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WOODWORKER'S JOURNAL

February 2001
Volume 25
Number 1



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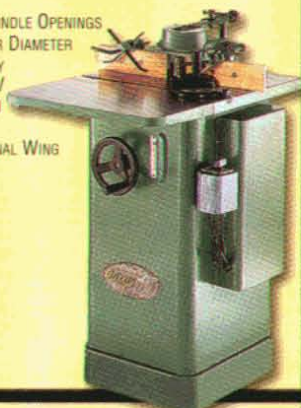
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Woodworker's Journal

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By Rick White

A lesson in bent lamination tops of this ash and walnut bed — with the perfect tilt for late night reading.

38 Shop-Built Disk Sander

By Jeff Jacobson

Convert half of your bench grinder into a 12" disc sander. While you're at it, add a tilting table with a miter gauge.

44 Marking Up Lumber

By Ian Kirby

Why mark up? Because poorly prepared stock will haunt you throughout the making of a piece of furniture.

50 Portable Router Caddy

By John English

This dovetailed cabinet provides your router with a handsome carrying case, functional bit storage and a mini table.



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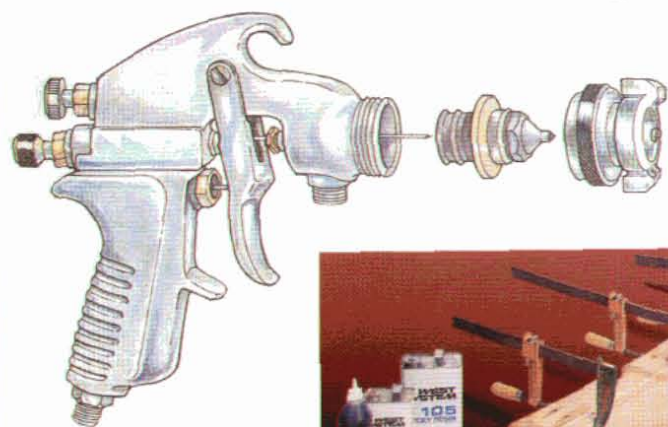
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January/February 2001

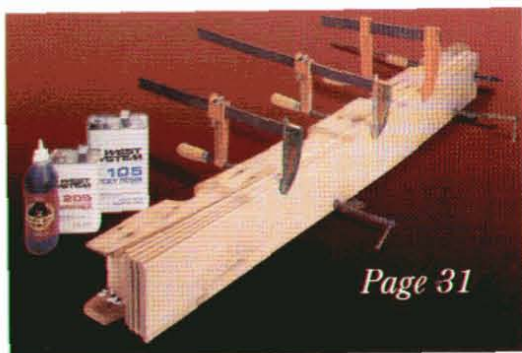
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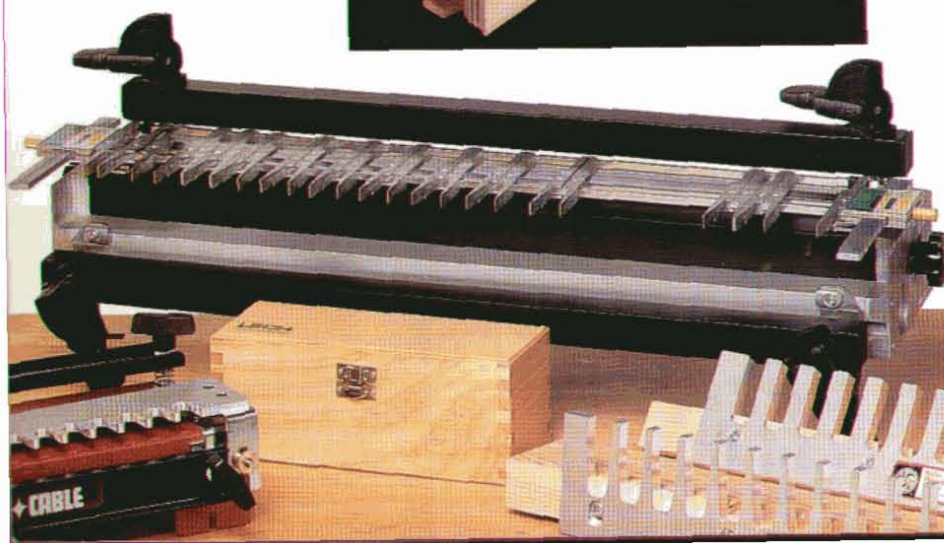
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We put three dovetail jigs through their paces.

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New tools for the new year.



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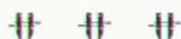
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WOW! Our 25th Year



It's our 25th anniversary! *Woodworker's Journal* began bringing you woodworking projects, tools and techniques in early 1977, and we've been hard at it ever since. That's unusual in today's magazine climate, where, according to one of the top authorities in the field, only one in 10 new magazines survives long enough to see its 10th anniversary.

Yet here we are, 25 years after our first 16-page newsprint issue. You've seen changes over the past quarter century: glossy pages, new departments and the addition of a web site, to name a few. The most important quality, however, remains the same: a commitment to bringing you great projects and telling you about the best tools, tips, and techniques to help you make them.



As is the custom here, our first issue of the new year features a couple of great projects for your shop: **John English's** router case and table (page 50) and **Jeff Jacobson's** shop-built disc sander (page 38). But before you start either of these projects, I'd like to strongly recommend that you spend some time with **Ian Kirby's** "Marking Up Lumber" article (see page 44). I can't imagine how many mistakes I might have avoided in my own woodworking if I'd learned some of these basic lessons earlier in life.

And you can put those lessons into practice when you tackle **Rick White's** ash and walnut bed, featured on page 28. Rick did a fine job with this project while teaching some interesting techniques along the way (something we strive to do in all our project articles).

Our 25th anniversary also seemed the appropriate time to launch a new department — one that examines tools after they've seen some hard use in the shop. **Shop Journal** (see page 70) answers the question, "How will this tool stand up over time?" When a tool passes muster, we'll award the manufacturer with a special **"Tools that Endure"** plaque, recognizing solid quality that performs well in day-to-day use.



We'll be celebrating our silver anniversary in other ways throughout the year — although in some ways, it feels like we already had the celebratory dinner. At the recent Minnesota's Magazine and Publisher's Association's awards ceremony, *Woodworker's Journal* received an award for Overall Excellence, while our eZine was a winner in the "Best Internet Site" category. One of our frequent contributors, **Charles Self**, also took top honors last year from the National Association of Home and Workshop Writers for his review of jig saws in last April's issue. Such awards, of course, are only the byproduct of our main focus at *Woodworker's Journal*: producing your favorite magazine, a calling we've been happy to fulfill for 25 years.

Larry N. Stoiaken

CORRECTIONS: We got a few phone numbers and details wrong in our *Resource Digest* last time. Here are the fixes:

Grizzly Imports has changed its name to **Grizzly Industrial**.

Leigh Industries Ltd. offers a "vacuum attachment", not a vacuum adjustment, "to let you rout variable spaced through dovetails."

Meisel Hardware's correct phone number is 800-441-9870.

JANUARY/FEBRUARY 2001 Volume 25, Number 1

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A Better Biscuit Report

Your report on biscuit cutters (*Biscuit Joiner Roundup, December 2000*) could have been so much better if you had included a summary chart showing:

- a. each cutter with part number, price (include street and sale prices), phone, web site;
- b. size of cutter;
- c. number of teeth;
- d. type of teeth (carbide or whatever);
- e. motor size (OK to use amps);
- f. motor speed, fixed or adjustable;
- g. max speed of motor;
- h. fence adjustment angle;
- i. special features.

It's easier to review the features in a chart than to dig them out of the text. It would also be helpful to recommend one or more of the units being reviewed. *Consumer Report* does a good job of comparing items.

Richard A. Mortenson
Stow, Massachusetts

More on Norm

I read Larry Stoiaken's note about the letters defending Norm Abram (*On the Level, October 2000*). He said that no one had sent in letters but to defend Norm. Well, here is one for the other side.

Norm is good at what he does, but he is not a craftsman in the category of the great names that were mentioned in the original letter about Norm's award. Norm is a very good basic woodworker. He cannot be considered as one of the great craftsmen of our time.

Stanley Risk
Crawfordville, Florida

I feel compelled to come to Mr. Petersen's defense (*Letters, "Norm's No Ten," June 2000*). Norm Abram has been terrific for woodworking — by popularizing woodworking — much as Muhammad Ali popularized boxing and Arnold Schwarzenegger popularized bodybuilding. But this is not to say that by popularizing a vocation, one is the best there ever was in that vocation.

I'm afraid my Neanderthal tendencies force me to side with Mr. Petersen, since I find it difficult to award a greatest woodworking award to someone who uses a biscuit joiner!

Rich Donahue
Sierra Vista, Arizona

While I don't doubt Norm's sincerity, nor his contributions to the hobby of

woodworking, I doubt anyone will cite him for his sense of design or proportion or the advancement of woodworking. I was surprised while reading your letters section (*October 2000*). It amazed me that serious woodworkers would be ignorant of true leaders in this field: Krenov, Kirby, Nakashima, Maloof, etc. These are probably the same people who make silhouettes out of plywood.

Perhaps I am a snob. Perhaps your readers need exposure to these men. Maybe your fine publication can assist in this endeavor by profiling the living legends of our day. Or maybe we should all be content to watch Norm in our tool embroidered socks while wearing a "Tool Time" T-shirt, dreaming of a really big piece of pine to make another Shaker stepstool.

Paul Warnock
Akron, Ohio

What a pleasure it was to see all of the responses supporting Norm Abram. Through the "New Yankee Workshop," Norm has given many "amateur" woodworkers such as myself not

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only the knowledge of how to do something, but also the confidence to do it.

I have been doing serious woodworking for a little over five years. My projects have ranged from basic bookcase designs to a solid oak heirloom bed and, throughout, all of my projects have been built from Norm's example. Norm has dedicated himself to teaching techniques to the beginning and student woodworkers. You could not have made a better choice as far as naming Norm as one of the most influential woodworkers of the 20th century.

*Anthony Sailer
Las Vegas, Nevada*

I agree that Norm is one of the best when it comes to explaining a project and how to do it, but as I watch him, show after show, I wonder: how good is Norm, really? When you watch Norm week after week, you see a completely different set of tools in his shop. Every job that he does, he has just the right tools for the job. He never has to improvise or make do with one set of tools. It sure must be nice to have different tool manufacturers furnish just the right tool to do a specific operation on a certain job. Also, every project he does, he has one already built. Every woodworker knows



that the second one of the same project is always easier to build than the first. What I would like to know is: did Norm really build the first one, or did his cohorts build it and make all the jigs and show Norm the different steps?

*Roger Storts
New Lexington, Ohio*

Does Norm actually build each stage of the New Yankee Workshop's projects? Our editor, Rob Johnstone, has the inside scoop.

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Safety First: Learning how to operate power and hand tools is essential for developing safe woodworking practices. For purposes of clarity, necessary guards have been removed from equipment shown in our magazine. We in no way recommend using this equipment without safety guards and urge readers to strictly follow manufacturers' instructions and safety precautions.

Where should Rick White's hands be for this miter cut? As Mark Hampton suggests, you should avoid the position at far right, even if the blade is set low. The position immediately at right is safer.



WJ Responds:

You are not the only person who is a bit jealous of tools available to Norm for his projects. The New Yankee Workshop really is equipped with just about any power tool Norm could ever need. As for how much of the actual woodworking Norm does, I had the opportunity to visit the NYW and was pleasantly surprised. As the project was moving from step to step, I had assumed that an army of woodworking aides would sweep in. Wrong.

Norm moved easily from tool to really cool tool, building the next step to be videotaped. So, Norm builds it all ... every bit.

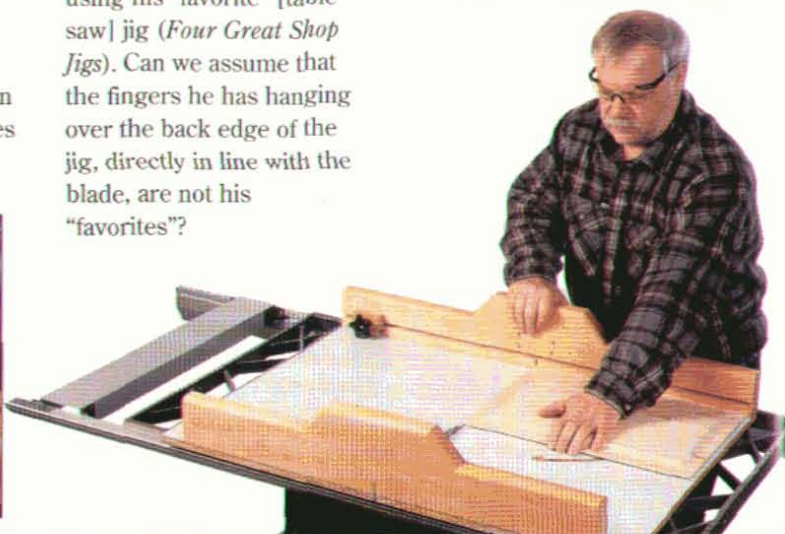
*Rob Johnstone, Editor
Woodworker's Journal*

Safety Concern

In your June 2000 issue, you have a picture of Rick White using his "favorite" [table saw] jig (*Four Great Shop Jigs*). Can we assume that the fingers he has hanging over the back edge of the jig, directly in line with the blade, are not his "favorites"?

While table saws are notoriously hard to guard (and, to face facts, remain mostly unguarded), his sled, which requires the removal of the factory guard, presents the perfect opportunity to install a full-length blade guard.

*Mark Hampton
Lowell, Arkansas*



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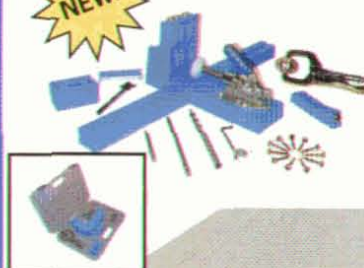
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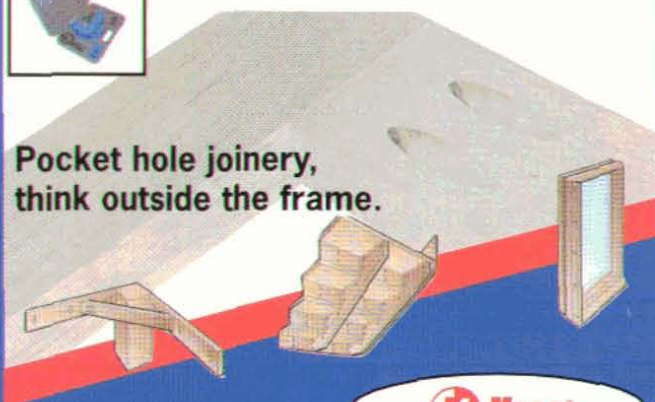
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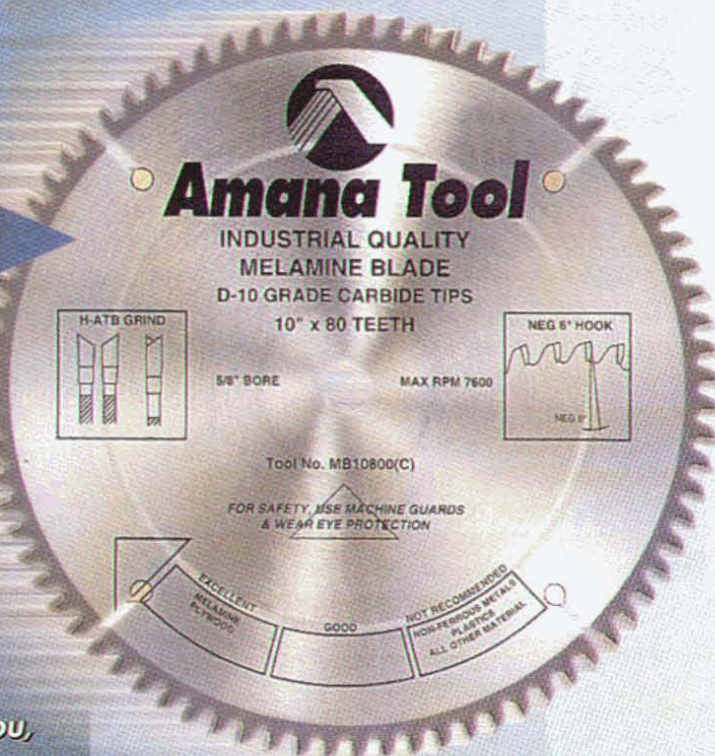
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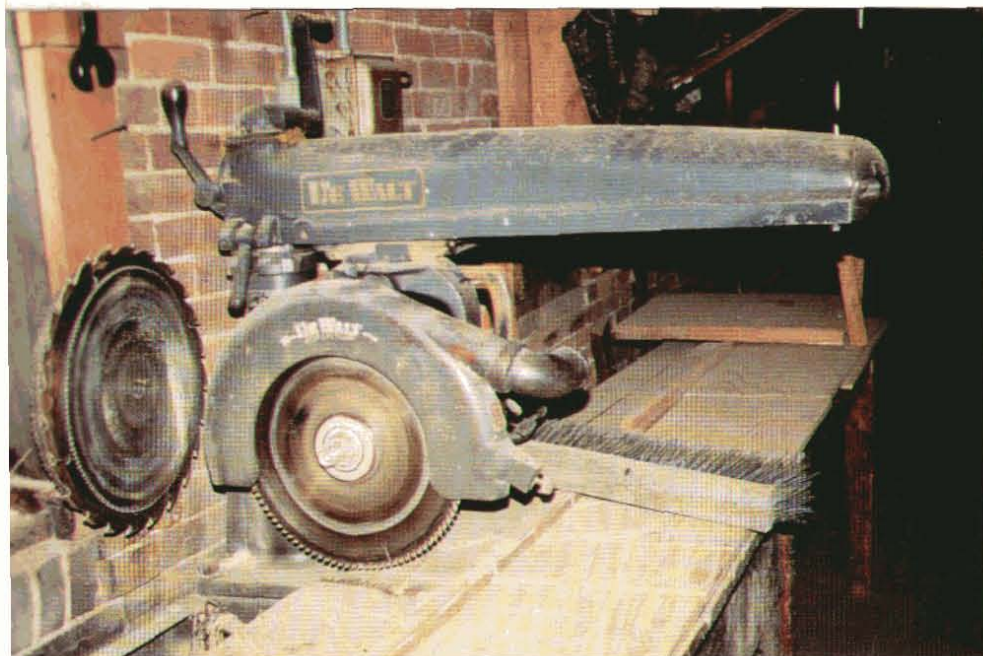
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A Woodworker's Dream Inheritance

By Joanna Werch Takes



A five HP DeWalt saw, left, was among the tools Joe Clay Young found in his great-grandfather's shop. A woodworker who examined the shop's contents told Clay and his wife, Pamela, that some of the tools dated back to the 1940s.

A foot pedal rip saw, right, is one of the tools the Youngs want to find out more about.

Family Shop Is a Virtual Time Capsule

Next: Museum or Auction?

Most woodworkers are content with their ancestors' furniture. Maybe a couple of tools. Joe Clay Young has a whole shop — and not just any shop. Built in 1901, the Jonesboro Building in northeast Arkansas incorporated a warehouse and lumberyard. It acted as a sawmill and a furniture production facility: "They brought the wood from a tree to a chair or a table," Clay said.

The builders were his great-grandfather and his great-great-uncle. Barton Lumber Company bought the shop in the 1950s, then shut it down in the early 1980s. It sat empty and unused until Clay

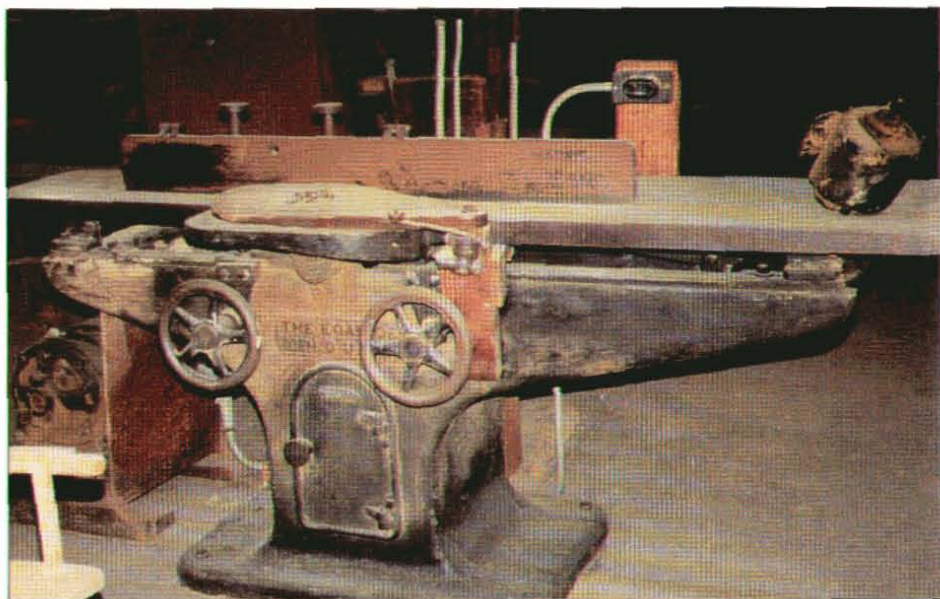
heard it was for sale. "I knew something special could be done with it," he said. "It's almost like a time capsule." Pamela Young, Clay's wife, added, "Nothing's put away. There's dust and tools lying out. It looks like they just got up and left." After Clay bought the 55,000 foot shop, he brought in some

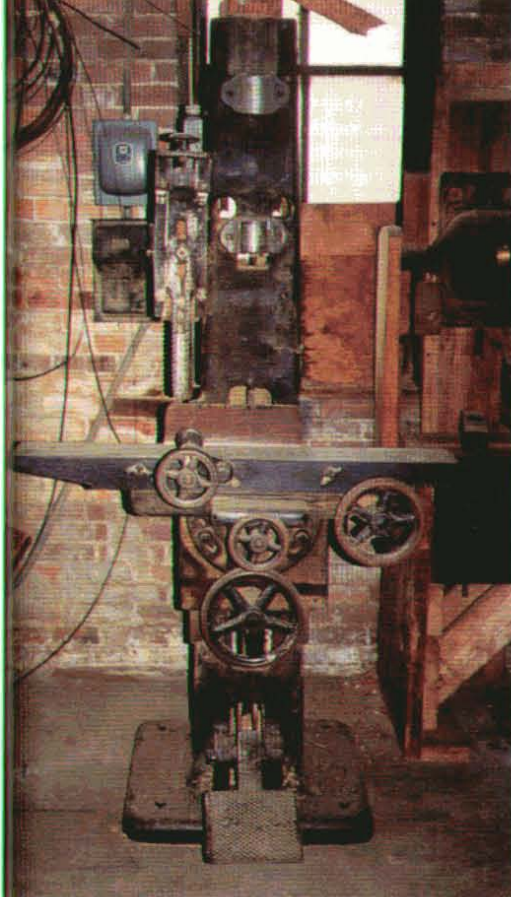
old woodworkers to check it out. "Their jaws just dropped," he said.

Clay and Pamela are still trying to figure out what some of the tools are. They do know that most of them are complete: "Belts for the sanders are still there; pulleys are in storage; there's an entire wall full of antique-looking clamps," Pamela said.

Now, the question is, what to do with the "inheritance?" Options include using it as a museum or selling the equipment. Clay and Pamela are not woodworkers. "He wanted the building because it was

Clay and Pamela Young found so many tools, from so many different eras, that they're having trouble identifying some.





in his family," Pamela said. "Then, when he found all the tools, it was even better." You can get in touch with the Youngs at 870-972-0013.

New Faces in the Shop: Women Woodworkers

What do women want? When it comes to woodworking, the answer is: to learn from other women, according to Pamela Philpott-Jones.

Pamela's a ringleader for a burst of women's woodworking activity in Colorado: she's an instructor, president of the Women's Woodworking Guild of Colorado, and coauthor of *Woodworking for the Serious Beginner*. She is also seeking financing for a women's woodworking school in Denver. She thinks other regions can tap into women's interest in woodworking, too, if a woman leads the way. "Women attract women," Pamela explained. Since she started teaching women's woodworking classes five years ago, she's taught "well over" 300 students.

Shop Talk continues on page 16 ...



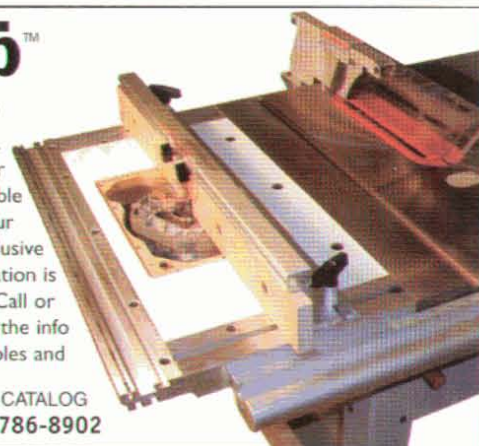
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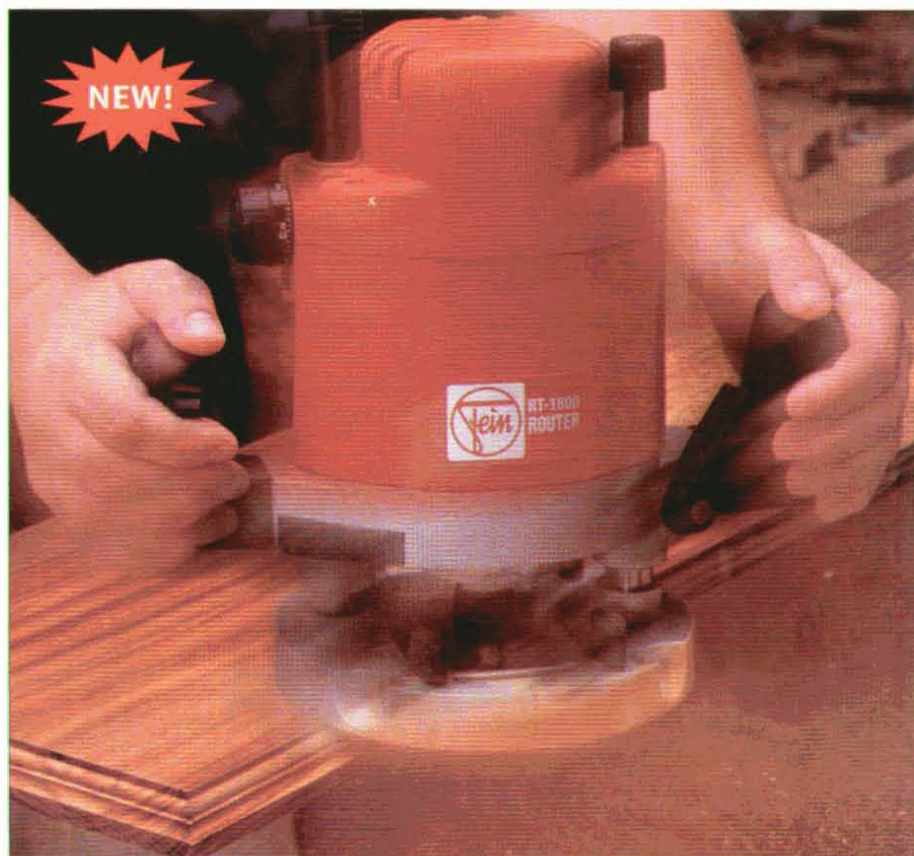
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Pamela Philpott-Jones, left, believes she's behind a burst of women's woodworking activity in Colorado.

Why the need for such outlets targeted specifically to female woodworkers? Pamela says it's because men and women learn differently. Her own instructor "would just show me how to do something and he expected me to get it," she said. In general, "Men like to come into a shop and dominate it," Pamela added. "It's kind of like, 'Here, little lady, here's how to do something.'" Women have a big discussion about how to do something, and when they do show each other, it's more teaching."

Ann Rockler Jackson, CEO of the *Women in Woodworking* web site's corporate sponsor, added that most of the visible resources have been geared to "traditional" woodworkers — which haven't included women. Rockler Woodworking and Hardware started the women's site because women woodworkers' goals and issues are different, she added.

"It's a place for them to come for support and encouragement and not be patronized."

For many women, Pamela said, the first step into woodworking is the same as it was for her: a desire to remodel their homes. The percentage of women doing their own kitchen remodeling, for example, increased from 17 in 1997 to 20 in 1999, according to 1,500 homeowners surveyed by the Home Improvement Research

Institute. The attraction for others is "getting back in touch with our senses," Pamela said.

Her students begin by building a tool tote, then move on to cabinets, and follow up by designing a table. "It's all built with absolutely no nails," Pamela said. "It's all tongue and groove and mortise and tenon."

As they gain more experience, Pamela said, women cabinetmakers can be more confident and safety-conscious than men. Many of her students, "are going to their fathers and saying, 'Why didn't you teach me this?' And they're becoming much better builders than their fathers ever were."

For more info on the Women's Woodworking Guild of Colorado, visit www.geocities.com/wwwgc_2000 or call 303-322-3018. For class info, call 303-782-0588. For the Women in Woodworking site, visit www.womeninwoodworking.com.

Shop Talk continues on page 18 ...

Pamela and women's woodworking guild members like Martha Pearce are preparing for a second show of their work in January.



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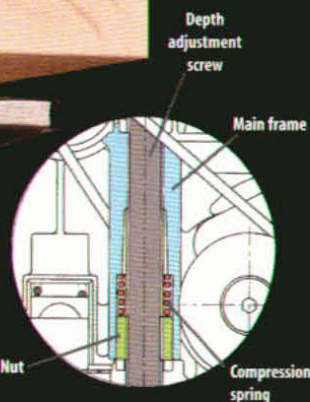
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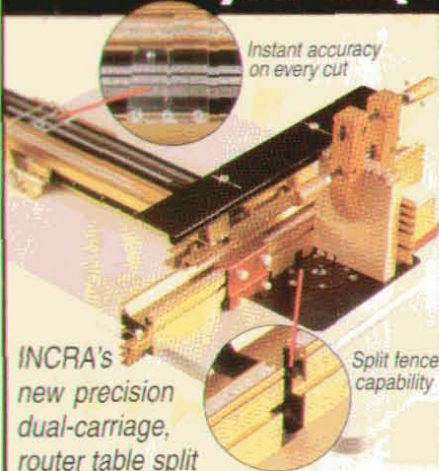
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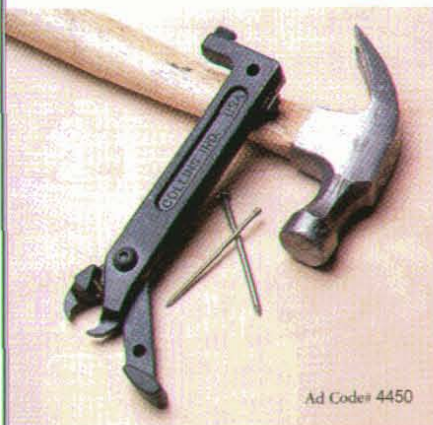
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SHOP TALK

Old Styles — New Friends Period Furniture

It might be a new century, but one group of woodworkers is still more interested in looking toward the past: the 17th, 18th and early 19th centuries, to be specific.

That's how Mickey Callahan, cofounder of the Society of American Period Furniture Makers, explains the group's focus. "We make a distinction of being American," too, he added. "We think there's enough distinction between what was done in America and Europe" during that time period.

The Society got its start when Mickey and Steve Lash met at 1999's Working Wood in the 18th Century Conference at Colonial Williamsburg. After noticing the

number of attendees, "We thought, 'Wouldn't it be great if there was an organization that addressed the needs of period furniture makers, either professional or amateur?'"

Mickey said.

Period woodworkers have long felt left out of the furniture community, where the focus tends to be on contemporary work, Mickey said. "You can call us a special interest group, but we think there's enough interest," he said.

A mahogany Chippendale corner chair is an example of John McAlister's period furniture.



photos by Dirk Bakker

Reproducing an 18th century armonica is one way Steve Lash stays in touch with period furniture.

