
- 4.2 SCFM @ 90 PSI • Oil lubrication
- Tool wt.: 51 lbs.

ITEM ~~\$149<sup>99</sup>~~ **\$79<sup>99</sup>**  
38898-2KTA

CENTRAL MACHINERY

SAVE \$100

## 20" DISC SANDER/GRINDER

Precision table adjustment makes it easy to finish pieces to your specifications.

- Ball bearing mounted armature for smooth operation
- Capacitor start, fan cooled motor for long life
- Table tilts 30° up, 45° down
- 2-1/2" vacuum chute with 2-3/16" adapter

Motor: 2 HP, 220V, 60 Hz, single phase; Table size: 27-1/8" x 10-3/8"; Base: 22" x 22"; Miter slot: 3/4"; Disc speed: 1740 RPM; Shipping weight: 446 lbs.

ITEM ~~\$499<sup>99</sup>~~ **\$499<sup>99</sup>**  
45725-2KTA

## 7" INDUSTRIAL RABBETING JOINTER WITH STAND

- Heavy-duty cast iron table, 41-1/2" wide
- Motor: 1 HP, 110V, 5.9 amps
- Max. depth of cut: 1/2"
- Rabbet cut: 1/2"
- Cutting width: 7"
- Rabbeting ledge: 3-1/4"

ITEM ~~\$299<sup>99</sup>~~ **\$219<sup>99</sup>**  
31849-5KTA

## 3 PC. REPLACEMENT PLANER BLADES

- 7" long x 5/8" wide x 1/8" thick

ITEM ~~\$9<sup>99</sup>~~ **\$9<sup>99</sup>**  
90179-1KTA  
Catalog and Internet Only

## 350 LB. CAPACITY RUGGED SAWS

### HORSES, SET OF TWO

These supports are no lightweights, even though they weigh less than 4 lbs. each. Each sawhorse has a capacity up to 350 lbs. - 700 lbs. for the pair! Fold easily for storage. Injection molded PVC frames won't rust.

Overall dimensions: 22-1/2" L x 20-7/8" W x 32-1/2" H. Weight of each: 3.95 lbs.

ITEM ~~\$16<sup>99</sup>~~ **\$9<sup>99</sup>**  
47782-1KTA

## SAWHORSE TOOL TRAY

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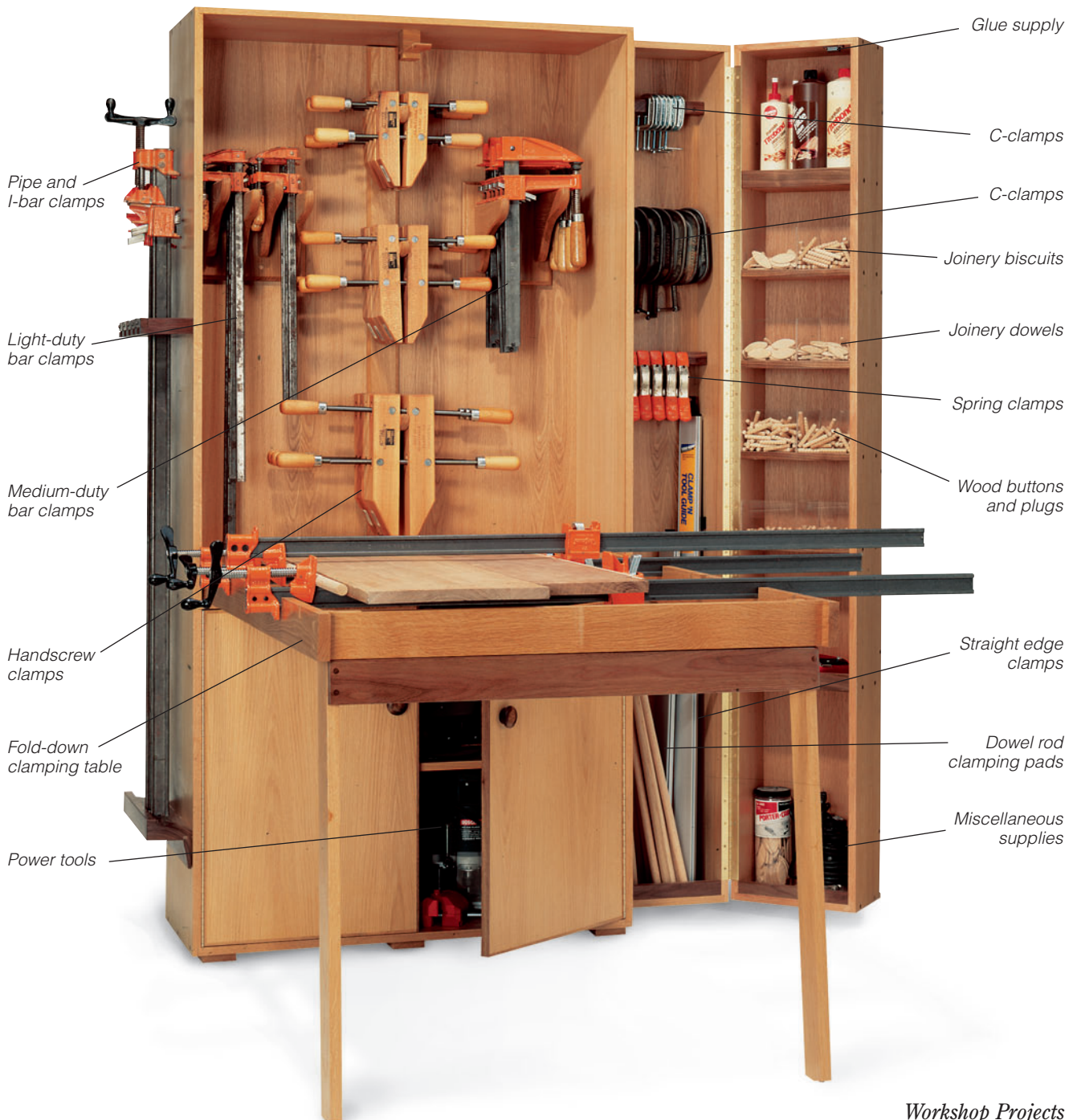


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# The Ultimate Clamping Station

*Organize all your clamps and glue-up supplies within arm's reach, and enjoy the advantages of the space-saving fold-down clamping table—you'll never have to scrape glue off your workbench again.*



After you're finished with a glue-up, the clamping station closes flat and takes on a clean, modular appearance. You'll appreciate this if floor space is in short supply in your shop.



If you've got a typical home shop, you probably store clamps wherever you can find a little spare space. Glue bottles are on a far off shelf, dowels and biscuits are in a cupboard and your clamping pads are stored in a box. Sound familiar?

Maybe a deluxe clamping station isn't the top project on your to-do list, but it could centralize your clamping supplies and put an end to the mad scrambles you might go through just before a glue-up. Better yet, the days of giving up your workbench for use as a clamping table are over.

### Cutting Your Plywood to Size

The bulk of the clamping station is made of white oak plywood. Lay out your panels, as shown on the *Plywood Cutting Layouts* on the *Pinup Shop Drawings*. Cut the pieces slightly oversize with a circular saw and straightedge, then recut the pieces to final size on a table saw. It makes the sheets more manageable to break down and bumps up cutting accuracy a nudge.

Now rip banding (pieces 1) and glue it to the front edges of the left side panel and divider, the right side panel, the top, bottom and fixed shelf (pieces 2 through 7). In addition, band both edges of the panels for the side door (pieces 8 and 9), with one exception: On the

right side panel, band the front edge completely, but only glue banding to the 2" at each end of the back edge, as shown in the *Exploded View* on page 50. The unbanded edge will provide the mortise for the piano hinges.

Continue working with the panels by plowing the rabbets and dados for the joints with your table saw and a 3/4" dado blade, as shown in the *Carcass and Side Door Elevations*. Next, slip each joint together and drill counterbored pilot holes for #8-1/2" screws (pieces 10), temporarily driving the screws as you go. After drilling all the holes, take the assemblies apart, spread glue in the joints and permanently screw the pieces together again. Glue walnut plugs (pieces 11) into the counterbores and sand them flush.

Slip the back panel (piece 12) into the carcass assembly and drill pilot

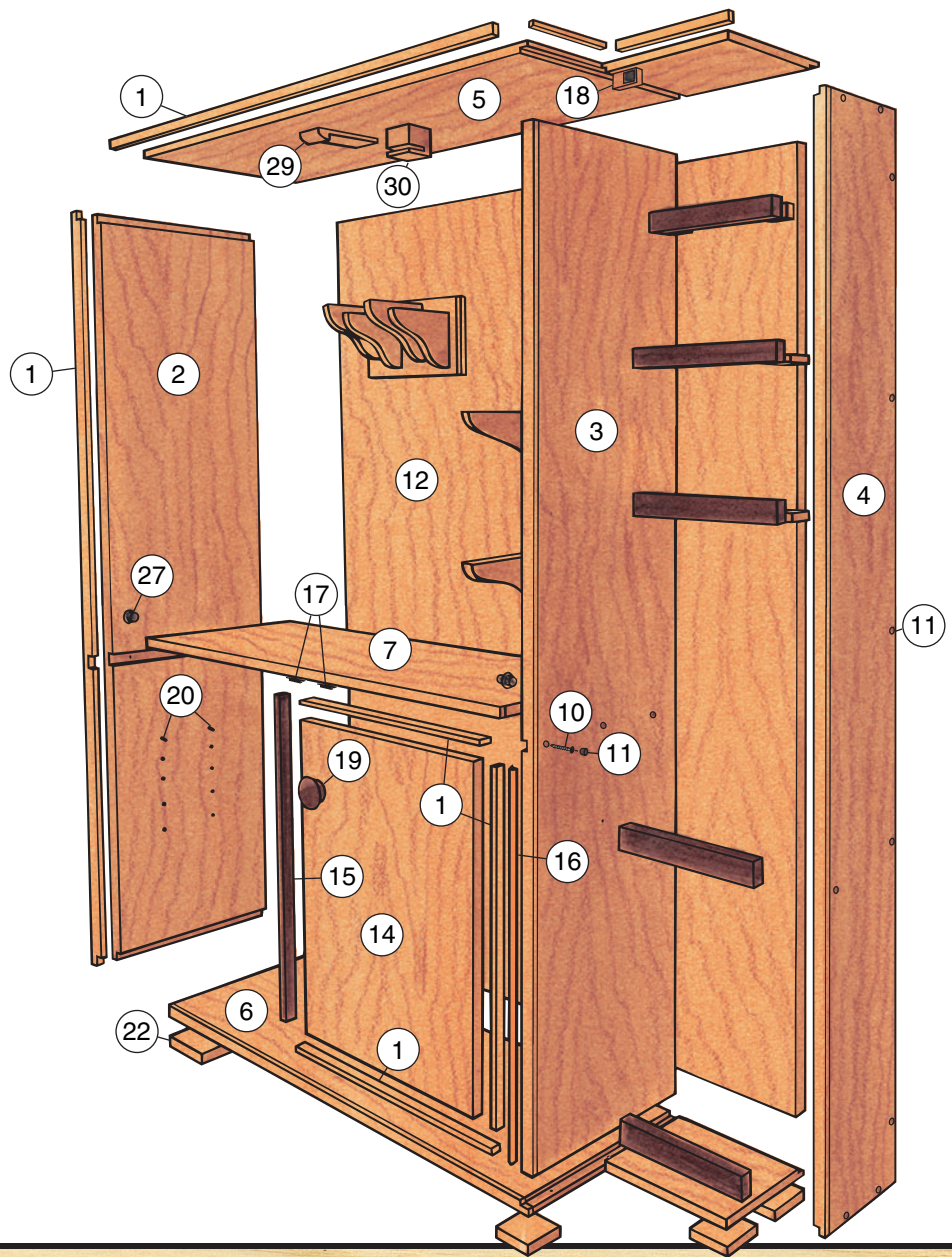
holes through the walls, top and bottom for the screws. Glue and screw the back into place and cover the screwheads with walnut plugs. Now trim the door front (piece 13) and glue it into the side door assembly. You may want to use a hand plane to shave the door front's edges to get a perfect slip-fit.

### Completing the Carcass

Cut plywood for the cupboard doors (pieces 14) and glue oak banding to three edges of each panel (see *Exploded View*). Cover the fourth edge with 1/4"-thick walnut banding (pieces 15).

