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## DEPARTMENTS

<b>Editor's Notebook</b>	4	<b>Tool Forum</b>	120
<b>Letters</b>	6	<b>Reviews</b>	126
<b>Methods of Work</b>	20	<b>Events</b>	130
<b>Questions &amp; Answers</b>	30	<b>Notes and Comment</b>	134

## ARTICLES

<b>A Small Bureau Built to Last</b> by Robert Treanor <i>Opaque finish and applied moldings cloak a flock of dovetails</i>	54
<b>Two-Day Lustrous Oil Finish</b> by Sven Hanson <i>A technique to turn four coats into a smooth, beautiful finish in just 48 hours</i>	59
<b>Basics of Vacuum-Bag Veneering</b> by David Shath Square <i>Tips and tricks to make even your first project a success</i>	62
<b>A Stop for Every Jig</b> by Sandor Nagyszalanczy <i>Simple, versatile stops are crucial to accurate machining</i>	67
<b>Making a T-Slot Track</b> by Sandor Nagyszalanczy	71
<b>Building an Open-Pedestal Table</b> by John Burchett <i>Doubled members simplify joinery; templates make shaping quick and easy</i>	72
<b>Comparing Jointer-Planers</b> by Robert M. Vaughan <i>Do combination surfacers match the performance of separate machines?</i>	76
<b>A Visit to Irion Company Furniture Makers</b> by Jonathan Binzen <i>Passion for period furniture creates a brotherhood of joiners</i>	82
<b>Hand-Picked Wood for Handmade Furniture</b>	85
<b>Simple Tools Can Reproduce Most Moldings</b> by Robert S. Judd <i>Scratch stocks are quick and easy to use and make</i>	86
<b>Shopmade Rip Fence Assembles Easily, Stays Aligned</b> by Worth Barton <i>Bolted steel components, setscrews and a toggle clamp are keys to accuracy</i>	88
<b>Bowback Windsor Step by Step</b> by Harriet Hodges <i>Green woodworking lends its strength to this classic design</i>	91
<b>Spline Joinery</b> by Steven Cook <i>Stronger, quicker and more versatile than biscuits</i>	97
<b>Krenov Student Show</b> by William Sampson <i>Thoughtful design, superlative craftsmanship</i>	100



Vacuum-bag veneering, p. 62



Jointer-planers compared, p. 76



Building a Windsor chair, p. 91

**On the Cover:** Sven Hanson adds another coat of oil finish to this tabletop. To learn how he achieves a no-fuss, lustrous finish with only four coats in just two days, see p. 59. Photo: Charley Robinson

**A visit with James Krenov**—There are few real stars in woodworking. Of the handful who might be called stars by woodworkers even fewer are known outside the woodworking community. James Krenov is one of those few.

Until recently, I knew Krenov only through his books and the pieces of his furniture I'd had the pleasure of seeing in person. Most of those experiences dated to the early 1980s when I lived in Mendocino County, home of the College of the Redwoods woodworking program, which Krenov still directs. So it was a bit of a homecoming when I had the chance last May to visit the area, see the work of his students and meet the man himself.

Krenov is a man of passion. He is passionate in his approach to his materials, design and construction. He is passionate in his love of the craft of woodworking, and he is passionate about passing that craft on to his students. Each of his students spoke of him in glowing terms particularly of Krenov's power to inspire.

That inspiration showed in the work the students displayed at the Highlight Gallery in Mendocino, Calif. (see the photos on pp. 100-101). Just as their teacher's own work shows, the Krenov students emphasize details. Although this was "student" work, the fit and finish were virtually flawless, even of the most hidden parts. In an age of hype and flash, Krenov and his students are carving a place for craftsmanship that is meant to stand a longer test of time than the latest furniture fad.

**Tooling up for tool reviews**—Good tool reviews are as essential to *Fine Woodworking* as, well, good tools are to woodworking. We do two basic tool review articles. One type takes a look at a single tool, often a new entry in the marketplace. These are typically the kinds of reviews we run in our "Tool Forum" (in this issue on p. 120). The other is the comparison of a class of tools, such as the jointer-planer review in this issue (see p. 76).

For even the single-tool reviews, we insist on a thorough examination. That often means sending the tool to an experienced user to put it through its paces.

The more elaborate comparison reviews begin with research to find out what manufacturers have or may be working on. Sometimes we have to chase down rumors and prod manufacturers to let us know about prototypes. When the tools do arrive, our editors and authors unpack and assemble the tools themselves. That provides valuable clues about the quality of service, precision, manuals and instructions. In the evaluation, we try to carefully separate the empirical from the subjective and make an effort to duplicate real-world work situations wherever possible.

When it comes to the results, some readers complain when we don't simply say, "Buy model X." But we know our readers have diverse interests and needs. To meet the needs of the budget sensitive, we usually talk about what tool offers the best value. If cost is no object, a different tool fills the bill. Still other readers may be looking for quality beyond the economy range, but they don't want to pay top dollar. In some tools, the recommendation might say, "If you do this kind of work, buy model Y." But whether you agree or disagree with the conclusions, you'll find plenty of information to help make up your own mind.

**On the lookout for new tools**—Most woodworkers get excited about new tools, and our editors are no different. When we get a line on a new product that looks promising, we are anxious to let our readers know about it. It's not just a matter of tool gossip. Sometimes knowing what a tool manufacturer has in the works or what is soon to be in the stores may change a buying decision.

Recognizing a need for that kind of information, with this issue, we have started a section inside "Tool Forum" called "On the horizon." Associate editor Vincent Laurence, who edits "Tool Forum," will use this new space to offer some information about new products soon to be out.

**Dust collection for routers**—One area that tool manufacturers are devoting a lot of energy to is dust collection. Most portable woodworking power tools in particular are now coming with some kind of attachment for dust evacuation. A notable exception is probably the biggest dust offender on the portable power tool shelf: the router.

Scott McBride, a woodworker in Sperryville, Va., writes us urging the magazine and its readers fill the gap. "I think it would be best to solicit homemade solutions from the readership," he wrote. "I'm sure there are many readers out there, amateur and professional, who would be interested in ways to get this messy tool under dust control." We're anxious to hear some solutions, too.

**Fast, not fussy finish**—Woodworkers tell us repeatedly that finishing is their biggest bugaboo. They are always searching for that simple, foolproof finish. If that sounds like you talking, Sven Hanson's article on p. 59 may be just the thing for you. Hanson does professional work where time is frequently a consideration, but quality still must be maintained. His no-fuss techniques are a breath of fresh air for those woodworkers who look at finishing as something akin to attending chemistry classes. —William Sampson, editor

## Fine Woodworking

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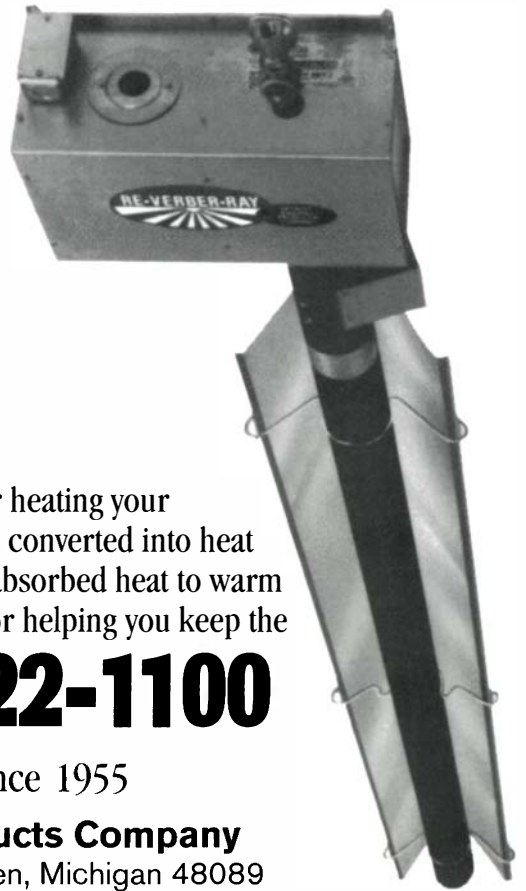
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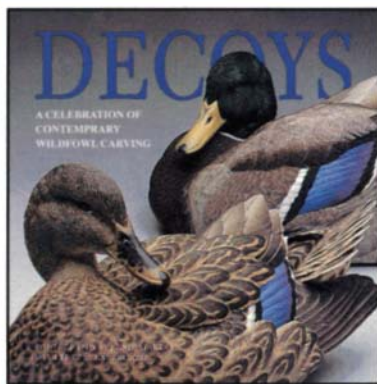


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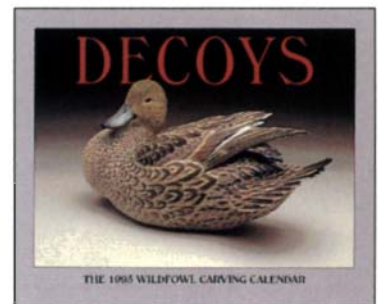
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**Church of sawdust**—In the August issue (*FWW* #107), John Marlowe of San Francisco wrote that there should be more, not less, woodworking shops in secondary schools. I wholeheartedly agree. What caught my eye was the title, “Almost everything I need to know I learned in seventh-grade woodshop.” In my case, it was seventh- and eighth-grade woodshop.

I retired two years ago from an engineering career and am now free for the first time in many years to devote myself to my love of woodworking. I’m having to learn a whole lot of things about woodworking, but it is built on a basic and fundamental understanding of wood, tools and safety. When I enter my woodshop (this is gonna sound kinda corny, but...), I feel like what some people must feel when they enter their place of worship—a sense of peace, comfort and a satisfying solitude.

John, you’re absolutely right in lobbying for more woodshop time in schools. I’m having more fun and satisfaction than one man deserves, and I owe a great deal to my schools and my teachers.

—*Dick Roush, Gainesville, Ga.*

**Woodshop may not belong in today’s schools**—The letter by John Marlowe (*FWW* #107) regarding the plight of woodshop classes and equipment in our schools brings to light some of the major problems in the educational system. I also believe making something with one’s own hands that will last is a worthwhile experience. The discipline required to plan and execute a project is something that will be valuable in future years. As an amateur woodworker, I would like my children to learn how to enjoy woodworking. I have taken community education classes that use the local high school shops and enjoyed them very much. Where else can the average person get his hands on a 12-in. jointer, 20-in. bandsaw and 24-in. surface planer? Be that as it may, a woodshop may not be the right thing for our schools.

Our schools have been forced to take on more and more of the job of rearing children. The monetary cost of this effort has gotten quite high. When it comes time to set priorities on what should be funded, we all need to look for what is the best for the largest number of children. There is little room for personal priorities and favorite hobbies in today’s school budget. We may not like it, but the trend today is toward fewer manufacturing jobs and more professional and service jobs. In the future, a college degree is going to be more important in getting a good job and being a productive member of society. The “power courses for college” that Mr. Marlowe mentions are just what is required.

The government should focus on teaching core academic courses, and let parents assume their responsibility for non-core things, such as woodshop, music and sports. They could either do this directly or pay a private provider (e.g., music lessons). I would rather teach my children woodshop myself than have them attend subpar “power courses for college.”

While we would all like to see our favorite subjects taught, we need to broaden our vision to determine what is the best education for the largest number of children, given the world they

are likely to be facing in the future. We cannot send our children off to the school system and expect the system to do it all. It is up to parents to spend the time with children to teach them our values (which is really the underlying theme of Mr. Marlowe’s letter, I believe) and not expect someone else to pick up that responsibility.

—*Michael C. Stich, Rochester, Minn.*

**Dado safety**—I read with interest Jim Tolpin’s response to dado safety issues in *FWW* #107. Mr. Tolpin clearly recommends routing grooves in plywood over dado cutting for a number of reasons; each of them could be debated. I believe one of the best solutions for dadoing panels was not discussed.

I have found modern stack dado sets (high quality, designed for minimal tearout) to produce exceptional, flat-bottom cuts even in the most difficult materials. Mount this on a saw with a sliding table attachment, and even the longest panels can be crosscut safely. Additional benefits over a router are lower noise, easy chip/dust removal, higher production and longer tool life: all important issues for a production shop.

Another method used years ago in my father’s shop was done by clamping a long guide board to the underside of a narrow panel and guiding it along the outer table surface of a tablesaw with the fence removed. The saw was adjusted so the blade was parallel to the outer table surface. My father was very comfortable with this setup.

The right process for one person might not be the best one (or safest) for another; discussing the alternatives and then making a choice is always best. In addressing safety, it’s common to look for unsafe things; however, unsafe things are actually the result of an unsafe act. Focusing on one’s actions is the way to improve safety. Both dadoes and routers are potentially dangerous things. Users should choose the process that’s safe for them.

—*Randy E. Benway, Horicon, Wis.*

**Diagnosing drill-press pulley problems**—Here’s a suggestion for another solution to the drill-press step-pulley problem cited by reader Milton Upland in *FWW* #107. It would appear quite possible that his problem is the result of the axis lines of the two pulleys not being parallel. To visualize this, rotate one of the pulleys in the illustration you have shown. It is now obvious how the belt tension will change at each step of the pulleys.

A suggested solution is to correctly set the belt tension for any step-pulley position. Then remove the belt, and cut a scrap of sheet metal to a sliding fit between the valleys of the correctly set pulley’s step. Now loosen the motor-adjusting bolts, and adjust the motor position, so the sheet-metal piece has the same sliding fit at both extreme speed positions of the step pulleys. The correct belt tension should now exist for any step setting.

—*Dick Westrick, Dallastown, Pa.*

**An overlooked cordless tool**—The article “Powerful Cordless Drill/Drivers” in the November/December 1993 issue (*FWW*

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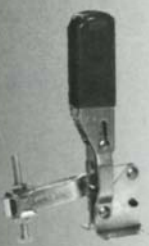

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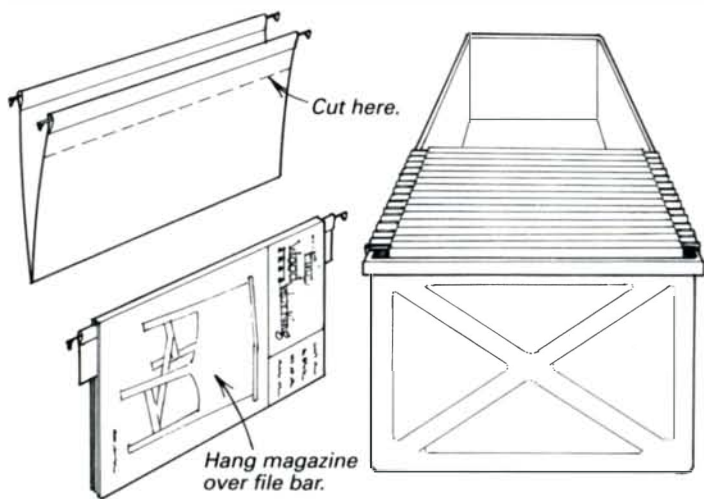
#103) is interesting for several reasons. It does point out that no one needs a cordless drill when 110v outlets are located all over the house and shop. Then six pages follow with specifications and details that should warm the cockles of every Chinese/Japanese toolmaker.

One important old tool should have been included for comparison—the carpenter's brace and bit. I've used one for over 60 years. Total maintenance has been a few drops of oil every several years. Specs are as follows: battery discharge time, infinite; battery charging time, zero; projected life in charge cycles, infinite; weight, 2 or 3 lbs.; balance, excellent; chuck, keyless and absolutely non-slip; speed range, 0 to 80 rpm or so; brake, yes; comments, particularly good for slotted-head screws because I can use all of my 150 lbs. to keep the bit in the slot; torque available up to 100 ft. lbs. or so and will take over when a 1/4-in. or 3/8-in. electric drill stalls out.

There are two problems with the brace and bit, however. First, it is somewhat hard to find in the average hardware store or tool catalog. Second, it conveys very little status in our battery-oriented society where children from 2 years or so on up expect everything to be battery powered and spring to action at the push of a button.

—Hugh Minton, Hendersonville, N.C.

**A solution for better magazine storage**—For some time now, I have been looking for a way to store my 100 plus issues of *Fine Woodworking*. A system that didn't deform the magazine and provided easy access to all the volumes was hard to come by. I came up with the following solution that works for me (see the drawing below).



I purchased a stackable plastic file suitable for hanging file folders (\$9.99). A box of hanging file folders was \$2.79 for 50 folders. The hanging metal bars were then cut off the folders, leaving some folder to protect the magazines. This provided 100 hangers for magazines. The hangers then were inserted into the middle of the magazines and hung in the file. Each file holds about 100 magazines.

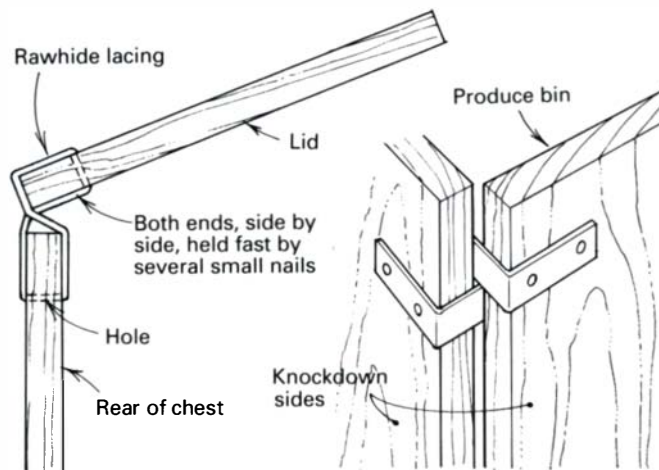
—Marven Riggins, Rockford, Ill.

**Singing the praises of a sawmill song**—Your essay “Song of a Sawmill” (*FWW* #106) is a beautiful piece of work. The toning of the photos and the mood of the whole article are just right.

Your art director is to be congratulated, and I hope you will give him freedom to do similar essays in the future. Make space by abandoning those silly attempts at humor that all woodworking magazines put on or near the last page. People save *Fine Woodworking* issues and consult them repeatedly. No one would read those attempts more than once.

—William Stilwell, Dapp, Alta., Canada

**Another take on flexible hinges**—I do not want to take anything away from Mr. Erwin O. Deimel's letter in “Methods of Work” (*FWW* #105), but I, too, have encountered these unique hinges. Once, at a yard sale, I spied a small, old wooden chest with unusual hinges of rawhide lacing. It was simple, with a single row of lace on each end where a metal hinge would be, in a figure-eight configuration (see the drawing below).



More recently, in the produce section of a huge supermarket, I noted the knockdown sides (about 4 ft. high) on pallets holding vegetables. The hinges were of some sort of man-made fiber material; at each hinge location were nailed two strips, on opposite sides, so it could fold either way, like Mr. Deimel's *shoji* screens.

—Roger S. Apted, Milton, Wis.

**More on growing walnut trees**—I was reading the “Q&A” part of the June issue (*FWW* #106) and feel that poor information was given to the person who was asking about growing walnut trees. As a former practicing forester in the Southeast, I noticed several misconceptions.

First of all, tree height is determined by the ability of the land to grow the tree. Spacing, the amount of room the tree has to grow, determines the diameter growth. A tree grows toward the available sunlight, and as long as the genetic characteristics are good, a tree is more likely to grow straight where there is little or no competition. The only thing competition will do is promote natural pruning, and with a high-value crop like this, manual pruning would be much better.

As to the spacing, 4 ft. to 6 ft. is the normal spacing used in plantations in Michigan, but in the Southeast, the normal plantation spacing is 8 ft. to 10 ft. But this is not a plantation situation; it's more like an agricultural crop. The field will need to be mowed and possibly harrowed or disked to keep the brush and grass from accumulating and presenting a fire danger, as well as competition for the young trees. But in no case should there be less than an 8-ft. spacing, and even then, he will need to take out every other one. Better to use 14 ft. to 16 ft. and be ready to replace those that die rather than overplant.

For the best advice, he really should see his county forester or the agricultural extension agent.

—Carl H. Hoffman, Suncook, N.H.

**What is safety overkill?** In Jeff Greef's article on stile-and-rail router bits (*FWW* #107), Mr. Greef said that using the anti-kickback design standard on bits smaller than panel raisers was overkill. How do you overkill safety? I have heard other experts state that woodworkers in America are not interested in safety. American woodworkers welcome any safety device that does not restrict the use of the equipment. The anti-kickback limiters on router bits, sawblades or shaper cutters do not limit feed-



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ing or operation under normal working conditions.

It took several years, a lot of work and a sizable capital investment to convert our line of bits to meet the anti-kickback design standard. This makes it easy to understand why technical representatives of other router bit manufacturers feel anti-kickback design is overkill. Many manufacturers are unwilling to put forth this effort or expense and would like nothing better than to see the safe tooling movement go away.

In addition, I would also like to request a correction to the sources of supply section of the article. In it, Freud is listed as selling direct. We have never sold our products directly to the consumer and only sell through authorized dealers.

—Jim Brewer, research and marketing manager, Freud, High Point, N.C.

**Look before you franchise**—I want to thank all of you and give a warning, too. I have been a reader of *Fine Woodworking* from “day one.” Even when I lived on an island, my magazine came to me on an old C-46.

Having turned 53 and finding a job hard to find, I replied to an advertisement, “furniture repair person wanted.” This turned out to be a franchise owner wanting someone to work for him. Well, due to woodworking being a hobby and all the background you all have given me, I got the job.

The first week, after signing an agreement not to give away any “secrets,” I was given tapes to watch. Guess who? Bob Flexner, etc. The company that sold the franchise said they had spent hundreds of thousands of dollars on research and development. Remember the Ieroplane shown in *FWW* #102 on furniture spot repairs? They have this in their kit. Folks, that is sold to anyone by Mohawk. The finish finder they put their label on is really Dr.

Dan’s Finish Indicator, sold by Liberon/Star finishing supplies.

I went to a two-week school, and that was really something, almost a bad joke. And backup support from the home office: awful. If you want to go into furniture repair, check out your area and write Mohawk or Liberon/Star, talk to their representatives and maybe go to their two- to three-day school. Don’t put a lot of money into a furniture repair franchise that is almost a joke.

—Sam M. Meek, Nashville, Tenn.

**Another way to make fifes**—I read with interest the “Methods of Work” (*FWW* #107) by Walter Sweet on making fifes. I have a copy of the book he refers to. Years ago, I made a couple of them and did them a different way. I cut my stock into two pieces lengthwise and put a groove down the center of both pieces and then glued them together. I cut the slots 1/8 in. by 1/4 in. only because I had 1/4-in.-wide shaper cutters. I am sure any shape would do, but a half-round cutter of the correct size would be ideal.

Gluing was easy. I made a couple of slightly tapered plugs to keep the slots in line while clamping and glue was drying. I can’t even remember how I put in the hole. I know I had a twist drill that had an extension added, so probably I grabbed the rough square fife in a vise and used a portable electric drill.

Here is the payoff: When I got them done, I tried to play them and couldn’t make a sound. We had a couple in church who both played flute. So I took them to church and asked them to try them. Behold, they sounded good and both in tune.

—Charles R. Adams, Harlingen, Texas

**Buying MDF by the sheet**—In the article on medium-density fiberboard (MDF) in *FWW* #104 (February 1994), there is a list of

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suppliers. One of them is Norbord Industries of Deposit, N.Y. I found out that Norbord will not sell individual sheets, but a company next door, Indian Country Inc. (HC86 Box 247, Laurel Bank Ave., Deposit, N.Y. 13754; 607-467-3801) makes MDF in various thicknesses and will sell individual sheets of 4x8 and will also cut them to size.

To cut a sheet of MDF to specifications, they will need three day's notice, and the material must be picked up at Deposit. Additionally, they claim that their product has a content of less than 1% formaldehyde. They do not make an exterior grade and stress that one must not get it wet.

—Jonathan Slocum, M.D., Beacon, N.Y.

**Shaper holder defended**—In issue #107, August 1994, p. 34, Richard Merrick's review of the Veritas scraper holder is unfair to an excellent tool. His statement, "to exert sufficient pressure on the tool for it to cut, I really had to bear down on the holder, straining my hands and wrists," is a clear indication that his problem lies in a dull scraper, not the holder. The photo of the awkward grip (does he usually hold a cabinet scraper like that?) shows a lack of understanding of cabinet scraper use. He would be happier with a paint scraper.

I have found the Veritas scraper holder, allowing constant curvature, no heat transmission and firm grip, to give complete control of the scraper with much less fatigue in long scraping jobs. But the scraper must be sharp, with or without a holder.

—R.S. Lee, Calgary, Alta., Canada

**RICHARD MERRICK REPLIES**—A new tool should either solve a problem or allow something to be done in a previously unknown way. Veritas succeeds partially with a light, strong hold-

er that has accurate control over the blade and its curvature, but the body is too small to be gripped comfortably. It would be easier to use if the body were larger.

I tried the scraper in several different ways. I like pulling it toward me because I can see the shavings and the grain changes. The photograph was chosen to clearly picture the scraper and not for its reflection of technique. As for me being happier with a paint scraper, at least the average paint scraper has a sufficiently large handle. Veritas shipped the holder with a sharpened scraper (nice touch). During use, I kept the hook keen with my Veritas burnisher.

**Free enterprise at work**—I'm confused. Before the Black & Decker dumping case against Hitachi, the sliding compound miter saw from Hitachi could be delivered to my door from mail-order sources in your great magazines for under \$450. That price included a profit for the Japanese manufacturer; freight forwarding and ocean shipping fees; customs duties and customs broker fees; a profit for the U.S. distributor; shipping to the mail-order firm; a profit for them and shipping to my home.

After the punitive duties were imposed, the mail-order price of the same saw shot up to \$599. Then a ray of light appeared: Hitachi was opening a U.S. plant, and all would be well again. So now, with a profit for the U.S. manufacturer, shipping to the mail-order firm, a profit for them and shipping to me, the price is—are you ready for this?—\$599.

Is the capitalist system great, or what?

—Dan Cook, Falls Church, Va.

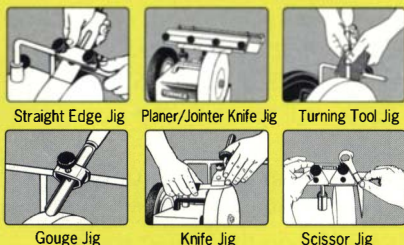
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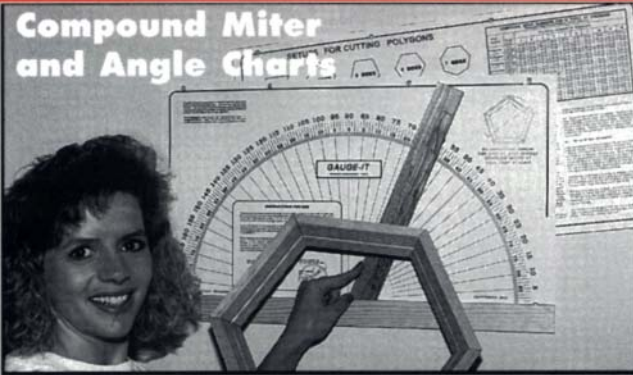
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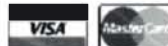
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how many of them have an understanding and appreciation for the volume of sales being lost because of the exorbitant shipping and handling charges being appended to the purchase price of a given article.

I can recall when shipping and handling appeared to reasonably reflect the cost of shipping an article. Today, however, it is more often a way to increase the cost of the item while attempting to hide such an increase under the guise of shipping and handling.

If for one have foregone purchases I would otherwise have made were it not for these unreasonable charges. I am sure others share similar feelings. Advertisers: Wake up.

—A.J. Ferrara, North Haven, Conn.

**Print more on machine maintenance**—It has been my experience to use a number of power tools over the years. In my judgment, the manuals or whatever literature is provided rarely cover maintenance well enough.

I would greatly enjoy seeing your magazine deal with this in the same wonderful manner as all the other features. I would like to see a feature dedicated to maintenance of the various key tools found in all shops. I may be able to make works of art with the machines, but I feel quite at a loss as to how to ensure they retain their original quality. I have seen more than one of my machines lose performance due to a lack of correct upkeep. Proper upkeep can't be much work, but you must know what to do.