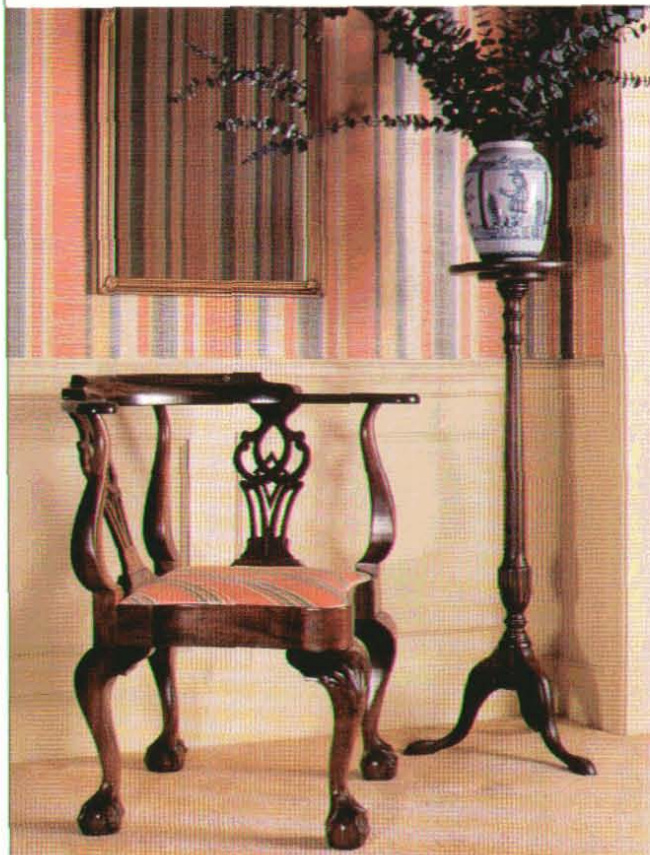


photo by Pat Shanklin

John McAlister will receive the second annual Cartouche Award from the Society of American Period Furniture Makers in January. At right are his Newport six shell secretary and Queen Anne chair.

Indeed, the Society, first organized in 1999, now has 235 members. Its first year of activity was 2000, which saw the launch of a web site and electronic newsletter; hands-on workshops on regional characteristics of ball and claw feet carving and on string and berry inlay technique; and the first presentation of the Cartouche Award, named after a carved pediment from a Philadelphia style highboy, "the epitome of the high style of period furniture," Mickey explained.

Members include amateur and professional woodworkers, antique dealers, conservators, and "people who just have an appreciation for period furniture," Mickey said.

"Some members light a candle rather than turn on a light switch, so they can build as if it's the 17th century, but that's a minority."

The members do share a fondness for colonial and early American furniture. "The decorative arts in general were in high development" at the time, Mickey said. Members of the Society intend to keep exploring that development. For more information, visit www.sapfm.org or call 703-449-8549.



Shop Talk continues on page 20 ...

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"In many ways I'm like a fine furniture maker," admits Larry, who selects detailed instructions from his customers and works from specifications "falling somewhere between intricate violin and guitar construction."

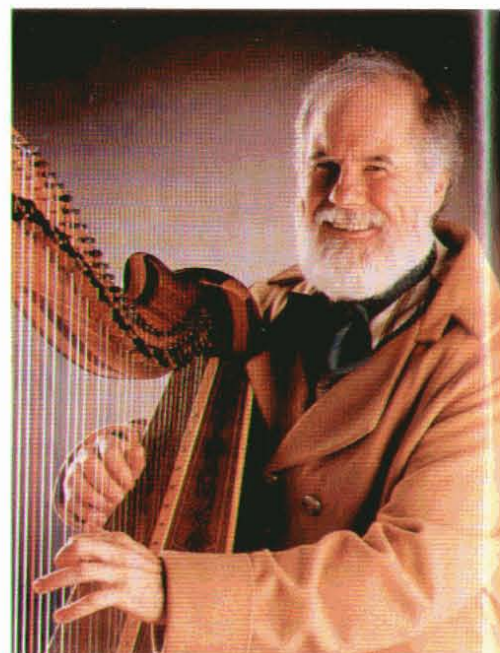
His three premium choice hardwoods are black walnut, American cherry and rock maple, with sitka spruce soundboards. Larry also considers the combination of woods: "Spruce and maple tend



to sound 'even' from top to bottom, with redwood and walnut having a blacker tone." Finish choices are important, too. "I like to use natural oils," says Larry. They produce the least degradation in tone.

Perhaps the most important consideration, though, is moisture. Larry recalls how one musician's harp cracked when the apartment humidity reached three percent, and another harp "blew up" inside a 125 degree Fahrenheit automobile. He kiln dries his stock for a week before building.

Loreena McKennitt is among those who've



played Larry's harps. Another, harpist Danishka Esterhazy, considers him "one of the top harp makers in the world."

— by Gary Watkins



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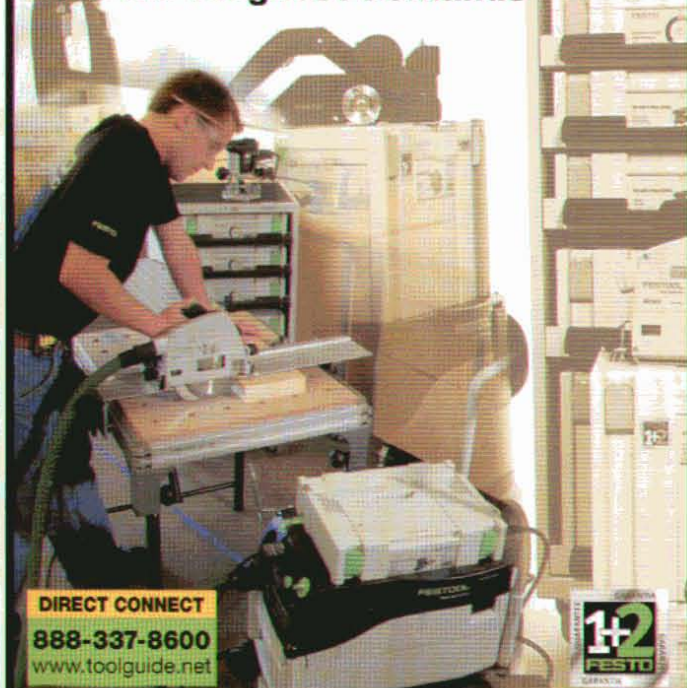
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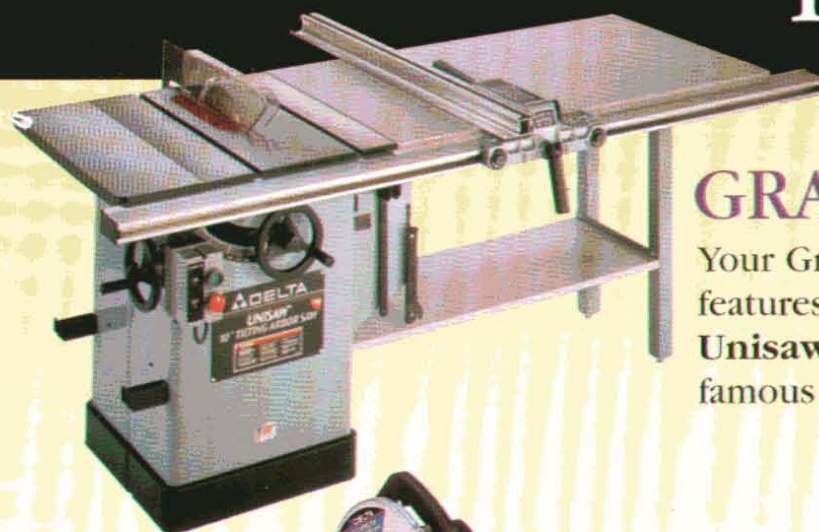


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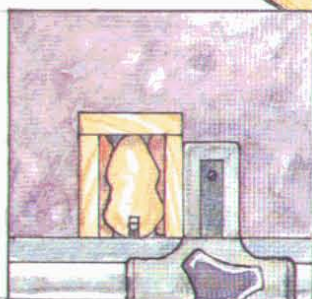
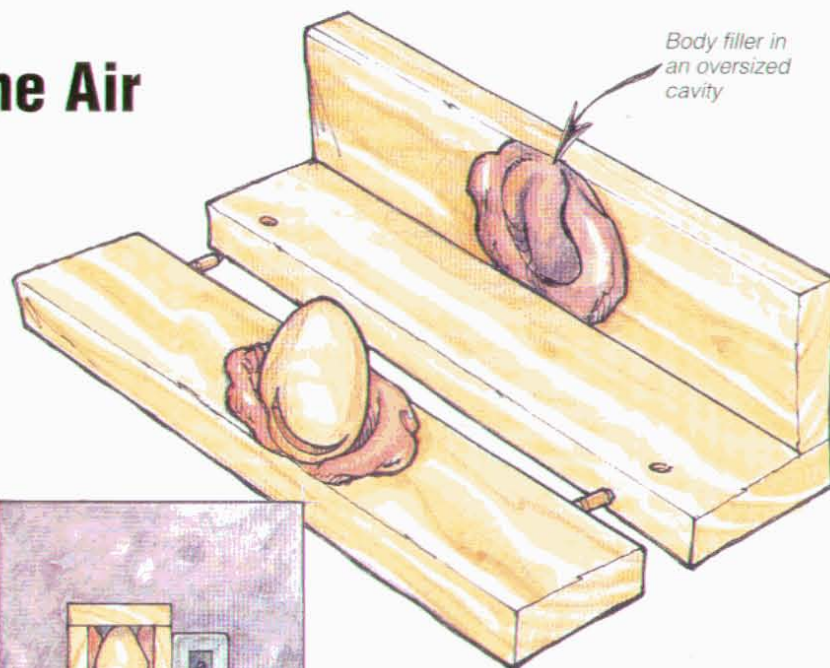
Cleaning the Air

Machining Irregular Shapes

I have a trick for cutting a groove into an irregular shape, such as a wooden egg. I use four short pieces of 1/4" dowel to join three pieces of scrap. Scoop out a cavity on the two side pieces of the jig, so the egg will fit between them with some to spare. Wipe the egg with "butcher's wax" to insure separation, then mix enough body filler to take up the space in the cavity. Squish the jig parts together and let your filler harden.

Now you may set your rip saw at the proper distance and safely pass your egg through.

*Forrest Brown
Hampstead, New Hampshire*



Aluminum Safety Shield

I often use a flexible shaft tool, equipped with a small sanding drum, for intricate detail sanding. It's work that requires all my concentration and attention and sometimes I hold the work, and the tool, pretty close to my body. Several times I have snagged the sanding drum in my shirt! Once, I broke the flexible shaft due to this problem. So, I cut a piece of thin aluminum (about a 10" x 10" square) and drilled a small hole near one edge. Now I hang this aluminum bib from my shirt button to protect myself and my shirts. Nothing catches on this smooth surface.

*Don Stutzman
Johnstown, Pennsylvania*

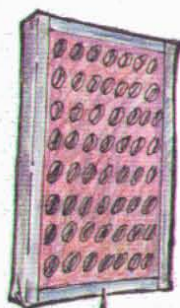
Double-stick Trick

The bottom bag on my dust collector is held tight with a locking band. The bag is always slipping off as I try to set the locking band in place. I discovered that if I put a bit of double-faced tape on the lip, the bag stays put as I drop the locking band in place.

*Tom Bowman
Woodburn, Indiana*

PICK OF THE TRICKS

Make a Dust Trap



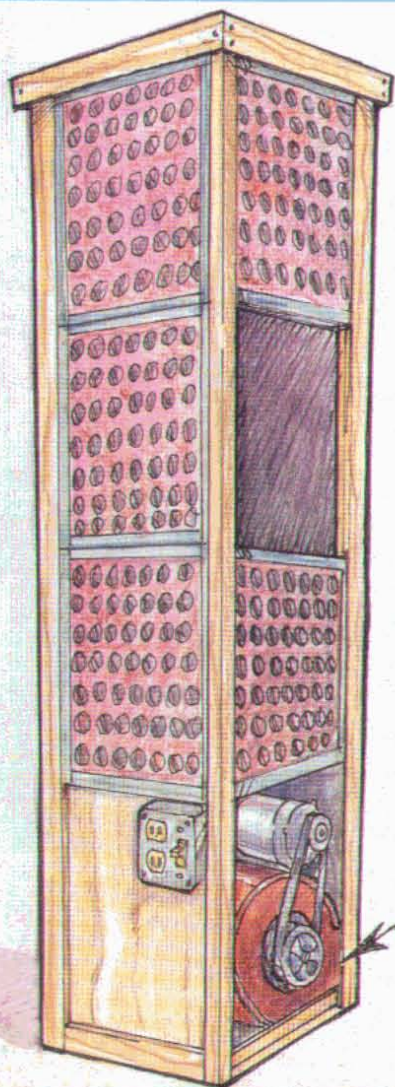
Filter

I made my own dust trap with twelve 15" x 20" filters and a squirrel cage fan salvaged from an old furnace. I built a frame and mounted the filters in courses of three per side.

The squirrel cage fan sucks the dusty air in through the filters and pushes it out of the bottom of the tower. I also wired a power outlet onto the bottom section for convenience. With the possible health problems associated with extensive dust exposure ... this is one "tool" I just won't work without.

*Michael Burton
Glorieta, New Mexico*

Squirrel cage fan



Tricks continues on page 26 ...

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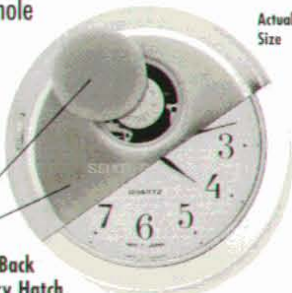
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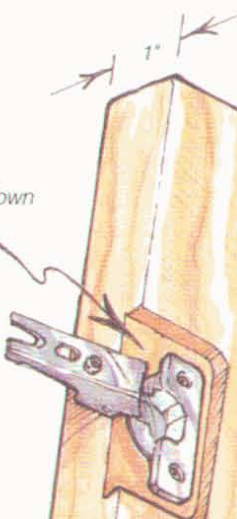
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Hinges for Thick Doors

I was retrofitting a beautiful old cabinet with those newfangled cup hinges when I ran into a problem. The old-fashioned doors were 1" thick rather than the current standard of 3/4". Instead of buying other hinges to accommodate the thicker doors, I devised a method that allowed me to use standard 32mm cup hinges. I simply routed out an area a little larger than the cup and screw flange, thus making the area where the hinge is mounted 3/4" thick. This method works well on inset doors and will accommodate all door thicknesses.

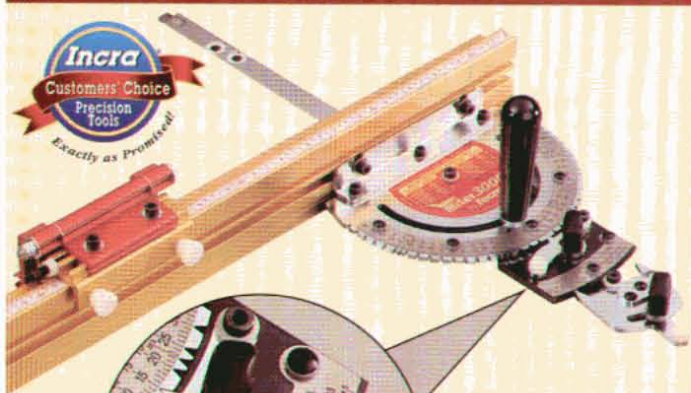
Dennis DiVito
Buena Vista, Virginia

Routed down to 3/4"



Winner! Michael Burton will receive Porter Cable's 9845 Saw Boss for submitting this month's Pick of the Tricks. **Woodworker's Journal** will pay from \$50 to \$150 for all Tricks of the Trade published. In addition, the reader whose trick is selected as our "Pick of the Tricks" will receive a free tool. To join in the fun, submit your original, unpublished trick to the editor. Include photos or drawings needed to explain your idea. Send all tricks to *Woodworker's Journal*, Dept. T/T, P.O. Box 261, Medina, Minnesota 55340. Or send us an e-mail: rjohnstone@woodworkersjournal.com.

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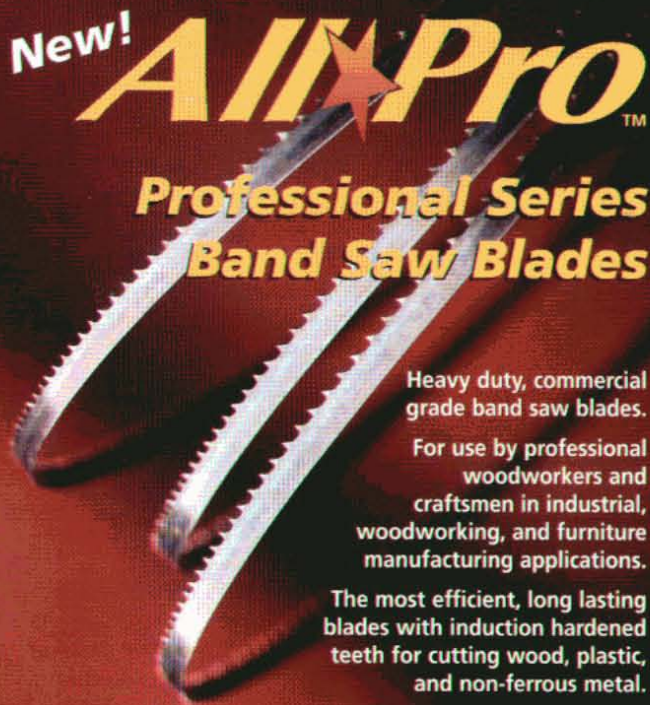
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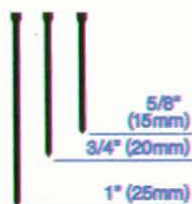
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Build a Bed Designed for Readers

By Rick White

This queen sized bed features a perfectly inclined backrest, three large storage compartments and three drawers for your bedside collectibles. The crowning touch? Open the middle drawer and drop the support down: you have a rock solid resting place for that steaming mug of hot tea.



Arched pediments, walnut accents, and solid ash construction are all part of a dream come true for bedtime readers.

There's an old adage that says "The longer your years, the shorter your days." Well, I'm not quite over the hill yet, but my days definitely seem to keep getting busier. Lately, the only quiet time Susie and I find to catch up on reading is late at night when the kids are finally asleep. Our old bed was pretty comfortable, but there was just no getting around the fact that it was designed for lying down, not sitting up and reading. Plus, our small bedside table didn't cope very well with all the magazines, plans and catalogs I accumulate every week. Besides which, the joints were going (the bed's, not mine!), so it wasn't much of a sell when I suggested to Susie that we design and build something more suited to our current lifestyle.

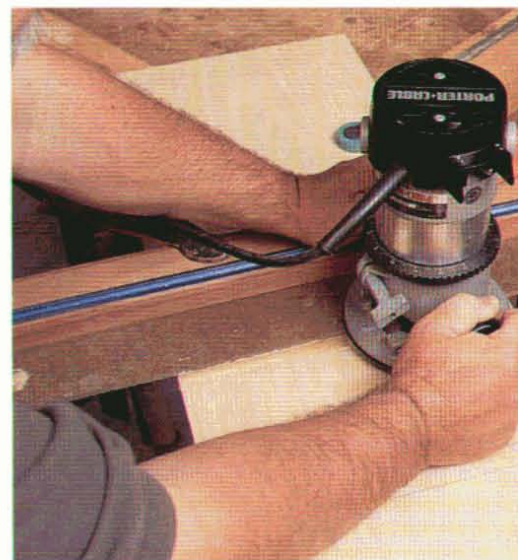
We came up with this multiple use queen sized bed. It features comfortable back support for reading and lots of storage. One key feature is the flip-down doors that are supported by the pull-out drawers. The backs of the doors then become small, but sturdy tables to hold books, popcorn bowls or maybe even your remote control ... sometimes we watch instead of read.

Simple Headboard Cabinet Design

The headboard is essentially just a plywood cabinet with nine separate compartments. This subassembly is secured between two legs and topped off with a gently curved arched pediment.

Begin building the cabinet by cutting the sides, dividers, top, bottom and shelves (pieces 1 through 6) to size. You'll want to check the *Exploded Views* and

Elevation Drawings throughout this article for the construction details. As this is hardwood veneered plywood, make the straight cuts with a fine toothed plywood blade on the table saw. Keep the best looking side of each panel facing up as you cut: the tearout will occur when the blade exits the workpiece. Grab your router and straight bit to plow three 3/16" deep dados across each side, and four across each divider (two on each side), as shown in the photo below. As the *drawings* show, these are all through cuts. Once they're made, adjust the bit depth to 1/4" to create stopped rabbets along the back edge of each side and the top, to accommodate the back. With the routing completed, lay out the angled front edges of the sides and dividers. Trim the angled cuts close to your line with a saber saw, then clamp on a straightedge and clean



The dados for the headboard's straightforward joinery are plowed while the sides and dividers are still rectangular. The angled front edges are laid out and cut next.



up the edges with a 3/4" straight bit
chucked in your portable router, as
shown in the photos above.

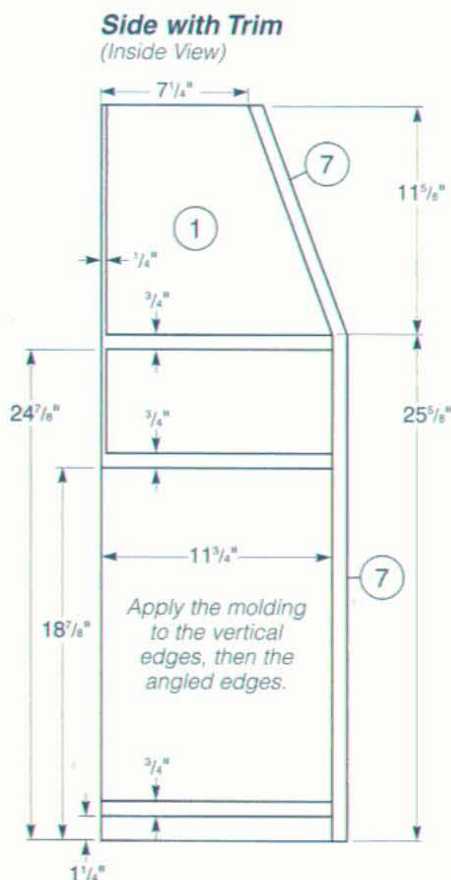
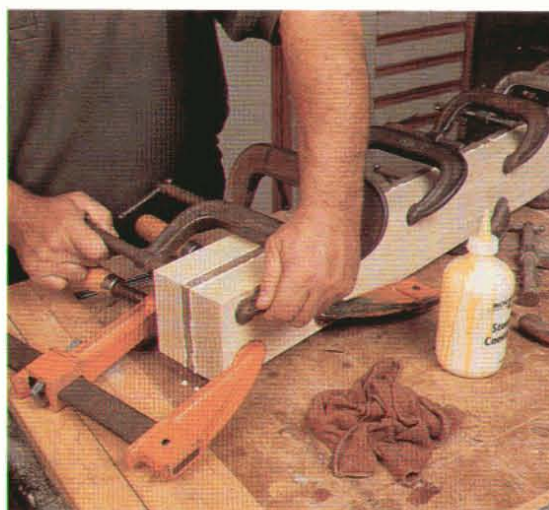
Dry fit the cabinet together, then mill enough cap stock (piece 7) to trim the front edges of all the cabinet parts. This is just square stock, ripped and planed to size.

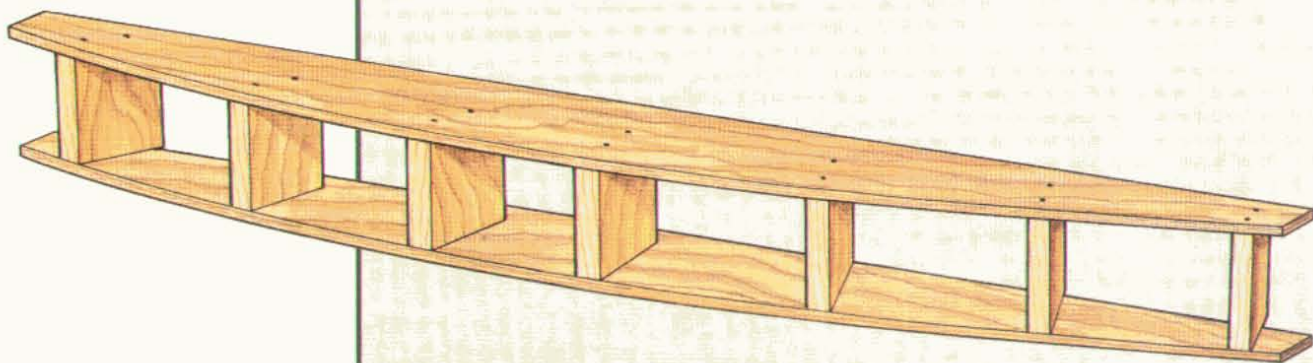
Assemble the cabinet with glue and clamps, making sure that it's flat and square. When the glue is dry, miter the cap stock to fit and apply it to the cabinet with glue and finish nails. Be sure to apply the vertical strips first. Predrill pilot holes in the hardwood for the nails and set the nail heads below the surface. The last trim to be applied is the upper shelf trim (piece 8), which helps to frame the drawer openings. Apply a matching filler and sand it smooth after it dries. The plywood back (piece 9) and the lower panels (pieces 10 and 11) close up the headboard. Attach

panel cleats (piece 12), setting them 7/8" in from the front of the headboard, and secure the panels with glue and screws. Fit the back into its rabbet and use brads to firmly attach it.

Laminated Legs

The two headboard legs are created by laminating pieces of ash lumber to a 1/2" thick walnut core. Face glue and clamp one long ash





Curved Laminations

lamination (piece 13) to each of the walnut laminations (pieces 14). After the glue dries, clamp the two short ash laminations (pieces 15 and 16) to the other side of the leg and clamp them in place.

When dry, run each assembled leg across the jointer. Later, you'll need to form gentle curves onto the top of each leg to mate them to the arched pediments.

A Graceful Arched Pediment

The curved top of the headboard and the footboard (the pediments) are built up with a series of five 3/8" thick ash laminations (pieces 17) that are glued together in a plywood form. A sixth walnut lamination (pieces 18) will be installed after the pediments are secured to the legs.

A bending form forces each lamination into an arched shape and holds them all tightly together while the glue dries. After you rip and crosscut all 12 laminations to size, refer to the sidebar (at right) and *Elevation Drawings* for directions on building your form. Then apply a liberal amount of adhesive between five of the ash laminations and clamp them in place securely.

When the adhesive is dry, scrape off the excess and pass one edge of the pediment across the jointer. Set your table saw fence so it's 6 5/16" from a sharp ripping blade and rip the pediment to width. (You may need a helper for this task — the pediment is a handful.) Then pass the ripped edge across the jointer, reducing the part to its final 6 1/4" width. Crosscut it to 68 1/2" long (measuring along the curve), then

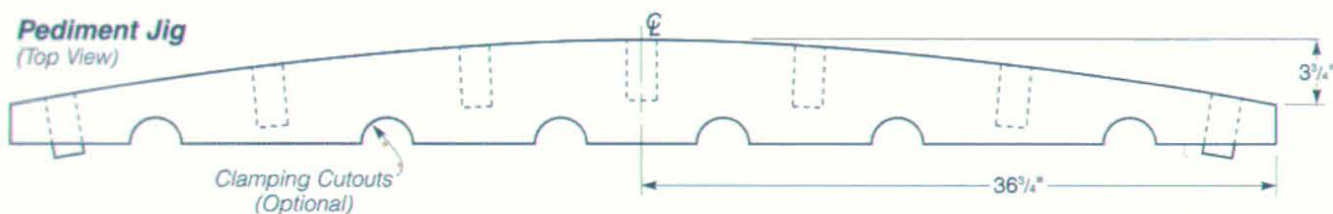
The arched pediments on the head and foot of the bed are created by gluing hardwood laminations together while clamped to a shaped form. The form I used was made from plywood shaped and mounted to dimension lumber with glue and screws. It is important that the form's curve be fair and true. To form the curve on your jig, mark the endpoints and centerpoint and flex a thin strip of hardboard to layout the curve. I used a 4 x 24 belt sander to smooth out the long gentle arc. The form also needs to provide good purchase for the many clamps it takes to apply even pressure to the build-up. If you're limited to using shorter clamps, make some clamp cutouts, as shown in the *Elevation Drawing* on the following page.

The type of adhesive to use is a significant consideration for this task. White or yellow woodworking glues will probably work, but are too elastic for my peace of mind. They could allow the curve to creep and change shape. I prefer epoxy for this operation and specifically a mixture with a long open time. The open time not only provides enough time to place the laminations around the form and clamp them properly, but it allows the resin time to infiltrate the wood fibers, thus creating a better and stronger bond. Polyurethane glues are also a good choice for dry bent lamination.

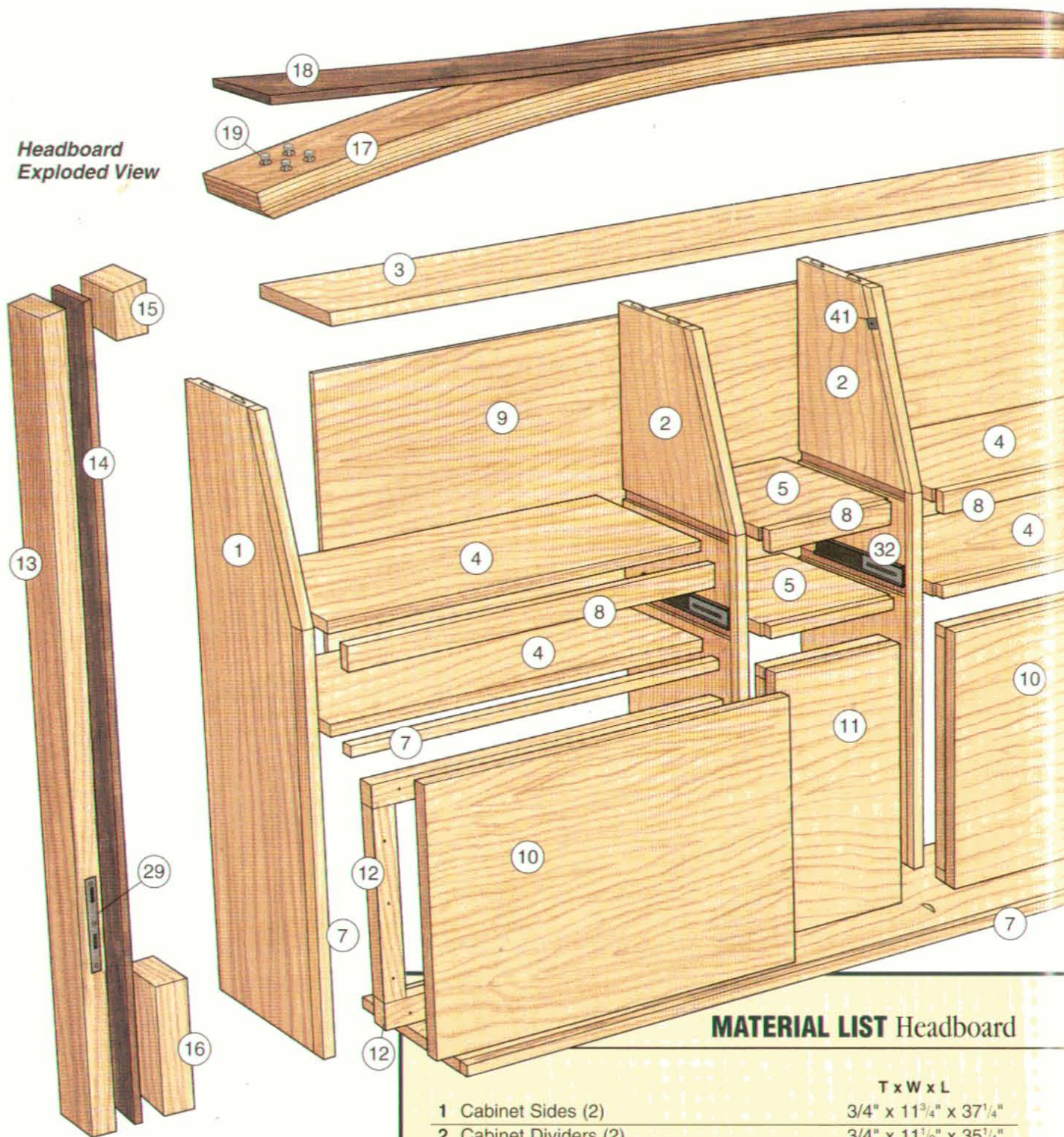


Go with epoxy or polyurethane glues for dry bent laminations. Yellow or white glues are not recommended.

