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WOODWORKER'S JOURNAL

April 2000
Volume 24
Number 2

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Veneering with **Ian Kirby**

Power tool review: **Ellis Walentine**

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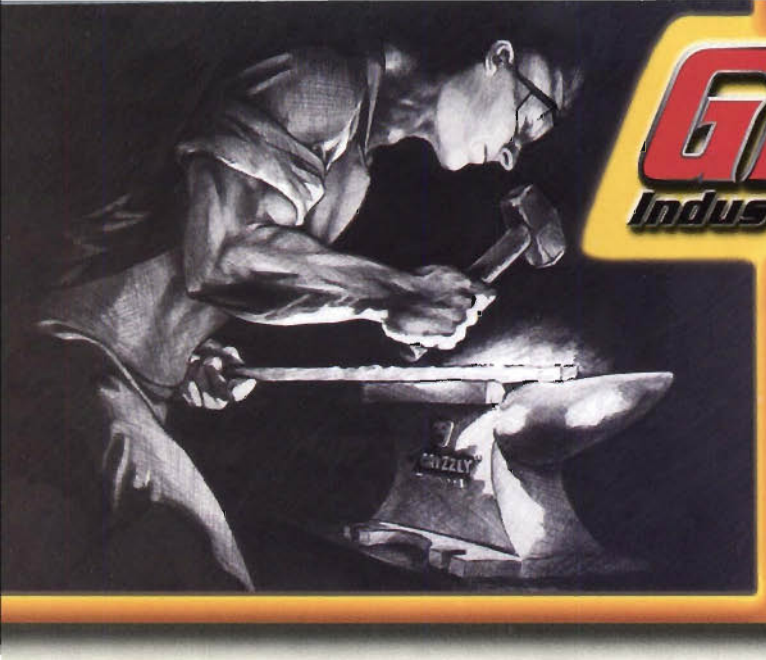

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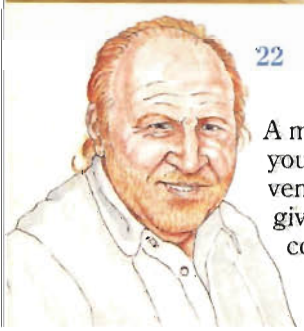

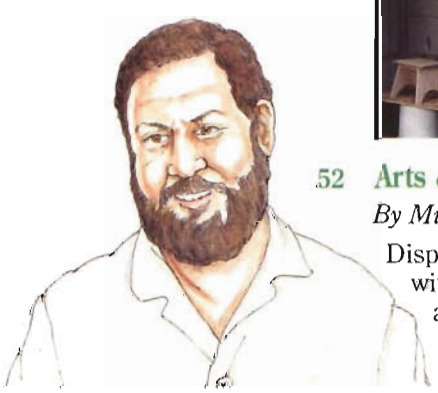

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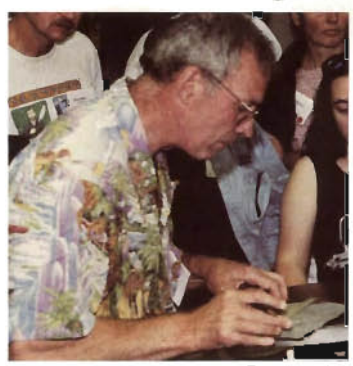

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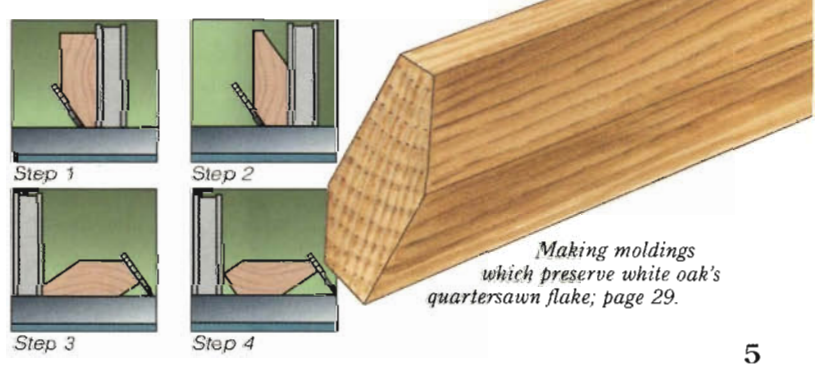

Making moldings which preserve white oak's quartersawn flake; page 29.

RAM or RPMs?

When I go home after a long day of staring at a computer screen in the office, there's nothing I like better than to get my hands on some power tools and set to work in my small shop. But associate editor **Joanna Werch Takes'** story about woodworkers on the Web *(see Shop Talk, page 16)* has me wondering. Of course, we've noticed that a lot of woodworkers have been visiting our web site — and we expect a lot more, now that we've revamped it (to see the changes, go to *www.woodworkersjournal.com*). Still, it sure did surprise me that a search engine could already find over 400,000 sites related to woodworking.

It makes me kind of sad ... to think that woodworkers are spending more time and energy maxing out the RAM on their computers than revving up the RPMs on their routers.

Contributor **Ellis Walentine** thinks the Web will change everything. "It may take a while longer to effect changes on woodworkers, but it will happen as surely as the telephone changed our lives in the past 50 years," he told me recently. When he's not reviewing palm sanders for our readers *(check out Shop Test on page 58)*, Ellis runs a terrific wood-related forum on the World Wide Web, so he should know.

It makes me kind of sad, though — no, wait, that's just a speck of sawdust in my eye — to think that woodworkers are spending more time and energy maxing out the RAM on their computers than revving up the RPMs on their routers.

How about you? Are you spending more time surfing than sawing? Let me know, either by snail-mail or, if you insist, by e-mail: *letters@woodworkersjournal.com*.

For those of you who are planning to do some woodworking of the nonvirtual variety over the next couple of months, we have another issue full of great projects. **Rick White's** Prairie Lamp *(page 28)* is an illuminating example of this popular style. If you'd like to use a finish that's authentic to the period, check out **Michael Dresdner's** article on Arts and Crafts Finishes *(page 52)*.

The Cricket Xylophone was a big hit in our December 1998 issue, so we're pleased to offer plans for the next member of **John Hutchinson's** moving menagerie: a Winged Dragon on *page 47*.

If you just need to blow off some steam, throwing darts is a great method. Associate art director **Jeff Jacobson** designed and built a handsome dart board cabinet that will lend your game room a veneer of class *(see page 34)*. Finally, for some great tips on veneer designs and techniques, turn to **Ian Kirby's** article on *page 23*.

Larry N. Stoiaken

MARCH/APRIL 2000
Volume 24, Number 2

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Woodworker's Journal (ISSN: 0199-1892), is published in February, April, June, August, October and December by Rockler Press, 4365 Willow Dr., Medina, MN 55340. Periodical postage paid at Medina, Minnesota and additional mailing offices.

Postmaster: Send all address changes to Woodworker's Journal, P.O. Box 56585, Boulder, CO 80322-6585.

Subscription Rates: One-year, $21.98 (U.S. and possessions); $27.98 U.S. funds (Canada and other countries). Single copy price, $4.95 (U.S. and possessions); $5.95 (Canada/other countries).

SUBSCRIPTION RELATED INQUIRIES: Write: Woodworker's Journal, P.O. Box 56585, Boulder, CO 80322-6585 or call 800-765-4119. Include mailing label for renewals and address changes. For gift subscriptions, include your name and address and those of your gift recipients, or call 800-765-4119.

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LETTERS

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Cutting Remarks

In the February 1998 issue of your *Today's Woodworker* magazine you featured a girl's rocking cradle and chair. My husband has the pieces cut out, but he inadvertently cut the pattern up and now does not have the **Pinup Shop Drawings** for assembly. Would you please send a copy of these instructions? Thank you, from the wife he did not consult (twice) before cutting the pattern.

Margaret Lohman
Holden, Massachusetts

WJ Responds: It's on the way, Margaret. If anyone else needs patterns from back issues of *Woodworker's Journal* or *Today's Woodworker*, please call 800-610-0883 or drop us an e-mail. And Mr. Lohman ... listen to your wife!

Honest Joints

How can you name Gustav Stickley as "Woodworker of the Century" (*Yesterday's Woodworker, December 1999*) and cite his philosophy of honest joinery — and then feature an Arts and Crafts style desk using screws and faux tenons? Doing it Stickley's way is not much — if at all — more difficult.

Joan Hiskey
Chapel Hill, North Carolina

Save Your Marbles

I was somewhat amused by your response to the query by Mr. Rudy regarding ways to store small cans of paint (*Stumpers, August 1999*). I don't know if you've attempted to purchase glass marbles lately, but the cost to half fill a quart can might be as much as a whole new small can. Reusing them is surely possible, but this would likely be quite messy and time-consuming.

From geometric considerations, using small spheres to fill a volume is quite inefficient. If you filled the entire container full with marbles, even with perfect packing, you would still leave about 1/3 of the paint in the can between the marbles. Even worse, you would not be able to access this paint with your brush, so all of this paint between the marbles would be wasted.

Although some of your marbles may have been lost, your additional solutions to the problem were both quite good.

Wayne Mitzner
Baltimore, Maryland

Spinning Tops

I have more than a passing interest in spinning tops. It occurs to me that it would be great fun to have a museum of contemporary spinning tops on the World Wide Web, and I would invite all turners to send me one of their tops to photograph and place in this electronic museum. If any readers would like to contribute, would they please label their top with their name, their country and the wood it's made from.

I would also love to correspond with any of your readers that might have an academic interest in tops. I am currently researching Australian aboriginal spinning tops and would like to have more information about them.

Brian Lemin
11/28 Deaves Road
Cooranbong
New South Wales
Australia 2265
Brian@DavidReedSmith.com

Switch Concerns

In the December 1999 issue on page 14 (*Tricks of the Trade*) is a picture of a mess of pipes which the owner said helps him to control his saw. Never would I add such a rig of pipes to my saw or other machine.

I guess he never thought that his jacket button or string could cause the saw to start when not wanted. This is my thought about the rigging: no thanks.

Theo Ninneman
Sheboygan, Wisconsin

WJ Responds: Theo, J.D. Carlson's rigging only makes contact with the "off" button.

JET White

We noticed the photograph of the JET tool on the cover of your recent Resource Digest (*December 1999*) was of our blue 10" XACTA cabinet saw. A more accurate reflection of the tools JET will be providing our customers in the next year would have been a picture of our new white model with red and black stripes.

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David Loving
JET Equipment & Tools, Inc.
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Corrections

The material list for the Arts and Crafts style desk in the December 1999 issue included incorrect measurements. The thickness of the back frame center panel, back frame side panels and exterior frame panels should be 1/4". The width of the deep drawer bottoms is 10¾".

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.

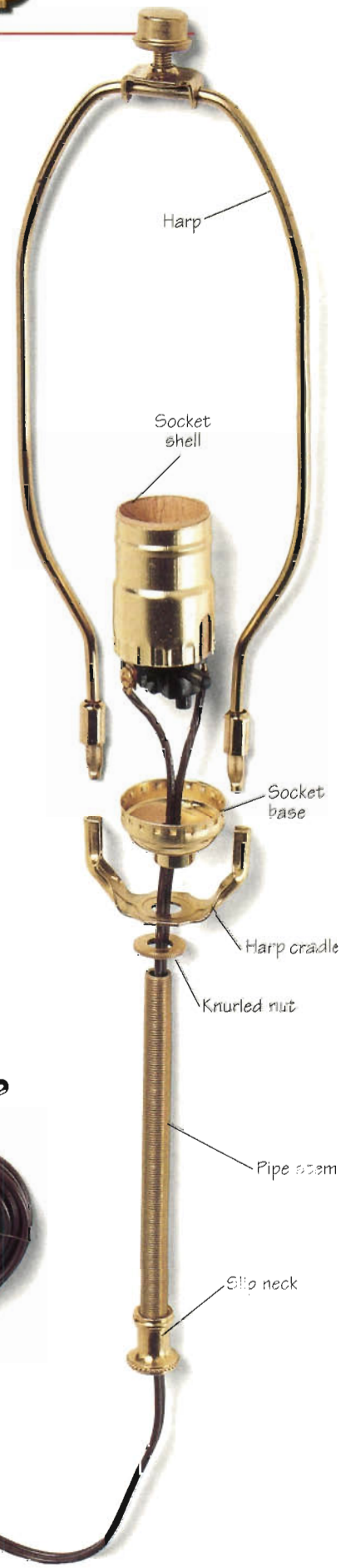
Lamp Hardware

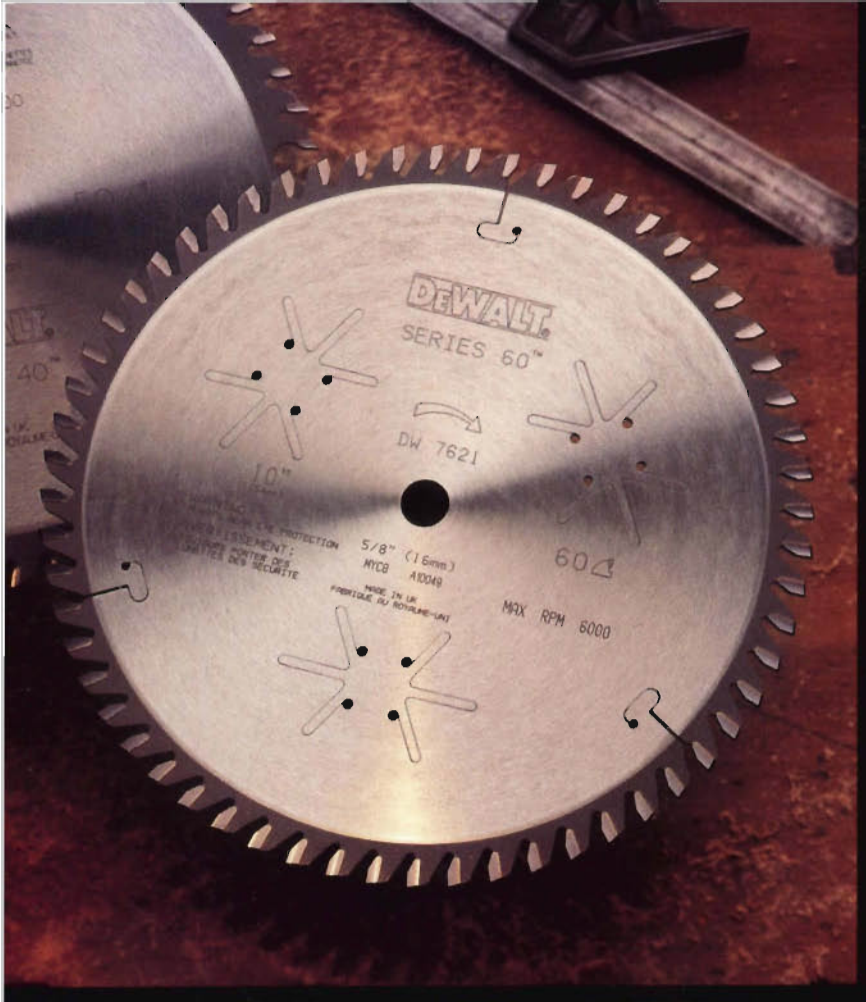
By Al Wolford

After you make Rick White's Prairie Lamp (*page 28*), you'll want everyone to see how well your woodworking shines — and properly installed lamp hardware will certainly help out! It's not hard to assemble the hardware which supports a light bulb, a lamp shade and, of course, electrical wiring. Just follow a few simple steps.

It goes without saying that your electrical cord should be unplugged during these tasks. To get started, drill a hole the size of your pipe stem in the base of your lamp fixture, making sure it goes all the way through. Drop the slip neck over your pipe stem and the cord (the cord will emerge from the top of the pipe stem) so it rests at the bottom of your lamp fixture, then slide the pipe stem through the lamp body from bottom to top, threading the knurled nut on tightly.

Place the harp cradle on the pipe stem and snap the socket base on next. (Some sockets have set-screws to tighten here.) At this point you'll need to attach the wires to the socket shell's contact screws. After you've finished, slip the socket into place (it requires just a bit of force). Wrap up by placing the harp in the harp cradle, screw in a light bulb and attach your lamp shade. Like I said, it's just a few simple steps!





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Old Traditions - New Trends

By Joanna Werch Takes

"Fragmentation" — running veneer through a blender to create tiny pieces — is the unique technique employed by marquetarian Fred Kerridge from East Yorkshire, England.

Art of Marquetry

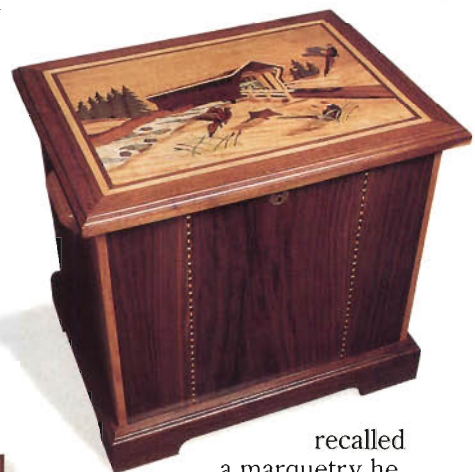
New Show Attracts Top Talent

Marquetarian Will Bondhus doesn't need a fancy shop or the latest stationary tools to do his woodworking: in fact, his shop only takes up one corner of his bedroom. As for equipment, "All I really need is an Xacto knife, and maybe a straightedge" he told us. *Woodworker's Journal* caught up with Will as he was chairing the first-ever National Marquetry Exhibition, sponsored by the American Marquetry Society. Over 100 pieces were on display during the exhibition, from members all over America. Participants represented the first wave of Americans' slowly increasing interest in marquetry, following a European revival of the art in the 1940s and 50s.

Minnesotan Oskar Schreiner, for example, recalled a marquetry he received from a German prisoner of war during World War II. The man, held in a Canadian camp, pried open produce boxes for the wood, cut them with a jackknife, and finished the piece with shoe polish.

Today's marquetarians sometimes use more complicated tools — like a blender — but maintain a healthy respect for the centuries-old skill.

If you're interested in this traditional woodworking technique, call the Society at 408-354-2334 or visit *http://alpha.bevcomm.net/~ami*.



Arlin Ristau of Blue Earth, Minnesota showed a box (right) and Robert Swanson of Manchester, Missouri a Celtic knot during the first National Marquetry Exhibition.

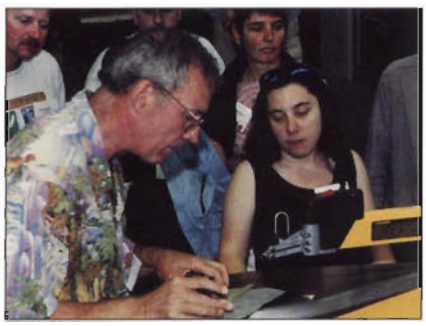
While marquetarians occasionally stain their veneers, some trees can produce bright colors like those in "The Old Sourdough" by Frank Helvey of Torrance, California.

The Circle Unbroken

Furniture's Past and Future

The third annual conference of the Furniture Society attracted top names among furniture makers and collectors to Furniture '99, "The Circle Unbroken: Continuity and Innovation in Studio Furniture." The Furniture Society, founded in 1996, is a nonprofit organization dedicated to advancing the art of furniture making.

"The program was designed to explore the relationship of tradition to contemporary work," explained society president Dennis FitzGerald. Presentations ranged from lectures by Jere Osgood on his exploration with form to hands-on demonstrations of green

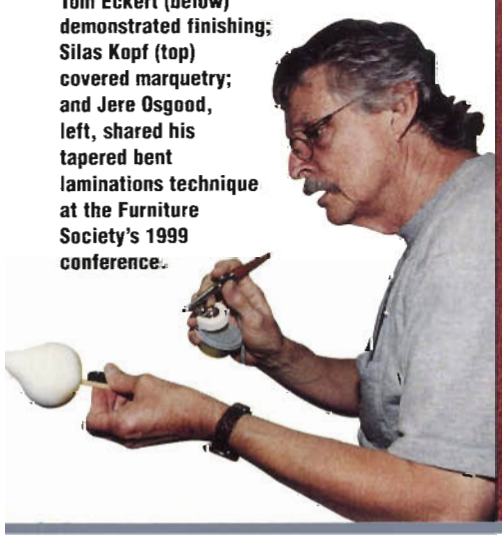


woodworking by chair maker Drew Langsner. Lectures and workshops in related fields like upholstery, metal spinning and glass demonstrated the breadth of materials and craftsmanship involved in the field of contemporary furniture design.

A slide show offered participants the opportunity to show their own work and receive comments from other attendees. "The Circle Unbroken," a juried furniture exhibition which opened at the conference, illustrated the theme of tradition and innovation. Also unveiled at the conference was the book *Furniture Studio — The Heart of the Functional Arts,* by and about contemporary furniture makers.

The next conference is scheduled for June 14th in Toronto, Canada. Want to go? Call 804-973-1488 or visit the Furniture Society at *www.avenue.org/Arts/Furniture.*

Tom Eckert (below) demonstrated finishing; Silas Kopf (top) covered marquetry; and Jere Osgood, left, shared his tapered bent laminations technique at the Furniture Society's 1999 conference.



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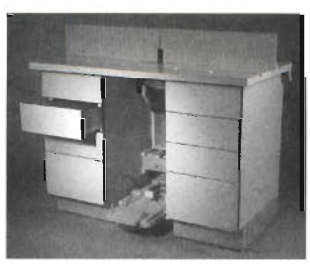

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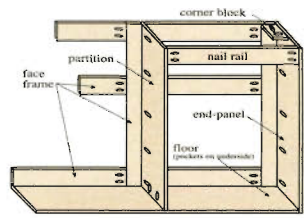

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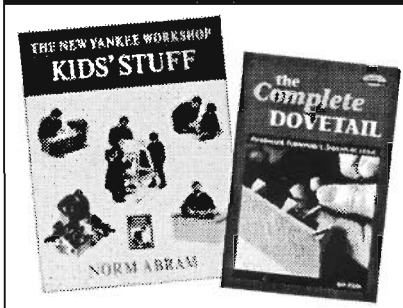

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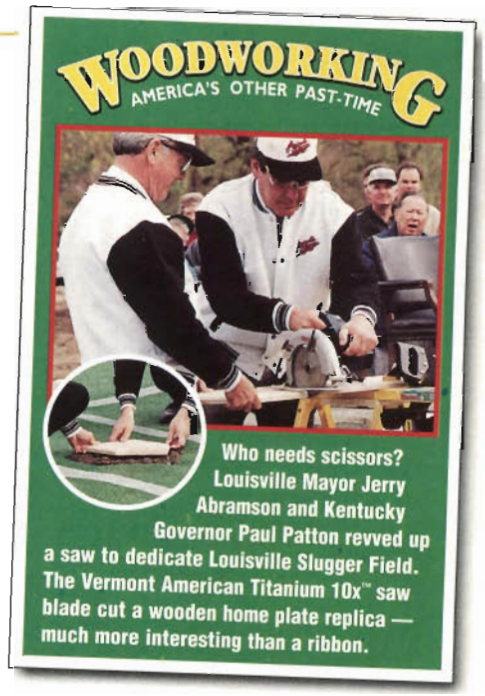
Web Woodworking:

Computers As Power Tools

By the end of 1999, typing the word "woodworking" into search engine Alta Vista yielded 406,650 related pages on the World Wide Web. Information isn't always that available on the Internet — Yahoo's categories only list woodworking under the "crafts" subhead, while "dumpster diving" gets its own subcategory in recreation — but thousands of woodworkers are now surfing the Web.

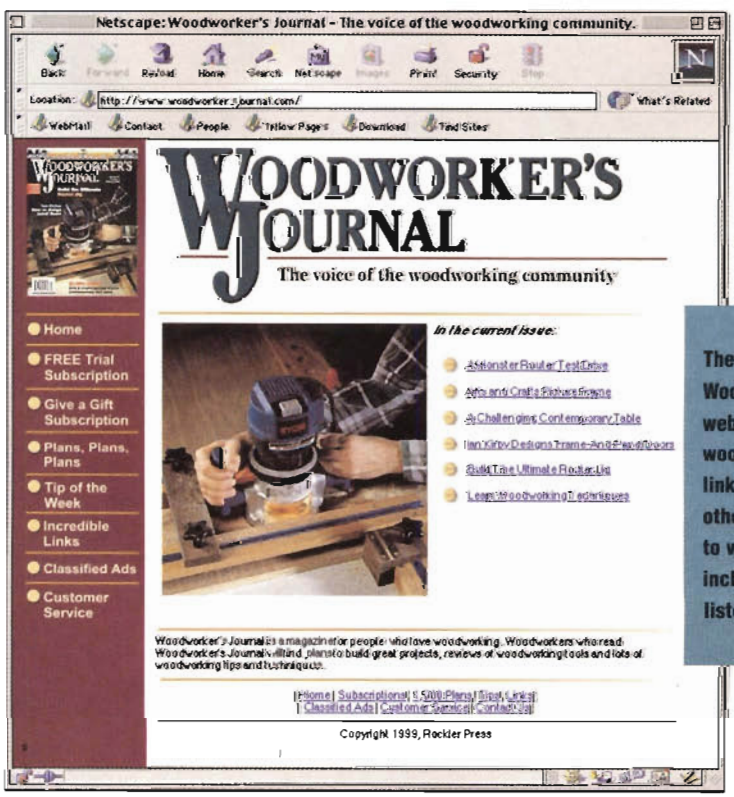
Ellis Walentine, who founded the *WoodCentral.com* site last year, tried to explain the appeal. "The underlying advantage of the Internet is its immediacy," he said. "Nobody has time for anything anymore. People come to WoodCentral because they know they are going to get world-class answers in no time flat."

Web-surfing woodworkers might be looking for plans, inspiration from uploaded photos, or chat room and discussion board buddies to listen to their ideas and questions, Ellis said.



"What I see going forward is that woodworkers will find usefulness in carefully crafted Web services that free them in some way."

Besides the *WoodCentral.com* and *woodworkersjournal.com* sites, good places to visit include *theoak.com*, *kiva.net/~rjbrown/w5/wood.html*, and *www.hardwood.org*.



The recently updated Woodworker's Journal web site features 1,500 woodworking plans and links to over 1,400 other sites of interest to woodworkers, including the sites listed above.

Easy to turn on. Hard to turn off.

When we designed our new scroll saw, we gave it the features you wanted most. (We know, because we asked you.) We put the power switch and variable speed controls where they made sense, up top. We designed the table to tilt both ways, instead of just one way. And the table "clicks in" every 15 degrees to make bevel cutting easy and sure. Of course, we also included handy features like a tool-less blade change, an adjustable blower and an integrated light. And we put it all on a heavy cast-iron base for solid performance. All of which makes it one of the easiest scroll saws to have fun with, right out of the box. In fact, the only hard part is turning it off.

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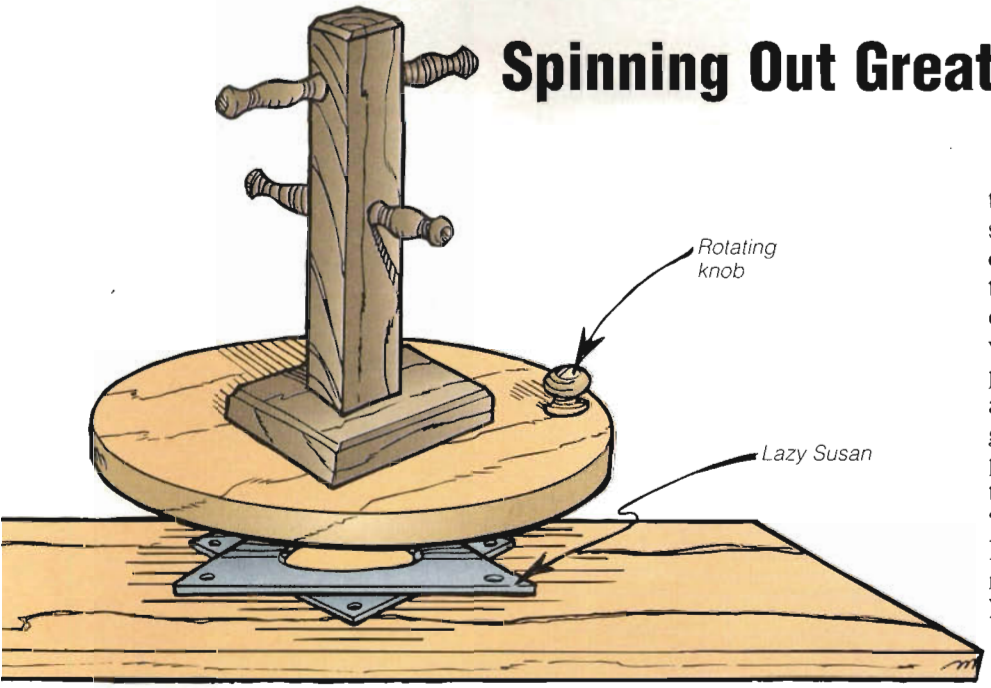
Spinning Out Great Shop Ideas



Finishing Carousel

A retractable TV shelf with a 12" lazy Susan (I got mine from a discarded entertainment center) makes an ideal finishing jig. Secure a 16" diameter plywood disc to the lazy Susan, and you're ready to finish. I recently finished 20 oak mug trees while standing in one place — saving a lot of steps.

Robert O. Wendel
Marlboro, New Jersey

Roll Out the Paintbrush ...