—Les Baines, Lindsay, Ont., Canada.

**Cabinet improves sanding unit**—I was pleased to read about the good review you gave the Ryobi oscillating spindle sander in FWW #108. I had already purchased one before your article on

“Oscillating Spindle Sanders” by Charley Robinson went to press.

I find it satisfactory for my home workshop after building a custom, movable cabinet for it. The top of the cabinet is somewhat lower than the regular height of most workbenches. I'm a rather short person (5-foot-7) and found standard workbench height too high for this unit. The picture of Charley on p. 54 is a good illustration of what I discovered when using this machine on a regular workbench: The workpiece is too close to the operator's face.

I designed a compact cabinet for my unit, which holds its own vacuum system and spare spindle-sanding sleeves. The closed cabinet also cuts down on the Shop-Vac noise. There was sufficient space left to place three sliding-dovetail shelves to hold three different size grit sleeves. —Joe Cormier, Peabody, Mass.

**Sharpening soliloquy was sappy**—I read with amusement the sappy article on sharpening in the March/April issue of *Fine Woodworking* (“The ghosts of the birds: a lesson in sharpness,” FWW #105). I had the benefit of attending Frank Klausz' fine seminars on hand-tool joinery at which Mr. Klausz demonstrated the ease with which chisels, planes, even kitchen knives can be sharpened.

Although I am not Japanese, I can now, after several weeks of intermittent practice, bring virtually any edged tool to a razor sharpness in *much* less time than it takes to dull it, using only a grinder, two stones and a few minutes. Using the same common-sense techniques that Mr. Forrest is so effusive about, the Hungarian-born Mr. Klausz reduces sharpening to what it truly is: a necessary shop chore, to be performed as quickly and accurately as any other, nothing more, nothing less.

—T. Dorsey Harrington, Gillette, N.J.



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Tim Carter

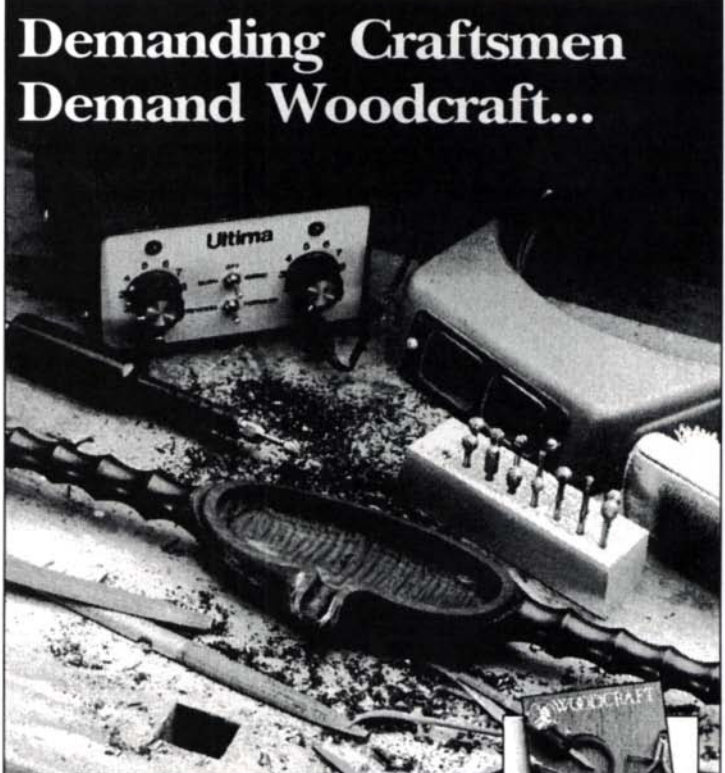
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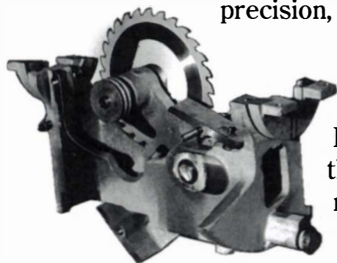
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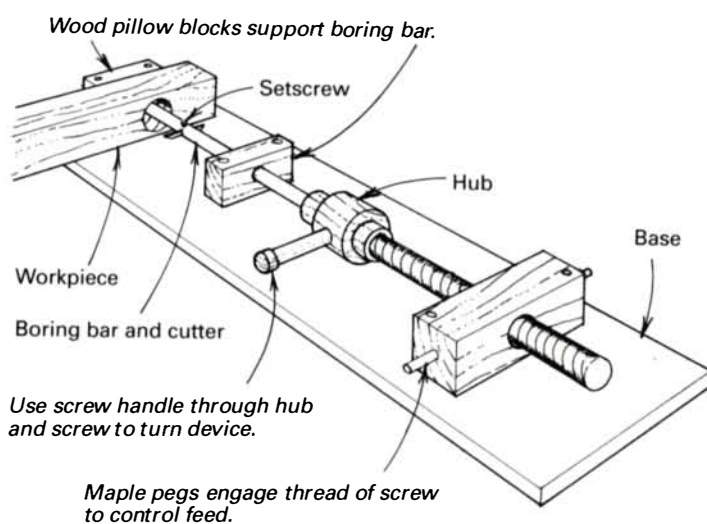
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## Adventures in wooden thread

Despite all the precision and availability of modern woodworking tools, there are certain throwbacks to the past that seem to have a special attraction for woodworkers. Wooden screw thread is just such a subject. After Steven Bunn's response to a question from Greg Furness in *FWW* #106, we received several suggestions on alternative schemes for wooden threads. One came from the manufacturer of a 1 $\frac{7}{8}$ -in. by 21-in. bench screw, which he sells for \$45 postage paid. For more information, contact Tom Branch, Box 45006, Edmonton, Alta., Canada T6H 5Y1; (403) 472-3518. He also sells a jig for router-cut wooden threads for \$15. An 18-in. by 2-in. maple screw and nut with 3 tpi is available for \$59.95 from Garrett Wade Co. (161 Avenue of the Americas, New York, N.Y. 10013; 800-221-2942). Here are a few of the other comments on wooden thread. —*William Sampson, editor*

**Rethreading a bench screw**—I was faced with rebuilding a bench that had been shipped from Europe before the turn of the century. It had a non-standard thread size and configuration. Though the screws were in good shape, the female threads and their attendant wooden pieces had to be replaced. The female parts can be made as follows: Glue up and turn a hub that acts like a sleeve over the head or handle part of the screw shaft and over a 1-in. shaft, as shown in the drawing below.



Make a pillow block with a hole exactly the same diameter as the outside dimension of the threaded portion of the screw. Bore two holes in this pillow block to fix it to a base. Bore two more holes, almost opposite from each other on the sides of the block so that maple pegs fitted into those holes will contact the screw. As the screw is turned, these pegs force it to advance at the pitch rate of the screw.

Drill a hole at right angles to the center turning line of the tool holder. Enlarge it so that it will handle a square bit that can be secured with a setscrew. Make another pillow block with a 1-in. hole to guide the back end of the bit holder. Drill two holes in the sleeve, one to accommodate the handle and big end of the vise screw and the other to secure the boring bar.

Secure all the components to the baseplate, as shown in the drawing. I used the original vise handle through the hub and the big end of the vise screw to turn the device.

I had ground the cutter to the angles that I wanted to achieve on both sides of the threads. I started with a scratch cut, and I made five passes to make the thread. I found I had to be quite careful after each pass because there is a lot of play in a wooden system such as this. I used turpentine as a lubricant.

—*William D. Edwards, Hillsborough, Calif.*

**The right thread for a wooden screw**—The standard 60° truncated thread form is the appropriate thread for a wooden screw. It is not appropriate for a steel vise screw. The buttress, Acme and modified Acme thread forms are specialized forms not suited to the nature of wood. The buttress thread has a serious tendency to jam in wood unless fit very closely. The standard 60° V-thread has been used for centuries on wooden screws, and I possess some old enough that they were hand-made. All of them show heavy use and very little wear.

Another misconception is about size. This is one thing that usually gives a wooden screw a large advantage in speed and power. A diameter of 1 $\frac{1}{4}$  in. is maybe okay for a steel screw: 2 in. is a minimum size for a wooden bench screw. This allows the geometry to make a faster helix and provides more wood in each thread. At 3 tpi, one should allow for four or five threads in the nut, making the nut about 2 in. thick.

—*A.C. Dobberstine, Wood Design Machine, Galveston, Texas*

## Late news on jointer-planers

At the time that this issue was going to press, we came across two new jointer-planers that hadn't come out in time for Robert M. Vaughan's article, "Comparing Jointer-Planers," on p. 76.

Delta International Machinery Corp. (246 Alpha Drive, Pittsburgh, Pa. 15238; 412-963-2400) has just come out with a 12-in.-wide, over-and-under machine (model 37-790). Another entry is from Makita USA Inc. (14930 Northam St., La Mirada, Calif. 90638-5753; 714-522-8088), which now offers a portable side-by-side unit (model 2030SC) that has a 6-in. jointer and a 12-in. planer. This machine is in addition to Makita's heavier stationary model 2030N, which is included in Vaughan's article.

—*Alec Waters, associate editor.*

## Sources of supply

New information has surfaced about where to obtain some items that were mentioned in past issues of *Fine Woodworking*. The carbide rotary files that John Grew-Sheridan uses to sharpen bandsaw blades (*FWW* #105) are available as a regular stock item (#25881) from Ace Hardware stores. Dremel Tool Co. also offers carbide rotary bits in two sizes. John uses a  $\frac{1}{8}$ -in.-dia. spiral carbide rotary file, which is item #9902 and priced at \$9.85 in the Dremel catalog. On the mail-order front, S.G.&S. Carbide (54 South Main St., Monroe Falls, Ohio 44262; 216-688-6667) has a variety of the carbide bits available at prices ranging from \$6.60 to \$15.85.

For readers who are looking for quality unplated hardware following the discussion in "Q&A" (*FWW* #108), Paul Bennett has offered to sell to other woodworkers unplated screws and hinges from England. You can write him for more information at 21 Crosby St., Center Moriches, N.Y. 11934.

—*Charley Robinson, associate editor*

## Errata

The photo of E.W. Carson's cradle in "Heirlooms for Infants" (*Fine Woodworking* #108, p. 95) should have been credited to Gary Buss.

## About your safety:

Working wood is inherently dangerous. Using hand or power tools improperly or neglecting standard safety practices can lead to permanent injury or death. So don't try to perform operations you learn about here (or elsewhere) *until you're certain that they are safe for you and your shop situation.* We want you to enjoy your craft and to find satisfaction in the doing as well as in the finished work. So please keep safety foremost in your mind whenever you're in the shop.

—*James P. Chiavelli, publisher*



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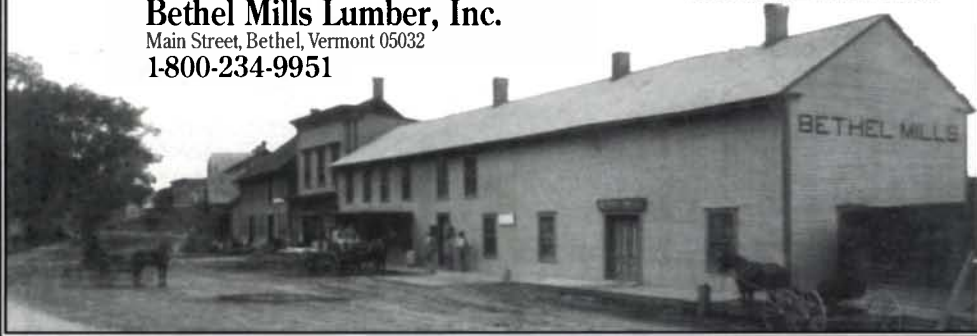
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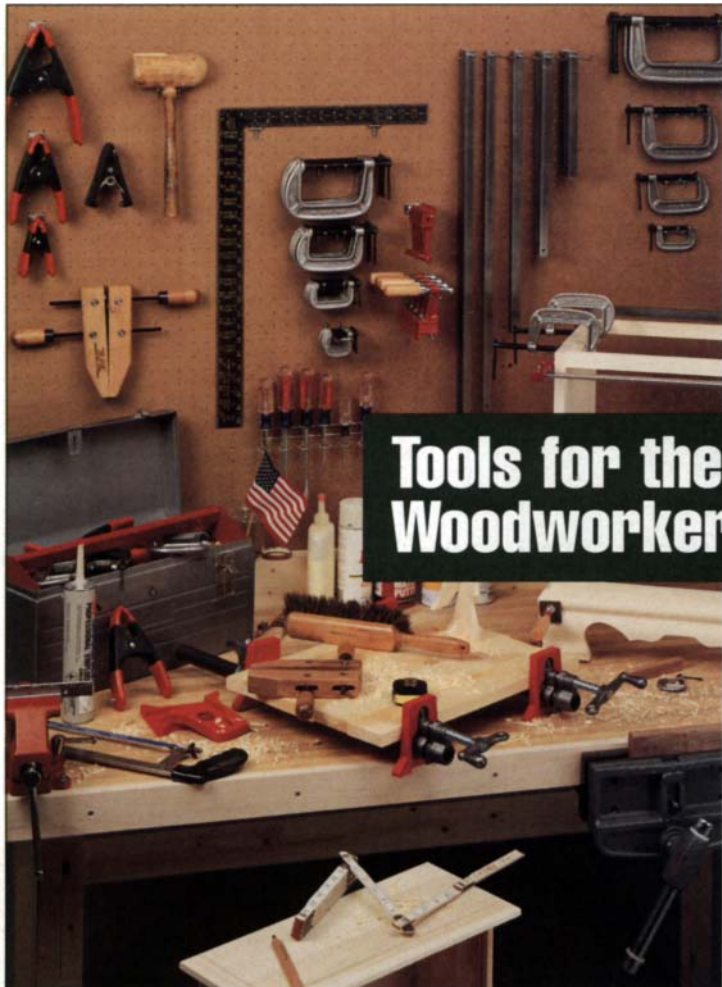


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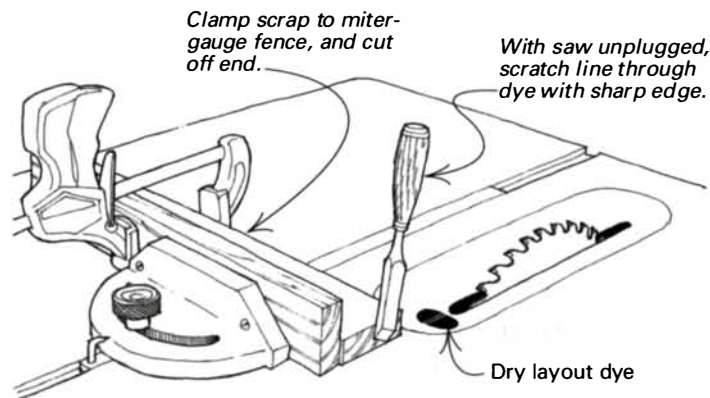
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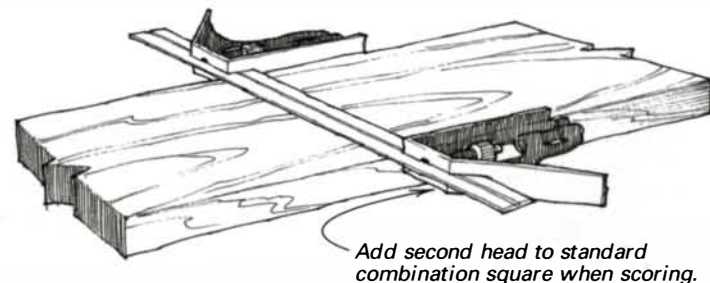
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—Gladden Griggs, South Bend, Ind.

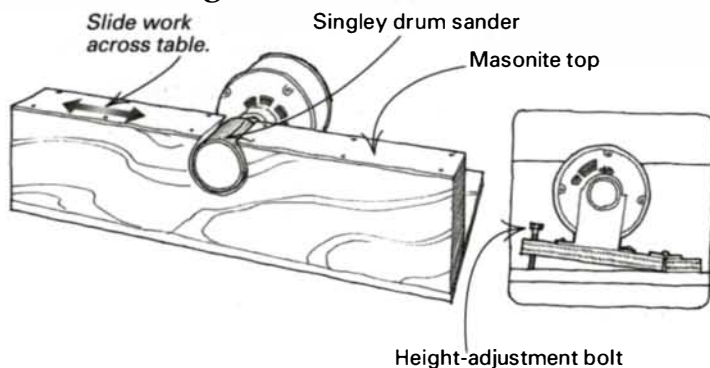
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—Leonard H. Feldberg, Chestnut Ridge, N.Y.

**Drum-sanding tool handles small work**



Sanding small pieces with an orbital or belt sander is a chore because there is no easy way to hold the pieces while sanding. So when I had to sand lots of little slats for a bed project, I was inspired to build this tool. I simply slide the workpiece across the sander's table. It sands narrow edges as well as broad flats and does not round over the corners, unless you want them rounded.

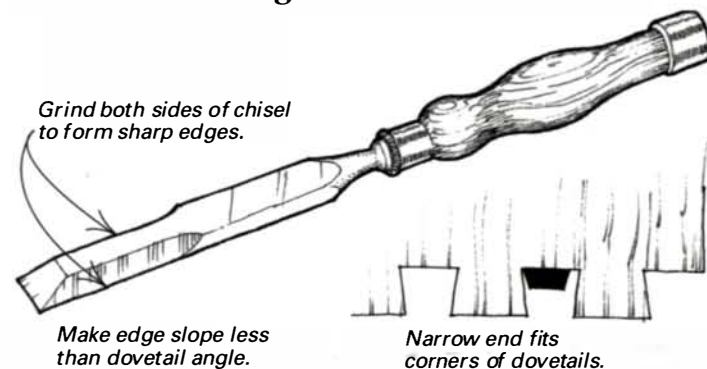
One of the advantages of a drum is that it contacts the work for only about 10° and has the remaining 350° to unload the dust.

That characteristic, combined with a vacuum attachment, makes for very clean sanding and long abrasive life. The big disadvantage of a drum is that any hesitation in the feed will put ripples in a flat surface. The table on this tool makes it easy to slide the work across at a controlled, uniform rate and avoids the ripples.

Construction is straightforward. I used 3/4-in. plywood for the base and covered the tables with 1/4-in. Masonite. Drum-height adjustment is provided by a hinged table under the motor. I use J-weight resin-bonded, resin-coated abrasive cloth on a Singley drum (Singley Specialty Co. Inc., P.O. Box 5087, Greensboro, N.C. 27403). The 3x3 drum I use has a 1/2-in. bore, which will fit common motor shafts. For work that has been planed, I start with 180-grit sandpaper and follow with 320-grit.

—Eugene C. Hise, Oak Ridge, Tenn.

**A better dovetailing chisel**



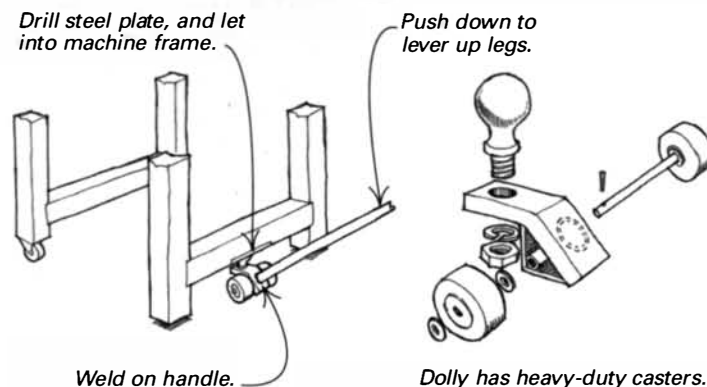
Ordinary chisels bought for the purpose of chopping out dovetails are beveled on the top. This bevel, however, is really more of a chamfer that leaves a flat of about 1/16 in. or so, which prevents pushing the chisels completely into acute corners. To correct this problem, grind both sides of a square-edged chisel across to a sharp cutting edge. Select an angle slightly less than your usual dovetail angle to allow the tool to trim right into the corner of the tails.

—Percy W. Blandford, Stratford-upon-Avon, England

**Quick tip:** To soak a hardened paintbrush, insert the bristles into a sandwich-sized freezer bag. Pour in a few spoonfuls of solvent, and close the bag around the ferrule with a rubber band. Stand the bagged brush in water up to the ferrule. This will squeeze out the air and ensure the solvent wets the whole brush.

—Don Stewart, Bellevue, Wash.

**Trailer ball makes a machine mover**



Many of the techniques for making machine tools portable involve putting wheels at one end, fixed legs at the other end and installing handles to lift and push the tool like a wheelbarrow. Here's a variation that came to me while watching boats on trailers being moved around in a boatyard with very little effort.

First build the tool base with heavy-duty casters on one end



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855-501	Glue Joint Bit	1/2"	1-3/4"	1-1/4"	\$69.00	806-627	Flush Trm Bit	1/2"	1/2"	1"	\$19.30
855-502	Drawer Lock Joint	1/2"	2-1/4"	1/2"	\$69.00	880-002K	Solid Brass Inlay Kit	1/4"	1/8"	1/2"	\$38.90
891-501	Ogee Rail & Stile	1/2"	1-3/4"	7/8"	\$138.00	811-564	Straight Bit	1/2"	1/4"	3/4"	\$18.40
890-501	Ogee Raised Panel	1/2"	3-1/4"	5/8"	\$82.00	880-014	Downcut Spiral	1/4"	1/4"	1"	\$25.10
800-506	Slot Cutter Set	1/2"	1-7/8"	11/16"	\$79.40	880-507	Upcut Spiral	1/2"	3/8"	1-1/4"	\$56.20
855-601	Finger Pull Bit	1/2"	1-7/8"	1-1/8"	\$69.00	880-508	Downcut Spiral	1/2"	3/8"	1-1/4"	\$57.10
854-504	Bull Nose Bit	1/2"	1-1/8"	1"	\$39.50	812-127B	Top Bearing Pattern	1/4"	1/2"	1-1/4"	\$27.10
801-817B	Top Bearing Mortising	1/2"	1-1/4"	1/2"	\$30.60	811-628	Straight Bit	1/2"	1/2"	1"	\$18.20
800-640	Rabbit-Master Plus	1/2"	1-3/8"	1/2"	\$65.80	818-128	Dovetail Bit, 14°	1/4"	1/2"	1/2"	\$20.30
836-920	Chamfer Bit, 45°	1/2"	1-5/8"	3/4"	\$30.90	VHS-001	Router Bit Magic Video				\$17.90
845-787	Classical Ogee	1/2"	1-1/8"	1/2"	\$37.80	MAH-001	Mahogany Box				\$80.00
815-690B	Top Bearing V-Groove	1/2"	3/4"	5/8"	\$39.70						
						<b>TOTAL VALUE \$1130.00</b>					

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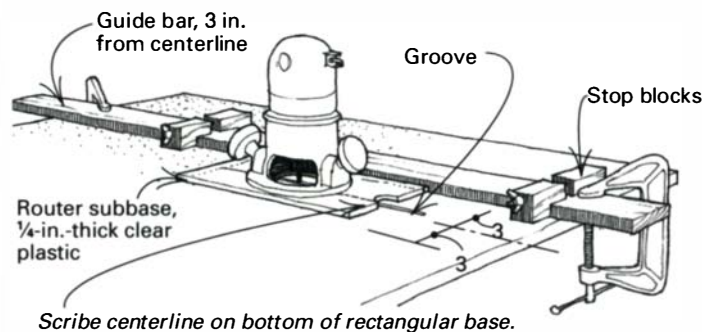


and a crosspiece fitted with a steel plate at the other. If you have several stationary tools, make the height of the crosspiece the same on each tool. Now weld up a wheeled dolly bar, as shown in the sketch. Use high-strength structural tubing, such as ASTM A50, and solid bar stock. Water pipe is too weak and will bend. A welding shop will have these materials on hand and will probably do the job quite reasonably.

To move the tool, locate the trailer ball in the steel plate on the underside of the crosspiece. Push down on the handles to lever the legs off the floor. Now push or pull the tool into place.

—Glenn D'Onofrio, Downey, Calif.

### Quick setup for routing grooves



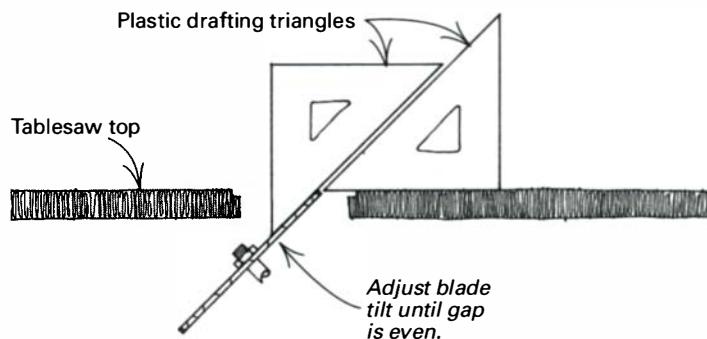
Recently, I had to rout some slots at odd angles for a display rack. Here's the method I devised. Lay out the grooves on the project, and draw a centerline through each one. Make a rectangular base for your router from 1/4-in.-thick clear plastic by scribing a centerline through the base centered on the bit. Then

trim both edges 3-in. away from the centerline. You can now use the base like a drafting template to set up the router.

To use the base, retract the bit below the base. Set the router over the centerline of the groove, and place a guide bar against the plastic base, parallel to the cut line. Clamp the guide bar in position. The guide bar should be 3-in. away from the center line. If the grooves are stopped, you can add stops to the guide bar. Mine are two L-shaped pieces of wood tightened with a bolt and wing nut.

—Richard Herst, Redondo Beach, Calif.

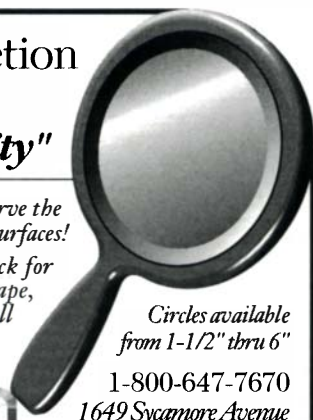
### Cutting perfect miters on the tablesaw



When trying to rip beveled miters or crosscut perfect miters on a tablesaw, the 45° blade setting is usually anything but. And if the angle is off even a little, the cumulative error makes that fourth corner gap in your assembly very noticeable. Here's how to ensure virtually perfect miters. Buy two 45° plastic drafting triangles, one clear and one colored (for better visibility), and set them up on the blade as shown. You will only be able to get

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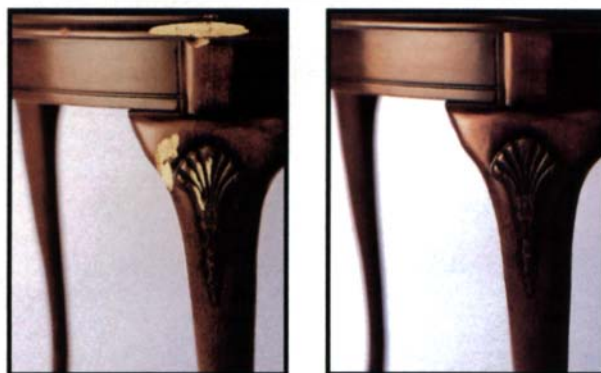
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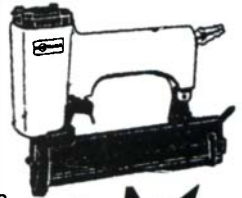
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about 3 in. of the triangle down on the blade, but this should be enough. Hold the second triangle on the saw table, or clamp it between two pieces of scrap. Adjust the blade until the gap is even; the long bases of the triangles exaggerate the gap

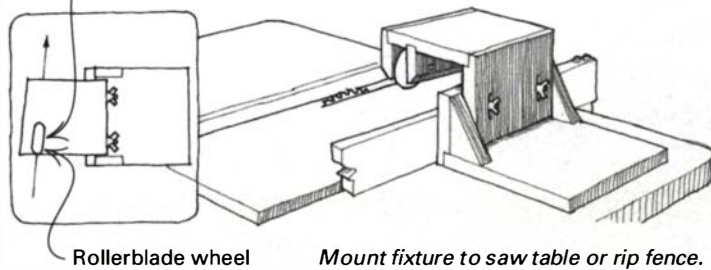
—James H. Wolfe, Enumclaw, Wash.