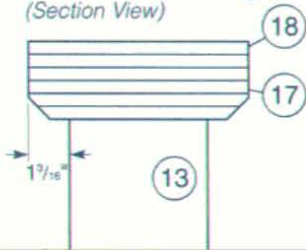
Pediment Jig
(Top View)



Headboard Exploded View



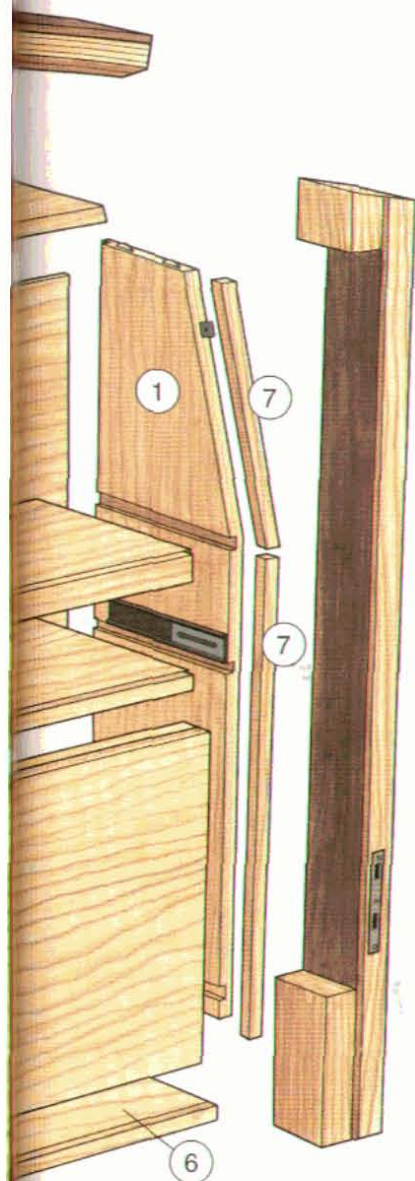
Pediment and Leg
(Section View)



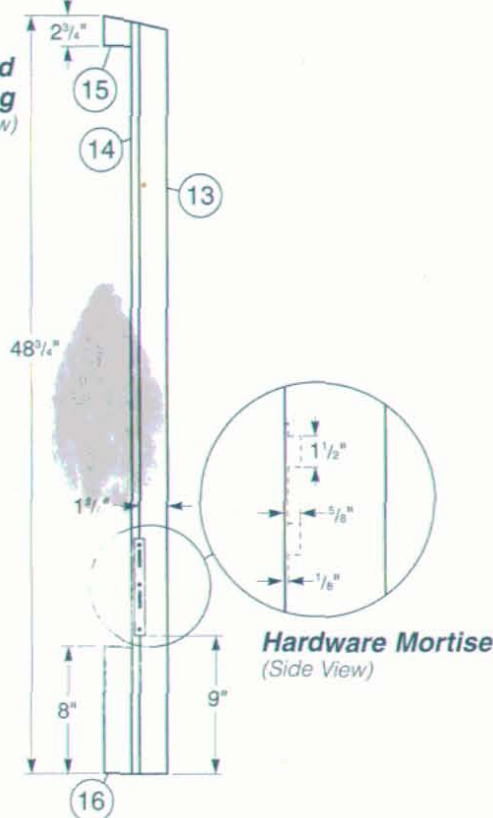
MATERIAL LIST Headboard

	T x W x L
1 Cabinet Sides (2)	3/4" x 11 3/4" x 37 1/4"
2 Cabinet Dividers (2)	3/4" x 11 1/2" x 35 1/4"
3 Cabinet Top (1)	3/4" x 8 1/4" x 61 1/4"
4 Cabinet Large Shelves (4)	3/4" x 11 1/2" x 25"
5 Small Shelves (2)	3/4" x 11 1/2" x 9 3/8"
6 Cabinet Bottom (1)	3/4" x 11 3/4" x 60 1/8"
7 Cap Stock Molding (1)	3/4" x 3/4" x 350"
8 Upper Shelf Trim (1)	3/4" x 1 3/4" x 60"
9 Cabinet Back (1)	1/4" x 18 7/8" x 60 3/4"

*Sufficient material for headboard and footboard pediment



Laminated Leg
(Front View)

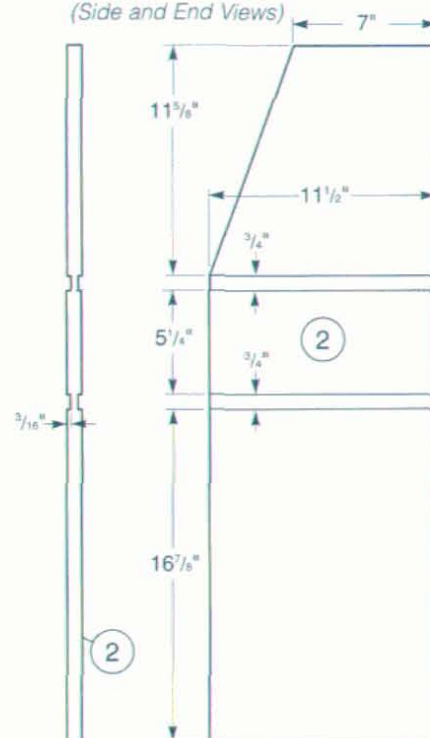


Hardware Mortise
(Side View)

chamfer the bottom edge with a 45° bearing-guided chamfering bit. Run the bearing along the bottom face of the pediment, so the router can ride the jointed sides (rather than having to follow the curve). Using several passes, shape the ends first, then the sides: this will eliminate any tearout from cutting across the grain on the ends. Before moving on, repeat this process to create the footboard pediment — it's identical to the headboard pediment.

Now clamp the legs temporarily in place on the headboard. Center one of the pediments on the two legs and trace its curve onto the face of the legs. Remove the legs

Cabinet Divider
(Side and End Views)



and step to the band saw to cut the ends of each leg to the curved layout lines. Sand the curves smooth and exactly to the lines on a stationary disk sander. When you're satisfied that the curve on the pediment and leg are a perfect match, glue and clamp the legs in place on the headboard.

Grab one arched pediment and position it on the headboard subassembly. Mark the leg locations on its underside and bore pilot holes through the piece. Then attach the pediment to the legs, after predrilling for the 3 1/2" long lag bolts (pieces 19). The reason you're using such large bolts is that people are bound to use the arched pediments as handles to lift the bed, so these joints will be subject to some serious stress. Countersink for the bolt heads, making sure they are below the surface before you proceed to the next step.

Wrap up by gluing and clamping the final (walnut) lamination in place. After the glue dries, use a bearing-guided laminate trimming bit to pare the edges flush with the ash. Sand the edges, and you're ready to move on to the footboard.

	T x W x L
10 Large Lower Panels (2)	3/4" x 16 7/8" x 24 5/8"
11 Small Lower Panel (1)	3/4" x 16 7/8" x 9"
12 Panel Cleating (1)	3/4" x 1 1/2" x 210"
13 Long Leg Outside Laminations (2)	1 3/4" x 4" x 48 3/4"
14 Long Leg Center Laminations (2)	1/2" x 4" x 48 3/4"
15 Upper Long Leg Inside Lamination (2)	1 3/4" x 4" x 2 3/4"
16 Lower Long Leg Inside Lamination (2)	1 3/4" x 4" x 8"
17 Pediment Ash Laminations* (10)	3/8" x 6 3/8" x 72"
18 Pediment Walnut Laminations* (2)	3/8" x 6 3/8" x 72"
19 Lag Bolts (16)	3/8" Dia. x 3 1/2"

Solid Ash and Walnut Footboard

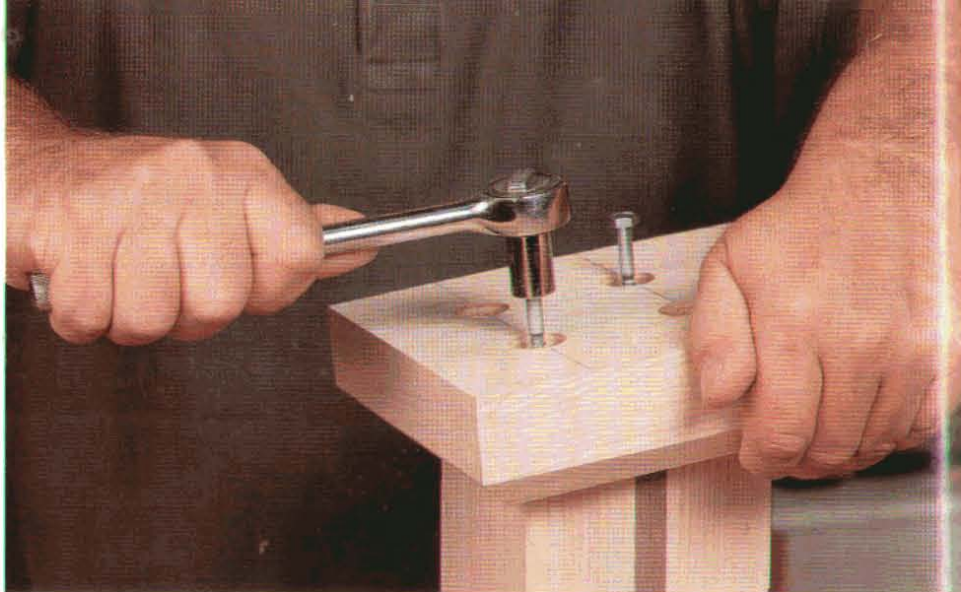
The only difference between the headboard and footboard (aside from height) is that the latter sports a couple of hardwood panels instead of a cabinet. Construction begins with the legs. Face glue and clamp two ash laminations (pieces 20) around a walnut one (piece 21), and dress it on the jointer after the glue dries. Do this for each leg and then crosscut them to length. On the router table, plow stopped mortises into the inside faces of the legs and square out the ends of each mortise with a chisel.

Edge glue hardwood stock to make the footboard panels (pieces 22 and 23), paying attention to the grain pattern. Size the panels to create the upper and lower sections and then plow a 1/2" groove along the joining edges. Cut the curved shape on the upper edge as shown in the *Elevation Drawings*. Mount a dado head in your table saw and machine the 1/2" x 1/2" tenons onto the panels ends. Mill the decorative walnut strip (piece 24) which fits between the upper and lower panels to size. Sand both panels (and the walnut strip) to 180 grit, and then glue and clamp the panel subassembly between the legs to complete the footboard.

Attach the footboard pediment (which you made earlier) in exactly the same fashion as the headboard version. Apply the final walnut lamination, clean up and sand the edges smooth.

Side Rails and Moldings

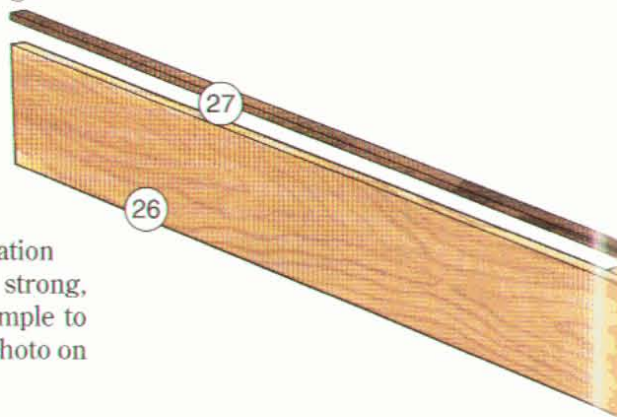
There isn't much to the side rail assemblies: they're just a couple of lengths of molding (pieces 25) attached to boards (pieces 26). Rip the moldings to size, then lay out the five dados in each, at the locations shown in the *Elevation Drawings*. Install a dado head in the table saw and make the cuts with the aid of your miter gauge. The last step is to glue the walnut accent strip (pieces 27) to the top edge of each rail. Lastly, sand it smooth for finishing later.



Heavy-duty lag bolts ensure that the arched pediments will not come loose from the bed's legs. Make sure you sink the heads below the level of the arch.

After sanding, screw and glue the moldings to the side rails. Form five lengths of stock to serve as the rail slats (pieces 28). These fit into the dados in the side rail moldings and will support your box spring once the bed is assembled. Now you're ready to attach the rails to the headboard and footboard. This is done with hardware designed specifically for this application (pieces 29). They're very strong, totally invisible and quite simple to work with, as shown in the photo on the last page of this article.

Footboard and Side Rail Exploded View

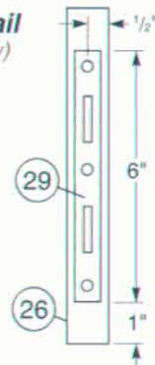


Three Drawers for Storage

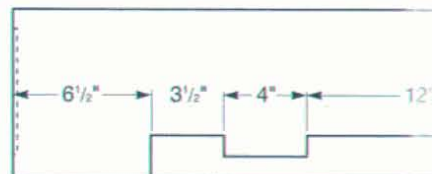
Our bed features three 12" deep drawers, two of which are ideal for storing stationery and reading materials. The third, smaller drawer is designed for reading glasses, pens and similar items.

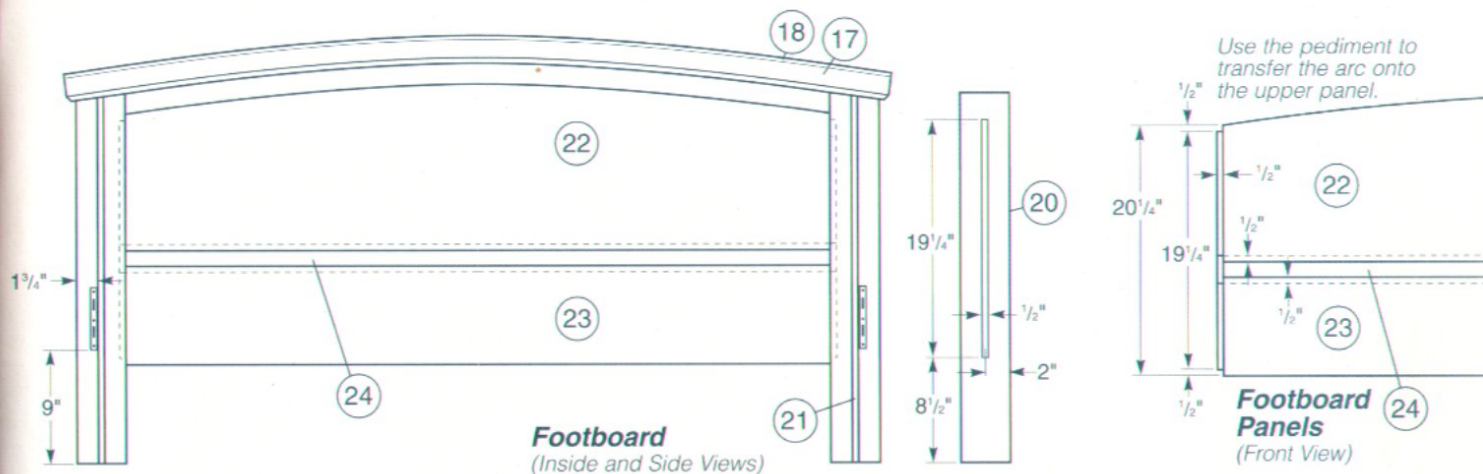
Cut the drawer fronts, backs and sides (pieces 30 through 32) to size, then chuck a 1/4" straight bit in the router table. Plow a through groove in each part for the drawer bottoms (pieces 33 and 34), as shown on the next page. Then, select the drawer sides and mill a vertical dado near each end, in the same face as the groove you just plowed. Each dado is 1/4" square and is located 1/4" in from the end of the workpiece.

Side Rail (End View)



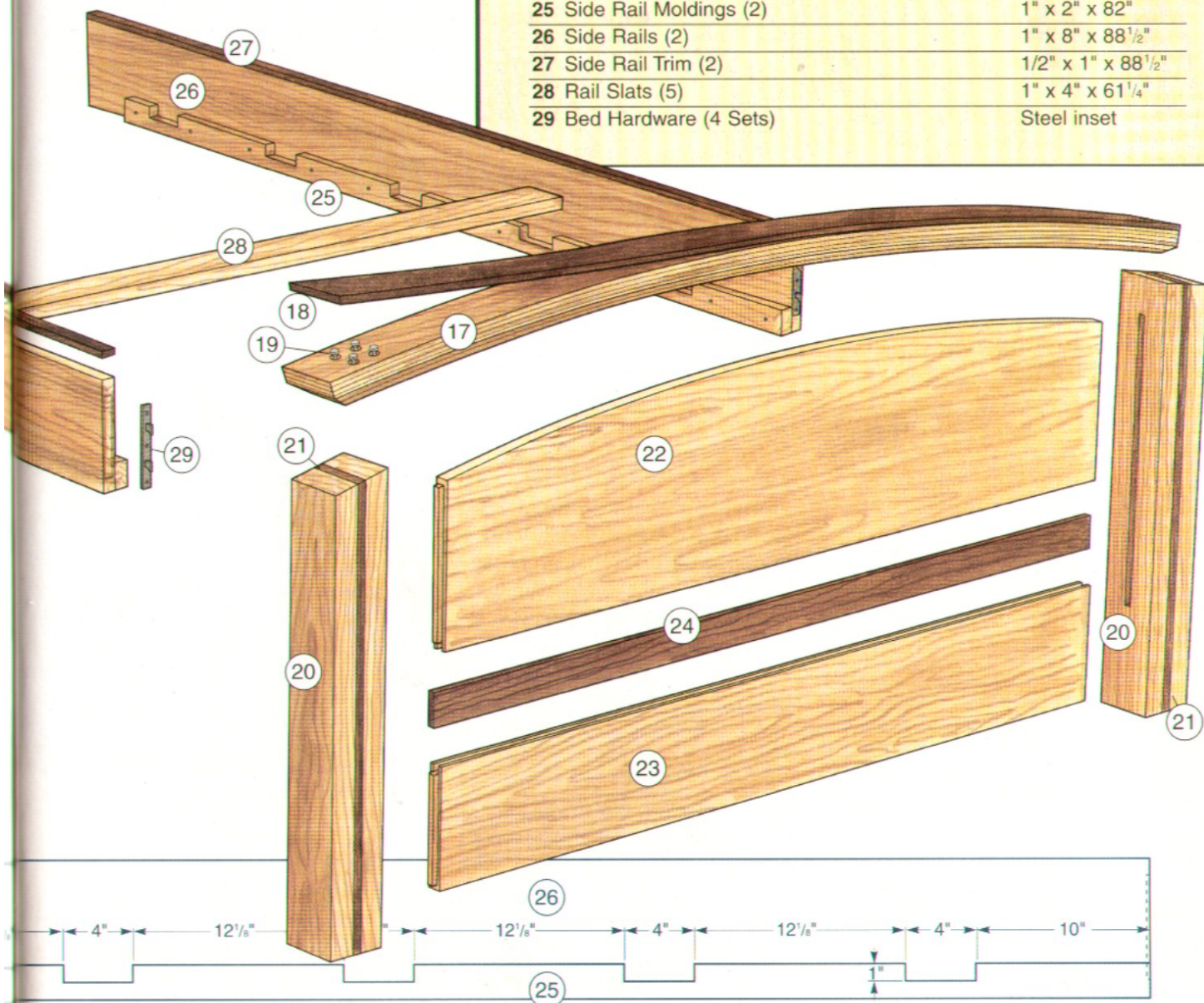
Side Rail and Molding (Inside View)

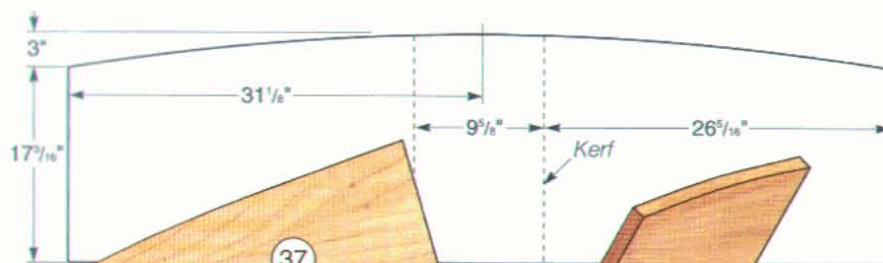




MATERIAL LIST Footboard

	T x W x L
20 Short Leg Outside Laminations (4)	1 3/4" x 4" x 30"
21 Short Leg Center Laminations (2)	1/2" x 4" x 30"
22 Footboard Upper Panel (1)	1" x 13 1/2" x 58 1/4"
23 Footboard Lower Panel (1)	1" x 8" x 58 1/4"
24 Footboard Walnut Strip (1)	1/2" x 2 1/4" x 58 1/4"
25 Side Rail Moldings (2)	1" x 2" x 82"
26 Side Rails (2)	1" x 8" x 88 1/2"
27 Side Rail Trim (2)	1/2" x 1" x 88 1/2"
28 Rail Slats (5)	1" x 4" x 61 1/4"
29 Bed Hardware (4 Sets)	Steel inset





Tilting Doors (Front View)

Glue up the tilting doors as one large piece. Form the gentle curve on the top edge before cutting the individual doors to length.

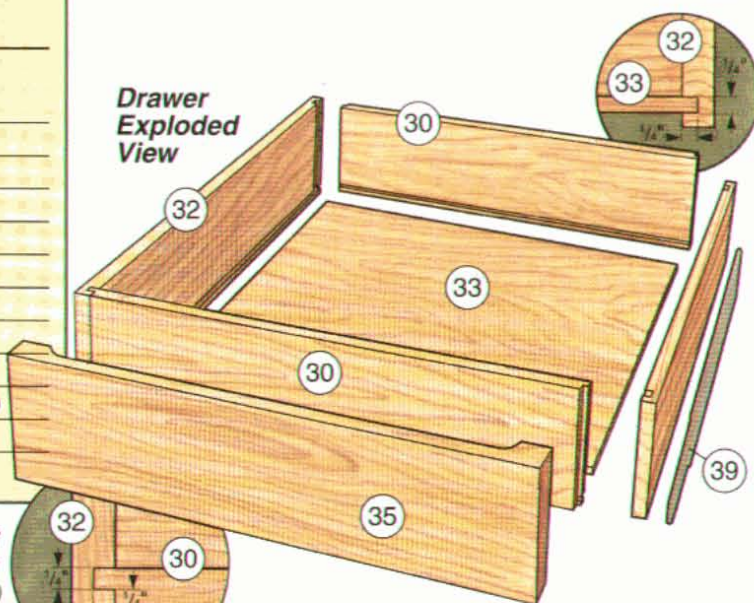
Tilting Door Exploded View

Drawer Bottom Groove (Section View)

MATERIAL LIST Doors and Drawers

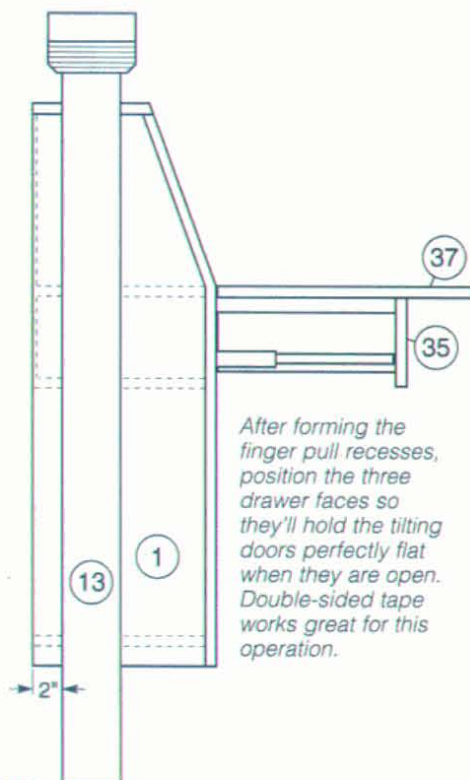
	T x W x L
30 Large Drawer Fronts & Backs (4)	1/2" x 4" x 23"
31 Small Drawer Fronts & Backs (2)	1/2" x 4" x 7 1/2"
32 Drawer Sides (6)	1/2" x 4" x 12"
33 Large Drawer Bottoms (2)	1/4" x 11 1/2" x 23"
34 Small Drawer Bottom (1)	1/4" x 7 1/2" x 11 1/2"
35 Large Drawer Faces (2)	3/4" x 6" x 26 3/16"
36 Small Drawer Face (1)	3/4" x 6" x 9 5/8"
37 Large Tilting Doors (2)	1" x 17 3/16" x 26 3/16"
38 Small Tilting Door (1)	1" x 17 3/16" x 9 5/8"
39 Drawer Slides (3 Pairs)	Accuride™ full extension
40 Door Hinges (3 Pairs)	1 1/2" Brass piano
41 Door Catches (3)	Magnetic

Drawer Exploded View



Drawer Joint Detail (Top View)

Headboard Assembly (Side View)



After forming the finger pull recesses, position the three drawer faces so they'll hold the tilting doors perfectly flat when they are open. Double-sided tape works great for this operation.

Use the same 1/4" router bit to cut rabbets on the ends of the drawer fronts to make a slick locking corner joint, then dry fit the drawers together. When everything works, assemble them with glue and clamps. Make sure they're flat and square as the glue dries.

Solid Hardwood Drawer Faces

You'll give your bed a great look if you arrange a continuous grain pattern through the hardwood drawer faces (pieces 35 and 36) and the tilting doors above them (pieces 37 and 38). If you edge glue stock to produce this effect, match the grain along the joint so it looks as though all six parts were cut from the same board.

Following the manufacturer's instructions, use heavy-duty, full extension drawer slides (pieces 39) to install the three drawers in their openings. Full extension slides allow the drawers to pull out far enough to support the doors above them. The heavy-duty rating means that even an unabridged edition of *War and Peace* won't cause them to sag. Hold off on mounting the drawer faces until the doors are in place.

Uniquely Designed Tilting Doors

The three tilting doors in the headboard are what really fulfill a reader's dreams. All three conceal cavities large enough to store a great deal of printed matter, while either of the larger doors drops down to become an instant desk (depending on which side of the

Putting it all together

bed you prefer). The smaller, middle door transforms into a shelf for popcorn or a TV remote.

You have already glued up stock for the doors: now you can cut them to size. Reduce them to a rectangle on the table saw, then arc the tops on the band saw. Belt sand the saw marks, then sand all three doors and break their edges gently with 180 grit paper.

Mount the doors using heavy-duty piano hinges (pieces 40). Mark the locations of the hinges on the doors and the headboard. Install just a couple of screws per hinge to assure you have the alignment right. Once you're sure all is correct, install the remaining screws. When the doors fit nicely, mount the magnetic door catches (pieces 41) to keep the doors from accidentally opening while, umm ... reading. With all three drawers mounted in their openings and fully extended, open the tilting doors. Locate the drawer faces so they'll support the doors at a true 90°. I suggest using double-sided tape or hot melt glue to temporarily locate and attach the faces and make sure they are properly spaced left to right. Remove the drawers and secure the faces with screws, working from the inside of the drawers. Be sure to predrill and countersink for your screws. When your holes

are all drilled, remove the faces and use a 3/4" corebox bit mounted in your router table to create the finger pulls. I used stops to keep the recesses about 1" in from each end.

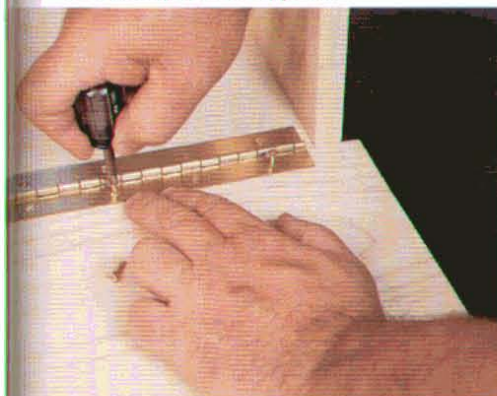
Final Touches and Finishing

The only thing left to do before you pull out the mattress and take a break is to apply a finish. Remove the drawers, then sand everything down to 220 grit. Use a tack cloth to remove residual dust, then apply a coat of clear sanding sealer. I used three coats of satin polyurethane, sanding lightly between each with 400 grit wet/dry paper. After the finish is dry, reinstall the hardware and reassemble the bed. As hard as you've been working, it's time for a well deserved nap.

Contributing editor Rick White has built many projects for Woodworker's Journal. He answers reader's questions in our eZine, a free electronic publication available at woodworkersjournal.com.



Heavy-duty drawer slides are an important feature, as the drawers (when open) do double duty as door supports.



Sewing machine hinges were tested, but weren't up to the job. Piano hinges offer the strength and support these doors need.

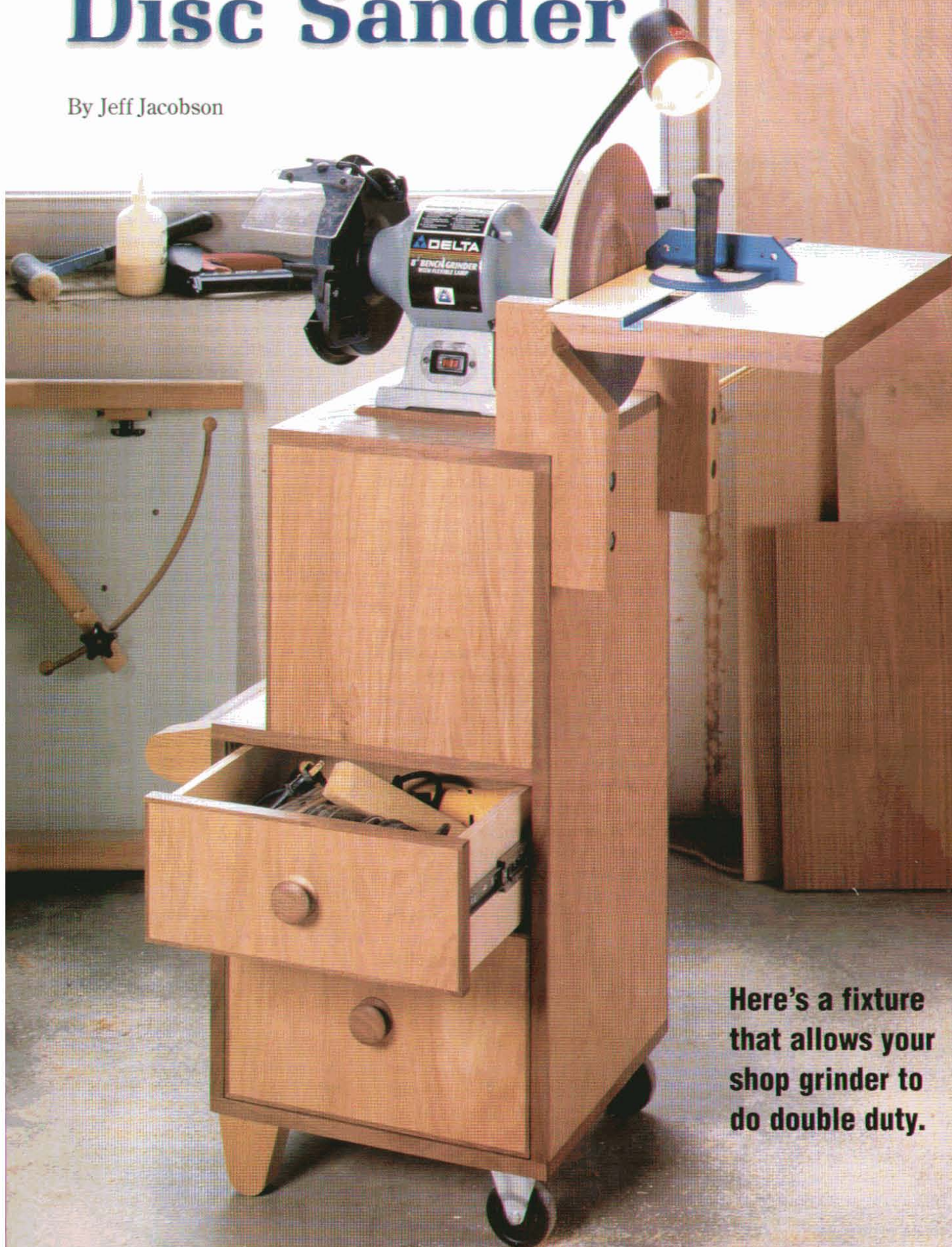


Installing knock-down bed rail hardware in mortises keeps it invisible when assembled.



Shop-built Disc Sander

By Jeff Jacobson



**Here's a fixture
that allows your
shop grinder to
do double duty.**

Glue up trim like a pro

You never can tell where you'll end up when you begin to get creative. I always thought a disc sander would be a useful addition to my shop, but I could never justify the purchase. I was in the middle of yet another project where a disc sander would have made things easier, when it hit me. I did have a disc sander! Well, what I had was a couple of bench grinders and it seemed to me that converting one of them into a disc sander would be a piece of cake. Then I decided the sander would need a stand ... which of course led to this cabinet ... you know the drill, a typical woodworker's day in the shop!

If you decide to build this project, use a grinder that revolves at 1,725 RPM or less for safety reasons, and also to avoid burning your wood.

A Solid Cabinet for the Base

Get started on the cabinet by cutting the bottom, shelf, top, sides, front and back (pieces 1 through 7) from a sheet of oak veneered plywood. And while you're at the table saw, make the storage bin shelves (pieces 8) from 1/4" plywood.