I often line the small boxes I make with felt. After spraying adhesive, I press the material onto the drawer bottom using what was once the handle of a "throwaway" paint brush. I cut it off just above the metal ferrule and round over the edges for a "felt-friendly" roller which leaves no corner untouched!

Ann Ehrlich
Long Beach, California

Twine Around Your Laminate

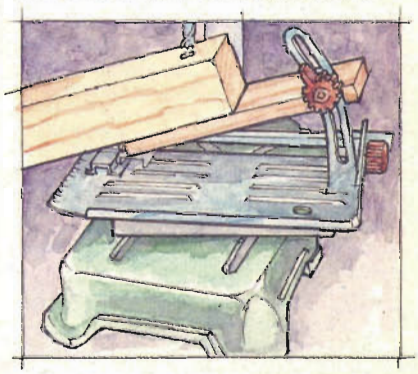
I build cabinets for a living and often use laminates for counter surfaces. Rather than fuss with small dowels or shims while aligning my glued-up sheet product with the sub-surface, I use heavy twine, like the kind used at the post office. Start at one end of the sub-surface and, leaving about six inches hanging over the edge, cover the glued area in loops about three inches apart, covering the entire width and length of the workpiece. When satisfied with the position of the laminate, press down at one end, making contact with the glue below. This will prevent the piece from shifting as you pull the twine from the leading six inch "starter." As the twine pulls out, the laminate drops down into place ... no fuss, no frantic pulling on the laminate to try to relocate it.

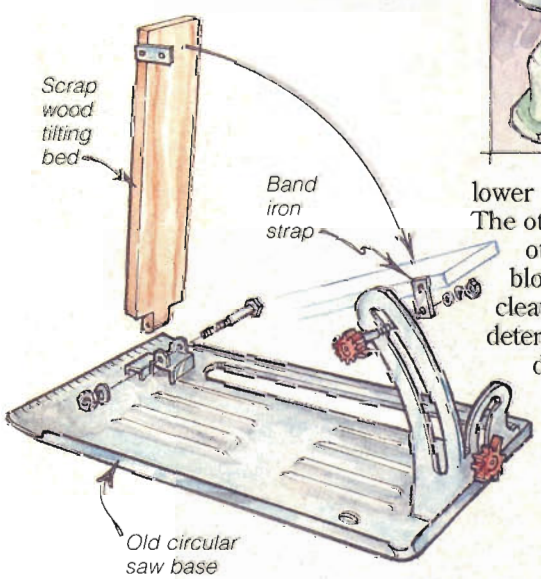
Frank Wyatt
Galax, Virginia

Old Tools and Shop Scraps Make a Great Tilting Table for the Drill Press

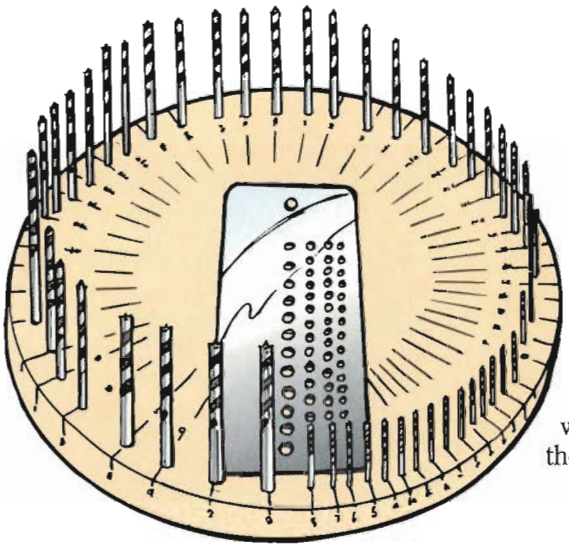
PICK OF THE TRICKS

When your circular saw gives out, save the base, stripping it of everything but the bevel adjustment, attached hinge and depth adjustment. Now make a tilt table of hardwood to fit this base. Permanently tighten the bevel adjusting knob to hold the hinge in a horizontal position and cut and drill the lower end of the tilt table to fit the hinge (pivot point). Attach a band iron strap to the side of the table to engage the depth adjustment, which will be used to hold the table at the desired angle. To protect the table, make two pieces to fit over it. One is flat with a cleat across the lower side to prevent it from sliding. The other, for drilling chair legs and other round stock, has two V-blocks attached to a base and a cleat across the end. To use the jig, determine the desired angle for drilling with your protractor, set a sliding T-bevel to this angle and adjust the blade until it's aligned with your drill bit.





Ralph Wilkes
Penn Yan, New York



gauge in the center to help me select the right bit every time. Even though this jig was designed for my weaker eyesight, I'm sure it will help fellow readers keep their bits in order.

Bernard C. Wiklund
Minneapolis, Minnesota

Spin for a Drill Bit

Here's a drill bit holder design that makes it easy to pick out any bit with a quick spin. I'm legally blind, but I can still see the numbers on the edge of the lazy Susan. So far, I have three different types of bits and each has its own color-coded lazy Susan, together with a drill

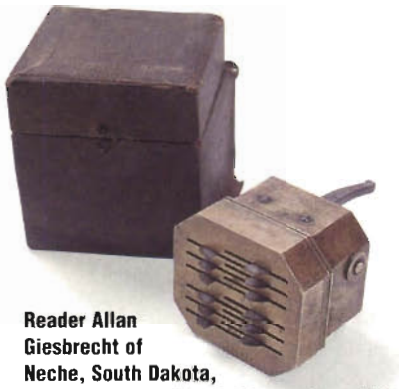
A Pin in the Hole Stops Slips

If the back saw in your miter box pulls out of the guide at the end of your backstroke, try slipping a cotter pin in the hole at the end (drill your own hole if necessary).

C.M. Wegner
Bloomington, Minnesota

Winner! Ralph Wilkes 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.

An Uncomfortably Close Shave



Reader Allan Giesbrecht of Neche, South Dakota, said his grandmother-in-law preferred this tool over "these modern docs."

Q Love your magazine. It's very informative, and the pull-out plans are great! I have enclosed photos of a tool that I have been trying to identify for several years. Please publish it in your Stumpers department to see if someone can identify it. Thanks!

Alan Ribbe
Hawthorne, New Jersey

A Sometimes flattery will get you somewhere, Alan: we're glad to oblige your request. As the rest of you can see, the tool Alan's been toting around for years has the markings "Dudly Tool Co., Pat. May 29, 94" on the handles. We think it can safely be assumed that's 1894, not 1994. And it certainly looks like some sort of wrench. Are the wheels turning in anyone's brain?

Does anyone out there have fond memories of Alan's tool?

Q In the December 1999 Stumpers, Phil Flesland presented us with a "mystery in a box": a tool with rotating blades that came in its own carrying case. A frightening number of readers were able to slice right to the heart of this mystery.

The Editors
Woodworker's Journal

A The tool is a medical instrument called a scarificator, "the mechanical answer to leeches," according to **Martin W. Knapper** of Placerville, California.

"At a time when bloodletting was the standard cure for everything from fever to headaches, this was the tool for the job. The tool was placed against the skin and with a flick of the lever, multiple blades made a series of small incisions to 'let' or allow blood draining," explained **Rick Garcia** of Sacramento, California.

"The operator held a small ball of cotton which had been moistened with alcohol between his fingers while operating the scarificator. He then ignited the cotton ball and dropped it into the small glass cup, where it stuck to the bottom. The glass was then placed over the wound and pressed firmly against the patient's skin. The burning cotton quickly went out as the oxygen in the cup was used up, producing a vacuum in the cup which drew blood from the shallow cuts," added **Robert Braunberg** of Onancock, Virginia.

Scarificators were one tool early barbers used — in their role as surgeons.

Historically, barbers served as bloodletters, "which is why the red and white barber pole signifies blood spiraling down the arm after the barber made his gashes," **Michael C. Beachley, M.D.**, of Bakerstown, Pennsylvania, told us.

Phil's style of scarificator was in use from about 1790 to 1900, according to **Roger Kerr** of Dearborn Heights, Michigan. Now, as Dr. Beachley says, "the mere thought of using it ought to make you feel better!"

Winner! For taking the time to respond to Stumpers, Rick Garcia of Sacramento, California wins a collection of American Tool's Quick Grip clamps. We toss all the Stumpers letters 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

Q The other day, I noticed spots of fine sawdust on a few of my cherry boards — and I found a larva eating away. An exterminator told me it was probably a powder-post beetle. I would like to know about wood-boring beetles: how to get rid of them, what moisture content is a good host; how to identify, etc.

Douglas Johnson
Fairfax, South Dakota

A Powder-post (*lyctidae*) beetles are one of three groups of wood-boring beetles — and that wasn't exactly sawdust you noticed. It's "frass," a mixture of feces and food fragments.

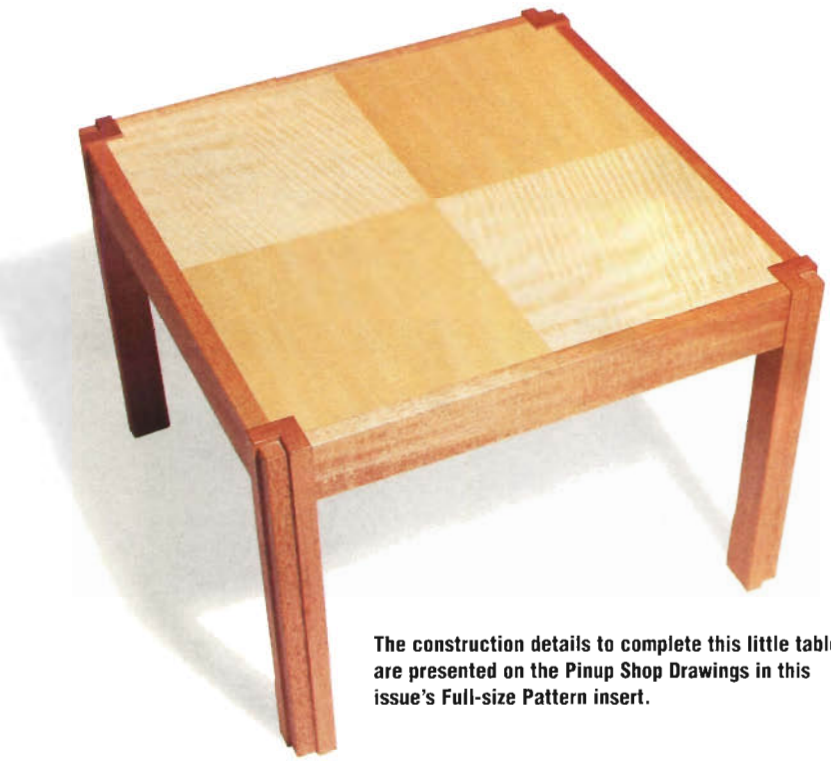
Lyctidae Grossius

Creating frass with a fine, talc-like texture is how powder-post beetles got their name. They only attack hardwoods, and can deal with moisture contents as low as eight percent. Kiln-drying wood destroys bugs, and sealing pores with paint or varnish protects against reinfestation. Already got 'em? The University of Califoria at Davis' Statewide Integrated Pest Management Project says you should destroy or replace infested wood. If that's not possible, liquid insecticides with borate can penetrate wood to kill any bugs inside.

Adult powder-post beetles create tiny exit holes (the tip of a ballpoint pen will just fit in), but it's the larvae that do the most damage to your wood.

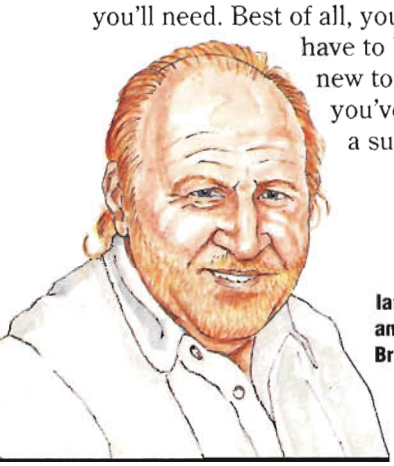
Your First Veneering Experience

By Ian Kirby



The construction details to complete this little table are presented on the Pinup Shop Drawings in this issue's Full-size Pattern insert.

Veneer makes the most of the rarest and most beautiful woods. Veneers are thin and delicate, so working with them takes a bit more care than working with solid wood, but it's not all that difficult. If you've wanted to try your hand at veneering but didn't know where to begin, make a veneered panel like the tabletop shown above. It won't take a lot of time or money, and it's easy to construct the press you'll need. Best of all, you won't have to buy any new tools. Once you've laid up a successful panel, you can use it to build a cabinet door or a box, or a small table like mine — a knockout project that's sure to please.



Ian Kirby is a master woodworker, designer and wood scientist who was trained in the British Arts and Crafts tradition.

Why Veneer

Veneer is an ancient and honorable material, long used for the finest furniture and interiors. While the tools you use have a lot in common with those for solid wood, the results offer at least three distinct advantages.

Aesthetic advantage: A clear log yields thirty square feet of veneer to every board foot of solid wood. This is why the best logs go to the veneer mills, giving you access to the rarest and most beautiful material in the world of wood.

Technical advantage: With modern glue and substrates, a correctly veneered panel is dimensionally stable. You can forget about wood movement.

Design advantage: Because veneered panels don't shrink or expand, they're structural. You can glue them right into your project, and you can join other subassemblies directly to them.

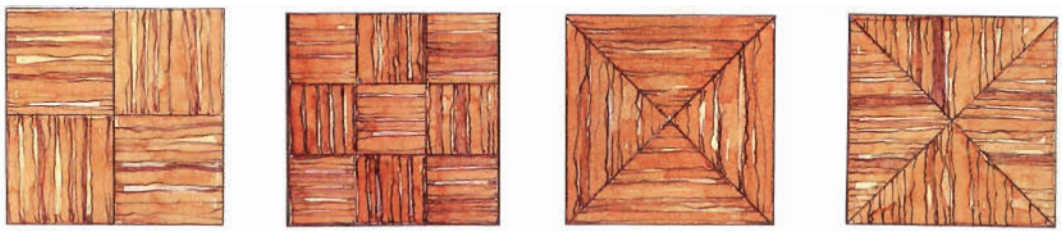
Veneer Patterns

Veneer slicers begin by sawing the log in two lengthwise, then they soften the wood fibers with hot water and steam. They mount the half-log in a heavy frame that swings it up and down at a frightening rate, against a huge, stationary knife. The veneers slice off the log like shavings from a plane. Successive slices from the same log allow you to make near-perfect matches.

The little table shown at left features straight-grained, tiger-stripe anigre veneer. The top is dramatic because of the way light plays on wood figure. Simply cutting the veneer into squares and arranging them like a checkerboard produces the effect. The diagrams at the top of the next page show a few more of the many possible patterns you can make using straight-grained veneers.

Tight Side, Loose Side

When you look closely at a piece of veneer, you'll see how like a plane shaving it is. One side is rougher than the other, and the veneer curls more easily with the rough side out. The smooth side is called the tight side, while the rough side is called



Patterns: Simple shapes with changing grain orientation make beautiful panels.

the loose side. The tight side is covered with tiny compression cracks; the loose side has tension cracks. Usually you can sense which side is which by looking at both: the shiny, smooth-looking side is the tight side. Your pattern may not permit it, but whenever possible, glue the loose side down, leaving the tight side facing up for finishing.

Glue and Substrate

All veneered panels consist of five elements: face veneer, glue line, substrate, glue line, and balance veneer. The substrate has to be strong, dimensionally stable and flat. Our ancestors went to a lot of trouble to glue up suitable substrates, but we can buy them ready-made: industrial particleboard and medium-density fiberboard (MDF). Particleboard has a bad reputation because it's manufactured in two forms, structural and industrial, and woodworkers often end up with the wrong one. Structural particleboard is for building houses; industrial board is for furniture and interiors. It's easy to tell the difference: industrial board comes in sheets one inch larger than the standard 4x8.

You don't need exotic glues to do the job. You'll get excellent results with regular yellow or white glue, spread with an ordinary 3" roller for painting trim. Hide glue was the first glue used, but it's a lot of trouble and it can make a big mess. Contact cement is not recommended for the small shop. Industry can control the formula and spread, but you can't — lumps, glue voids, and finish solvent interactions are all but inevitable.

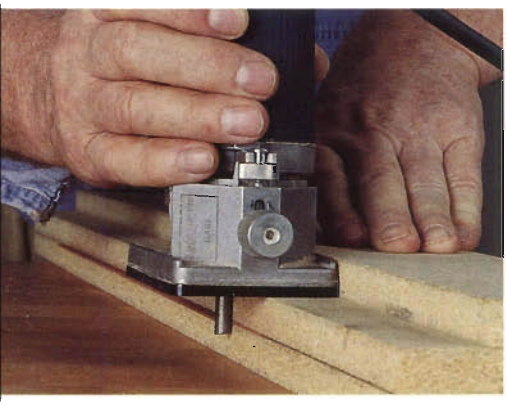
For dimensional stability, you must always glue veneer onto both sides of a panel. The balance veneer doesn't have to be the same species or thickness as the face veneers, and its grain doesn't have to run in the same direction. It's the glue line that balances the panel, not the veneer itself, so it just has to be there.

Tight side, loose side. The veneer curls more easily with the loose side out (left). When possible, glue the loose side down.

Cutting Veneer

The key to success with veneers is cutting clean, straight edges. While there are special tools for the job, you can get perfect results with a sharp knife and a straightedge on a smooth surface. I use a Swiss Army knife against the back edge of my straightedge, on a sheet of tempered Masonite with a square grid drawn on it. Get in the habit of using the back edge of your straightedge for cutting;

Cutting veneers: Use a sharp knife against a steel straightedge. To crosscut, press hard for one or two passes, then snap the veneer by lifting it against the straightedge. To cut with the grain, press lightly and make multiple passes.



Shooting the edges: A shooting board keeps the bench plane at right angles to the face of the veneer, producing a clean, straight edge (top). To get the same result with a trim router, make a simple fixture to trap the veneers and guide the machine.

otherwise you'll risk shaving and destroying the front edge.

Cut the veneer to the dimension of the substrate plus an inch, giving you a half inch overhang all 'round. To crosscut, set the straightedge in place, hold it tight, and take a firm pass with the knife. Chop down extra hard for the last half-inch of the cut, to prevent splintering there. Then make a second firm pass with the knife. If the veneer doesn't separate, lift the free end while you hold the straightedge in firmly place. It will snap across the knife line.

To cut veneers lengthwise, make a series of light passes with the knife. Concentrate on keeping the knife against the straightedge, so it doesn't wander in the grain.

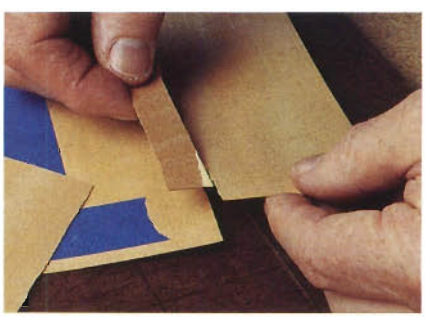
Shooting Edges

Once cut to size, pieces of veneer have to be glued together edge to edge, a micro butt joint, just like a full-size joint in solid wood. Knife-made crosscuts will be clean enough to join without further preparation, but you will have to shoot long-grain edges — that is, plane or rout them straight and square with the aid of a shop-made shooting board. The photos at left show the hand and machine versions of the setup.

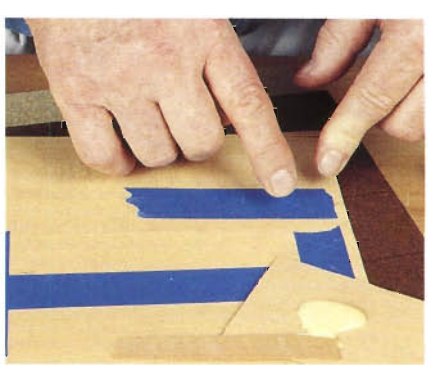
Joining Veneers

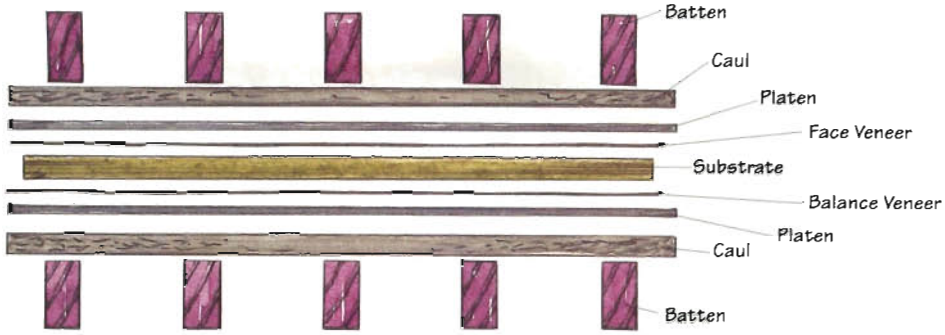
Instead of pipe clamps, close the joint with masking tape. The blue kind that painters use is strong enough and can be removed without tearing the veneer or leaving a residue. The photos below show the sequence: press a piece of tape onto the first veneer, then pull the tape to butt the two pieces together, stretch it across the joint line, and press it onto the second veneer. With one side taped, fold the joint so you can spread a fine thread of glue on the mating edges, then close it, scrape and wipe the excess glue off, and tape the other side. Let the glue dry for a couple of hours before

Glue veneers by stretching tape across the joint line, then tape along it and fold the seam open. Run a thread of glue on the edges, refold the joint, scrape off the excess glue, and tape the other side.



To repair a crack in your veneer, simply smear a little glue in it and tape until dry.





Veneer press: Curved battens transmit pressure from the center outward. To make the battens curve, tape two pieces of veneer about one third the length of the batten to the center of each one. Screw the battens to the particle board cauls, and protect the veneers with smooth, waxed Masonite platens.

you carefully remove the tape. In a complex assembly, don't try to glue more than one joint at a time. That way you can adjust each pair of edges before gluing it to the next, so the whole panel comes out as close to perfect as you can make it.

You'll probably have to deal with a few stray cracks and tears. Make sure the broken pieces will fit together neatly, then glue and tape them as if they were a regular joint.

Building a Veneer Press

The secret to veneering is applying uniform pressure. In professional shops, vacuum bag presses have replaced the old-style veneer press. In the home shop, you can make a simple press using clamps, two particleboard cauls and two waxed Masonite platens. A set of wooden battens top and bottom transmit the clamping pressure to the cauls, platens and veneers. The illustration above shows the setup; it's designed so that as you tighten each pair of clamps, the pressure builds from the center out to the edges of the panel.

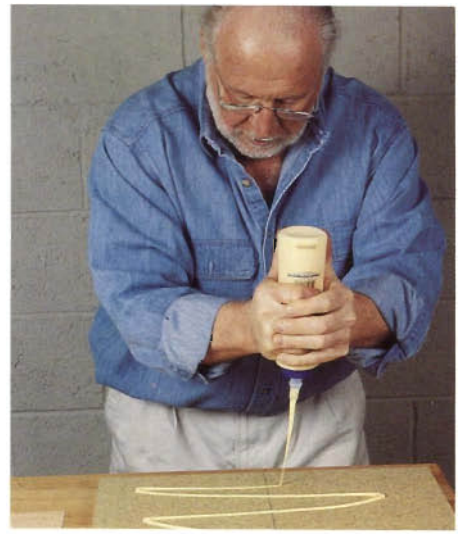
The battens apply center squeeze by being curved, but you don't actually have to shape them. All you have to do is tape two pieces of veneer in the center of each batten. For my 18" battens the veneer strips are 7" long. Then fasten the battens to the cauls with a single centered screw into each one, carefully countersunk.

If you don't curve the battens, the press will squeeze the edges of the panel ahead of the center. This will drift the glue toward the middle, forming a thick pad. The excess glue then will soak into the veneer, causing it to expand and corrugate. Once dry, the resulting mess, in woodworking parlance, is called washboarding. In the best of pressings, some glue is likely to seep through the veneers. That's why the platens have to be waxed.

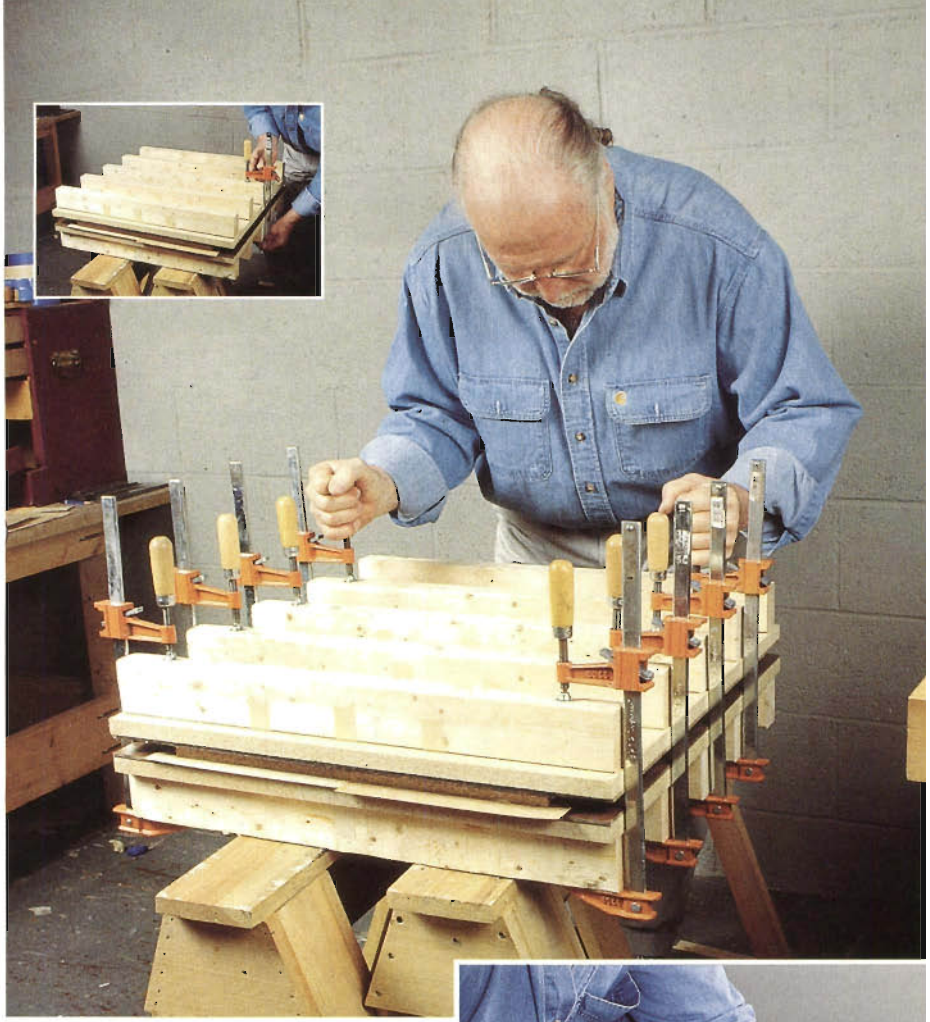
Gluing the Veneer

The veneered panel is a sandwich, and like a sandwich, it goes together all at once. When you've cut and joined the face and balance veneers, you're ready to glue up. First, however, align the veneers on the substrate to make sure you know where they go. In most cases, a center line or center cross is all you need for a layout line, but be sure to extend the marks onto the edge of the substrate so you'll always know where you are.

The sequence is easy when you spread the glue with a small paint roller. Roll glue onto one side of the substrate, position the balance veneer and hand-press it into the glue, flip the panel over, roll glue onto the other side, and position the show veneer. Then pop the panel into the press. Always spread glue on the substrate, not on the veneer itself. It will transfer just fine when you apply pressure.



Spread a uniform layer of glue with a 3" paint roller. Spread the glue on the substrate, not on the veneer, then lay the veneer in it.



Assemble the press, platens and panel on a couple of sawhorses, so you'll have lots of room for clamps. Tighten the clamps in pairs, working from the center outward.

If you try to roll it onto the veneer as well, the thin material will curl up and you will lose control.

Roll the glue to a uniform and even layer. It's difficult to say exactly how much glue — too much and it's liable to soak through (you will be able to sand it off); not enough and you will have pockets of glue starvation, where the veneer doesn't adhere. When you get it right, you'll see little beads of squeeze-out as you press the panel. Leave the panel in the press overnight to dry thoroughly.

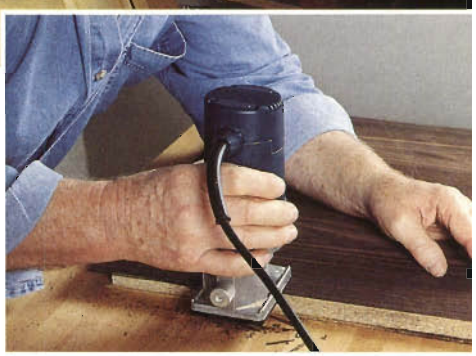
Cleaning Up

The first step in cleaning up is to remove the veneer that overhangs the substrate. Do it with a trim router and a straight bit that has a ball-bearing pilot on the bottom end. Guide the bearing along the edge of the substrate. Then sand the surface smooth. If you've got a lot of glue squeeze-through, you might have to start with 100-grit paper, but don't forget that you've only got 1/32" to play with.