Cut two piano hinges (pieces 16) to length for the cupboard doors, then install the doors and hinges in the cabinet. Make sure the doors swing shut without banging into each other—plane the walnut edges if necessary. Next, mount the magnetic door catches (pieces 17)





**Planning Ahead:  
Clamping  
Station Project**

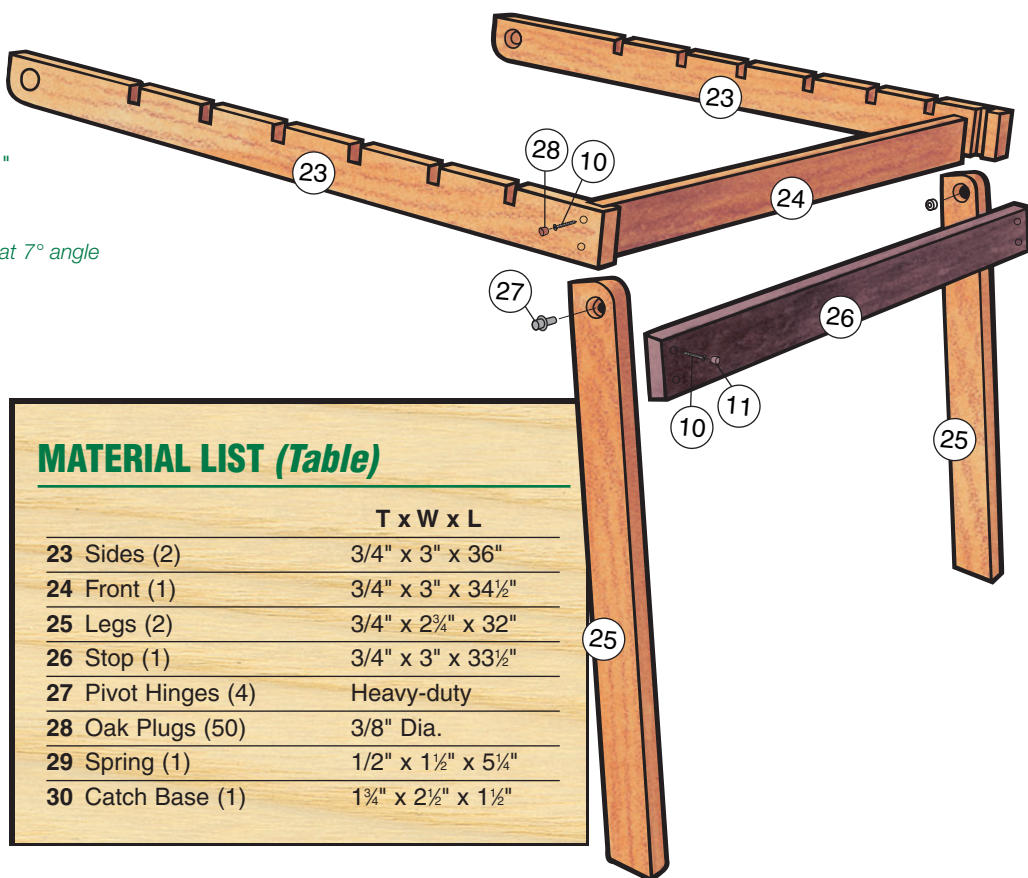
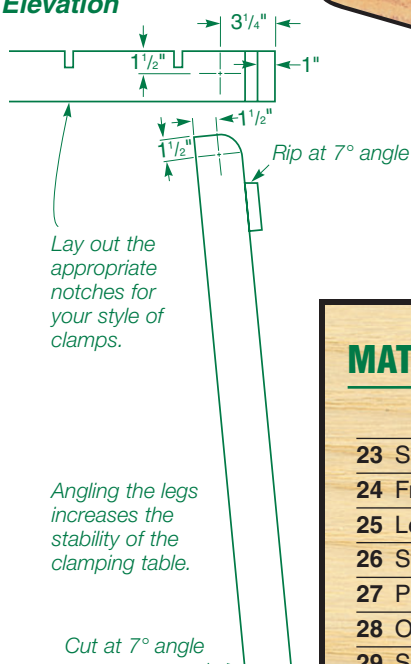
Constructing the clamping station will require about 30 hours of shop time. You'll need a circular saw, table saw, jigsaw and drill. A dado blade is also called for extensively. Finish the project in varnish or lacquer.

- 3 sheets of 3/4" white oak plywood
- 15 board feet of 3/4" white oak
- 4 board feet of 3/4" walnut
- 3 board feet of 1 1/4" walnut
- One 24" x 24" piece of 1/8" acrylic

**MATERIAL LIST (Carcass)**

	T x W x L		T x W x L
1 Oak Banding (10)	1/4" x 3/4" x 96"	12 Back (1)	3/4" x 48" x 75 1/4"
2 Left Side (1)	3/4" x 13 3/4" x 76"	13 Side Door Front (1)	3/4" x 10 3/4" x 75 1/4"
3 Divider (1)	3/4" x 13" x 75 1/4"	14 Cupboard Doors (2)	3/4" x 17 1/4" x 26 1/2"
4 Right Side (1)	3/4" x 7" x 76"	15 Walnut Banding (1)	1/4" x 3/4" x 60"
5 Top (1)	3/4" x 13 3/4" x 48 1/4"	16 Piano Hinges (4)	1 1/2" x 36" (brass finish)
6 Bottom (1)	3/4" x 13 3/4" x 48 1/4"	17 Door Catches (3)	Magnetic
7 Fixed Shelf (1)	3/4" x 13" x 36 1/2"	18 Block (1)	3/4" x 1 1/4" x 2"
8 Side Door Sides (2)	3/4" x 6 3/4" x 76"	19 Door Knobs (3)	1 3/4" Dia. (beech)
9 Side Door Top/Bottom (2)	3/4" x 6 3/4" x 10 3/4"	20 Shelf Supports (4)	1/4" Dia. Posts
10 Screws (100)	#8-1 1/2"	21 Adjustable Shelf (1)	3/4" x 12 1/2" x 35 3/4"
11 Walnut Plugs (100)	3/8" Dia.	22 Feet (6)	3/4" x 2 3/4" x 2 3/4"

## Clamping Table Elevation



### MATERIAL LIST (Table)

	T x W x L
23 Sides (2)	3/4" x 3" x 36"
24 Front (1)	3/4" x 3" x 34 1/2"
25 Legs (2)	3/4" x 2 3/4" x 32"
26 Stop (1)	3/4" x 3" x 33 1/2"
27 Pivot Hinges (4)	Heavy-duty
28 Oak Plugs (50)	3/8" Dia.
29 Spring (1)	1/2" x 1 1/2" x 5 1/4"
30 Catch Base (1)	1 3/4" x 2 1/2" x 1 1/2"

and drill pilot holes for the door knobs (pieces 19), as shown in the *Carcass Elevation* on the *Pinup Shop Drawings*.

Inside the the cupboard drill rows of 1/4" holes (see the *Carcass Elevation*) for the shelf supports (pieces 20), using a strip of pegboard as a template. Now cut plywood for the adjustable shelf (piece 21) and glue oak banding to its front edge. Wrap up the carcass by cutting the feet (pieces 22) to size and screwing them to the underside of the bottom panel.

### Making the Clamping Table

The clamping table is a great space saver. When it's not in use it swings out of the way, yet when you need to clamp a panel together it's right at your fingertips and within reach of all your clamps. You'll also appreciate the fact that the table supports a panel at a comfortable working height—much better than clamping at the bench or down on the floor.



With notches holding the bar clamps or pipe clamps steady, the fold-down clamping table is ideal for gluing-up panels. You'll get even better results using dowel pads that direct the clamping pressure exactly at the center of the panel's edge.



## Storage



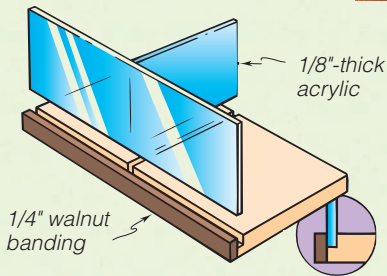
### Storage Strategy

In addition to storing glue, dowels, biscuits and light-duty clamps, keep some 3/4" dowels on hand for use as clamping pads. When gluing-up a panel the dowels direct the clamping pressure right where it's needed.



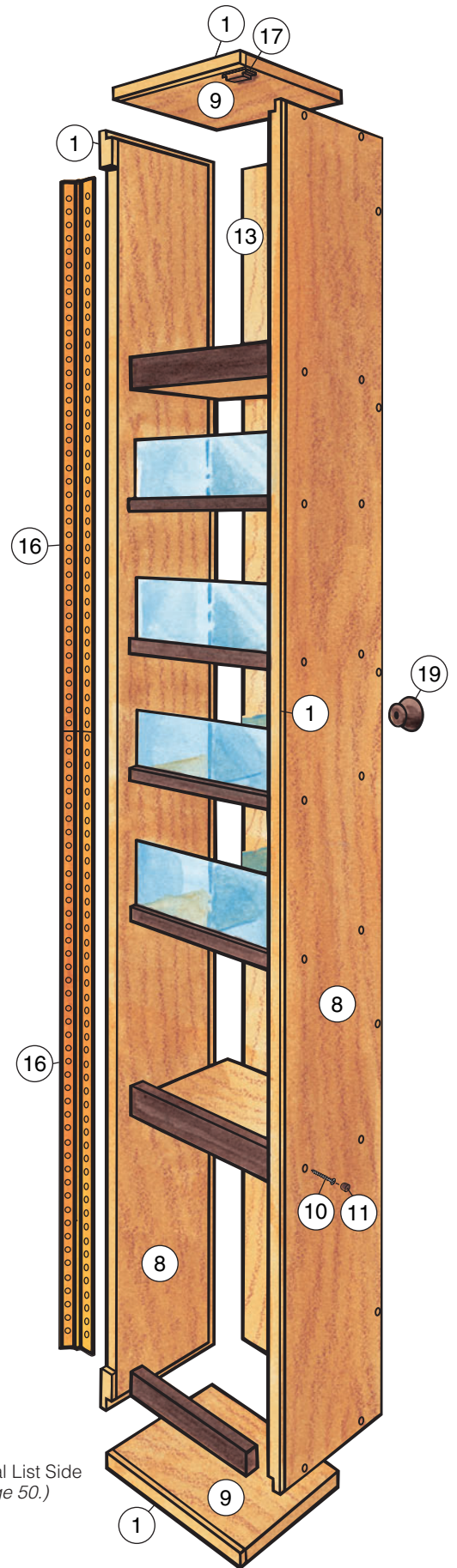
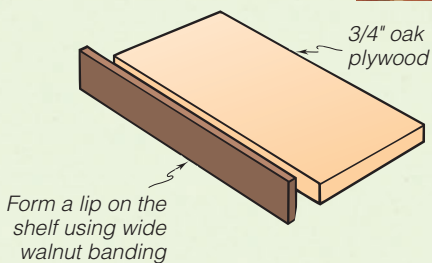
### Storage Bins

with acrylic fronts and dividers keep small joinery supplies organized and in full view.



### Storage Shelves

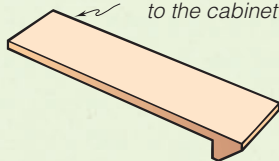
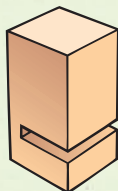
with a tall front lip are ideal for holding extra glue bottles, solvents and band clamps.



(See Material List Side Door on page 50.)

### Table Catch

The wood spring lock allows quick release of the fold-down clamping table.



Glue into base, then screw the catch to the cabinet

## Outfitting Your Clamping Station

Simplicity is the key to designing clamp supports and other clamping station fixtures. If they work in different situations and are easy to make and install, you'll get the most mileage out of the design. Once you've made the fixtures, move them around to find the best arrangement in your cabinet. Keep your heavy-duty clamps close to the clamping table, where they're used most often, and put the light-duty clamps and other supplies in the side compartment and door.

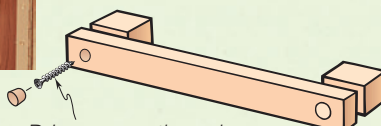
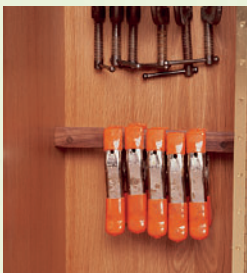
To build the clamping table, cut oak for the sides, front and legs, and cut walnut for the stop (pieces 23 through 26). Shape the ends of the legs with a jigsaw, as shown in the *Elevation Drawings* on page 51. Cut the bottom end of each leg at a 7° angle so that it's more difficult to accidentally kick the legs out from under the table. Use the jigsaw to notch the frame sides (see the *drawings*) to form holders for your bar or pipe clamps, then cut the dado near the end of each piece with your table saw and a 3/4" dado blade.

Now drill holes for the pivot hinges (pieces 27) in the frame sides, legs and carcass, as shown in the *Clamping Table Elevation* (page 51) and on the other carcass *elevation drawings*. Install the frame sides in the carcass with the hinges, then glue the front rail into the side rail dados. Drill counterbored pilot holes into these joints and drive the screws, then cover the screws with oak plugs (pieces 28). Next, join the legs to the frame sides with the pivot hinges and mount the walnut stop to the front legs with screws and plugs.

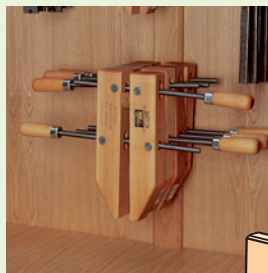
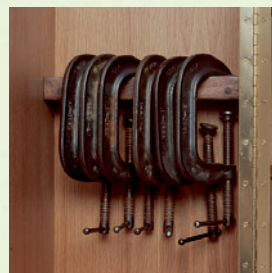
The catch (pieces 29 and 30) for holding the clamping table closed is shown on page 50. Lay out the spring shape on the edge of some oak stock and band-saw it to shape. Sand the piece smooth and cut the base to size. Kerf the base with a table saw blade to fit the spring and glue the pieces together. Glue and screw the catch to the roof of the main cabinet compartment.