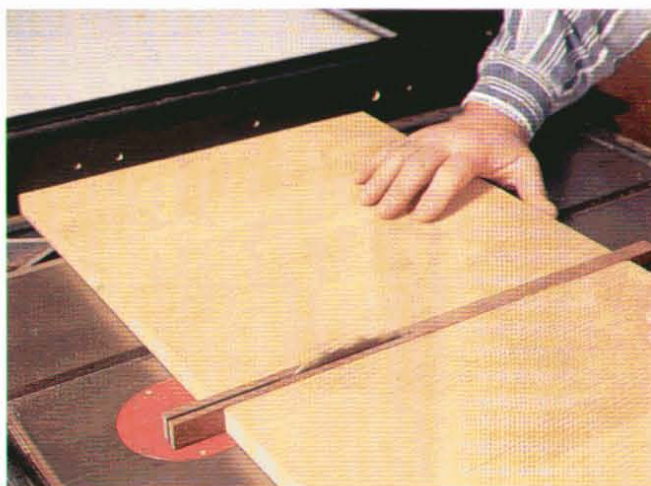
While most of the milling with this project takes place on the edges of the stock, there is a little routing required. Chuck a 3/4" straight bit in your router and clamp a straightedge in place to plow the dado in the cabinet back for the cabinet shelf: its location is shown in the *Elevation Drawings* on the following page. Switch to a 1/4" bit and mill the dadoes for the storage bin shelves on the inside faces of the upper sides.

All of the panels are trimmed to some degree with 1/4" thick solid walnut (piece 9), and some of this trim must be attached before you start milling grooves. Use the technique shown in the photos above to attach trim to the back edge of the cabinet top, the front edge of the shelf and both the front and back edges of the cabinet bottom.

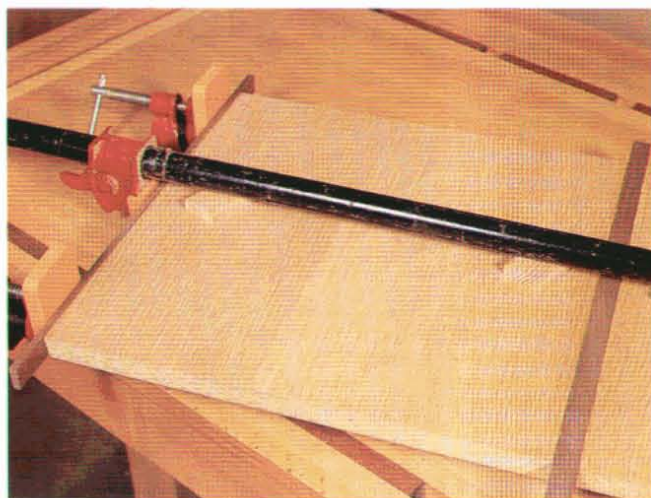
Start by gluing and clamping a strip of solid hardwood between two pieces of plywood. With this approach, the clamping pressure is even and strong across the entire joint.



Rip the assembled pieces down the middle, leaving two securely attached strips of hardwood in place. The strip is machined to be a bit thicker than the plywood.



Now simply spin the plywood panels around and repeat the process. Whenever your trim is likely to get abuse, this method of glue-up provides a slightly stronger bond.



When the glue is dry, mount a 3/8" dado head in your table saw and mill the appropriate dadoes, grooves and rabbets, as shown in the *Drawings*. The grooves will be captured by the hardwood edging. As you assemble the cabinet, the method behind this construction technique will become clear.

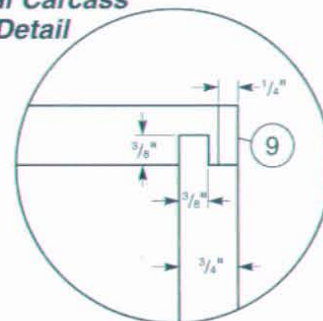
Assemble the Base

Glue and clamp walnut trim (ripped to 1/4" thickness) along the remaining plywood edges of the cabinet pieces, as shown in the *Exploded View* on the next page. Note that the trim stops short of the rabbets on the front, back and shelf. Dry fit and temporarily clamp the

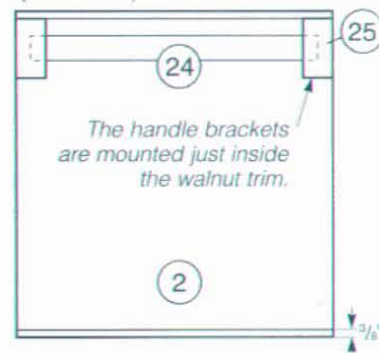
Cabinet Upper Sides (Inside View)

Carcass Exploded View

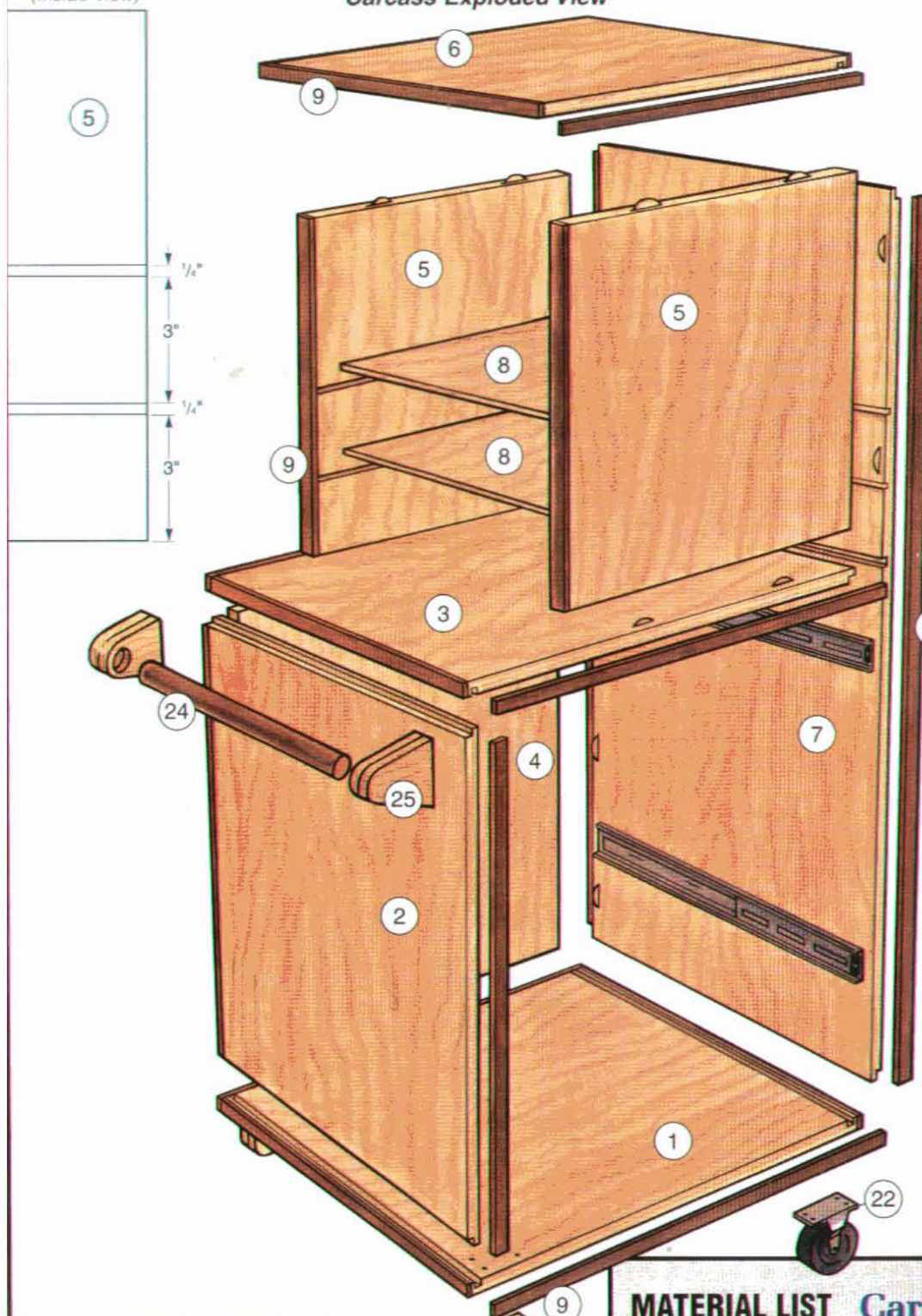
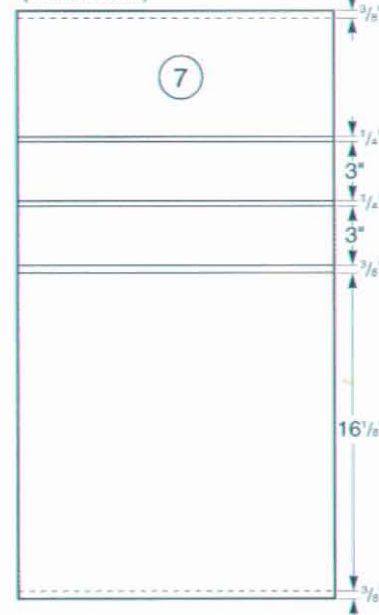
Typical Carcass Joint Detail



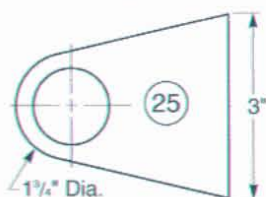
Cabinet Front (Front View)



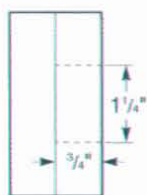
Cabinet Back (Inside View)



The handle brackets and cabinet feet are shaped exactly the same. The brackets for the feet have no borings for a handle.



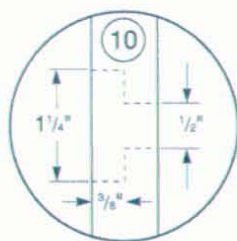
Handle Brackets (Inside and End Views)



MATERIAL LIST Carcass and Disc Sander

	T x W x L
1 Cabinet Bottom (1)	3/4" x 16" x 15 1/2"
2 Cabinet Front (1)	3/4" x 16" x 16 1/2"
3 Cabinet Shelf (1)	3/4" x 16" x 15 3/8"
4 Cabinet Lower Side (1)	3/4" x 16 1/8" x 14 1/8"
5 Cabinet Upper Sides (2)	3/4" x 12 1/4" x 12 1/2"
6 Cabinet Top (1)	3/4" x 16" x 12 3/4"
7 Cabinet Back (1)	3/4" x 16" x 29 3/4"
8 Storage Bin Shelves (2)	1/4" x 15 3/8" x 11 1/8"
9 Walnut Trim (1)	1/4" x 3/4" x 400"

*Final thickness is 1/4". Note the technique shown on page 39.



Disc Arbor Boring
(Side View)

Disc and Table Exploded View

Locate the miter gauge groove to fit your specific miter gauge.

Table and Mounting Block Assembly
(Side View)

Attach the table bracket to the mounting block, which is positioned just inside the walnut trim.

	T x W x L
10 Disc (1)	3/4" x 12"
11 Disc Laminate (1)	1/32" x 13" x 13"
12 Disc Spacer (1)	Cut to fit
13 Grinder Sub-base (1)	Cut to fit
14 Table (1)	1 1/2" x 12" x 18"
15 Walnut Table Edging (1)	1/2" x 1 1/2" x 43"
16 Table Laminate (1)	1/32" x 13" x 19"
17 Miter Gauge Channel (1)	Aluminum, trim to length
18 Table Mounting Blocks (2)	1 1/2" x 5" x 12"

	T x W x L
19 Block Bolts & Nuts (4 Sets)	5/16" x 4"
20 Table Hinges (1 Pair)	1 1/2" Brass
21 Table Support (1)	Brass lid support
22 Cabinet Casters (2)	3" Dia.
23 Cabinet Feet (2)	1 1/2" x 3" x 3 1/2"
24 Cabinet Handle (1)	1 1/4" Dia. x 14 1/2"
25 Cabinet Handle Brackets (2)	1 1/2" x 3" x 3 1/2"

Hard-to-find Supplies

The following hard-to-find supplies are available from Woodworker's Journal.

43298 Sure-Loc™ Miter Gauge.....\$89.99

35252 32" Miter Track.....\$14.99

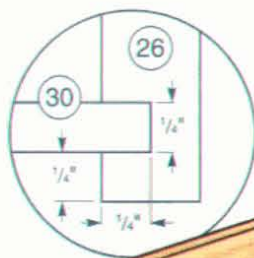
32102 Table Support.....\$19.49

25825 1 1/2" Pair Brass Butt Hinges.....\$4.99

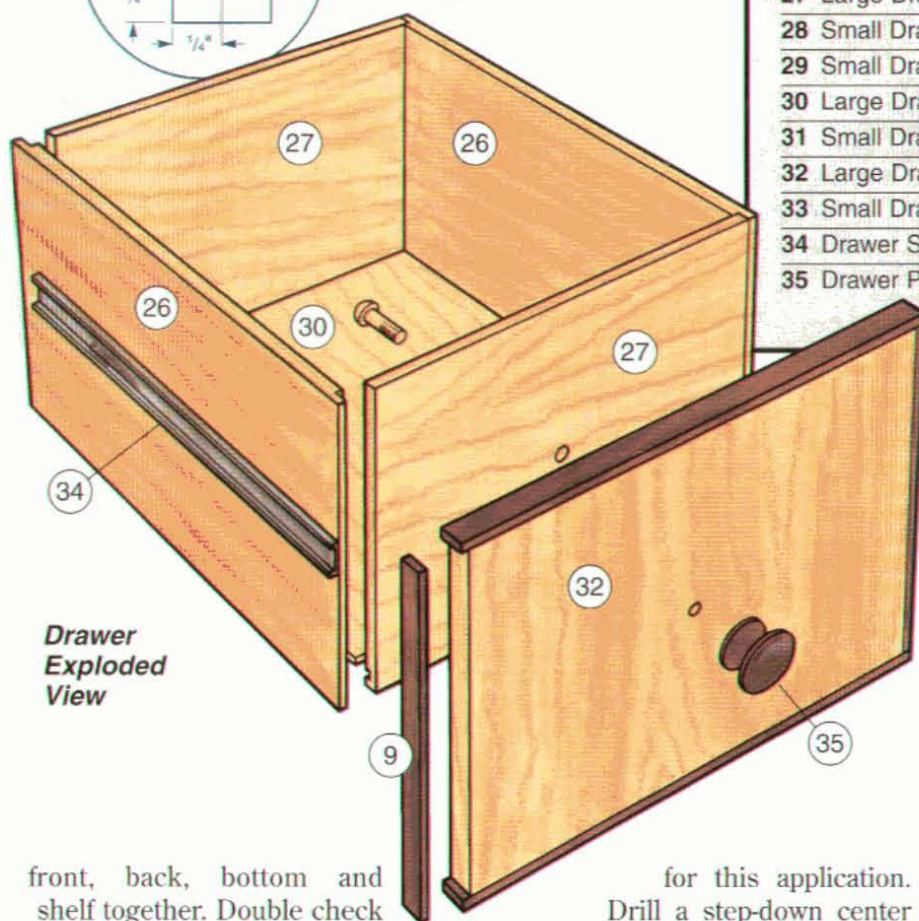
35685 14" Full Extension Slides*.....\$20.49

* Two sets required.

To order your supplies, call **800-610-0883**.



Drawer Bottom Groove
(Section View)



Drawer Exploded View

front, back, bottom and shelf together. Double check the size and fit of the lower side and upper sides, making adjustments as necessary. The sides are installed with biscuits, so you can mark their locations and cut their slots now. Then assemble the cabinet with glue and clamps, dropping the lower side (and its biscuits) in place as you do.

Next, install the upper sides and the top with glue, clamps and biscuits, capturing the storage bin shelves. Check that everything is square as you tighten the clamps.

The Heart of the Project

The reason I started this whole project was to end up with a disc sander. I decided on a 12" disc to match the standard size stick-on discs available through catalogs and home improvement centers. I definitely recommend using plywood: MDF and particleboard are not structurally stable enough

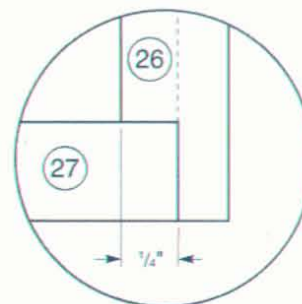
for this application. Drill a step-down center hole to match the diameter of your grinder's arbor as well as the nut and washer, then cut the disc (piece 10) to size on the band saw. Stay just outside your layout lines and finish to the center of the pencil line with a belt sander.

Apply plastic laminate (piece 11) to the sandpaper side of the disc, using a good quality contact adhesive, then trim it to size with a bearing-guided flush trim bit. Break the sharp edges of the disc with sandpaper, and don't forget to remove the laminate over the center hole.

The cylindrical hardwood spacer (piece 12) provides support for the disc, but it also takes up space on the arbor so the threads are barely shy of the sanding disc face. Band saw the spacer after boring the arbor hole on the drill press (to ensure that it is exactly 90° to the disc face). Slide the spacer and disc

MATERIAL LIST Drawers

	T x W x L
26 Large Drawer Sides (2)	1/2" x 8 3/4" x 14"
27 Large Drawer Front & Back (2)	1/2" x 8 3/4" x 13"
28 Small Drawer Sides (2)	1/2" x 5 1/2" x 14"
29 Small Drawer Front & Back (2)	1/2" x 5 1/2" x 13"
30 Large Drawer Bottom (1)	1/4" x 13 1/2" x 13"
31 Small Drawer Bottom (1)	1/4" x 13 1/2" x 13"
32 Large Drawer Face (1)	3/4" x 9" x 14"
33 Small Drawer Face (1)	3/4" x 5 5/8" x 14"
34 Drawer Slides (2 Pairs)	14" Full extension
35 Drawer Pulls (2)	Walnut



Drawer Corner
(Top View)

onto the arbor and lock them in place with the nut and a washer. Then stick an 80-grit paper disc to the disc and mount the grinder on the cabinet. Depending on the model, you may have to install a sub-base (piece 13) under your grinder to achieve 1/4" of clearance between the bottom of the disc and the top of the cabinet. Alter the thickness of this piece as required.

An Adjustable Table

The tabletop (piece 14) is comprised of three thicknesses of 1/2" plywood, face-glued together. The hinged edge is chamfered on the table saw at 45°, and the other three edges are then laminated with 1/2" thick walnut table edging (piece 15), mitered at the corners. After sanding, apply plastic laminate (piece 16) to the top surface, then use a straight bit in your router table to plow the groove for the aluminum miter gauge channel (piece 17). Locate this groove so the edge of your miter gauge (use the one from your table saw) is about 1/4" away from the disc when it's set at 60°, then screw the channel in place.

Use the table saw to cut the two mounting blocks (pieces 18) to size, then band saw them to the shape shown in the *Drawings*. Sand the blocks smooth, then secure each to the cabinet with a pair of predrilled, counterbored bolts (pieces 19). Attach the table to the mounts with a pair of brass hinges (pieces 20), making sure the screws are not so long that they penetrate the tabletop.

You can adjust and set the angle of the table with a heavy-duty brass lid support (piece 21). This is surface mounted by means of predrilled screws, at the locations shown on the *Drawings*.

Making the Cabinet Mobile

To make my disc sanding center mobile, I added two casters (pieces 22), a pair of feet (pieces 23) and a handle (piece 24). The feet and the handle brackets (pieces 25) are identical, except that the brackets feature a shallow bore to accommodate the walnut handle (see the *Drawings*). All four parts are secured with predrilled screws driven home from inside the drawer cavity. The casters are simply screwed to the bottom of the cabinet.

The Drawers

Choose a high quality 1/2" plywood for the drawer sides, fronts and backs (pieces 26 through 29). I favor Finnish birch because of its machinability. After cutting these parts to size, install a 1/2" dado head in the table saw and plow two rabbets on the inside face of each drawer side (see the *Drawings*). Switch to a 1/4" dado head to mill a groove in each drawer side, front and back for the bottoms (pieces 30 and 31). Assemble the drawers with glue and clamps.



Storage is always useful in the shop, and the two drawers in this cabinet will hold plenty of supplies.



By adding a miter gauge slot, this shop-built disc sander can help create compound angles.



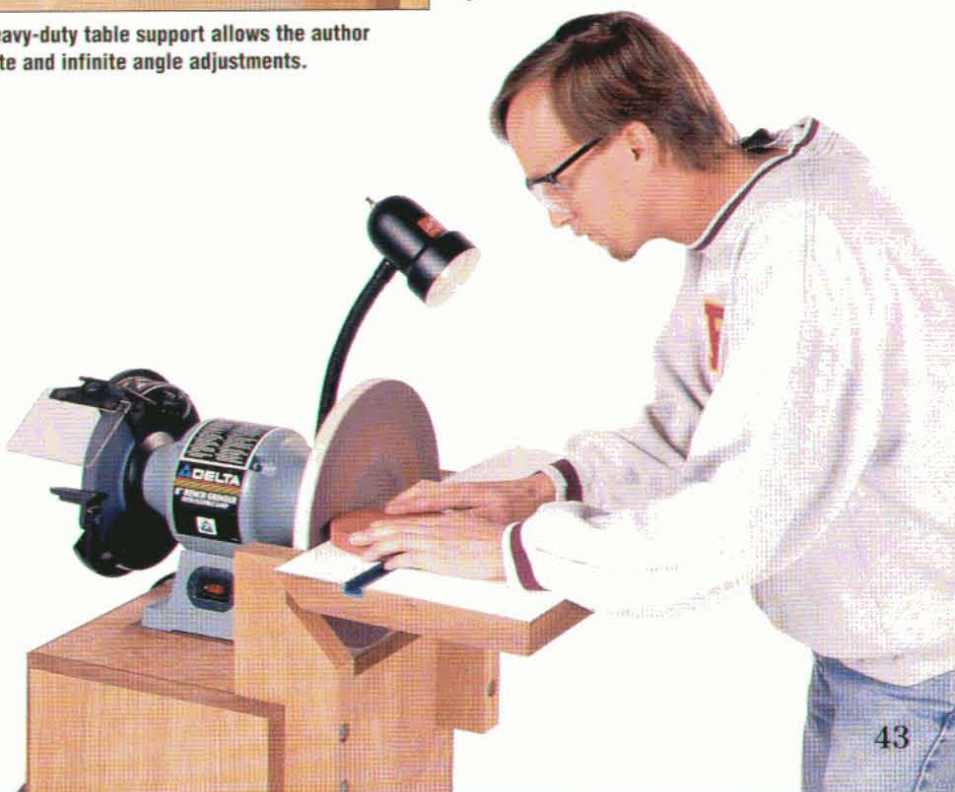
This heavy-duty table support allows the author accurate and infinite angle adjustments.

Both drawers fit in the same opening, so it's a good idea to install them before sizing the drawer faces (pieces 32 and 33). Use full extension slides (pieces 34), following the manufacturer's instructions. Mount the slides after placing the drawers in the opening.

Cut the drawer faces from 3/4" plywood, with the grain running vertically. Now attach walnut trim to all edges. Test fit the drawer faces using double faced tape (allow 1/8" between the two drawers). Permanently affix the drawer faces with glue and screws, then drill a hole dead center in each and install the hardwood pulls (pieces 35).

After sanding the entire project down to 180 grit, I sprayed on three coats of satin finish. I now have an extremely useful addition to my tool arsenal. Like I said, you never know what will happen once you start to get creative!

Jeff Jacobson is the associate art director with Woodworker's Journal.



Marking Up for Success: Prepare the Stock

By Ian Kirby

Put the Arts and Crafts legacy to work in your shop.

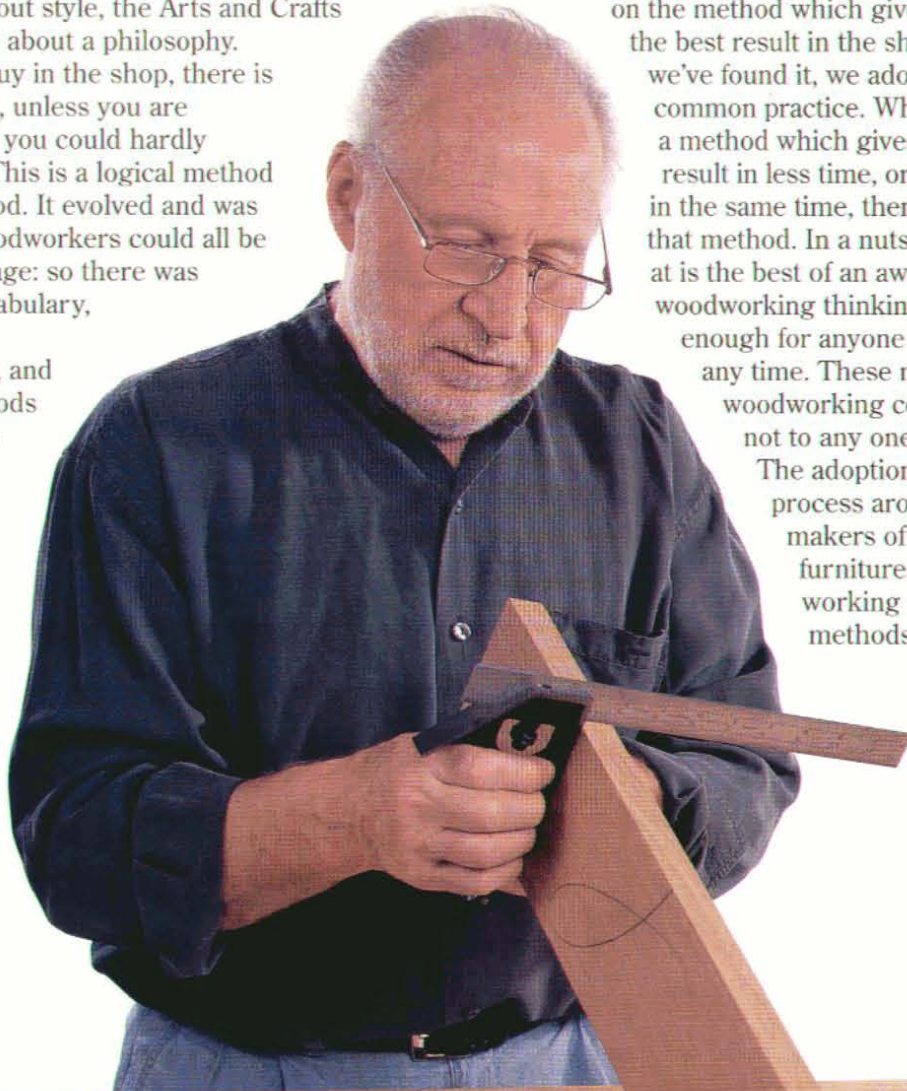
When writers, lecturers and academics talk about the legacy of the Arts and Crafts movement, they refer to the simplicity of the design, the rightness of the materials and the rightness of the construction. These three aspects were the canons at the heart of the movement. Unlike other furniture periods (Queen Anne, William and Mary, Chippendale, et. al), which were about style, the Arts and Crafts movement was about a philosophy.

But for the guy in the shop, there is a legacy which, unless you are a woodworker, you could hardly comprehend. This is a logical method of working wood. It evolved and was adopted so woodworkers could all be on the same page: so there was a common vocabulary, a common understanding, and common methods of work. It was

adopted to take advantage of the best of communal thinking. It evolved around 100 years ago, and it goes beyond simple design and right materials.

Among woodworkers, we know all the ways, good bad and indifferent, to get any woodworking task done. In order to achieve a logical approach to each specific task or skill, we look at all the different ways it could be done. What we do then is decide on the method which gives the best quality or the best result in the shortest time. When we've found it, we adopt that method as our common practice. When someone devises a method which gives the same quality result in less time, or a better quality result in the same time, then we will all adopt that method. In a nutshell, what you arrive at is the best of an awesome array of woodworking thinking which is flexible enough for anyone to improve upon at any time. These methods belong to the woodworking community at large and not to any one person in particular. The adoption of this thoughtful process around 1900 gave the makers of Arts and Crafts furniture their tool skills, their working systems and their methods of work.

Marking up lumber before you start, author Ian Kirby maintains, is critical to your success. Here he's using a try square, winding strips and a straightedge, key tools in the process.



What's in a Mark?

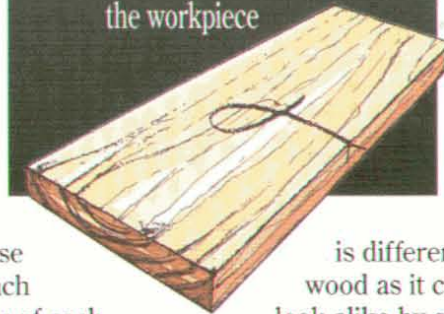
A piece of prepared stock (below) that has been marked with the looping face side mark tells a woodworker many things.

The Face Side is ...

1. Flat in length.
2. Flat in width
3. Out of winding
4. Destined to be the inside face

The Face Edge is ...

5. Perfectly square to the face side
6. Designated to be the bottom or back of the workpiece



Bear in mind that solid wood was their material, and they worked it using hand tools. Understanding this is key to understanding how and why the system worked. Everyone and every workshop had exactly the same tools, and all were using the same materials. They were indeed, "all on the same page," in ways that are no longer the case and never will be again.

So what does that leave us as a legacy? It means that if you want to work solid wood using hand tools, then the legacy is complete, "they had it down pat." The world, however, has changed. We have new materials: plywood, particle board and medium density fiberboard. New hardware systems, new hand-held power tools, new stationary machinery. These things have changed the content of each woodworker's toolbox and the makeup of each workshop. The net result, as I see it, is simply more reason to observe the legacy of a thoughtful methodology which highlights and exemplifies our beginnings.

First Steps

Once you have the design of the piece, either as a working drawing or as a full size mock-up, you can draw up the cutting list. This is the transition point from designing to making. To many woodworkers, "real" woodworking begins when you start to make joints, but before this can happen there are two essential steps to go through. They are called, respectively, harvesting the parts and the preparation of stock.

The first step, harvesting the parts, results in a pile of "rough cut" pieces as per the cutting list. Rough cut means the parts are sawn oversize up to one inch in length and width.

The second step, preparation of stock, results in the same pile of pieces being made dimensionally and geometrically accurate, as per the cutting list.

Harvesting the Parts

The aim of cutting the parts from the necessary boards of wood is to get the best looking parts with the greatest economy of the material.

Right away we come into contact with the woodworking legacy of the Arts & Crafts movement. I'll explain by going right to the other end of the making process: the finish. The common finish was shellac and beeswax — the effect of this finish was that the looks of the wood had to stand on its merits. Wood stain in any form was not an option. This means that the initial selection of the parts is in evidence as long as the piece of furniture lasts. It is one of the ways that the small woodworker

is different from industry. Industry takes the wood as it comes — and then makes the parts look alike by squirting on dark brown stain.

The first thing to emphasize is how radically a piece of solid wood can vary in grain pattern and color from one side to the other. You have to keep looking at both sides to make the best selection.

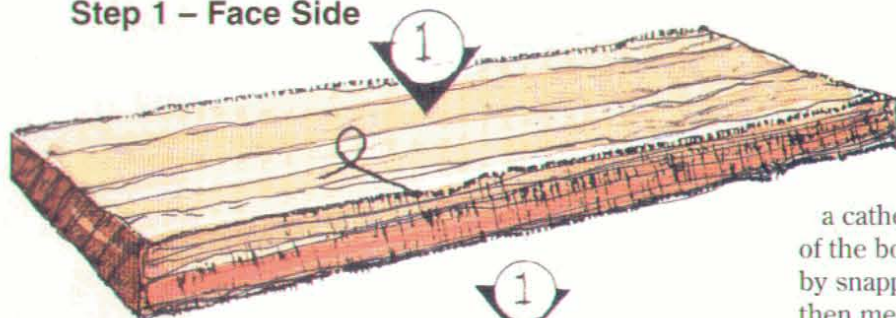
Selection Process

It's best to begin by marking out the pieces which will be the largest and/or the most visible on the piece of furniture. In this way you have the most board from which to harvest the choice pieces. It can be a most frustrating hunt, and you may want to change your decisions as you go along. For this reason, use chalk as the marker.

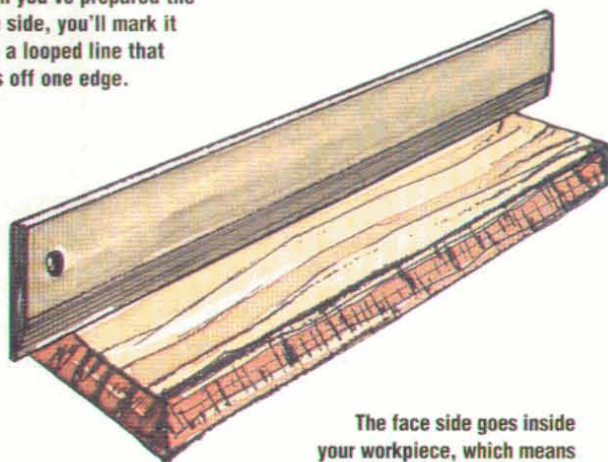
An important expression of the selection process is to get the grain of a part aligned with its edge. This shows the proportion of the part to the best advantage and retains the pattern value of the assembly. All too frequently, especially on quartersawn boards, the grain and the edge of the board are not parallel. Use a snap line to mark the intended cut line.