Making the Table

The panel I made in the photos is anigre face veneer, with Macassar ebony for the back, on an 18" square of 5/8" industrial particle board. I made the table legs and rails from 11/16" thick Honduras mahogany. The legs are right angles made by joining two pieces that have been ripped at 45° on one edge. I make this cut with a simple jig on the table saw. The jig is a sled that holds the wood at 45 degrees; it's guided by the rip fence. This allows me to leave the saw blade upright and make a safe and accurate cut. To learn more about this technique, see my book, *The Accurate Table Saw*. (Cambium Press, 800-238-7724).

In solid wood the legs and rails would be structural, while the top would have to float so the wood could expand and contract. In this table, the veneered panel is what holds the structure together. First I glued the rails to the top using 1/8" splines centered on the edges of the panel. Then I cut out the corners to accept the legs, which were screwed into a corner block. The cover strip beefs up the visual weight of the legs and also conceals the screw heads. You could leave the rails and legs slightly proud and radius the edges, or you could make them flush. I chose to soften the top edge of the rail with a slight curve. The finish is a mixture of beeswax and oil.



When the glue has dried, clean-up is easy: rout the excess veneer flush with the substrate and sand smooth.

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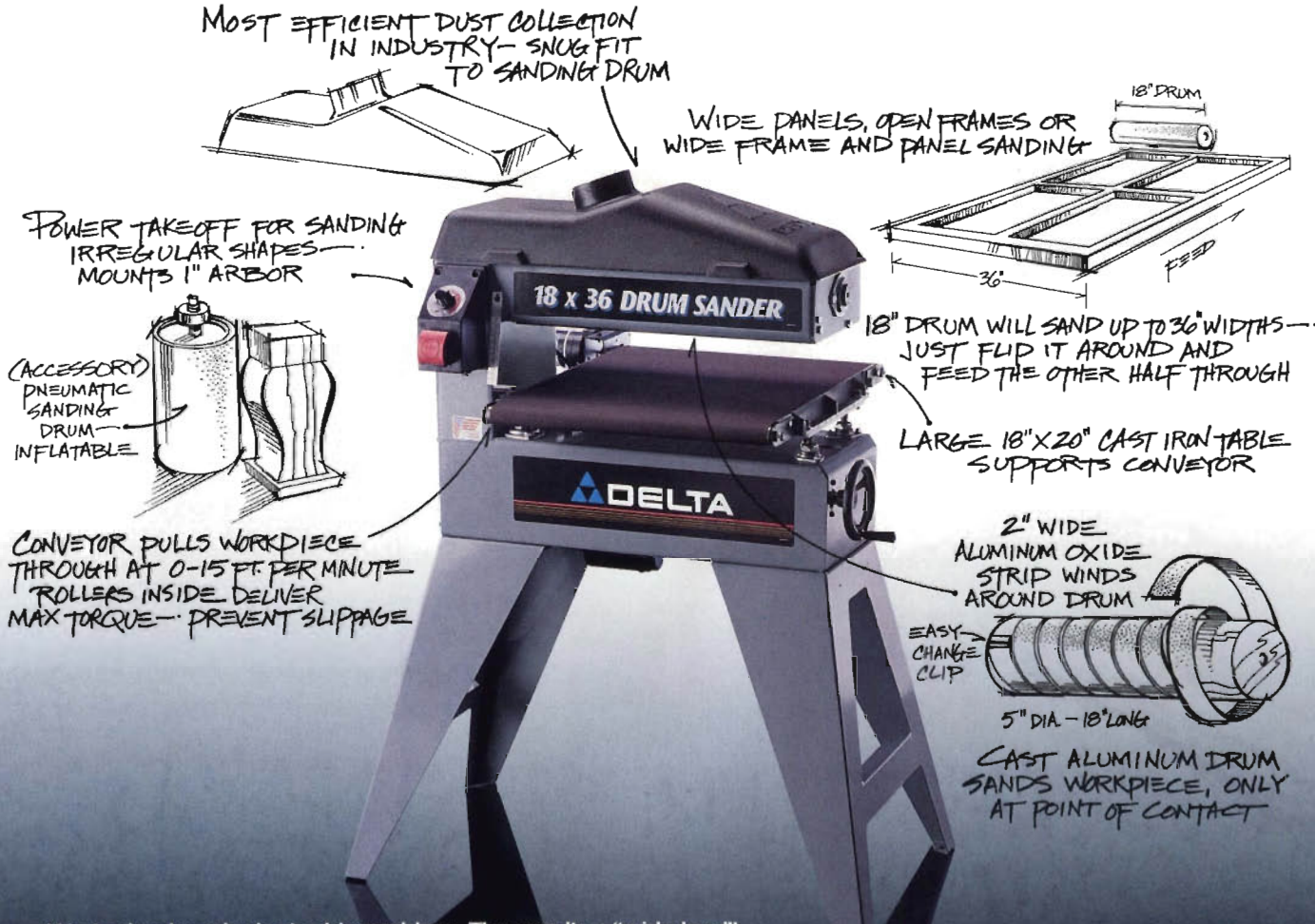

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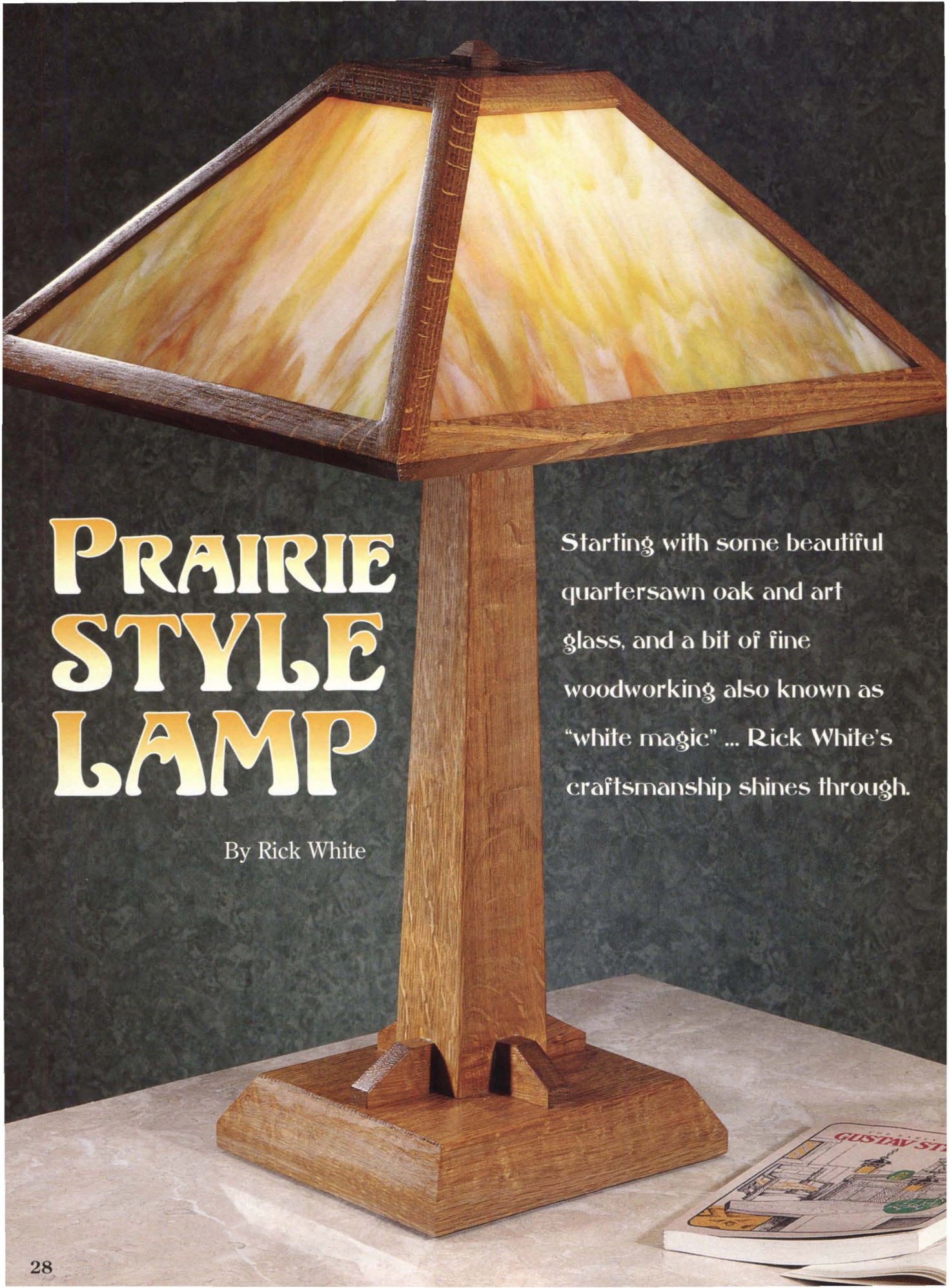


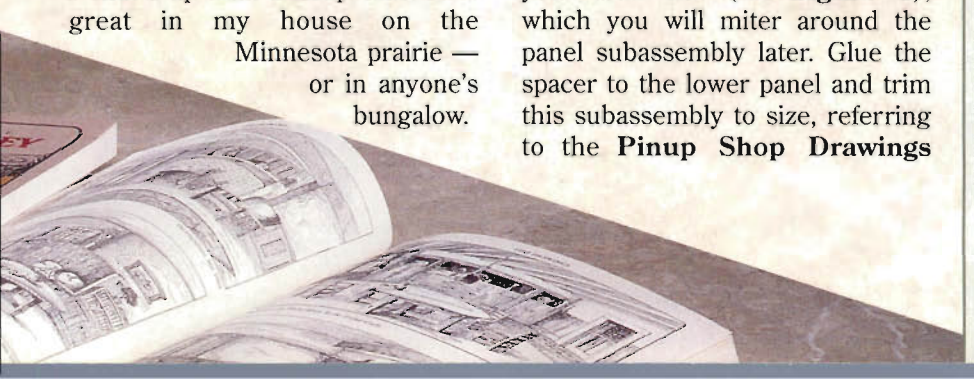
PRAIRIE STYLE LAMP

By Rick White

Starting with some beautiful quartersawn oak and art glass, and a bit of fine woodworking also known as "white magic" ... Rick White's craftsmanship shines through.

aybe you've noticed, from the projects I've built over the past year, that I'm fond of the styles the Arts and Crafts movement made popular around the last turn of the century. And what better way to light my table and chairs than with a Prairie lamp? Its wood and its overall style match my previous projects, so it has that unity among different pieces that the big names in the Prairie movement prized so much, as well as the typical rectilinear, geometric base. The Prairie subcategory of Arts and Crafts is also dear to my heart because those guys believed in using tools — and I'm in favor of turning on my table saw whenever it's going to make things easier.

Of course, I wanted an authentic look for the lamp, so I called expert finisher Michael Dresdner for some tips on how to stain it. We had such a productive conversation that he ended up writing a whole article on the topic (*see page 52*). For the shade, I went with Kokomo brand stained glass *(available from Gaytee Stained Glass; 888-872-4550)*, the exact same brand Gustav Stickley and his buddies used to specify. I ended up with a lamp that looks great in my house on the Minnesota prairie — or in anyone's bungalow.



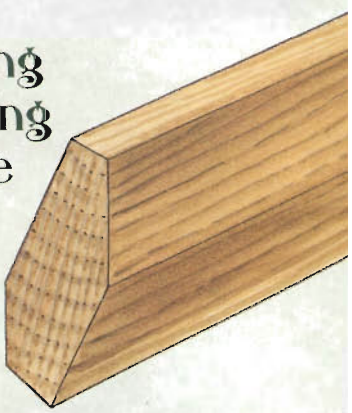
Start at the Base

I broke this project into three subassemblies: the base, the column and the shade. Even though you will tackle each subassembly separately, it's important to select all of your material in advance to ensure you don't get bad grain matches once you start bringing the project together. As always, I strongly recommend you have all your hardware on hand prior to turning on your saw. You may have to do a little fine tuning if your hardware is odd-sized, and the time to deal with that is before you make your first cut.

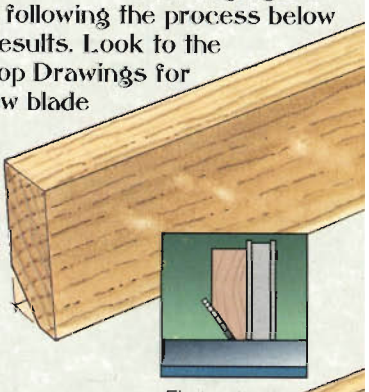
Figure 1: Move your fence to the left side of the blade when making the first two chamfers on the molding. See the sidebar at right.

Start work on the base by cutting the molding, panels and spacer (pieces 1 through 4) to overall size. Form a long piece of molding on your table saw (see **Figure 1**), which you will miter around the panel subassembly later. Glue the spacer to the lower panel and trim this subassembly to size, referring to the **Pinup Shop Drawings**

Making molding on the table saw

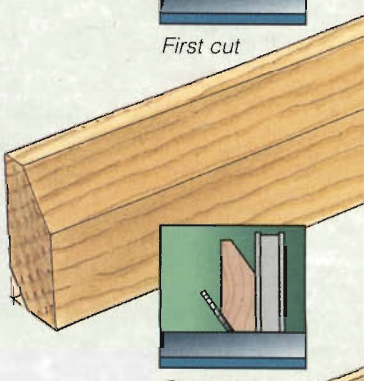


Ribbons of quartersawn flake are visible on only one aspect of any given piece of lumber. Form the lamp's base molding to take advantage of the best looking figure and flake, following the process below for best results. Look to the Pinup Shop Drawings for proper saw blade settings.

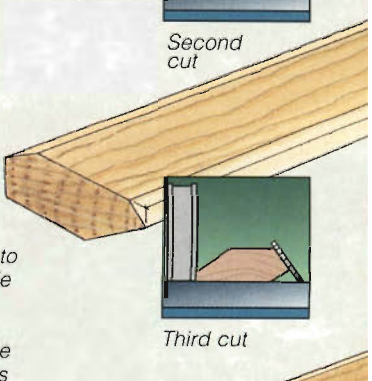


The first and second cuts are made on the left side of the saw blade, as shown in the photo at left.

First cut

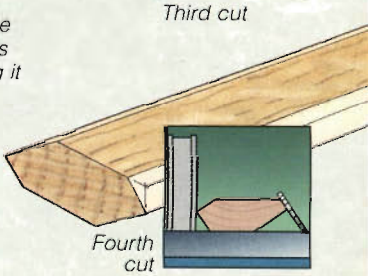


Second cut



Move your fence back to the right side of the saw blade to complete the molding, this time holding it flat to the tabletop.

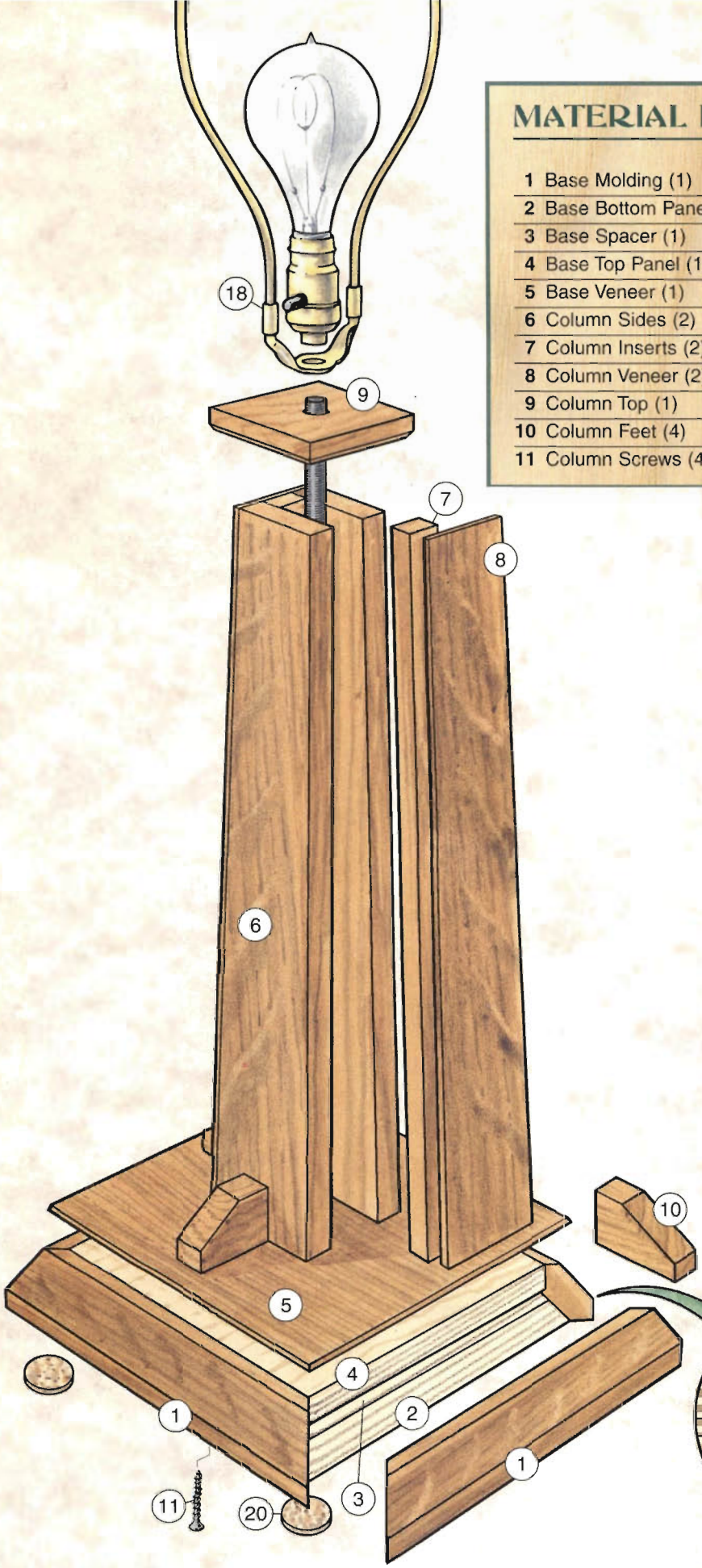
Third cut



Fourth cut

MATERIAL LIST (Base and Column)

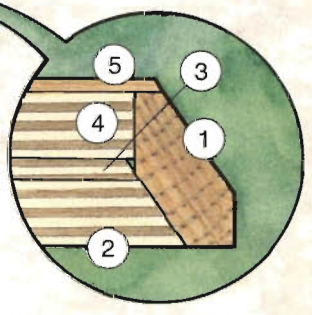
		T x W x L
1	Base Molding (1)	3/4" x 2 1/8" x 45"
2	Base Bottom Panel (1)	3/4" x 9" x 9"
3	Base Spacer (1)	1/4" x 8" x 8"
4	Base Top Panel (1)	3/4" x 7 7/8" x 7 7/8"
5	Base Veneer (1)	1/8" x 8 1/2" x 8 1/2"
6	Column Sides (2)	3/4" x 2 3/4" x 15"
7	Column Inserts (2)	3/4" x 1 1/4" x 15"
8	Column Veneer (2)	1/8" x 3" x 15"
9	Column Top (1)	1/2" x 2 7/8" x 2 7/8"
10	Column Feet (4)	3/4" x 1 1/4" x 2 1/4"
11	Column Screws (4)	#8 x 1 3/4"



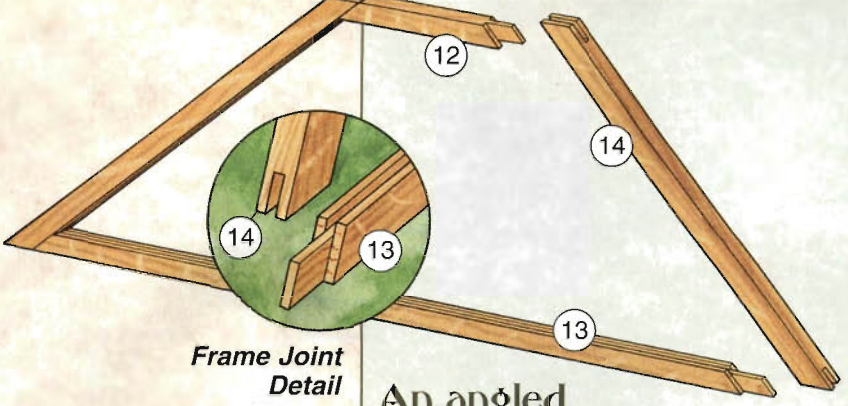
(see the Full-size Pattern at the center of this issue) to establish the proper angle for these cuts. Center the top panel on top of these pieces, but hold off on gluing it in place for just a moment.

Hold the mitered molding in place with a web clamp, and test the fit of the top panel. Trim it until it fits in perfectly, and then glue and clamp the molding and top panel to the bottom panel and spacer.

Turn to your band saw to resaw some highly figured 3/16" thick veneer (piece 5) to cover your base and, while you're at it, slice the veneer for the column. To get to the right thickness, I recommend using a slave board on your planer. Set your blades to remove about 1/32" with each pass and bring these pieces to exactly 1/8" in thickness. Set aside the column veneer for now, and then book-match, glue and clamp the base veneer to the base, carefully trimming to pick up the angle of the molding. (I used a belt sander for this operation.)



Base Assembly Detail



Frame Joint Detail

Move Up to the Column

The dimensions of the column sides and inserts (pieces 6 and 7) are provided on the **Pinup Shop Drawings**. Start this step by cutting the sides and insets to length and forming the angles on their tops and bottoms. Now dig up your tapering jig to form the taper on each edge of these pieces. I used up a few scrap pieces of plywood to ensure that these taper cuts were right on the money.

When the four pieces fit together nicely, glue and clamp them together and sand the joints smooth. Trim the column veneer (pieces 8) roughly to size, then glue and clamp them over the insert pieces. Once again, take your time trimming this veneer, keeping the corners nice and square.

Now turn to the **Pinup Shop Drawings** and mill the column top and feet (pieces 9 and 10) to size. Keep an eye on grain orientation, particularly for the feet. The **Exploded View** at left will help you decide. Now bore a 1" diameter stopped hole in the base's center, followed by a through hole to accommodate the lamp hardware (see **Pinup Shop Drawings**). Drill another through hole in the column top and glue it in place. Now you're ready to attach the column to the base, using two screws (pieces 11) to hold the subassemblies together. Leave the feet to the side for now.

Making the Shade

The elegant simplicity of the shade's appearance is produced by some sophisticated woodworking. The shade is four frames which are joined by modified mortise and tenon joints, mitered at the corners and capped with a slotted top piece. Begin by cutting the shade frame top and bottom rails as well as the shade frame stiles (pieces 12 through 14) to size. To achieve the best appearance, slice these pieces from the same piece of well-figured (nice quartersawn flake) white oak. While the pieces are still in sticked-up form, put a dado head in your table saw and plow a groove down their inside edges, as shown in **Figure 2**. Move to your miter saw and cut the stiles and rails to their appropriate lengths while chopping the correct angles on their ends. (see the **Pinup Shop Drawings**).

Build the jig shown in the photo at right (bottom) to help form the angled mortise and tenon joints. You can find **Elevations** of the jig on **Pinup Shop Drawings** as well as details for the three other jigs you'll need to complete this project. Once the jig is ready, use it to plow out the mortises and slice the cheeks of the tenons. Simply adjust the dado head (the same one used earlier to plow the grooves) to the proper height. Then it's a matter of clamping the stiles and rails in place and removing stock from the center of the stiles and the outside faces of the rails, as shown in **Figure 3**. (As always, testing the set-up with scrap lumber is a good idea.) Dry fit the stile and rail subassemblies and, once you are happy with the fit, glue and clamp them together.

An angled mortise and tenon jig

It took me a while to work out the angled shoulders for the frames' mortise and tenon joints. On the Pinup Shop Drawings, you will find elevations for the jig (pictured below) that will make this step easy for you. Its design allows you to cut both the mortise and the tenon. Test the open mortise and tenon joints on appropriately dimensioned scrap lumber.

Figure 2: Before cutting the rails and stiles to length, use a dado blade to plow a groove. This will make it easier to create the rabbets for the glass after you assemble the frames.

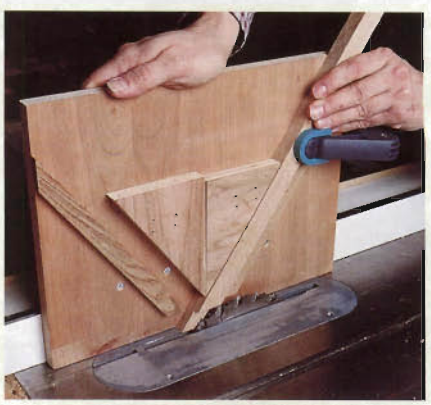


Figure 3: With the same dado blade in your table saw, use our jig to help chop the mortises and slice the tenons on the ends of the frame's stiles and rails.

Figure 4: Use a rabbeting bit and a shop-made jig to safely and accurately rabbet the back of the shade frames. Homemade jigs are the key to success with this Prairie project.

With that task complete, create a routing jig like the one shown above, using the details provided in the **Pinup Shop Drawings.** This is a two-level jig which holds the frames securely as you rout the rabbet for the glass into their back faces (see **Figure 4**). When you have routed all of the rabbets, use a sharp chisel to extend the rebate into the corners of the frames.

Bevel Away

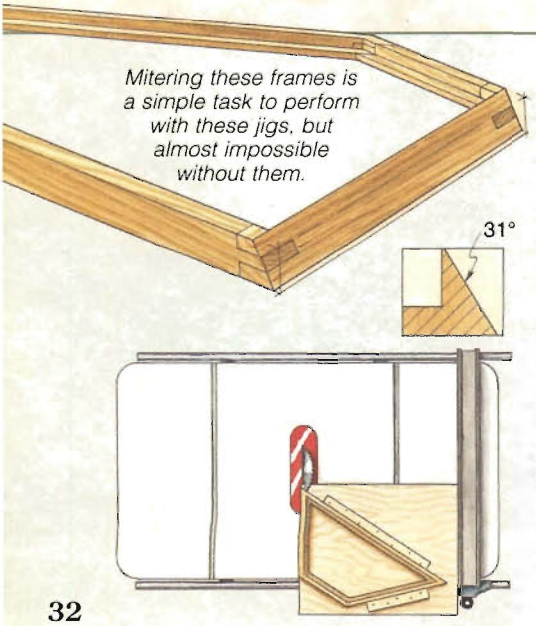
Two new jigs are required to miter the joining edges of the shade frames. These jigs allow you to make essentially the same cut, but on *opposite* sides of the frame. It's a simple operation to do with these jigs, but nearly impossible without them. The jigs hold the frame's stiles exactly parallel to the saw blade while you slice 31° chamfers on their edges. See the sidebar below for more details.

Assembly

Now for the fun part. Once the miters are cut, it's time to assemble the shade frames. I hinged three of the four joints with clear packing tape. Next, apply yellow glue, fold the frame together, and tape the fourth joint. Then use whatever combination of web, squeeze, hand and any other of clamps you can think of to complete the clamp-up. (Just be absolutely sure the glue-up is square!) Cut the shade cap (piece 15) to size and test fit it to the shade frame subassembly. When it fits well, lay out the ventilation slots and the location of the two-step boring at the cap's center. Step over to your drill press and remove most of the waste from the ventilation slots with a drill bit. Then bore the stopped and through hole to accommodate the lamp harp's mounting bolt. Move to a scroll saw and clean up the ventilation slots. Glue the shade cap in place. After the glue cures, sand the shade carefully through the grits.