**Quick tip:** To remove excess glue squeezed out of a clamped joint, first scoop up the bulk of the glue with one of the loose subscription cards found in each issue of *FWW*. Next, grab a handful of sawdust, preferably from the wood being glued, and rub it around, which will create little balls of glue and sawdust that will remove all traces of the glue.

—Phil Hall, N. Berwick, Maine

**Straight line ripping fixture is fast, accurate**

Set wheel at angle to push work against fence.



Rollerblade wheel Mount fixture to saw table or rip fence.

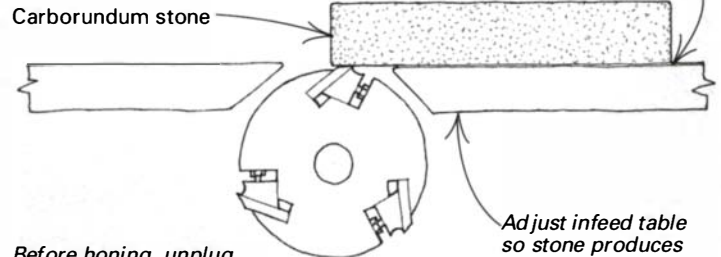
Here's a fixture I built for keeping work tight against the table-saw's fence. It allows accurate, fast ripping in production situations. The heart of the fixture is a common wheel from an in-line

skate or rollerblade, which comes complete with precision bearings. When building the fixture, angle the wheel slightly toward the fence. This will apply inward and downward pressure on the workpiece as it rolls under the fixture.

—John Chung, Santa Barbara, Calif.

**Honing jointer knives into perfect alignment**

Plastic sheet protects surface.



Carborundum stone  
Before honing, unplug machine, and measure knife heights from outfeed table.

Adjust infeed table so stone produces a 5° micro-bevel.

Most of the problems with jointer-knife setup happen after the blades have been perfectly aligned—when they are tightened. The tensioning of the holding screws invariably will cause some blade movement or distortion, which is virtually impossible to anticipate and counteract. My solution is to set the blades as close as you reasonably can, but still just a bit high, and then sharpen them to alignment.

With the machine unplugged, use whatever method you prefer to get basic alignment. Tighten the blades, and then measure

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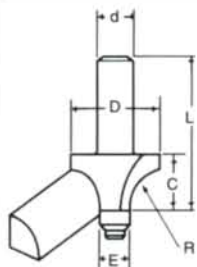
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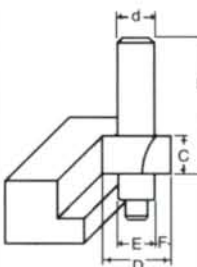
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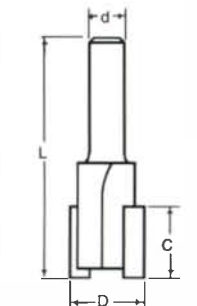
Model	R020	R025
L	1 7/8"	2 9/16"
d	1/4"	1/2"
C	5/8"	1 1/8"
R	3/8"	3/4"
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D	1 5/16"	2 1/8"
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d	1/4"	1/2"
C	9/16"	1/2"
F	3/8"	3/8"
E	9/16"	9/16"
D	1 3/8"	1 5/16"
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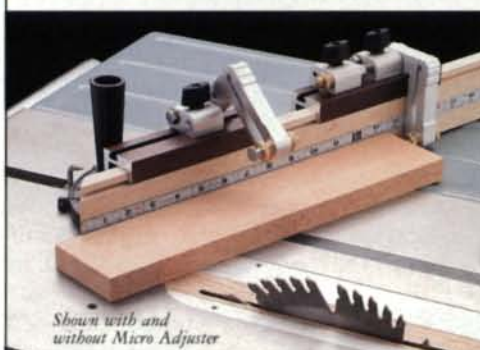
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how high they are from the outfeed table using a dial indicator. Rotate the blade forward, lock in place and lower the infeed table, using it as a guide for a Carborundum stone to grind a micro bevel. Protect the infeed table with a thin piece of plastic. Grind the micro bevel until it is consistent along the knife's length. If you have aligned the knives to .003 in. high to begin with, for example, you'll need about 3 to 5 minutes per knife to hone the knives by hand to where you want them. After honing, I normally leave the knives about .001 in. high because the height will diminish as the blades wear.

The real beauty of this system is that you can custom-grind exact blade alignment even on bowed blades or on the out-of-round cutterheads of older machines.

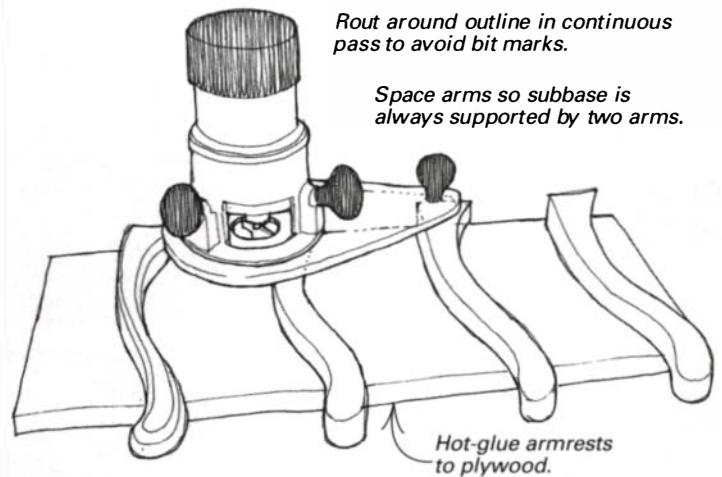
—Thomas R. Schrunk, Minneapolis, Minn.

### Drying board saves time in finishing

A simple drying board I make in seconds has saved me many hours during the finishing stages of my projects. To make it, just shoot staples from a staple gun through a piece of corrugated cardboard at regular intervals making a grid of staple points protruding through the other side. The spacing can be several inches for large projects or very close together for small ones. Lay the board flat, points up.

Apply the finish to the bottom of your project just as you normally would. While the finish is still wet, set the bottom of the project on the staple points of the drying board, and then immediately apply the finish to the top side of the project (no waiting). The staple points allow air to circulate under the project to dry the finish, but the points leave little or no visible flaws on the bottom of the project. —Larry Wiese, Newport News, Va.

### Routing the edges of odd-shaped pieces




Shaping edges on small pieces with a router is always ticklish. I was recently faced with this problem when I needed to round over edges on some one-half scale tapered walnut rocking-chair arms. My magic mat wasn't stable enough. And because I wanted to round over the perimeter in one pass to keep the cut smooth, I didn't want to clamp and reclamp each arm. Also, I needed to prevent the router from rocking on the small surface.

I solved the problem by hot-gluing all four armrests to a scrap piece of birch plywood, spaced 8-in. apart, in line and parallel. I used the extended subbase on my router supported by the adjacent armrest to steady the router. After shaping one side, I pried the armrests off and flipped them over to rout the other side.

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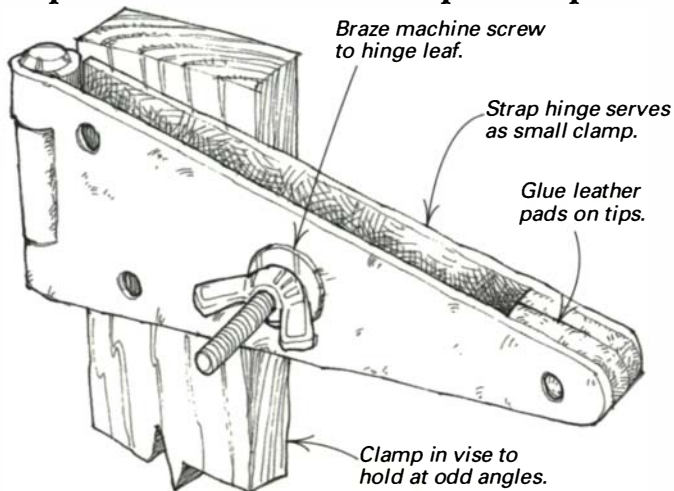
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It took only two little dabs of hot glue on each armrest to hold them. The dried glue, and occasional flakes of plywood veneer, were easily removed with a scraper. I've since used this technique successfully on other small parts where I needed a stable base and didn't want to spend a lot of time clamping and reclamping each piece.

—Dave Coumes, Franklin, Tenn.

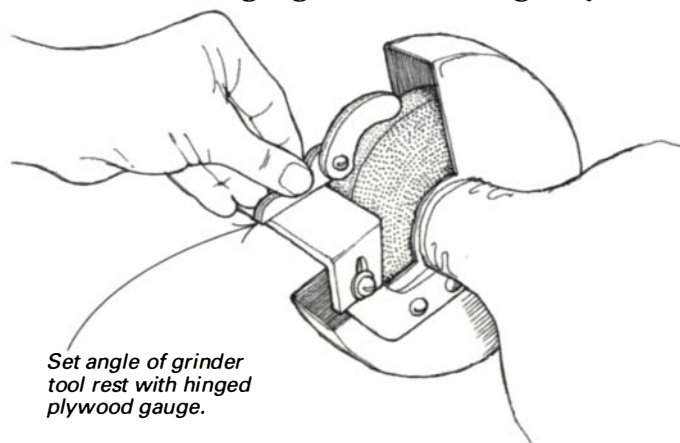
### Shopmade miniature vise clamps small parts



I saw a street jeweler using this homemade device as a ring clamp. It consists of a strap hinge, machine screw, wing nut, spring and two leather pads. Braze or silver solder the machine screw to the hinge. Then attach the vise to a length of hardwood so that you can clamp it in your bench vise at any angle.

—Ted Walton, Hilton Head Island, S.C.

### Grinder tool-rest gauge makes setting easy



When going from the coarse to the fine stone on my bench grinder, I always had trouble getting the tool rests at the same angle. The solution was to develop a simple shop-built gauge. With this two-piece adjustable 1/4-in. plywood gauge, I can now align the tool rests with ease, assuming the grinding wheels are about the same diameter. Starting on the coarse wheel, I position the gauge to the tool rest. I then move the gauge to the fine wheel and adjust the tool rest to the gauge.

—Robert Vaughan, Roanoke, Va.

*Methods of Work* buys readers' tips, jigs and tricks. Send details, sketches (we'll redraw them) and photos to *Methods*, Fine Woodworking, PO Box 5506, Newtown, Conn. 06470-5506. We'll return only those contributions that include an SASE.



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## When to allow for wood movement

*Gary Rogowski's article on boxes, particularly in combination with the boxes shown in Chris Minick's finish selection article (both in FWW #104), raise a beginner's question. How big can a box be before the rules against trying to glue cross-grain come into play? In an early effort at glued construction, I put together a redwood box for garden hand tools and supplies with rabbeted joints all around and to attach the bottom. It's functional but the bottom, not surprisingly, is split in a couple of places. Are there rules of thumb to predict the size where one has to allow the top and bottom to move?*

—John T. Porter II, Valley Center, Calif.

**Gary Rogowski replies:** Whenever you are building a piece of furniture, your design should allow for wood movement. It's in the nature of the material to move—to expand and contract in response to changes in its moisture content (MC). By designing with this variable in mind, you will be building pieces that will better withstand the vagaries of time and weather.

Many factors can affect the rate a piece of wood will move. The first is the type of wood itself. Some woods tend to move more than others. There's a reason that exotic woods were chosen for fine instrument and tool making: They exhibited great stability through a variety of seasonal changes. A material like beech, however, goes through moisture swings with a greater amount of movement, so it is less desirable in some situations.

Other factors include whether the piece will sit indoors or outdoors, the MC of the wood, the seasonal variations in your area, how the wood was milled (plainsawn or quartersawn) and what kind and how much finish was applied to the piece. Having said all that, it's still a crap shoot. That's the maddeningly beautiful part about the material. It's not like metal or stone, it still responds to its surroundings.

Now you can figure out by way of R. Bruce Hoadley's book, *Understanding Wood* (The Taunton Press), how much a piece of 9-in.-wide plainsawn cherry, for instance, will shrink if it goes from 12% MC to 4% MC. It's about  $\frac{3}{16}$  in. That's a considerable amount. Gluing a piece so that this movement is prevented will

stock are needed. In this fashion, the panel is captured in grooves let into a frame, but the panel is not glued, which allows it to float. Where wider boards are put together for a carcass or box, always run the grain direction around the perimeter of the box, so the sides all shrink or expand in the same direction. If a solid bottom, top or back is used, let it float in grooves like a panel, or slot screw it to allow for movement.

Avoid cross-grain glue-ups if at all possible. Now, I will confess that one of the boxes shown in my article uses cross-grain gluing, and it has never shown any signs of ill effect in 18 years. Of course, the material was walnut and it was mostly vertical grain, so the movement was minimized, but there you have it. There really are no hard and fast rules for breaking the rules. Pay attention to the basics when you are designing; err on the side of caution, and you generally won't go wrong. Cross your fingers and hope for the best when you decide to ignore the rules: just don't be too disappointed when the wood does what it wants to do.

[Gary Rogowski teaches woodworking at the Oregon School of Arts and Crafts in Portland, Ore.]

## Why does cherry darken?

*My problem is that after completing a project in cherry, I usually have some milled stock left over. But this stock darkens so much in contrast to unmilled stock that I'm afraid to combine the two in one project. I've wrapped milled stock in black plastic to cut down on light and air exposure to try to slow down the process, but to no avail. Can you tell me exactly what it is that causes cherry to darken, the rate that it does so and how to prevent or at least retard the process? Would painting the surface slow the process? And why, if left roughsawn, does the coloration process slow down so much?*

—Robert Nanninga, Zeeland, Mich.

**Jon Arno replies:** Your assumption is correct in that light is the primary factor causing cherry to develop its renowned patina. When exposed to bright light, the wood will noticeably darken in a matter of hours, and it will continue to subtly change across the span of decades, if not centuries. Like you, however, I suspect exposure to the air also plays a role. I've seen nothing in the literature that lends clarity to this complex subject, but by way of personal experience, I once stored some cherry lumber in a pitch dark attic for several months and its color did in fact shift from flesh pink to amber brown. Why roughsawn cherry darkens more slowly than the planed lumber is certainly consistent with its known photosensitivity: loose wood fibers on the surface would tend to refract light. Although I haven't personally tried it, as you suggest, it seems logical that a coat of opaque, nonporous paint would retard the wood's patina-forming process by providing a barrier to both light and air.

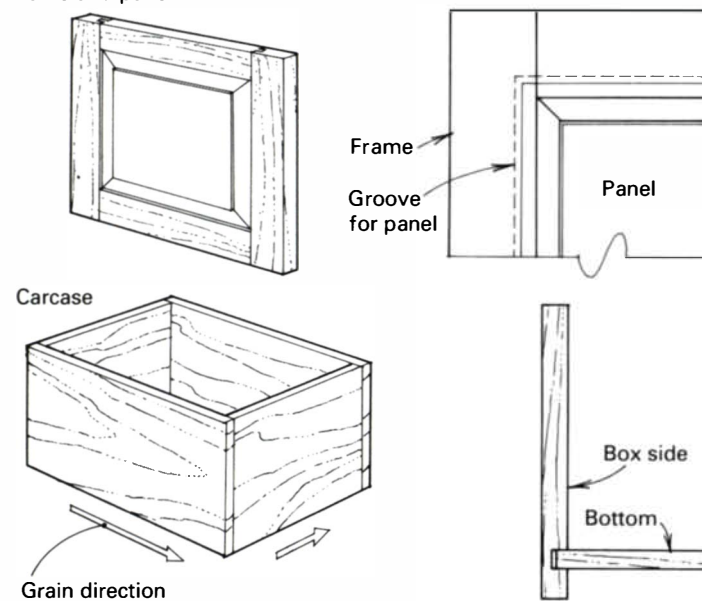
If you will pardon the pun, I think you are being entirely too sensitive about cherry's tendency to blush. Actually, this species' pronounced patina is one of the most attractive elements of its character and helps make it the world-class cabinetwood that it is. There is no harm in combining pieces of cherry that are at slightly different points in their patina-building process. Sanding or re-machining the cherry will usually lighten it somewhat, and once the project is complete, simply place it in bright light for a few days before applying the finish. It is far more important to avoid using sapwood when working with cherry because this immature wood tissue is, well, just too innocent to ever blush. And finally, don't use a UV-inhibiting varnish. The ultimate beauty of cherry rests in letting it do its thing.

[Jon Arno is a wood technologist and consultant in Troy, Mich.]

## The best kitchen cabinet finish

*I have no spray equipment, so what would be the best and easiest finish to apply on kitchen cabinets? The doors and*

Frame and panel



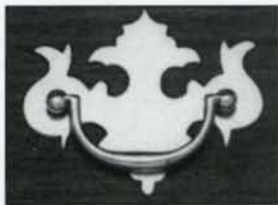
generally lead to warping or cracking, so why risk it? You also can't predict whether a piece of your work will get soaking wet or stuck next to a wood stove for a season. Because you also can't guarantee the wood itself, the best you can do is minimize the dangers of movement by designing for it in your work.

Some simple solutions, shown in the drawing above, include using frame-and-panel construction where large spans of solid



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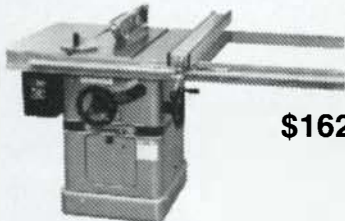
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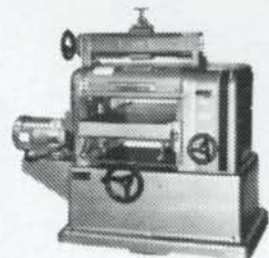
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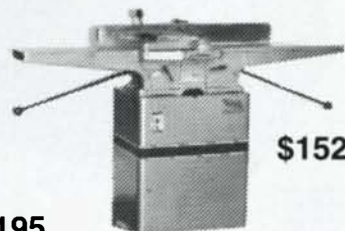
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drawer fronts are made of birch plywood. Should I raise the grain before finishing? —Paul Lasicki, Warwick, N.Y.

**Chris Minick replies:** I'm asked that question all the time. The truth is there is no best finish, and easy depends on your finishing abilities (see "Choosing a Finish," FWW #104, pp. 85-89). Like life, finishing is a series of compromises. In your case, I think a solvent-based polyurethane varnish would be appropriate. But don't just open the can and slap on the stuff. Most oil-based varnishes are too thick to flow and level well straight from the can. I always thin my varnish to about the consistency of whole milk before applying it to my project. (For the technically inclined, the actual flow rate is 13 seconds with a Zahn #3 viscosity cup, an inexpensive, easy-to-use accessory available at better paint supply houses.) The thinned varnish takes more coats to build a substantial film, but I've found it's easier to brush on a few extra coats than to sand off a thick one that has bumps, ridges and bubbles.

The extended drying time of oil-based varnishes is both a blessing and a problem. Long drying times allow the finish to level evenly, but they tend to pick up dust in the process. The drying time can be shortened by adding Japan drier, or better yet, a small amount of cobalt drier to the thinned varnish. Be careful, though; too much cobalt drier can cause brittle finish films and even slow down the drying process. Follow package instructions, and then test your concoction on scrapwood to be sure. I usually add about 10 drops of artist's cobalt drier (available in art supply stores) to 1 qt. of thinned varnish. This mixture usually dries to the touch in about one hour.

Brush selection plays an important role in how the final finish looks. Cheap brushes are hard to use and produce a lousy-looking finish. Expect to pay about \$15 for a high-quality natural-

bristle brush, an investment well worth the money. With proper care, a good brush will last a lifetime and improve with age.

Unlike waterborne finishes, you need not worry about raising the grain before applying a solvent-based finish, but the first coat should be sanded to remove the stiffened wood fuzz before applying subsequent coats.

A properly applied polyurethane varnish finish will not look plastic-coated and will give your cabinets more than enough protection. By the way, the companion video to *The Woodfinishing Book* by Michael Dresdner, *The Woodfinishing Video* (available from The Taunton Press), is the best primer on brush applying a solvent-based varnish that I have seen.

[Chris Minick is a product development chemist and amateur woodworker in Stillwater, Minn.]

### Cleaning files

*How do I clean the grooves of a metal file (especially a fine-toothed file) of materials such as aluminum and that ubiquitous hard-packed mixture of dirt and fine metal particles? I've tried wire brushes, chemicals and hand cleaning each groove. None of these methods is satisfactory.*

—Sands Figures, Livermore, Calif.

**Charley Robinson replies:** The usual technique for cleaning a file is to use a file card. A file card is like a wire brush, but the bristles are short, about 1/4 in. to 3/8 in. long. File cards are generally available at most hardware stores, and they will do a reasonable job of cleaning your file as long as you haven't let it get overly clogged.

Files that are clogged with wood and/or glue dust can be cleaned more easily if you soak them in hot water before going at them with the file card. For more stubborn materials, such as

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soft aluminum, you'll have to clean each groove individually with something like a finishing nail, ice pick or awl.

To help prevent the file from clogging in the first place, try rubbing it with a piece of chalk before you start to file. The chalk acts as a lubricant and makes the cutting action a little smoother while preventing the filings from sticking in the teeth. One other tip to keep in mind is that a file is designed to cut only on the forward stroke. If you lighten up on the pressure when drawing the file back, you'll find that your files last a lot longer.

[Charley Robinson is an associate editor for *FWW*.]

### Finishing the inside of carcasses and drawers

*I'm building a four-drawer cherry chest as a copy of an antique that has been in the family for years. The sides are made from one 20-in.-wide board. Surprisingly, the books on finishing that I have don't discuss whether the inside of the carcass and drawers should be finished. What is the expert's view on this common occurrence?* —A.G. Russell, Hilton Head, S.C.

**Pat O'Daly replies:** One of the purposes of finishing wood is to slow down the migration of moisture into and out of the wood. The happy result of this is less wracking and warping in the finished piece. Protecting the inside of the carcass and drawers is a step sometimes eliminated in production shops or budget jobs. In my opinion, a quality job requires a minimum of a sealer coat and one finish topcoat on the inside of the carcass and all interior drawer surfaces.

If you are using a brushable finish, you may want to use a wash coat of shellac and a coat of your chosen finish. Be sure the shellac is fresh, or it won't dry properly. If you buy a can of it, look for a date. I make mine fresh with flakes or buttons dissolved in alcohol. I make just what I need for a given project. An easy way to

test the freshness of the material is to dip the pad of your middle finger in the shellac, and wait a second or two. Then snap your fingers. You should feel it tack and dry in about five minutes. The longer it takes to dry, the greater your need for fresh shellac.

[Pat O'Daly is a professional finisher. She operates a furniture and antique restoration business in Sonoma, Calif.]

### Heating a part-time woodshop

*I built a 50-ft. by 30-ft. insulated metal building with a 14-ft. ceiling on a concrete slab. Inside and in one corner, I built a finish room with inside dimensions of 17 ft. by 14 ft. with an 8-ft. ceiling. I have at present been heating the finish room with an electric register-type heater and have been doing all my winter glue work and finish work inside.*

*I generally work three or four days a week in the shop, but most times, it is only for a day or day and a half at a time. I know it is not practical to heat an area this big for the entire winter, and it is hard to heat it once it has gotten very cold.*

*I have run a natural gas line to the shop and have an older furnace that I could use (150,000 BTU input, 84,000 bonnet capacity). But I am afraid of any open flame, especially because I do not have a dust-collection system and have no plans for one. I know dust can explode. Must I use inside air as a return (for intake), or can I use outside air and then vent the opposite wall to allow the forced heated air in? I have noticed that in the winter, if I have not been in the shop for several days, the building is finger-freezing cold, turning my breath into visible fog. Will this moisture harm my machinery?*

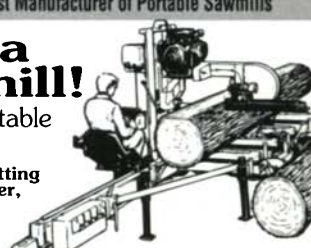
—Ronald Funk, Ogden, Utah

**Rick Groff replies:** I would need more information than square footage to exactly size a furnace for your shop. A guess

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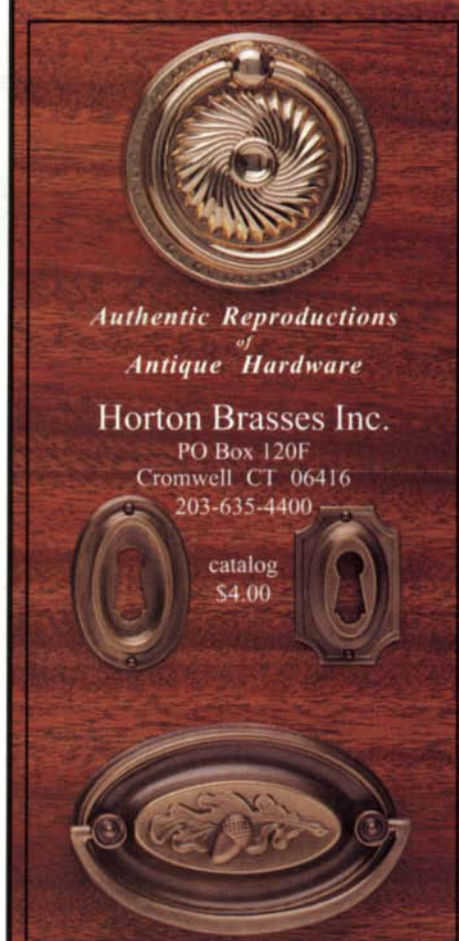
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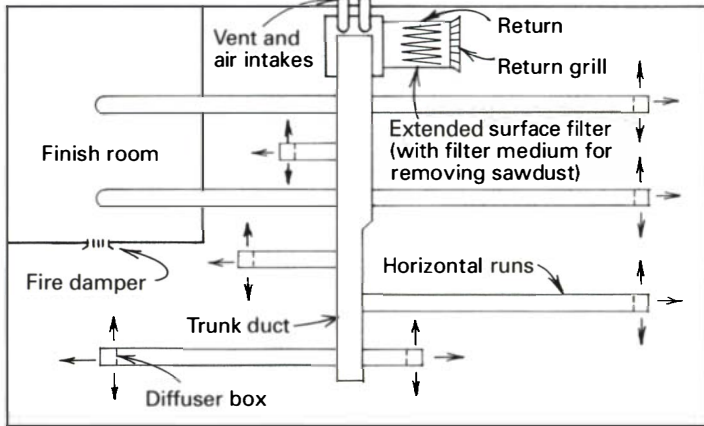


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at this point would be about 50 BTUs per square foot. Although you don't use your shop day in and day out, a central, forced-air heating system using the available natural gas is your

*Set furnace on floor or suspend from rafters. Run trunk duct below rafters to horizontal runs that terminate in diffuser boxes.*



best bet. Rather than using the old furnace because it is extremely inefficient, I suggest a newer sealed combustion model. If floor space is at a premium, you could suspend the furnace from the rafters. The new furnace will allow you to pull combustion air from outdoors and vent right back out—no chimney needed. The combustion chamber is not open, so dirt and contaminants will not make contact with the burner. These units are more than 90% efficient, so your operating costs will be lessened.

Make sure to have insulated ductwork installed to deliver the warm air to the outside walls and near doors and windows (see

the drawing below). One return near the floor will suffice, it can be around the furnace location.

You can do one of two things about your system filter. Either install a standard dust filter and clean it every day or two, or go to an extended-surface bag-type filter. These filters are not cheap but have a large dirt-holding capability without restricting airflow. One of these would probably last six to 12 months depending on density of dust and dirt.