Boards from the outer edge of the tree have a typical arch-shaped grain pattern which we call

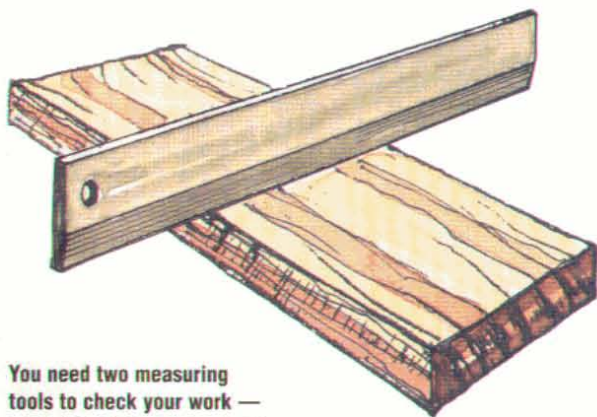
Step 1 – Face Side



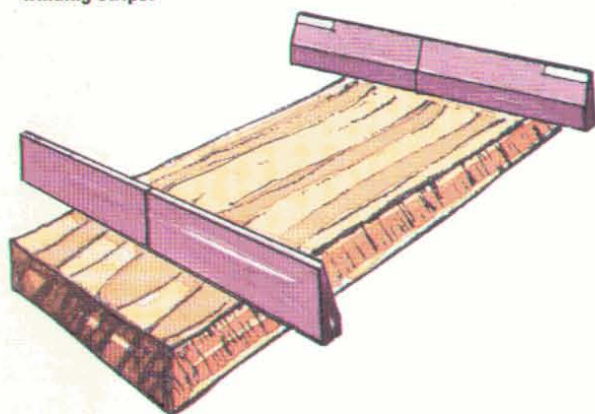
All other measurements and angles come from the face side of your wood. When you've prepared the face side, you'll mark it with a looped line that goes off one edge.



The face side goes inside your workpiece, which means it's the less good-looking side. Its characteristics: flat in length, flat in width and out of twist.



You need two measuring tools to check your work — a straightedge and a pair of winding strips.



a cathedral figure. Rarely is the arch in the center of the board. To harvest a symmetrical panel, begin by snapping a line down the middle of the arches, then measure each side of the center line to get the widest panel from the boards.

When you are choosing stock for legs — especially square legs — you want the end grain to run across the diagonal. In this way you get a very balanced grain pattern on each of the two visible faces.

Preparation of Stock

You may undertake the preparation of stock using a variety of tools, machines and methods. How it is prepared is not critical; what is critical are the properties of the finished pieces. If the cutting list calls for stock 1" x 6" x 24", the piece of wood must exhibit more than the specified dimensional accuracy. It must be geometrically accurate as well — flat where it should be flat, parallel where it should be parallel and square where it should be square. Don't be tempted to add to the cutting list dimensions as a precaution against possible error further down the line. You cannot create insurance for yourself with a little extra width, thickness, or length; all you do is create confusion. So work with confidence exactly to the cutting list dimensions.

This "preparation" step is a long-winded, exacting and often tedious part of the work. It has all the ingredients which invite us to lower our standards, but to be less than rigorous would be a bad mistake. Badly prepared stock will haunt you throughout the making of a piece of furniture, and its effects become more pronounced with each stage of manufacture. Joints will not be correctly aligned, faces will not be square to the other and so on. I emphasize the need for accuracy here because its importance is badly understood. When woodworkers are confronted by an error whose origin eludes them, they should first look to stock preparation for the answer. The one saving grace about preparation of stock is that once this stage is completed, the entire job is about half done.

To explain the process, I'm going to use the 1" x 6" x 24" piece. It has six faces: two sides, two edges and two ends. All have to be prepared.

Face Side: Step 1

We begin with a side. Look at the piece and choose which is the best looking and the one you want to show on the outside of the piece of furniture. The

Step 2 – Face Edge

other side is destined to be the face side — face sides go inside. The face side is simply the datum from which all other measurements and angles will be taken. It has three physical properties. It is: flat in length, flat in width and out of twist.

To prepare a face side using hand tools, you need a very accurate bench, a jointer plane, a straightedge and a pair of winding strips. The straightedge checks the planed stock for flatness in length and width; the winding strips check for twist. To prepare a face side by machine, you need only a jointer with accurate tables. Once the surface satisfactorily meets the condition of a face side, it is marked with a looped line which goes off one edge of the wood. The edge where the face side mark leaves the planed surface is destined to become the face edge.

The face side and the face edge are the only two faces which get marked. They are used to orient the part in the structure. Face sides go inside and face edges go down or to the back, depending on whether the face side is oriented vertically or horizontally.

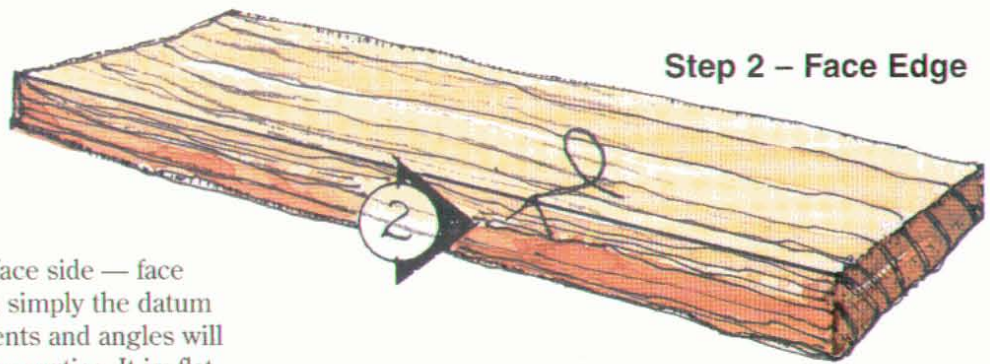
Any subsequent marking with gauge, try square, sliding bevel or miter gauge is done from one of these two faces. Any machine setup should have one of these faces against the bed or the fence to ensure consistency.

Face Edge: Step 2

Next, prepare the face edge. The face edge has four physical properties. It is: flat in length, flat in width, out of twist and at right angles to the face side.

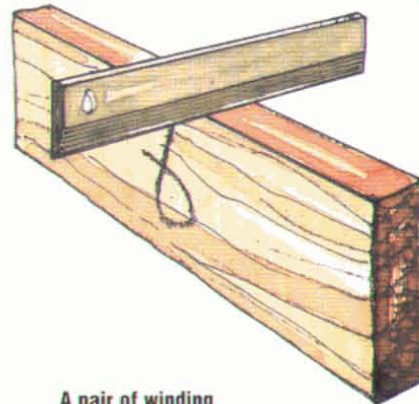
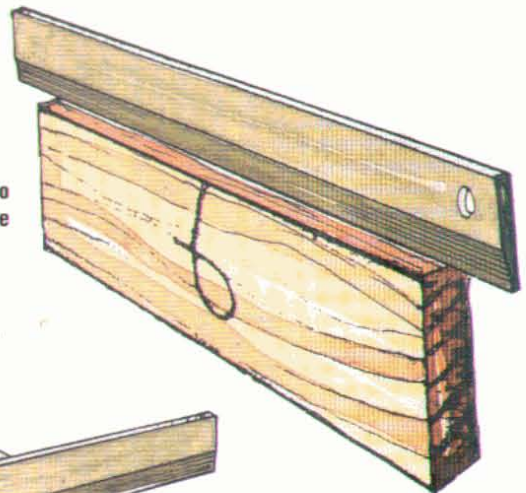
The hand tools necessary to prepare a face edge are a jointer plane, a straightedge to ensure the edge is flat in length and width, a pair of winding strips to ensure that it is out of twist and a try square to ensure that the face edge is at a right angle to the face side. To prepare a face edge by machine, all you need is a jointer with a fence positioned perpendicular to the tables.

Once the edge satisfies the conditions of a face edge, mark it with a V connected to the face side mark. You should put the marks which indicate the face side and the face edge onto the workpiece when you know it to be correct. Make them bold and use a soft pencil 4B or 6B, so they will remove easily at the cleanup stage prior to polishing.

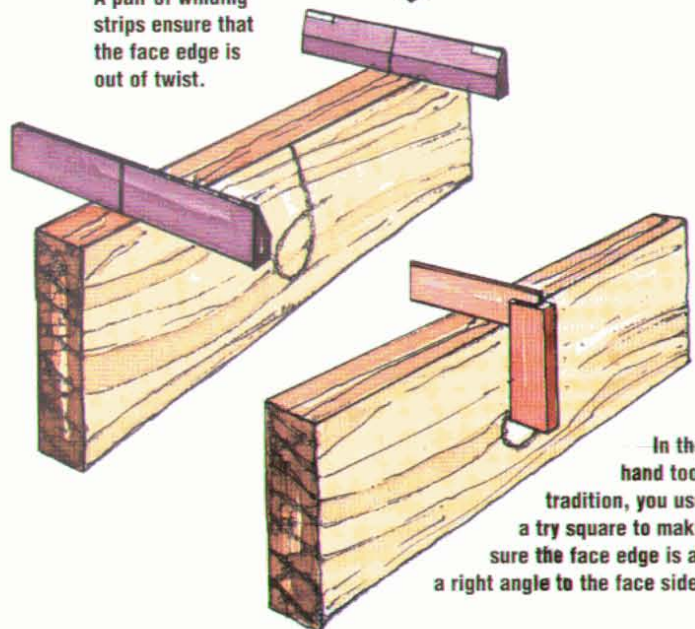


The marking for a face edge is a V connected to the looped face side mark.

Once again, you'll use a straightedge to ensure that the face edge is flat in length (right) and in width (below).

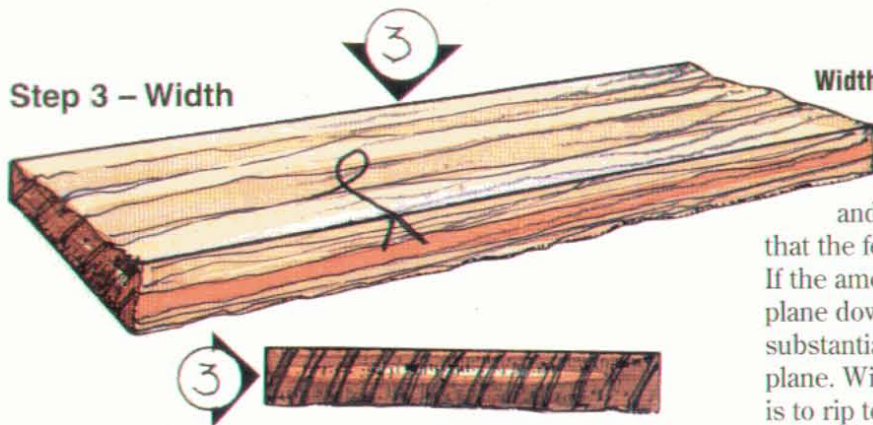


A pair of winding strips ensure that the face edge is out of twist.



In the hand tool tradition, you use a try square to make sure the face edge is at a right angle to the face side.

Step 3 – Width

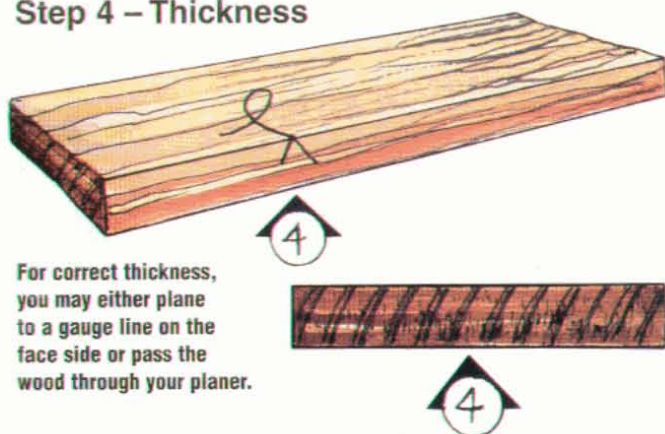


To get your stock the correct width, either hand plane it to a gauge line along the face edge or rip it to width on the table saw.

Width: Step 3

It is common to prepare the wood to width next. By hand, the procedure is to set a marking gauge to the width required and gauge down the two sides, making sure that the fence of the gauge rides the face edge only. If the amount of material to be removed is small, plane down to the gauge line. If the amount is substantial, remove the waste with a rip saw and then plane. With machinery, the most probable procedure is to rip to width on the table saw, cutting all pieces of like dimension in succession before changing the fence setting. Then clean up the sawn edge by passing through the planer. The normal technique is to assemble all the parts that are the same width, bank them together and pass them through the machine as one piece. An alternative is to pass the sawn edge once over a jointer. This is not the best method, but it is acceptable if you don't own a planer.

Step 4 – Thickness

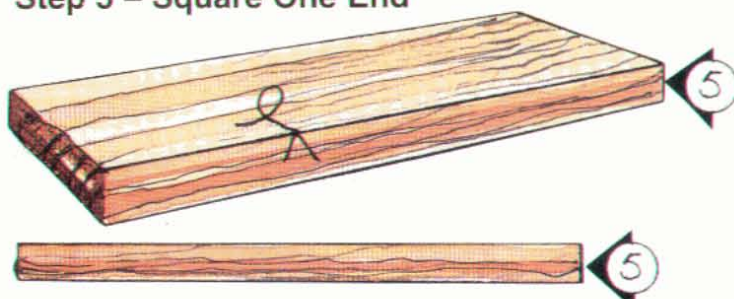


For correct thickness, you may either plane to a gauge line on the face side or pass the wood through your planer.

Thickness: Step 4

The next stage is to prepare the wood to thickness. The hand method involves gauging round the piece with the fence riding the face side and then planing down to the gauge line. By machine, the piece is simply passed through the planer at the correct setting. You can check and assess these two new faces in the same way as the face side and the face edge; indeed, you will have to if you are working the wood by hand. If they are incorrect coming from the planer, then the planer has to be rectified. These faces do not get identification marks as the face side and face edge do.

Step 5 – Square One End

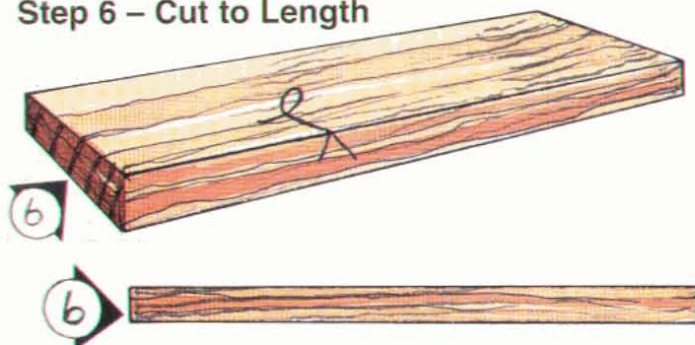


Square one end of the board. By hand, you'll saw to a line you've created with a marking knife. You can accomplish this step in several different ways if you're using machinery.

Square One End: Step 5

The next part of the procedure is to square one end. The required hand tools are a marking knife, a try square, a sawing board and a back saw. Knife around the end, placing the stock of the try square only on the face side and the face edge. Place the piece on the sawing board and saw to the knife line. Depending upon what the piece is for, you may have to plane the end grain down to the knife line and get the end absolutely square with the face side and the face edge. This certainly would be the case in making a set of dovetails. If the piece is to become a rail with a tenon at each

Step 6 – Cut to Length



The final step is to square the other end and cut to length. Use a simple stop on your miter gauge or crosscut table.

Sighting across winding strips: as effective today as when they were invented in woodworking's long distant past. Essential to properly preparing stock, checking for twist is one basic step often overlooked ... Learn why you should not.

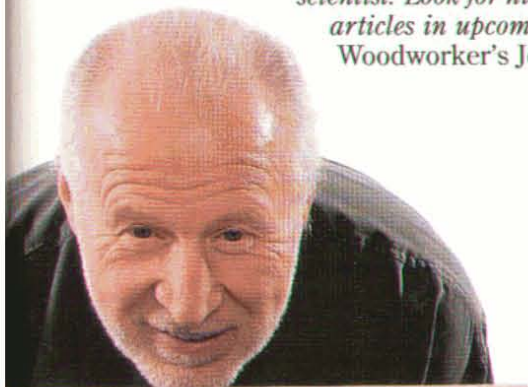
end, leaving the end as cut from the saw is correct practice. To accomplish this on a table saw, place the face edge against a crosscut fence. Provided the fence travels at right angles to the blade, you have a square end. The usual device for crosscutting is a miter gauge. Another system is a crosscut table of your own manufacture which slides in the tabletop grooves. You can also cut the ends using a chop saw or a radial arm saw.

Cut to Length: Step 6

The second end has to be squared and cut to length. Having marked the distance from the first end, the procedure is much the same as for the first end, with one major exception. You must cut accurately; you can't reposition the length line. To machine the ends, attach a simple length stop to the miter gauge or the crosscut table.

It's important that each stage in the construction of a piece of furniture be completed, as far as possible, in its entirety. When selecting stock, choose all the materials for the job at that time. When you undertake stock preparation, all the parts and pieces should be processed at the same time. This keeps mistakes to a minimum. Going back and forth between various stages becomes a serious waste of time and very confusing. And you don't have time to waste: now that you've prepared your stock correctly, you're ready to start building some beautiful projects.

Ian Kirby, a master of the British Arts & Crafts tradition, is a woodworker, designer and wood scientist. Look for his continuing articles in upcoming issues of Woodworker's Journal.



Winding strips: An old tool for a new generation



Winding is the woodworker's term for twist. A slightly twisted piece of wood will have twisted joints on its ends and will give you all sorts of trouble at the sub-assembly stage and thereafter; so twist really is an important factor to be dealt with early on. To tell if a board is flat, you place your winding strips at right angles to the edge of the workpiece and near the ends, line up the center marks and sight the top edges. Trying to assess twist by sighting directly on the stock is as futile as assessing straightness or squareness by the same method. Winding strips have always been an essential measuring tool for the woodworker. We have no other method to survey flatness. In the past, woodworkers made their own. The wood of choice was quartersawn Cuban Mahogany with the edges inlaid with prized materials such as ivory and ebony for better sighting. Most woodworkers would have two or three pairs of different lengths.

You can make your own very easily. The drawing above will give you some "starter" dimensions, but they can be made to any size you want. Use good quality, straight grained quartersawn wood that you know to be dry. The major requirement is that the opposite edges of each strip be straight and parallel. They can be made using hand or machine tools. If you care to emulate your woodworking predecessors, you can fuss with the details. You might inlay the top edge of one strip with a white material so that it will be in sharp contrast to the black material inlaid on the edge of the other strip. Detail the center mark with inlay or incised carving and polish to suit your pleasure.

The tools required to prepare wood have remained the same for generations. Winding strips can be as simple or as fancy as you choose ... as you will need to make your own.



Traveling Router Table

By John English



This dovetailed cabinet slips off your shop wall to serve as a carrying case. Flip it over and it's an instant router table.

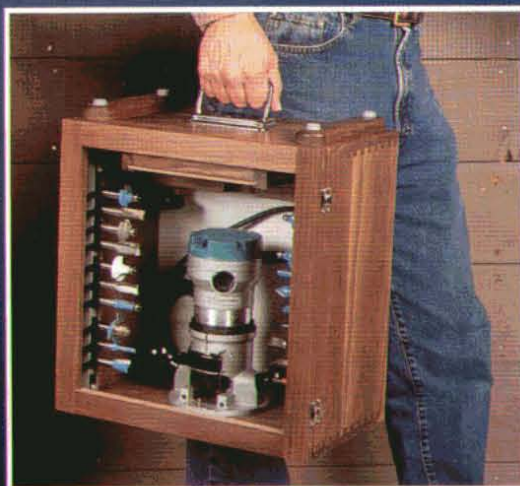


t had already been "one of those days" when I took off in a hurry to visit a woodworking friend in need of some routing help. So it wasn't a surprise that I remembered my router bits 14 miles down the road. That little oversight cost me 45 minutes and several degrees of stress — but it did give me time to come up with the design for this combination router storage case and work site router table.

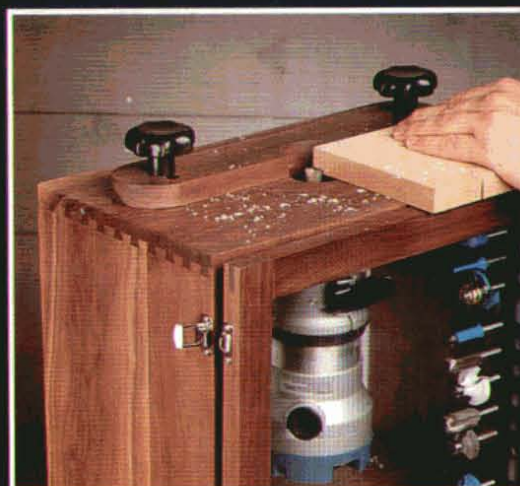
Two days later, this beauty was hanging on the wall in my shop. Obviously, such a fixture will be just as handy and useful if you make it out of plywood, but I was also looking for a workout on my dovetail jig, and a pile of scrap walnut seemed like just the thing. Aside from keeping everything together, this fixture shelters the router from excessive dust. I can check out my bit selection through the Plexiglas™ window, so I always have the right bits when I take the case to a job. It easily lifts off the wall and the heavy-duty handle lets me carry everything I need to the truck.

On site, I place the carrying case upside down on a table or bench (the truck's tailgate works well, too), and I have an instant router table, complete with a moveable fence. Four rubber feet stop it from slipping, so I only need to clamp it down when I'm working with very large workpieces.

If I need to make a free-form cut, removing the router is just a matter of reversing out three machine screws and attaching the base plate. And the plate, along with two wrenches and a spare collet, are all stored in a special compartment.



The author's router carrying case is ready to move to the job site on a moment's notice.



Turn the case over and you have an instant router table, with an adjustable fence.

A Dovetailed Carcass

Routers weigh a lot and this case is designed to travel. Those two facts suggested that the joinery had to be strong, so interlocking dovetails were a natural choice. My aging Porter-Cable jig (shown on page 53) only cuts half-blind dovetails, but that was actually an advantage; it meant that the bottom of the case (which becomes the router table) would be smooth.

Get started by edge jointing and gluing up several boards to create stock for the top, bottom and sides (pieces 1 and 2). If you're new to dovetailing, you can cheat a little by making the parts 1/2" too wide and trimming them to size after all the milling is done. Set up your jig according to the manufacturer's

instructions and remove any excess glue from the boards. Install a dovetail bit and collet (see your jig instructions for sizes) in your router and make practice cuts on some scrap lumber exactly the same dimensions as the actual workpieces. When you're satisfied with the setup, mill the boards.

Dry fit the top and bottom to the sides. The joints should be snug, but not so tight that you need a hammer to close them. If your setup was slightly off, trim a little from the edges to achieve perfect alignment.

Glue and clamp the top and bottom to the sides, making sure that the assembly is square and flat as you apply clamping pressure.

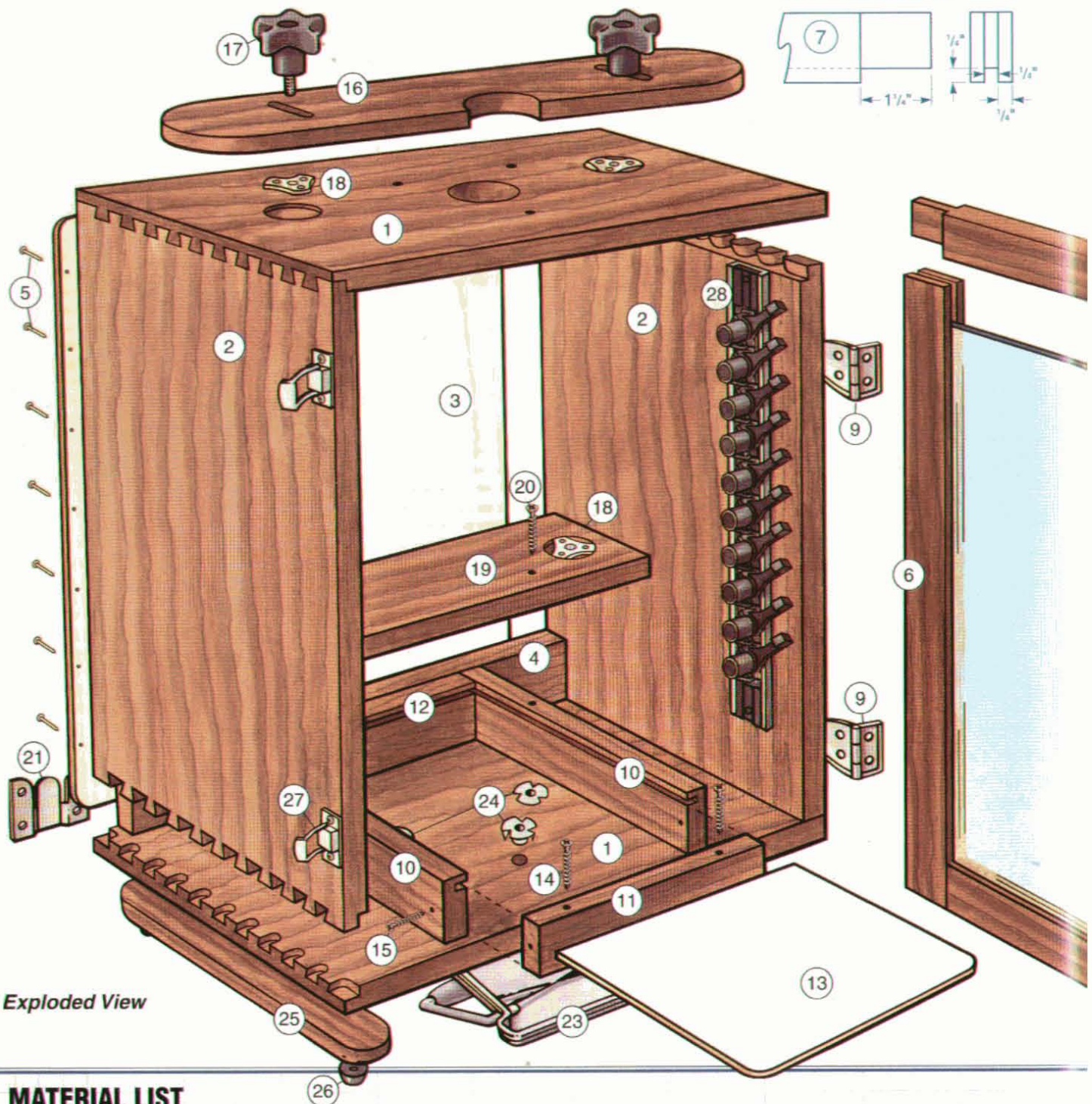
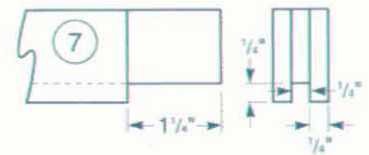
Rabbets for the Back

I chose bright white 1/4" hardboard paneling for the back of my case (piece 3).

This sets off the bits nicely, so I can easily see their profiles through the Plexiglas™ door. Remove the clamps from the carcass and install a bearing-guided rabbeting bit in your router. A table-mounted router works well here, since the thin walls of the carcass don't provide a very stable base for a portable router (see photo on page 53). Set the bit height to exactly the thickness of the back panel, as the panel must be flush when installed.

Mill the rabbet for the back in a single pass. Next, glue and clamp the hanging cleat (piece 4) in place, flush with the edge of the newly milled rabbet (see Exploded View on next page). When the glue dries, trim the back panel to size and sand a radius on each corner to match the

Door Rail (Front and End Views)



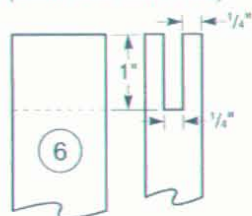
Exploded View

MATERIAL LIST

	T x W x L		T x W x L
1 Top and Bottom (2)	3/4" x 9 1/16" x 15 1/2"	11 Compartment Front (1)	3/4" x 1 7/16" x 7 5/16"
2 Sides (2)	3/4" x 9 1/16" x 16 1/4"	12 Compartment Back (1)	3/4" x 1 3/8" x 7 5/16"
3 Back Panel (1)	1/8" x 14 3/4" x 15 1/16"	13 Compartment Top (1)	1/8" x 8" x 8"
4 Hanging Cleat (1)	3/4" x 1 3/4" x 14"	14 Screws (4)	2" x #10
5 Brads (28)	1"	15 Screws (6)	1 1/4" x #8
6 Door Stiles (2)	3/4" x 1 1/4" x 16 3/16"	16 Fence (1)	3/4" x 2 3/4" x 13 7/8"
7 Door Rails (2)	3/4" x 1 1/4" x 15 1/2"	17 5-Star Fence Knobs (2)	5/16" - 18 1" Stubs
8 Plexiglas™ Door Panel (1)	1/4" x 13 3/8" x 14"	18 T-Nuts (4)	5/16" - 18 Screw-on
9 Door Hinges (1 Pair)	90° Stop hinges	19 Fence Board (1)	3/4" x 3 1/2" x 14"
10 Compartment Sides (2)	3/4" x 1 3/4" x 8"	20 Fence Board Screws (2)	1 1/2" x #8

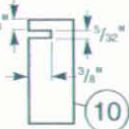
Door Stile

(Front and End Views)

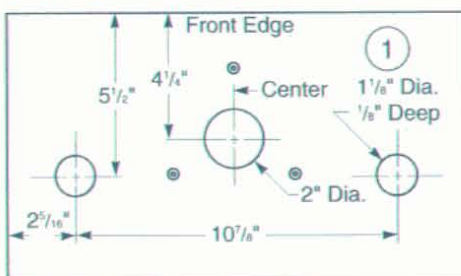


Compartment Groove

(End View)

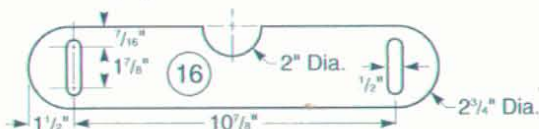


Case Bottom Layout (Top View)

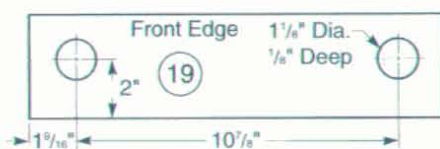


The bit access hole and mounting holes will vary. Use your base plate as a template.

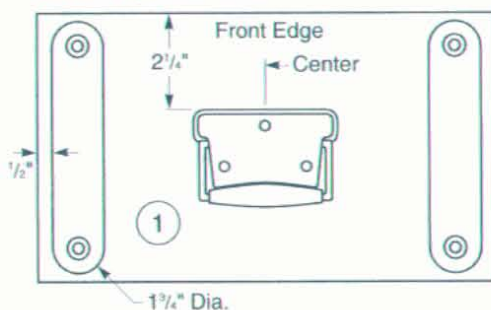
Fence (Top View)



Fence Board (Top View)



Case Top (Top View)



The author's aging Porter-Cable jig was up to the job of forming the half-blind dovetails.



Form the 1/4" deep back panel rabbet with a bearing guided rabbeting bit. To be safe, the author used a table mounted router set up.

corners left by the rabbeting bit. Wrap up by gluing and tacking the back in place. I used 1" brads (pieces 5), evenly spaced every 3".

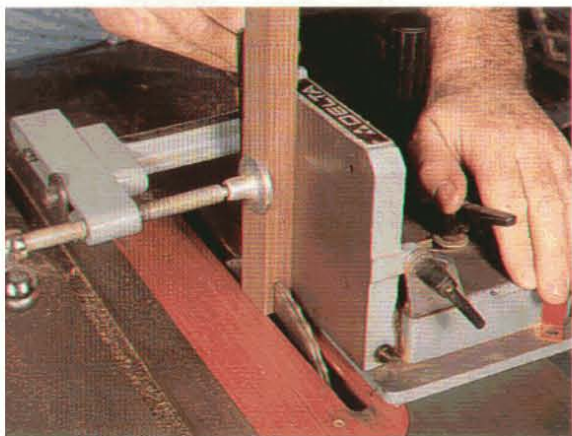
Frame-and-panel Door

The door is built with an open saddle mortise on each end of the stiles (pieces 6), and matching tenons on the rails (pieces 7). The clear Plexiglas™ panel (piece 8) is 1/4" thick to stand up to use and abuse.

Rip, crosscut and joint the stiles and rails to size, then install a 1/4" wide dado head in your table saw. Plow a groove in one edge of each stile and rail for the door panel, using the *Elevation Drawings* at left for the dimensions.

I used a tenoning jig on the table saw to chop the saddle mortises, as shown in the photo on the next page. Note these mortises are not as deep as the rails are wide: as the door panel grooves you just machined have the effect of reducing the width of the tenons (check the drawings at left for all the appropriate dimensions).