Details

A few more steps and you are on the home stretch. Rip a length of shade frame retaining stripping (piece 16) to use for securing the shade glass (pieces 17) into the rabbet you routed earlier. Read through *Hardware Hints* (see page 10) to learn the finer points about the lamp hardware kit (piece 18). To enhance the appearance of the kit, create a pyramid shaped hardware cap cover (piece 19) and epoxy it to the

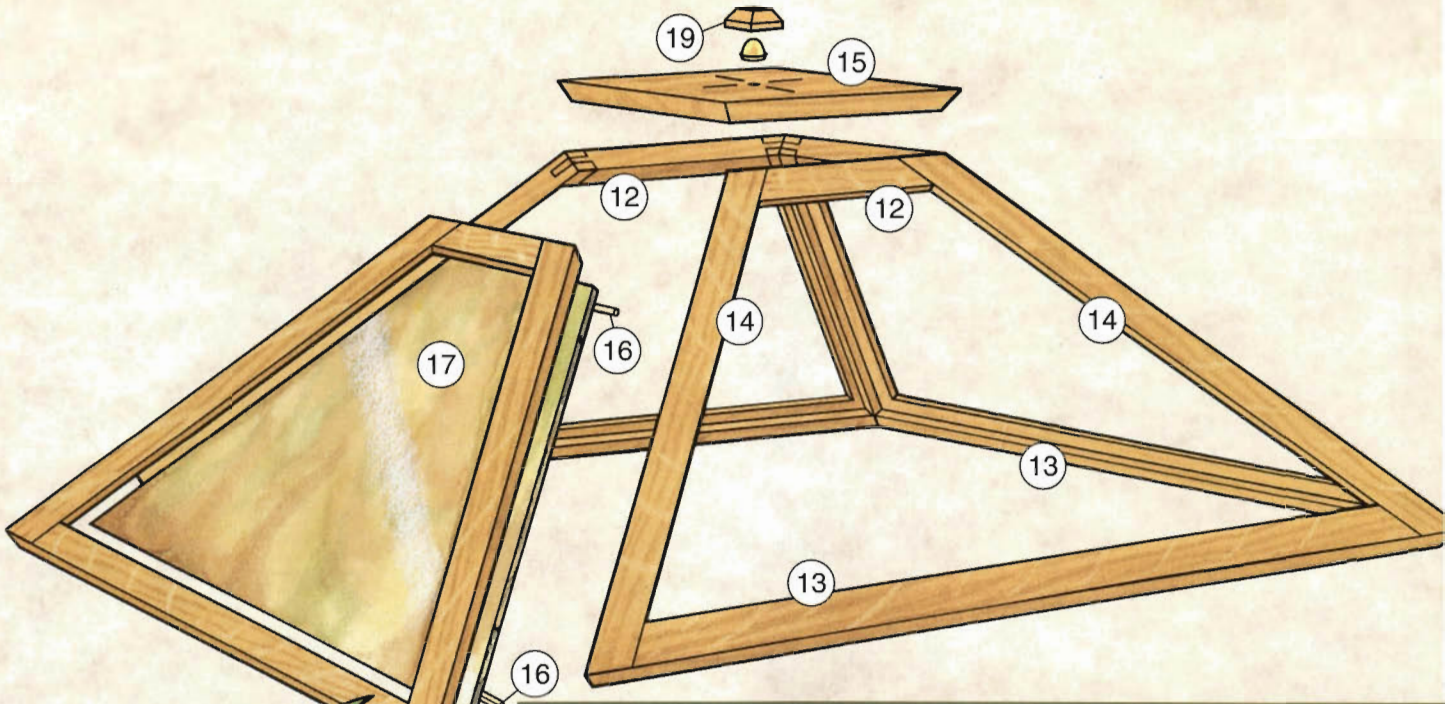


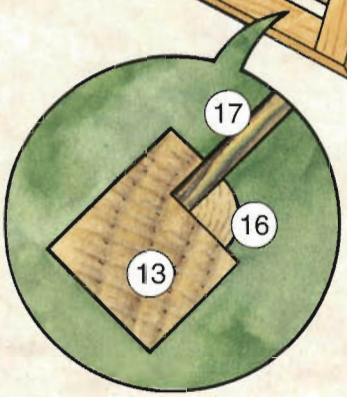
Mitering these frames is a simple task to perform with these jigs, but almost impossible without them.

How to cut perfect compound miters

I made the two jigs shown at right to miter the frames accurately (see the Pinup Shop Drawings). They hold the stiles parallel to the saw blade during the cuts. The geometry of the shade frame requires that a jig be made for both the left and right cuts. Use some scrap sheet stock to test the fit of the miters. Your saw's angle scale may be a bit off, and if you multiply that variance by the four joints, it will never fit ... no matter how many times you cut it!

The first jig miters the left side of the frames.





Retaining Strip Detail

MATERIAL LIST (Shade Frames)

		T x W x L
12	Shade Frame Top Rails (4)	3/4" x 7/8" x 6⅞"
13	Shade Frame Bottom Rails (4)	3/4" x 7/8" x 20⅛"
14	Shade Frame Stiles (8)	3/4" x 7/8" x 13¼"
15	Shade Cap (1)	1/2" x 5¾" x 5¾"
16	Shade Frame Retainer Stripping (1)	1/4" x 44" Quarter round
17	Shade Glass (2)	Cut to fit. Kokomo brand
18	Lamp Hardware Kit (1)	Brass kit with 7½" harp
19	Hardware Cap Cover (1)	5/8" x 1" x 1"
20	Cork Feet (8)	1/16" x 5/8" Dia.

metal retaining nut. Mount the lamp hardware in the lamp. You may have to cut the center brass rod down in length a bit. When it all fits correctly, take it back out until you are done finishing.

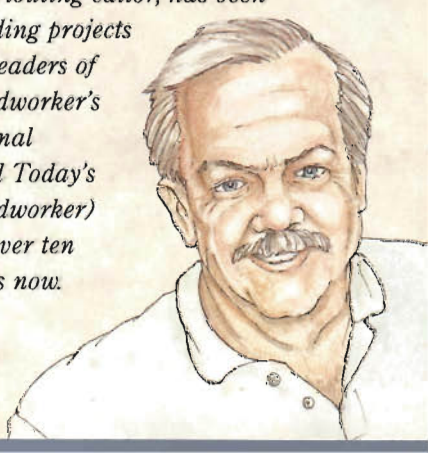
Just a note of caution: do not order your glass until you have completed making the shade. Make a template for your glass from heavy card stock, and use it to have your art glass cut.

Finishing

Use the advice provided by Michael Dresdner to choose an appropriate finish. I chose to fume my lamp and loved the results. I did, however, forget to remove the metal lamp hardware and discolored the brass.

After the finish is complete, install the glass with the retaining strips and apply the self sticking cork feet (pieces 20). Re-install the hardware, attach the electric wires and screw in a light bulb. (I chose a clear glass bulb.) Then sit back and bask in the glow of a well-made project.

Rick White, our long-time contributing editor, has been building projects for readers of Woodworker's Journal (and Today's Woodworker) for over ten years now.



The second jig miters the right sides.

Inspired by the strong graphic elememts of the dart board itself, this striking cabinet serves as a great project to hone your veneering skills on.

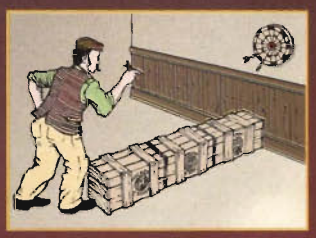
Deco Dart Board

By Jeff Jacobson

In the early part of this century, games of chance were illegal in English pubs. This was bad news for a pub owner named "Foot" Anakin. In the spring of 1908, he was hauled before the magistrates of the Leeds Crown Court, accused of operating just such a game of chance in his establishment. In a novel defense, Anakin argued the game in question, darts, was not a game of chance, but rather one of skill. To prove his point, he set up a board and threw three darts in the 20. He then invited the magistrates to duplicate his feat, which they failed to do. Anakin's case was dismissed and, within a decade, almost every pub in England had a dart board.

Darts became a legitimate sport in 1927 when that famous London newspaper, *The News of the World*, instituted its renowned championship. This event, the most prestigious of its kind, is currently restricted to British citizens. While we wait for it to become open to the rest of us, we can at least get prepared by building a championship caliber dart board cabinet.

The game of darts is perhaps a thousand years old, but the modern game wasn't born until an 1898 U.S. patent was granted for paper flights. Rumor has it that the throwing distance was set by lining up three beer cases from the English brewery, Hockey & Sons. To this day, standing on the throwing line is known as "toeing the Hockey".



Toeing the Hockey

Key Design Features

This dart board cabinet is built in the traditional English pub style, with the board housed behind a pair of veneered doors in a wall-hung case. If you're not familiar with veneering, don't let that discourage you. We asked master craftsman Ian Kirby to address the process, and his article on page 22 presents a comprehensive introduction.

My design makes a couple of concessions to the march of time (and technology) by adding a built-in halogen light, a board with an electronic scoreboard and a switch that turns everything on when the cabinet doors are opened. This case also features a simple wall hanging system that lets you remove the cabinet in an instant.

The first step in construction is to choose your dart board (piece 1), since its size will ultimately determine whether or not you have to adjust measurements in this plan.

Constructing the Case

With your dart board purchased, begin construction of the cabinet by machining the mahogany case sides, top and bottom (pieces 2 and 3) to the dimensions shown in the **Material List** on page 37.

The top and bottom are attached to the sides by means of simple tongue and dado joints. You can check the **Pinup Shop Drawings** (see the center pull-out of this issue) for dimensions and locations. These joints are milled on the table saw with a 3/8" dado head set at a 3/8" height. Guide the workpieces

Board Basics

There are really only two dart board sizes out there on the market – professional and "wrong." If you have any interest in pursuing the game of darts, be sure the board you purchase is "professional" size.

And don't think those plastic-tipped darts are just for the kids. They are, in fact, sanctioned by virtually every dart league you're apt to find in this country.

Dart Board Cabinet Supplies *The following supplies are available from Woodworker's Journal.*

#18309	10" x 48" Maple Veneer*	$3.99
#18325	10" x 48" Mahogany Veneer**	$3.99
#19463	1" x 6' Mahogany Plyedge**	$0.99
#19372	1" x 6' Birch Plyedge**	$0.99
#15108	1/8" x 24" x 48" Natural Cork	$12.99
#29744	Brass Knife Hinges (pair)**	$2.99
#25767	2" Brass Butt Hinges (pair)	$3.59
#28662	Brass Ball Catches**	$3.69
#34090	Brass Lid Support	$1.99
#23119	2" Beech Knob	$2.59
#21030	3/4" Walnut Dowel	$4.49
#36384	Pressure Switch	$9.99
#10567	12" Halogen Lamp	$44.99
#70904	Wire Master Channel	$6.99

*Five required. **Two required.

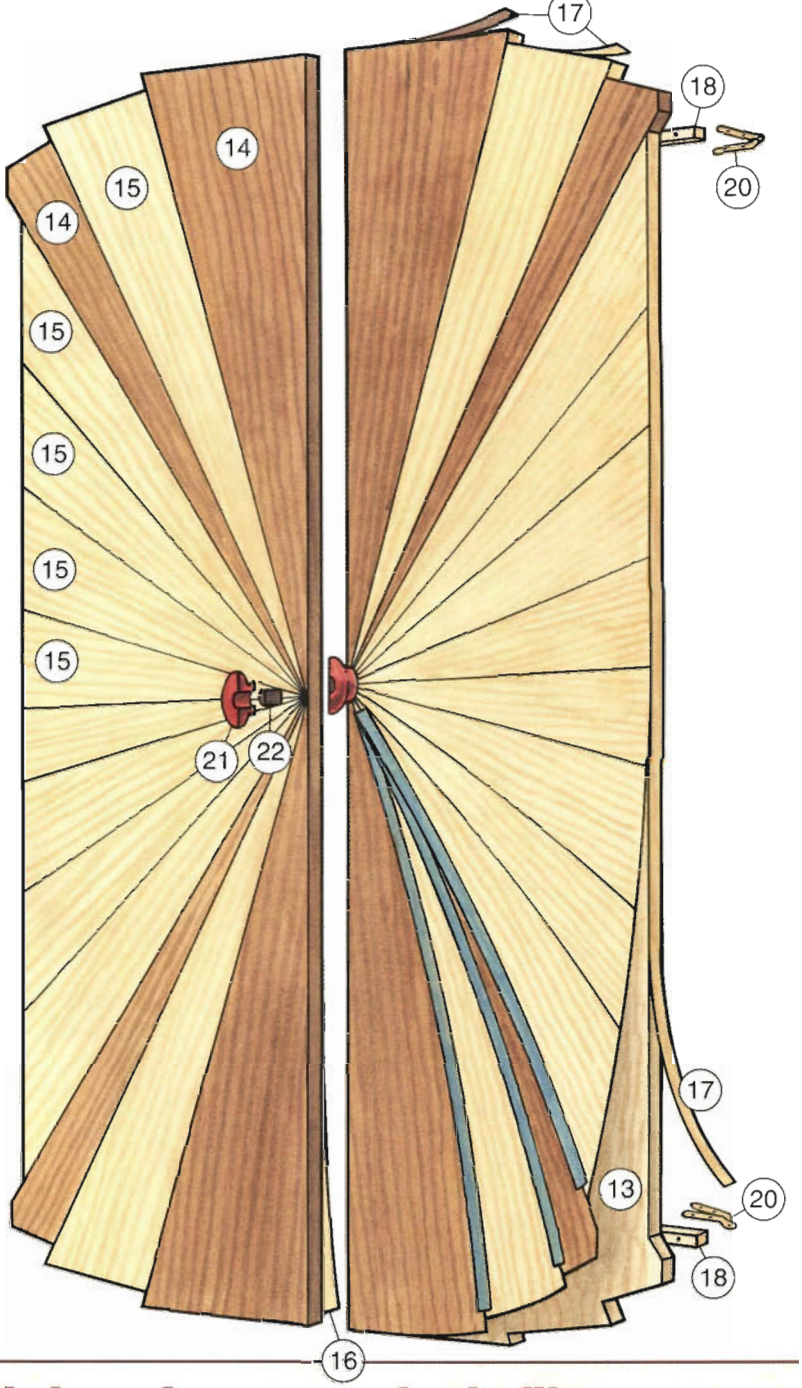
To order your supplies, call 800-610-0883 and mention code W0040.

through this cutter with the saw's miter gauge. If you butt the workpiece against the fence for these cuts, you'll run into major binding problems. Avoid this by clamping a small spacer to the fence near the front of the table saw. Butt each workpiece against the spacer to set up the cut and position the fence, then make your cuts.

Dry fit the top and bottom to the sides. When everything fits, install a 3/4" straight bit in your table-mounted router, lock the fence 3/4" from the bit and plow grooves for the back (piece 4) in the case top and bottom. The locations and dimensions can be found on the **Pinup Shop Drawings**.

Make similar grooves in the sides, but this time start and stop the plow 1/2" from each end by aligning pencil marks on the workpiece and the fence. Mill on all four pieces, raising the bit 1/8" on each pass until you have plowed 3/8" deep grooves in each. You won't have to square these up, since the cuts end in the dadoes you made earlier.

Cut the plywood back to size and dry fit it in the case. Trim the cork (piece 5) to fit and apply it to the back with contact adhesive. Then glue and clamp the case together, checking for squareness as you go. Don't glue the back in its groove: it should float freely to accommodate movement in the hardwood parts.

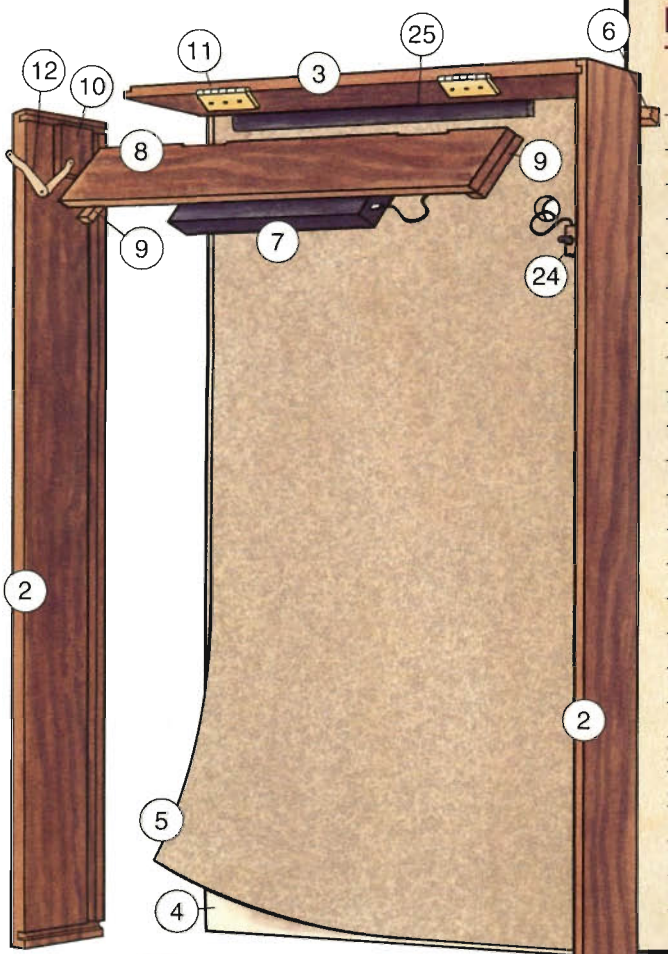


Using hardboard templates for a perfect fit

Ian Kirby's article on page 22 provides the basics you need to veneer this panel. When it came time to clamp, however, I used my vacuum press rather than the clamping method Ian employed.

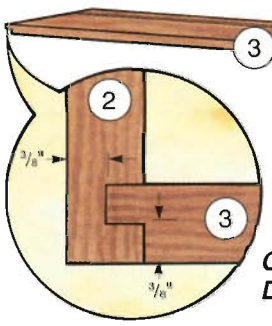
After you cut the door panel to size, use the diagram on the Full-size Pattern to make three hardboard templates. These are used to trim the mahogany and maple veneers to size. Score and cut them according to the method outlined by Ian, making sure they extend past the door panel edges by at least 1/2". Tape the veneer sections together and apply glue to their edges. Apply the cold press adhesive and set your large veneer panel in place. If you don't have a vacuum press, continue following Ian's advice. For me, it was simply a matter of turning on my pump to create pressure to the entire surface of the door panel, and letting it dry.

Create hardboard templates of the shapes which comprise the face veneer pieces. Find these shapes on the Full-size Pattern.



MATERIAL LIST

		T x W x L
1	Dart Board (1)	Dimensions vary
2	Case Sides (2)	3/4" x 5" x 34 1/2"
3	Case Top and Bottom (2)	3/4" x 5" x 22 3/4"
4	Case Back (1)	3/4" x 22 3/4" x 33 3/4"
5	Case Back Lining (1)	1/8" x 22" x 33" Cork
6	Interlocking Hanging Cleats (2)	3/4" x 1 1/4" x 22 7/8"
7	Light Fixture (1)	12" Halogen 25W
8	Light Valance (1)	3/4" x 4" x 21 7/8"
9	Light Valance Cleats (2)	3/4" x 3/4" x 4"
10	Light Valance Stops (2)	3/4" x 1 7/8" x 4"
11	Light Valance Hinges (2)	2" x 1 3/8" Brass butts
12	Light Valance Support (1)	5" Brass
13	Door panel (1)	3/4" x 25 1/4" x 43 1/2"
14	Face Veneers, Mahogany (8)	1/32" Trim to fit
15	Face Veneers, Maple (20)	1/32" Trim to fit
16	Balance Veneer (1)	1/32" x 26 1/4" x 44 1/2"
17	Plyedge (Mahogany & Birch)	1" x 6' 2 rolls of each
18	Door Cleats (4)	3/4" x 3/4" x 11 3/4"
19	Screws (10)	#8 x 1¼" Brass
20	Door Hinges (4)	2" Reversible knife
21	Door Knob (1)	3/4" x 2" Beech
22	Door Knob Insert (1)	3/4" Dia. x 3/4" Walnut
23	Door Ball Catches (2)	1/4" x 1 3/4" Brass
24	Pressure Switch (1)	1 1/2" x 1 1/2" Antique
25	Wire Channel (1)	Black Plastic



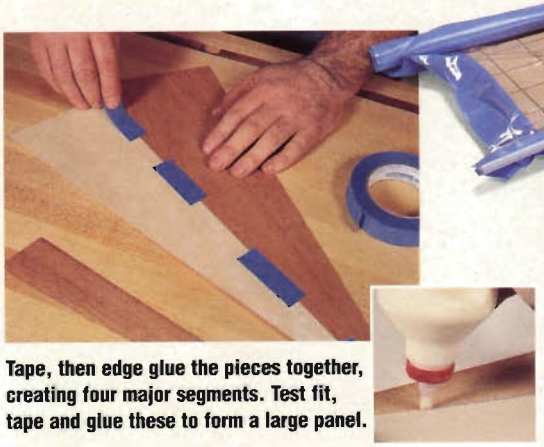
Corner Detail

Making the Interlocking Hangers and Valance

The dart board cabinet is hung on the wall by means of a pair of interlocking cleats (pieces 6). One is attached to the back, and the other to the wall. These are identical and can be made by chamfering a piece of rectangular stock at 45° on the table saw. See the **Pinup Shop Drawings** for a cross section of these parts. Attach one cleat to the cabinet with 1¼" screws, securing it just down from the top edge.

To increase your odds of being able to recreate Foot Anakin's amazing courtroom feat, this dart board is illuminated by a halogen

Using the appropriate templates and a sharp knife, slice the radiating face veneer pieces from contrasting hardwood veneer.



Tape, then edge glue the pieces together, creating four major segments. Test fit, tape and glue these to form a large panel.

The author's vacuum veneer press worked perfectly for the door panel. If you don't have one, check Ian Kirby's article on page 22.

lamp (piece 7), which is suspended behind a wooden valance (piece 8). Cut the valance, its cleats and stops (pieces 9 and 10) to size, then glue and clamp the stops to the sides and the cleats to the valance (see the **Pinup Shop Drawings**). After the glue has dried, chisel out a pair of shallow mortises for the hinges, and install them and the support (pieces 11 and 12), referring to the **Pinup Shop Drawings** for locations.

The electronic dart board will automatically turn on when the doors are opened. The halogen light, however, must not be wired through the pressure sensitive switch, since it can get very hot, very quickly.

Making the Doors

The veneered doors are the most visible and therefore the key elements of this project. Start making them by trimming a piece of hardwood plywood (piece 13) to the overall dimensions shown in the **Material List** on page 37. Follow the basic steps provided in Ian Kirby's article to veneer both sides of the panel. The face veneers (pieces 14 and 15) make up the tricky portion of this job, while the balance veneer (piece 16) is simple to install on the back side. Refer to the sidebar on page 36 for directions on cutting, trimming and applying your face veneers. Prepare four veneer segments (one quarter of the door face at a time) for easier final application.

Final Fit and Finish

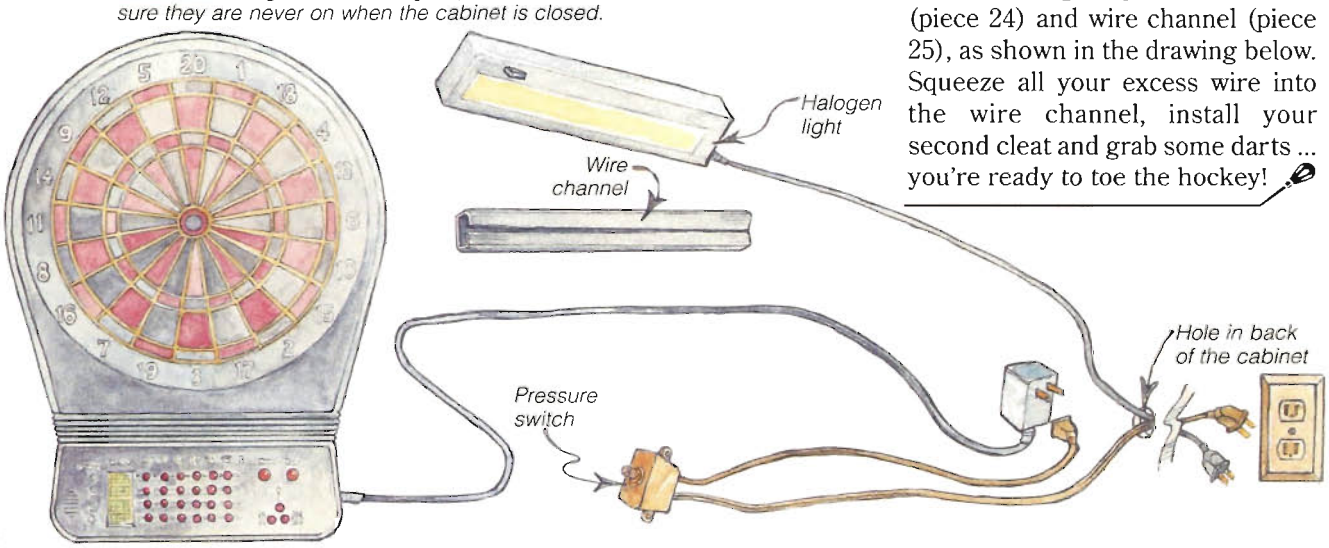
After the door veneers dry, rip the panel down the middle to create two identical doors. Then form the long outside edge of each door, using a router and a straightedge to make these stopped cuts. Install your widest, sharpest blade in your band saw to shape the balance of your doors (see **Pinup Shop Drawings**). To eliminate veneer tearout, I recommend a fresh throat plate for these cuts. File and sand all the edges, taking care not to lift the veneer. Seal the edges with the appropriate species of plyedge (piece 17) secured with yellow glue. Plastic packaging tape serves as the perfect clamp for edging veneer. Use scrap wood cleats to spread out the pressure while stretching and wrapping your tape.

Rip and sand the four door cleats (pieces 18) to size, then attach them with glue and screws (pieces 19) at the locations shown on the **Pinup Shop Drawings**. Hang the doors with reversible knife hinges (pieces 20), installed at the locations shown on the **Pinup Shop Drawings**.

The door handle is a beech knob (piece 21), with its center bored out on the drill press to accommodate a 3/4" walnut dowel (piece 22). After cutting the dowel to length, fine sand both pieces and cut them in half. I used red analine stain for the knob and black analine for the dowel. When the stain dries, glue a half-dowel to a half-knob and screw them in position from the back with #6 screws.

The doors are kept in place with a pair of brass ball catches (pieces 23) screwed to the door backs and the top of the case (see **Pinup Shop Drawings**). After installing them, remove all the hardware and sand the entire cabinet down to 180 grit; then apply three coats of clear finish. When that dries, install the hardware, light, pressure switch (piece 24) and wire channel (piece 25), as shown in the drawing below. Squeeze all your excess wire into the wire channel, install your second cleat and grab some darts ... you're ready to toe the hockey!

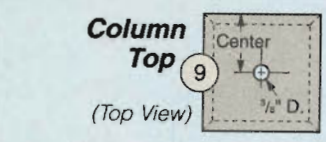
Caution: *Halogen bulbs can get quite hot; make sure they are never on when the cabinet is closed.*



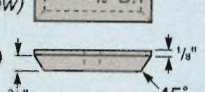
Pinup Shop Drawings — Prairie Style Lamp

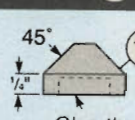
Woodwo

Column Top (Top View)



(Side View)

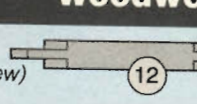




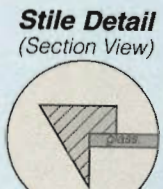
Hardware Cap Cover (Side View)

Glue the harp nut into the hardware cap cover with epoxy.

Shade Frame Top Rail (Top View)



Stile Detail (Section View)



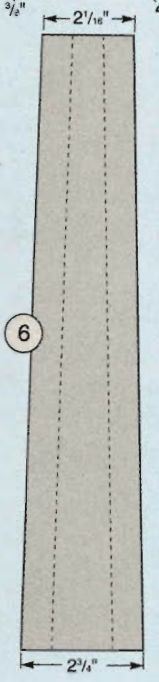
Stiles are mitered to form this shape using the jigs shown below.

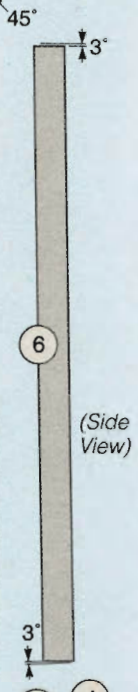
Shade Fram Subassembl (Front View)

Note: *Secure the glass round retaining strip (pie the top and bottom ra*

NOTE: *Angle the top and bottom edges of the column pieces before you taper their sides.*

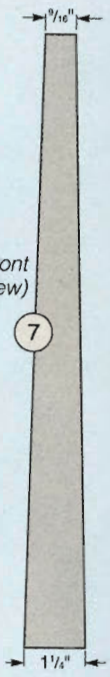
Column Side (Front View)

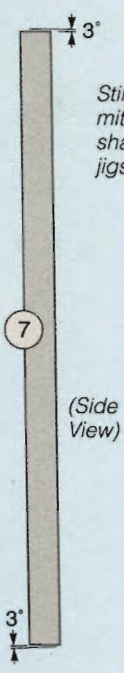




(Side View)

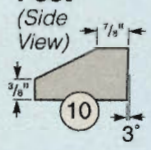
(Front View)



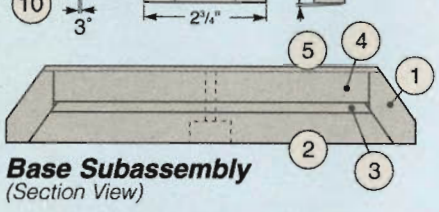


(Side View)

Column Feet (Side View)

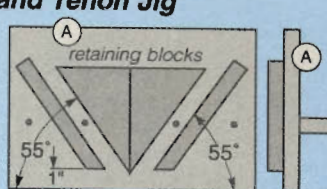


Column Insert



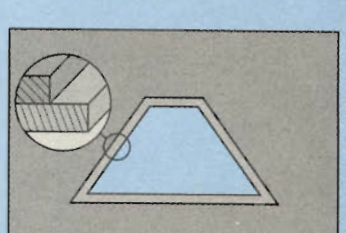
Base Subassembly (Section View)

Table Saw Mortise and Tenon Jig



Mount retainin and strips to stiles and rail correct angle L sh char ride your

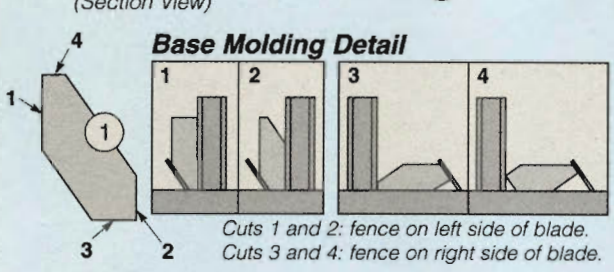
Length of mortise and tenon.



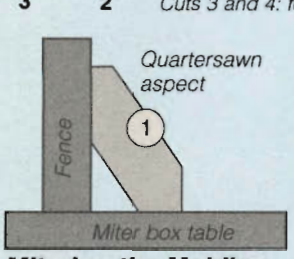
To build the routing jig, t shade frame pieces of 3/ stock - the i on one and outside edg other. Cut ou shapes and pieces as s detail drawi

Frame Routing Jig

Base Molding Detail



Cuts 1 and 2: fence on left side of blade.
Cuts 3 and 4: fence on right side of blade.