### Spring Clamps and C-clamps

Simple wood bars are sufficient for hanging these light-duty clamps. Be sure to size the back-up blocks to accommodate the clamp sizes in your shop.

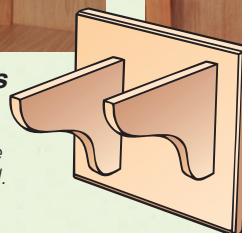


Drive screws through block into back of cabinet

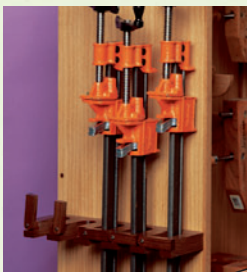


### Bar Clamps and Handscrew Clamps

For balance, install two brackets at different heights to support each set of bar clamps. Handscrew clamps, on the other hand, balance on a single bracket once the jaws are tightened.

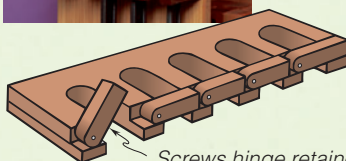
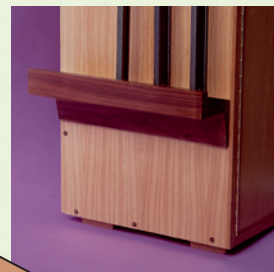


Offset brackets keep clamps level

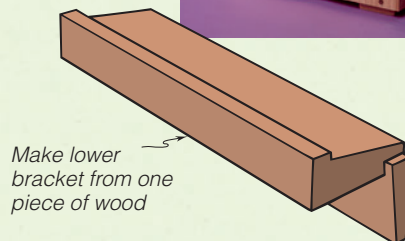


### Pipe and I-bar Clamps

Because they're heavy and unsteady, these clamps should be stored in individual slots. The lower bracket carries the weight while the upper bracket assembly pins the clamps in for safe keeping.



Screws hinge retainers to upper bracket



Make lower bracket from one piece of wood



### Adding Clamp Supports and Bins

All the fixtures you can make for the side door and side compartment are versatile enough to hold a variety of clamps and shop supplies. You may need to redesign some of them or come up with designs of your own to suit your tools. In addition, we recommend that you use our fixture sizes and layouts as a guide (they're not in the *Material List*) and spend time figuring out the best position for each bracket according to your needs.

Begin by making the fixtures for the side door. Install shelves and bins in the door for holding all sorts of glue-up odds and ends, including glue bottles and a scraper, fluted and spiral dowels, biscuits, band clamps, clean-up rags and a can or two of solvent. Build the shelves and bins, as shown on the previous pages, to span the width of your door. The walnut strip on the front of each shelf rises 1" above the plywood to prevent your supplies from falling off. The see-through acrylic bin fronts and dividers slip nicely into 1/8" grooves cut with a standard table saw blade. Be sure to cut the grooves in the plywood before adding the walnut strip to the front edge (otherwise you'll cut through the walnut).

Mount the shelves and bins by driving screws through the door sides into the plywood base of each fixture. Remember to counterbore all the pilot holes and fill them with walnut plugs.

Our piano hinge lengths were 36", so we butted two hinges end-to-end to mount the side door to the cabinet. Once the door is in place screw the magnetic catch to the top panel and cut a block (piece 18) for holding the strike plate in the side compartment. Screw the strikeplate to the block, then glue this

assembly into the compartment so the strikeplate is just a hair past the front edge of the cabinet. This will allow the magnetic catch to fully contact the strikeplate. Finally drill a pilot hole for the door knob (piece 19).

Now make the fixtures for the side compartment, as shown page 52. Cut walnut bars and blocks for the C-clamp and spring clamp hangers, and glue them together. Drill counterbored pilot holes and screw the hangers to the back of the compartment.

Cut two more walnut bars for the dowel bin and install them by driving screws through the divider and right side wall into the ends of the bars.

To make the fixtures for the main compartment, lay out and cut the clamp brackets to shape (see page 53) and band-saw as many as you think you'll need. Screw the brackets to baseplates, then screw the baseplates to the back panel. Fill the counterbores with oak plugs.

The best place for storing pipe and I-bar clamps is on the outside of the cabinet. For the upper clamp bracket glue two pieces of walnut face to face, then lay out notches. Use a Forstner or spade bit to drill the ends of each notch, then remove the rest of the waste with your table saw. Next, rip a 1/2" x 1/2" strip of walnut for the retainers and cut them to length for spanning each notch. Screw the retainers into place. Cut the lower bracket out of one thick piece of walnut. Screw the brackets to the side of the cabinet and plug the holes.

### Finishing Up

Stain the door knobs dark brown and give the clamping station two coats of varnish or lacquer to protect it from glue drips. Slide the cabinet into position and screw it to the wall to prevent it from tipping forward once the clamps are loaded up.



**If you like the design of this clamping station, why not start a system of other wall cabinets and tool organizers based on the same style? You'll end up with a shop that looks as good as it stays neatly organized.**



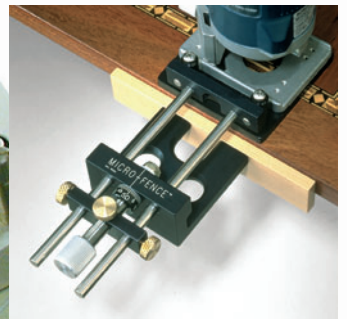
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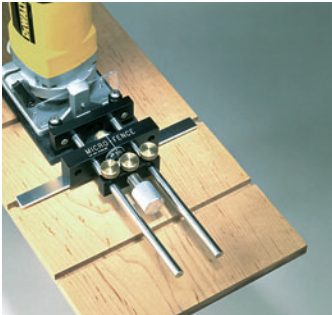
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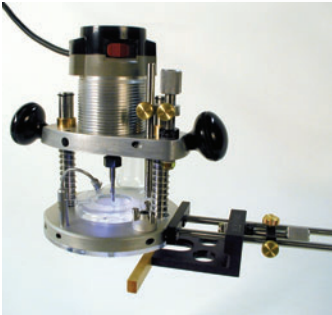
Dadoes-Rabbets-Flutes



Straight-Line Work



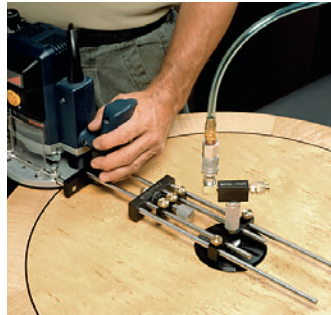
Portable Three-Axis Mill



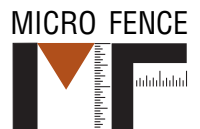
Ellipses-Arches



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# Trapped Wedge Layout Gauge

*This quick-set marking gauge features a knife cutter that scribes razor-thin layout lines either with or across the grain. It'll be a handsome and useful addition to your fine tool collection.*



**H**alf the challenge of cutting tight dovetail or mortise and tenon joints is getting them laid out precisely.

A standard marking gauge featuring a sharp pin for a marker does a fine job scribing lines that follow the grain, but it tends to tear the wood when going across the grain. A knife tip makes a cleaner line than a pin on cross grain; it cleanly severs the wood fibers to establish a precise shoulder, which helps guide a chisel or saw during the joint-cutting process.

Besides the knife cutter, this gauge features a trapped wedge, which allows for quick, one-handed adjustments and eliminates the need for special hardware. Many hand tools constructed 150 years ago, when hardware was costly and more difficult to come by, utilized the trapped wedge.

Traditionally, rosewood is the wood of choice for gauges of this type. This project requires less than

one board foot of 3/4" stock. Buy a 1/4" spade bit for the knife stock, which you'll regrind to achieve the correct edge.

## Start Your Cutting

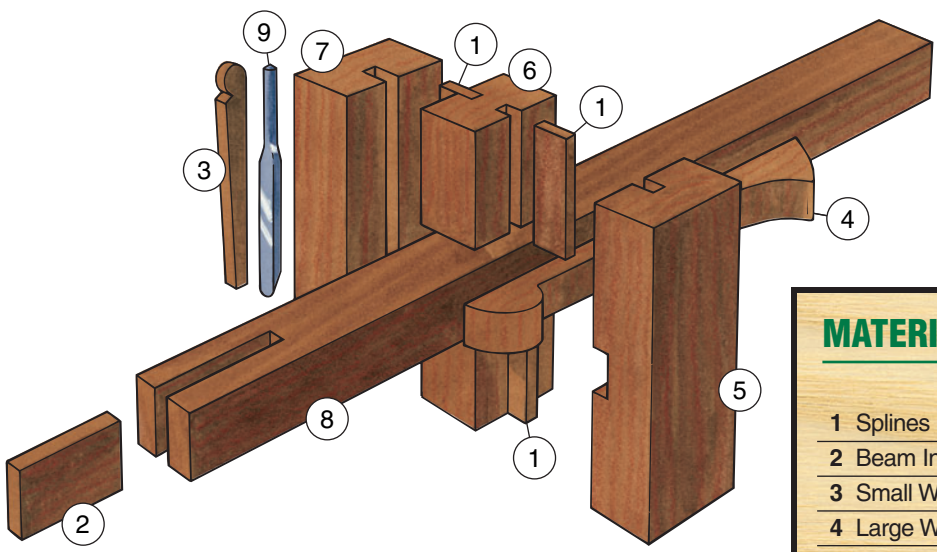
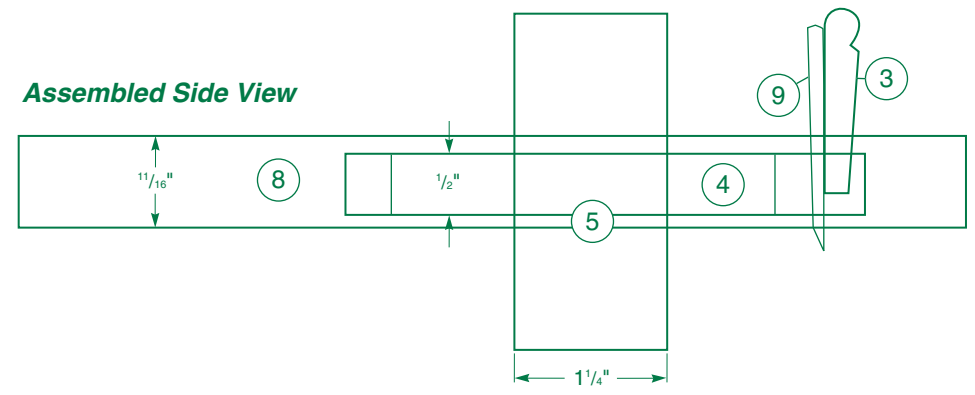
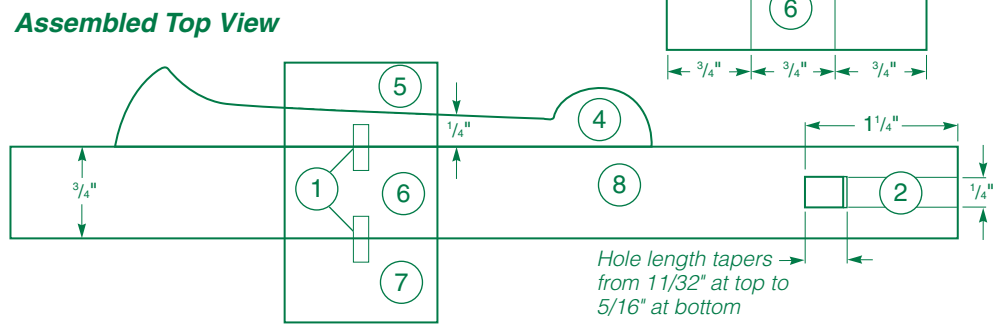
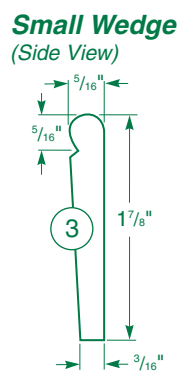
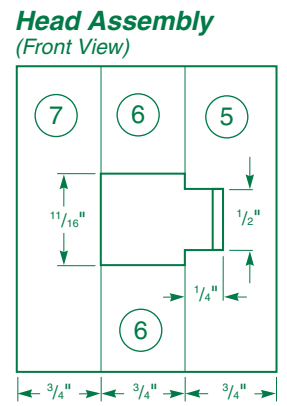
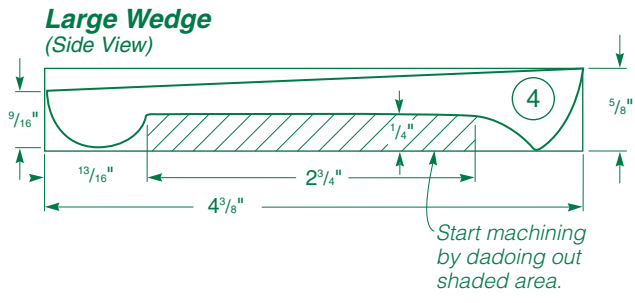
It's always safer to cut smaller pieces from larger ones, so begin making your cutting gauge by ripping a slice of rosewood for the splines (pieces 1). These will eventually slip into a saw blade kerf, so cut a saw groove in some scrap to test the fit. Next, rip a 1/4"-thick by 8"-long strip that will be used later for the beam insert and the small wedge (pieces 2 and 3), and slice a 1/2"-thick strip for the large wedge (piece 4). Sand off the saw marks and cut the splines and large wedge to length.