Run a couple of ducts into your finish room. Is this room ventilated? I did a system for a friend of mine in his woodworking shop. We installed a fire-damper between this room and the rest of his shop. A fire-damper allows the pressure to equalize between the finish room and shop when running the exhaust fan or furnace.

This may sound like more than you wanted to get into, but you needn't keep this area heated to the same temperature when not in use. My friend tells me of how nice his working conditions are, not to mention his equipment no longer rusts and the moisture content of his wood stays more even. So for comfort, care of tools and equipment, and material storage, I hope you consider this option.

[Rick Groff is vice-president of heating and air conditioning for Neffsville Plumbing and Heating Service, Neffsville, Pa.]

### Tablesaw fences left of the blade

*One reason that I bought my Sears contractor saw was a fence system that offers equal capacity to either side of the blade. Unfortunately, the fence is not very precise, so I'm considering an aftermarket fence. Most of these fences, however, are primarily set up for use to the right of the blade. Given my limited experience, I don't know if I'm being overly concerned*

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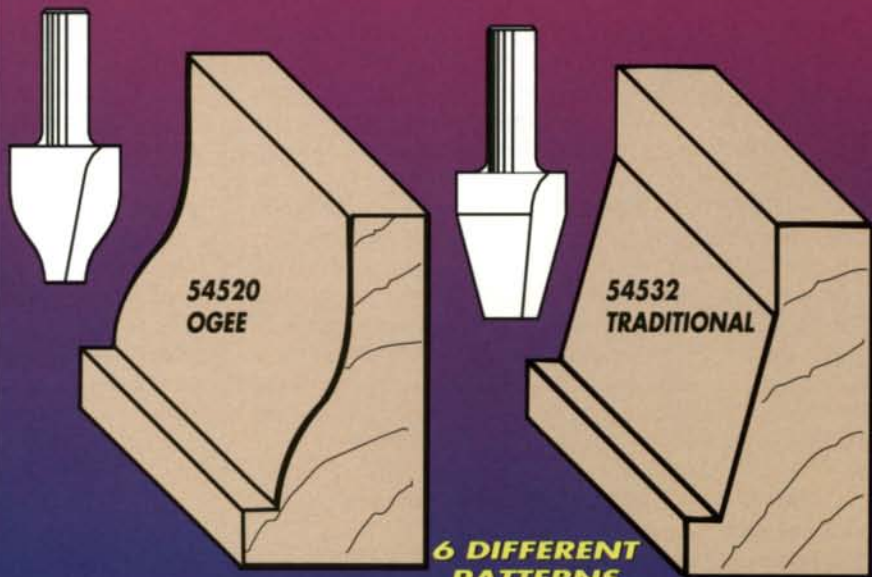
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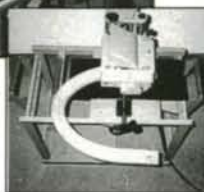
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about this setup. Are there occasions when a left-of-the-blade capability would be desirable? —Ted Baca, Evans, Colo.

**Sandor Nagyszalanczy replies:** Your concern about a saw fence that can be used to the left of the blade is an interesting one. Most woodworkers (as well as a statistically higher percentage of the general populace) are right-handed and prefer to push stock past the blade with the right hand. Therefore, manufacturers make their saws to please the majority. What if you're a lefty? I suppose you could always remount your stock fence (or fit an aftermarket one) so that the majority of its rail extends to the left of the blade.

Are there situations for a right hander when it's preferable to cut with the fence to the left of the blade? Right off the top of my head, I can think of two situations: If you need to bevel the back edge of a plywood or veneered panel and you want to minimize the tearout on the delicate face veneer, you'll want to cut with that side up. Now because the majority of saws have blades that tilt toward the right, you'd have to guide the panel with the fence mounted to the left of the blade. The other situation is when beveling stock with the blade tilted. With the good piece riding on a left-mounted fence, the angled cutoff doesn't get trapped between the fence and blade where it can pinch and be kicked back dangerously.

[Sandor Nagyszalanczy is a contributing editor to *FWW* and a woodworker in Santa Cruz, Calif.]

### Flattening a warped benchtop

*While I was living on the Oregon coast, I built a woodworking bench using coastal soft maple. The top was primarily glued up from 2-in.-wide by 2 1/4-in.-thick boards (the edges are thicker to provide for bench dogs and vises).*

*I moved inland to an area where the climate is very dry. Within six month of moving there, the workbench began to warp—both outside edges moving up and the center moving down. The total warp is about 3/32 in., which is not overwhelming, but significant.*

*In retrospect, I note that the benchtop is free-floating with nothing to hold it from warping. I would like to remove the warp without breaking the top. I have considered using a series of clamps and strongbacks across the bottom of the benchtop, removing the warp over a period of days or weeks by tightening the clamps a tiny bit each day, or planing or sanding the top flat.*

*After achieving a flat benchtop, I plan to fasten the top to rigid supports in such a way as to keep the benchtop from further warping. Can you offer any suggestions?*

—Jeff Fagan, Grants Pass, Ore.

**Mario Rodriguez replies:** I think your idea of attaching the benchtop to strongbacks (or battens) and bringing it down slowly will work fine. I would then attach the battens permanently to the underside of the benchtop with floating screws that will allow the top to expand or contract seasonally. If the battens are flat and stout enough, they will keep the benchtop level. Finally, you can plane out any remaining bow with a jack or jointer plane.

[Mario Rodriguez is a contributing editor to *FWW* and a woodworker in Warwick, N.Y.]

*Send queries, comments, and sources of supply to Q&A, Fine Woodworking, PO Box 5506, Newtown, Conn. 06470-5506. We attempt to answer all questions, but due to the great number of requests received, the process can take several months.*

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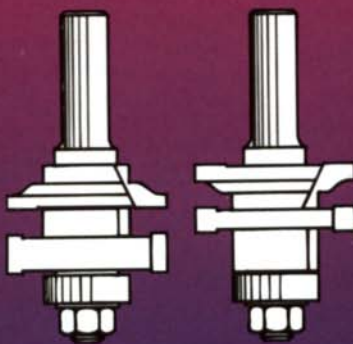
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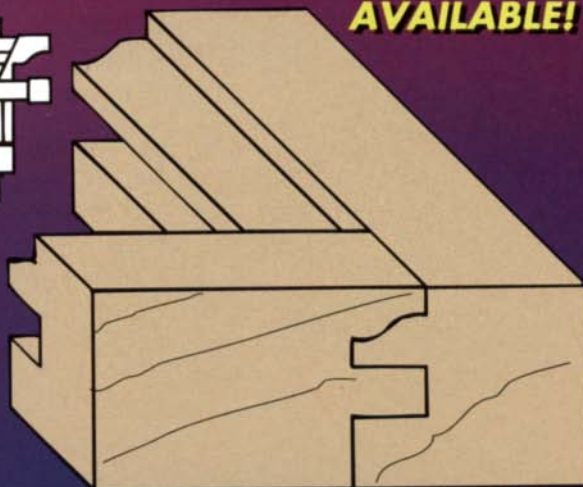
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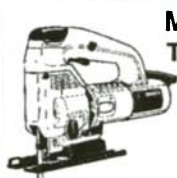
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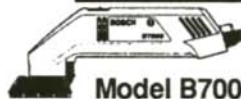
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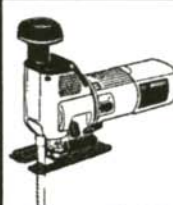
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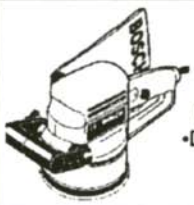
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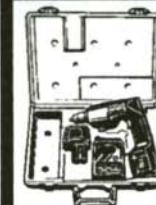
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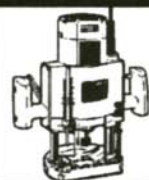
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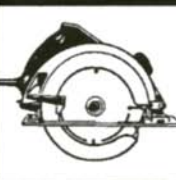
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11220EVS	ROTARY HAMMER	00668-352A	\$457.99	3102-1	COMPACT HOLE SHOOTER	02921-352A	\$189.99	352	CABLE 1/4" SAW BOSS	03527-052A	\$99.99	HD4560	JIG SAW	31592-052A	\$92.99
1615EVS	ROTARY HAMMER	00669-352A	\$457.99	3102-2	RIGHT ANGLE DRILL	02922-352A	\$189.99	330	FRINGING SANDER	03530-352A	\$59.99	HD7778	WORM DRIVE SAW	32143-052A	\$179.99
11230VS	BELT SANDER	04407-152A	\$293.99	6016	Y&R HAMMER DRILL	02926-452A	\$136.99	7334	ORBITAL SANDER	04659-352A	\$117.99				
11230VS	BREAKER HAMMER	04409-752A	\$177.99	6016	FINISHING SANDER	02928-352A	\$49.99	7335	ORBITAL SANDER	04672-352A	\$126.99				
11212VSR	HAMMER DRILL	04720-452A	\$146.99	6226	PORTABLE BANDSAW	02930-052A	\$304.99	7336	6" ORBITAL SANDER	04673-352A	\$132.99				
1632VSK	RECIP SAW	04721-352A	\$146.99	6365	1 1/4" CIRCULAR SAW	02931-352A	\$119.99	555	PLATE JOINER	04674-352A	\$166.99				
3050VSRK	CORDESS DRILL	05056-152A	\$129.99	6508	SANWAL VARIABLE SPEED	02932-352A	\$132.99	691	1 1/2" HP ROUTER	06537-352A	\$142.99				
1194VSR	HAMMER DRILL	06353-452A	\$143.99	8975	HEAT GUN	02937-152A	\$54.99	7518	3 1/4" HP ROUTER	06538-352A	\$267.99				
1348AE	5" MINI GRINDER	07634-052A	\$99.99	6140	5/8" GRINDER	04759-452A	\$89.99	7538	PLUNGE ROUTER	06539-452A	\$229.99				
3051 VSRK	KEYLESS DRILL	07635-352A	\$139.99	398-1	12V CORDLESS DRILL	05280-052A	\$162.99	9852	3/8" 1/2V DRILL	06710-052A	\$147.99				
1022VSR	3/8" VSR DRILL	07636-152A	\$99.99	5341	1 1/2" ROTARY HAMMER	05281-052A	\$459.99	9853	3/8" 1/2V DRILL	06711-052A	\$149.99				
3272A	3 1/4" PLANER	30109-252A	\$99.99	6527	SUPER SAWZALL	05660-152A	\$162.99	9854	1/2" 1/2V DRILL	06712-052A	\$154.99				
1028VSR	1 1/2" VSR DRILL	30433-052A	\$139.99	6528	SUPER SAWZALL	05661-152A	\$162.99	32V5	2" x 2 1/2" BELT SANDER	30534-352A	\$163.99				
1289	1/4" SANDER DUSTLESS	30442-352A	\$57.99	6507	SAWZALL	05662-152A	\$134.99	347	BUILDERS SAW	30743-052A	\$67.99				
32830VSR	SANDER KIT	30443-352A	\$116.99	6798-1	V5 SCREW SHOOTER	05819-352A	\$129.99	1799	CUTOUT TOOL	31601-052A	\$79.99				
3272AK	3 1/4" PLANER KIT	30475-352A	\$99.99	0402-1	KYS CHUCK DRILL	05814-352A	\$166.99	7310	DRILL W/2 BATTIS	31759-052A	\$158.99				
86050	3/8" DRILL	31425-052A	\$69.99	0224-1	3/8" HOLE SHOOTER	06601-352A	\$112.99	7319	TRIMMER	31761-052A	\$88.99				
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82100K	CORDESS DRILL	31429-152A	\$169.99	1670-1	1/2" HOLEHAWG	06605-352A	\$259.99	9690	GRIP ROUTER	32256-352A	\$147.99				
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81650	PLATE JOINER	31438-052A	\$179.99	5362	1" ROT HAMMER	06628-352A	\$359.99								
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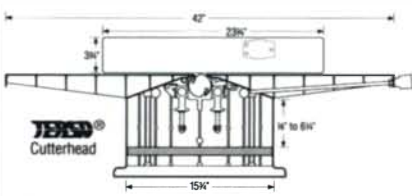
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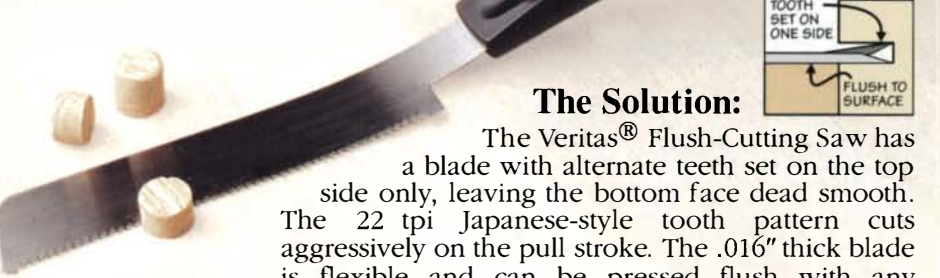
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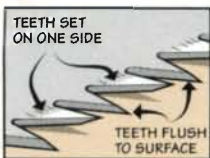
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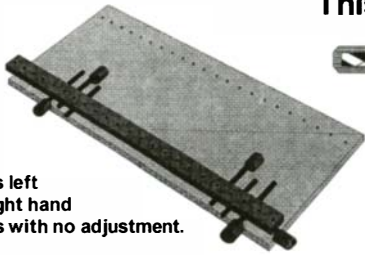
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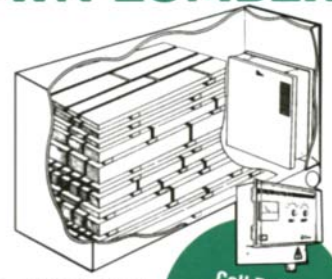


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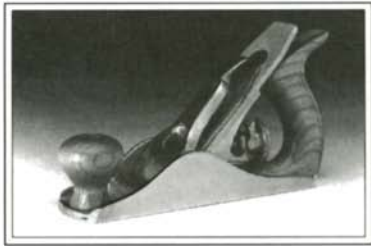
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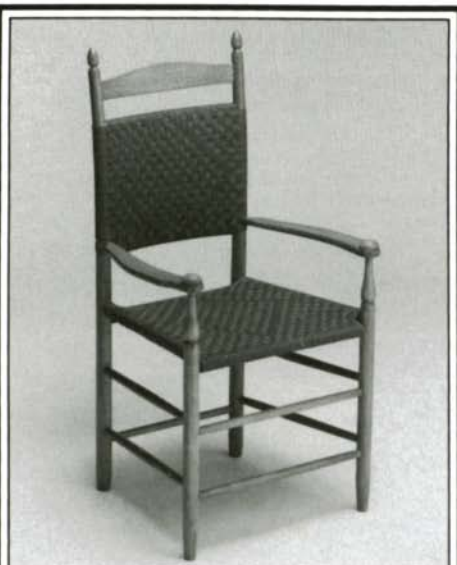
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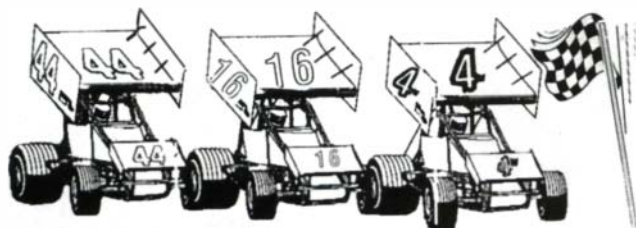


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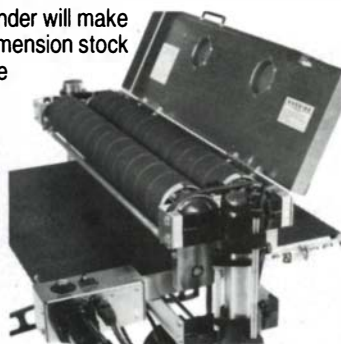
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<b>Jf32</b> 18 ga. Brad Nailer Kit ¾-1¼ (incl. 4 boxes nails).....	\$89.95
<b>Jf45</b> 18 ga. Brad. Nailer ¾-1¼ (incl. 6 boxes nails).....	\$149.95
<b>Jf650</b> 16 ga. Finish Nailer ¾-2.....	\$189.95
<b>Jf564</b> 16 ga. Finish Nailer ¾-2½.....	\$219.95
<b>Ju432</b> 18 ga. Narrow Crown Stapler ¾-1¼.....	\$159.95
<b>NR83A</b> Hitachi Framing Gun 6 to 16 Pen Nails.....	\$399.00
<b>1 HP Oil Free Contractors Compressor</b> .....	\$229.95
<b>1½ HP oil Free Contractors Compressor</b> .....	\$279.95

**Framer Special PKG** **\$739<sup>95</sup>**

1½ HP DeVILBISS Oil Free Contractor Series	Hitachi NR83A Framing Gun	50 Ft. Hose & Fitting	1 Box of 16 Penny Nails
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**Finish Special PKG** **\$429<sup>95</sup>**

1 HP DeVILBISS Oil Free Contractor Series	Jf650	50 Ft. Hose & Fitting	1 Box 16 ga. 2"
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**Super Finish Special PKG** **\$579<sup>95</sup>**

1 HP DeVILBISS Oil Free Contractor Series	Jf32	Jf 564	50 Ft. Hose & Fitting	4 Boxes 18 ga. 1 Box 16 ga. 2½"
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Most corner sanders just scratch the surface compared to the new Bosch B7000. For example, its motor not only delivers 1.1 amps of true orbital action but also minimizes annoying vibrations.

What's more, to meet the demands of jobs ranging from scraping to polishing there's a wide selection of optional pads. Hook-and-loop backings make them easier to change than messy adhesives. Plus, unlike the competition, pads and head points last longer thanks to the exclusive Clic™ adjustable head.



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Be sure to get the corner sander that's cornered the market on performance, the B7000 from Bosch.



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Established 1933

DELTA BENCH TOP TOOLS			
Model	Description	List	Sale
23-700	Wet/Dry Grinder/Sharpener	234	155
23-680	6" Bench Grinder 1/4 HP	86	75
23-880	8" Bench Grinder 1/2 HP	151	115
23-980	10" Bench Grinder 1 HP	255	239
11-950	8" Drill Press	199	135
14-040	14" Drill Press	382	345
28-160	10" Hobby Band Saw	210	135
31-050	1" Belt Sander 2.0 amp	104	75
31-460	4" Belt/6" Disc Sander	198	129
31-340	1" Belt/8" Disc Sander	268	204
31-080	1" Belt/5" Disc Sander	134	89
40-560	16" 2 speed Scroll Saw	266	178
23-580	5" Bench Grinder 1/5 HP	68	52
11-990	12" Bench Drill Press	276	195
11-090	32" Radial Drill Press	399	305
43-505	1/2" Bench Router/Shaper	399	285
36-220	10" Compound Miter Saw	350	229
33-060	"Side kick" Miter saw	510	375
14-070	14" Floor Drill Press	450	349
40-640	20" Bench Scroll Saw	466	295
23-675	6" Grinder/3 x 24 Belt Sander	128	109
50-075	Dust Collector/Sweeper 3/4 HP	360	254
36-090	10" Sidekick Miter Saw	293	214
37-070	6" var. speed Bench Jointer	337	249
20-150	14" Abrasive cut-off saw	375	219
28-180	10" Bench Band Saw	232	158
46-700	12" var. speed Wood Lathe	548	445

JORGENSEN CLAMPS				
Model	Size	List	Sale	Lots of 6
3524	24"	31.40	18.95	99.00
3526	36"	33.65	20.35	109.00
3548	48"	36.95	22.45	125.00
3560	60"	41.20	25.10	136.00
3572	72"	44.50	26.95	145.00

ADJUSTABLE HANDSCREW KITS				
Model	Jaw Length	List	Sale	Lots of 6
J-04	4"	7.95	4.99	29.00
J-06	6"	9.05	5.55	33.49
J-08	8"	10.15	6.19	36.95
J-10	10"	11.90	8.25	46.95
J-12	12"	14.75	9.30	52.95
J-14	14"	15.85	11.39	62.45
J-16	16"	19.25	12.99	69.99

ADJUSTABLE HANDSCREWS				
Item#	Jaw Length	Opening Capacity	List	Sale
#5/0	4"	2"	14.34	8.35
#4/0	5"	2-1/2"	15.40	8.95
#3/0	6"	3"	16.53	9.59
#2/0	7"	3-1/2"	17.75	10.35
#1	8"	4-1/2"	19.76	11.75
#0	10"	6"	22.63	12.50
#2	12"	8-1/2"	25.95	14.50
#3	14"	10"	32.88	18.00
#4	16"	12"	42.76	23.95

STYLE 37-2-1/2" Throat 1/4"x3/4" Bar				
Item#	Bar Length	List	Sale	Box of 6
3706	6"	10.65	6.05	32.50
3712	12"	11.80	6.65	37.25
3718	18"	13.00	7.45	40.50
3724	24"	14.25	7.99	42.50
3730	30"	15.88	8.85	47.75
3736	36"	17.36	9.99	53.95

STYLE 45 5" Throat 1-3/8" x 5/16" Bar				
Item	Bar Length	List	Sale	Lots of 6
4512	12"	33.17	19.95	109.99
4518	18"	34.97	21.45	116.99
4524	24"	37.02	22.75	123.99

PONY CLAMP FIXTURES				
Model	Description	List	Sale	Lots of 12
50	3/4" Black Pipe Clamps	14.87	7.80	88.95
52	1/2" Black Pipe Clamps	12.40	6.70	71.50
53	Double 3/4" Pipe Clamps	42.90	27.95	299.00

STEEL "I" BAR CLAMPS				
Model	Size	List	Sale	Lots of 6
7224	24"	34.36	17.99	103.00
7236	36"	36.88	18.99	109.00
7248	48"	40.54	20.99	119.00
7272	72"	46.64	27.99	159.95

PRAZI BEAM CUTTER				
Model	Description	List	Sale	
PR-700012	12" beam cutter for worm drive saws	149	124	

SKIL				
Model	Description	List	Sale	
7102	"Sandcal" 2-1/2" x 16" Belt Sander	78	62	
7313	3" x 18" Belt Sander	85	69	
7621	3" x 21" var. speed Belt Sander	245	149	
7575	1/4 sheet Palm Sander	75	54	
7576	above Sander with bag	81	59	
1605-02	Biscuit Joiner with case	221	129	
2735-04	12 volt cordless Drill with charger, case, and 2 batteries	249	144	
2736-04	2735-04 w/keyless chuck	269	145	
7484	5" Random Orbit Sander	153	99	
5250	2-1/4 HP Circular Saw	82	65	
5350	2-1/3 HP Circular Saw	102	78	
5750	7-1/4" Circular Saw drop foot	259	165	
3810	10" Miter Saw 15 amp	365	239	
5825	6-1/2" Worm Drive Saw	257	165	
5660	NEW 8-1/4" 60° Circular Saw	238	149	
5510	5-1/2" Circular Saw	166	110	
77	7-1/4" Worm Drive Saw	257	144	
77M	NEW 77 Mag Worm Saw - 2 lbs lighter than original saw	300	164	
5860	NEW 8-1/4" 60° Worm Saw	282	174	
5790	10-1/4" Circ. Saw 15 amp	472	305	
5613	NEW 7-1/4" Circ Saw - pivot foot	205	118	
5525	NEW 6-1/2" Circ Saw - big capacity	173	115	
3400	10" Table Saw - Bench Top	270	178	
3330	16" Scroll Saw - Bench Top	209	139	
3370	4" Belt/6" Disc Sander - Bench Top	209	145	
3380	8" Drill Press - Bench Top	209	145	

DUO-FAST AIR NAILERS				
Model	Description	List	Sale	
BB-4440	Brad Nailer 1/2" - 1-1/4"	336	199	
LFN-764	Finish Nailer 1" - 2"	564	335	
LFN-880C	Finish Nailer 1-1/2" - 2-1/2"	720	425	
RCN-60/225	Coil Roofing Nailer	740	435	
CN-350	Framing Nailer - Full Head	704	415	
CN-325	Framing Nailer - Clip Head	670	395	

ACCU-MITER				
Model	Description	List	Sale	
18-34	Professional Miter Gauge	149	145	

HITACHI TOOLS				
Model	Description	List	Sale	
C75B	7-1/4" Circular Saw	233	125	
C78B	7-1/4" Circular Saw with brake	258	105	
K10001	Hitachi Steel case for above saws	14.95	14.95	
M12V	3 HP variable speed Router	476	239	
TR12	Plunge Router 3 HP	389	188	
SB-75	3 x 21 Belt Sander w/ bag - 2 speed	278	155	
F1000A	12" Planer/6" Jointer	4600	2349	
P12R	12-9/32" Planer	1470	789	
P12RA	12-9/32" Planer/6-1/8" Jointer	1940	989	
C10FC	NEW 10" Miter Saw	432	255	
C8FB	8-1/2" Slide Compound Saw	1400	599	
P20SB	3-1/4" Planer 3.4 amp	179	95	
FR5UD	LU91M008 8-1/2" carb. blade 48 tooth	54	54	
C15FB	15" Miter Saw	1320	675	
G12SA	4-1/2" Grinder 6.9 amp	160	89	
DS10DVAK	12 volt cds Drill Kit w/2 batt.	393	199	

Hitachi Air Tools				
Model	Description	List	Sale	
NR83A	Framing Nailer 2" - 3-1/2" Full Head	700	395	
NR83AA	Framing Nailer 2" - 3-1/2" Clip Head	750	419	
NT65A	16 ga. Brad Nailer 1" - 2-1/2"	610	335	
NT45A	18 ga. Brad Nailer 13/16" - 1-3/4"	490	275	
NV45AB	Coil Roofing Nailer 7/8" - 1-3/4"	750	419	
NR83A	Coil Nailer 2" - 3-1/4"	750	419	
NV50A1	Coil Nailer 1-1/4" - 2"	564	315	
N5008AA	7/16" Stapler - 16 ga. 1" - 2" lgh	580	325	
N3824A	1" Stapler 16 ga. 1/2" - 1-1/2"	630	359	

QUAL-CRAFT JACKS				
Model	Description	List	Sale	
2200	Pump Jack	79	58	
2201	Pump Jack Brace	30	20	
2203	Pump Jack guard rail holder	31	21	
2204	Work Bench & rail holder combo	53	39	
Buy any 6 (can be assorted) deduct additional 10%				
2601	Wall Jack	167	108	

WEDGE SMART LEVEL				
Model	Description	List	Sale	
SM-PR2	2 FT Level with sensor and case	120	88	
SM-PR4	4 FT Level with sensor and case	150	105	
SM-PR6	78" Level with sensor and case	180	139	
SL209	9" Torpedo Level w/sensor	69	45	
SL224	2 FT Level with sensor	79	58	
SL248	4 FT Level with sensor	95	65	

AEG POWER TOOLS				
Model	Description	List	Sale	
HBSE75S	3" x 21" variable speed Belt Sander	309	175	
ABSE15S	12V cds 12V Drill complete w/case	403	174	
FSPE100X	NEW Barrell Grip Jig Saw w/case	274	155	
BSPE100X	NEW Top Handle Jig Saw w/case	286	155	
TXE150	6" var/spd Rand Orb Sander	304	139	
SKS300	10" Compound Miter Saw	1019	499	

DREMEL TOOLS				
Model	Description	List	Sale	
3950	Moto Tool Kit with bits & case	134	79	
3952	Super Moto Tool Kit with accessories	152	95	
1671	16" Scroll Saw - 2 speed "Best buy"	302	174	
1695	NEW 16" var. speed Scroll Saw	408	224	
290	Electric Engraver with point	25	16	
8508	Cordless Moto Tool Kit with case	109	64	
1731	5" Disc 1" x 30" Belt Sander	189	114	