	T x W x L
21 Flush Mount Brackets (1 Pair)	Extra thin
22 Bracket Small Screws (8)	3/4" x #8
23 Carrying Handle (1)	5" x 3 11/16" Chrome
24 T-Nuts (3)	Supplied with handle
25 Feet (2)	3/4" x 1 3/4" x 8 1/2"
26 Bumpers (4)	5/16" x 3/4" Dia.
27 Door Catches (2)	Plated steel
28 1/4" Router-Loc™ Bit Holder (1)	3/8" x 1 1/4" x 13"
29 1/2" Router-Loc™ Bit Holder (1)	3/8" x 1 1/4" x 13"



A tenoning jig works great for cutting the mortises on the door stiles, but measure twice when setting the depth — the panel grooves on the rails have the effect of reducing the tenon width.



Cut the door rail tenon cheeks on your table saw using both the miter gauge and a wide dado head.



Use your router's base plate as a template when you're ready to drill both the bit access hole and the router base's mounting holes.

You can reset the tenoning jig and dado head to mill the tenons, or they can be cut a bit quicker with a wider dado head and a miter gauge, as shown in the middle photo above.

Dry fit the stiles and rails, sliding the panel in place as you do. Note

that the door is flush with the top of the case, but remains 1/16" shy at the bottom. This prevents the door from expanding into the working area during the rainy season.

When you're happy with the way things fit, glue and clamp the door together. Let the panel float freely and make sure the door is flat and square as you apply clamping pressure. After the glue cures, remove the clamps and install the door with a pair of surface-mounted hinges (pieces 9).

Small Parts Compartment

Every router comes with a handful of small parts — wrenches, different sized collets, a manual, extra base plate and so on. You'll need to size your case's compartment to fit everything you'll need on the job.

If you think the compartment shown with my fixture is the right size for you, rip the sides, front and back (pieces 10, 11 and 12) to 1 3/4" in width. Now mill a groove (see drawing) for the compartment top (piece 13) in one face of this stock. Crosscut all four parts to length, then rip the front to final width (eliminating the groove and thin section of material above it). Predrill and countersink for 2" screws (pieces 14), apply a little glue and assemble the

compartment with simple butt joints. After the glue dries, drill pilot holes for 2" screws in the front of the compartment and 1 1/4" screws (pieces 15) in the rear, and secure the compartment subassembly within the case. See *Exploded View*

for screw locations. Note that the front of the compartment ends up 1/4" shy of the front of the case.

Cut the compartment top to size from the same material you used for the back panel of the case. Test fit it, then sand a slight radius on each front corner. Size the lid so it's flush with the Plexiglas™ panel when the door is closed: this secures it in transit, and leaves you about 1/2" of material to use as a handle.

A Hidden Router Table

My favorite part of this case is the "secret" router table. By drilling a few holes in the bottom of the case, you can mount your router there. When you get to the job site, turn the case upside-down and you have a small but functional router table. This also serves to secure the router in transit. Refer to the *Elevation Drawings for the locations of the mounting holes and the bit access hole*. Every router will be a little different, so use your machine's base plate as your template, as shown at lower left.

Band saw the fence (piece 16) to the shape shown in the drawing, then use a drum sander in the drill press to clean up the edges. The fence is secured by means of a couple of large plastic knobs with threaded stubs (pieces 17). These pass through slots in the fence and are screwed into a pair of T-nuts (pieces 18) that are recessed into the case's bottom. Plow the slots in the fence on your router table, using a straight bit and a pair of clamped-on stops to establish the beginning and end of each cut. Check the drawings for the slot dimensions. Make the cuts in several passes, raising the bit about 1/8" each time and using a miter gauge to guide the workpiece.



A large Forstner bit is ideal for setting the T-nuts flush. Just drill about 1/8" deep with a 35mm bit, then bore a 1/2" hole in the center of this depression all the way through the case's bottom (see drawing for locations). Tap the T-nuts in place, drill pilot holes for the supplied screws.

When you carry the case around, you'll want to set it down every now and then. If the fence is in place, this isn't possible. To store the fence inside the case, install a second pair of T-nuts in a short board (piece 19) that is screwed (pieces 20) to the small parts compartment. These T-nuts have the same spacing as the first pair.

Hangers and Handles

One nice feature of this case is that it can be hung on the wall just like a regular cabinet. This is done with some extraordinarily simple hardware that allows for quick and easy removal when it's time to hit the road. Two pairs of 1/8" thick flush-mount brackets (pieces 21) are all that are required. Simply screw one half of each bracket to the back of the cabinet and the other half to the wall. Use 1 1/4" screws (pieces 15) in the top two screw holes and the bottom outside hole, but switch to 3/4" screws (pieces 22) for each of the last two holes, as you're only screwing through the back into the 3/4" thick hanging cleat.

Because of the router's weight and value, I recommend a strong handle (piece 23) for your case. The one I used is secured to the top of the cabinet with three T-nuts (pieces 24), supplied by the handle manufacturer. This handle is

Hard-to-find Supplies

The following hard-to-find supplies are available from *Woodworker's Journal*.

29975	Pair of Extra Thin Flush Mounts.....	\$2.24
90077	Pair of 90° Nickel Stop Hinges.....	\$1.79
23846	5-Star Knob*	\$.99
68379	Screw-on T-nut**	\$6.79
90316	Heavy-duty Handle.....	\$15.49
26047	Set of Rubber Bumpers (4/set)	\$1.99
20227	1/4" Router-Loc Bit Holder	\$6.99
20241	1/2" Router-Loc Bit Holder	\$6.99
28191	Rectangular Catches*	\$3.49

* Two required. ** Four required.

To order your supplies, call **800-610-0883**.

spring-loaded and very comfortable. To install it, center the handle (not the mounting plate) on the top of the case, locate the three screw holes and drill them. Tap the T-nuts home from inside the case, then screw the handle in place.

Now attach two feet (pieces 25) to the top of the case. These are simply band sawn to shape and sanded. Predrill for screws (pieces 15), then run the screws through four small rubber bumpers (pieces 26) as you drive them home. These bumpers give the case very sure footing when it's being used as a router table.

The Last Details

After removing all of the hardware and masking the Plexiglas™, I sprayed

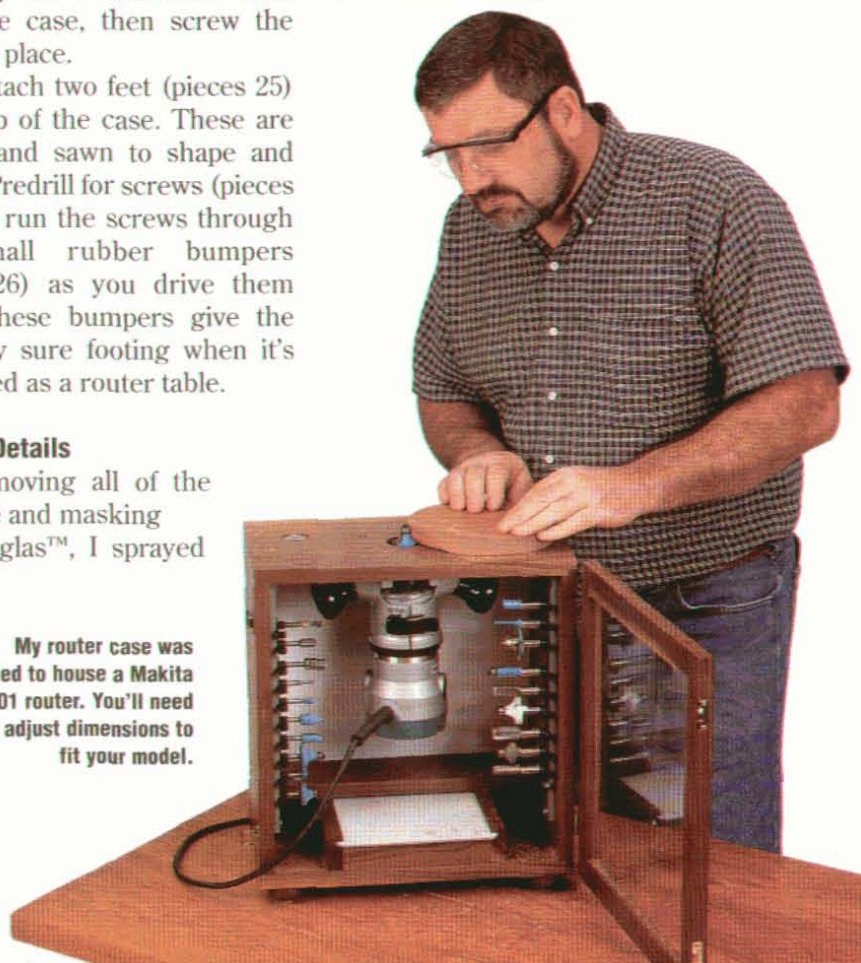
three coats of clear finish on all the wooden parts, sanding lightly between coats.

Once the finish dried, I reinstalled the hardware and added two of flush-mounted catches (pieces 27) to secure the door.

Complete the project by screwing a couple of Router-Loc™ bit holders (pieces 28 and 29) to the inside of your carrying case. They come in two formats: one holds ten 1/4" shank bits, while the other holds ten 1/2" shanks. If your case is large and you're lucky enough to own a generous selection of bits, there's no reason you couldn't add a couple more of these strips. After all, you don't want to be 14 miles down the road when you realize you forgot to pack the right bits!



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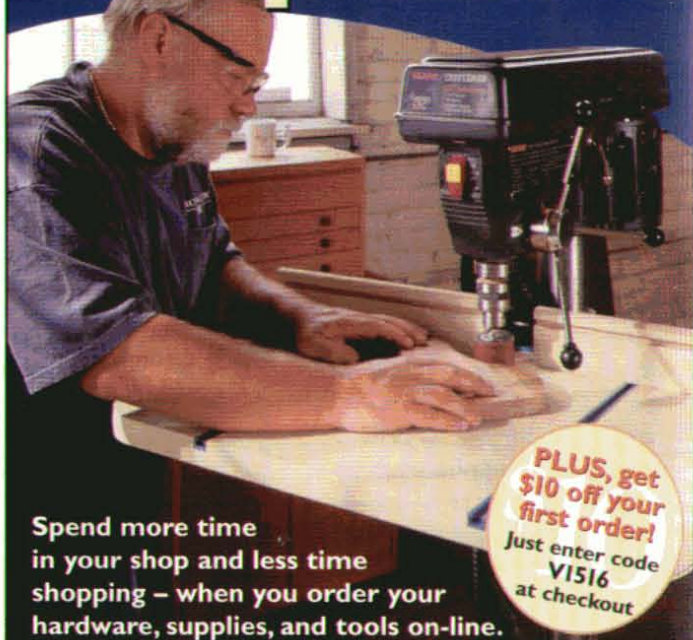
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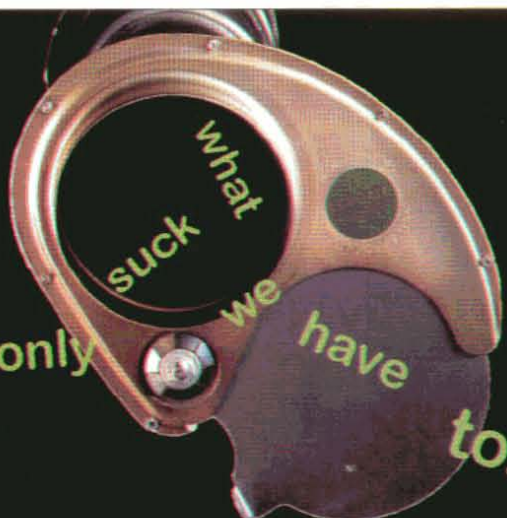
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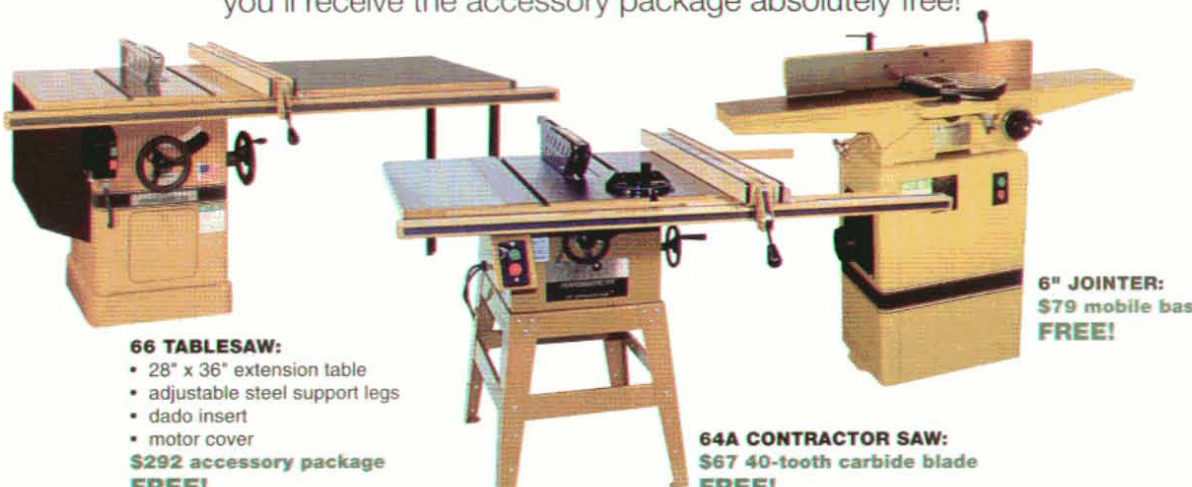
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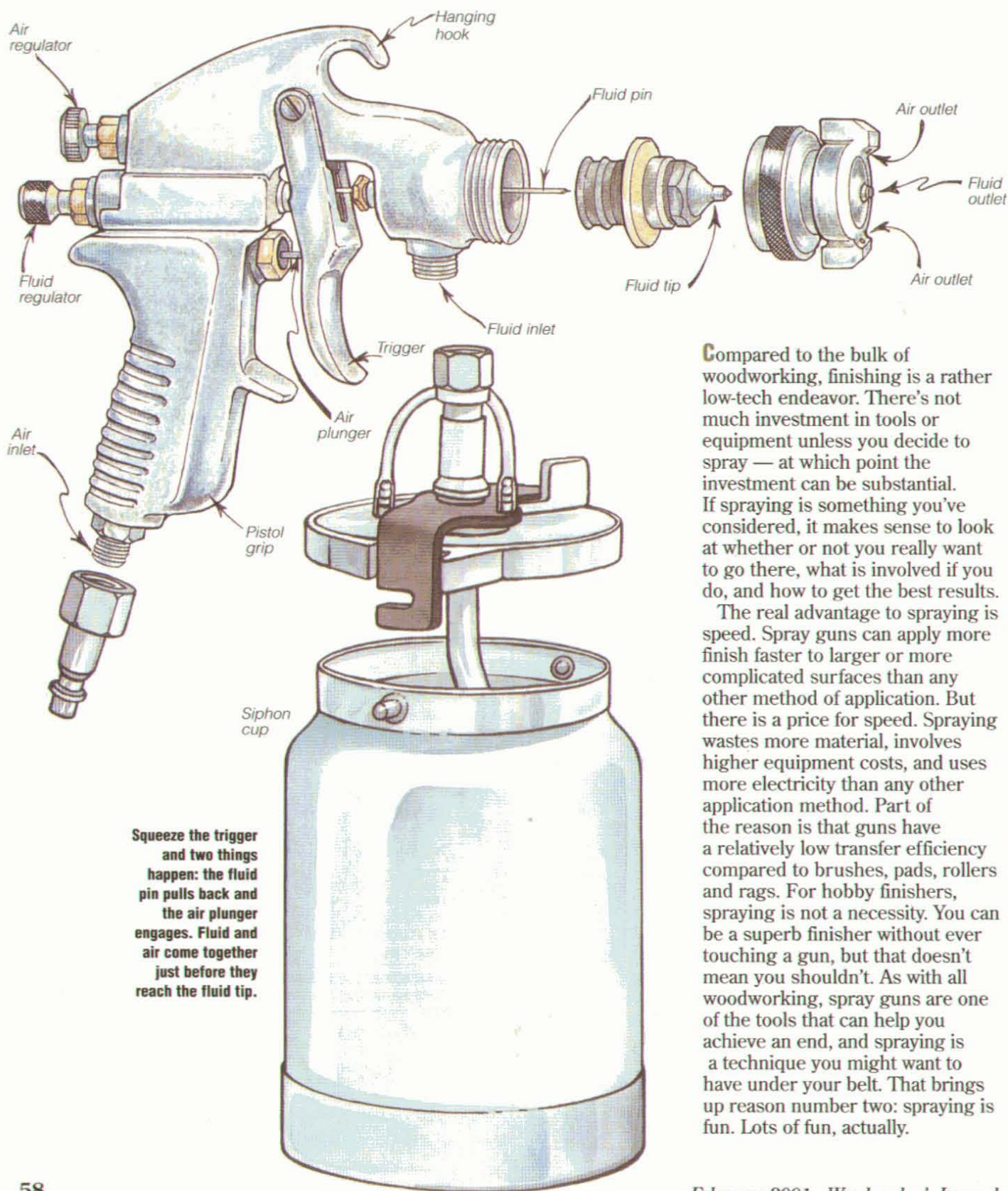
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Understanding Spray Guns

By Michael Dresdner



Compared to the bulk of woodworking, finishing is a rather low-tech endeavor. There's not much investment in tools or equipment unless you decide to spray — at which point the investment can be substantial. If spraying is something you've considered, it makes sense to look at whether or not you really want to go there, what is involved if you do, and how to get the best results.

The real advantage to spraying is speed. Spray guns can apply more finish faster to larger or more complicated surfaces than any other method of application. But there is a price for speed. Spraying wastes more material, involves higher equipment costs, and uses more electricity than any other application method. Part of the reason is that guns have a relatively low transfer efficiency compared to brushes, pads, rollers and rags. For hobby finishers, spraying is not a necessity. You can be a superb finisher without ever touching a gun, but that doesn't mean you shouldn't. As with all woodworking, spray guns are one of the tools that can help you achieve an end, and spraying is a technique you might want to have under your belt. That brings up reason number two: spraying is fun. Lots of fun, actually.

How Spray Guns Work

A spray gun works like a carburetor. It forms liquid into tiny droplets and mixes them with moving air to create an airborne mist. Pulling the trigger releases a controlled pattern of air and finish toward the wood. Most guns have controls to change the size and makeup of that mist pattern. The primary controller is the trigger. The further back you pull it, the more fluid is released into the airstream. The large knob at the back of the fluid pin is a governor. By turning it clockwise, you create a stop that limits how far the trigger retracts, which in turn limits the amount of finish flowing through the nozzle.

Either above the fluid knob or to the side of the tip there's usually a smaller knob. This one adjusts the size and shape of the mist pattern. Turn it clockwise to get a smaller, rounder pattern, and turn it counterclockwise for a larger, oval one. Some HVLP guns change from round to oval pattern by rotating the air cap 45 degrees.

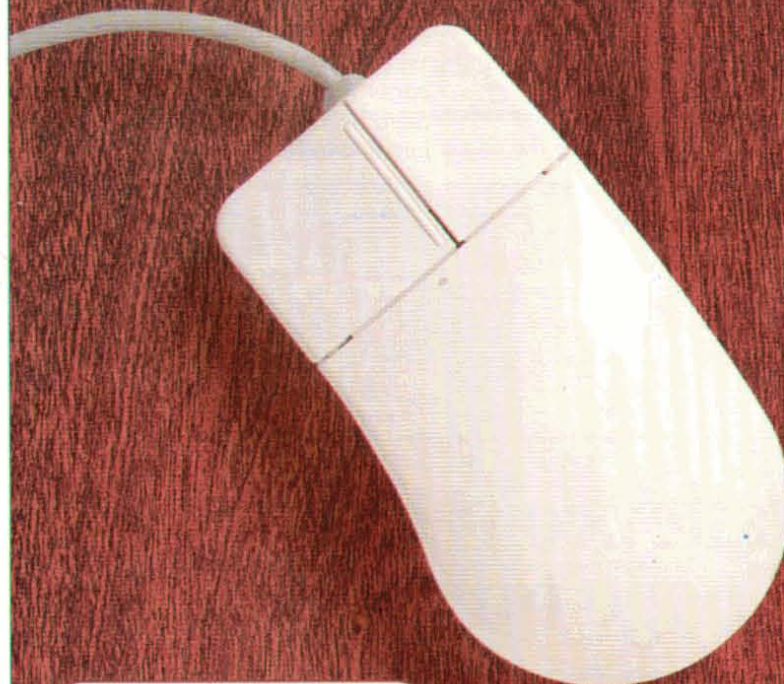
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On almost all spray guns, rotating the air cap 90 degrees will change the fan pattern from a horizontal oval to a vertical oval.



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What is transfer efficiency?

Transfer efficiency measures what percentage of the finish actually ends up on the furniture. A standard high pressure spray gun has a 25 percent transfer efficiency. That means one quarter of what you put into the cup of the gun ends up on the wood, and the other three quarters either misses or bounces off the wood. An HVLP gun, which delivers a more gentle spray, may have a transfer efficiency of up to 65 percent.



Type of Gun	Type of Compressor	Portable	Transfer Efficiency	Versatility
Standard	small air	limited	25% or lower	high
Conversion HVLP	large air	no	45% to 65%	high
Turbine HVLP	turbine	yes	65%	medium

Types of Spray Guns: Standard

There are three common types of spray guns sold to woodworkers. Two of them operate in conjunction with a compressor, and the third is powered by a turbine.

Up until the 1980s, the standard spray gun in the field was one that used high pressure compressed air. A standard gun is highly versatile and will spray any material, thick or thin, merely by changing the air pressure going into the gun and the gun's settings. It uses a relatively small volume of compressed air and will work with even a small air

compressor. Since it is attached to the compressor via a 3/8" air hose, it is only as portable as the compressor and limited by the length of the hose. Standard guns have a fairly low transfer efficiency at 25 percent or less and need a strong, efficient spray booth to keep overspray from becoming a problem. This is the least expensive of the three types of guns, and is a good option if you own a compressor and want to spray several different types of materials.

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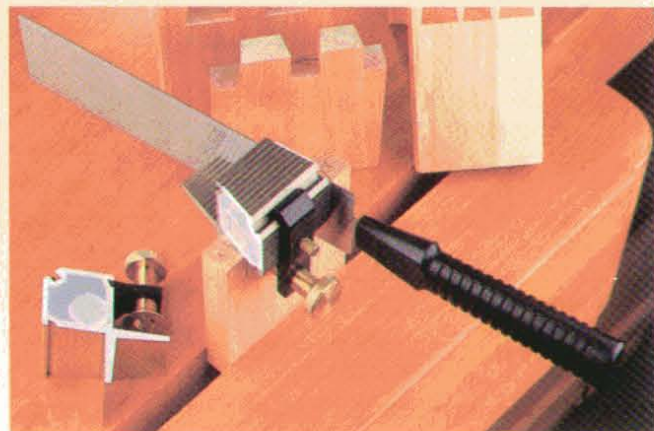
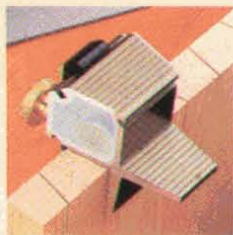
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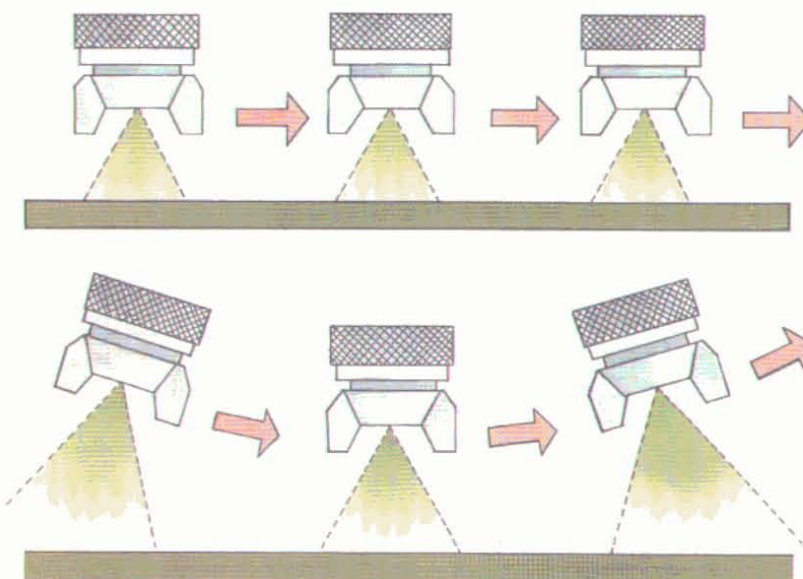
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HVLP Conversion Guns

Standard guns use fairly high air pressures but very little air. In contrast, HVLP guns use lots of air (high volume) at relatively low pressure: typically 10 psi (pounds square inch) or less. The acronym HVLP stands for High Volume, Low Pressure. Conversion HVLP guns convert moderate volumes of high pressure air into low pressure air, and should really be called MVLP guns.

These guns typically require a 5 HP or larger compressor. They are tethered to it via a 3/8" air hose, and that means they are not really portable. Because you can increase the air pressure at the tip by turning up the pressure going into the gun, conversion guns are very versatile and can spray most any material, thick or thin.

They also boast a much better transfer efficiency at 35 percent to 65 percent — because they generate much less overspray. These guns are typically more expensive than their standard counterparts but may save you money by wasting less finish. They're great for any type of finish, provided you own a large enough compressor.

HVLP Turbine Guns

Imagine a turbine blowing lots of warm air but at only five to ten psi. The turbine consists of a motor spinning from one to four fans, each inside a housing. The size of the motor controls how much air is moved (usually 80 cfm or more) and the number of fans, called "stages," determines how much pressure is generated. A one-stage turbine may create only five psi at the gun, while a three- or four-stage may get up to eight or even 10 psi. The gun itself is connected to the turbine by a rather large (1" diameter) hose. The turbine, hoses, and gun are usually sold as a package and can easily cost upwards of \$600. No compressor is needed.

These are lightweight, highly portable self-contained units that plug into a standard 110 volt outlet, making them ideal for on-site spraying as well as shop work. They have a high transfer efficiency and may save money by reducing finish waste, but they lack versatility. There is no way to turn the pressure up, so you are limited by whatever the turbine produces. One that gives you only five or six psi at the gun may have problems spraying thicker finishes or even some waterbased coatings.

Cup and Fluid Tip Options

Two important factors to consider in your choice of gun are the cup configuration and the range of fluid tips that are available.

Cups come in three different configurations. With a gravity feed cup, the finish flows down into the air path, thanks to gravity. That means all the air in the gun is used for atomizing the finish, not moving it out of the cup. This format is the easiest to clean and my personal favorite.

In a siphon feed, air moving across the mouth of a small tube creates a vacuum, to siphon fluid up from the cup. Most HVLP guns do not have sufficient air pressure to power a siphon cup, but they are common on standard guns.

Finally, there's the pressure feed. Some of the moving air is diverted into a sealed cup, creating enough pressure to force the fluid

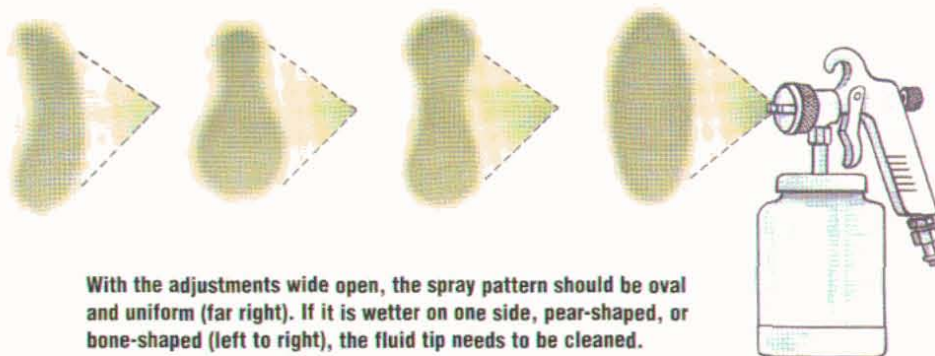
up the tube to the nozzle. It takes only three or four pounds of pressure to move the finish.

The fluid tip is important because different types of finish work best with different sizes of tips. Lacquer and paint will spray nicely through a large 0.070" (1.75 mm) tip, but I find many waterbased finishes and thin varnishes work better through a smaller .040" (1 mm) or .055" (1.3 mm) tip. Better manufacturers offer a range of fluid tip, needle and air cap sizes to make the gun more versatile. If you plan to spray acid catalyzed lacquer, conversion varnish, or waterbased coatings,

make sure all the fluid passages, including the tip and nozzle, are stainless steel. Regular steel will rust. This is standard fare on high quality guns.

Each type of gun has its strengths and weaknesses, and which is right for you depends on your needs and how you plan to use it. No matter what you choose, there is no guarantee that high prices mean good quality — but for the most part, you get what you pay for. A good gun, even though it costs more up front, will be well worth it.

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With the adjustments wide open, the spray pattern should be oval and uniform (far right). If it is wetter on one side, pear-shaped, or bone-shaped (left to right), the fluid tip needs to be cleaned.

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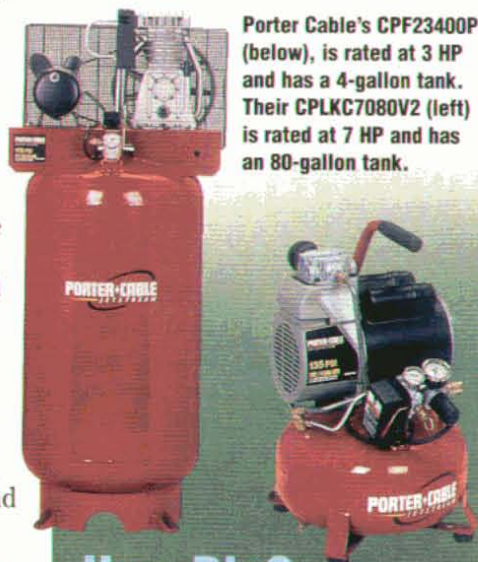
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How to Spray

Before you spray anything onto your project, check out how your gun is working. Start with nothing but solvent in the cup, and spray some out onto a large piece of cardboard. Use the cleanup solvent for what you intend to spray, or simply use clean water. (If you use water before anything except waterbased finish, you'll have to "chase" the water afterward by spraying some denatured alcohol.)

With the adjustments wide open, the pattern should be oval and uniform. If it is not, it means the fluid tip needs to be cleaned (see below). Turn the small adjustment knob from oval to round and back again while spraying to see the different patterns it makes. Set it to the pattern you want. A round pattern, which will deliver more material to a single spot, is great for getting into inside corners and spraying narrow stretchers and chair parts. For spraying a panel, a long oval is better.

move the gun from side to side. Use a horizontal <> pattern when moving up and down. Change from horizontal to vertical by rotating the air cap 90 degrees. Move the gun evenly in a straight line and always keep the tip about 8" from the surface of the wood.



Porter Cable's CPF23400P (below), is rated at 3 HP and has a 4-gallon tank. Their CPLKC7080V2 (left) is rated at 7 HP and has an 80-gallon tank.

How Big?

Any compressor will produce enough pressure (measured in pounds per square inch) to run any gun. However, the size and efficiency of the compressor determines how much air volume (measured in cubic feet per minute) it will produce. Standard guns typically need 2 to 5 cfm at 35 psi: even a 1 HP compressor is likely to be adequate. HVLP conversion guns may require from 7 cfm to 18 cfm at 60 to 80 psi, and need a larger compressor. I've found that the gun tech sheets often understate their needs, while compressor plates often overstate output abilities. Therefore, buy a compressor that seems larger than what you need.

Resist the impulse to swing the gun up at the end of the board. Overlap each pass about one half the width of the last pass.

Now empty out the thinner and fill it with what you intend to spray. Most materials designed for spraying should work without thinning. If yours needs to be thinned, it will form an "orange peel" pattern. Spray waterbased coatings and oil varnish lightly so that the surface is just barely wet. Solvent based lacquer can be sprayed heavier, until the surface is glossy wet. Practice will tell you a lot. Too wet and it will run and sag. (Beginning sprayers almost NEVER spray too dry.) Learning to spray is not any more difficult than learning to use a brush, but both take at least a little bit of practice.

Cleaning the Gun

When you are done spraying, open the cup and empty out the remaining finish. Pour in about a cup of the cleanup solvent for the finish and spray it through the gun to clear out anything left in the fluid passages. Break down the gun by removing the air cap, fluid tip, and needle and soak them in solvent until they are clean. Remove the cup and clean it separately by rinsing and wiping it out. Scrub out the fluid passages with a pipe cleaner dipped in solvent. When all the parts are clean, put a dab of petroleum jelly on any threaded parts and put the gun back together. The needle gasket nut should be snugged up only hand tight. I like to add a drop of machine oil to the needle packing now and then.