Cut the beam (piece 8) so that its width and thickness are unequal.

This may seem odd, but through experience—meaning goof-ups—we've learned to avoid the age-old headache of fitting parts together the wrong way. By cutting the beam in this manner it will fit into the gauge head correctly every time. Rip the beam to size, then rip a 1/4"-wide piece for the parts that make up the head assembly (pieces 5, 6 and 7). Trim all the pieces 1/4" longer than their finished sizes.

Arrange the head pieces for assembly, matching their grain patterns so they appear to be one piece, and mark the front face of the

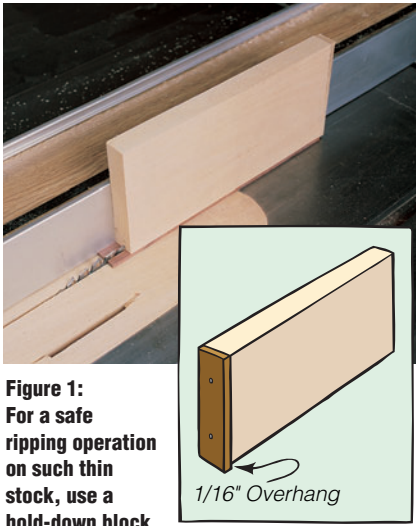




**MATERIAL LIST (Layout Gauge)**

	T x W x L
1 Splines (4)	1/8" x 3/8" x 1 1/16"
2 Beam Insert (1)	1/4" x 3/4" x 4"
3 Small Wedge (1)	1/4" x 5/16" x 4"
4 Large Wedge (1)	1/2" x 3/4" x 4 3/8"
5 Side Head (1)	3/4" x 1 1/4" x 2 3/4"
6 Center Heads (2)	3/4" x 1 1/4" x 1"
7 Side Head (1)	3/4" x 1 1/4" x 2 3/4"
8 Beam (1)	3/4" x 11/16" x 8"
9 Cutter (1)	1/4" Spade bit





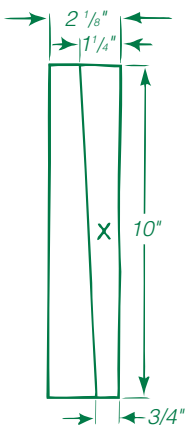
**Figure 1:** For a safe ripping operation on such thin stock, use a hold-down block to keep the material pressed tightly to the saw table throughout the cut.

assembly so you can reorder it again later. Next, separate the pieces and rip a 3/16"-deep groove in the center of each adjoining edge for inserting the splines. For perfect alignment, be sure to always run the front face of each piece against the saw fence during these cuts.

Ripping the splines to their final size requires a special hold-down block. Cut a block measuring 3/4" x 4" x 9", and screw a thin, narrow piece to its back end as shown in *Figure 1*, left. Set the blade height at 3/8" and rip your spline, using the block to hold it tightly to the table. Next, crosscut the strip into four segments (pieces 1) and check their fit in the head piece grooves you just made.

### Cutting the Head Dado

The bottom of the dado in the side head (piece 5) is tapered to fit the large wedge. The tapered dado jig for making the cuts is built from

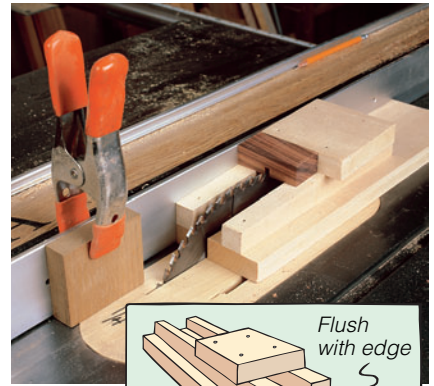


**Figure 2:** Begin making the jig for cutting a tapered dado by laying out a 1:20 slope on a 3/4" x 2 1/4" x 10" piece of scrap wood, then label the measured wedge with an "X".

softwood scraps. First, draw the pitch for the wedge taper, then mark this measured wedge with an "X" (see *Figure 2*). Next, cut a 1/4" x 1 1/2" x 12" piece of plywood and nail it to the wedge stock so it's aligned with the pitch line and covering the side marked with the "X". With your fence set at 1 1/2", rip the wedge stock while the plywood rides against the fence, as shown in *Figure 3*. Trim the wedge ends so they're identical. Complete the jig by nailing the wedges to a 3/4" x 3 1/2" x 14" board (see *Figure 4*), and nail a fence block on top of the wedges.

To use your tapered dado jig, just raise your table saw blade 1" and set the fence 1/4" away. Push the jig into the blade until the center of the blade just passes under the front of the fence block. At this point, clamp a stop to the saw fence in front of the jig, as shown in *Figure 4*. Draw a line on the front edge of the fence block 1/4" from its bottom and raise the saw blade to hit the line.

Make your cut by placing the side head (piece 5) on the jig with its marked front facing the fence block and one end bearing against the saw fence. Make your first pass, then continue moving the saw fence to make several more passes until the dado is 1/2" wide. Be sure to fine-tune the last pass so the dado fits the large wedge precisely, then smooth the dado's angled bottom with a file.



**Figure 4:** Cut the tapered dado in several passes, moving the fence a little for each pass.

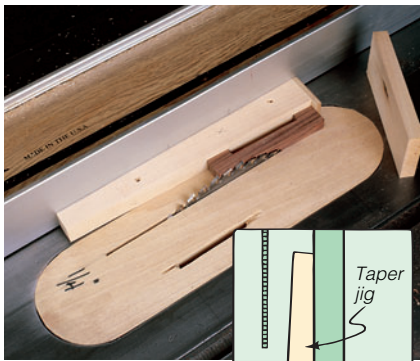
### Assembling the Head Pieces

After a careful sanding, dry-assemble the head pieces and splines around it, sanding the 3/4" dimension of the beam, if necessary, so it slides through the opening.

To prevent the beam from bonding to the head, coat its first 2" with paraffin wax. Now glue the head and spline pieces together and, while pinching the assembly with your fingers, quickly clean out the excess glue in the opening. Slip the waxed end of the beam into the head assembly and clamp everything tight in both directions (top to bottom and side to side). Later, when the glue has dried, you can sand the beam's 1 1/8" dimension so it slides in the opening easily, trim the head to final size and chamfer all its edges and corners.

### Making the Trapped Wedge

Begin making a the trapped wedge (piece 4) by ripping the stock you cut earlier to 5/8" wide and cutting a dado as shown in the Large Wedge Side View on page 57. Once the dado is cut, remove one of the wedges from the tapered dado jig and nail a stop to its wide end to make a tapering jig for the large wedge (see *Figure 5*). Set the wedge against the taper jig and rip the piece, splitting the lead corner with the blade. For safety, use scrap wood to press down on the



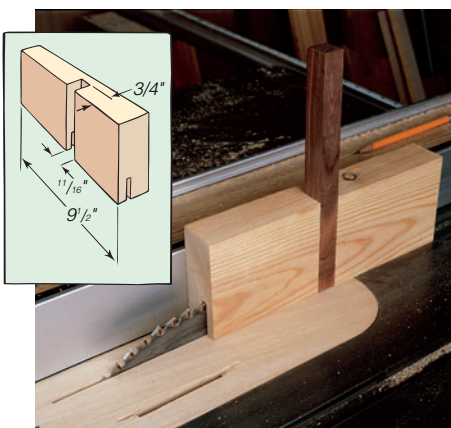
**Figure 5:** To use your tapering jig, adjust the saw fence so the cut splits the leading corner of the stock. During the cut, be sure to control the trapped wedge stock with a narrow hold-down block.

wedge as you cut. Now center the wedge in the dado to see if its back edge is flush with the shoulder of the larger hole. If the fit isn't right, continue trimming the wedge in very small increments, then shape the ends of the wedge with a coping saw and a file.

### Cutting the Beam Slot

The hole in the beam that holds the knife and small wedge is tapered on its forward edge. It sounds unorthodox, but this is easily done on the table saw. Make the jig shown in *Figure 6*, then use it to cut a 1/4"-wide by 1 1/4"-deep slot in the end of the beam (remember, the beam isn't square, so be sure to cut into its wider edge).

Earlier you cut a 1/4"-thick strip for making the small wedge and the



**Figure 6:** Cutting a 1/4"-deep slot for the beam insert is safe and easy using this jig.

beam insert. To cut the strip in half, set your tapering jig against the table saw's miter gauge, then place the strip against the jig. The resulting angled cut is just what you need for the end of the beam insert. Sand one of the pieces to fit into the slot in the beam, then glue it into place with the angled end pointing into the beam and leaving a 5/16"-long hole on the bottom side for the cutter and the small wedge. Trim off the excess when it's dry, and chamfer the ends of the beam.

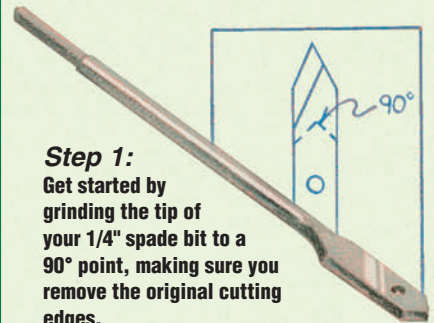
A stout knife blade (piece 9) is easy to resharpen, and we've found that regrinding a 1/4" spade drill bit is ideal (see *sidebar* at right). In use, the knife's bevel should always face the waste side of the work, leaving a square shoulder on the proper side of the cut.

Use the remaining 1/4"-thick piece for the small wedge (piece 3). First taper one edge on the table saw with the tapering jig, then plane the piece to width and cut it to length (see *Small Wedge Detail* on page 57). Shape the top of the wedge with a file and smooth any saw marks.

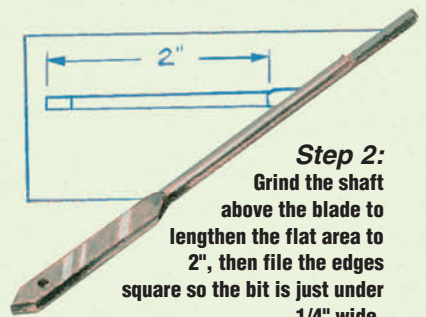
### Final Assembly and Finishing

Slip the cutter into the beam hole and install the small wedge. Trim the end of the wedge so it's flush with the bottom of the beam, then pull it back out to chamfer the end with a file. Coat the gauge with a penetrating oil-type finish and put more wax on the beam so it slides easily. You'll quickly find that the trapped wedge locks with slight hand pressure to maintain the exact position you set it at.

## Four easy steps to grind the cutter



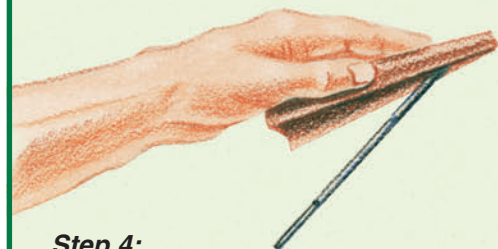
**Step 1:** Get started by grinding the tip of your 1/4" spade bit to a 90° point, making sure you remove the original cutting edges.



**Step 2:** Grind the shaft above the blade to lengthen the flat area to 2", then file the edges square so the bit is just under 1/4" wide.



**Step 3:** Hone the back of the blade on your sharpening stones, then, while rounding the end into a fingernail shape, grind a 25° bevel.