Mitering the Molding

NOTE: *Mitering the base molding around the base panel subassembly is best done with a miter box saw (power or not ... your choice). Set the shaped stock against the fence as shown here, and miter away!*

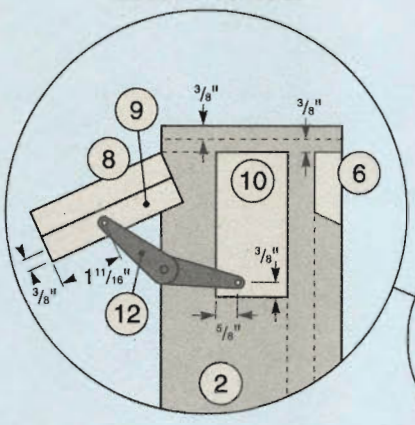
MATERIAL LIST

		T x W x L
1	Base Molding (1)	3/4" x 2 1/8" x 45"
2	Base Bottom Panel (1)	3/4" x 9" x 9"
3	Base Spacer (1)	1/4" x 8" x 8"
4	Base Top Panel (1)	3/4" x 7 7/8" x 7 7/8"
5	Base Veneer (1)	1/8" x 8 1/2" x 8 1/2"
6	Column Sides (2)	3/4" x 2 3/4" x 15"
7	Column Inserts (2)	3/4" x 1 1/4" x 15"
8	Column Veneer (2)	1/8" x 3" x 15"
9	Column Top (1)	1/2" x 2 7/8" x 2 7/8"
10	Column Feet (4)	3/4" x 1 1/4" x 2 1/4"

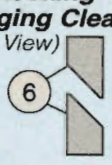
Pinup Shop Drawings — Dart Board Cabinet

Wood

Valence Hinge Location Detail

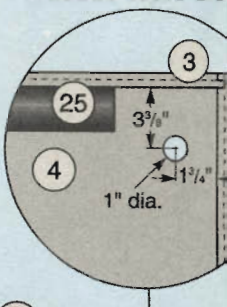


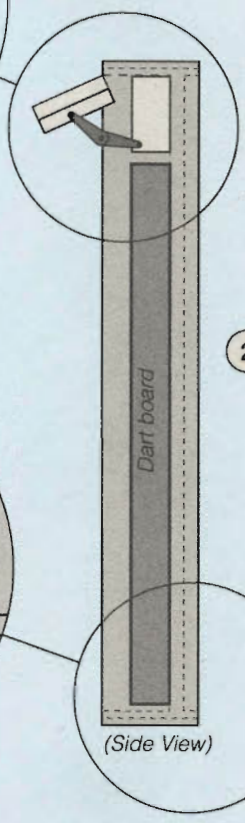
Interlocking Hanging Cleats (End View)

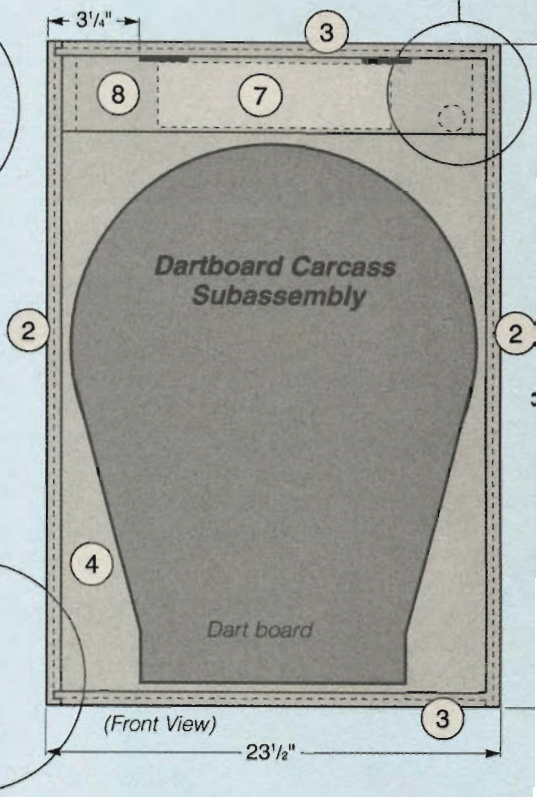


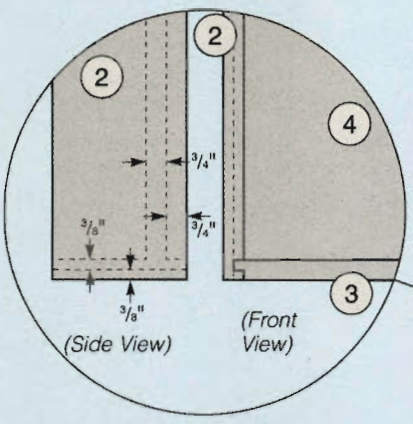
Mount one cleat to the cabinet's back as shown in the detail at left. Mount the other directly to the wall.

Access Hole De









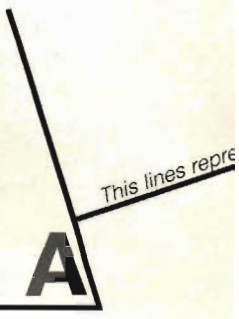
Groove and Dado Detail

Making Hardboard Templates

*Create three hardboard templates **(A, B and C)** for cutting the radial veneer segments by using the door outline shown below. Extend the vertical line at left to exactly 21¾" to establish the point at which all of the veneer segments will converge. Then extend the angled lines to this same point to complete the template shapes. (We couldn't fit them on this pattern.) The templates must also extend past the lines below by 1/2" (this allows for veneer trimming later). Use template **A** to create the large mahogany veneer pieces as well as the smaller maple veneer segments (located next to segment **C**). Once your template are cut to size, look to the sidebar on page 36 for instructions about using them and laying up the veneer segments.*

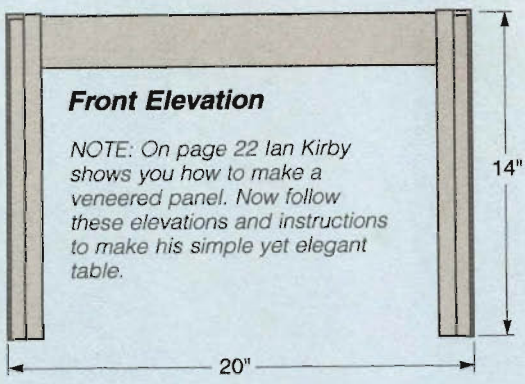
This line represents the finished edge of the door.

Continue this line 21¾". All the veneer segments will converge at that point.



Door outline (these lines represent the shape of the door panel and the veneer segments).

The veneer templates must extend 1/2" beyond this door outline.

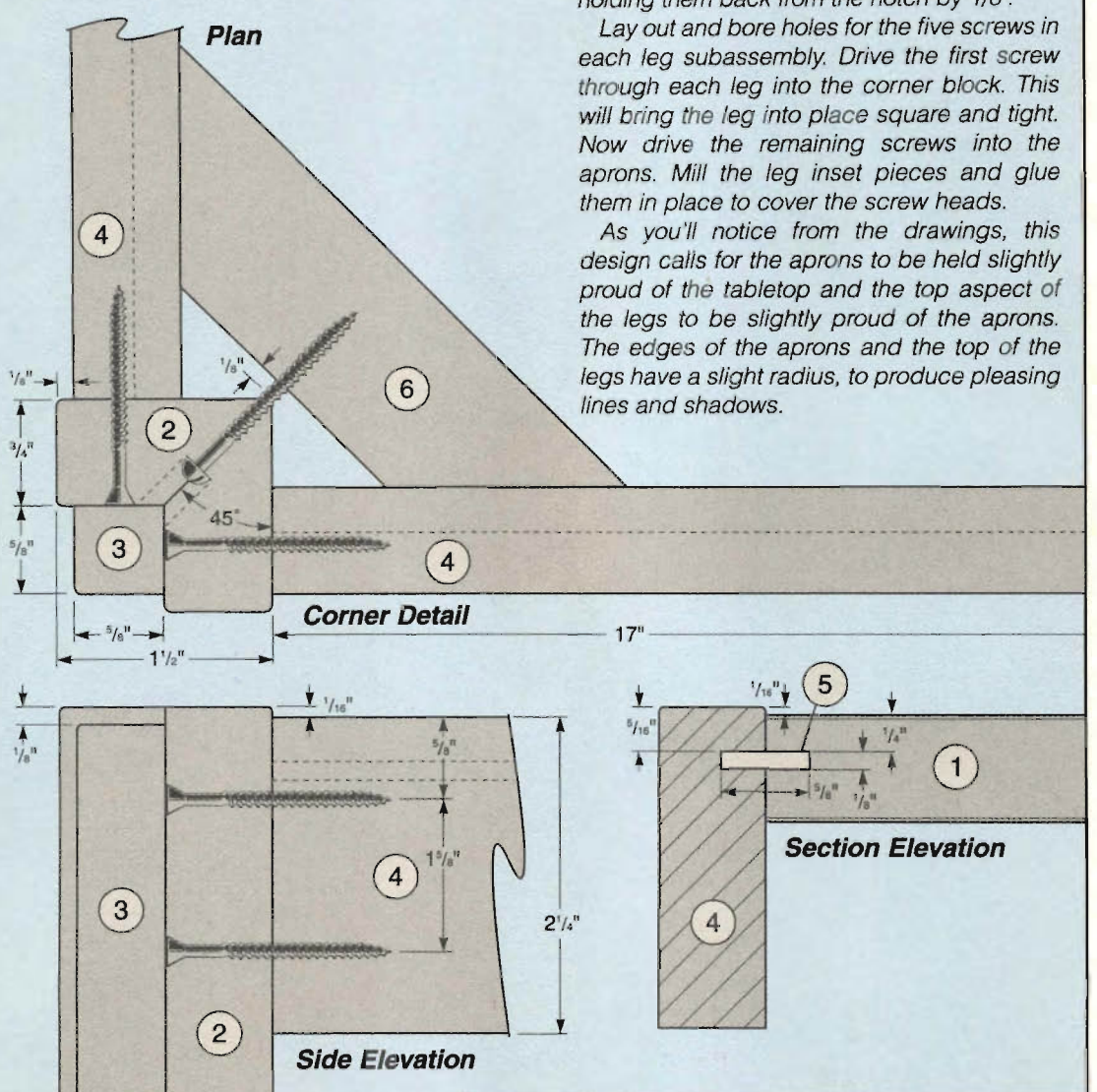


Turning your veneered panel into a table

Before you get started, make sure your panel is dead-on square. Now make your mitered leg subassemblies, mill the aprons and cut a saw kerf into their inside faces. Cut a matching kerf on the edge of the veneered panel, as shown in the drawing below. Make splines to match your saw kerf and glue the aprons onto the tabletop, exactly centered on the veneered panel. Form a 1⅜" notch at each corner to accept the legs. Glue corner blocks on the bottom of the panel (no need for screws), holding them back from the notch by 1/8".

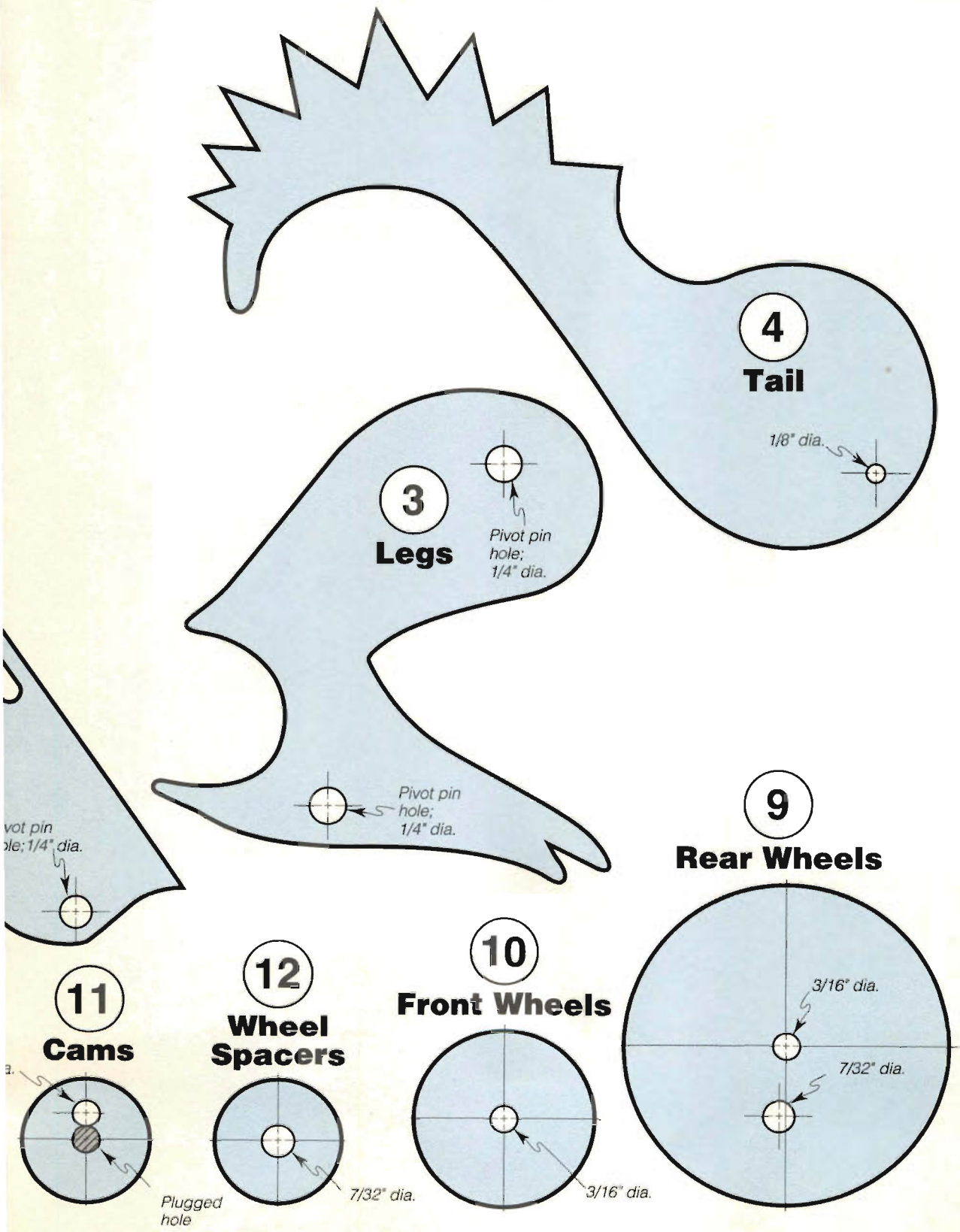
Lay out and bore holes for the five screws in each leg subassembly. Drive the first screw through each leg into the corner block. This will bring the leg into place square and tight. Now drive the remaining screws into the aprons. Mill the leg inset pieces and glue them in place to cover the screw heads.

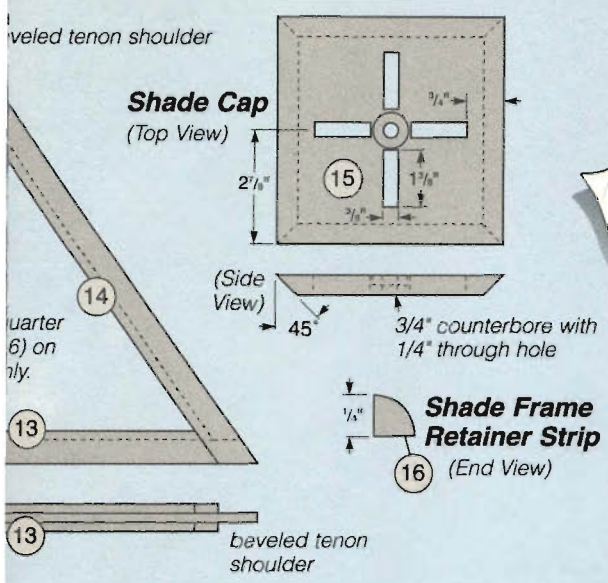
As you'll notice from the drawings, this design calls for the aprons to be held slightly proud of the tabletop and the top aspect of the legs to be slightly proud of the aprons. The edges of the aprons and the top of the legs have a slight radius, to produce pleasing lines and shadows.

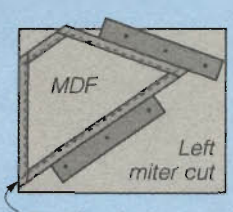


MATERIAL LIST

		T x W x L
1	Tabletop (1)	3/4" X 18¼" x 18⅛"
2	Legs (8)	3/4" X 1½" x 14"
3	Leg Insets (4)	5/8" X 5/8" x 13⅞"
4	Aprons (4)	3/4" X 2¼" x 17"
5	Splines (4)	1/8" X 5/8" x 17"
6	Corner Blocks (4)	1¼" X 1½" x 4½"







Frame Mitering Jigs

(See sidebar on page 32)

To miter the shade frame stiles, build two jigs, one for the left side cut and one for the right. Use 3/4" MDF, positioning the frame flush to the edge. Mount retaining blocks to the sheet stock with screws. Test the miter angles on scrap 3/4" sheet stock cut to match the shade frame's shape. Make sure all your scrap pieces fit well before cutting the shade frames.

		T x W x L
11	Column Screws (4)	#8 x 1¾"
12	Shade Frame Top Rails (4)	3/4" x 7/8" x 6⅞"
13	Shade Frame Bottom Rails (4)	3/4" x 7/8" x 20⅛"
14	Shade Frame Stiles (8)	3/4" x 7/8" x 13¼"
15	Shade Cap (1)	1/2" x 5¾" x 5¾"
16	Shade Frame Retainer Stripping (1)	1/4" x 44" Quarter round
17	Shade Glass (2)	Cut to fit. Kokomo brand
18	Lamp Hardware Kit (1)	Brass kit with 7½" harp
19	Hardware Cap Cover (1)	5/8" x 1" x 1"
20	Cork Feet (8)	1/16" x 5/8" Dia.

Full-Size Patterns

PINUP SHOP DRAWINGS

- Open staples carefully, remove pattern and fold staples back in place.
- Use graphite paper (available at art supply stores) or cut and trace full-size patterns onto your stock.
- Cut out the elevation drawings and pin them to your shop wall.

Dart Board Cabinet
Templates for the door's radiating veneers. Elevations for the carcass and important construction details.

Prairie Style Lamp
Jigs to help create all the angles, rabbets and compound miters.

Veneered Table
Elevations, joinery details and a complete material list.

Animated Dragon
You get full-size patterns for all of the little fellow's body parts and locations for key pivot points and registration holes.

WOODWORKER'S JOURNAL

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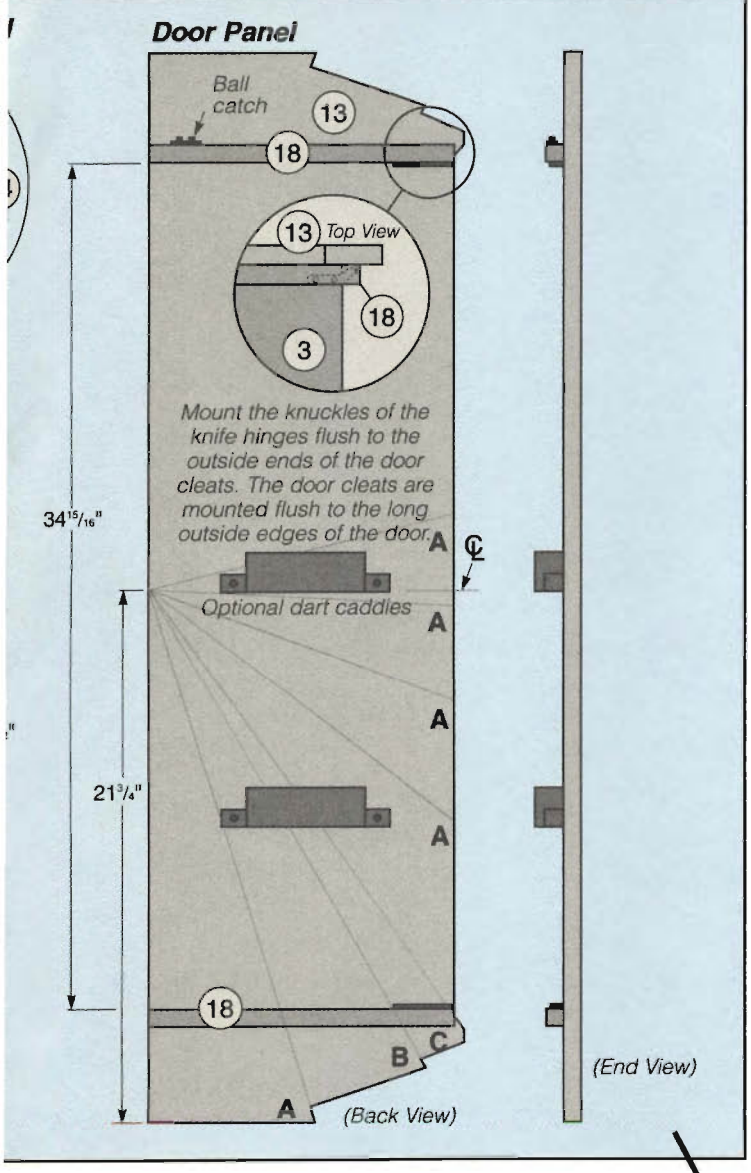
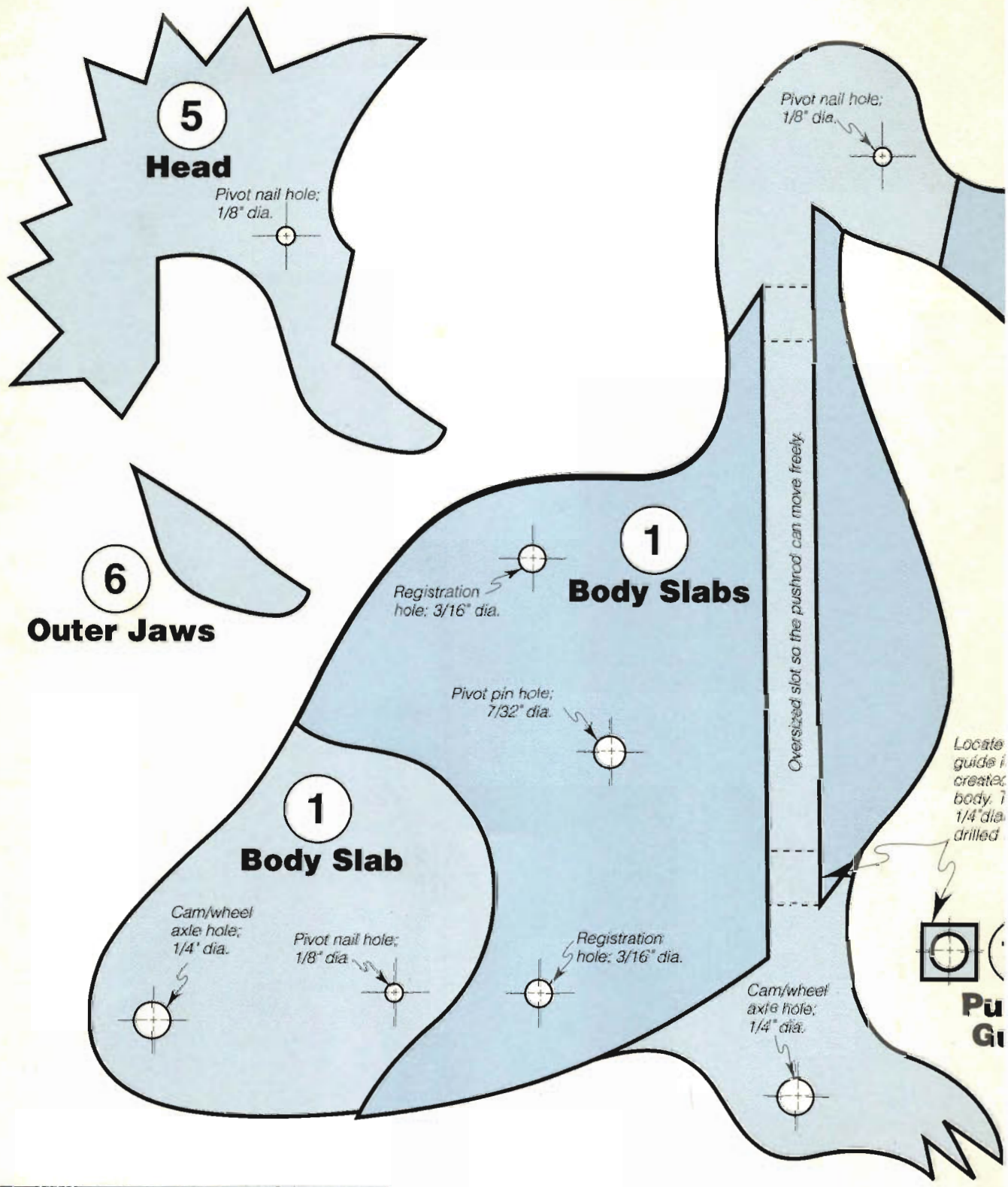
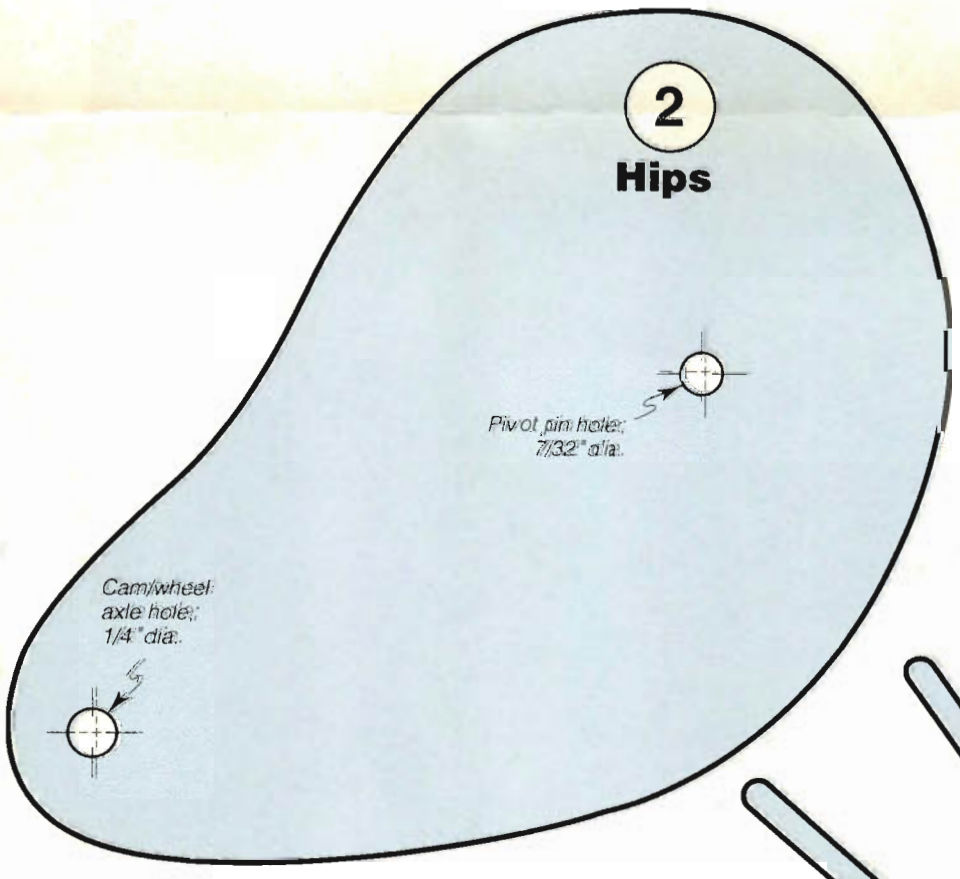


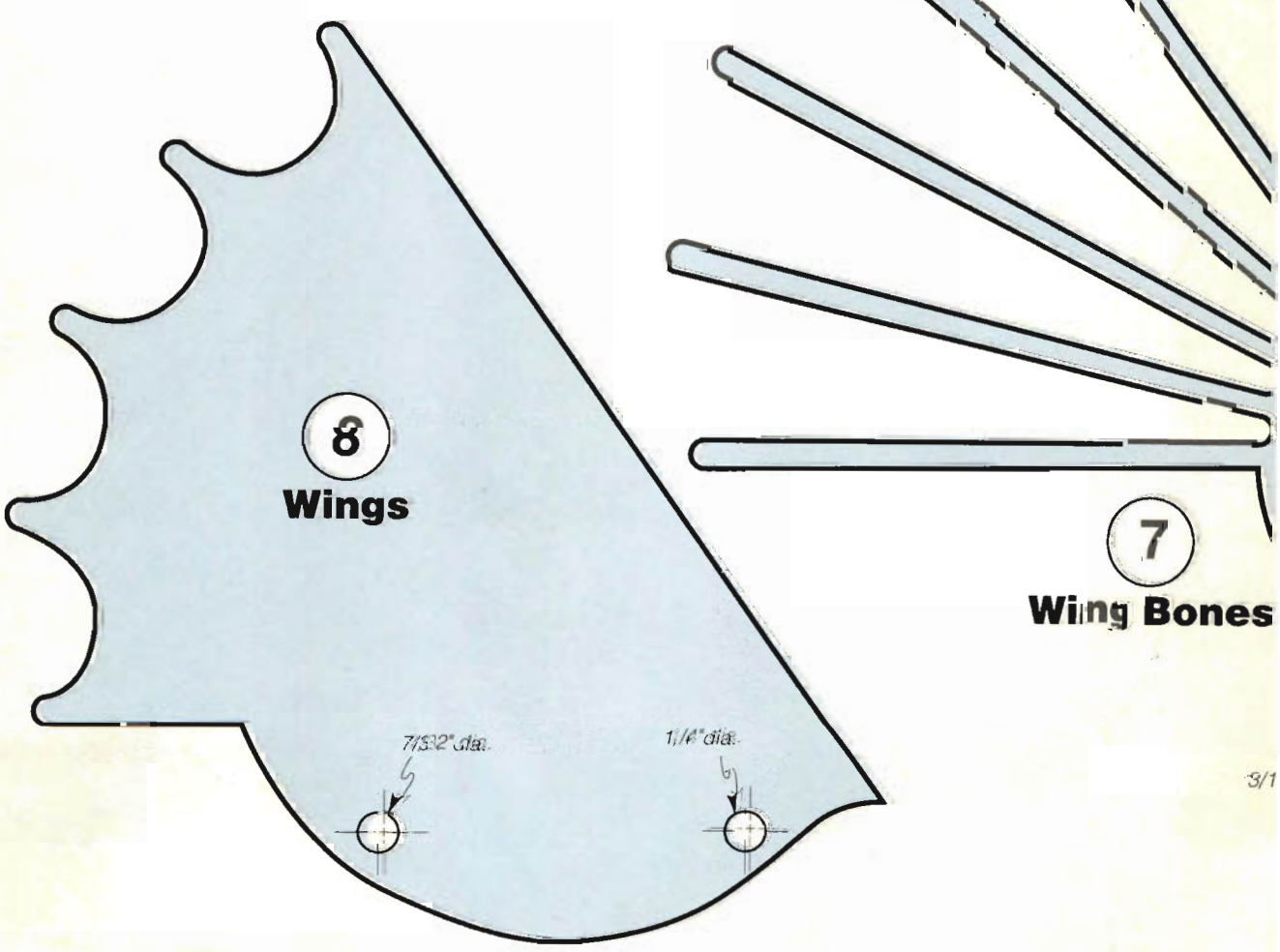
NOTE: As you lay up your door's face veneer into four oversized panels (see the sidebar on page 36), you'll notice the last piece of maple veneer radiates past 90°. Overlap the two panels and use a sharp knife to trim them to fit perfectly by intersecting those last two pieces of maple veneer.