Break down your gun by removing the air cap, fluid tip and needle. Soak them in solvent until they are clean.

Practice pulling the trigger more or less as you move the gun. The more you pull it, the more liquid will emerge. Set the gun to a vertical pattern () if you want to

Michael Dresdner is a nationally known finishing expert and author with over 20 years experience. His latest book, The New Wood Finishing Book, was recently published by Taunton Press.

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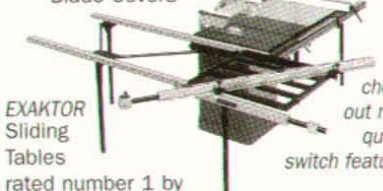
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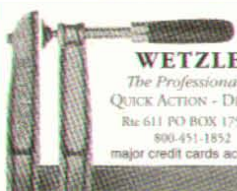
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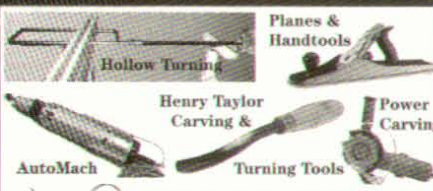
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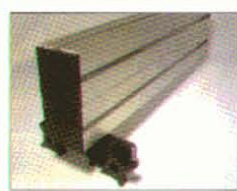
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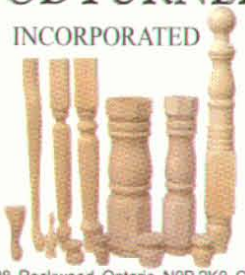
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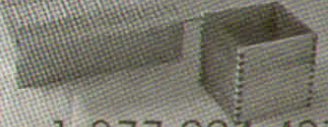
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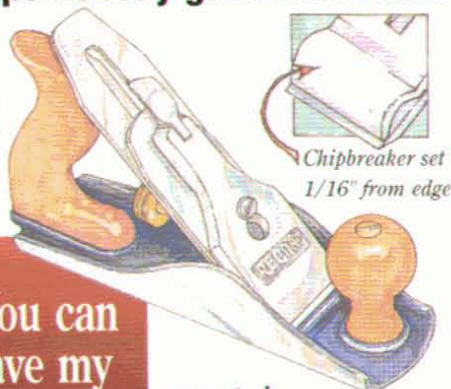
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Scrapers Vs. Planes: Hope nobody gets flattened!

This was a discussion I summarized from rec.woodworking. It went for 51 messages before I gave up on it. There wasn't any real conclusion, and how could there be? Some woodworkers swear by their scrapers and some love their planes like their own children. The first message was from someone who, because of an injury, could no longer hold a scraper. He wanted suggestions.

Someone immediately suggested he try a smoother plane, but the injured woodworker already had four of them and it wasn't exactly what he needed in this case. He said he had someone who could loan him a #112 plane and would give that a try.

Steve Knight, a regular on this group (and a noted plane maker),

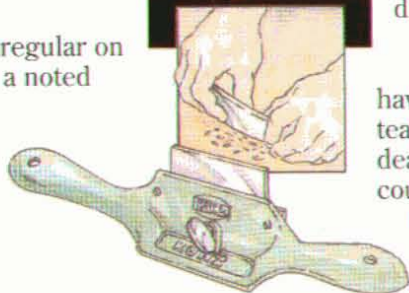


Chipbreaker set
1/16" from edge

"You can have my scrapers when you tear them from my cold, dead fingers."

asserted that the only wood he's encountered that should be scraped, rather than planed, was desert ironwood. He finished off with, "I think scraping is something that should be abolished." That, as expected, touched off "the difficulties."

The reply was, "You can have my scrapers when you tear them from my cold, dead fingers." And, of course, that didn't do much to cool down the rhetoric



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Q&A

Your questions ... answered by our experts online

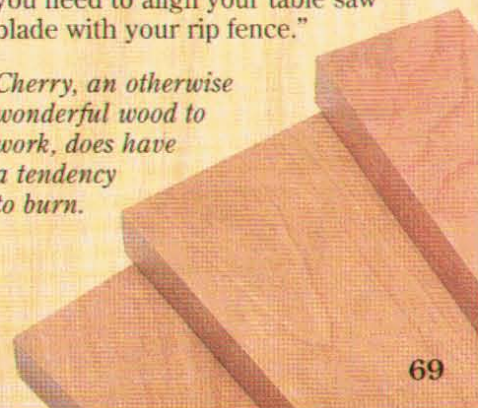
Q Burning hardwoods: This woodworker was having problems with his table saw burning hardwoods on one side of the blade. He heard that some hardwoods are more prone to burning than others. Is that true?

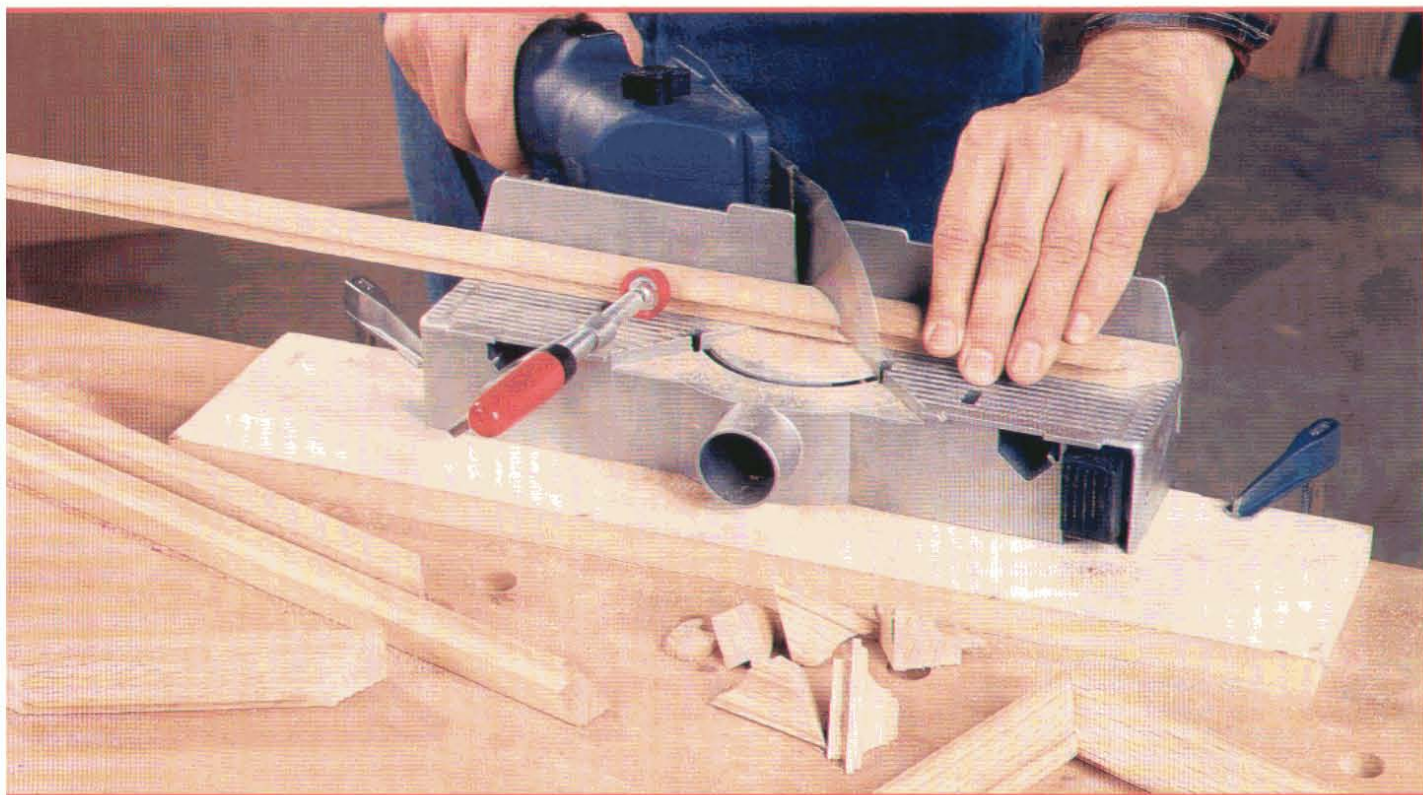
A Michael Dresdner: "Yes, it is true. Cherry is a good example of a wood prone to burning. However, the problem is most likely in the saw setup, the blade trueness, or the speed the wood is being fed into it. A well set-up saw with a good blade will not burn wood that is fed at the right speed. Take another look at your setup — it is too soon to be blaming the wood."

A Ian Kirby: "It very much sounds like the fence isn't aligned parallel to the blade. Slow feeding, even with a brand new carbide blade, will cause burning because there's too much friction."

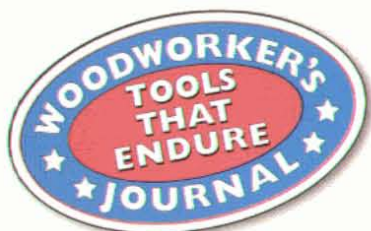
A Ellis Valentine: "Certain woods, whether hard or soft, are more prone to burning from the friction of a saw blade or router bit. If your wood is burning on just one side, it suggests that you need to align your table saw blade with your rip fence."

Cherry, an otherwise wonderful wood to work, does have a tendency to burn.





Bosch's 1640VSK Finecut Precision Saw



The Bosch Finecut Power Handsaw Kit, originally previewed in the *Woodworker's Journal* August 1999 issue, quickly disappeared into contributing editor Rick White's shop. Along with the projects he regularly builds for us, Rick does his fair share of cabinetmaking and home improvement work. He was the perfect woodworker to find out if Bosch's 1640VSK would become a recipient of one of our first "Tools that Endure" awards.

The complete kit adds only \$60 to the price of the Finecut saw and is, in Rick White's view, "a must" for woodworking operations.

After reviewing thousands of new products at 1999's *National Hardware Show*, a select panel of retailers picked the Bosch 1640VSK Finecut Precision Handsaw Kit as a winner of the "Retailers' Choice Award." The awards are given to products that signify "the best-of-the-best."

They won't get any argument from *Woodworker's Journal* contributing editor Rick White, who, after using the Finecut over the past year, told us, "This is a slick little unit!" The lightweight (3.5 lbs.) and compact 1640VS Finecut Precision Saw is sold separately with two blades for a little over \$100. The complete 1640VSK kit, which includes the saw, two blades, the miter jig fixture, three clamps and a sturdy carrying case, adds about \$60 to the cost. The two products are targeted at those who have to cut a lot of moldings and trim, counter cut-outs, straight long



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cuts and flush cuts. Detail work, including flush cuts, Rick reported, "is an absolute breeze" with the lightweight new saw. "And I found it to be pretty versatile," he added. "I've used it on everything from solid hardwood to plywood and plastic laminate. It is particularly nice on melamine covered sheet stock, where you want to make a notched cut-out and you don't want the surface to chip ... very handy."

Other features Rick came to appreciate over the past year include a large, integrated on/off switch and stroke speed control dial (2,000 to 2,800 no-load strokes per minute). "I also like the offset position of the blade," Rick said. "You get a good look at your cut, and the tool is out of the way when you have to make a flush-cut."

Like many Bosch tools, the Finecut is ergonomically designed and counterbalanced to reduce vibration. It features quick, tool-free blade changing or reversal at the press of a button.

"I can't believe what a nice clean cut this saw delivers," Rick told us. That may be because Bosch specially developed blades for the 1640VS with a finer tooth design. Sil Argentin, marketing director with Bosch, pointed out that the unit comes with a flex-resistant high-alloy steel blade holder to provide precise guidance and straight cuts.

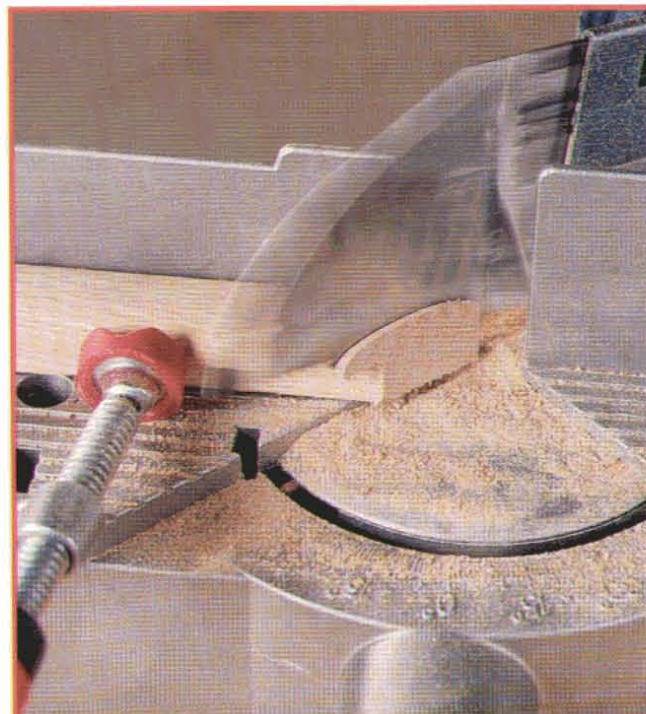
Miter Table Attachment

As noted, the saw can be purchased with an optional miter jig fixture to perform cut-offs and mitering applications. But it wasn't that optional in Rick's mind:

"I consider the miter jig fixture 'a must' with this saw for most woodworking applications," Rick said, adding that it's not really a tool built for ultra accurate cuts in its free-hand configuration.

"It won't replace my back saw for cutting dovetails," he noted, "but it is a great little tool for picture framing and other accurate operations with the jig." The portability of the unit also appealed to Rick: "I use it at my cabin all the time. It's a lot lighter than my power miter box, yet it is tough enough to do many of the traditional PMB operations."

For its accuracy, toughness and innovation, we are pleased to give the Finecut the first "Tools that Endure" award. It's also become clear ... that we are going to have a hard time getting the Finecut out of Rick's shop!



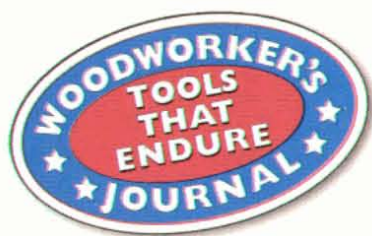
Freehand joinery cutting (top photo) is not as accurate as with a traditional back saw, but does demonstrate the Finecut's versatility.

Very small and accurate cuts are no problem for the Finecut saw and miter jig system. Note how smoothly it cuts. Our verdict: a tough little tool which will be a nice addition to anyone's shop.

Continues on page 72 ...



JET's JTAS-10 cabinet saw is the kind of table saw many woodworkers dream about. But what would they say about such a machine after a year of hard work in the shop?



The JET JTAS-10 Left-tilt Table Saw

Back in the October 1998 *Woodworker's Journal*, Charles Self reviewed several brands of contractor's saws. At that time, we asked him to do a long-term evaluation of JET's JTAS-10 Table Saw. The saw lived in Charles' shop for more than a year, serving as his everyday table saw. He chose the left-tilt saw version for the evaluation, and really put it through its paces. The result of the test is the JTAS selection as one of our "Tools that Endure."

At a certain stage in a hobby woodworker's development, there is a tendency to look around at the available equipment and wonder just what a better (and more costly) tool might help that woodworker do. This is especially true with table saws. Stepping up to a cabinet saw is many a woodworker's secret desire. The JTAS-10 saw is a good example of what a cabinet saw will bring to the table when compared to the smaller and more affordable contractor saws.

Bigger, Stronger and Sturdier

The first thing that becomes clear when it comes to a cabinet saw, Charles told us, is that they are simply more massive in every regard and "that alone might be a consideration when picking a saw."

Charles' JTAS-10 arrived in three boxes, the largest of which weighed 485 pounds! "Picture

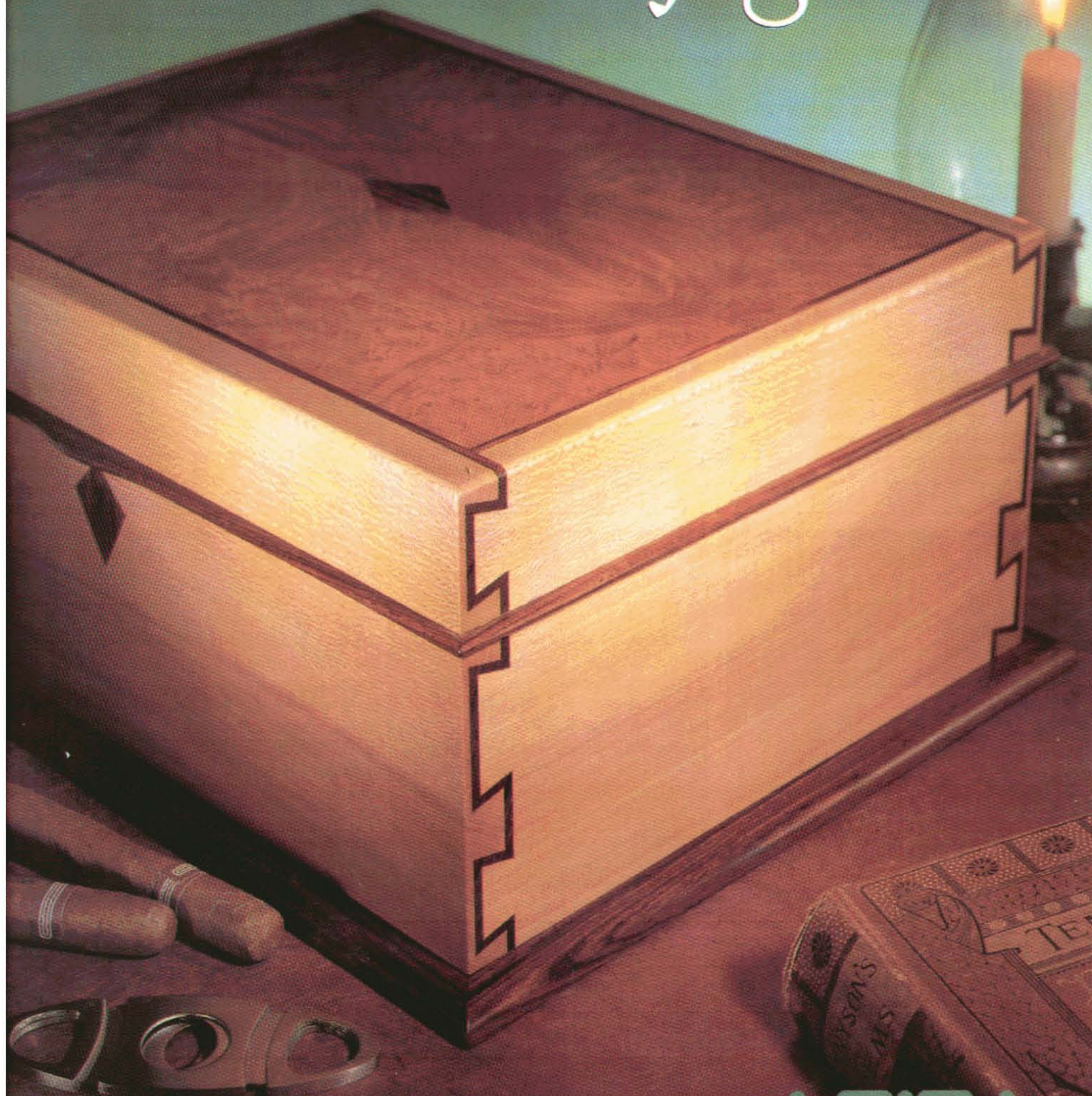
a couple of middle-aged guys trying to lift the world," Charles said. "But we got it into my shop without too many problems." He did warn, however, that "not everybody has the room I have in my shop. Readers should know that this saw takes up a fair bit of room when set up, and it's not easy to move around."

From that extra mass, you get more substantial components. Three drive belts power the heavy-duty arbor. While the saw blades are the same 10" diameter you're used to, they are being driven by much higher horsepower. The saw Charles tested was a 3 HP model, but the JTAS is available with motors rated at up to 5 HP.

"I was impressed with the power of the 3 HP motor. Plowing dados and ripping thick hardwood stock were no problem at all," said

Shop Journal continues on page 74 ...

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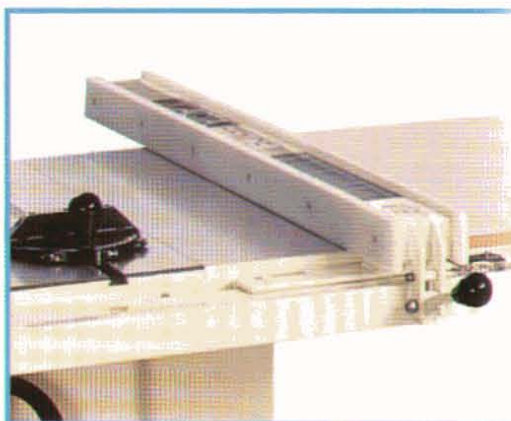
Charles. "I did not feel that for my woodworking tasks, 5 HP was necessary."

In the same way, the trunnions and even the bearings in which the arbor turns are larger and more heavy-duty. "You can easily expect twice the life for all moving parts on this saw, when compared to a contractor's saw," Charles said. "The other thing I really like is the remarkably low vibration — because of all the heavy-duty parts and the three drive belt system. It speaks well of the saw's quality over all," he pointed out.

Fence, Table and Controls

The XACTA FENCE™ is standard with the JTAS-10. A saw is only as accurate as the fence, and a fence is one component that really takes a beating. So durability is nearly as important as accuracy. Charles found no fault with JET's offering: "Remarkably, one person was easily able to install the fence, even though mine was a 52" commercial model. Over the course of the next year, with regular day-to-day use, I didn't need to readjust the fence at all." He also liked the slick plastic (HDPE) faces of the Xacta. "They are easily replaced (if you get a little too close to the saw

blade) and have an added vertical alignment feature that no other similar fence system has."



The 8" diameter adjustment handles are what you would expect on a quality machine. On the left-tilt model, which Charles tested, they are mounted on the front and the right side of the metal cabinet. They are reversed on the more common right-tilt version. Fit and finish met Charles' expectations as well.

A fine example of cabinet style saws. The JTAS-10 left-tilt features heavy-duty construction, built-in dust collection and a 3 HP motor.



The JTAS-10 comes in both a left-tilt and a more standard right-tilt model. The price starts at about \$1,400.00 for a reasonably equipped model.



"The table is highly polished and the powder coat paint is reported to be 30 times harder than regular paints. I had no real problems assembling the saw, which was my first indication that it was well-made," said Charles, adding "In fact, I'd have a hard time finding a real gripe with this unit."

But Does It Cut Wood

All in all, Charles said, "JET's JTAS-10 is a mechanically superior table saw." Of course, features are one thing, but the real question is how does the saw perform over time, with day to day use. And according to Charles, the answer is "very well indeed."

"Over a year of woodworking, I really put the saw through its

paces. I ran dado cuts in particle board, hardwood and MDF; no problem. Of course, that's exactly what you would expect for a saw that costs about \$1,400! I also ripped and crosscut a variety of materials, and the saw worked like a champ," Charles reported after his testing was complete.

Recommendation

Cabinet saws are not for everyone. Not all of us have the space for them — or maybe even the skill

level to make the best use of their considerable heft and quality. On a practical level, the price may simply be a non-starter for many. But as a result of an entire year's worth of bread and butter woodworking (under a fairly critical eye), we are happy to pronounce the JTAS-10 a real woodworking value. And, for all the reasons noted by our tool tester, Charles Self, we are pleased to present JET Equipment and Tools with our "Tools that Endure" award.

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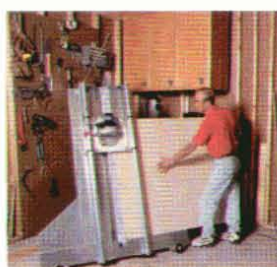
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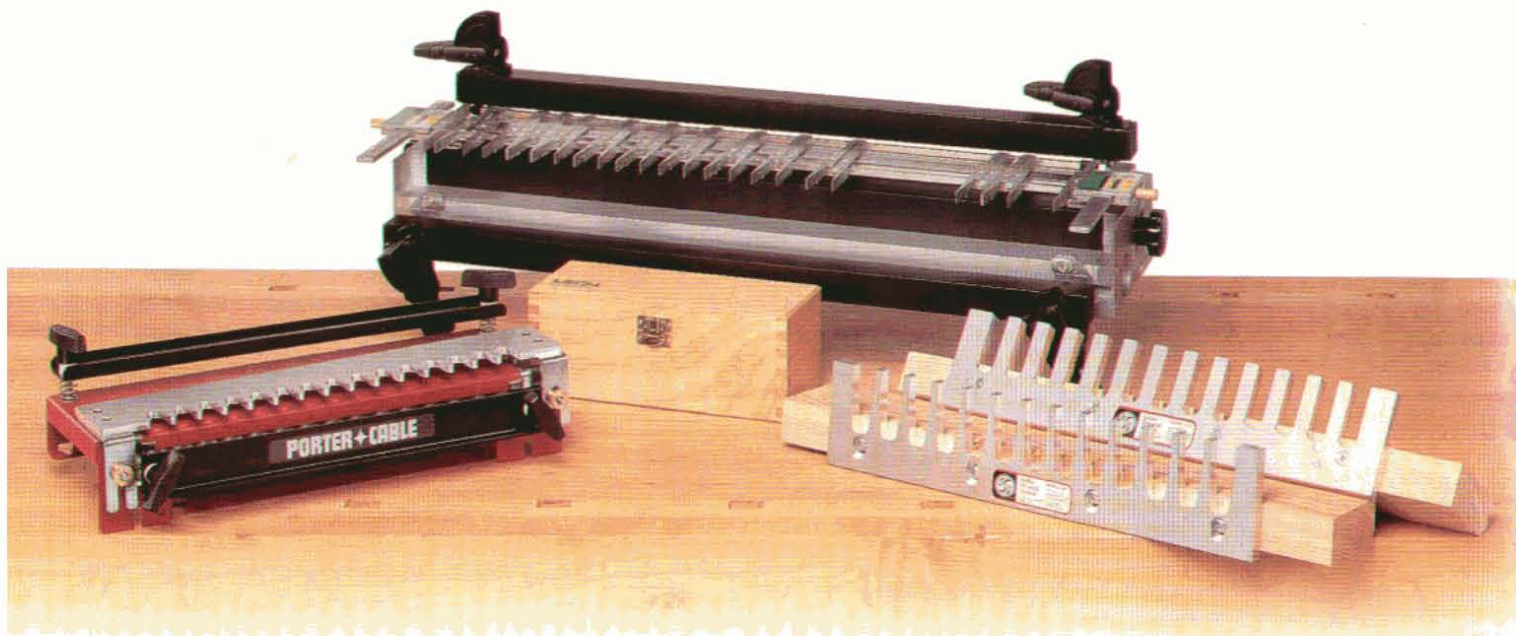
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Foolproof Dovetails: 3 Superior Jigs

By John English

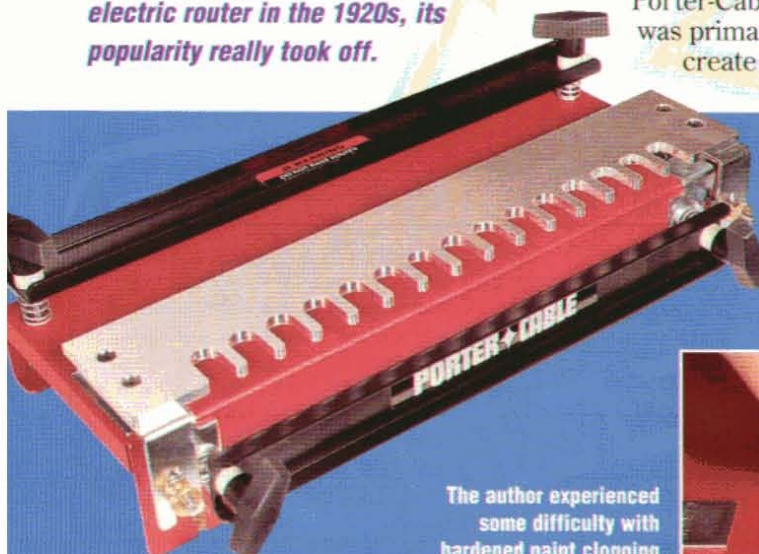


The University of North Carolina hosts an interesting Web site that talks about the popularity of dovetail joinery ... 2,000 years ago in ancient Rome! Through the ages, this joint has been one of the true hallmarks of woodworking excellence. With the advent of the electric router in the 1920s, its popularity really took off.

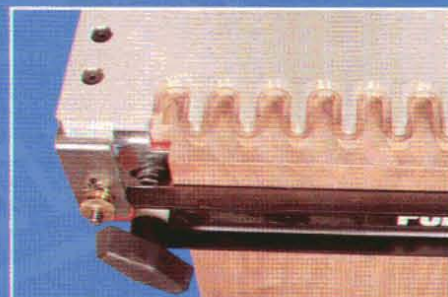
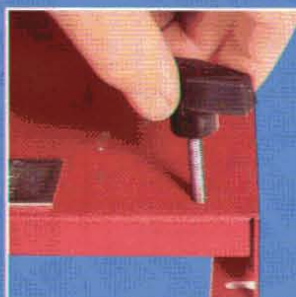
Ever since routers started showing up as a shop staple, dovetailing jigs have been making short (and very accurate) work of this joint, opening the door to woodworkers of all skill levels. To help you decide which type of jig is most suitable to the work you do, I took a look at three of the most popular small shop versions on the market. Porter-Cable's model 4112 was primarily designed to create half-blind

Three of the most popular small shop dovetail jigs (left to right): the Porter-Cable, Leigh and Keller.

dovetails, while the Keller 1601 delivers perfect through dovetails. The third machine, the Leigh Dovetail Jig, encompasses both. A fourth option, the Incra Jig Ultra™, was covered in depth in our June 1999 issue. It should be mentioned that, in addition to dovetailing, all of these jigs allow the operator to create box (finger) joints.



The author experienced some difficulty with hardened paint clogging up the threads on the 4112, a "classic" half-blind jig.



Porter Cable 4112 Dovetail Jig

Price: \$99.99

Phone: 800-487-8665

Stock thickness: 7/16" - 1"

www.porter-cable.com

The current model includes an upgraded template: aluminum instead of plastic.

Simple operation is key to the Keller 1601. After centering the first template and clamping it to your stock (right), you're ready to mill the tails with your first cut.



Use the results of your first cut to mark the pins (right), which you'll cut with the second template (below).



Keller 1601 Dovetail Jig

Price: \$249

Phone: 707-763-9336

Stock thickness: 1/8" - 3/4"

www.kellerdovetail.com



Porter-Cable 4112

The least expensive option that I looked at, the PC 4112, is a classic half-blind jig. A half-blind dovetail is one where the pins and tails are visible in one exterior plane (as in the side of a drawer), but are not present in the other plane (the drawer front). That made it an ideal choice for the mini router table featured on page 50 of this issue. With that project, I was after the strength and structural integrity of dovetail joinery, but also needed a continuous, smooth surface for the router table.

The instructions that came with the PC 4112 were fairly explicit when it came to both setup and use. However, I had some difficulty following them as the threaded holes in the jig were full of hardened paint. I actually had to remove the paint with a tap and die set before the jig could be assembled.

The current model of this jig is a vast improvement on the version that has generated dust in my shop for the past 20 years. The template has been upgraded to cast aluminum (it used to be plastic), and the two U-shaped clamping bars are sturdier than their predecessors. Assembly took about an hour. I was somewhat disappointed that the edge guides (four pairs are supplied for a wide variety of setups) were held in place by nothing more than a small slotted screw. This, too, had to be retapped before it could be tightened.

After initial assembly, you must put the machine through a methodical setup procedure before each joint can be cut. This involves adjusting locking nuts and knurled knobs to set the location of the

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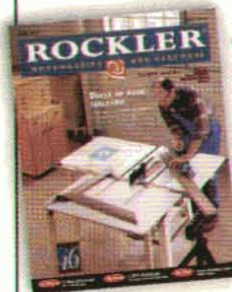
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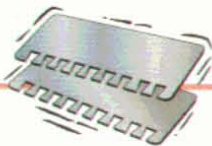
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template, and matching the depth of cut to the combined thickness of the stock and template. The second and third times I went through this routine, it went a lot quicker than the first, rather frustrating effort. This is an easy machine to get comfortable with, once you learn the temperamental basics.

The 4112 came packaged with a template for 1/2" half-blind dovetails (ideal for standard 3/4" thick stock); a guide bushing and locknut that fits most routers; and a 1/2" bit. It can be used with stock up to 12" wide and 7/16" to a full 1" thickness. If your primary goals are to make drawers and save money, the Porter-Cable 4112 is the way to go. The jig's street price of \$99.99 includes the 1/2" half-blind dovetail template, a template guide and a 1/2" high speed steel bit. For more information you can find them on the Web at www.porter-cable.com.