**Step 4:** Hone the bevel with a slipstone and finish up by hacksawing the cutter off the shaft 2" from the tip.



# Deluxe Drum Sander

*If you want to build a better mousetrap, the best starting point is a list of the limitations of your old one.*

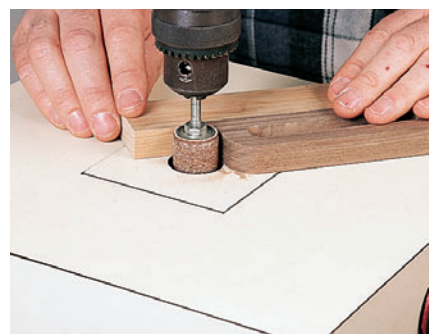
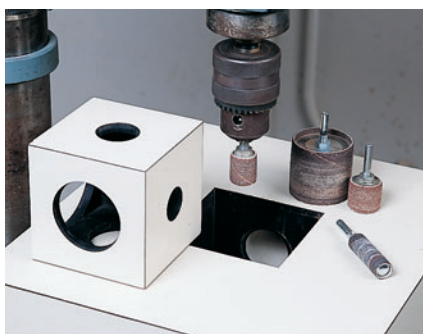
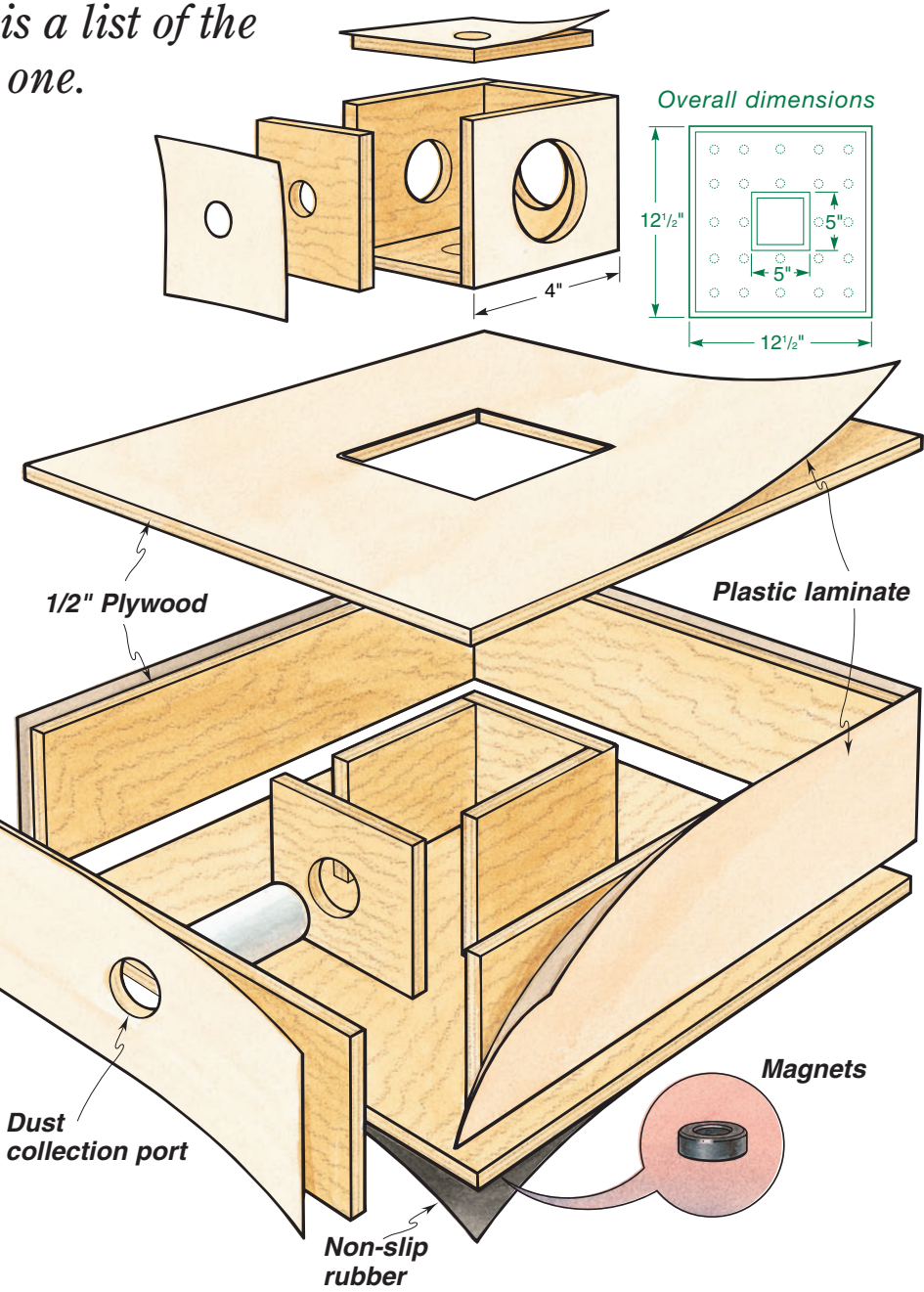
As far as drum sanding on a drill press goes, most sanding jigs lack dust control, and the drums tend to clog too soon. This jig addresses both problems: It has a built-in dust collection port, and the drum can be raised or lowered through the table-top, so you can work with a new, unclogged part of the sleeve as often as needed.

There's another advantage to this jig: The cube in the center can be revolved to present different sized holes for various drum diameters, so it supports the workpiece right up to the drum. That makes it easier to sand thin or delicate stock that might otherwise break off or get trapped.

The inner cube measures 4" on all sides, and we built it from 1/2" Finnish birch plywood. Measure your six most frequently used drums and drill appropriately sized holes in the cube. Then construct the main box (also 1/2" stock) so that the 4" cube is absolutely flush with its top.

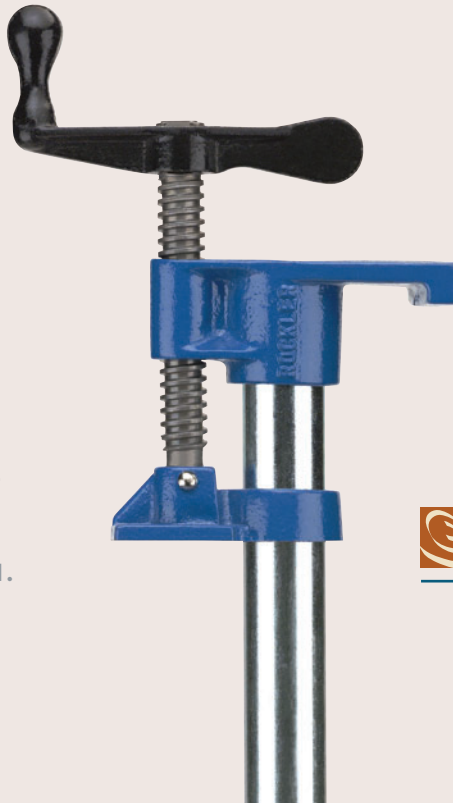
The vacuum port in the jig is standard 1 1/4" I.D. plastic plumbing pipe, but you'll have to adjust that to fit your own shop's dust collector hose.

Two dozen 3/4"-diameter rare-earth magnets hold the jig to the drill press table, eliminating the need for clamps. Drill 3/8"-deep holes in the bottom for these magnets and secure them with silicone adhesive. Finally, cover the bottom with non-slip rubber (the type used on steps or ramps), and you're ready to start sanding.

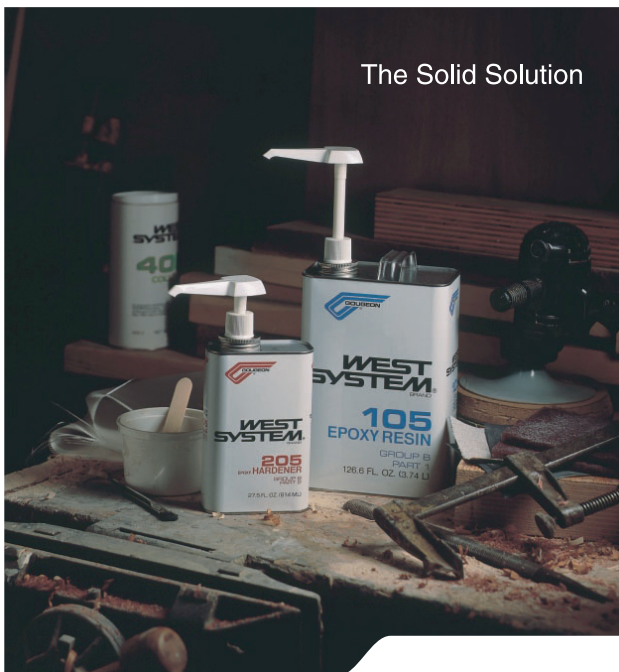


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# Dovetail Puzzle Mallet



*Even though this intriguing mallet design has been around for centuries, the method for building it had nearly been lost. Thanks to the counsel of experienced hand tool woodworker, Stephen Sheperd, we've revived the methodology here. And, making this mallet provides a double bonus—you'll have a beautiful tool to display and a powerful workhorse around the shop.*



*Dovetailed tenons tapering towards the handle make this mallet impossible to assemble...or do they? To get a handle on the answer, read on.*

There will always be a place in woodworkers' hearts for trick joinery, if only for the sheer delight of stumping their friends with the finished product. But seemingly impossible joints can also be useful and fun to make.

This mallet is a classic example of a puzzle joint that is both useful and a great exercise in hand tool joinery. It is mystifying because the dovetails appear to taper in two conflicting directions that would make it impossible to assemble.

The secret is that the dovetails are "ramped," or double-tapered, as shown in the *Elevation Drawings* on page 66. A small shoulder where the pins meet the handle covers up the fact that the dovetail is deeper at the bottom of the head. The joint is tricky to assemble because the two dovetail pins on the handle have to be bent in order to get them started into the ramped dovetail slots on the sides of the head.

Though this puzzle mallet design has been around for centuries, the method for making it had nearly been lost. In this article, we'll explain how to make this useful shop tool that doubles as a great shop conversation piece.

### **Making the Head First**

When making a puzzle mallet, it's a good idea to start with the head and then fit the handle to it. This is roughly the same as cutting the

tails of a conventional dovetail joint first and then making the pins to fit.

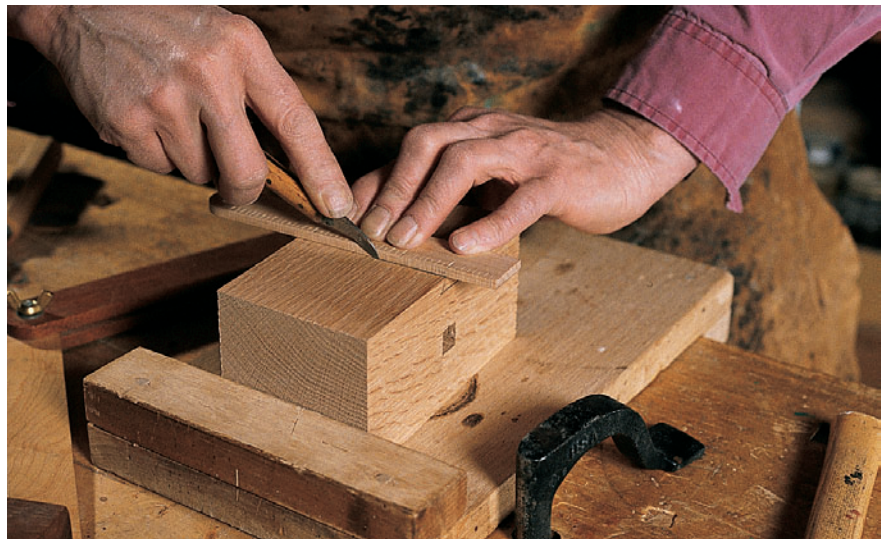
You can use any type of wood for the head, as long as it is hard enough to stand up to the abuse you plan for it. Red oak, rosewood, lignum vitae, ebony, maple and walnut are all good options that take a real pounding (no pun intended).

Cut the head from a single block of wood, with the grain parallel to the direction of swing, as shown in the *drawings*. Slope the faces of the head 5° from top to bottom to provide a natural striking angle.

It is not critical to create a center tenon in the mallet's head, but it will add strength, even on mallets with narrow heads. You might even

consider switching to a round tenon in the center rather than a square one. This way, you can drill a hole through the center of the head—much easier than chopping a long, narrow mortise.

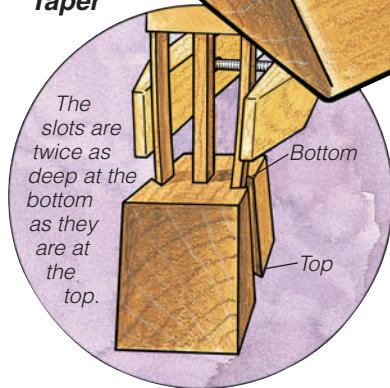
Lay out the dovetail slots on the sides and the ends of the head exactly as they will appear in the completed mallet (see the *drawings* on page 66 and *photos* on the next few pages). At the handle end, the dovetail is twice as deep as at the top of the mallet head. This creates the secret taper that makes the joint possible. It is important that the widest part of the ramped dovetail is the same width at both ends, as you'll see in the *drawings*.



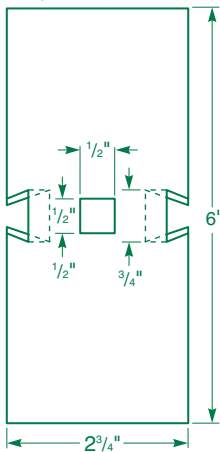
**Step 1:** Gauge the depths of the dovetails on the top and bottom of the head, then mark the width of the tails on the centerline.



**The Secret Taper**

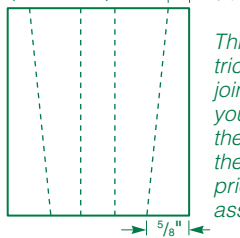


(Top View)



Ramped dovetail slots are the secret to this mallet's seemingly impossible joints.