FEIN				
Model	Description	List	Sale	
Msx636	Oscillating Triangle Sander	185	185	

PONY				
Model	Description	List	Sale	
LPN672	Air Palm Nailer with glove	184	99	

BLACK & DECKER				
Model	Description	List	Sale	
1166	3/8" Drill 0-2500 rpm 4 amp	118	65	
2600	3/8" Drill rev. 0-1200 rpm 4.5 amp	167	95	
1180	3/8" Drill 0-1200 rpm 5 amp	207	114	
1321	1/2" Spade handle Drill 450rpm 7 amp	320	188	
1349-09	1/2" Timberwolf Drill 2 speed	551	309	
2037	Drywall Gun 0-4000 5.0 amp	184	98	
2038	Drywall Gun 0-2500 rpm 5 amp	184	99	
2054	Tek Gun 0-2500 5.0 amp	287	159	
2050	Tek Gun 0-900 5.0 amp	260	169	
2660	Drywall Gun 0-4000 4.5 amp	149	88	
2665K	3/8" cordless 12V Cyclone Drill	294	166	
5045K	MACHO Rotary Hammer Drill	439	238	
2750	4-1/2" Grinder 10,000rpm 6 amp	156	83	
3157	Orbital var. speed Jig Saw 4.5 amp	263	149	
1703-1	10" Miter Saw w/73-770 blade&bag	344	198	
79-032	Workmate 200	155	78	
79-033	Workmate 300	175	89	
79-034	Workmate 400	184	109	
1180	3/8" Drill rev. 0-1200 rpm 5 amp	192	114	
2694	7-1/4" Super Sawcut Circ Saw w/cse	285	152	
2695	8-1/4" Super Sawcut Circ Saw w/cse	328	182	
BD5200	Quantum New 1/2" Rand Orb Sander	160	88	
BD5900	Quantum New 1/2" Belt Sander	121	69	

ELU by Black & Decker				
Model	Description	List	Sale	
3304	1 HP variable speed Plunge Router	307	169	
3375	3-1/8" Universal Planer 7.2 amp	329	159	
3380	Biscuit Joiner with case	569	185	

BOSTITCH AIR NAILERS				
Model	Description	List	Sale	
NR80S-1	Stick Nailer	348	209	
NR45	NEW Coil Roof Nailer 3/4" - 1-3/4"	845	409	
N60FN	2 Finishing Nailer 1-1/4" - 2-1/2"	650	335	
N60FN-2K	N60FN-2 with case, oil, & nails	647	379	
T50S4-1	Decking & Sheathing Stapler	619	355	
M11FS	Flooring Stapler 15 ga.	931	535	
N100S	Stick Nailer 2" - 4"	931	539	
T31	Brad Nailer 5/8" - 1"	281	145	
CWC1001	HP Pancake Compressor	463	289	

SENCO AIR NAILERS				
Model	Description	List	Sale	
SFN1	Finishing Nailer 1" - 2"	448	298	
SFN40	NEW Finish Nailer 1-1/4" - 2-1/2"	571	385	
SN325	Nailer 1-7/8" - 3-1/4"	665	419	
SLP20	NEW Pinner w/case 5/8" - 1-5/8"	399		



# DEWALT

Model	Description	List	Sale
DW944K-2	3/8" 9.6V cordless drill kit w/2 batteries	283	165
DW945K-2	3/8" 12V cordless drill kit w/2 batteries	309	169
DW364	7-1/4" Circ. Saw with brake, 13 amp	285	154
DW306K	8.0 amp Recip Saw with case var. speed	291	164
DW610	1-1/2 HP 2 handle Router	274	149
DW411	1/4 sheet Palm Sander, 1.7 amp	97	58
DW705	12" Compound Mitr Saw	706	379
DW704	12" Mitr Saw	570	325
DW100	3/8" Drill, 4 amp, 0-2500 rpm, rev.	118	68
DW947K	3/8" 13.2 volt cordless Drill Kit	327	219
DW421	NEW Palmgrip Random Orb Sander	138	79
DW421	above Sander with dust collector	138	79
DW930K	NEW 12 volt 5-3/8" Trim Saw kit	370	209
DW935K	NEW 14.4 volt 5-3/8" Trim Saw kit	444	249
DW444	NEW 6" Random Orbit Sander - PSA pad	286	149
DW443	NEW DW444 with hook & loop pad	286	149

Model	Description	List	Sale
DW250	4.5A Drywall Gun, 0-4000 rpm, rev.	169	94
DW254	4.5A Drywall Gun, 0-2500 rpm, rev.	169	94
DW280K	NEW Screwdriver kit complete	207	119
DW318K	Top Handle Jig Saw with case	277	159
DW402	4-1/2" Grinder 6 amp	158	89
DW614	NEW 1-1/4 HP Plunge Router	290	145
DW615	NEW 1-1/4 HP Electronic Plunge Router	290	158
DW624	NEW 3 HP Plunge Router	441	245

**SUPER SPECIAL**  
**DW625** NEW 3 HP v/spd Plunge Router... Sale 269  
 Includes FREE DW6966 fine depth adjuster.

Model	Description	List	Sale
DW675K	NEW 3-1/8" Planer with case	289	164
DW430	NEW 3"x 21" Belt Sander	291	165
DW431	NEW 3"x 21" variable speed Belt Sander	331	179

**NEW DEWALT CORELESS DRILLS**

Model	Description	List	Sale
DW952K	3/8" var/spd includes one 9.6V battery	280	159
DW953K	3/8" var/spd includes one 12V battery	306	175
DW962K-2	3/8" var/spd incl. two 9.6V XR batteries	324	179
DW972K-2	3/8" var/spd incl. two 12V XR batteries	352	189
DW991K	3/8" var/spd includes one 14.4V XR battery	370	199

Above drill kits come with charger & steel case

**SUPER SPECIAL**  
**DW682K** NEW Biscuit Joiner with case... Sale 219

# RYOBI

Model	Description	List	Sale
JP-155	6-1/8" Jointer/Planer	700	305
TS-254	10" Mitr Saw	440	209
RE500	3 HP Plunge Router var speed	500	235
R175	NEW 1-3/4 HP Plunge Router	158	95
RE175	NEW 1-3/4 HP var/spd Plunge Router	210	124
BE321	3" x 21" var. speed Belt Sander	310	139
SC160	16" Bench Scroll Saw	282	135
SC162VS	NEW 16" var. speed scroll saw	298	174
TFD172VRK	9.6 volt cordless Drill Kit w/2 batteries	330	139
TFD222VRK	12 volt cordless Drill Kit w/2 batteries	365	155
JFF100	Flashlight uses 7.2, 9.6, or 12V battery	19.95	
MI100K	Biscuit Joiner with case	475	218
BT3000	10" Table Saw with stand	1125	529

Model	Description	List	Sale
TSS220	8-1/2" Slide Comp. Saw	966	445
TS260	10" Compound Mitr Saw	486	239
TR300	3/4 HP Trimmer	174	85
DS1000	NEW Detail Sander	90	44
DS2000	NEW Detail Sander - 2 speed	112	69
DC500	NEW Detail Carver	120	75
RS112	Palm grip Random Orb Sander	90	55
RS115	4-1/2" v/spd Random Orb Sander	136	74
AP12	NEW 12" Bench Planer	884	395
JS45	NEW Top Hole Jig Saw v/spd	98	59
TDS4000K	NEW 12V Drywall Gun Kit 2 spd	420	215
RA202	NEW 8-1/4" Bench Radial Arm Saw	800	389
BS900	NEW 9" Bench Band Saw	340	169
IDV28	NEW 28 Gal. Industrial Dry Vac	225	119
BMM2400	NEW 24 volt Mulching Mower	349	349
W660C	7-1/4" Circ Saw 13 amp	184	79
ML618	NEW Mini Lathe variable speed	418	219

**SUPER SPECIAL**  
**OSS450** NEW Oscillating Spindle Sander... Sale 159

# PANASONIC

Model	Description	List	Sale
EY6205EQK	Same as EY6205BC but comes with NEW Ironman battery	368	192
EY6207EQK	1/2" Drill w/ keyless chuck var. speed w/ 15 min. charger, case, & Ironman battery	420	229
EY6282EQK	Var. spd 9.6 volt Drill with 15 min. charger, case, and NEW Ironman battery	315	169
EY6282DKW	9.6 volt Drill Kit w/2 batteries	395	162

Model	Description	List	Sale
EY6181CRKW	NEW 9.6V PREDATOR Compact Drill Kit with 2 batteries - 10% more power than EY6282DKW	305	158
EY6100CRKW	NEW 12V PREDATOR drill kit with 2 batteries, 1 hr charger, & case	358	185
EY6100CQKW	Same as EY6100CRKW but has 15 minute charger	420	198
EY6100EQK	NEW 12V PREDATOR drill kit w/NEW Ironman battery, 15 min. charger, & case	375	199
EY6100EQKW	Same as EY6100EQK but with 2 Ironman batteries	473	225

**Ironman Battery** = Battery has 40% more life and 20% more torque!

**Most Tools In This Ad Shipped Federal Express for \$9.00!**

**SEE NEXT PAGE FOR MORE SPECIALS!**

# PORTER CABLE

Model	Description	List	Sale
630	1 HP Router 6.8 amp	200	129
690	1-1/2 HP Router 10 amp	260	138
9690	690 Router w/steel case	305	145
691	1-1/2 HP Router D handle	285	155
43800	Router bit case	2.99	
695	1-1/2 HP Router/Shaper	400	223
696	Heavy Duty Shaper Table	230	129
100	7/8 HP Router	190	109
5060	"Stair Ease" Stair Templet	208	145
5061	"Stair Ease" Hard Wood Templet	243	149
5008	Dovetail Template kit	130	85
5009	Mortise & Tenon Jig	75	48
693	1-1/2 HP Plunge Router	320	174
6931	Plunge Router Base	125	77
5116	16" Omni-Jig	470	258
7116	24" Omni-Jig	535	294
7310	5.6 amp Laminate Trimmer	165	95
7312	5.6 amp Offset Base Lam Trimmer	230	128
7319	5.6 amp Tilt Base Lam Trimmer	182	115
97310	Laminate Trimmer Kit complete	360	198
7518	3-1/4 HP 5 speed Router	510	268
7519	3-1/4 HP 2 handle Router	445	239
7536	2-1/2 HP 2 handle Router	365	205
7537	2-1/2 HP "D" handle Router	385	214
7538	3-1/4 HP Plunge Router	445	239
7539	3-1/4 HP var. spd Plunge Router	510	269

Model	Description	List	Sale
351	3"x21" Belt Sander without bag	280	154
352	3"x21" Belt Sander with bag	290	159
352VS	3" x 21" Belt Sander var. speed w/case	305	169
360	3"x24" Belt Sander with bag	365	194
361	3"x24" Belt Sander without bag	345	189
362	4"x24" Belt Sander with bag	380	205
363	4"x24" Belt Sander without bag	360	195
503	3"x24" Belt Sander w/bag Worm Drive	582	365
504	3"x24" Belt Sander Worm Drive	565	359
330	1/4 sheet Palm Sander \$10 rebate	110	60
7400	7" Vertical Grinder 12 amp	260	145
7401	7" Polisher 8 amp	270	149
7403	6" Power Paint Remover 8 amp	290	165
7402	7" Vertical Disc Sander 8 amp	260	145
505	1/2 sheet Orbital Pad Sander	230	128

**RANDOM ORBIT SANDERS**

Model	Description	List	Sale
332	Palmgrip Random Orb Sander	120	69
333	above Sander with dust bag	135	75
334	333 sander with PSA pad	135	74
7334	5" Pad 6000 rpm	225	122
7335	5" Pad var. speed with case	245	132
7336	6" Pad var. speed with case	250	137
73333	Dust Collection Kit	31	24.50

**RECIPRO SAWS**

Model	Description	List	Sale
9627	Recipro Saw 2 speed 8 amp	244	148
9629	Recipro Saw variable speed 8 amp	270	148
9637	Full var/spd Recipro Saw 8 amp	270	148
9647	TIGER CUB Recipro Saw	210	119

Model	Description	List	Sale
7556	1/2" Right Angle 330/700rpm Drill w/cse	385	224
666	0-1200 rpm 3/8" var. speed Drill 4 amp	230	128
7557	3/8" variable speed angle Drill	295	195
97751	1/2" var. speed Hammer Drill w/case	270	155
2620	3/8" HD var. speed Drill 0-1000 rpm	185	105
6611	New 3/8" Drill 0-1000 rpm 5.5 amp	220	125
6614	New 1/2" Drill 0-750 rpm 5.5 amp	230	128
6615	New 6614 with keyless chuck	230	128
9852	12 volt 3/8" Drill w/cse 0-400/0-1000 rpm	280	154
9853	9852 with keyless chuck	280	154
9853K	9853 Drill Kit with extra battery	Sale 164	
9855	12V 1/2" Drill w/cse 0-350/0-1000 rpm	335	188
8500	12 volt battery for above Drills	69	45
9841	9.6 volt cordless Drill Kit with 15 minute charger, battery, & case	309	169
9840	9.6 volt cordless Drill Kit with 1 hour charger, 2 batteries, & case	289	164
8400	9.6 volt battery for above Drills	67	49

**SAWS**

Model	Description	List	Sale
314	4-1/2" Trim Saw 4.5 amp	255	142
9314	above Saw with case	280	158
345	6" Saw Boss 9 amp	190	104
9345	345 comp. with case & carbide blade	220	124
7700	10" "Lazerloc" Miter saw	634	344
1400	14" abrasive cut-off machine	372	215

**PLANERS**

Model	Description	List	Sale
9118	Porta Plane w/carbide cutter & case	390	215
9652	Versa-Plane w/carbide cutter & case	479	319

Model	Description	List	Sale
550	Pocket cutter with case	330	179
555	Plate Biscuit Joiner with case	320	159
5554	1000 Assorted Biscuits		29
5553	1000 #20 Biscuits		29
5552	1000 #10 Biscuits		29
5551	1000 #0 Biscuits		29

**SUPER SPECIAL**  
**556** 555 Joiner w/5556 tilt fence... Sale 165

**DRYWALL GUNS**

Model	Description	List	Sale
7399	Drywall cutout unit 5.6 amp	140	84
6645	New 0-2500 Drywall Gun 5.2 amp	195	99
96645	New Screwdriver Kit	226	129
1700	Heat gun 750° - 1000°	120	74

**NEW TOOLS**

Model	Description	List	Sale
340	NEW 1/4 Sheet Orb Sndr w/dust pickup	89	55
511	NEW Cylindrical Lock installation kit	250	149
310	NEW Production Laminate Trimmer	250	145
312	NEW Production Offset Lam. Trimmer	295	169
410	NEW Underscribe Trimmer	266	155
347	NEW 7-1/4" "Framers" Circ. Saw	225	129
743	NEW 347 Saw - left hand version	225	129
9743	NEW 743 Saw with case	255	148
9347	NEW 347 Saw with case	255	148
843	NEW 447 Saw - left hand version	245	139

**SUPER SPECIAL**  
**447** NEW 7-1/4" "Framers" Circ. Saw w/brake Sale 134

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## MAKITA

CORDLESS			
Model	Description	List	Sale
6070DW	3/8" var. speed rev. Drill 7.2 volt	128	84
6071DWK	3/8" variable speed rev. Drill with removable battery 7.2 volt	216	119
5090DW	3-3/8" Panel Saw 9.6 volt	270	145
6010DWK	3/8" Drill Kit 7.2 volt	182	105
4390DW	9.6 volt Recipro. Saw Kit	258	148
ML90	Incandescent Flashlight 9.6 volt	Sale	37
6010DL	3/8" Drill with flashlight 7.2 volt	230	125
6891DW	Drywall Gun 0-1400 9.6 volt	270	158
6172DWE	7.2V 3/8" var. spd Drill Kit w/ 2 batt	200	109
T220DW	Cordless Stapler Kit 9.6 volt	370	198
DA391DW	3/8" angle Drill Kit 9.6 volt	312	175
6012HDWE	9.6V 2 speed Drill Kit w/ 2 batteries	243	135
6093DW	9.6V Var/speed Drill Kit complete	283	135
6093DWE	6093DW Drill Kit with 2 batteries	270	139
6095DW	6093DW Kit with keyless chuck	291	135

SAWS			
Model	Description	List	Sale
5007NBA	7-1/4" Circ. Saw w/electric brake	263	135
JR3000V	Var. speed Recip. Saw w/case	252	135
9820-2	Blade Sharpener	394	205
4301BV	Orb var. speed Jig Saw 3.5 amp	292	158
LS1440	14" Mitre Saw	969	579
2414	14" Cut-off Saw AC/DC	403	225
4320	Var. spd economy Jig Saw 2.9 amp	156	98
LS1030	10" Mitre Saw	428	225
LS1020	10" Mitre Saw 12 amp	630	355
2708W	8-1/4" Table Saw	585	298
2711	10" Table Saw with brake	1067	565
5007TB	7-1/4" Hypoid Saw	281	155
5007NB	7-1/4" Circular Saw 13 amp	232	124
5007NBK	5007NB Saw w/ plastic case	Sale	129
5007S	5007NB with square cutting guide	283	139
5012B	11-3/4" electric Chain Saw 11.5A	264	159
LS1211	New 12" Slide Compound Saw	1550	865

**SUPER SPECIAL**  
6095DWE 6095DW Drill Kit w/2 batteries...270 139

**SUPER SPECIAL**  
LS1011 10" Slide Compound Saw...Sale 509

6201DWE	NEW 9.6V Drill Kit with 2 batteries	298	158
6211DWE	12V "Mac Pak" Drill Kit w/2 batteries	330	169
6011DWE	NEW 12 volt Drill Kit w/ 2 batteries	330	165
632007-4	9.6 volt Battery	47	30
632002-4	7.2 volt Battery	39	28

PLANERS			
Model	Description	List	Sale
2012	12" portable Bench Planer 12amp	959	539
N1900B	3-1/4" Planer with case	244	129
2030N	12" Planer/6" Jointer	2861	2399
2040	15-5/8" Planer	2167	1749

ROUTERS			
Model	Description	List	Sale
3606	2 Handle Router 1 HP	180	109
3620A	1-1/4 HP Plunge Router w/case	220	135
3612BRA	3-1/4 HP Plunge Router with brake	524	175

DRYWALL GUNS			
Model	Description	List	Sale
6800DV	0-2500 rpm 3.5 amp	180	105
6801DV	0-4000 rpm 3.5 amp	180	105
6805BV	0-2500 rpm 4.8 amp	214	129
6820V	0-4000 rpm 5.2 amp	171	99
6802BV	0-2500 rpm Screwdriver 4.8 amp	223	145

SANDERS			
Model	Description	List	Sale
BO4510	1/4 sheet Pad Sander	106	59
BO4530	6" Round Sander	117	68
BO4550	1/4 sheet Pad Sander w/bag	98	52
9035	1/3 sheet Finish Sander	129	79
9900B	3"x21" Belt Sander w/bag 7.8amp	344	175
9901	3"x21" Belt Sander w/bag 6.7amp	278	145
9924DB	3"x24" Belt Sander with bag	329	184
9401	4"x24" Belt Sander with bag	378	229
GV5000	5" Disc Sander	123	74
9207SPC	Sander-Polisher 1500-2800 rpm	350	184
BO5001	NEW 5" Random Orbit Sander	120	69

DRILLS			
Model	Description	List	Sale
6402	3/8" Drill 0-1200 rpm 5.2 amp	199	112
6404	3/8" Drill 0-2100 rpm 2.8 amp	112	58
6510LVR	3/8" Drill 0-1200 rpm 3.5 amp	168	93
6302	1/2" Drill 0-550 rpm 5.2 amp	228	124
6013BR	1/2" Drill 550 rpm 6 amp	280	149
6301LR	1/2" D-handle 550 rpm 5.2 amp	281	155
DA3000R	3/8" angle Drill 0-1400 rpm	314	179
6300LR	1/2" right angle 550 rpm 5.2 amp	400	235
DA6300	1/2" angle Drill 2 speed 7.5 amp	472	249
NHP1030W	3/8" v/spd Hammer Drill w/cse	225	129
HP2010N	1/2" v/spd Hammer Drill w/cse	335	178

GRINDERS			
Model	Description	List	Sale
N9514B	4" Grinder 4.6 amp	111	59
N9501B	4" Grinder 4.0 amp with case	168	99

**SUPER SPECIAL**  
1584VSK or 1587VSK with steel case and 30 Bosch Blades...Sale 189

## BOSCH

ROUTERS			
Model	Description	List	Sale
1608	5.6 amp Laminate Trimmer	168	95
1608LX	same as above w/trimmer guide	191	110
1608T	5.6 amp tilt base Trimmer	191	104
1609	5.6 amp offset Base Trimmer	239	139
1609K	Laminate Installers Kit w/1609	343	184
1609UR	Underscribe Laminate Trimmer	227	145
1609KX	Same as 1609K/Underscribe base	405	228
1601A	1 HP Router 25,000 rpm	191	119
1604A	1-3/4 HP 2 handle Router	250	139
1604AK	same as above w/case & access.	318	185
1606A	1-3/4 HP D handle Router	295	179
1613	1-3/4 HP Plunge Router	316	169
1613EVS	2 HP v/spd Plunge Router	359	194
1614	NEW 1 HP Plunge Router	245	149
1614EVS	NEW 1-1/4 HP v/spd Plunge Router	283	159
1615	NEW 3 HP Plunge Router	430	259
1615EVS	NEW 3 HP var. spd Plunge Router	505	278

PLANERS			
Model	Description	List	Sale
3272K	3-1/4" Planer with case	187	115
3258	3-1/4" Planer w/blade guard 5.7amp	247	155
3258K	3258 Planer with case	273	169

**SUPER SPECIAL**  
B1650K NEW Biscuit Joiner...Sale 155

SANDERS			
Model	Description	List	Sale
1272D	3" x 24" Belt Sander with bag	375	204
1273D	4" x 24" Belt Sander with bag	380	215
1273DVS	Var. speed 4"x24" Belt Sander	415	219
3270DVS	3" x 21" v/spd Belt Sander w/bag	270	165
3283DVS	5" Random Orbit Sander	169	98
3283DVSK	above sander w/discs and case	199	118
1370DVS	6" Random Orbit Sander	427	224
1289D	1/4 sheet Sander with bag	107	68
B7000	NEW Corner Detail Sander	122	68

SAWS			
Model	Description	List	Sale
1587VS	NEW Top Handle "CLIC" Jig Saw	292	149
1587DVS	above saw with dust collection	295	154
1584VS	NEW "CLIC" Barrel Grip Jig Saw	285	149
1584DVS	above saw with dust collection	295	189
BB	Bosch metal case for above Jig Saws	Sale	32
BCA	30 of Bosch's best Jig Saw blades	28.99	
1632VSRK	Recip Saw 8.4 amp Orb var spd	225	154
1655	NEW 7-1/4" Circular Saw	120	125
B4050	NEW In Line Jig Saw	199	119

DRILLS			
Model	Description	List	Sale
1195VSR	3/8" var. speed Hammer Drill	229	135
1194VSR	1/2" var. speed Hammer Drill	282	149
1194VSRK	Same as above with case	313	169
11212VSR	"Bulldog" 3/4" SDS Rotary Drill	390	209
11304	"The Brute" Breaker Hammer	2240	1199
11305	Demolition Hammer 10 amp	1199	715
3050VSRK	9.6 volt cds Drill Kit w/2 batteries	288	149
3051VSRK	3050VSRK with keyless chuck	299	149
3054VSRK	NEW 12V Cordless Drill Kit with 2 batteries	330	185
1021VSR	3/8" Drill 4.8 amp 0-1100 rpm	203	112
1023VSR	1/2" Drill 4.8 amp	227	119
1942	Heat Gun 600° - 900°	125	78
1130EVS	Demolition Hammer	879	535
11210EVS	1-1/2" Spine Hammer Drill	889	485
11210VSR	3/4" Rotary Drill var speed	355	199
1420VSR	Drywall Gun 4.8 amp 0-4000 rpm	179	98

GRINDERS			
Model	Description	List	Sale
1347AK	4-1/2" Grinder with case & access.	185	109
1348AE	5" Grinder 8.5 amp	225	129

## MILWAUKEE

RECIP SAWS			
Model	Description	List	Sale
6527	Super Sawzall variable speed 8 amp with case & Quick Loc Cord	320	172
8528	6527 with Wired Cord	316	172
6507	"The Original" Sawzall with case	264	144
6508	6507 with Wired Cord	260	144
6511	2 speed Sawzall with case	249	139

DRYWALL GUNS			
Model	Description	List	Sale
6754-1	0-4000 rpm 4.5 amp	196	114
6749-1	0-2500 rpm 5.2 amp	218	128
6755-1	0-4000 rpm 5 amp	170	99
6747-1	0-2500 rpm 5 amp	186	109
6767-1	Screw Shooter Kit	229	138

CORDLESS			
Model	Description	List	Sale
0399-1	12V cordless variable speed Drill with battery, charger, & case	315	172

DRILLS			
Model	Description	List	Sale
0224-1	3/8" Drill 5.2 A magnum 0-1200 rpm	227	124
0225-1	Above drill with keyless chuck	203	124
0234-1	1/2" Drill 5.2 A magnum 0-850rpm	237	128
0235-1	above Drill with keyless chuck	237	128
0236-1	0234-1 drill with case	269	149
0244-1	1/2" Drill 5.2 A magnum 0-600rpm	237	128
0222-1	3/8" Drill 3.5 amp 0-1000 rpm	198	109
0228-1	3/8" Drill 3.5 amp 0-1000 rpm	195	109
0230-1	3/8" Drill 3.5 amp 0-1700 rpm	218	119
0375-1	3/8" close quarter Drill	237	129
0379-1	1/2" close quarter Drill	268	152
3102-1	Plumbers rt angle Drill Kit 500rpm	389	215
1676-1	HD Hole Hawg with case	499	268
3107-1	1/2" v/spd rt angle Drill Kit 0-500 rpm	399	219
3300-1	1/2" v/spd rt angle Kit 0-850rpm	356	194

**SUPER SPECIAL**  
0407-1 Same as 0399-1 but with keyless chuck and 2 batteries...Sale 172

BELT SANDERS			
Model	Description	List	Sale
5925	3" x 24" with bag 10 amp	449	245
5936	4" x 24" with bag 10 amp	449	249

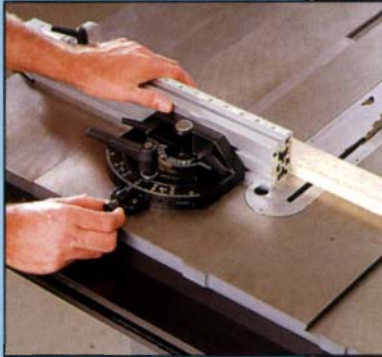
SAWS			
Model	Description	List	Sale
6215	16" Chain Saw	375	205
6365	7-1/4" Circular Saw	218	122
6367	above Saw - double insulated	213	128
6366	6365 Saw with fence & blade	228	129
6368	6365 Saw w/fence, blade & case	249	139
6377	7-1/4" Worm Drive Saw	330	189
6378	8-1/4" Worm Drive Saw 15 amp	341	189
6256	Variable speed Jig Saw 3.8 amp	264	148
6460	10-1/4" Circular Saw 15 amp	468	279
6232	4-3/4" Band Saw w/cse v/spd	480	289
6175	1/4" Chop Saw 15 amp	499	279
6369	7-1/4" Circular Saw w/brake	259	148
6494	NEW 10" Compound Mitre Saw	444	255
6490	NEW 10" Mitre Saw	444	255

SANDERS			
Model	Description	List	Sale
6125	5" Rand Orbit Sander 10,000 rpm	200	119
6126	6" Rand Orbit Sander 10,000 rpm	205	124
6127	5" Random Orbital Sndr dustless	270	155
6008	1/3 sheet Orbital Sander	209	124
6010	1/2 sheet Orbital Sander	214	124
6016	1/4 sheet Palm Grip Sander	97	54



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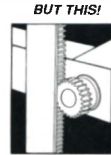
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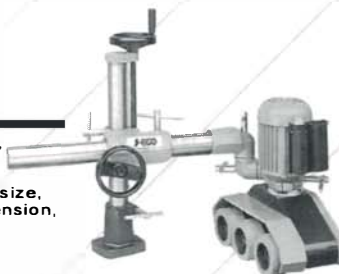
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READER SERVICE NO. 157



# A Small Bureau Built to Last

*Opaque finish and applied moldings cloak a flock of dovetails*

by Robert Treanor





The dovetail joint's prevalence and persistence is due to its unsurpassed ability to hold pieces of wood together. The painted chest of drawers I made (see the photo at left) illustrates the strength and versatility of the dovetail in a variety of forms. Tapered sliding half-dovetails lock the top to the sides; half-blind dovetails join the sides to the bottom; sliding dovetails link the drawer dividers to the sides; and through- and half-blind dovetails join the drawers (see the drawings on pp. 56-57).