Deco Dart Board


5
Head
Pivot nail hole; 1/8" dia.
6
Outer Jaws
1
Body Slabs
Registration hole; 3/16" dia.
Pivot pin hole; 7/32" dia.
Oversized slot so the pushrod can move freely.
Pivot nail hole; 1/8" dia.
1
Body Slab
Cam/wheel axle hole; 1/4" dia.
Pivot nail hole; 1/8" dia.
Registration hole; 3/16" dia.
Cam/wheel axle hole; 1/4" dia.

Dragon


2
Hips
Pivot pin hole; 7/32" dia.
Cam/wheel axle hole; 1/4" dia.


8
Wings
7/32" dia.
1/4" dia.
7
Wing Bones

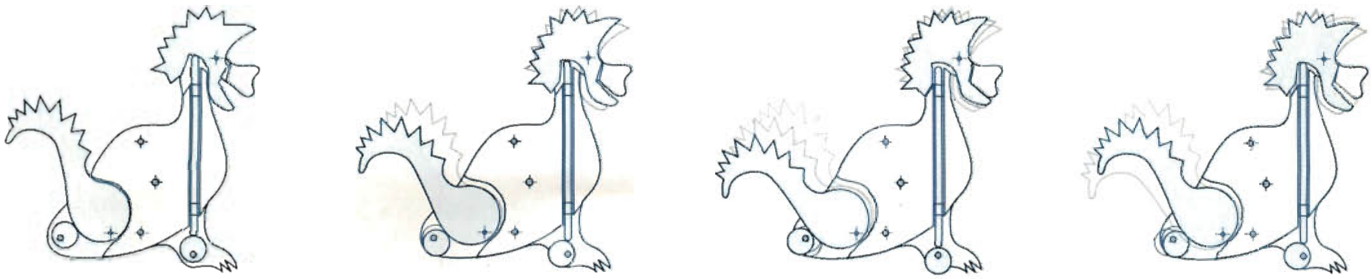
3/1

Articulating the Dragon

By John Hutchinson

This world can use all the delight we can afford – and our author is certainly doing his part. Check this issue's pattern for full-size dragon drawings.

Dragons are mythical creatures of many cultures. Evil in some, good in others ... gifted with speech and an appreciation for beauty, their jewel-like eyes reveal a picture of who we are. This little fella was designed to demonstrate our love of fun and function.



Start with the Body Slabs

Begin by making three 1/2" cherry body slabs (pieces 1), photocopying the **Full-size Patterns** on the center pullout and adhering them to the stock with an application of spray adhesive. Rough cut the shapes with a band or scroll saw, staying wide of the lines. Next drill the holes shown on the pattern and stack the slabs, aligning them with dowels through the registration holes. Sand to the lines, using a spindle sander or drill press outfitted with a drum sander to ensure the edges of these parts stay square. Cut one of the slabs on the dashed lines of the pattern to create the mid-body filler pieces.

Once you've completed sanding the slabs, follow the same cut-stack-drill-sand procedure for the walnut hips and cherry legs (pieces 2 and 3).

Forming the Tail and Head Plates

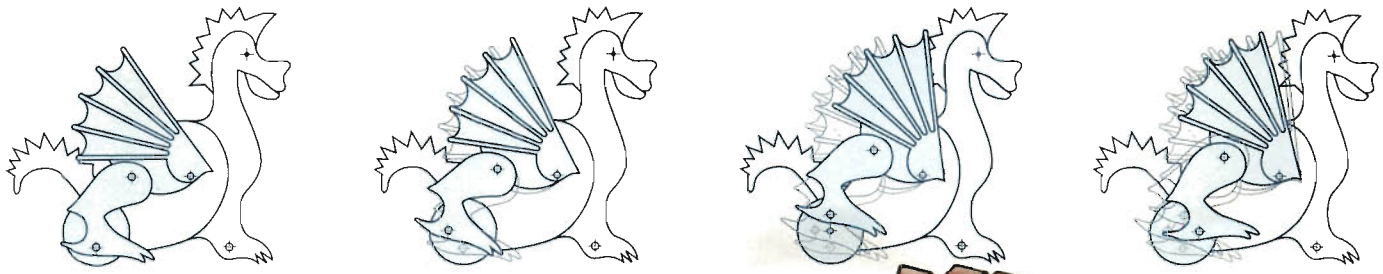
Cut the tail and head plates (pieces 4 and 5) from 1/2" walnut stock, downsized in thickness by 1/16". While you're at it, cut the cherry outer jaws (pieces 6) to size, but lay them aside for now. Since the bottom curve of the tail will be the contact area for the back cam, take extra care with its final sanding. Drill 1/8" holes through the plates for 8d pivot nails. The nails have an outside diameter of 3/32".

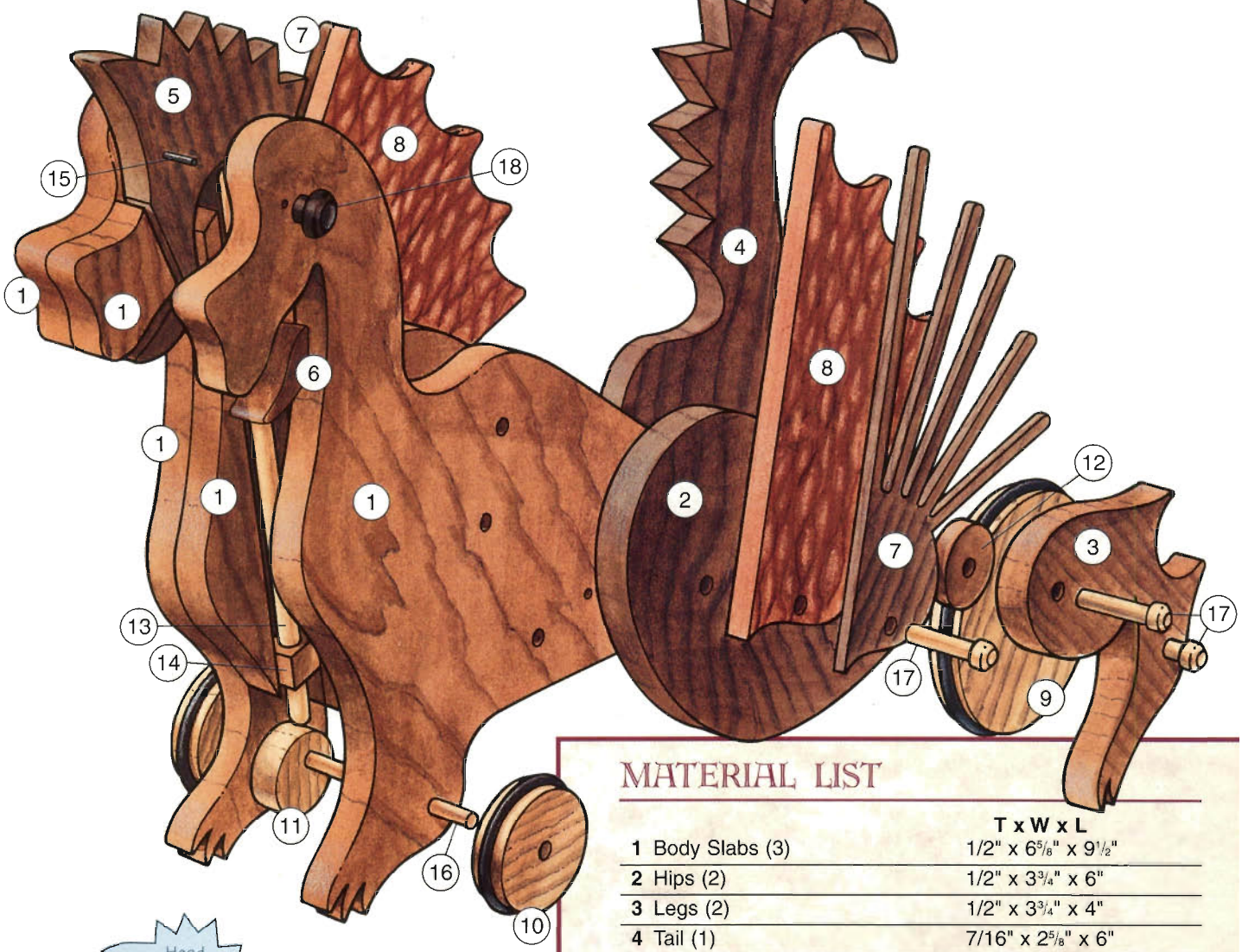
A Pair of Leathery Wings

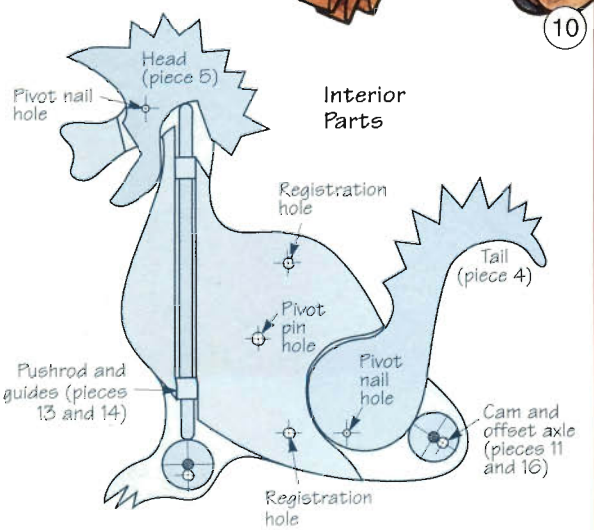
Regarding materials used for this project, my only indulgence was the 1/8" walnut and 1/2" lacewood used for the bones and membranes of the wings (pieces 7 and 8). Nothing that I have seen approaches lacewood in its resemblance to skin. The two woods look great together, creating this creature's signature feature.

Rough cut the lacewood membranes, drill the pivot holes, and set them aside. Forget about using a saw to cut out the bones. Position the bone pattern on the walnut stock so that the middle bone is parallel to the grain of the wood. Drill the tight inside corners with a 1/8" bit. With the aid of a straightedge, lightly score the

Registration holes align the stacked body slabs while you're cutting and sanding them to their proper shape and size. The Full-size Pattern provides drawings of all the shaped parts and locates the registration and articulation borings. The dragon's wings and legs hide the registration holes once they're applied.







MATERIAL LIST

		T x W x L
1	Body Slabs (3)	1/2" x 6⅝" x 9½"
2	Hips (2)	1/2" x 3¾" x 6"
3	Legs (2)	1/2" x 3¾" x 4"
4	Tail (1)	7/16" x 2⅝" x 6"
5	Head (1)	7/16" x 3¼" x 3¼"
6	Outer Jaws (2)	1/2" x 1½" x 1½"
7	Wing Bones (2)	1/8" x 4½" x 5½"
8	Wings (2)	1/4" x 3¾" x 5½"
9	Rear Wheels (2)	1/2" x 2¼" Dia.
10	Front Wheels (2)	1/2" x 1¼" Dia.
11	Cams (2)	7/16" x 7/8" Dia.
12	Leg Spacers (2)	1/4" x 7/8" Dia.
13	Pushrod (1)	1/4" Dia. x 6"
14	Pushrod Guides (2)	3/8" x 3/8" x 1/2"
15	Pivot Nails (2)	8d Finish
16	Cam/wheel Axles (1)	3/16" Dia. x 6" for both
17	Pivot Pins (bag)	7/32" Dia. Axles
18	Eyes (2)	3/8" Buttons

Figure 1: Lightly score the bones with a utility knife and a straightedge. Then hold the stock with the heel of your hand and complete the cuts with repeated firm knife strokes.

lines with a sharp utility knife (**Figure 1**). Now, with the heel of your hand securing the stock, make repeated pull cuts in the scored lines until you shear the thin walnut. If you take your time, you'll end up with perfectly straight and polished edges. Now glue the bones to the membrane; stack and align the two wing assemblies with pivot pins and finish sand the edges to final shape.

Wheels, Cams and Axles

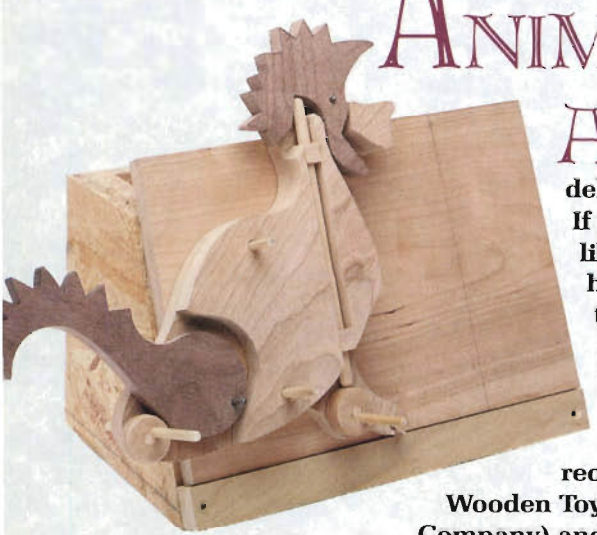
Form the wheels and cams, pieces 9 through 11 (oak for the wheels, and cherry for the cams), using an adjustable hole cutter. Spin sand all the wheels using sandpaper and a wood block held square to the axle of a wheel turning jig (See **Figure 2**). To ensure they spin freely, downsize the thickness of all the wheels by approximately 1/16". Although the exact diameter of the sanded wheels is not important, the pairs must be equal. A dial caliper comes in handy here.

Now comes the trick that makes the creature operable on a coffee table. Since the wheels must generate a good deal of lifting power, they need to grip the table. Simple wooden wheels would merely slide along a smooth surface — to prevent this from happening, purchase a package of variously sized rubber O-rings at your local hardware store. Using any kind of scratching device (I used an awl), cut a V-groove on the centerline of each wheel's tread surface while spinning it with the turning jig. Put a few dots of polyurethane glue in the groove and stretch an O-ring over the wheel until it snaps into the groove. Instant traction!

Now spin sand the cams and the leg spacers (pieces 12), rocking the sandpaper just a bit to create

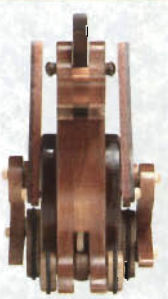
Figure 2: Make a wheel sanding jig from a 3/16" threaded rod, a nut, two rubber-backed washers and a wing nut. Use the jig to score the wheels for their O-rings, too.

Animated Toys



Testing Jig

Animated toys are not a new idea. Dancing dolls, music boxes and pull toys have delighted generations of children and adults. If you're building an animated toy from a plan like John Hutchinson's, most of the tricky stuff has already been worked out. But if you're thinking of designing your own, take a tip from John and use a testing jig to ensure all of your interior parts (see front and rear view at right) interact according to plan. To learn more about animated toys, we recommend two books: "The Great Mechanical Wooden Toy" by Ed and Stevie Baldwin (Chilton Book Company) and "How to Make Animated Toys" by David Wakefield (Popular Science Books).



Front View

Rear View

a crown on the cams, thereby minimizing the contact area. Finish sand the cams with very fine sandpaper until they shine. Where the objective in making the drive wheels is to increase the surface friction as much as possible, the opposite is true for the cams. Next, plug the hole left by the hole cutter (in the cams, not the spacers) with an appropriately sized dowel and trim it flush. Sand the sidewall of the cam to reduce the thickness by 1/16" and drill a new 3/16" axle hole, offset 3/16" from the center of the cam (see **Figure 3**).

Forming the Pushrod

A 1/4" dowel (piece 13) is used to transfer the vertical movement of the front cam to the head plate. Rather than drilling a 5/16" dowel shaft for a length of 6" through 1/2" stock, I chose to create two pushrod guide blocks (pieces 14), one at each end. Rip a strip of cherry to 3/8" square, then drill a 5/16" hole centered 1/4" from the end. Now cut off a 1/2" length, as shown in the **Full-size Pattern**. Repeat the process for a second guide block. Cut the pushrod to size and round over the ends.

Figure 3: Offset the cam's axle by filling the boring created by the hole saw and drilling a second hole 3/16" from the center.

Assembly

Since all the parts have registration holes, the final glue-up will go quickly with no sliding during clamping. I used yellow carpenter's glue to mate the flat surfaces and expanding polyurethane glue to secure the wheels on their axles.

First, glue all the center pieces in place, aligned with wooden dowels, to one of the full body slabs (don't forget the pushrod guides). Then test all internal movements by pinning the head and tail plates with the pivot nails (pieces 15). Temporarily place the cams in position, rotating them on the axles that have been friction-fit (not glued) in place.

Although the axles and registration dowels protrude through the outside body slab, they will be covered by the eyes and hips. When you're satisfied that all your moving pieces interact correctly, glue the third slab in place, trapping the head and tail. The cams must be secured to the axles by drilling a 1/16" hole through both cam and axle and gluing in a toothpick.

Now glue the hips in place. When the body is dry, position the rear wheels, the wings (glue the leg spacers to the wings now) and the legs, pinning them in place with the pivot pins (pieces 17). Next, assemble the front wheels, axle and cam, and pin the cam to the axle as before. Glue the eyes (pieces 18) and the outer jaws in place.

Finish

Finish the dragon with a heavy-duty gloss, oil and urethane top coat such as General Finishes Arm-R-Seal to accentuate the contrasting woods. The wet look seems appropriate for a dragon.

Opal Swirtz and her brother John (on the front page of the story) find the dragon to be a fascinating toy. Made from cherry, walnut and lacewood, this mechanical marvel is as interesting to adults as it is to children.

ARTS & CRAFTS FINISHING

By Michael Dresdner

The Arts and Crafts movement signaled a return to simplicity and elegance in furniture design. Here in the U.S., proponents of the movement embraced strong, local woods, like oak, coupled with simple, durable lines. Some cabinetmakers felt that the large pores and grain patterns of this noble wood should stand out, and used finishes that added contrast. Others, like Gustav Stickley, felt the design of the piece should not have to compete with the wood's patterns. To that end, he chose finishes to mitigate rather than enhance the grain patterns in oak.

In this article, I'll show you all the steps to follow either of these paths. First, I'll describe a simple, one-step stain. It has a rugged appearance that many feel shows off oak to its best. After that, I'll introduce you to traditional ammonia fuming, which lends a darker, more monochromatic look to white oak. Naturally, I will show you how to handle ammonia safely, but if that is still a bit too risky for your tastes, I'll tell you about a safe chemical alternative that attempts to mimic fuming while eliminating the mess and danger.

First, Proper Preparation

In order for stain to color wood evenly, you must sand the wood uniformly. Follow the same sanding procedure whether you plan to stain the oak or fume it. Start with 80 grit open coat aluminum oxide paper. This is rough enough to take out any machine marks and will let you get your surfaces flat and smooth. Sand by hand, with a block, or with an electric or air sander. If you sand with a power sander, remember that it works best when moved slowly — about one inch per second. Let the weight of the sander provide the only pressure. Pressing down on a sander will only slow it down.

Now move on to 120 grit of the same aluminum oxide paper. Since you have already flattened your surfaces, the only goal of this sanding step is to remove the 80 grit scratches. If you have one, set up a strong work light and look at the wood from a low angle with the light on the far side. This will help you see the scratch pattern you are leaving and will make it easier to tell when the larger grit scratches are removed. Follow the 120 sanding with 180 grit — again, merely to remove the 120 grit scratches.

Do your final sanding with 180 grit paper, but this time switch to garnet instead of aluminum oxide. Sand with the grain, and only by hand — no sanding machines. Hand sanding with the grain will eliminate any cross grain scratches and leave the wood ready for staining or fuming.

Mike McGlynn's fern stand appeared in issue 41 of Today's Woodworker.

Rick White's Arts & Crafts dining room chairs appeared in the April 1999 issue of Woodworker's Journal.

This Stickley-inspired bookcase, built by John English, was featured in Today's Woodworker, issue 56.

A traditional-looking Arts & Crafts finish is easily attained through a variety of modern products. The tried and true techniques of yesteryear are a great option as well.

The Beauty of Gilsonite

One of my favorite oak stains is a mixture called "asphaltum." It is a thickish tar made from a natural mineral, called gilsonite, ground into a drying oil, such as linseed oil or modified soya oil. In addition to being used in many dark stain formulas, asphaltum shows up in roofing tar and tree pruning paint.

Finishers prize this dark brownish black paste for the richness of color it offers. Like an oil slick on water, it shows highlights of both green and red. It makes an excellent glaze between coats of finish as well as a deep rich stain for raw wood. If you are a purist, as I am, you can buy asphaltum in one gallon containers from Sherwin Williams' commercial stores. (Sherwood Wiping Stain Concentrate, stock #S64N44) Cut it 50/50 with mineral spirits and you have a wonderful stain. (See "Trade Secrets" on page 57 for more info.)

For those who prefer their stains ready to use, Minwax offers a very close alternative. Minwax Wood Finish #2750 Jacobean, used right out of the familiar bright yellow can, will give you a color almost identical to the straight asphaltum stain mixture. Whichever you choose, the process is the same.

Flood it On; Wipe it Off

Both stains tend to settle, so start by stirring or shaking the container to mix the solvent and color. With a rag, brush or sponge, flood the stain onto the raw sanded wood and wipe it all off before it dries. I like to use paper shop towels for wipe-off when I don't have enough rags available. When it is applied this way, the stain will come out even and uniform. Let it dry overnight before you go on to the first top coat.

Once the stain is dry, go on to your favorite top coat. For a table, sideboard or desk, I'd apply three or four coats of an oil-based satin polyurethane. The poly will look great and give you the durability and heat resistance you'd want for a heavily used piece. It will take the wear of everyday use and even hold up if an occasional carafe of hot coffee is set on it.

Fuming

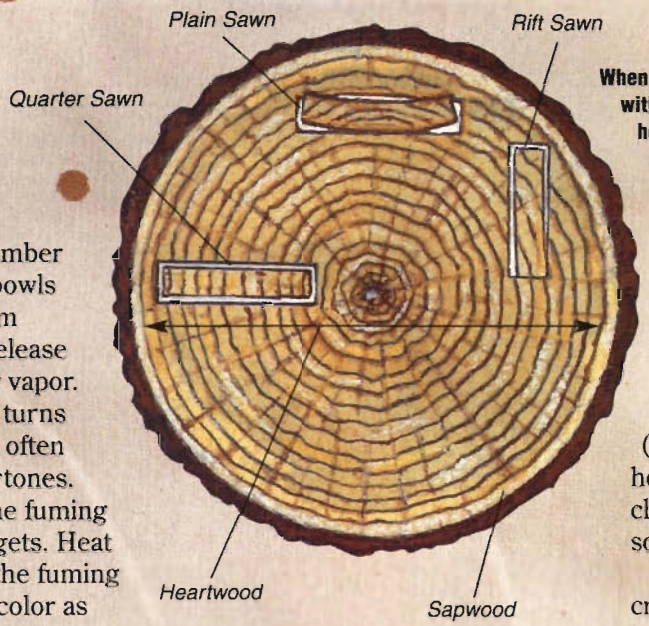
At some point, someone discovered that ammonia fumes make high tannin woods, like oak, turn dark. Rather than apply stain to the wood, we can darken oak substantially by causing it to react chemically with ammonia fumes. Because ammonia is harmful to us, the way to fume oak furniture is to

Mix asphaltum in a fifty percent mixture with mineral spirits to create a beautiful Arts & Crafts style stain.

Flood the surface of your properly sanded project with the mixture. A generous application helps to insure uniform coverage.

Wipe the stain off before it dries. Move quickly, but thoroughly rub the entire piece, working toward uniform coverage.

The stool is nicely stained with a minimum of muss and fuss. A "secret" formula known now by thousands.



When fuming white oak or other woods with a significant tannin content, the heartwood will change color but the sapwood will not.

seal it in an airtight chamber along with some open bowls or troughs of ammonium hydroxide, which will release ammonia gas and water vapor.

When oak is fumed it turns a dark, blackish brown, often with slightly green overtones. The longer it stays in the fuming chamber, the darker it gets. Heat increases the speed of the fuming process, and alters the color as well. The warmer the fuming chamber is, the faster the color change and the redder the color. Cooler temperatures mean slower color change and greener colors.

As a rule, white oak fumes better than red oak, and dense wood works better than lighter wood. Heartwood changes color, but sapwood does not. If you plan to fume, build your furniture from dense white oak heartwood. Since the ammonia reacts with tannin, you can intensify the effect by washing the wood first with a solution of strong tea. Tea contains tannin, which will then be deposited in the wood. However, dense white oak usually has enough tannin on its own so that a tea wash is not necessary.

Setting Up Safely

The ammonia used to create fumes is the same 28% solution of ammonium hydroxide used in blueprint machines. You can buy it from any chemical supply house or a reprographics (blueprint) company. By contrast, household ammonia used for cleaning is typically only a 5% solution or weaker.

Unfortunately, the fumes it creates are quite irritating and harmful to our eyes, nose and lungs. Any time you will be exposed to them, such as when you pour the ammonia or empty the fuming chamber, you should suit up to protect yourself. Wear good, tight-fitting chemical goggles to protect your eyes and an organic vapor mask to protect your nose and lungs. I use a full-face organic vapor mask that protects everything at once. It is also a good idea to wear long sleeves and gloves, but any type, even the cheap vinyl disposable gloves, will work to protect your hands.

Creating a Fuming Chamber

To keep the wood in contact with ammonia fumes for a long period of time, you need to create a fuming chamber that is airtight and large enough to hold the

At right, the author demonstrates a slick outdoor fuming chamber. At left, Rick White uses a simple polyethylene chamber he constructed to fume his Prairie Lamp (page 28). Note that Rick left the hardware on the lamp during fuming ... a big mistake! The brass was discolored by the fumes.

Ammonia fumes require time to affect the tannin within the cells of the wood. The test pieces of white oak at right were exposed to ammonia fumes in twelve-hour increments, from zero to 72 hours (bottom to top). The author then sealed the pieces with dark shellac. Notice how the sapwood did not react to the fumes.

pieces you are fuming. The chamber can be anything from a small Rubbermaid® container that will hold small items, like wood handles, up to even an entire room. (See the sidebar below for an ingenious fuming chamber.)

You can make a simple chamber of any size by building a wood frame large enough to enclose whatever you need to fume. Leave the bottom open, but cover the four sides and the top with clear polyethylene film. Leave some extra film rolled up at the bottom to help make the seal airtight, and cover any seams with duct tape. Remove all the hardware and place the furniture on a piece of black plastic (garbage bags will do) that is at least as large as the footprint of the chamber. Place the plastic-clad frame over it and slip some saucers of 28% ammonium hydroxide inside. Make sure there is a good seal where the clear plastic meets the black plastic. Now shine a heat lamp on the entire unit from the outside of the chamber. The heat lamp shining through the clear plastic and onto the black plastic will help raise the temperature inside the chamber to 80 degrees F — an ideal temperature for quick, even fuming. There is no need for fans or special air movement inside the chamber, since the ammonia fumes will quickly disperse throughout the enclosure. When it is time to remove the furniture, suit up with goggles, gloves and vapor mask, pour the ammonia back into an empty sealable jug, remove the heat lamp and the enclosure, and put some strong fans on to air out the room while you go somewhere else. The used ammonia can go down the sink or toilet. Though it smells bad, it is not harmful to the environment.