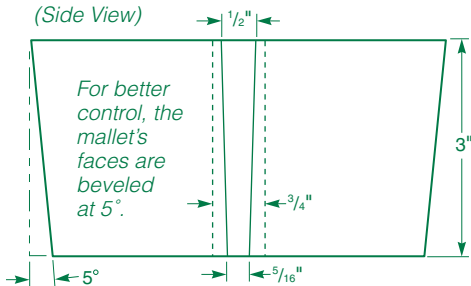
(End View)



This is a very tricky piece of joinery because you can't test-fit the handle to the mallet head prior to the final assembly.

**Mallet Head**

(Side View)



For better control, the mallet's faces are beveled at 5°.

**Shape the Handle**

Make the mallet head with its mortise and dovetail slots first. Then form the handle to fit the machining you've done in the head. Shape the 15"-long handle to please your sense of proportions.



**Step 2:** The dovetails are half as deep at the top of the mallet head as they are at the bottom (where the handle enters). Scribe the depths with a marking gauge.



**Step 3:** Connect the scribe marks with a reliable straightedge and a sharp marking knife to ensure precise layout lines.

The best and safest way to create the dovetail slots in the head is with a dovetail saw, followed by a sharp chisel to remove the waste material. Saw the angled sides of the dovetail slots first, then cut a couple more kerfs between them, stopping at your layout lines on the top and bottom ends of the head, as shown in the five-step photo sequence starting on page 65. These kerfs provide a depth reference when you're removing the waste wood with a chisel. Once the slots are cut, drill or chisel out the mortise for the center tenon.

### Making the Handle

The wood you pick for the handle must be strong enough to stand up to the abuse a handle on a mallet gets, yet it should be flexible enough that the pins may be bent. We've found that ash and hickory both work well and that quartersawn stock in either species is best for both strength and bending qualities.

Lay out the tapered dovetail pins and the center tenon to match the slots in the head. Make the handle slightly wider than the head so the pins will stand proud when assembled. Also, allow about 1/8" of extra length on the pins and 1/2" on the tenon for ease of assembly, as we'll explain later.

Band-saw the waste between the pins and the tenon, then cut the

bottom shoulders and sloped sides of the pins with a handsaw. A backsaw works well for this purpose. If the wood is straight-grained enough, you can carefully split it away with a chisel. Pare the pins until they align with your layout lines using a sharp chisel.

This is a difficult joint because you can't dry-fit the handle to the head to check the fit. You have to carefully check all of the measurements and angles on your pins and tails to make sure they match their corresponding surfaces perfectly. It's exacting work, but the end result is quite satisfying if you work carefully and keep your patience in check.

Once you've cut the pins and tenon, band-saw the rest of the handle to its approximate shape, but leave the final smoothing until later.

### Assembling the Mallet

In order to assemble the mallet, you will need to bend the pins inward to meet the grooves in the head. The pins are likely to be too stiff to bend easily, so soak the pin end of the handle for a few minutes in boiling water to make it more pliable. Use filtered or distilled water to reduce mineral staining. Cold water will also work, but it will take longer to soften the wood, and you risk staining the wood if you soak it for a long time.

Check the softening process periodically by squeezing the pins together. As soon as they bend easily, you're ready to assemble the mallet. Start by tightening one clamp across the flat of the handle (below the pins) to prevent the wood from splitting as the pins are bent inward. Then, place another clamp near the ends of the pins and tighten it until the pins are close enough together to fit into the dovetail ramps in the head, as shown in the lower right *photo* on the next page.

Line up the center tenon with its mortise and tap the end of the handle with another mallet to force the joint together. Since the center tenon is longer than the pins, it goes into the mortise first and helps align the pins when you engage them in the head.

Once the pins are partway into the slots, you can remove the end clamp; the sides of the slots will guide the pins the rest of the way. To protect all the work you've done on the handle, leave the other clamp in place until it is completely seated in the head.

Even with a tight friction fit, it's still a good idea to secure the joints with glue. We use hot hide glue. It has a suitable working time and is compatible with the moisture saturating the boiled tenon and pins. With the tenon engaged and





**Step 4:** Saw the sides of the dovetail slots with a backsaw. Slice kerfs in the slot's middle to help you gauge the depth when paring.



**Step 5:** Chop out the waste with a chisel, working your way up from the bottom end.

the hide glue brushed into the openings, firmly drive the handle home with a mallet. Wipe off any excess glue that has been squeezed out, then clamp the handle tightly into the head until the glue and wood dries thoroughly.

### Finishing Up

When the wood and the glue have dried, trim the ends of the pins and tenons flush with the head and scrape or sand them smooth. Then you can softly bevel the edges of the head and chamfer or round the handle to final shape.

To fill any slight gaps in the joints, after they shrink, use an authentic 19th-century mixture of linseed oil, whiting and a little dry powdered pigment. This mixture

takes a few days to dry, so you might prefer a faster drying mix such as wood flour (fine sawdust) and hide glue.

When the filler is dry, sand or scrape the joints flush. The scraper imparts a smooth hand finish on the tool that feels wonderful to the touch. As a final finish, soak the mallet in a 50/50 mixture of turpentine and linseed oil. It's an appropriate finish for wooden tools and easy to reapply as necessary.

Once the finish dries, it's time to put your new handmade mallet to work. Reach for it the next time you have some serious mortises to square up. There's nothing quite like swinging a mallet you've made yourself.



After soaking the pins in boiling water to make them pliable, clamp the ends together until they line up with the oversized dovetail slots. The second clamp keeps the handle from splitting at the base.



**Step 6:** Clean up the slots with a sharp paring chisel. Note the gradual slope of the opening, top to bottom.



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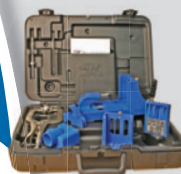
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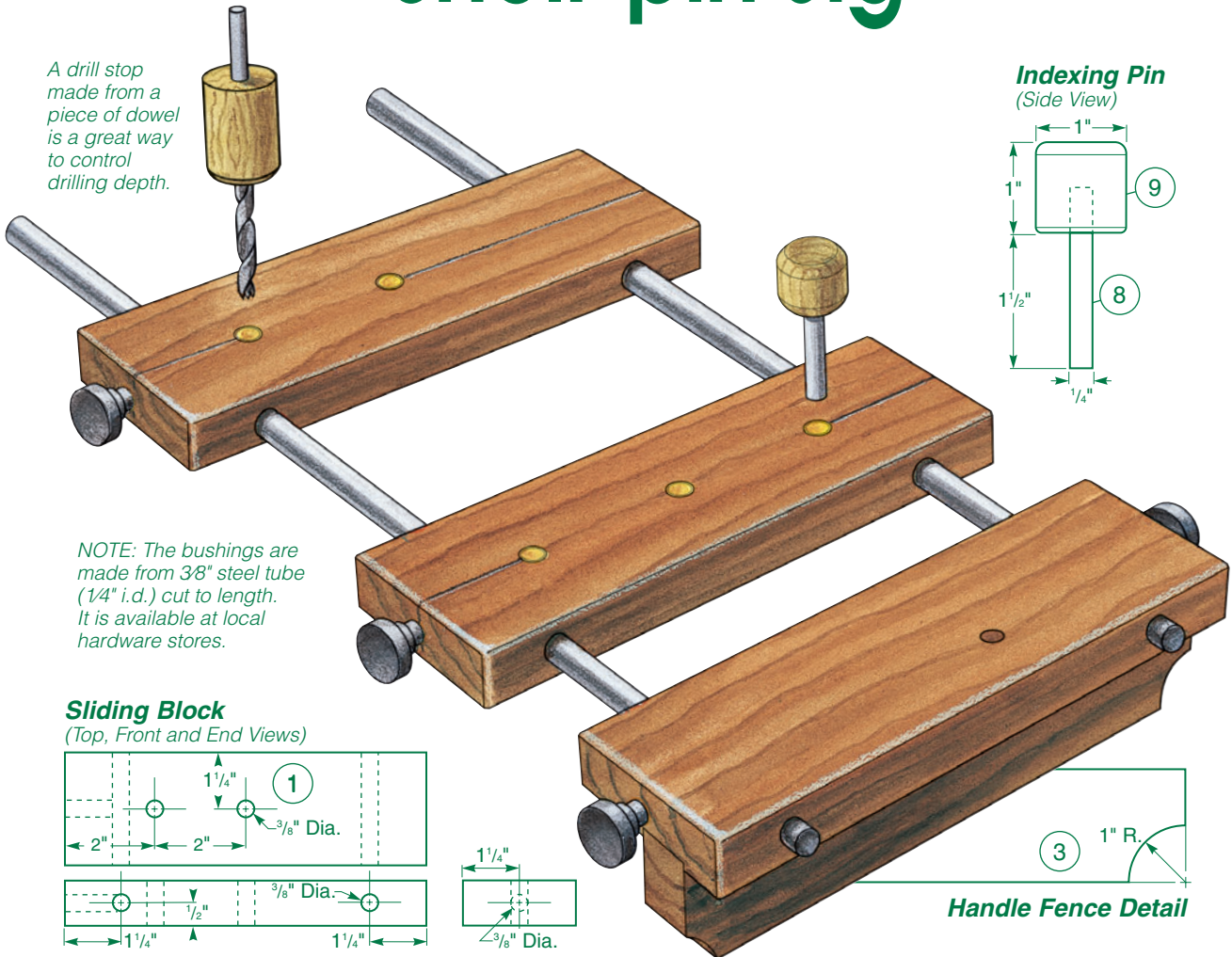
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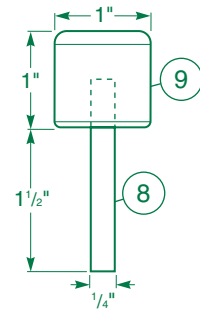


# The Most Versatile Shelf-pin Jig

A drill stop made from a piece of dowel is a great way to control drilling depth.

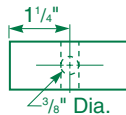
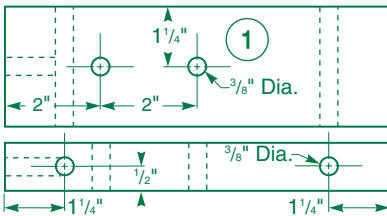


**Indexing Pin**  
(Side View)

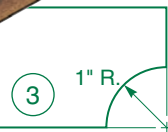


**NOTE:** The bushings are made from 3/8" steel tube (1/4" i.d.) cut to length. It is available at local hardware stores.

**Sliding Block**  
(Top, Front and End Views)

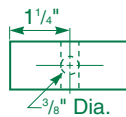
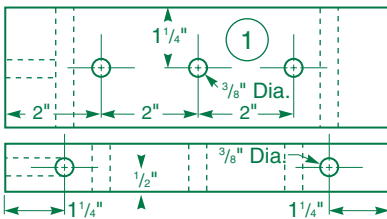


**Handle Fence Detail**

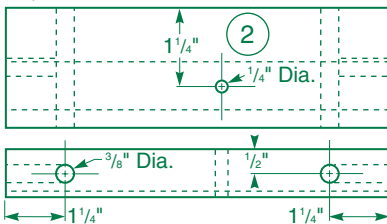


**NOTE:** The holes for the threaded bolts must reach the holes for the guide bars.

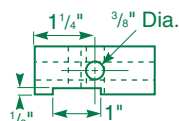
**Sliding Block**  
(Top, Front and End Views)



**Handle**  
(Top, Front and End Views)



Plow a 1/8" groove to accept the handle's fence.



## MATERIAL LIST

	T x W x L
1 Sliding Blocks (2)	1" x 2 1/2" x 8"
2 Handle (1)	1" x 2 1/2" x 8"
3 Handle Fence (1)	1" x 2" x 8"
4 Steel Bushings (5)	3/8" O.D. x 3/4"
5 Threaded Inserts (4)	1/4-20 x 3/4"
6 Knurled-headed Bolts (4)	1/4-20 x 1 1/2"
7 Guide Bars* (2)	3/8" Dia. x 15"
8 Indexing Pin (1)	1/4" Dia. x 2"
9 Wooden Knob (1)	1" x 2" x 8"

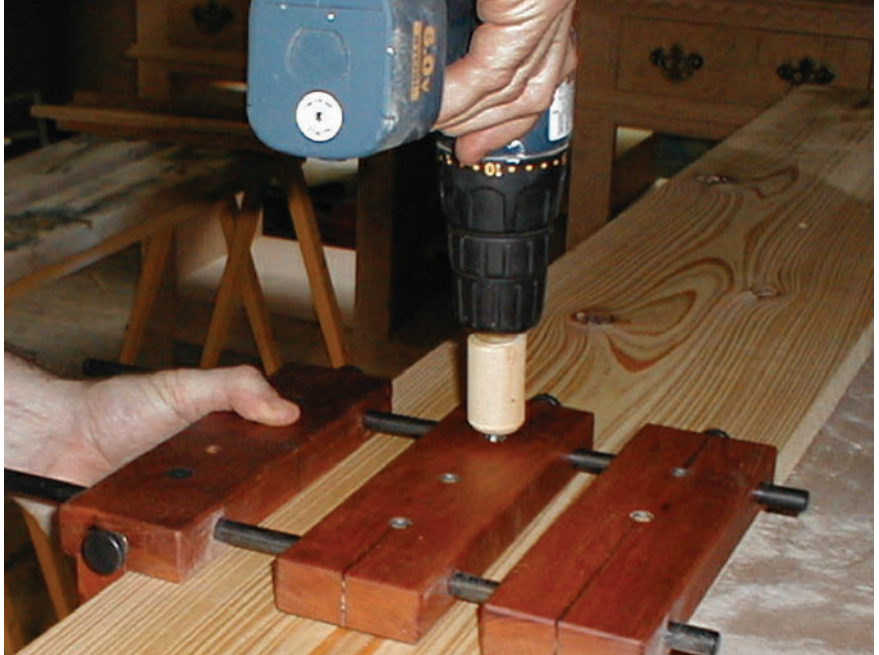
\*Length may vary as desired.