All this dovetailing makes the piece rock solid, but it is hidden strength. The chest has an unimposing scale that suits it to a living room, where it could stand at the end of a sofa and serve as an end table as well as a bureau. The moldings that hide its joinery are clean and simple, particularly the single-arch molding on the front of the chest with its bird's-mouth joints at the drawer dividers and its tapers, top and bottom.

### Construction

I began the chest by gluing up material to form the top, bottom and sides. I used ash, a ring-porous, coarse-textured hardwood. Because I intended to paint the piece, I wasn't too careful about the color match of planks. But because the wood's coarse texture would show, I took pains to ensure figure and grain were consistent between the boards to be edge-glued.

**A strong, self-locking joint**—I used tapered, sliding half-dovetails to join the case sides to the top (see figure 1 on p. 56). This joint is excellent in a situation where one case member runs past or

**Dovetails hide behind moldings and paint**—This sofa-side chest of drawers (left) packs a robust array of joinery in a small frame.

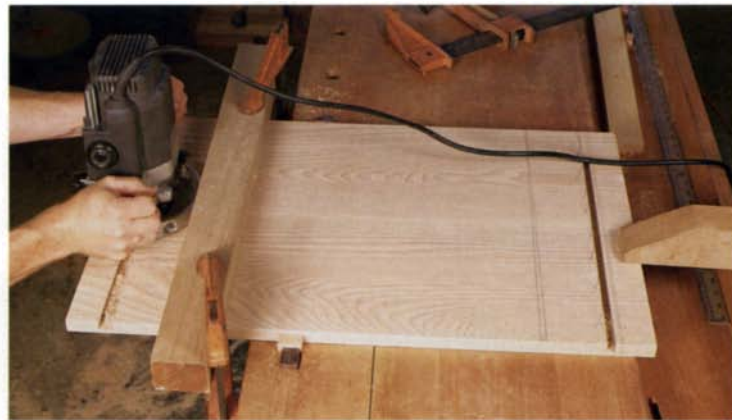
overhangs another. Its advantages are many: It is self-locking, so it will hold both pieces rigid and flat even if the glue should fail; it won't bind in assembly; and it is strong. The half-dovetail is a variation on tapered sliding dovetails in which the pin seen in cross section has only one wedged side; the other side is simply a rabbet that tapers from one end of the joint to the other.

I made sockets for these pins in two stages. The first cut was

a dado routed with a 3/8-in. straight bit along the tapered layout line. I routed the dado to a depth of 1/2 in. in several passes. With both dados cut, I changed to a 1/2-in. dovetail bit, set my scrap-stock fence parallel to the square layout line and routed the dovetail side of the socket in one pass (see the top photo).

I kept the dovetail bit at the same setting to cut the mating tapered half-dovetail pins on the tops of the case sides. I

locked the side in my bench vise and clamped a freshly milled piece of scrap along the top edge to give the router a greater bearing surface. Then, using the router's fence guide, I cut the dovetail along the outside face of the sides. Next I cut the tapered side of the half-dovetail with a rabbet plane. I clamped a fence along the shoulder line and guided the plane against it, as shown in the center photo. I planed down close to the taper line, taking light passes as I neared it. Before I reached the line, I started trial fitting the joint. This type of joint goes together sloppily until it's nearly home. The final inch or so will require firm hand pressure or even light mallet blows to close the joint completely. If you plane off too much, you can glue shims along the tapered edge and plane again to fit.



**Tapered socket in two steps**—First rout dados along the taper lines, as at right in the photo above. Then switch to a dovetail bit, clamp the fence parallel to the square layout line and cut the dovetailed side of the sockets, as at left in the photo above.

**Sliding half-dovetails are finished with a rabbet plane (left).** Cutting the taper of a sliding half-dovetail square with a rabbet plane instead of sloped on both sides like a full sliding dovetail makes a joint that's easier to fit. Stop and check the fit frequently as you approach the taper depth line.

**Perfecting half-blind dovetails**—After clearing waste with a Forstner bit in the drill press (below), the author pares to the lap line between pins of the half-blind dovetails at the bottom of the carcass sides. The board clamped to the workpiece guides the chisel for chopping through end grain.





**Half-blind dovetails** join the case sides to the bottom. I waited before cutting the bottom to length until I had the sides dry-fit to the top and could get an empirical measurement. I used nine tails across the width of the bottom, but the number or spacing isn't critical.

Because the pins on half-blind dovetails don't go through, it's harder to use them to lay out the tails, so I

cut the tails first and lay out the pins from them. I do most of my dovetail sawing with Japanese dozuki saws, which are fast, accurate, easy to control and leave only a hairline kerf. After using the tails to lay out the pins in the sides, I cut and chop the remainder of the joint. I often hog out waste between the pins with a Forstner bit in the drill press. That makes the chisel work much lighter (see the bottom photo

on p. 55). These joints won't show, but the more accurately they're cut the stronger the case will be and the closer the case will be to self-squaring. The joints will also provide practice, if needed, for the half-blind dovetails at the fronts of the drawers, the first place many people look when they open a drawer.

**Dividers and tenons**—The joinery for the drawer dividers

at the front and back of the case and the runners between them is a hybrid. The dividers are attached to the sides with sliding dovetails, which keep the sides from bowing and the dividers in place. The runners are tongued along one edge and let into a dado in the cabinet side and are tenoned at each end into the drawer dividers (see figure 2).

I cut a 1/2-in.-wide dado 1/8 in. deep for each of the runners





and for the kickers above the top drawers. As well as housing the runners, the dados index the router jig I use to cut the sliding dovetail sockets for the dividers. The jig is a simple assembly: An indexing bar on its underside fits in the dado, arms guide the router and a center section both limits the router's travel and provides a place to attach the jig to the workpiece with drywall screws (see the center photo

on p. 58). With the jig in place, I waste the bulk of the material with a 1/2-in. straight bit. Then the socket can be cut in one pass with a 3/4-in. dovetail bit.

With the drawer dividers cut to length, scraped and sanded, I cut dovetails on their ends. I cut them on the router table with the same bit I used to cut their mating dovetail sockets. I clamp a high fence to the table to aid in keeping

the pieces stable and run them past the bit vertically. The remaining joinery on the dividers are mortises cut at each end that will receive the tenons on the runners. I rout these with the dividers wedge-locked in a mortising box. I use a plunge router with a straight bit and cut in several passes. Then I square up the mortises by hand.

To fit the runners, I cut a 1/8-in. by 1/2-in. tongue on one

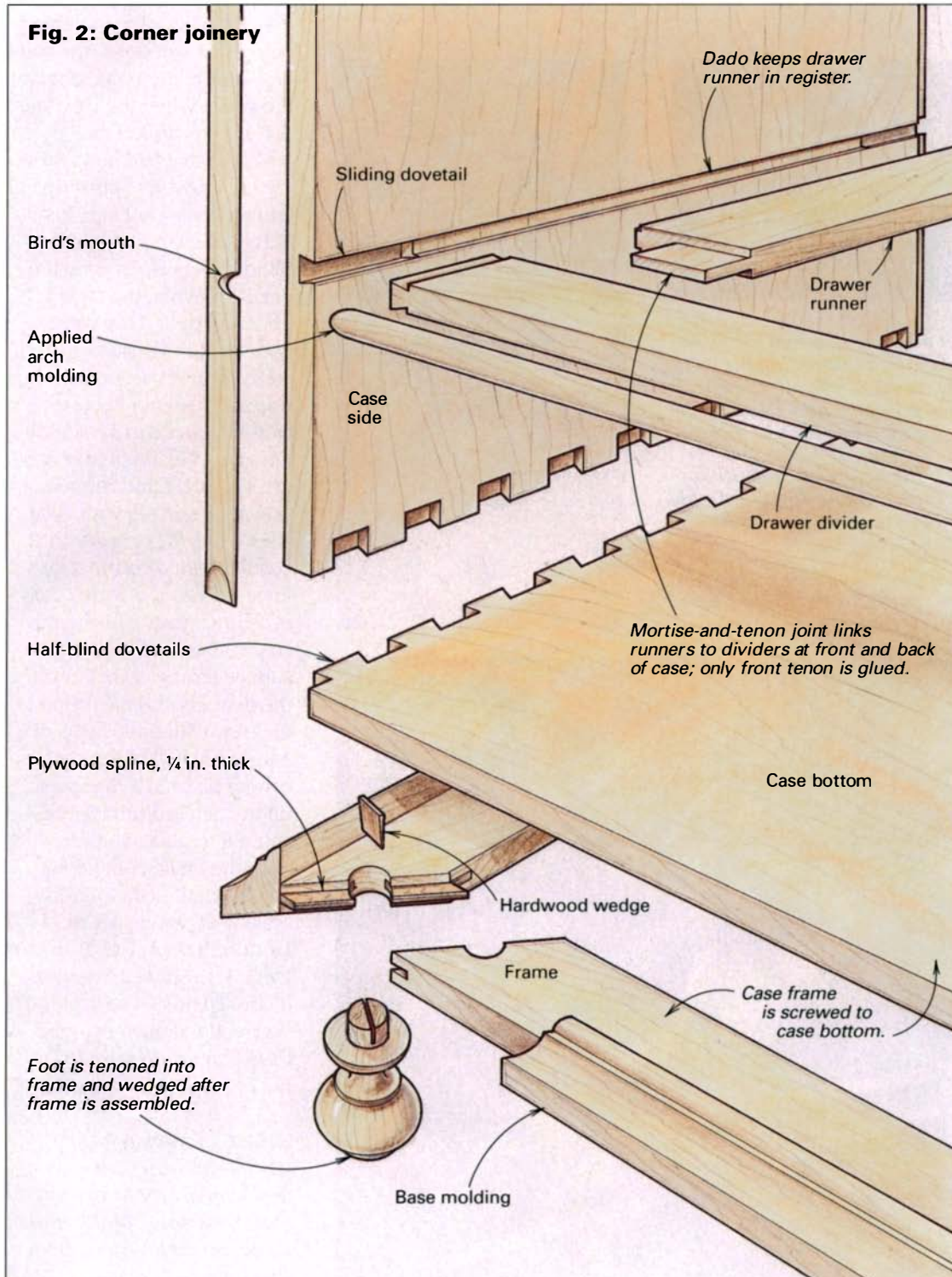
edge and tenons on each end. When the case is assembled, I'll glue the tenons into the front dividers but will leave them dry at the back to allow for seasonal movement of the case. Be sure to leave a gap between the shoulder of the dry tenon and the back divider. The size of the gap will depend on what fluctuations of humidity the piece is likely to encounter.

### Gluing up the case

The case is now nearly ready to glue up. But before that step, I shaped the edge of the top and routed rabbets in the parts to accept the frame-and-panel back. Because the joinery is all dovetails, I needed very few clamps. I used urea formaldehyde glue because it has a longer open time than the polyvinyl acetates (PVAs), and I planned to assemble the whole main case at once.

I began the assembly by applying glue to the tapered sliding half-dovetail sockets in the underside of the top. If the joint is a tight fit, only a small amount of glue is needed. I carefully slid the joint together, tapping lightly as needed. With the sides joined to the top, I turned the case upside down and glued the bottom to the sides, knocking the joints home evenly with a mallet and a block of scrap. Then I checked for square and cleaned off glue squeeze-out. If necessary, I use bar clamps to square up the case and hold things in alignment as the assembly continues.

I glued in the front dividers next, using glue judiciously and checking for square after each divider was glued in. Then I flipped the case over, so it sat on its front face. I applied glue to the mortises in the front dividers and installed the runners into the mortises and the dados cut into the sides, taking care not to get any glue in the dados. Finally, I glued the back dividers into their dovetail slots, pinching myself to refrain





from gluing the mortise-and-tenon joint that attaches them to the runners.

### Dressing the case

To make the arch molding that covers the front edges of the case, I milled a straight-grained board to  $\frac{3}{4}$  in. thick. I cut the profile on a router table with a fingernail or half-radius bit. The entire edge is shaped, so I put several layers of masking tape along the out-feed side of the fence to create an offset bearing surface. I ripped the molded edges off the board with the tablesaw.

I applied the arch molding after the cove molding at the top of the case was already in place. Fitting the small bird's-mouth junctions of the arch moldings requires patience and sharp tools. I began by

cutting the vertical pieces of molding to length and taping them to the front edge of the sides. Then I carefully marked the locations of the drawer dividers on the moldings, removed the moldings and laid out the bird's mouths on their back faces. I cut the waste away with a fine toothed backsaw and cleaned the cut by paring the remaining material with a sharp chisel, working up to the line with light cuts. Then I taped the moldings back onto the case and



**Paint pronounces the texture**—On a coarse-textured wood like ash, an opaque finish brings out the grain while hiding the color (above). The author left the ash case and drawer fronts unprimed to keep from filling the pores. He used painter's tape to mask the drawer sides and drawer openings. The interior finish is shellac.

**A good jig is easy to locate** (right). The drawer-runner dadoes across the case sides double as an indexing slot for the simple router jig, which cuts the stopped sliding dovetail sockets for the drawer dividers.

**Scarfs cut by eye**—A few mallet taps produce the scarf detail at the ends of the vertical arch moldings (below). The author keeps his first scarf in view and approximates the angle on the other cuts.



took measurements for horizontal moldings. I cut the horizontal moldings to length with a backsaw and a miter box. I glued and nailed the moldings to the case after all the joints had been fitted. I scarfed the ends of the moldings to meet the cove molding at the top of the case and the frame molding at the bottom. It's a small detail, but one that gives the piece its feeling of simple refinement. I made the cut by eye with a chisel, as shown in the bottom photo.



**A painted finish** is in keeping with the early 18th-century origins of this chest of drawers. I like the finish for the bold field of color it provides from afar and for the way it emphasizes the texture of the wood when seen up close. I used Fancy Chair Green, a latex finish that simulates milk paint (it is one of the Williamsburg Paint Colors made by the Stulb Co.; I bought mine from Primrose Distributing, 54445 Rose Road, South Bend, Ind. 46628; 219-234-6728). To prepare for painting, I wet down the surface with a damp rag to raise the grain. When the case was dry, I scuff-sanded the whiskers that had been raised. On the drawers, I put strips of painter's masking tape just behind the lap of the half-blind dovetails, creating the detail shown in the far left photo. I applied the paint with a natural bristle brush directly to the bare wood. I skipped a primer coat because I wanted to avoid filling the grain. I let the first coat dry overnight and rubbed down the surface with 0000 steel wool. When a second coat had dried completely, I finished the case with a coat of satin varnish to make the color richer and to give the surface more depth. I finished the drawers and the inside of the case with three coats of a thinned shellac. Shellac cannot be used as a topcoat on the painted surfaces because it tends to lift the paint. With the finish completely dry, I mounted the period brass pulls (available from Horton Brasses, P.O. Box 120, Dept. F, Cromwell, Conn. 06416; 203-635-4400), glued and wedged the feet to the base frame, and screwed the base frame to the case. □


*Robert Treanor, a former teacher in the woodworking program at San Francisco State University, builds and writes about furniture in the Bay area.*



# Two-Day Lustrous Oil Finish

*A technique to turn four coats into a smooth, beautiful finish in just 48 hours*

by Sven Hanson



*Building a lustrous oil finish in just two days is easy with the proper techniques. Preparation (sanding) and a smooth stroke, applying the right amount of finish, is the key.*

**W**ood finishing is a repository for so much voodoo lore that some procedures should list chicken blood as an ingredient. But it can be done easily. I'll give you the basics and a plan for applying four successive coats of oil in 48 hours, using a clean rag to wipe clean oil onto a clean surface with just a bit of fine sanding between coats. The fourth coat comes out so smooth (see the photo above) that abrasion, wax or oil is necessary only to fine-tune the level of gloss desired. Really!

At first I made the natural mistake of assuming that if a surface looked smooth or felt smooth, it was ready for finishing. But when a board passes beneath the planer blade, the blade's rotation causes variations in cutting angle and height. Unless you smooth that cornrowed surface, it will reappear in your finish.

So you sand. But if you start with too rough a grit and don't get those sanding scratches out, you'll see swirls, especially if you apply an oil stain. Although they are hard to see, these scratches are visible in the unfinished or unstained piece.

## **Reducing the need to sand**

Thorough sanding devours the hours, so I try to reduce the need by keeping sharp blades on my cutting tools and buying smooth, flat lumber. But understanding some sanding basics can really speed up things. Start with the finest grit that will do the job because a fresh piece of 100-grit, for example, cuts deeper than 150-grit. So I skip the 100-grit, except on bad tearout, and begin with fresh 150-grit paper, which also helps with reducing swirls.

My first sanding typically begins with a 150-grit belt on my belt sander. I like the belt sander because, in the hands of the skilled, you can create and maintain flat surfaces, and even a gorilla can't get swirls. Before I move on to 220-grit and finer orbital sanding, I thoroughly blow off the work surface and bench to remove the accumulated 150-grit. Then I sand with moderate pressure for the majority of the time and finish off every area at one-half pressure. This lets each grit of sandpaper remove some of its own scratches. To be sure that I sand evenly, I make a series of parallel



**Water rubdown makes for smoother finish**—The author raises the grain with water and then sands until the grain no longer raises (right). This procedure also helps reduce stain blotching.



**A hair dryer speeds up the grain-raising process.** After wetting the wood enough to darken the surface (below), a hair dryer quickly gets the surface sufficiently dry to sand.



pencil lines across the surface to be sanded. As the lines disappear, I can tell exactly where I have sanded, as shown in the top photo on the facing page.

All woods improve in finishability with a light water rubdown before a final gentle sanding (see the photos above). This, by the way, is the first step in a blotch-free stain job. Serious smoothing calls for repeating this step until water no longer raises the grain. With some woods, the grain will continue to raise until hit with a first coat of finish, which raises the grain and locks it in place to be sheared off in the next sanding.

### Oiling the wood

Protected by cheap vinyl lab gloves and working in a well-ventilated space, I begin oiling the wood. Many “oil” finishes are actually rubbing varnish. They’re alkyd based, reduced with paint thinner, with lots of hardeners added. These “oils” offer the ease of application of oil combined with high solids for fast build and a

hard drying finish that can be built up to a bright, protective surface. My favorite finish is Waterlox because it embodies all these features, is easy to use and usually is available at hardware stores.

I flow on a good wet coat with any absorptive rag. But don’t use steel wool because it breaks down and darkens the pores of the wood. It also leaves behind steel fibers beneath the finish that can react with water and acids in wood, causing black splotches.

As the oil first goes on, I always spot a few flecks or streaks of glue. I immediately scrape them off with the back of a freshly sharpened chisel dragged across the surface like a scraper. (Hey! This isn’t the top of a Steinway.) It usually blends right in, but when it doesn’t, I sand the still-wet repair with a scrap of my usual 220-grit sandpaper.

Cleanliness doesn’t matter for the first coat. The pores are full of dust, and some finishers actually sand the oily surface with wet-or-dry paper to make dust to fill the grain. Vacuuming just wastes time. Because of dust, fibers and the breaking of the finish film over the wood’s pores, you can’t create a sealed finish in one coat.

I lean or hang up the oil-covered workpiece, and when the first coat loses its gloss, I return to add more finish, usually in less than an hour. This wet-over-wet second coat needs only half the amount of finish as last time.

As with the next coat or two, I try to apply just enough finish to leave a temporary gloss without causing runs or drools. After 30 minutes, which can be shortened by warm breezes and sunlight, I wipe the oil down, not off. By using a rag that contains heavy traces of oil in it, I avoid scouring the finish out of every pore. The rag leaves almost as much oil as it picks up. Think of it as “feathering off,” like leveling the surface with a fine china-bristle brush. This is the essence of my fast-build system.

### Hot air beats down beads

Oil stains and finishes have one nasty habit: beading up. You can apply finish and wipe it down to perfection, but when you return to see it in the morning, a constellation of tiny beads of soft finish has formed above the surface.

I beat the beads back by blasting them with hot air from my old hair dryer. The warm air lowers the viscosity of the oil, so it can





**Pencil lines are a guide for even sanding**—The author pencils parallel lines across the workpiece before sanding. As the lines are sanded away, he sees just where and how much needs to be sanded (left).

**Building an oil finish**—After the initial coat, the author lightly feathers on three succeeding coats (below) in just two days to build a heavy, durable finish. Buffing with wax will help protect the finish after the oil has hardened.

penetrate better. The heat also speeds up the cross-linking process, so the oil cures faster. I hang up the work and check on it an hour later to wipe down any beads that might have formed in spite of my best efforts. It's then left to dry overnight. If you try to work it any sooner, you'll just soften the uncured oil and remove as much as you apply.

### Day two, final coats

Next morning, I lightly sand with 220-grit or 320-grit sandpaper. This is the most important, and often the only, sanding required. Just a light pass will shear off the wild hairs, cut open the bubbles and knock down the few beads that popped up. Don't fear this step. If you give every square inch a light swipe or two with a folded piece of used paper, easy on the corners, then it's done.

Now you cleanliness freaks can sweep the shop, blow the dust off the walls and vacuum the work and the work surface. Don't worry about the dust in the air. The dust that will ruin your finish will come from the work surface, polluted finish, a dusty brush or rag, or fall out of your hair or sweatshirt.

After dusting myself off, I change into a fresh shirt and apron and put on a clean dust mask. I blow off and then wipe the surface with a tack rag, making sure to clean out mortises, rabbets and around-the-corner areas where your once-clean rag can find fresh dust.

I filter the finish through a painter's filter or a clean muslin cloth. And I round up a well-worn but clean cotton sweat sock from my wife's sock drawer to use as an applicator.

I dampen the sock in clean finish and begin applying it to the difficult areas where two or more planes meet. I work from there to the outer, more visible, parts. Forget flooding and wiping off, and think of the process as brushing. I apply the amount of finish I want to remain on the work, spread it evenly, and then feather it all flat, as shown in the bottom photo. I stroke the molded edges and cross-grain parts first and finish wiping with the grain on the broad, flat parts. I try to complete the massage while the finish is still slightly liquid, so it can pull itself flat as it cures.

As I hang up the work, I'm often so amazed by the dazzling surface that I think three coats make a good enough finish. But no! Normally, after six hours of setting up, the finish has pulled tightly



around microscopic swales and hillocks of wood pore and fiber. The flatness tells me I need another coat to fully protect the wood.

If you sand, use 320-grit paper. Barely caress every visible square inch of the work. Clean up and then apply the finish just like the last time. Take the afternoon off.

I promised you a lustrous finish in 48 hours, and you've got it. Four hours later, the piece will be ready to assemble or move with careful handling. I give it the fine-old-furniture feel by waiting a few days for the oil to fully cure. Then I apply a coat of paste wax with a superfine, non-abrasive pad and buff to a satin sheen.

Virtually every finish manufacturer specifies waiting before giving a final rub. A harder finish is less susceptible to damage and will rub out faster and more evenly. Wax topcoats require maintenance but provide extra protection from liquids and abrasion. □

*Sven Hanson is a woodworker and professional carpenter in Albuquerque, N.M.*



# Basics of Vacuum-Bag Veneering

*Tips and tricks to make even your first project a success*

by David Shath Square



**Vacuum-bag veneering is easier with an adaptable setup—**Sectional platens and platforms in this vacuum-veneering work station are supported by sawhorses with dadoed top rails, which

hold interchangeable 2x4 stringers of various lengths. Spring clamps suspended from the ceiling and roller stands at the mouth of the bag make it easy to slip work to be pressed into the bag.

Until recently, I was an advocate of the solid hardwood approach to furniture construction as taught by the cabinetmaker I apprenticed with in the early 1970s. But as it became increasingly difficult to find that perfectly figured rooster-tail walnut, quilted maple or swirl cherry in solid wood, I became more attracted to the exquisite veneers that are readily available. However, I continued to shy away from veneer because of my prejudicial training. Besides, the mechanical veneer presses I had encountered reminded me of unwieldy instruments of torture.

But then I read an article about vacuum veneering by Gordon Merrick (*FWW* #84, pp. 68-70). Although skeptical, I was fascinated by the simplicity, flexibility and effectiveness of this system. Af-

ter some preliminary investigation, I gave into the appeal of veneering and bought a system (see *FWW* #99, pp. 72-75 for a review of various systems).

Although vacuum veneering is not a complicated process, there are several procedures and techniques that I've learned along the way. These tips, from shop and equipment setup to helpful suggestions about what to try and what to avoid, will help any beginner get off to a smooth start.

## Shop layout and equipment setup

I work in a small, one-man shop, and setting up a 4-ft. by 8-ft. table that would handle all my veneering needs was out of the question.



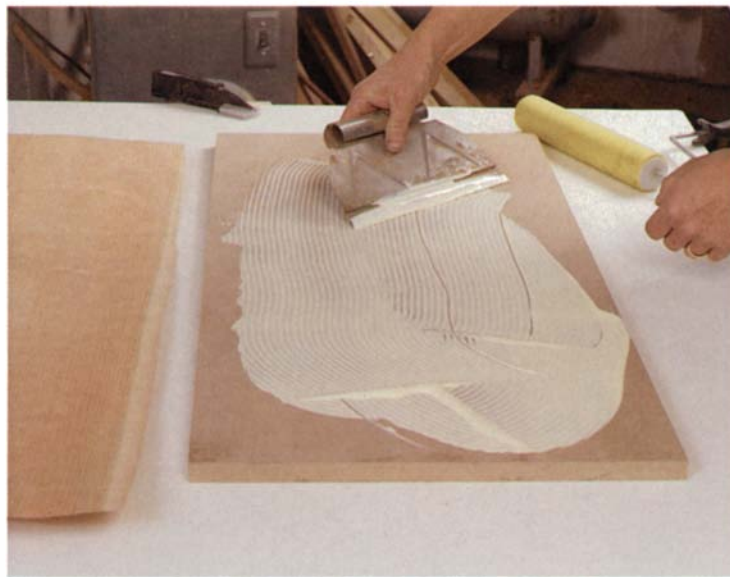
So I designed an adjustable platform system that could be shortened or lengthened to suit various jobs. I generally keep the platform and base in a 4-ft. by 4-ft. mode, as shown in the photo on the facing page, because this handles most veneering needs. The base is constructed of three heavily built sawhorses that have dadoes cut into their top members. A pair of 2x4 stringers rest on edge in these dadoes. They form a joist-like structure to support the melamine sheet that makes up the platform on which the bag and platen rest. To increase the size of the base, I pull the sawhorses farther apart, replace the stringers with longer 2x4s and add another section of melamine.

Whether you are veneering a flat surface or forming a curved panel, a platen is required inside the bag to help draw out all the air and to support the workpiece. I used a 3/4-in.-thick melamine panel with a grid of 1/8-in.-wide grooves that are approximately 1/4 in. deep and ripped 2 in. apart on the table saw. A series of platens can be adjusted along with the platform to suit the size of the work. For most of my work, I use just one section. The setup is easier, and it takes up less of my precious shop space. However, if I'm veneering a large, flat surface, I add more sections side by side in the bag as needed. I also use the smaller platens when pressing a curved panel to allow more room for the bag to envelope the form (see the photo on p. 65).