Fuming Times

Since wood is a natural material, some pieces will have more tannin than others and, consequently, may darken at different rates of speed. Before you tackle your finished project, do a set of samples in a small test chamber. Seal some of the small cutoffs from the wood you used into a clear

JOHN BROCK'S FUMING SHED

John Brock, a Seattle woodworker specializing in Arts and Crafts pieces, fumes large items in this cleverly modified plastic tool shed. Note the vinyl gutter along the back wall of the shed. After loading the furniture and sealing all seams with duct tape, he lifts the jug of ammonia and hangs it on a hook. The ammonia runs down through the hose, past the shutoff valve, and into the vinyl gutter. After a few days of fuming, he lowers the jug and the ammonia runs back down into it, since the vinyl gutter is slightly angled. After shutting the valve, he opens the doors and lets the shed air out before removing the furniture.

WHERE TO GET IT!

If you are planning on trying some of the techniques taught in this article, you'll need to find the various chemicals and finishes described. Ammonia of the strength needed for fuming is found at most any chemical supply house or reprographics (blueprint) company. The Sherwood Gilsonite stain concentrate (asphaltum) is found at Sherwin Williams commercial supply stores (Sherwood Wiping Stain Concentrate, stock # S64N44). Old Growth treatment is available from Woodworkers Supply. Sources for dyes to adjust sapwood color inconsistencies are: Homestead Finishing Products, Garrett Wade and Rockler Woodworking and Hardware. Rockler also has Behlen products (stains, tints and dyes) and shellac flakes. Good finishing!

Rubbermaid® container along with a saucer of ammonia. Check the samples at regular intervals (6, 12, 24, 36 hours) to see how dark they get. Follow all the safety precautions, and don't forget the heat lamp. You'll want this test chamber to mimic the same conditions as the real thing.

It is also a good idea to finish some of the samples once they come out of the chamber. You will notice that the color of the fumed wood changes dramatically once finish is applied. Short of finishing, you can get a fair idea of how the wood will look under a finish by wetting it with mineral spirits. If it is not dark enough, wipe it off, let the mineral spirits evaporate, and pop the wood back into the fuming chamber.

After the furniture has been removed from the chamber and aired out so that the smell is gone, you are ready for finishing. At times, the grain may be slightly raised. If it is, sand the wood very lightly with 320 or 400 grit stearated paper, but sand only enough to smooth the raised grain. If there was any sapwood included in the board, you will notice that it did not change color. You can blend the sapwood areas by selectively staining them with the proper color of dye stain, or leave them as is for contrast.

Fuming Without the Fumes

Recently, a new product arrived on the market that seeks to offer the look of fuming without the danger. "Old Growth" is a line of safe, water-based compounds that attempt to mimic many different chemical stains, including fuming. The fumed oak treatment, like all the others, consists of two clear liquids that are applied separately.

Using a clean brush for each solution, you first apply the #1 portion evenly. After it dries, follow with the #2 solution. As the second solution goes on, the wood immediately changes color, and it continues to get darker until the wood dries.

Because it is water-based, the treatment seriously raises the grain of the oak. You can make it less problematic by raising the grain first with water, letting the wood dry, and cutting it back with 320 grit sandpaper before you apply the chemical stain. Old Growth certainly has an interesting look and comes close to the real thing. However, placed side by side with fumed oak, you can see the differences.

Topcoat with Shellac

My favorite finish for fumed oak is a thin coat of dewaxed garnet shellac followed by several coats of dewaxed blond shellac. The garnet adds a nice warm tone to the rather cool color of fumed oak, and the blond allows me to build up a finish without worrying about getting the color even. Although shellac is certainly historically authentic, it is not a good choice

Old Growth is a water-based system designed to mimic different chemical stains. It's safe and effective. Apply it in a two-step procedure.

for tabletops, bars or areas of heavy use, but perfect for chairs, occasional tables and other light duty pieces. Shellac can be damaged by alcohol, heat or alkalines (such as ammonia-based cleaners and detergents), but it has good stain resistance and is impervious to acids. It has moderately good scratch resistance and is quite easy to repair, even after years of use.

Michael Dresdner is a nationally known finishing expert with more than twenty years' experience. Look for his upcoming column beginning in the June issue of Woodworker's Journal.

TRADE SECRETS

It was early in the 1970s when I bluffed my way into a job at a good-sized finishing shop in south Florida. I landed the job by convincing the owner that I knew everything about finishing. At the time, I probably believed that I did. No matter; within a few days we both knew the truth.

That shop had a secret finish called Golden Oak, and it was popular enough that we had developed a local reputation for it. We'd stain oak with a pigmented French ochre wiping stain on the raw wood, then seal it with a coat or two of lacquer. When that was dry, we'd glaze the wood with "special glaze," a dark, thick, oily concoction that was secured in the front office in unmarked cans. One day the boss, Wade, called me into the office to reveal the secret formula for our special glaze. I was elated. Here was my chance to learn one of the coveted trade secrets that separate professional finishers from amateurs.

The "special glaze" was asphaltum (roofing tar), purchased from a local contractor and cut with mineral spirits to a liquid consistency. It was easy to understand the secrecy. Our high-class customers would be less than ecstatic to learn their oak antiques were being smeared with tar, even though the end result was rather alluring. Wade made me promise to keep his secret.

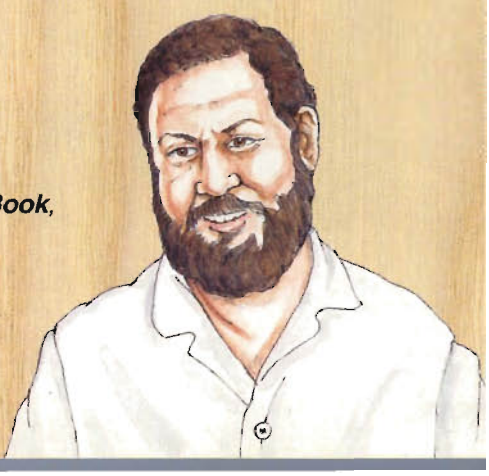
A few years later, I found myself working in one of the top finishing houses in New York. My first day on the job, I was checking out the familiar cans of finish on the shelf when, to my shock, I came across one labeled "asphaltum." Sure enough, it contained the old familiar glaze. Clearly, some cad had stolen Wade's secret formula and brought it up north. I quizzed one of the older employees about the can, and he looked at me as if I had just fallen off the turnip truck. It seems that asphaltum was a staple in every New York finishing shop, not only for glazing, but as a raw-wood stain as well. The local finishing-supply company had been selling asphaltum to shops for longer than my former boss had been alive. I smelled a rat.

It didn't take too long to figure out what happened. Wade had been only a mediocre finisher in the competitive arena of New York. Once he arrived in the Deep South, he was the proverbial big fish in the small pond. He parlayed his knowledge of asphaltum, a common material that had not yet arrived on the local Florida scene, into a finish based on a trade secret. Such is the stuff of myth.

As for me, I would never again be conned out of sharing information. I learned early on that in finishing, there are no trade secrets.

— Michael Dresdner

The preceding story is from my recently released book, ***The New Wood Finishing Book,*** *published by Taunton Press.*



Six Palm Sanders for Under $90

By Ellis Walentine

In the nine years since the first electric random orbit sanders were introduced, these swirl-free speed demons have become the choice of millions of woodworkers.

Let's face it: sanding isn't high on anyone's list of favorite jobs. That's why it's no surprise that random orbit sanders have gathered such a loyal following among woodworkers. Not only do these tools get the job done faster than conventional orbital sanders, they also leave fewer visible scratches on your work.

Random orbit sanders, powered by compressed air, were a well-kept secret of the auto body and finishing trades until Porter-Cable introduced the first electric version about nine years ago. Now there are over 50 models available in three different configurations, including "palm-grip," "pistol-grip" and "right-angle" (bevel-gear) models.

For this test, I chose six popular palm-grip models — the most compact and least expensive of the major types of random orbit sanders. Weighing in at around three pounds, these mighty mites pack almost as much abrasive power as their heavier-duty cousins, yet they all sell for less than $90.

Random Orbit Advantages

The big difference between random orbit sanders and conventional orbital sanders is their dual sanding action — a combination of orbital and rotary motion. The sanding pad orbits in tight little circles like a conventional sander, but it is also free to rotate. This rotary action mixes up the familiar squiggly orbital scratch pattern, blending the scratches so they are less noticeable.

The round sanding pads on random orbit sanders offer advantages, too. For one thing, they've made it possible for manufacturers to build dust

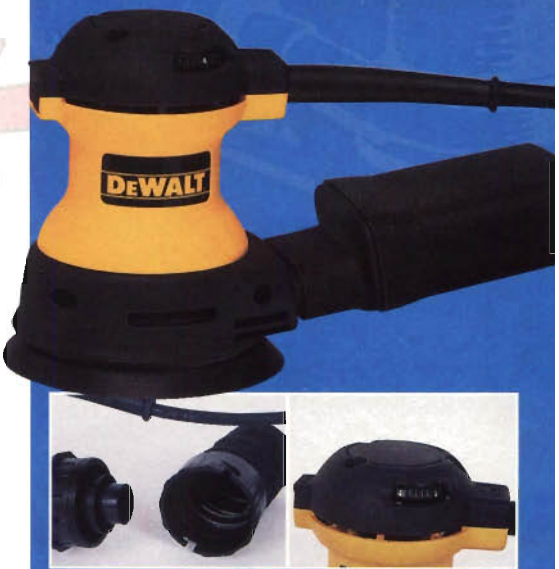
BOSCH 1295DH

Price: $75
2.2 and 2.4 amps @ 115 volts
No-load speeds: 12,000 and 14,000 OPM
5" hook-and-loop pad, 8 holes
BOSCH: 877-267-2499

The Bosch's rubber-padded grip helps dampen the vibration from its muscular motor. The dust canister attaches securely but allows some fine dust to pass through.

DEWALT DW423

Price: $85
2.0 amps @ 115 volts
No-load speeds: variable from 7,000 to 12,000 OPM
5" hook-and-loop pad, 8 holes
DEWALT: 800-433-9258



The DeWalt features a cushioned grip and variable speed control. Its top-rated dust collection system locks with a twist.

Photos by Ellis Walentine.

collection fans right into the drive mechanisms, so these tools produce far less airborne dust than their predecessors — good news for basement woodworkers everywhere.

Round sanding pads also conform to curved surfaces better than square pads, and they don't rely on clumsy spring clips to secure the sandpaper. Instead, they use pre-cut pressure-sensitive adhesive (PSA) or hook-and-loop disks. These are more expensive but much more convenient than sheet sandpaper.

Hook-and-loop pads are standard on most electric random orbit sanders, while a majority of professionals still prefer PSA pads, frequently for their air-powered random orbit sanders. Of my test sanders, only the Ryobi had a PSA pad as standard equipment. Porter-Cable also offers two PSA-equipped models.

The hook-and-loop system makes a lot of sense for woodworkers who change grits frequently: you can't re-use PSA pads. The downside of hook-and-loop is that the disks are more expensive than PSA disks, and the pads eventually wear out from heat and friction. Replacement pads for most models cost around $20.

Bosch 1295DH

The 1295DH is Bosch's deluxe palm-grip model, with dual speed settings of 12,000 and 14,000 OPM speeds for medium- and heavy-duty sanding tasks. I liked its muscular feel, especially at the higher speed setting, where the motor scarcely slowed under heavy pressure. Yet, despite its comfortable rubber grip, the 1295DH seemed to vibrate slightly more than the other sander models I tested.

The Bosch's pad brake didn't work as well as I would have liked. It allowed the pad to rotate too freely, which leads to circular scuff marks when you set the spinning pad on the work. Bosch recommends you start the sander with the pad on the work to reduce this problem. I also found the two-position, rubber-booted switch difficult to turn on and off accurately.

The Bosch's dust collection system does a good job of extracting dust through the eight-hole hook-and-loop pad, but its

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MAKITA B05010

Price: $69
2.0 amps @ 115 volts
No-load speed: 12,000 OPM
5" hook-and-loop pad, 8 holes
MAKITA: 800-462-5482

The Makita's dust bag has a locking rim, but leaks at the edges of the bag. Its molded plastic pad brake works effectively.

plastic collection canister is a bit too porous, allowing some fine dust to escape through the canister wall.

DeWalt DW423

DeWalt's model DW423 is the variable-speed version of their popular single-speed random orbit sander, the DW421. The DW423's speed range — 7,000 to 12,000 OPM (orbits per minute) — lets you select the ideal speed for a wide range of sanding tasks, such as lightly scuff-sanding finishes and polishing with very fine abrasive grits.

I rated the DeWalt's dust collection system best of the models I tested. I particularly liked the collapsible cloth dust bag, which locks securely onto the sander and collects even very fine dust. It's easy to empty, too, by simply compressing the large, lightweight coil spring found inside.

In action, the DeWalt felt very similar to the Bosch, with its large cushioned grip, powerful motor and higher than average vibration level. The grip may feel too big for people with small hands, but the on-off switch and variable speed control were responsive and easy to reach.

The DeWalt's pad brake does a respectable, but not completely effective, job. DeWalt thoughtfully includes a spare brake disc with each sander, so your first replacement is free.

MILWAUKEE 6019-6

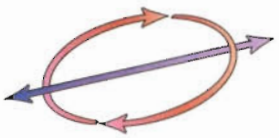
Price: $70 1.8 amps @ 115 volts
No-load speed: 12,000 OPM
5" hook-and-loop pad, 8 holes
MILWAUKEE: 800-414-6527

The Milwaukee's dust bag was simple but effective. The unit runs smoothly and quietly, but a pad brake would be a great addition.

Makita B05010

The Makita B05010 is a moderately priced, no-frills sander that is comfortable and effective. Its single-speed motor delivers smooth, aggressive performance with low vibration and very little wobble. Its pad brake allows some freewheeling spin but effectively eliminates swirl marks.

The Makita's dust collection system worked well enough, but I did notice a fair amount of dust



"Weighing in at around three pounds, these mighty mites pack almost as much abrasive power as their heavier-duty cousins, yet they all sell for less than $90."

being blown out around the edges of the bag. Variable speed control would make this excellent sander even more versatile.

Milwaukee 6019-6

Milwaukee's 6019-6 was disappointing. With its single-speed, 1.8-amp motor and no pad brake, the Milwaukee falls short in power and performance. It removed material significantly slower than any of the other test models. And, because it has no pad brake, it took as long as 19 seconds to freewheel to a stop after sanding. Those seconds can add up if you start and stop your sander often.

On the other hand, the Milwaukee is a smooth, quiet and gentle sander that will do a respectable job of finish sanding. But, in terms of power and features, it can't match the other models I tested.

Porter-Cable 333VS

My favorite in this test, the Porter-Cable 333VS, has everything you could want in a random orbit sander — smoothness, power, good dust collection, an excellent pad brake, and variable speed control.

While it wasn't quite as aggressive as the Makita and Ryobi sanders, the 333VS wasn't far behind. And, the feeling of smoothness and precision was

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PORTER-CABLE 333VS

Price: $89
2.4 amps @ 115 volts
No-load speeds: variable from 5,000 to 12,000 OPM
5" hook-and-loop pad, 5 holes*
PORTER-CABLE: 800-487-8665
**channeled pad also works with 8-hole sandpaper*

The Porter-Cable's top-rated pad brake is a loop of clear plastic. The dust canister is held securely by double O-rings. The variable speed control is conveniently located.

worth the small price of slightly slower stock removal. The variable speed feature (from 5,000 to 12,000 rpm) was another nice amenity, although the two lowest speed settings were too slow to be useful.

Porter-Cable's plastic dust canister trapped the sanding dust very effectively, without allowing much to be blown through its walls. With its double O-ring gasket, the canister showed no tendency to blow off in use — a reported problem with earlier models of this sander.

The pad brake was also very impressive, holding the pad almost motionless until it touched the work, then allowing it to spin at a controlled speed to provide a consistent random orbit effect.

Ryobi RS240

The Ryobi RS240 was a pleasant surprise. Retailing for only about $49, this sander performed with the best of them and easily earned my "best value" honors.

Ryobi has an unique approach to the sanding pad issue. The RS240 comes with a standard PSA pad and a stick-on hook-and-loop pad. You get to choose which type works best for you.

Although it lacked variable speed control, the Ryobi had an excellent pad brake and an almost wobble-free pad — key features for delicate sanding operations. I also liked its elongated grip. The horn in front allowed for easy two-handed control.

The Ryobi's dust collection system was effective, although the elastic rim of the dust bag leaked more than other sanders in the test. If dust collection is a major issue for you, you could seal the connection with duct tape without impairing removal of the bag for cleanout.

Recommendations

When you're shopping for a palm-grip random orbit sander, the most important factors to consider are power and ergonomics. For most sanding jobs, you want a sander that removes material as quickly and efficiently as possible, and you want it to be comfortable to operate for hours at a time when necessary. These two factors figured most heavily in my test ratings.

Next in importance are the pad brake and variable speed control: these factors affect your control over the sanding process and its outcome. Dust collection, while important, is probably less of an issue when it comes to the six units, because all the sanders in this group have it, and none work perfectly. You'll still want to wear a mask or respirator, or provide good ventilation or air cleaning devices when sanding.

Overall, the Porter-Cable 333VS was my favorite, because of its top-notch pad brake and extremely smooth, steady sanding action. I also liked its variable-speed control — a valuable feature for very delicate sanding tasks, where a higher speed could erode a delicate finish.

I was also very impressed with the Makita B05010 and the Ryobi

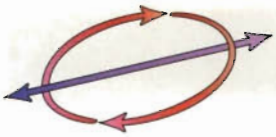
RYOBI RS240

Price: $49
2.4 amps @ 115 volts
No-load speed: 12,500 OPM
5" PSA pad, 8 holes**
RYOBI: 800-525-2579
***PSA-backed hook-and-loop pad standard*

The Ryobi's horn-shaped grip is comfortable for two-handed operation. At $49, it's the author's "best value."

RS240. Both were slightly more aggressive than the Porter-Cable, but they didn't have the same feel of precision. Their pads wobbled slightly and their pad brakes, though effective, weren't quite as good. Neither the Makita nor the Ryobi had variable speed control.

Close behind were the DeWalt DW423 and the Bosch 1295DH. These models handled similarly, and they performed equally well in stock removal tests — about as well as the Porter-Cable — but they weren't as comfortable to use as the above models. They were also somewhat noisier, averaging 87 to 89 dBA at top speed, compared with 83 to 85 dBA for the other models tested. I noticed the DeWalt was a bit jumpier than the Bosch, but it had a more effective pad brake. The DeWalt also had infinitely variable speed control, which I judged superior to the Bosch's two-speed control for selective sanding capability.



"When you're shopping for a palm-grip random orbit sander, the most important factors to consider are power and ergonomics."

The only disappointment in the group was the Milwaukee 6019-6, which didn't have a pad brake and didn't remove material effectively enough to suit me. It was very smooth-running, though, and would be adequate for lighter-duty sanding jobs.

In my opinion, for $49, the Ryobi RS240 was the best value for the money.

Ellis Walentine is the former editor of "American Woodworker" and the principal personality behind WoodCentral.com and Wdfinder.com.

A Real Dutch Treat

By Joanna Werch Takes

"I just love the texture of wood," says Nora Hall, who carved this stunning lion's head mantel out of white oak.

In the early 1940s, Nora (Leereveld) Hall was a young woman fresh out of a Dutch art academy, ready to go to work teaching high school drawing in Holland. Then World War II broke out, and everything changed.

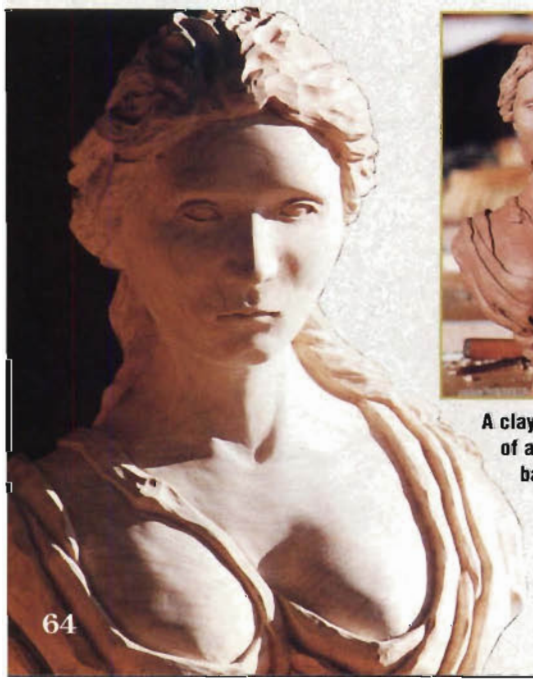
Instead of teaching, Nora apprenticed to her carver father. He had her do "hundreds and hundreds of same direction cuts," according to Nora's son, Wendell Langeberg. "He taught her almost like an assembly line." Once she had conquered a specific cut with her right hand, he would switch her to doing it with her left. "I used to love to master the wood, and to have the wood do what I wanted it to do," Nora said in her adopted language.

Besides learning carving during the war, Nora also learned how to survive. Her home appeared to be part of a larger house — so the occupying German army mistakenly believed they had searched both residences. Nora's brother, fugitive Jews and dissidents routed there by the Dutch Underground all took refuge in the small house.

Meanwhile, she and her father worked for clients who could obtain wood because they were exporting to the Germans. The style, too, was what Nora called "German" or gothic.

By the end of the war, everything — including wood — was in short supply. "The last year of the war, there was no food, nothing," Nora said. "I went mostly to the farms to get food for my parents." The trip was a two-day bicycle journey — and if she'd been caught, she would have been sent to a labor camp. The meat was intended for the German army.

Nora says the gothic carving style she first learned was "a little simpler" than the work she does now — like this mirror frame.

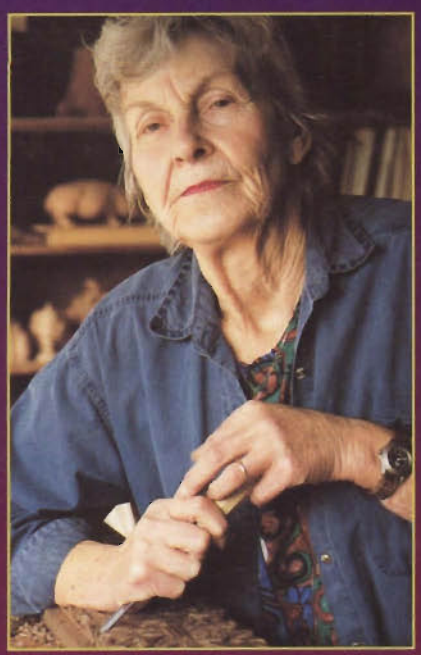


A clay model provides a template for Nora's carving of a female bust. Most of her carvings are in soft basswood, although she has also worked in cherry, walnut, curly maple and mahogany.

Using natural finishes and limiting sanding is one technique Nora employs to keep the cut marks of her carvings visible.

"Everybody's only really happy when they're creating something. Carving has lots of nice possibilities to express yourself."

Nora Hall



When antiques and reproductions became popular in the United States, so did Nora's carvings.

By the end of the war, Nora was famous as the only female woodcarver in Holland. She once received a letter addressed simply to "Nora Leereveld, woodcarver." In the 1950s, however, she spent her time raising a family — and immigrating to the United States.

She soon discovered that many Americans had taught themselves how to carve, and in the process had picked up a lot of bad habits that made their task harder. In the 1970s, Nora began teaching the European method of carving to a variety of American students, ranging from the young to the elderly.

Today, at 77, she's still teaching and carving full-time, mostly in basswood, but sometimes in cherry, curly maple or even mahogany. Nora's love of carving is something she feels compelled to share with as many people as possible, through her classes and her teaching videos. "Everybody's only really happy when they're creating something," she said: "Carving has lots of nice possibilities to express yourself."

Nora Hall's teaching schedule and instructional videos are listed at www.norahallcarvingdesigns.com.

Woodcarver Nora Hall, above in a 1940s photo, learned her trade as an apprentice to her father, master woodcarver Johannes Leereveld, right. The passing of the mantle between generations occurred in 1940s Holland, during World War II.

Chip carving is one of the techniques Nora Hall uses to create images like this woman carrying a bunch of fruit.

Safety First with Large Diameter Router Bits

By John English

The arrival of large diameter router bits in the home shop has opened up a lot of design possibilities ... and a few safety concerns.

There isn't a woodworker alive who hasn't had a day when he wished he had access to a shaper. Those few who are lucky enough to own one enjoy the ability to mill raised panels, large decorative moldings and unique profiles like hand rails. But the infrequent call for such work makes it hard to justify the cost of a new machine, especially one that takes up space in an already cramped workshop.

Those considerations, and the needs of industrial users, have led router bit manufacturers to explore another option. Over the past few years, a number of companies have introduced lines of large diameter router bits that essentially do the same work as a shaper knife — without the shaper. These bits are used with large horsepower, table-mounted routers equipped with 1/2" collets.

I recently asked several manufacturers their views on both the possibilities that large profile bits bring to the home workshop and the safety issues involved. For the purposes of this discussion, I defined large bits as those with a diameter over one inch.

Possibilities

The most common use for large bits in the home shop is the ability to raise panels. There are two ways to do this. Some companies offer a vertical bit that they claim is safer to use: in this case the workpiece is pushed along the fence on its edge. But by far the more popular approach is to make a wide-winged cutter (in the neighborhood of 3" in diameter) that allows the operator to push the workpiece across a flat table. Dozens of profiles are available, from straight cuts to curves and stepped panels. The best way to discover all the options is through a woodworking catalog or a specialty retailer; you won't find them in your local hardware store. While you can buy individual raised panel profile cutters, manufacturers also offer them in a door-building set that includes a pair of stile and rail cutters.

Using a fence with a large diameter bit, even if it has a bearing, is just common sense. Safety must always be your first concern.

Also popular are large profile roundover and bullnose cutters. While they have innumerable applications, these are especially popular among craftsmen who build with children in mind, using them to shape table edges, handrails and other child-safe features.

The Right Router

The key to using large bits is having the power to back them up. While none of the literature we received categorically required a specific size of motor, representatives from the companies we contacted feel that a 2 horsepower (HP) motor is an absolute minimum for bits in excess of 1" diameter — 3 HP is preferred. Bits over 2" in diameter definitely require a 3 HP motor.

Grandpa would never recognize today's large diameter router bits. Creating almost shaper-like possibilities is the key advantage of these new offerings.

To see how routers and bits match up, I tested large diameter bits in two different routers. I used my older model plunge router and a brand new model.

My Bosch 1611 EVS, which is about ten years old, is a soft-start router that takes a few seconds to build up to full speed. It's equipped with a five-setting knob that adjusts the cutter speed from 12,000 to 18,000 RPM. This tool's power was more than adequate, although I detected some very slight vibrations in a couple of the larger bits. This was most probably due to slight wear in the bearings after a decade of constant use, and is something you should keep in mind if your router has a few miles on it. New bearings are relatively inexpensive (my 1611 has already been shipped to the service center).

The second router I used to test these bits was the FT2000E, a relatively new, 3¼ HP model made by freud. This, too is a variable speed plunge router with six controls that regulate the cutter RPMs from 8,000 all the way up to 22,000. This machine had no problems whatsoever handling the largest bits in hardwood, and the relatively low bottom speed (8,000 RPM) was a definite advantage. If you're considering buying a new router to match the large bits you'll be using, I recommend you buy one with this kind of power and speed combination.

Both of these plunge routers were firmly installed in substantial router tables. If yours isn't as heavy as you'd like, consider securing it to a wall for added stability. Keep in mind that a router doesn't have the vibration-absorbing mass of a free-standing cast iron or steel shaper or molder.

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Door-making packages are a useful way for manufacturers to package these bits. This Jesada trio comes in its own wooden case.

Slow Down

Throughout all the literature I received from large bit manufacturers, one aspect of their use was uniformly stressed: the speed at which the bits rotate is critical to both our safety and the quality of the work. Larger bits simply require slower speeds. If your router isn't equipped with an integrated speed control dial, your choices are to either replace the tool or purchase an after-market rheostat. This is an electronic speed controller that is plugged in between the tool's power cord and the wall outlet. A dial allows the operator to adjust the revolutions per minute (RPM) of the cutter.

The Basics

With one exception, all of the manufacturers we contacted recommend that at least 80% of the router bit shank be inserted in the collet of the router. (CMT suggests that "at least 3/4 of the shank is secured.") The manufacturers also recommend that you don't allow the bit to bottom out: the base of the shank should be about 1/8" shy of the bottom of the collet when you tighten it down.

These large bits are not designed for use in a portable router application. They MUST be installed in an adequately powered, table-mounted tool equipped with a fence. Use the fence to guide your work even when the bit is equipped with a bearing. The bits are intended to remove a small amount of waste on each of several passes, so a fence is an integral part of the system.