**W**hile metal shelf standards are a strong and versatile application for cabinet and case construction, they can sometimes detract from the overall visual effect of certain pieces of furniture. Here's a quick jig you can build to hang shelves from dowel pins instead of standards. The jig allows you to drill four holes per setting in rows at the front and back of cabinet sides. Because it is adjustable, the locations for the rows of holes can easily be varied and set for casework of different depths and dimensions. The vertical relationship of the holes is fixed at 2". The 3/8" O.D. drill guide bushings work perfectly for aligning a 1/4" drill bit.

### Layout and Construction

Because this jig will become a tool in your shop, pay particular attention to stock preparation and layout accuracy as you build it. Begin by selecting the stock for the wooden jig parts. We chose cherry because it's a tight-grained hardwood that holds bushings well, and it is durable as well as attractive. You could also use hard maple, birch, poplar or any dense hardwood as substitutes. After you've cut the hardwood parts to size and shape (pieces 1, 2 and 3), lay out the holes for the guide bars in the sliding blocks and handle. Be sure to take a moment to plow the slight groove for the handle fence at this time. Refer to the *Drawings* on the opposite page for all the construction details. Mark the hole locations on the handle and use the handle as a guide for marking the two sliding blocks. The holes will need to be drilled slightly larger than the guide bar's diameter.

Next, with the handle and sliding blocks on the guide bars, lay out the holes for the five steel bushings



**To make best use of this jig, create a drill stop from a length of dowel so you can easily register the depth of your holes. Set up the jig and hold or clamp it in position to line up the shelf pin holes. Then simply drill down through the bushings.**

(pieces 4). These bushing holes need to be drilled a bit undersized to get a good fit. Tap in the bushings with a hammer and wooden block, leaving them flush with the top surface of the sliding blocks.

Threaded inserts (pieces 5) are installed at both ends of the handle and one end of each sliding block. They hold knurled-knob headed bolts (pieces 6) that secure the sliding blocks and handle to the guide bars in their desired positions. Install the threaded inserts so they are just flush with the surface.

The next step is to soften all the sharp wood edges by rounding them over with a sander. Then glue the two pieces of the handle and fence together and drill a 1/4" hole for storing the indexing pin (piece 8) when you don't need it. Make a little knob (piece 9) from a section of dowel to top off the indexing pin. With everything else done, sand the assembly with 120- through 220-grit sandpaper and finish the wood with a protective topcoat of your choice. We wrapped up construction by marking the centerlines of each sliding block with a woodburning tool outfitted with a chisel point. Or, you could cut indexing marks through the finish with a utility knife and

fill them with a swipe of a permanent marker.

The beauty of this jig is its versatility. You can even make a set of longer guide bars to expand its indexing range.



**Evenly spaced shelf holes are generally more attractive than metal shelf standards. This simple and adjustable jig is sure to do long and valuable service in your shop.**





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# Accurate Dadoes... In a Hurry





*This jig provides quick and accurate setups when cutting through or stopped dados and sliding dovetails. The flip-up stops and hold-down clamp firmly control your workpiece. And when you're done, the jig conveniently hangs on a wall for storage.*

## Quick and Easy Grooves

**Q**uick, easy and accurate ... that's what you'll get with this jig. It's quick to set up (both depth settings and dado placements), and it's quick when it comes to making repeatable cuts: the sliding hinged stops help you plow successive indexed dados (like those on matching bookcase sides) in a hurry.

Because you move the router across the stock — not the stock across a table saw — it's also a lot easier (especially on your back). And if you do any type of cabinetry, from bookcases to entertainment centers, you'll find this jig indispensable for plowing three styles of common dados: stopped, through and sliding dovetail.

Through dados are the easiest to make, although not as attractive if they remain in plain view.

Stopped dados allow you to hide the forward aspect of the joint, but they also force you to accommodate the stopped portion of the joint with a matching notch or rebate.

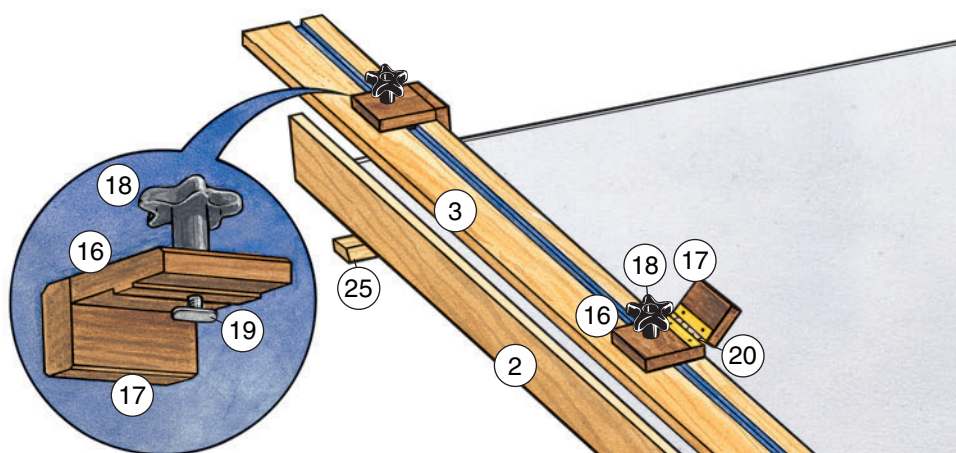
Sliding dovetails are a more challenging variation of a dado. The familiar wedge-like shape creates a strong and attractive mechanical joint.



The inspiration for this jig came from a bare-bones version that hung in editor Rob Johnstone's family woodworking shop from the day he set foot in it. Made from fir plywood and nondescript scrap lumber, it was constantly in demand. Ours is made of oak and walnut, but feel free to use whatever hardwood scrap you have on hand to create your own version.

Start by cutting the deck (piece 1) from a sheet of melamine and the rails (pieces 2) from hardwood stock. Go ahead and cut the front and rear rail returns (pieces 3 and 4) at the same time. Move to your table saw, and with a dado head in place, plow the long grooves in the rails and the shallow rabbets on the front and rear rail returns. Look to the *Exploded Drawings* on the next page and the *Pinup Shop Drawings* for the machining details. Remember most sheet stock these days is just a bit under a true 3/4" thickness. Check your grooves in scrap lumber to be sure they fit properly. Now take a few moments to find out how large an opening you will need to create for your router base.

For this jig to be accurate, your router must fit snugly between the guide rails. And to ensure smooth sliding action, these rails are lined with plastic laminate. This also



**Stop Block Detail**



**Figure 1: Determining the space required for your router is critical to the success of this jig. Measure your router and the two pieces of laminate to get the exact dimension.**

means they'll wear better for you. If the liners do begin to show wear, you can just peel them off and replace them with fresh laminate. (Voila!, good as new!)

Measure the width of your router base plus the two pieces of the plastic laminate you will be using. This is the only way to arrive at the opening you'll need for your router, as shown in *Figure 1*, above.

### Taking Custom Measurements

Take the measurement you found for the router opening and transfer it to the top edges of the rails, 24" from one end (see the *Pinup Shop Drawings*). Form a notch on each rail to accommodate the router rest and receiver. We left the dado head in the saw to nibble out

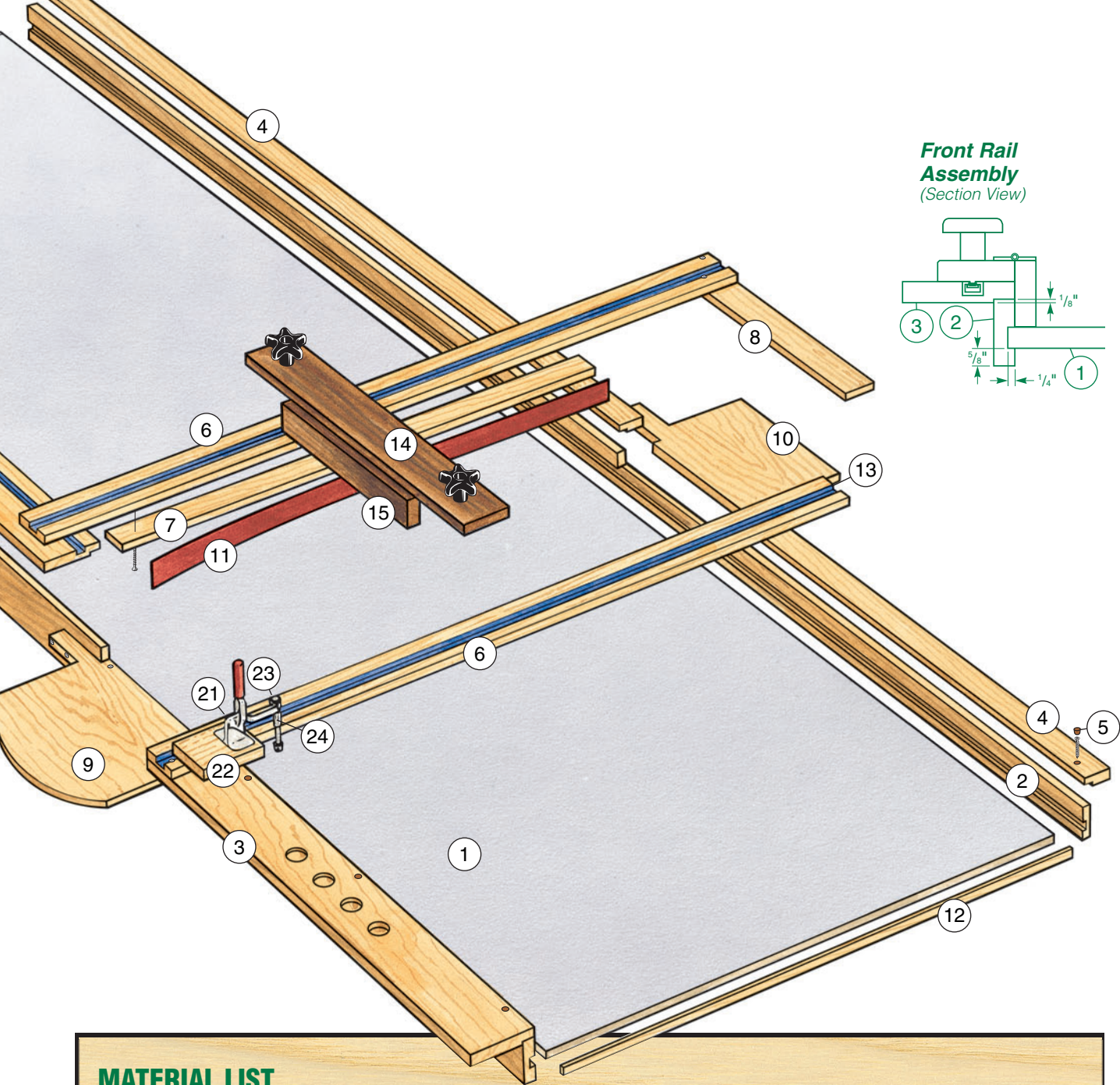
these notches with the help of a miter gauge.

Measure from the end of the rails to the edges of your notch and cut your front and rear rail returns into properly sized segments. Then look to the *drawings* for the location of the track groove in the face of the left front rail return segment. While you're at it, find the locations of the quick depth-setting aids in the face of the right front rail return. Use a Forstner bit to bore these four 1"-diameter stopped holes at exactly 1/8", 1/4", 3/8" and 1/2" depths. These holes serve as instant bit depth setters when setting up a cut.