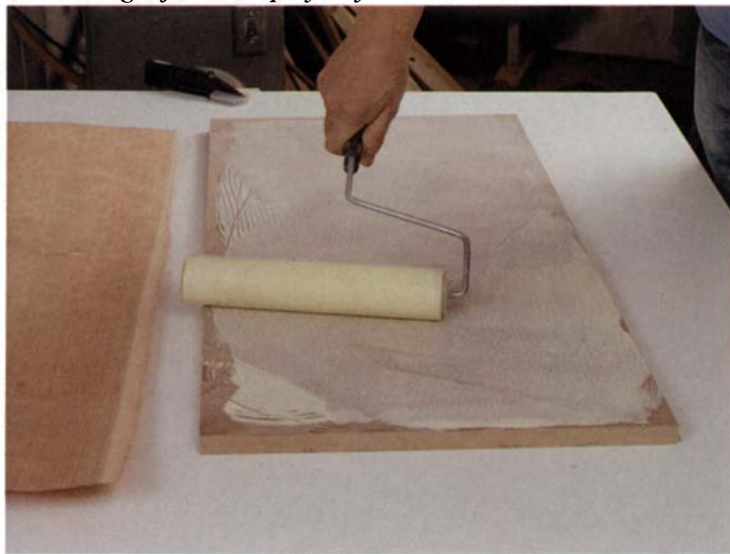
### The lessons of a first project

I kept my initial project, a small table, simple because of my limited experience. I ripped a 29-in. square of medium-density fiberboard (MDF) from a 4-ft. by 8-ft. panel and used an X-Acto knife to slice a 30-in. square of bubinga veneer from a 10-ft. roll. The 30-in.-wide bubinga didn't require any joints.

For this first project, I chose white glue because it had been recommended by a fellow woodworker with a lot of veneering experience. A rule of thumb I've developed is to use approximately 1 oz. of glue per square foot of substrate. However, experience is the best teacher, and you'll soon develop a feel for the correct



**Notched trowel spreads glue uniformly**—The author spreads adhesive with a notched trowel (above) and smooths it with a 9-in.-wide foam roller (below). One ounce of glue per square foot is about right for white polyvinyl acetate on MDF.



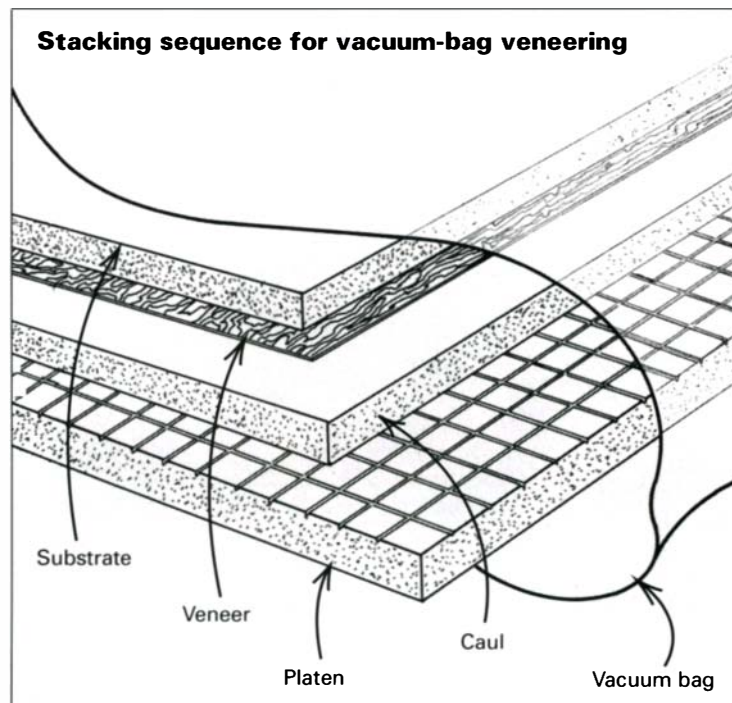
amount of glue to apply. I poured almost a cup of glue in the middle of the substrate for this table and spread it with a 1/16-in. notched aluminum trowel, as shown in the photos at left. Then I used a 9-in.-wide paint roller with a tight nap to smooth it. The nap left bits of fiber in the glue, and I soon discovered that a cheap foam roller makes a superior spreader. Once I had a uniform film, I placed the bubinga over the substrate, leaving a generous 1/2-in. overhang all around. I covered the veneer with a layer of 4-mil-thick polyethylene to prevent glue that oozed through the open grain from sticking to the 1/4-in.-thick Masonite caul. The caul distributes pressure evenly over the entire veneer surface. (I have since learned that

a 3/4-in.-thick piece of melamine makes a superior caul because it distributes pressure more evenly, and glue will not adhere to it, eliminating the need for the polyethylene.) With a great deal of difficulty, I single-handedly wrestled the entire sandwich, face side up, into the veneer bag.

I switched on the press, and the 5-cu.-ft.-per minute (CFM) pump exhausted the air from the bag to a vacuum of 25 in. of mercury (Hg), which is about 1,750 lbs. per sq. ft. of pressure, in less than 15 seconds. I was impressed. I was even more impressed when, two hours later, I removed the test piece and examined the bubinga veneer. It was uniformly stuck to the substrate—not a bubble, a wrinkle or a flaw anywhere. A small amount of glue had seeped through the open-grained bubinga, indicating a good initial spread. Too much glue seeping through coats the entire surface of the veneer and too little leaves the surface dry, which means there is insufficient coverage on the substrate.

The only problem was that the 1/2-in. overhang of veneer had been broken off by the downward pressure of the bag, leaving a ragged edge that had crept onto the finished surface. I corrected this by ripping 1/8 in. off all the edges of the substrate on the table saw. I soon realized that placing the substrate in the press veneer side down was a simple way to prevent breaking off the overhang. But I needed a new system to make it easier to load the whole as-





sembly into the vacuum bag.

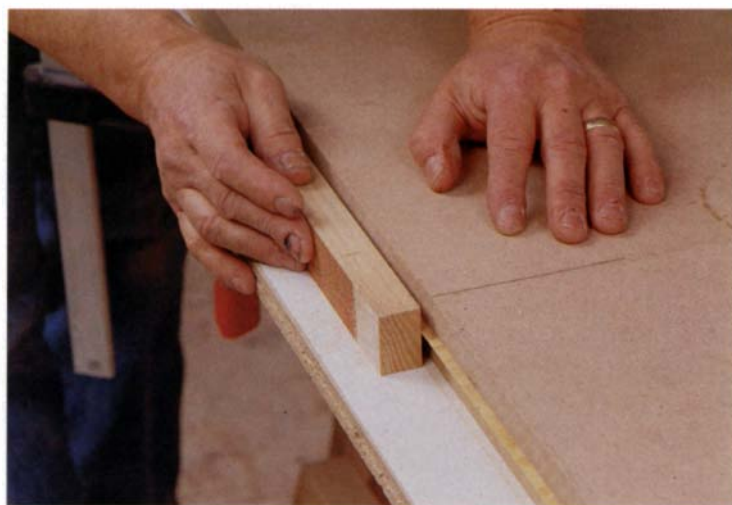
With this in mind, I devised an efficient system to load a workpiece into the press. On a 3/4-in.-thick sheet of melamine that sits on rollers aligned with the mouth of the bag, I place the substrate with the veneer side down. Then I roll the caul-veneer-substrate sandwich into the press shown in the drawing. I use a couple of elastic cords to keep the mouth of the bag open, as shown in the photo on p. 62.

### Joining veneers

After my initial success, I was filled with confidence and immediately embarked on a new project. It was a demilune table of Macassar ebony with a top design that required 11 pie-shaped pieces of veneer tightly joined together. I made separate patterns from 1/4-in. Masonite, laid each of them on the veneer and then cut out the pie shapes with an X-Acto knife honed on an 8,000-grit waterstone. This yielded an acceptable shape but left a less than perfect edge to join to the next piece in the pattern.

I discovered that on straight-grained material, this edge can be perfected by shooting it with a sharp plane, but on highly-figured veneers or pieces that are cut on an angle to the grain, a plane will cause serious tearout. After experimenting with electric routers, jointers and various veneer saws, I made a happy discovery. I cut a 1-in. by 1 1/2-in. piece of hardwood about 12 in. long and glued a strip of 100-grit garnet paper to it (3M's Photo-Mount spray adhesive works well). I shot the edge of the veneer with the sandpaper board by moving it back and forth along the edge of the piece to be jointed, as shown in the photo above. Similar to shooting the edge with a plane, this technique gives excellent results even on Australian silky oak, a veneer that crumbles at the touch of a plane.

I used masking tape on the bottom surface of the veneer to align the eleven wedges of ebony. When I was satisfied with the joints, I flipped the entire pattern over and then applied veneer tape to the top side. Veneer tape is a special, paper-backed tape that re-



**Sand, don't plane, veneer edges for less tearout**—An abrasive block is safer to shoot the edges of delicate veneer than a plane. Spray adhesive holds 100-grit garnet paper onto a squared wooden block. The veneer is supported between two pieces of MDF.

quires moistening. It will hold the veneers together without slipping or damaging the veneer and is available from any veneer supplier.

Then I carefully removed the bits of masking tape from the bottom of the veneer. Although it is handy for alignment, masking tape can tear out pieces of wood fiber if not used cautiously. Never run masking tape through the veneer press because it is difficult to remove from the veneer once it has been under about 1,800 lbs. per sq. ft. of pressure. If masking tape accidentally becomes pressed to the veneer, it can be removed by moistening with paint thinner, waiting five minutes and carefully shaving off the softened tape with a cabinet scraper.

### Veneer adhesives

I used Titebond aliphatic resin (yellow glue) to glue the ebony to the MDF substrate. It

gave excellent results, as did the white polyvinyl acetate (PVA) glue on the bubinga. If I am working on a tabletop or bent lamination that requires a glue with a longer open-time, I use a two-part urea-formaldehyde (Uni-Bond 800, available from Vacuum Pressing Systems, Inc., 553 River Road, Brunswick, Maine 04011; 207-725-0935), which allows for an assembly time of 30 minutes at 70°F. When gluing blond veneers with the tan-colored urea-formaldehyde glue, it is essential to add a lightening agent (also available from Vacuum Pressing Systems) to the mixture; otherwise, bleed-through will stain the veneer permanently.

Although I've used a variety of glues with great success, I've had a problem with hot hide glue. Previous experience with hammer veneering taught me that this material is smelly, messy and difficult to work. It is generally recommended as the glue of choice for applying veneer to the edge of a substrate because it becomes tacky as soon as it cools. In theory, this allows one to brush on a coat, lay the band of veneer along the edge and smooth out the whole mess with a few deft passes of the veneer hammer. In reality, the high water content of the glue causes the veneer to curl like



a palsied snake. Moreover, the much touted tackiness usually develops after the band of veneer is stuck to your hammer, your hand or the wall of the shop where you have flung it.

My experience suggests you purchase a can of industrial-quality contact cement (which usually stinks but does the job), and leave the hide glue to the instrumentmakers who use it without difficulty. Although I've heard horror stories of veneer sliding off cabinet sides when glued with contact cement, I've never had any problems when used for small areas, such as edge-banding.

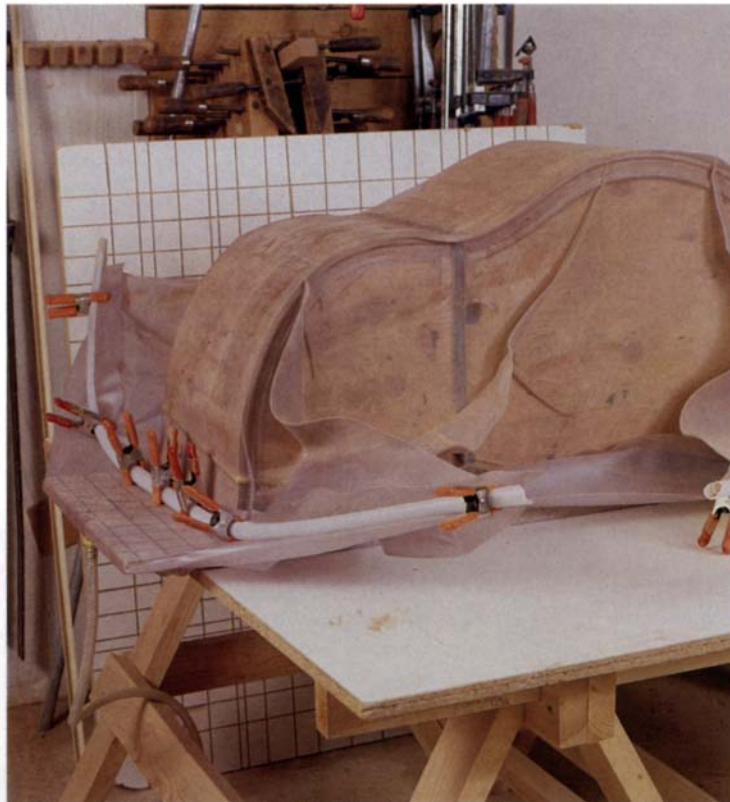
When working with contact cement, I brush a thin coat on both the edge of the substrate and the back of the veneer band. Then I place  $\frac{3}{8}$ -in.-dia. dowels every few inches along the length of the edge. I work carefully from the left to the right, pressing down the veneer with a veneer hammer while gradually removing the dowels, which prevent the band from adhering too quickly or moving out of alignment. The edge of a substrate should be banded before the top and bottom are veneered.

On tables that see daily service, I prefer to add a solid hardwood edge. I use a full-length spline of a material that matches the edge. I cut the mortise in the substrate with a  $\frac{1}{8}$ -in. slot-cutting bit in the router. For speed and convenience, I run the edging through the tablesaw equipped with a carbide-tipped blade that cuts a clean mortise similar in width and depth to that in the substrate. Another alternative that's quick and easy is biscuit-joining the edging to the substrate.

### Veneering solid wood and curves

Since I purchased a vacuum bag, my requirements for solid timber have decreased dramatically, although I still use red oak and maple for legs and structural members that require great strength. I find oak particularly good for this job because it is relatively cheap, readily available, takes the veneer well and bends easily where laminated aprons or other curved pieces are needed.

When I veneer a curved leg, I save the waste material from band-sawing the leg to shape to use as a caul. I clean up the kerf marks on the leg and waste piece with a cabinet scraper to ensure a good mate. Then I apply glue and veneer to the leg, cover the veneer with polyethylene and position the waste caul over the veneer. Using this method, I can veneer both the front and the back sides of a curved leg at a single pressing. Moreover, if I am using a glue



**Curved work must match the vacuum bag size—The circumference of a curved form and the platen should be about 12 in. less than the bag's, so there's excess bag to follow the contours. A length of CPVC pipe makes a good closure strip because it's flexible.**

with a longer open time, I can prepare and press up to eight legs at once. A carbide-tipped laminate trimmer bit in a router followed by a cabinet scraper is the best way to clean up the veneer overhang once the legs are removed from the press.

I have found, with a little care, the vacuum bag will also accommodate work on large curved surfaces. In this case, a single-part form is sufficient, although a caul of bending

plywood is required between the bag and the veneer. Darryl Keil of Vacuum Pressing Systems recommends bending forms be constructed with  $\frac{3}{4}$ -in.-thick plywood or particleboard ribs spaced 6 in. on centers with two layers of  $\frac{3}{8}$ -in.-thick bending plywood on top. If the ribs are placed every 3 in., one layer of plywood is sufficient. The ribs should be solid and extend from the top of the form to the platen with a groove cut in the bottom of the form to facilitate air evacuation. The ribs of a bending form should be cross-braced if they are more than 12 in. high. Otherwise, under vacuum, the bag can push in the outside ribs, causing the entire structure, including the workpiece, to deform. It's a good idea to make a test-run under pressure on any new form before it is used in an actual work situation. This allows you to discover any weak points and reinforce them *before* the project is ruined by an inadequately constructed form.

I use  $\frac{3}{4}$ -in.-thick spruce plywood (it's cheaper than fir but does the job) when constructing a bending form. I make the form large enough so that the laminates end 2 in. before the form touches the platen to allow enough room for the bag to wrap tightly around the structure.

Some vacuum bags come with a closing system made of stiff, plastic pipe. This system works well when pressing flat surfaces because the bag does not deform. However, to envelope a curved form, the bag must deform dramatically, which can bend or break the closure pipe. The remedy is to purchase an inexpensive length of  $\frac{1}{2}$ -in.-dia. CPVC water pipe. CPVC pipe is available in plumbing supply shops or home building centers and is more flexible than ordinary PVC. The CPVC pipe is flexible enough to bend with the bag yet has sufficient resilience to resist kinking and breaking, as shown in the photo above. If you also buy a similar length of  $\frac{3}{4}$ -in.-dia. CPVC pipe, you can make your own heavy-duty closer strip by cutting it in half on the bandsaw and using it as the outside clip to fit over the small pipe and vinyl.



Sometimes it is necessary to reduce the size of the platen or to construct a specially shaped platen to permit the bag to conform comfortably to the bending form. In this case, it is possible to calculate the size of platen by placing the form on it and measuring the total circumference of both together. This total should be approximately 12 in. less than the interior circumference of the bag. The extra room will allow easy in/out access and keep stress off the seams of the bag. With tall curved forms, it is best to lay the form on its side, and then construct a platen that follows the curve of the form.

As a final word, vacuum veneering has opened a whole new world of woodworking to me. I can now work with beautifully

figured exotic woods that I couldn't possibly afford in solid timber. Moreover, I can order the veneers by phone and have them shipped to my home via parcel post at a relatively low cost. The only trips I make to the lumber dealer now are for the readily accessible red oak I use for structural details and the MDF and bending plywood for tabletops and curves. I have never regretted the \$800 investment in the vacuum system because it has paid for itself in many ways. But if you can't justify the cost of a commercial system, you should check the story below on making your own vacuum press. □

*David Square is a woodworker in Tyndall, Man., Canada.*

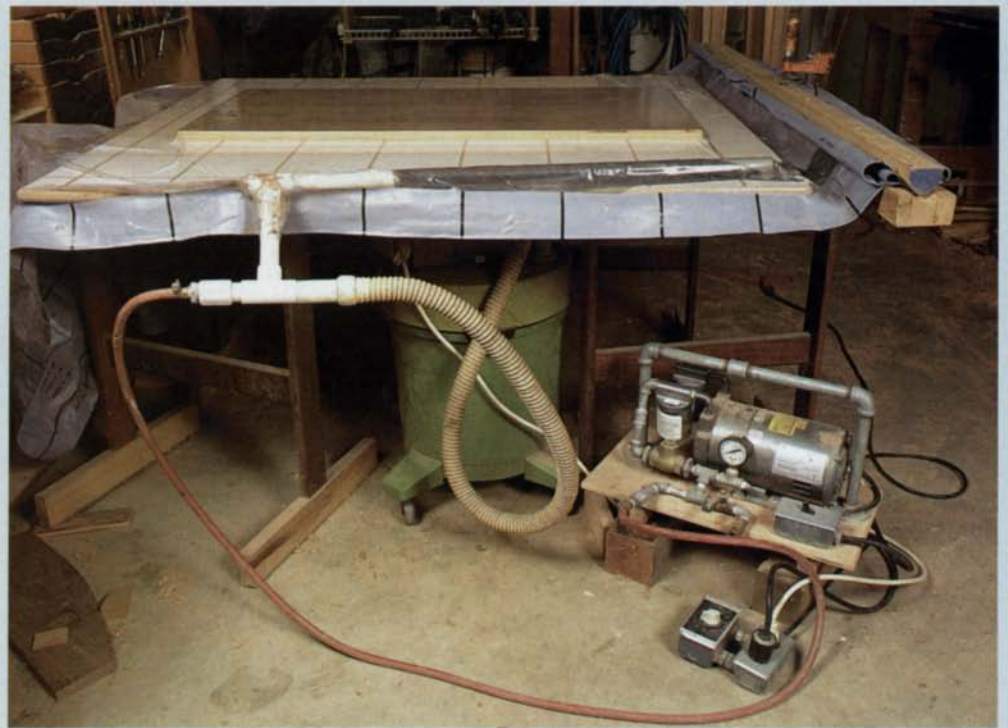
## Make your own vacuum system

by Wayne Locke

I began vacuum-pressing veneers before commercial systems were readily available, so I made my own bag and pump out of necessity. I still make my own because I prefer my connection system, which uses a shop vacuum for fast air evacuation prior to using the vacuum pump. I made my first bags from 10-mil- to 12-mil-thick clear vinyl purchased from fabric stores and put together with Tacky Tape (available from Seal-Tite Systems, Inc., 6357 Reynolds Road, Tyler, Texas 75708; 800-352-4864), an industrial sealant with the consistency of chewed gum that's used as a sealant in the assembly of metal buildings. A more expensive alternative is 883 Vacuum Bag Sealant, a similar product that the Gougeon Brothers, Inc. (100 Patterson Ave., P.O. Box 908, Bay City, Mich. 48707; 517-684-7286) offers for sealing vacuum bags.

Today my main bag is about 4 ft. by 8 ft. It has a clear, 20-mil-thick vinyl top cemented to a thicker gray-vinyl bottom. The gray vinyl is actually a shower pan liner purchased from a plumbing supply house. I glued about a 2-in.-wide joint around three sides of the bag, and then I doubled the wider gray vinyl over the clear and glued it again for a double seal. I made the bottom 6 in. longer than the top and use this excess as a lip for sealing the mouth of the bag. I have never had a joint problem with any bag I've made.

To evacuate air from the bag, I made a manifold of  $\frac{3}{4}$ -in.-dia. PVC pipe, as shown in the photo above. The manifold has a leg inside the bag that consists of a 24-in.-long piece of pipe with  $\frac{1}{4}$ -in.-dia. holes every 2 in. along one side. This piece connects to a T-fitting. A 6-in.-long pipe connected to the T-fitting exits the bag through a slit in



**Shop-built vacuum bag**—Made from 20-mil clear vinyl and shower pan liner, this vacuum bag has held up for several years. The PVC T-fitting connects a vacuum pump to one side and a shop vacuum to the other. The shop vacuum quickly removes most of the air.

the bag's seam sealed with Tacky Tape. On the outside of the bag, another T-fitting connects the pipe to a  $\frac{3}{8}$ -in.-dia. air hose on one leg and a 6-in.-long piece of capped pipe on the other leg.

The air hose connects my vacuum pump with a quick-connect air fitting for drawing the final vacuum. But first, to quickly remove most of the air in the bag, I slip the  $\frac{1}{4}$ -in.-ID hose of my shop vacuum over the pipe in the other leg after removing the cap. If any realignment is necessary, it's easy enough to remove the hose and move the items in the bag. With everything aligned and most of the air out of the bag, I pull off the vacuum hose and recap that leg. Then my  $\frac{1}{4}$ -hp vacuum pump does the rest.

I let the pump run continuously and use a fan timer wired to the motor to control the length of the gluing cycle. I leave curved panels in a vacuum for approximately two

hours to guarantee that the glue has set sufficiently, but for gluing flat faces, less than an hour is fine.

To seal the bag at its mouth, I use a  $1\frac{3}{4}$ -in.-thick by 4-in.-wide board a little longer than the width of the bag with a 90° "V" about  $1\frac{3}{4}$  in. wide cut down the length. I made another board to match this V, leaving a  $\frac{1}{2}$ -in.-wide flat rather than a sharp edge at the apex of the V. In use, the bag is loaded and the lip is folded over the mouth, which is then folded over one or two times. These two boards are then clamped on the fold. A small clamp in the center is usually sufficient because a vacuum bag will almost seal itself if given the chance. □

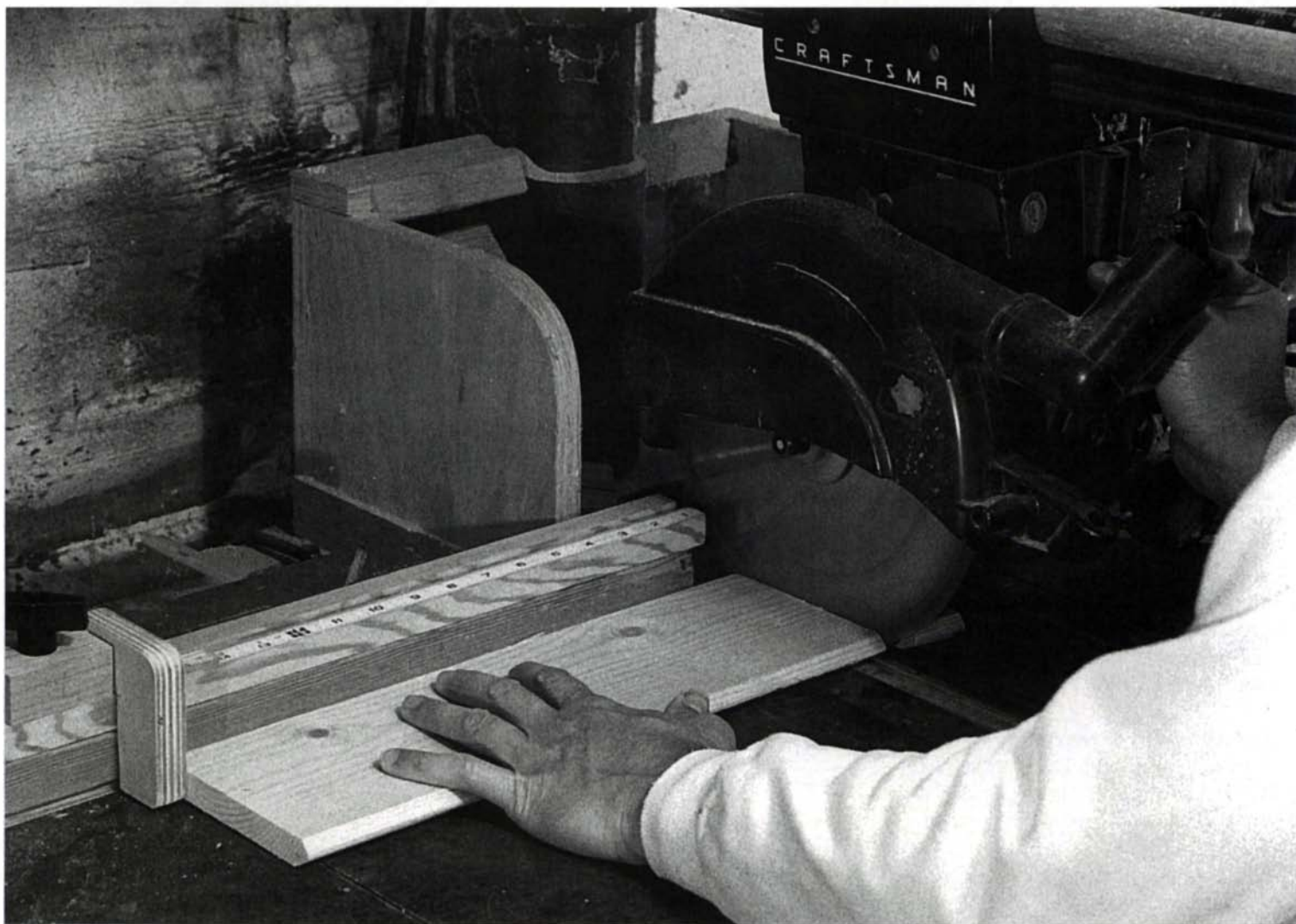
*Wayne Locke is a woodworking teacher at Austin Community College. He is also a designer/builder of furniture, specializing in ecclesiastical pieces, in Austin, Texas.*



# A Stop for Every Jig

*Simple, versatile stops are crucial to accurate machining*

by Sandor Nagyszalanczy



*Setting a crosscut is a breeze with a flip-down stop. The cursor's cross hair of the T-track-mounted flip stop lines up with the desired measurement on a self-adhesive measuring tape stuck on the fence.*

Most things that we do in our everyday lives have limits: the maximum speed you're supposed to travel on the highway; the minimum age you must be to buy a bottle of liquor; the most books you can check out of a library at one time. The world of woodworking is no different, except we call the limits *measurements*. We strive to maintain the exactness of measurements to make parts fit more precisely together, so the joinery will be strong and look

clean. Some measurements are set on our machines, such as the depth of cut of a table saw or handplane, and some must be regulated by eye, as when chiseling down to a pencil line. But we regulate a great many limits—measurements for the length or width of parts, depth of grooves and holes—by using stops on our jigs and in conjunction with our tools.