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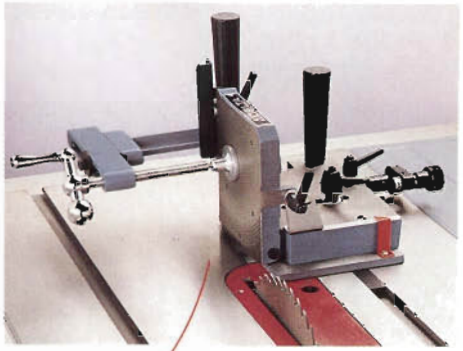
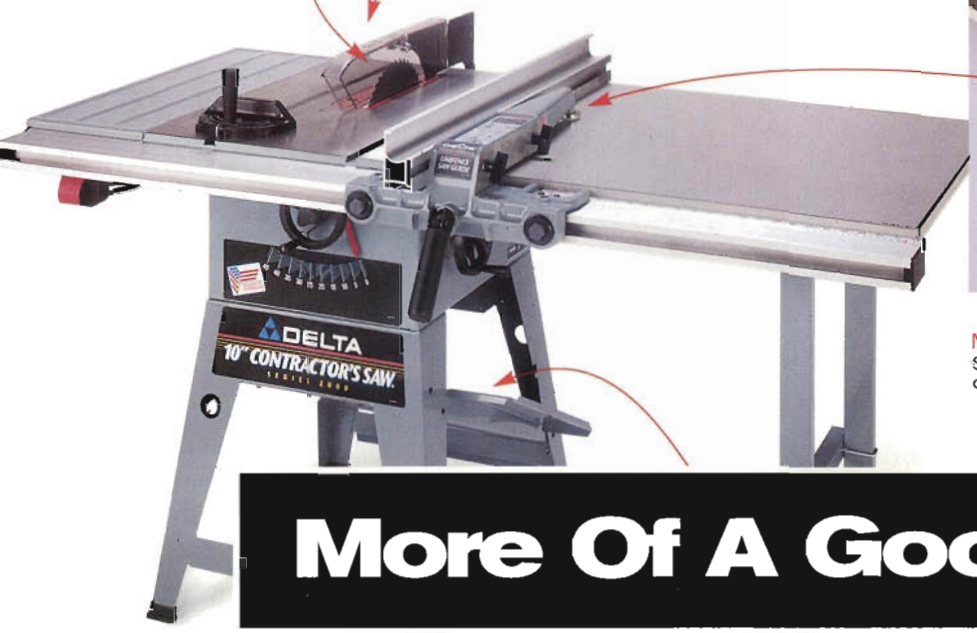
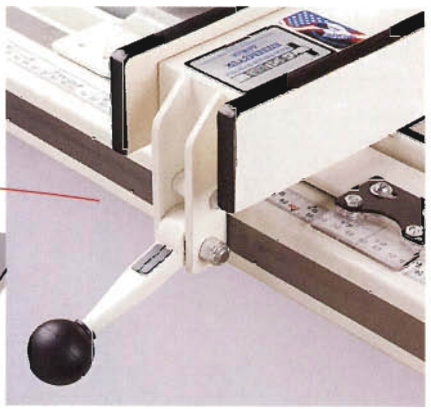


MORE VERSATILITY
Table top accessories such as a Delta tenoning jig or extra miter gages or hold downs can make your saw work harder.

Ask for Genuine Delta Accessories when you visit your Delta dealer. Whether you're buying a new Delta machine or upgrading an old one, (even another manufacturer's machine) the good stuff is the stuff in the *Delta package.*





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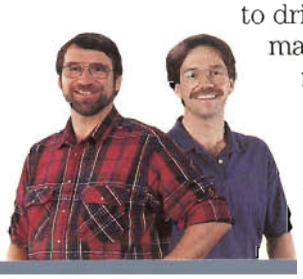

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www.deltawoodworking.com

(Circle No. 40 on PRODUCT INFORMATION form)

Safety Issues

The first instruction that freud lists in its safety guidelines took me a little by surprise: "Use router bits with routers only." On reflection, this makes a lot of sense. These large bits could be extremely dangerous if used in portable drills, drill presses or even portable routers. While freud was the only one to specifically point this out, all of our manufacturers emphatically agree on the rest of their guidelines. First and foremost is the admonition that you must never use dull, broken, cracked, chipped or otherwise damaged bits. Such flaws can render a bit unstable and/or unbalanced. And flaws are not uncommon: the carbide on these cutters is very brittle and even a slight shock can damage it.

Before each use, check that the collet is properly tightened around the shank of the bit. If this is a repeat operation, don't assume that the bit is still secure from the last time it was used.

We have all been advised a hundred times to read and follow a manufacturer's instructions on a new tool. Despite that, most of us still seem to believe we should only read the instructions when all else fails. In this case, don't take the warning lightly. These large bits can be dangerous if used improperly, so read and obey all the warnings and instructions that come with them. You should also pull out the manual for your router and check that it is an appropriate machine.

Keep loose clothing and long hair far away from spinning bits, and remove all your jewelry before turning on the router. And, as always, don't forget to wear eye protection.

Problems and Solutions

CMT USA, Inc. offers the following tips on dealing with large bits:
If the bit is burning, the feed rate (how fast the work is being fed into the bit) is too slow, or the bit is either dull or coated with pitch. Once you have established that the bit doesn't need cleaning or sharpening, go ahead and increase the speed up to (but not exceeding) the maximum recommended.

When chatter marks appear on the workpiece, the feed rate is too fast or the cut is too deep. Slow down the feed, or make the cut using more passes. Another possibility? The workpiece is vibrating: in this case, tighten all your clamps, fences and featherboards.

If the bit is vibrating, there are four possible causes. It may be dull, the router's bearings may be worn, the router's collet may be deformed or the bit may be installed incorrectly. If sharpening doesn't solve the problem and the router checks out OK, then you may be letting the bit bottom out in the collet. Raise it 1/8", tighten everything and try again.

Sometimes you may encounter excessive noise with large bits. In

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Learning More

The following manufacturers can answer any questions you may have about their respective large diameter router bits.

Amana Tool
www.amanatool.com
www.amanatool.com/instruction index.html
800-445-0077

CMTUSA
www.cmtusa.com
www.cmtusa.com/shop/shop.html
888-CMT-BITS

freud Customer Service
800-472-7307

Jesada Tools
www.jesada.com
www.jesada.com/instruction index.html
800-531-5559

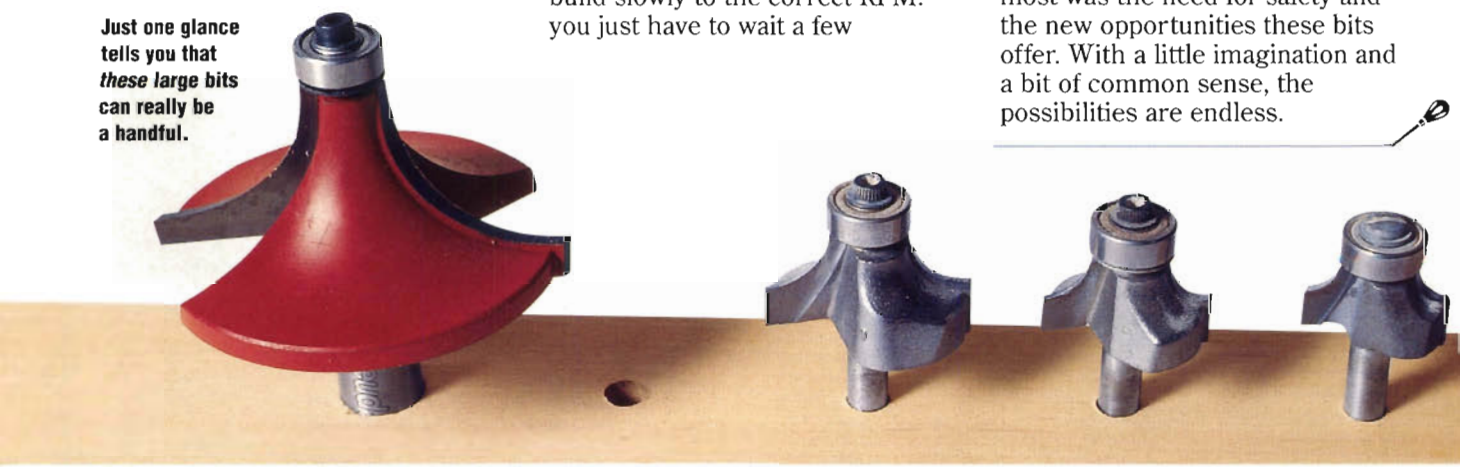
this case, you're probably asking the bit to work too hard: slow down the feed rate and/or take more passes to make the cut. Vibration (*see page 70*), dull bits and deformed collets can all be the cause of excessive noise.

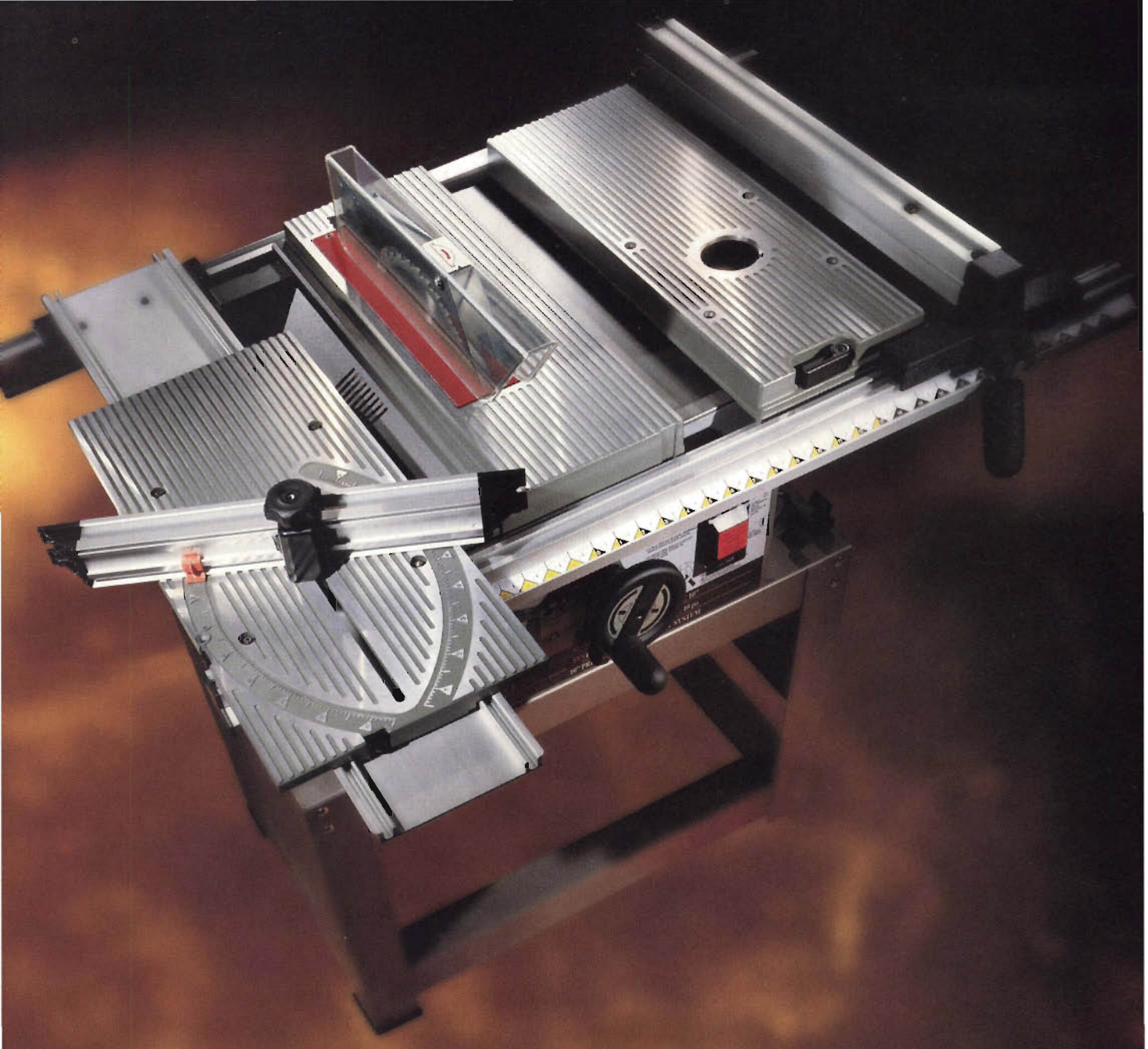
Thankfully, the most serious problem with large diameter bits is one that very rarely occurs. This is bit breakage. If your bit breaks during operation, chances are it was either working too hard (in which case a slower feed and more passes would have averted the problem), or you didn't let the router achieve its full working speed before introducing the stock. Many larger routers are equipped with a capacitor that lets them build slowly to the correct RPM: you just have to wait a few seconds until the sound of the motor indicates that this slow-start feature has kicked in.

Conclusion

All of the bits I sampled during my trial worked well in the brief time I used them. They represented major manufacturers and were of high quality. What impressed me most was the need for safety and the new opportunities these bits offer. With a little imagination and a bit of common sense, the possibilities are endless.

Just one glance tells you that *these* large bits can really be a handful.





PRECISELY.

With its fine-tuned sliding miter table, triple-axis self-aligning rip fence, smooth-running dual belt-drive system, and precision-ground carbide blade, you can achieve all the accuracy you need for your most demanding projects. So any way you cut it, the Ryobi BT3000SX is precisely what you're looking for.

RYOBI.

(Circle No. 123 on PRODUCT INFORMATION form)

Fill Your Shop with New Tools

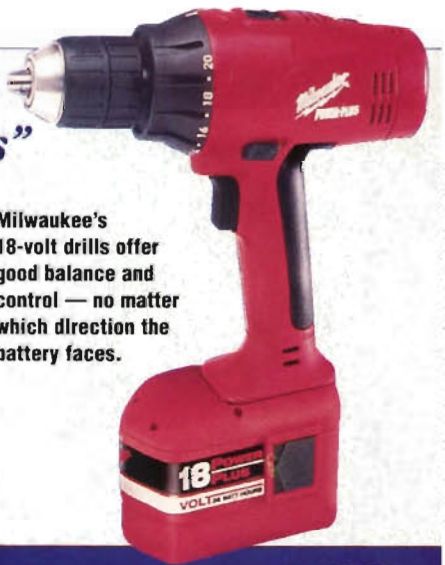
DeWalt's Speed Demon

... Faster than a speeding bullet — or, at the very least, 50 percent faster than accessory changes on standard keyless chucks. That's the claim from DeWalt Industrial Tool Co., which recently introduced Rapid Load™, a professional quality quick-change accessory system designed for heavy-duty use.

To change accessories, simply "click" them in and out of the heavy-duty holder, which fits all brands of 3/8" and 1/2" cordless and corded drills. DeWalt's various kits include drill bits, socket adapters, power screwdriver bits and more. Prices range from $19.97 to $49.99. *For more information, you can call 800-433-9258 or visit DeWalt's web site at* www.dewalt.com.

Craftsman's #2531Professional Routing Extension is a space saver for your shop. Removing one of your table saw's extensions and replacing it with the Routing Extension allows you to saw and rout in the same place. The 24" wide x 18" diameter extension mounts to Craftsman 27" stationary table saws and most other saw brands. Made of die-cast aluminum, the extension accepts 1/4" and 1/2" routers and includes three table insert rings for router bit clearance. It also incorporates its own jointer-fence. Price is $99.99 at Sears stores. *Call 800-377-7414 for more info.*

Milwaukee's "Reversible Batteries"



Milwaukee's 18-volt drills offer good balance and control — no matter which direction the battery faces.

You've heard of tools that can be put into reverse? Milwaukee has expanded the concept: the battery on their 18-volt drill drivers can attach so that it faces either the front or the rear of the tool. The advantage of turning the battery around, according to Milwaukee, lies in making it easier for users to work in tight spaces. A "no memory" effect means these batteries — standard on all tools in Milwaukee's 18-volt line — supply full capacity at all times. Other features on the Pistol Grip (Model 0521-22) or T-Handle (Model 0522-22) drills include a variable speed switch with an electric brake, 1/2" keyless chuck, 20 position torque adjustment and two speed ranges: 0 - 450 rpm and 0 - 1,500 rpm. Both drills sell for $353.50. *Call 800-732-4578 for more information.*

Hold Everything!

Since *What's In Store* features so many great tools, it's not surprising you'd need someplace to put them. Waterloo Industries, Inc. offers rugged portability and organization in its Professional 2-Drawer Portable Tool Chest (50220 TF) and Professional Large Capacity Tool Box (55020 TF).

Both units feature durable steel construction and two external lid-top plastic storage trays. Dimensions for both chests are 20" L x 8½" W x 11¼" D. The Portable Chest has two drawers and retails for about $80.95, while the Large Capacity Box has one drawer and sells for around $58.37. *For more information, call 800-833-8851 or visit them at* www.waterlooindustries.com.

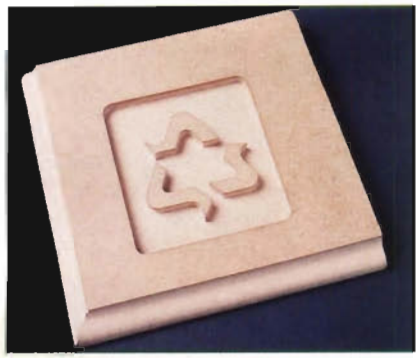
Band Saw Table

Here's something we haven't seen before ... and according to Rockler Woodworking and Hardware, neither has anyone else. Their new band saw table includes a 25¼" T-design fence with adjustments for band saw drift. Its work surface is 24" x 24" x 1⅛" melamine-surfaced MDF. An adjustable circle-cutting attachment lets you create circles up to 26" in diameter. It sells for $149.00; an optional resaw attachment is also available. *More info? Call 800-279-4441.*

Level Options

The L.S. Starrett Company wants to keep you level-headed. Available in 24" and 48" lengths, their series of levels offer features like aluminum working edges, double-angle brass bindings, reinforced I-beam frames and oversized Pyrex® vials or 360° vials machined from a solid acrylic block. The warp-resistant laminate is constructed from native birch lumber.

Prices range from the mid $40s to the high $60s. *For more info, call 978-249-3551.*



"Green Wood"

If you want environmentally conscious MDF, CanFibre/ Riverside has a new option: **AllGreen**™ is the first MDF produced in a North American mill with 100% recycled resources. Density is 48 pounds per cubic foot; moisture content's only four to seven percent. Panels, available in lengths up to 16 feet and thicknesses up to 2", will sell for about 37¢ per square foot. *Timber Products Company, 877-773-3427.*

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Milwaukee
800-732-4578
www.mil-electric-tool.com

Waterloo Industries
800-833-8851
www.waterlooindustries.com

Rockler Woodworking & Hardware
800-279-4441
www.rockler.com

L.S. Starrett
978-249-3551
www.starrett.com

Timber Products Company
877-773-3427
www.CanFibre.com

Elmer's
888-435-6377
www.elmers.com

Elmer's Unveils New Glue Paste

Stuck on glue choices? Elmer's has unveiled **Carpenter's Wood Glue Paste**. The patent-pending formula for vertical surface adhesives promises no runs and no slips on interior wood or laminate furniture, woodworking projects and repairs. The glue paste should be applied with a flat-edged tool to control surface coverage and adhesive waste. Suggested retail price for a 16 oz. tub is $5.99. *Give Elmer's a call at 888-435-6377 for more info.*

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- Adjusts in height from 25¼" to 43¼".
- Rollers Tilt from 0° to 45°
- All-steel construction
- 5⅛" wide ball bearing rollers

Dependable products that improve mobility and productivity in the shop.

Media Code
WA150

D2274
5 ROLLER STAND
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- All-steel construction
- 15⅞" wide ball bearing rollers

D2271 ROLLER TABLE
Use this versatile roller table wherever you need extra workpiece support. Features all-steel welded construction and measures 19" x 65" long. Comes with 9 ball bearing rollers and has four independently adjustable legs for any leveling requirement. Adjustable in height from 26⅛" to 44⅛".

D2275
TOOL STAND
This sturdy universal tool stand measures 24" tall, 27½" x 31½" at the base and 17¾" x 22" at the top. Includes non-slip rubber feet.
1,000 lb capacity!

D2056 TOOL TABLE
Great for bench-top tools like chop saws, drill presses, planers, scroll saws, bandsaws, etc.... Support cross braces on top provide incredible strength and capacity. Flared legs and adjustable rubber feet ensure stability and reduce machine vibration. Butcher block finish table top measures 13" x 23" and is 30½" tall. **700 lb capacity.**

D2260
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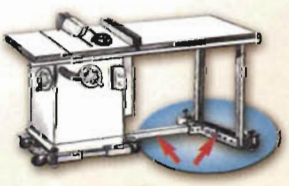
- Adjusts from 10½" x 14½" to 17" x 21½"
- **600 lb capacity**

D2057
HEAVY-DUTY MOBILE BASE
- Adjusts from 19" x 20½" to 29½" x 29½"
- **600 lb capacity**

D2058
SUPER HEAVY-DUTY MOBILE BASE
- Adjusts from 18" x 24½" to 28½" x 33½"
- **1200 lb capacity**

WOOD MAGAZINE EDITORS' CHOICE TOP VALUE



D2259 EXTENSION KIT
This kit easily bolts on to Models D2260 and D2057 to provide support for an extension table or similar device. Makes the whole machine and extension able to move as one unit. Adjustable for length (up to 44") as well as front to back. Very versatile!

D2246 EXTENSION BARS
These 36" extension bars replace the standard length side rails on the D2058 Super Heavy-Duty Mobile Base. This allows the base to be assembled with a minimum capacity of 18" x 34" to a maximum capacity of 28½" x 44", suitable for heavier and longer machines such as lathes.

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Marketplace

To place your advertisement in Marketplace, contact Jim Van Gilder, Mike Hill, or David Beckler, J.F. Van Gilder Co., P.O. Box 802405, Dallas Texas 75380. Call: 800-878-7137 or 972-392-1892, fax: 972-392-1893, or e-mail: jim@jvgco.com, mike@jvgco.com or david@jvgco.com.

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For product information at the speed of light ...

go to our *Electronic Advertiser's Directory* online at:
www.woodworkersjournal.com/adinfo
Link directly to our advertiser's web sites
for the fastest information available.

Resource Directory

To receive information about products or services featured in this issue of Woodworker's Journal by mail, fill in the attached postcard, circling the appropriate number(s).

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Instant Survey ...

The five main features from this issue are pictured at right. Here's your chance to let us know which ones you like (and would like to see more of)!

Simply circle the corresponding reader service number on the Product Information card above. Don't forget, you can also use this card to request more information on any advertiser in this issue. You'll receive your product information within six weeks.

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Fresh Perspectives

The Heirloom Toy Chest was featured in the Nov/Dec '91 issue of Woodworker's Journal.

A Treasured Chest
When his grandson, Tyler, asked **Sydney Webster** for a treasure chest, the Willowdale, Ontario woodworker hopped to it. Countersinking the screws and covering them with wooden buttons simulated rivet heads. The frogs aren't permanent, so Tyler can carry his treasures in this chest for years.

Entertainment Center III first appeared in the March/April '97 issue of Today's Woodworker.

Handsome Surroundings for Surround Sound TV
If you're going to bring a surround sound TV system into your home, **Richard Lowman** of Herndon, Virginia, reasoned, you may as well do it in style. Now Richard has an entertainment center that does his system proud. The crown molding, dentil molding and joinery from our plans helped him construct a cherry and plywood beauty, "plus, we saved a bundle by not buying from the store's furniture department," he wrote.

A Place to Bunk Down
When his "sprouting" daughters were ready for new beds, **Jeff Adams** of Duluth, Minnesota, knew right where to turn. His two girls, four and six years old, were the delighted recipients of his version of our Colonial Bunk Bed. Jeff used hard maple with cherry accents and spindles. A router jig on a lathe helped him duplicate the spindles so he could put even more of his love into this project. (We'd gone the easy route and purchased spindles to go with the beds' frame-and-panel construction.)

Bunk Beds, from the Nov/Dec '91 issue of Today's Woodworker.

Getting Carried Away
Some woodworkers have so much fun with their hobby, they just can't quit. For **Tom Crotty** of Cincinnati, Ohio, that meant "just one more tweak" to our Rocking Fish. He glued in dowel rods for strength, adjusted the dimensions and added a seat back, a fin and some character — with the eyes, the tongue and a spring-mounted hat with a bell inside. Tom finally finished the fish so his granddaughter Kaitlin could have hours of fun, too.

Rocking Fish: Today's Woodworker, September/October 1993

Art Schaller, on the other hand, finished his projects — but couldn't stop making more. The Newington, Connecticut auto dealer started his hobby with projects like the 18-wheeler from the March/April '94 issue of *Today's Woodworker* and the Toy Car from the May/June '95 issue. By the time he got to the Humidor in the July/August '96 *Today's Woodworker*, Art was on a roll. He made eight for his friends, learning new skills along the way. He called the humidors "my most rewarding project."

Winner! Richard Lowman wins a Bosch 1295H orbital sander for his contribution to End Grain. Send 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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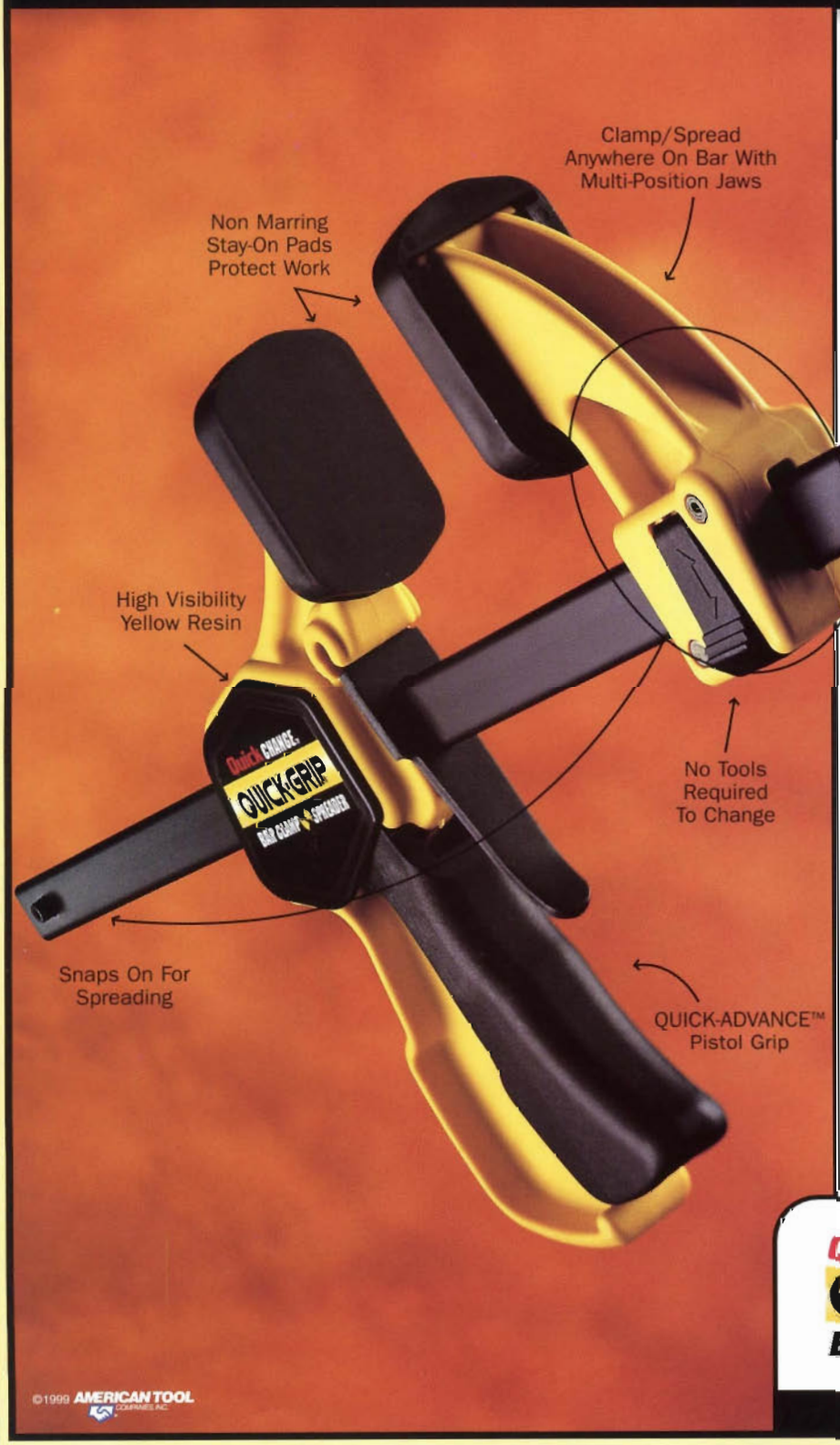
A: YES.



The QUICK-GRIP® QUICK CHANGE™ Bar Clamp/Spreader – the new and improved clamp that easily changes to a spreader without the use of tools. Simply unsnap the multi-position jaw, slide it off, turn it around, slide it on and voilá, it's a spreader. No kidding, it's that fast. And with the QUICK-ADVANCE™ trigger, you can clamp or spread faster. Which means you can turn most any task into half the work because you hold twice the tool. So, get the clamp that's a spreader from the company that has just re-invented the bar clamp, again.

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JWTS-10
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MSRP after mfr. rebate

JWTS-10
Contractor's Style Tablesaw
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JWP-15CS
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