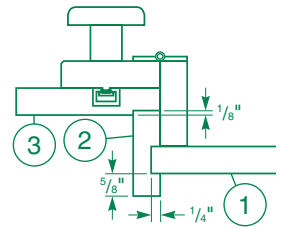
Now you're ready to start the first assembly phase. Drill and counterbore pilot holes, then attach the rails to the deck with #8 x 1 1/4"

**Melamine, an easy-to-find sheet stock, is a good choice for this shop jig, due to its hard plastic surface and dimensional stability. It is sized in sheets measuring 49" x 97" to allow for trimming. The factory edge is often damaged during shipping.**





**Front Rail Assembly**  
(Section View)



## MATERIAL LIST

	<b>T x W x L</b>		<b>T x W x L</b>
<b>1</b> Deck (1)	3/4" x 26 1/2" x 72"	<b>14</b> Centering Stop (1)	3/4" x 2 1/2" x (*)
<b>2</b> Rails (2)	3/4" x 2 3/8" x 72"	<b>15</b> Center Stop Return (1)	3/4" x 1 1/2" x (*)
<b>3</b> Front Rail Return (1)	3/4" x 4" x 72"	<b>16</b> Side Stop Tops (3)	3/4" x 2 3/4" x 2 7/8"
<b>4</b> Rear Rail Return (1)	3/4" x 2 1/2" x 72"	<b>17</b> Side Stops (3)	3/4" x 2 3/8" x 2 7/8"
<b>5</b> Walnut Plugs (bag)	3/8" Dia. flat	<b>18</b> Stop Knobs (5)	Plastic, 5/16" thread
<b>6</b> Guide Rails (2)	3/4" x 2 1/2" x 39"	<b>19</b> T-Bolts (5)	Steel
<b>7</b> Under Rails (2)	3/4" x 2 1/4" x 25 7/8"	<b>20</b> Stop Hinge (1)	1 1/2" x 36" (Piano)
<b>8</b> End Spacer (1)	3/4" x 2 1/2" x (*)	<b>21</b> Hold Down Clamp (1)	Steel
<b>9</b> Router Rest (1)	3/4" x 8 3/4" x 12"	<b>22</b> Clamp Spacer (1)	3/4" x 2 1/2" x 4"
<b>10</b> Router Receiver (1)	3/4" x 6 1/4" x 12"	<b>23</b> Hex Bolt (1)	5/16" x 1" Steel
<b>11</b> Laminate Liners (2)	1/16" x 1 1/4" x 25 7/8"	<b>24</b> Connector Nut (1)	5/16 I.D.
<b>12</b> Deck Trim (2)	1/8" x 3/4" x 26 1/2"	<b>25</b> Hanger Cleats (2)	3/4" x 1 3/4" x 24"
<b>13</b> Aluminum T-Tracks (3)	48"		

(\*) Adjust these pieces' lengths to accommodate your router.



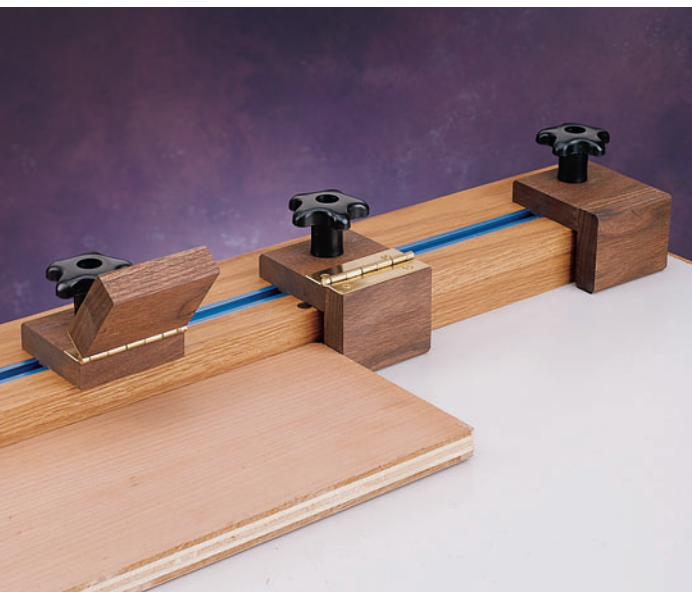
Four holes drilled to specific depths become a feature that lets you quickly set your router to predetermined settings. Use a Forstner bit to bore these holes to 1/8", 1/4", 3/8" and 1/2". It's quicker and safer than flipping the router over to measure from the base plate.



The center stop not only allows you to stop your dados accurately, but it also lines up your dado cuts to the path of the router bit. Use contrasting paint colors in shallow saw kerfs to identify where the center of the dado is, as well as where a full 3/4" dado will fall.



Flip-up sliding stops allow you to register multiple and identical dados on matching workpieces. Bookcases, display shelves and cabinets of all sorts are easier to make with this basic shop jig.



screws and glue (see *Figure 2*). Cap the screw holes with walnut plugs (pieces 5). Next, join the front and rear rail return segments to the deck/rail subassembly, again using glue and screws capped with the walnut plugs. Check to be sure the rail segments are square.

Cut the guide rails and under rails (pieces 6 and 7) to size. Move back to the table saw and plow grooves for more aluminum track down the

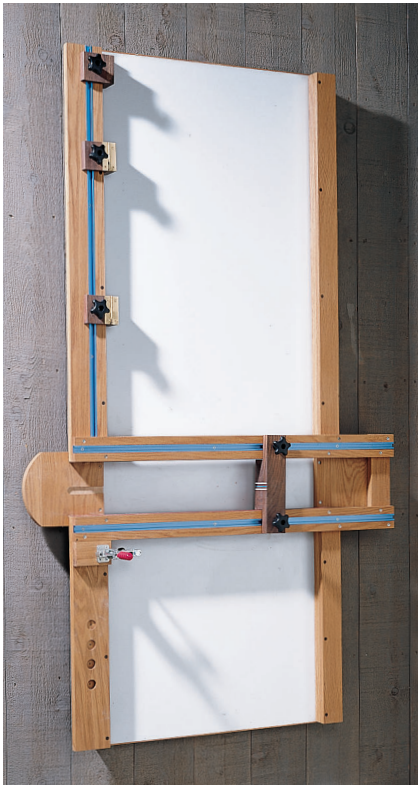


**Figure 2:** Attach the rails to the melamine deck with screws and glue. Cover the exposed screw holes with walnut plugs.

length of each guide rail, then attach the under rails to the guide rails with glue and screws driven up through the bottom. Clamp the guide rail subassemblies onto the deck subassembly exactly flush to the edges of the notches. Measure edge to edge across the guide rails to determine the exact length of the end spacer (piece 8). Cut this piece to length and secure it to the guide rails with countersunk screws and glue. Finally, go ahead and attach the guide rail subassembly to the deck subassembly with countersunk screws, but no glue.

### Creating Special Seating

The router rest and the router receiver (pieces 9 and 10) are made from hardwood and are mounted



**Keep your jig out of harm's way by machining matching beveled hanger cleats. One goes on the back of the jig, the other on the wall.**

into the notched openings that you created earlier in the rails. Both of these pieces must be surface-sanded or planed down to the nominal thickness of manufactured sheet stock (about  $1\frac{1}{16}$ " ). This will keep your router from "stepping down" as it enters sheet stock that will be clamped to the deck.

On the bandsaw, shape both pieces to fit into the notched opening and form the rounded rest's back edge. Drill for countersunk screws as shown on the *Exploded View*, page 79, and mount them to the jig with screws only. On your table saw, slice the laminate liners (pieces 11) from high-pressure plastic laminate. Then, using contact cement, glue the liners to the inside faces of the guide rail subassembly. Use a file to smooth the edges of the plastic laminate.

Slice the deck trim (pieces 12) from a piece of hardwood, cut two pieces to length and glue them to both ends of the deck.

### Adding More Bells and Whistles

Now you've come to the features that really add to this jig's versatility. Start by mounting the aluminum tracks (pieces 13). Cut the pieces to length with a hacksaw, and be sure to file or sand the ends smooth to remove any sharp edges. Next cut the centering stop (piece 14) to the same length as the end spacer and the center stop return (piece 15) so it's  $1/16$ " less than the distance between the laminate liners. Glue these pieces together (as shown in the *Pinup Shop Drawings*). After the glue has cured, place the stop on the guide rails and drill  $5/16$ " diameter holes to align with the aluminum track. Next, cut the side stop tops and side stops (pieces 16 and 17) to size. Reveal the top's raised tenon, which slides in the aluminum track, in two passes on your table saw. Drill the  $5/16$ " holes to mount the knobs and T-bolts (pieces 18 and 19) and cut sections of piano hinge (piece 20) to join the

tops and sides, forming two flip-up sliding stops. Glue up the third side and top for the end stop, which does not flip up.

To hold your work in place as you are routing, mount a hold-down clamp (piece 21) just to the right of the guide rail. We found that to get the proper reach and clearance when operating the clamp, we needed to glue a clamp spacer (piece 22) to the front rail and add a hex head bolt and connector nut (pieces 23 and 24) to the clamp, as shown in *Figure 3*.

One quick note: This jig is designed to plow dados into  $3/4$ " stock. If you need to work in  $1/2$ " or  $3/8$ " material, all you need to do is slide the appropriate thickness spacer on top of the deck. (Double-stick tape will help keep the spacer from sliding.)

### Final Details

When properly marked, the center stop can help you line up one-off dados. To find your registration lines, use your router to plow a  $3/4$ " dado in a scrap of plywood that is clamped in place. Slide the center stop over the dado and use a combination square to transfer the edges of the dado onto the stop. Find the halfway point and mark it. Take the center stop to the table saw and, with the blade just barely above the tabletop, scribe the three lines into the face of the center stop. Once you clean up the kerfs, you can paint them contrasting colors.

Now would be a good time to mount the hanger cleats (pieces 25) to the back of the jig and on a convenient spot on your shop's wall. Apply a couple of coats of an oil finish to it to keep the dust from sticking.



**Figure 3: The hold-down clamp is mounted on a spacer block and modified with a 1"-long hex head bolt and a connector nut.**



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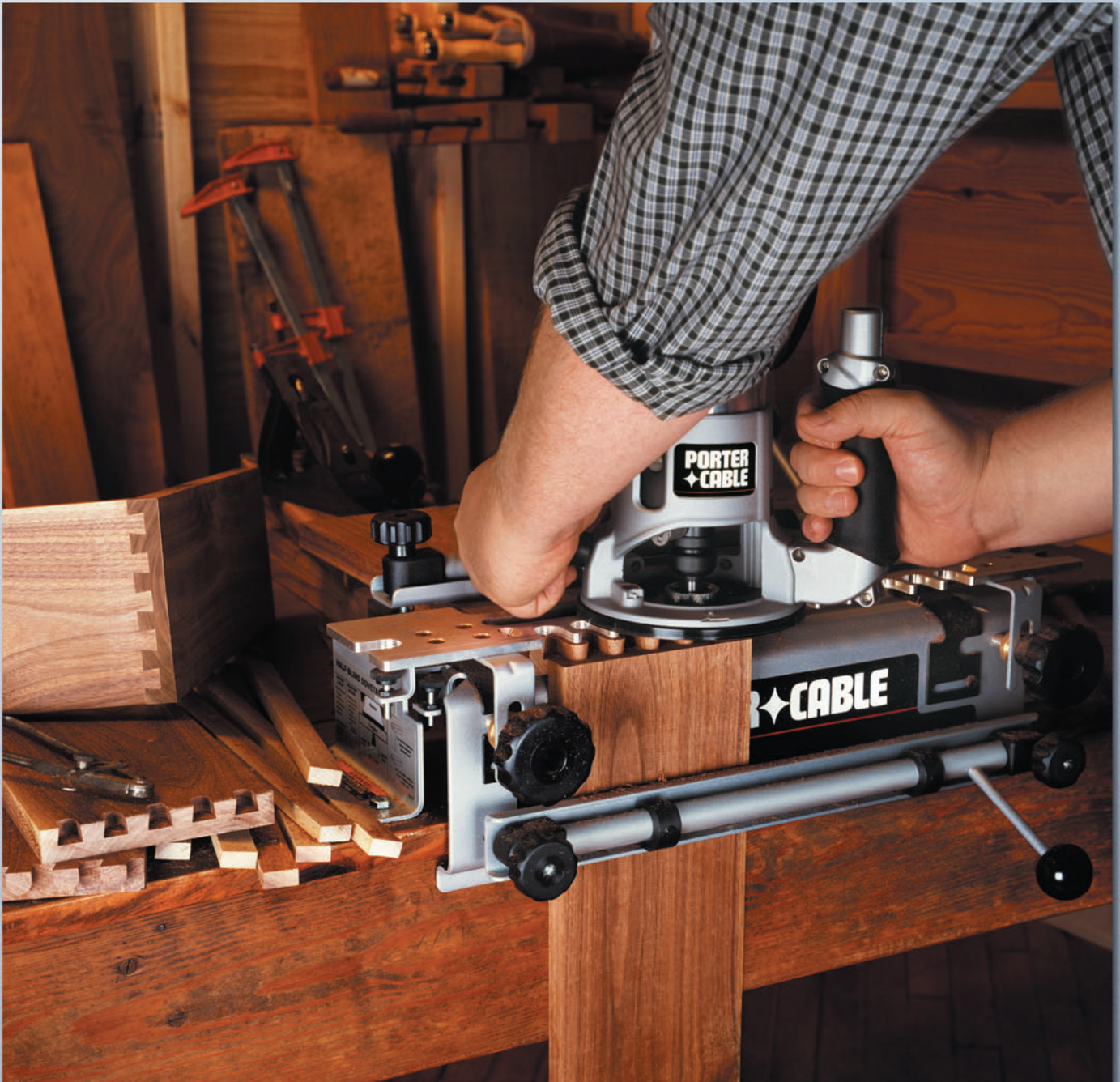
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