If your primary goals are to make drawers and save money, the Porter-Cable 4112 is the way to go.



Keller 1601

By far the simplest to set up and operate, the Keller Dovetail jig is ideally suited to decorative box building. Unlike the half-blind jig, this tool delivers visible pins and tails on all four faces of a box.

Initial setup for the Keller jig was incredibly simple. All I had to do was screw a length of 2x4 stock to each of the two templates, aligning them along factory-scored marks. Keller supplied the screws, and also

packaged two bearing-guided bits with the jig: one straight bit and one dovetail. Both bearings are mounted at the bottom of the shaft, above the cutters. These bits eliminate the need for a guide bushing and locknut.

The Keller Jig is very simple to operate, which turns out to be both its virtue and its vice. On the upside, all you have to do is center the first template on your stock and clamp it in place, then make your cut. On the downside, one size of pin and tail must fit all projects, although you can vary the spacing between them. Use of the Keller jig was explained in an accompanying 12-minute informational video that only had to spend half its time on operational details. Simply make the first cut (described above) to mill the tails, then use this part to mark the pins. Clamp the second template on the pin board, change bits, and make your second cut.

Shop Test continues on page 80 ...

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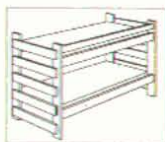
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Despite its simplicity, the Keller machine has some surprising abilities. Because it is essentially nothing more than a clamped-on template, it can be used on stock 1/8" to 3/4" thick of unlimited width. It can even be used to mill dovetail joints on curved surfaces, and in both acute and compound angles. Setup time is absolutely minimal, and no test cuts are required. These properties make it an obvious choice for production work. One can even gang-cut two or three parts at a time, further reducing production time. The Keller 1601, which lists for \$249, is one of four models offered by the company. The 1601 system includes

two aluminum templates and both bearing-guided, carbide-tipped bits. It comes with a limited 20-year warranty. For more information, visit them at www.kellerdovetail.com, or call 800-995-2456.

Leigh D4 Dovetail Jig

My grandfather used to say that the difference between an artist and an artisan is that one has talent, while the other has skill. Most of us spend a lifetime learning skills, while a few lucky souls produce work that simply takes our breath away. Well, I have discovered one of their secrets. Those beautiful, randomly-spaced pins and tails on elaborate drawers and boxes aren't always the result

of weeks of painstaking handwork. Sometimes they're completed in a couple of minutes on the unbelievably versatile D4 jig.

Leigh's D4 Dovetail Jig is the only machine in existence that can produce variably-spaced through dovetails with an infinite range of pin and tail settings. The fact that it also runs half-blind dovetails is just a little icing on the cake.

When I first opened the package surrounding my test jig, I have to admit I was a little intimidated. It took me almost three hours just to unpack and assemble the machine! But a comprehensive 168-page User Guide and superbly machined parts ensured that I got it right the first time. And assembly was truly the toughest part: by the time I was



Leigh D4 Dovetail Jig
 Price: \$329
 Phone: 800-663-8932
 Stock thickness: 1" max
www.leighjigs.com

Leigh's D4 has a unique ability: producing variably-spaced through dovetails with an infinite range of pin and tail settings.

A reversible template for cutting both the pins and tails (above), cam-operated clamping bars (far left) and integral scales (left) are features of the D4.

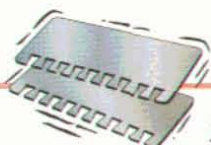
Leigh's D4 Dovetail Jig is the only machine that can produce variably-spaced through dovetails with an infinite range of pin and tail settings.

done, I was already well schooled in the vagaries of this versatile machine.

The Leigh D4, in a nutshell, is a comprehensive joinery system, offering through and half-blind dovetailing plus a host of other options. Available accessories allow the user to mill (among other options) multiple mortise and tenons, box/finger joints, as well as inlaid and angled dovetails. The company has even come up with a series of exotic round and curved templates that produce pins and tails in unique shapes, including the intriguing "bear's ears."

The key to success with the Leigh D4 is a reversible template that automatically lines up the pins and tails. A series of adjustable guide-fingers allows you to place these pins anywhere along the joint, so you don't have to build a uniform joint (although you can). On through dovetails you use the template to mill the pin sockets, then slide it out to rotate and reinstall it before milling the matching pins.

Work is held in the jig with cam-operated clamping bars that are quick to release and lock, so a part can be removed and replaced with minimum effort. A pair of adjustable alignment guides were part of the initial setup, so the workpiece can be replaced exactly where it was during the first cut with ease. This lets you test your joint. If it's too tight or too sloppy, the depth of cut can be adjusted by moving the template toward or away from the operator. This adjustment is controlled by a pair of integral and very accurate scales that are attached to each end of the template. Adjustment is by means



of a knurled brass knob. The D4 unit I shop-tested arrived with a standard dovetailing template that handles both through and half-blind joints, a pair of bits and their accompanying bushings, an excellent instruction book and a 45-minute instructional video. A dizzying array of optional bits are available, as is a comprehensive assortment of bushings to match just about any router base. You can review these and a multitude of other accessories at the company's Web site, www.leighjigs.com.

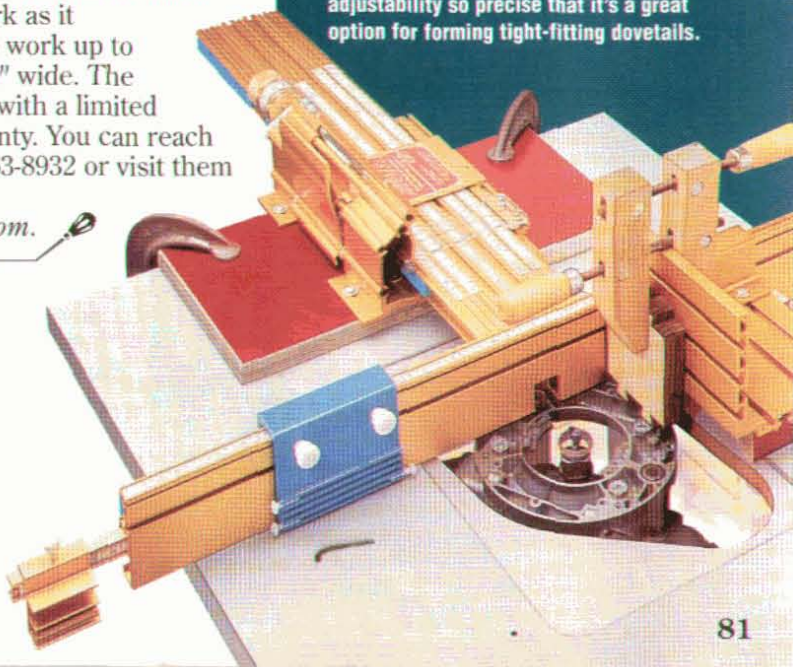
This is not an inexpensive system. The D4 package I tested sells in catalogs for around \$329, while the optional finger and mortising templates fetch \$259 and \$189 respectively. But it is definitely worth the price, especially if your project list includes lots of drawers, boxes, casework and exposed joinery. The system has an inherent capacity to grow with your skill level, and my suspicion is that few of us will ever outpace it. While it was designed with every woodworker in mind, the Leigh jig is suitable for small production work as it accommodates work up to 1" thick and 24" wide. The system comes with a limited five-year warranty. You can reach Leigh at 800-663-8932 or visit them on the Web at www.leighjigs.com.

INCRA Ultra™ Jig Revisited

As I noted in my *Tool Preview* last year (June 1999; page 56), Taylor Design Group's INCRA Ultra™ is, at its heart, an elaborate fence system for your router table, table saw or band saw. The thing that sets it aside from other fences is its precise micro-adjustability (to less than 1/1,000"). Couple that with a 40-page master reference guide and a complete set of templates for a wide variety of joints, and you've got yourself a very nice dovetailing jig – for not a whole lot more than you'd spend on a pure dovetailing jig. Prices range from about \$160, to \$325 for their top of the line system. You can reach Taylor Design Group at 972-418-4811, or visit them on the Web at www.incra.com.



The INCRA Ultra fence system offers micro adjustability so precise that it's a great option for forming tight-fitting dovetails.



Drilling Into the Past

Q This 10 inch long, 1 1/4 pound cast iron, 20-piece assembly, over-engineered tool has me stumped. The vee block has two set screw adjustments and is capable of holding a 3/4" diameter round workpiece. The handled end travels over a 120 degree arc with an adjustable spring-loaded holder for a five-toothed saw blade. Even the wood-colored handle is cast iron! The only marking is .015 on one side of the blued saw blade, indicating the thickness of the blade.

Gene E. Mott
Lake Park, Florida

A What in the world is this? That was our reaction around the offices to this one, Gene. It bears a vague resemblance to our old, hand-cranked eggbeaters, but somehow we don't think that's the right path to follow. So, folks, we're throwing it out to you: anyone else have a clue to this mystery?



Our staff isn't sure about the origins of this cast iron tool — so we're hoping some of you can enlighten us.

Q In our October 2000 issue, Martin Cecil wondered about a tool he discovered in a farm shed. His wife informed us that, unfortunately, Martin passed away before discovering the answer. Several readers, however, did post their responses to us.

The Editors
Woodworker's Journal

A "It is a post drill. Not because it drills posts, but because it mounts on a post," wrote Dee C. Wilson of Oakland, Oregon. "A forerunner of the modern drill press, it was used mostly in blacksmith shops to drill holes in iron and steel," continued Alvin Schafer of Rocky Ford, Colorado.

How does it work? John H. McCoy of Manhattan, Kansas, explained: "The crank shown on the right side, which was turned clockwise, was geared to a vertical shaft. This shaft has a rather crude chuck on the bottom end which holds the drill bit. The adjustable table,

on which the metal or wood to be drilled was placed, appears to be swung off to the left in the picture. The horizontal wheel at the top of the machine was either operated by hand, or by engaging a little "dog" on the gears. The wheel opposite the crank is simply a "balance" wheel.

Gregory Berg of Hammond, Indiana, put a post drill to work in the summer of 1966. "It worked fine," he said, but also added another sentiment: "God bless modern power tools."

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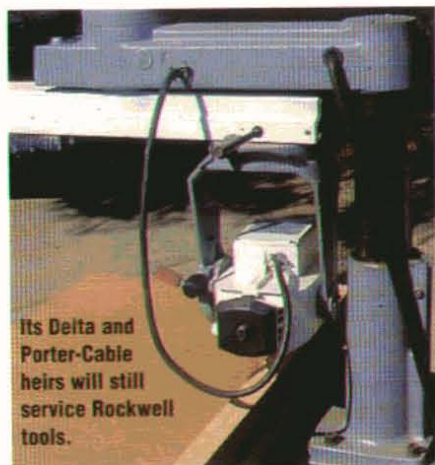


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Winner! For taking the time to respond to Stumpers, Allen C. Wood of Newark, Delaware wins a collection of American Tool's Quick Grip clamps. We toss all the Stumpers letters, published and unpublished, into a hat to select a winner. If you have a question or answer, send it to the editor: Stumpers Dept., Woodworker's Journal, P.O. Box 261, Medina, Minnesota 55340. Or send us an e-mail: jtakes@woodworkersjournal.com



Its Delta and Porter-Cable heirs will still service Rockwell tools.

Q I have some old Rockwell tools, including a router and a drill press. I am guessing Rockwell doesn't make these tools anymore — do they even exist?

Liam Moriarty
Shiremanstown, Pennsylvania

A Yes. And no. Rockwell exists today, but it has nothing to do with woodworking. Way back in 1945, Rockwell bought Delta Manufacturing Company. In 1960, Rockwell purchased the Porter-Cable Machine Company.

For several years, says Porter-Cable public relations manager **Todd Langston**, the now familiar Porter-Cable and Delta woodworking tool brands didn't exist. Instead, Rockwell was on the label. In 1981, Rockwell sold the portable electric tool business to Pentair in St. Paul, Minnesota, and the Porter-Cable name reemerged. Pentair resurrected Delta, too, with a 1984 purchase. In 1999, the two former Rockwell possessions merged operations at their Jacksonville, Tennessee headquarters.



Todd Langston says he can still find Rockwell parts at Porter-Cable's headquarters.

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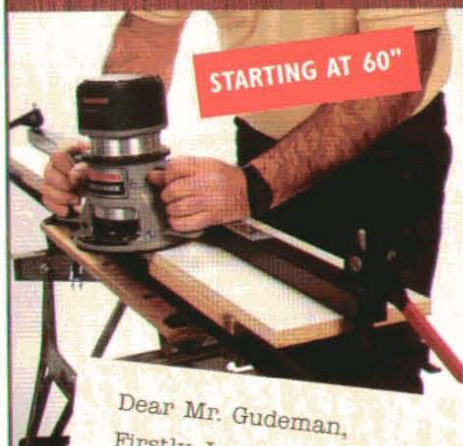
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Joint A-billi-T the new matched edge jointer



Woodworkers are abandoning their jointers for the ease, sureness and portability of the Joint A-billi-T.

Joint-A billi-T is just as its name implies, a tool for perfect glue joints. Use your router to cut these joints flawlessly in your shop: dadoes, rabbets, tapered cuts, squaring panels. Guaranteed square and tight joints starts your project right.

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Secondly, I rate your product up there with sliced bread and baseball. I am finally nearing completion on an order for forty - yes, forty - tables for an Inn. The smallest ones are 14" x 18" and they go up to 36" x 72". Without a doubt, I could never have completed all those tops and aprons without the JOINT A-billi-T. I believe the production time for jointing the edges was cut at least 50%, not to mention the improved quality of the finished products and my sanity, when you must tease a stubborn board into matching with its cousin.

Anyone who is a serious woodworker, or perhaps anyone who wants to plane an edge on a board, needs a JOINT A billi-T.

Congratulations on this wonderful improvement to the woodworking process. Like any process, each step must produce the desired results each time. With your product, this is possible.

Congratulations again for your contribution to woodworking.

Sincerely,
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New Tools Offer Quick Satisfaction

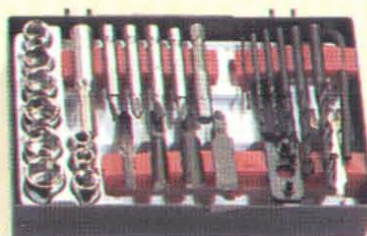
A Smooth Ride from a Fein Machine



A mighty fine ride is what Fein promises with its new router, the RT-1800. Electronic feedback circuitry keeps the rpm and torque constant for smooth, comfortable operation of the 12-pound router. At 3¼ HP, it offers variable settings from 8,000 to 22,000 rpm and a plunge depth of 3 inches. Standard on the RT-1800 are a soft-start feature, dust collection port and motor protection to increase the life of the tool. The RT-1800 retails for about \$349. For more info, call 800-441-9878 or visit www.feinus.com.



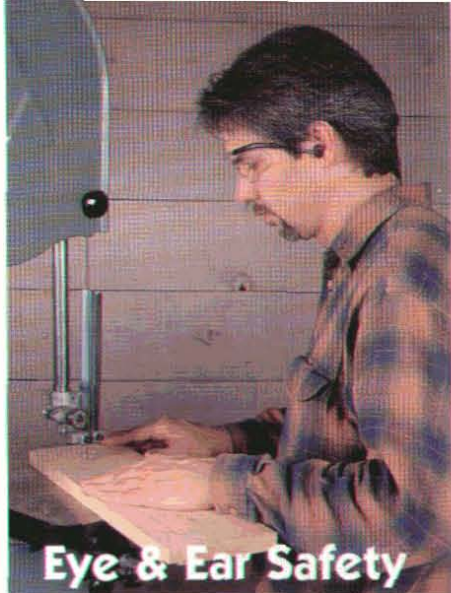
Grizzly's Five-in-One Tool Kit



At first glance, Grizzly Industrial's Model 9921, 18 volt power head seems to be a cordless drill/driver. But, with a quick flick of the lock, the drill/driver head comes off, and the tool transforms into ... a detail sander. A reciprocating saw. A power carver. Or a 4" angle grinder.

Necessary attachments for each tool come with the 5-in-1 Quick Charge Cordless Tool Kit: sandpaper, saw blades, chisel heads and an abrasive cutoff wheel. Drill and driver bits work with 16 different torque levels.

It operates in forward and reverse, with variable speeds up to 750 rpm. The kit comes with a carrying case and sells for \$149.95. For more info, call 800-523-4777 or visit www.grizzly.com.



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Screws are available in a variety of profiles, coatings, threads and head profiles, as well as in both Phillips and square-drive designs. The QuikDriver sells for about \$50. For more info, call 888-487-7845 or visit www.quikdriver.com.



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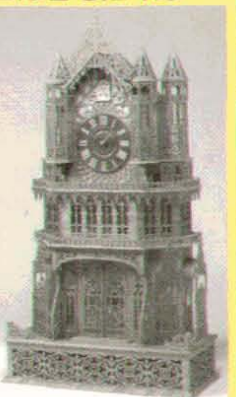
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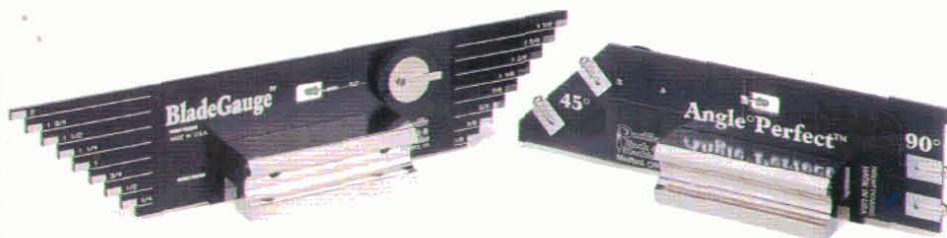
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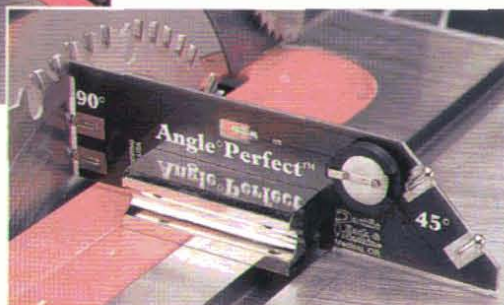
Lighting Up for the Perfect Cut

Wayne Tarris's Pacific Rack & Machine has invented tools to help woodworkers achieve the goal of perfection. LED displays on the BladeGauge™ and AnglePerfect™ jigs light up when you've achieved

the proper adjustment, making it easy to recreate table saw blade height and angle adjustments.

Magnetic bases hold the jigs to your saw while you adjust the blade. The Angle Perfect™ assures the accuracy of the 45 and 90 degree angle settings of your table saw to .002 inches of accuracy. The tools sell for about \$40 each.

For info, call 877-220-2699 or visit www.bigleg.com.



Both the BladeGauge™ (above) and Angle Perfect™ feature an LED that lights up when your blade contacts the jigs, ensuring perfect blade adjustments and repeat cuts.

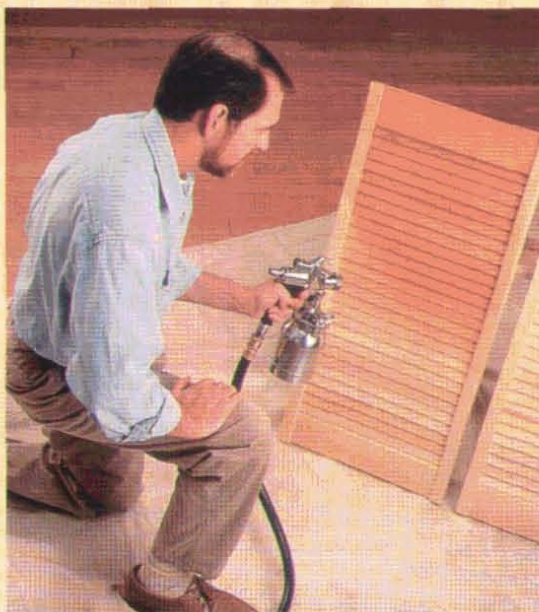
Conversion Gun: "Spraying's Future"

Wagner Spray Tech sales director Tony Torntore believes "The conversion gun is the future." Wagner's HVLP (high volume, low pressure) conversion gun will work

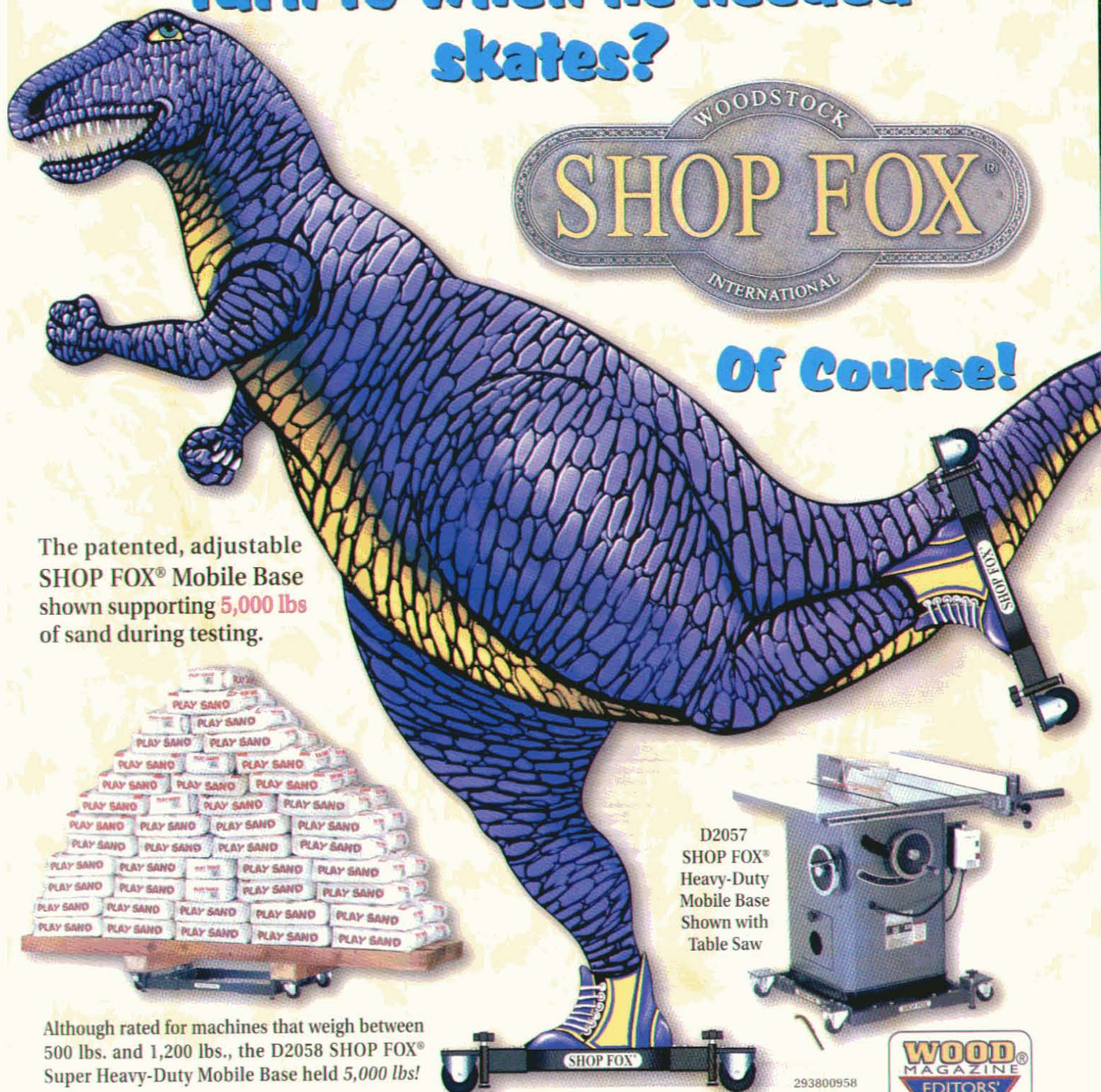
with an air compressor as small as 1 1/2 HP, but has the same features as the guns in Wagner's Model 2900 and 2600 turbine systems. A patented dual air control valve lets the user direct

air flow, and the gun also has a "non-bleeder" quality and a patented method of reducing bounceback.

The product transfer efficiency rating is 89 percent. The gun has three spray patterns — vertical, horizontal and round — while trigger control allows you to adjust from a 1/4" to 10" spray pattern. Cost is about \$300. For more info, it's 800-328-8251 or www.wagnerspraytech.com.



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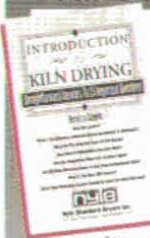
These mobile bases are patented in the U.S.A. with foreign patents pending. Shop Fox® is a Registered Trademark of Woodstock International, Inc.

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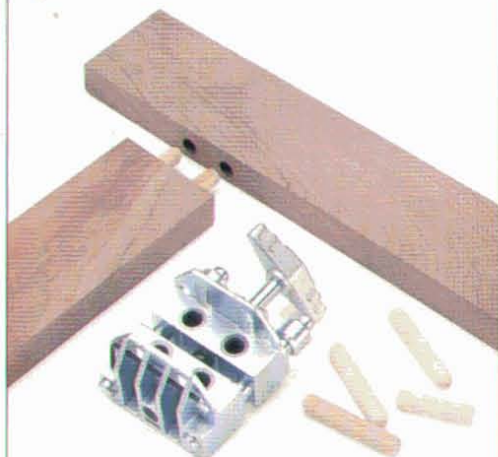
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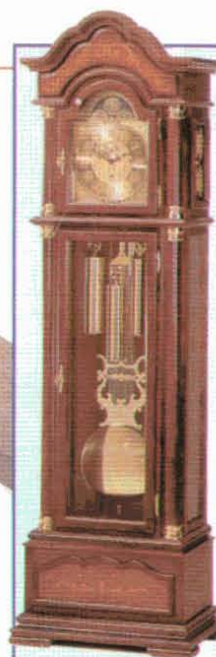
WHAT'S IN STORE



SMART DOWELING JIG

The Park family thinks their doweling jig is pretty smart. In fact, they've called the tool the "Smart Doweling Jig." An invention of hobbyist woodworker Joon Park, it works with 3/8" drill bits and 3/8" dowels to create a variety of joints. The jig itself provides the clamping function in the creation of edge-to-edge, edge-to-end of surface, edge-to-inside of surface and miter joints.

Joon and his brother, Daniel, recently created a business, now called Kharis Products, to sell the jigs and started taking them to California trade shows. It sells for \$54.95. For more, call 818-548-7810 or www.smartdoweling.com.



New Clock Kit Includes Complete Schematics

Black Forest Imports' HM1161-853/94A clockworks kit gives you all the "guts" of a clock. The cable-driven, eight-day movement has a triple chime, while the lyre pendulum, moon dial and serpentine

hands all come in polished brass. Accompanying the kit are complete schematics that cover the minimum case size that will accept the clockworks.

For more info, call 800-824-0900 or visit www.blackforestimports.com.



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We took a different angle to create the perfect miter gauge.

\$89⁹⁹

Sure-Loc™ (43298)

Pictured with optional
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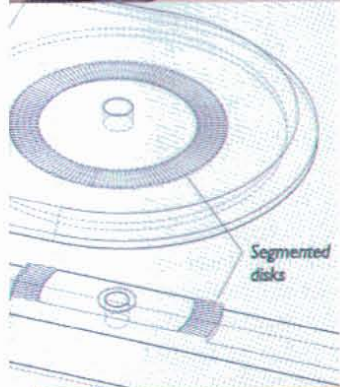


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teeth for
perfect
repeatability

The Tru-Trac™
Miter Bar gives a
no slop fit in any
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Take a look at our revolutionary new **Sure-Loc™** miter gauge. You'll see some exciting innovations that will make your miter operations smoother and more accurate. By combining common sense with new technology, we came up with the idea of a segmented disk with interlocking teeth that allows you to lock in at 2½° increments. Not only do you get accuracy to within 3/100°, but you get precise repeatability. Integral to the gauge is our Tru-Trac™ miter bar. It features a dual bar design that expands to fit any track, both T-slot or standard, no matter how old or worn. And it gives you a smooth, snug fit along the entire length of the bar plus constant support in the T-slot. The Sure-Loc™ miter gauge with Tru-Trac™ miter bar is another example of how our fresh perspective will give you a better angle. Time and time again.



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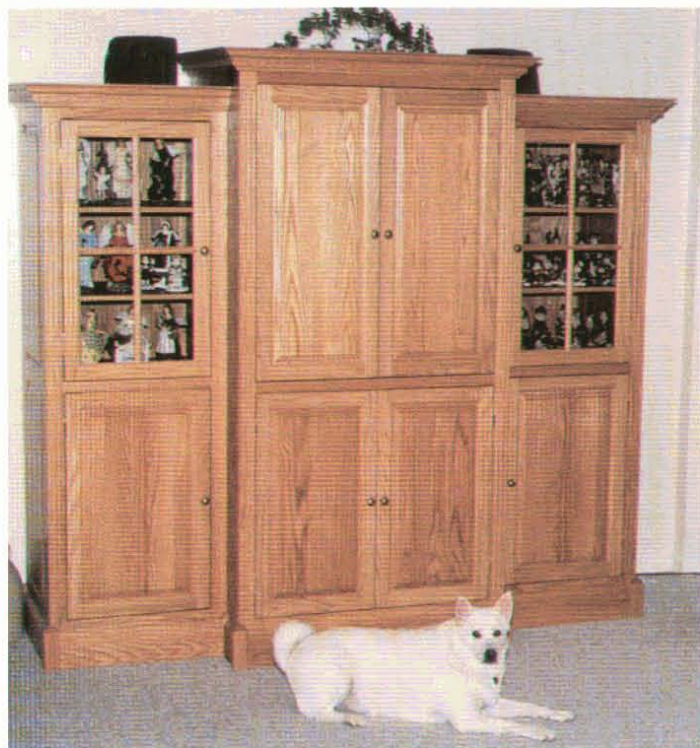


The NEW name for...



(Circle No. 55 on PRODUCT INFORMATION form)

Readers Enhance our Designs



Doing Doors

The first inset doors Bill Gelatka of Prince Frederick, Maryland, ever made were on his version of our Entertainment Center III. He stepped up to the challenge, and added a few of his own modifications to our plan, as well. While keeping our dimensions and overall construction, Bill enclosed the side units and the drawers in the center of the unit behind additional doors. In order to get it ready for the whole family to enjoy, Bill made his

Entertainment Center III, built by Bill Gelatka, first appeared in the March/April 1997 issue of Today's Woodworker.

entertainment center out of solid red oak and oak plywood, stained it with Minwax® Golden Pecan stain and finished it with three coats of Hydrocote® satin polyurethane.

The Steamer Trunk appeared in the September/October 1993 Today's Woodworker.

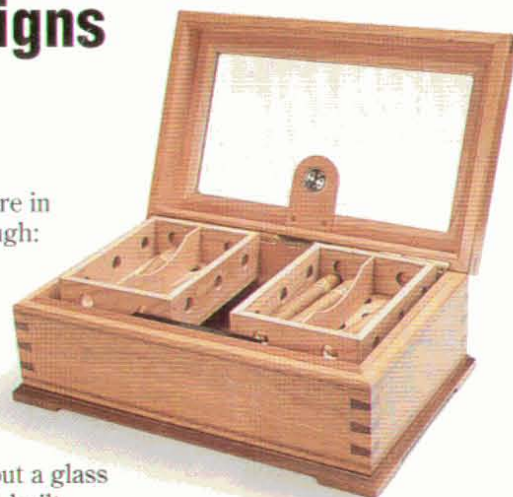


See the Smokes

Knowing they were in there wasn't enough:

it seems that Nick Medwid of Medina, Minnesota, wanted to see the cigars in his humidor.

Accordingly, he put a glass top on the box he built from our plans. Nick also added some inset shelves and, instead of the mahogany we used, he went with padauk. We're not sure if his cigars are an exotic species, too.



The Humidor first appeared in the July/August 1996 issue of Today's Woodworker.

A Trunk for Traveling

Looks like Tom Kropp's trunk gets more travel than ours. Although the design was based on earlier generations' luggage, we intended our Steamer Trunk to be used for storing linens and sweaters. Tom, of Allenton, Wisconsin, has more of an on-the-go version. It's saddled up only temporarily, but he added wooden ring loop handles on the ends in case he

needs to pick it up and haul it off to a rodeo. He also stuck with oak for his trunk, leaving off the walnut strap design we'd incorporated. Still, either version makes a classy container for all your neckerchiefs, pardner.



Winner! Tom Kropp wins a Bosch 1294 VSK detail sander for his contribution to End Grain. Send your letters and photos to: End Grain, Woodworker's Journal, P.O. Box 261, Medina, Minnesota 55340. If we publish yours, we'll throw your name in a hat for our free tool drawing. Photos of projects from Woodworker's Journal or Today's Woodworker are eligible.

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