Regulating the distance between the end of a part and the point where it's cut to length or machined is a basic function of



stop devices. As with other types of jigs and shopmade setups, there are many different kinds of stops to choose from, each appropriate for a particular range of tools and applications. The simplest stops are merely wooden blocks, clamped or screwed to the machine, jig or the work itself. More ingenious stops revolve to adjust or change position. The right stop can increase the accuracy of an operation, as well as save time when making repeat cuts because parts need not be marked individually. This is why production shops can't do without the use of stops.

### Length stops

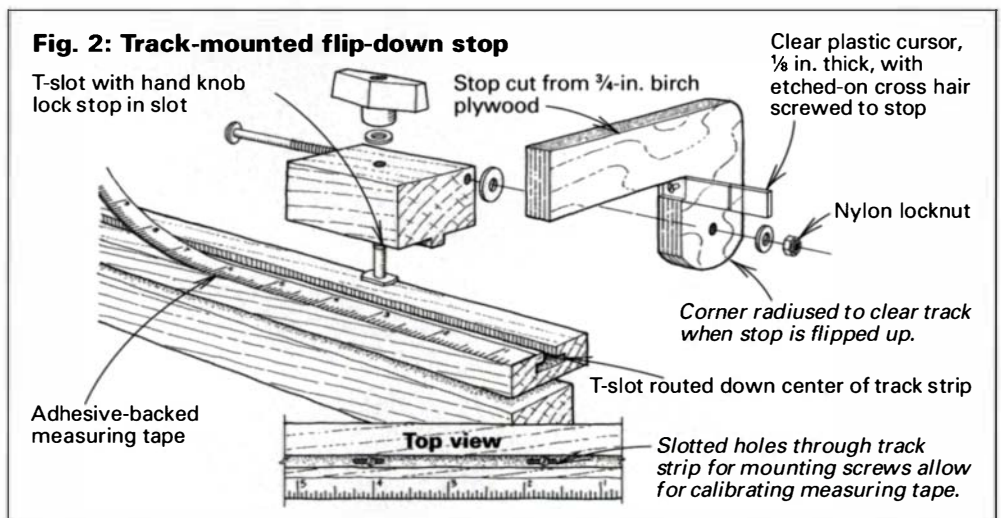
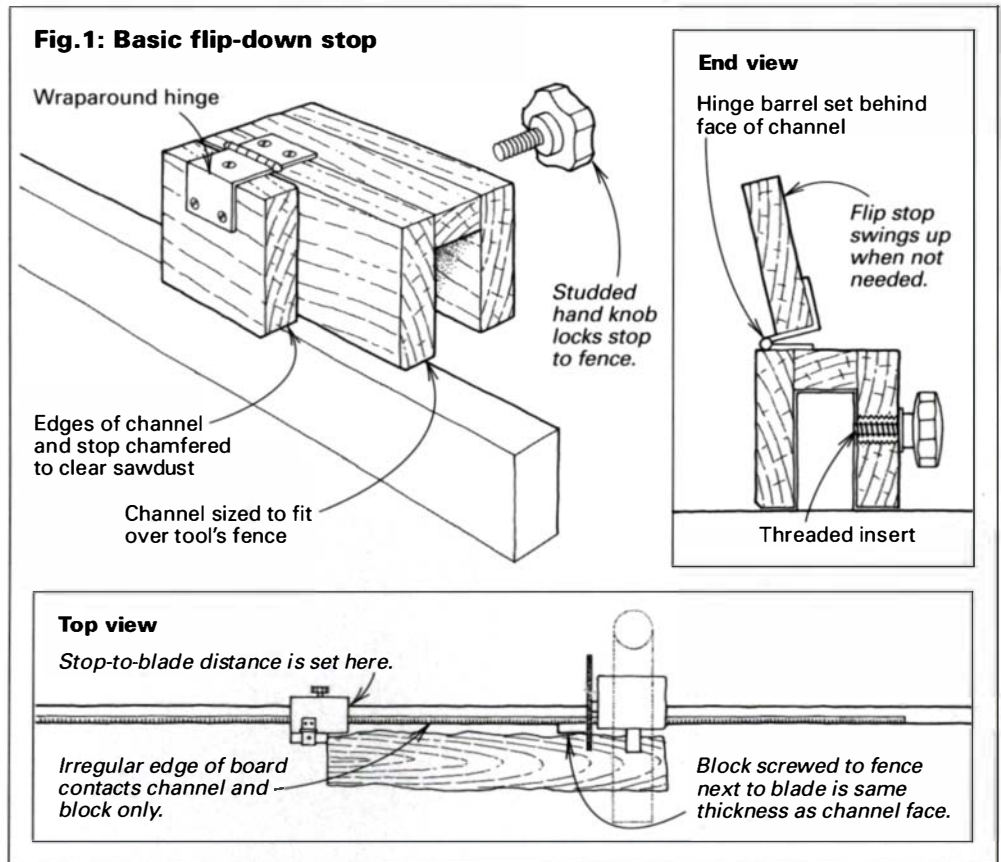
Length stops are used mostly for crosscutting or shaping across the width of stock, but they are easily adapted to work with other machines in a variety of applications. Length stops are commonly used on table saws, radial-arm saws, sliding-compound-miter saws and both powered miter saws and nonpowered (handsaw) miter boxes. Length stops are also welcome additions to fences used with miter gauges, drill presses, mortising machines, sliding cross-cut boxes and other sliding carriage jigs.

While the stops described here are shop-built, there are several high-quality, commercially produced stop devices on the market, such as the FastTrack stop system components including the micro-adjusting FastStop (available from Garrett Wade, 161 Avenue of the Americas, New York, N.Y. 10013; 800-221-2942). Also, the ProScale digital readout (available from Accurate Technologies, 11533 N.E. 118th St., Suite 220, Kirkland, Wash. 98034; 800-233-0580) can be added to many of the shopmade stops described below.

### Adjustable flip-down stops

Probably the most useful kinds of stops for basic crosscutting applications are adjustable flip-down stops. A flip-down stop is more useful than a simple stop block clamped to the fence because it quickly flips out of the way when it's not needed. This allows one end of the workpiece (a frame member or molding) to be squared with the stop flipped up. The part is then rotated end for end, and the stop (set and locked in the desired location) is flipped down to cut the part to final length. The two basic types of flip-down stops presented are illustrated as applied to a radial-arm or other crosscutting saw; however, they can be used as adjustable length stops on many other machines as well.

**Basic flip-down stop**—The flip-down stop shown in figure 1 will work with just



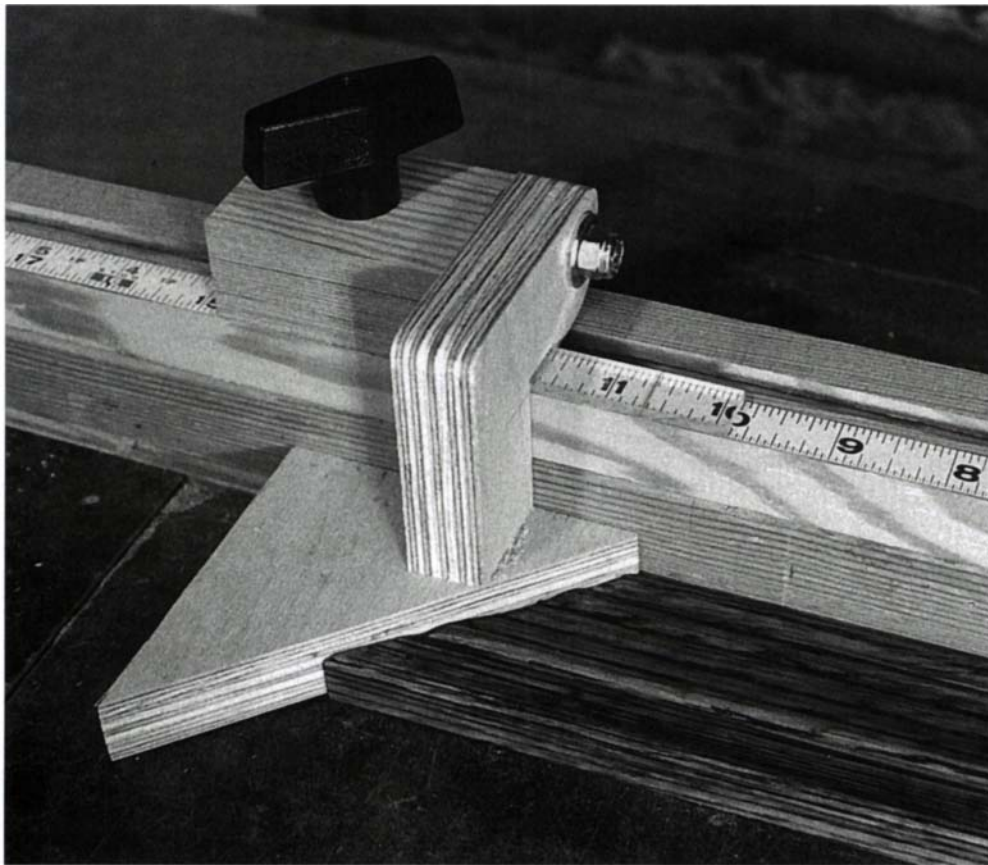
about any wood or metal crosscutting fence, and the stop can be set to any measurement, limited only by the length of the machine's fence. The channel-shaped body of the stop should be about 6 in. to 8 in. long and sized to fit not too snugly over the fence. A threaded insert driven into the back of the channel takes a knurled hand knob, which locks the stop to the fence. The flip stop itself attaches to the channel with a wraparound-style cabinet hinge, located so the hinge barrel is behind the front face of the channel (see the end view in figure 1 above). This keeps the flip stop completely out of the way when it's up. The edge of the channel face and corner of the stop are chamfered to keep

sawdust from misaligning the workpiece.

In use, the stock to be cut doesn't actually contact the machine's fence; one end bears against the face of the channel while the other bears on a short block the same thickness as the channel that is screwed to the fence next to the blade (see the top view in figure 1).

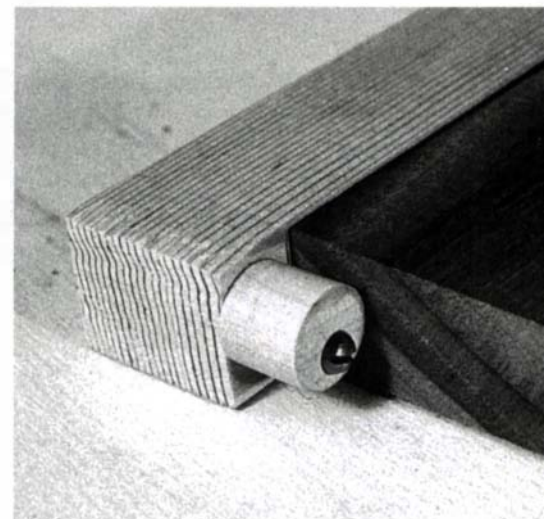
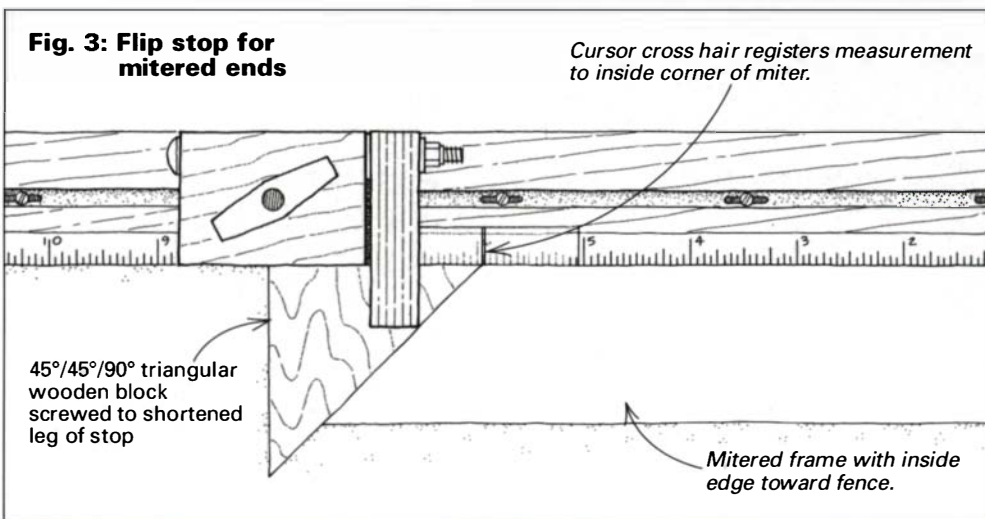
This arrangement allows you to cut stock that's bowed and won't set stably against the straight fence. The block near the blade also supports the workpiece near the cut to prevent tearout. To use this stop with a stick-on measuring tape, offset the tape's position, so the blade-to-stop distance can be set by aligning the end of the channel with the desired measurement.





*Measuring miters is easy with a dedicated stop. This flip stop (left) has been fitted with a 45° block for mitered ends. The stop's cursor shows the distance between the inside corner of the miter and the miter created when the member is cut.*

*Eccentric stop offers micro adjustments (below). Fine adjustments can be made by rotating the stop. The off-center hole makes the position of the stop shift slightly, and the screw locks it down.*



**Track-mounted flip-down stop**—Another flip-down stop, as shown in the photo on p. 67, rides on and locks to a track strip. As shown in figure 2 on the facing page, this adjustable stop setup has four basic pieces: a track strip with measuring tape, a sliding block, an L-shaped stop, and a cross hair and a cursor that allow very accurate settings. The solid-wood track strip has a T-slot routed in the top edge and an adhesive-backed, stick-on measuring tape pressed on (see the top box on p. 71). Flat-head screws through slots routed in the center of the T-slot mount the track to the top of the tool's fence. These slots allow side-to-side adjustment for calibrating the strip's measuring tape to the blade.

The sliding block has a short tongue that loosely fits the T-slot. A vertical hole through the center of the block mounts the T-bolt and hand knob that lock the stop assembly to the track strip. Another hole drilled lengthwise through the block mounts the flip stop via a carriage bolt with a nylon locknut (a steel nut with a nylon insert that prevents the nut from turning).

The stop itself is cut from  $\frac{3}{4}$ -in. good-quality plywood, such as Baltic or Finnish birch, into an L-shape. A notch on the underside of the stop holds a clear plastic cursor, mounted with a small flat-head screw through a countersunk hole (for instructions on making a cursor, see the top box on p. 71). Mark and etch the cross hair

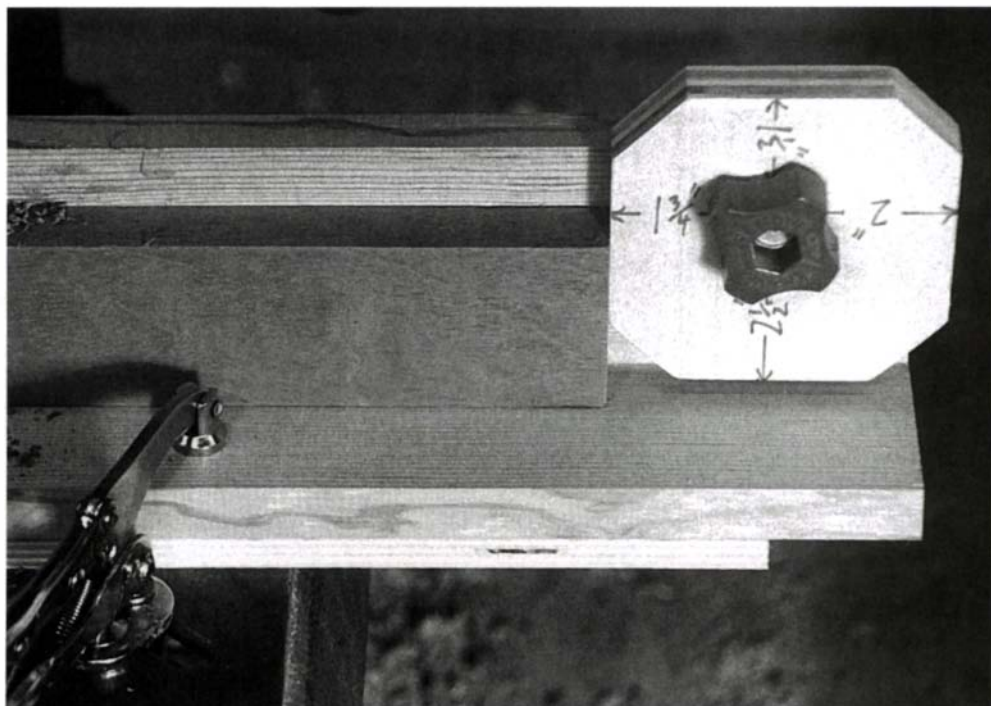
after the track strip has been installed and calibrated. If you do a lot of dado work or change blades often, additional cross hairs can be added to the cursor to be used with those blades.

To adjust the stop for different-thickness sawblades, you can reposition the track strip, or remove the flip stop from its bolt and add shims (I make these from aluminum beer cans with a leather punch) as necessary. You can also make up different stop assemblies, each with a cursor marked to work with different sawblades, molding heads or dado-blade thicknesses.

**Multiple flip stops**—Because unused flip stops can be set to desired measurements



**Rotating stop handles multiple measurements.** This rotating stop allows you to choose one of four stop positions. When used on a drill-press fence, as shown here, it can set distances between closely spaced holes.



and then flipped out of the way, several flip stops can be set up along the length of the fence. This would be an advantage if, say, you had to cut all the face-frame components for an entire kitchen to length; stops could be set at all the standard measurements and flipped down whenever needed during cutout. Because flip stops are fairly easy to make, you may wish to make a half-dozen or more at one time. Cut stock for the channels (simple version) or sliding blocks (T-track version) as you would a length of molding; then slice off individual blocks.

**Flip stop for mitered ends**—Either flip stop described above can be modified to handle boards with mitered ends. If wide picture-frame molding is mitered and the width of a standard stop doesn't catch the tip of the miter, make the face of the stop wider. Alternatively, when making picture frames, it's sometimes desirable to measure distances relative to the inside edge of the frame molding. A shortened flip stop with a 45° triangular block screwed on takes care of this situation, as shown in figure 3 on p. 69. A longer cursor must be fitted and etched to register the position the inside edge of the molding butts up to, as shown in the top photo on p. 69.

### Eccentric end stop

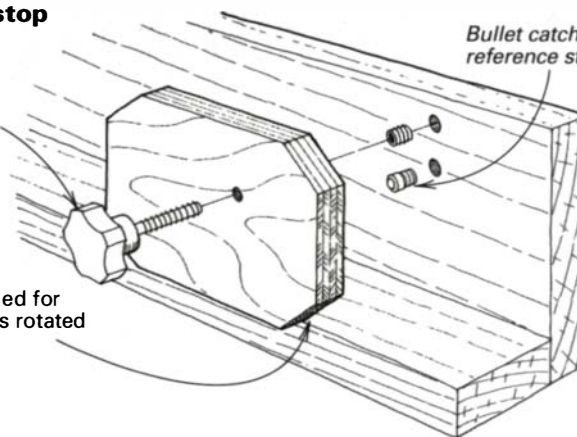
Sometimes you need to position a workpiece along a fence in a fixed position, but in a way that allows some fine-tuning. A simple stop that provides a firm stop, yet provides for a limited amount of adjustment is the eccentric end stop, as shown in

**Fig. 4: Rotating stop**

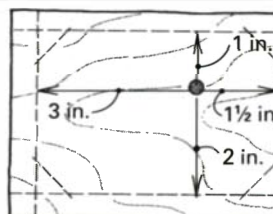
Studded hand screw set in threaded insert locks position of stop.

Corners of stop trimmed for clearance when stop is rotated

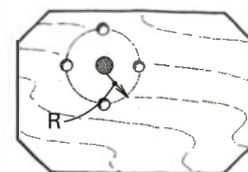
Bullet catch and strikes reference stop positions.



### Stop layout



A hole is drilled through a plywood square; lines are marked for trimming piece, so each edge is a different distance from hole.



Both sides of stop have four indentations drilled with countersink at same radius (R) from hole; these holes act as detents.

the bottom photo on p. 69. I use these as end stops on the pivot arms of my router-plate joinery setup, and they are extremely quick to make. First cut a short length of dowel with a diameter that suits the application. For a small jig, a 1/2-in.-dia. dowel is about right; for larger jigs, or to yield a greater amount of adjustability, use a 1-in., 1 1/2-in. or larger diameter dowel. Now drill a hole through the dowel lengthwise that's equidistant between the center and edge. A wood screw through this offset hole

mounts the stop to the jig. To make fine adjustments to the stop's position, loosen the screw and rotate the dowel; then lock it in place. You can employ this same principle with even larger stops: Drill an off-center hole in a sawn-out plywood disc, and screw it down where an adjustable stop is needed.

### Rotating stop

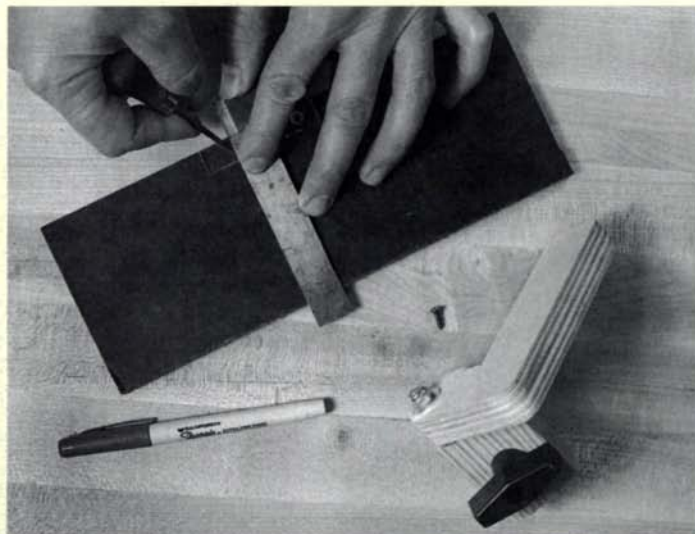
Sometimes you need to cut, rout or drill two, three or four grooves, shapes or holes



## Cursors and stick-on metal rules improve accuracy

Thin metal rules with a pressure-sensitive peel-and-stick backing provide a convenient way to add an adjustment scale to any fence or adjustable jig component. Scales are available that read both right to left and left to right (available from Highland Hardware; 800-241-6748). Reading the position of the movable part can be done by simply mounting the scale underneath the part or by adding a fine cross-hair cursor to the moving part.

To make a cursor, start with a piece of clear plastic. Make a test cut with the cursor installed on the jig to determine the cross hair's exact location. Then etch the cross hair on the down-facing side of the plastic using a scratch awl and a try square (see the photo at right). Color in the cross hair with a thin-point permanent marker pen, applied judiciously, to make it easier to see. If you're using a stop fitted with a cursor on a radial-arm saw that uses dado blades or sawblades of various thicknesses, you can etch additional cross hairs on the cursor; position them so they will represent the location of the cuts produced by those blades.—S.N.



**Etched cursors are easy to make.** A thin line etched with a scratch awl onto a piece of clear plastic makes the cross hair for a cursor that mounts to a flip stop used on a cutoff saw. Permanent marker on the etched line makes it easier to see.

## Making a T-slot track

One of the handiest methods of joining jig parts that must adjust is to use a T-track and T-bolt fasteners. A T-track is a useful way to mount fences, stops, hold-down clamps or to attach auxiliary tables and more. You can rout a T-slot into any solid wood, plywood or medium-density-fiberboard (MDF) surface with a special T-slot bit (available from Woodhaven; 800-344-6657 or The Woodworkers' Store; 800-279-4441). The Woodhaven bit requires a 1/4-in.- or 5/16-in.-dia. straight bit and cuts a T-slot best suited to 1/4-in.-dia. T-bolts or toilet bolts. The Woodworkers' Store T-slot bit needs a 5/16-in.- or 3/8-in.-dia. groove and is best for 5/16-in.-dia. T-bolts.

The T-track slot is cut in two passes. The first pass, with a straight bit, makes a plain groove as long as the desired track length. The second pass is taken with the special bit that cuts the T-slot at the bottom of the groove (see the drawing at right). For applications where a more durable slot is needed, The Woodworkers' Store offers a pressed-steel track that fits 5/16-in.-dia. T-bolts. The track, which comes in lengths of 40 in. and 60 in., can be cut with a hacksaw and is designed to be epoxied into a 13/16-in.-wide, 13/32-in.-deep slot.

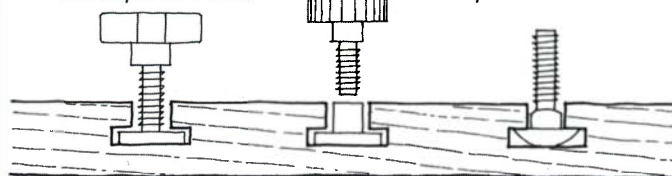
To attach parts or devices to a T-track, use T-bolts or T-slot nuts that ride in the track. T-bolts are available in 1/4-in. and 5/16-in. sizes and a variety of lengths. Standard toilet bolts (found in hardware stores) can also be used but not in all T-tracks. T-bolts may be se-

### Routing a T-slot



1. Rout a straight slot 1/4 in. to 3/8 in. wide to full depth of T-slot.

2. Use special T-slot bit to complete inverted-T-shaped slot.



Slot will hold (left to right): T-bolts, T-slot nuts or carriage bolts.

cured with a regular nut, wing nut or hand knob. Standard carriage bolts can be used in T-tracks, but the depth of the T must be increased with the T-slot bit to clear the head. Carriage bolts can't take as much torque as T-bolts can without stripping the edges of the slot. T-slot nuts (available from Woodhaven) fit several different screw-thread sizes, from 10-24 to 3/8 in. These are secured using a machine screw, a bolt or a studded hand screw. —S.N.

that are closely spaced but at a fixed distance from the end of the workpiece. A handy device for this is the rotating end stop, such as the one shown in the photo on the facing page. This stop mounts easily to any fence, carriage or table and can be rotated and locked in any of four positions. Each position provides a different spacing between the end of the workpiece and the cutter or bit you are using.

Make the stop by laying out a piece of plywood so that its four sides are each a

different distance from a single hole. Start with an oversized piece with a hole marked somewhere in the middle; then use a ruler and a square to mark how the piece must be trimmed (an example is shown in figure 4 on the facing page). A studded hand knob fits through the hole and into a threaded insert, which is driven into the fence itself.

To allow the fence-mounted stop to clear the jig's base when it is rotated (it's too big diagonally to clear), the corners can be cut

off, as on the stop in the photo on the facing page. The position of the rotating stop can be set manually, or detents can be fitted to reference each position. □

*Sandor Nagyszalanczy builds custom furniture in Santa Cruz, Calif., and is a contributing editor to Fine Woodworking. This article was adapted from his new book, Woodshop Jigs and Fixtures, which is available from The Taunton Press, Newtown, Conn.; (800) 888-8286.*





*This table's open framework has an open feel, making it stronger than it looks. The one-piece top seats eight comfortably, and the components are easily shaped using templates.*

# Building an Open-Pedestal Table

*Doubled members simplify joinery;  
templates make shaping parts quick and easy*

by John Burchett

The open framework that supports the elliptical table shown in the photos on this page has a light and airy look that belies its strength. Doubled members that form the feet and tabletop rails, as shown in figure 1 on the facing page, reduce overall mass, add interesting detail and simplify joining the legs to the feet and rails.

In addition to the elementary joinery, I used some template-shaping tricks to greatly simplify construction. The elliptical top, with its gently curved edges, was shaped and edge-molded with a template-guided router. And the many duplicate



*Doubling the frame members reduces the mass in the feet, legs and tabletop supports. It also simplifies the joinery and adds visual interest.*

parts of the base were all quickly and easily cut on a spindle shaper using a template that rides against a special fence.

## Working with templates

Templates are particularly useful for speedier and more accurate small production runs. I added extra length to the templates for tenons and for fixing the templates to the stock during machining. Templates that are slightly long are safer to use because they begin rubbing against the guide bearing or fence before the stock hits the cutter. Any errors in the templates will be reproduced in every cut



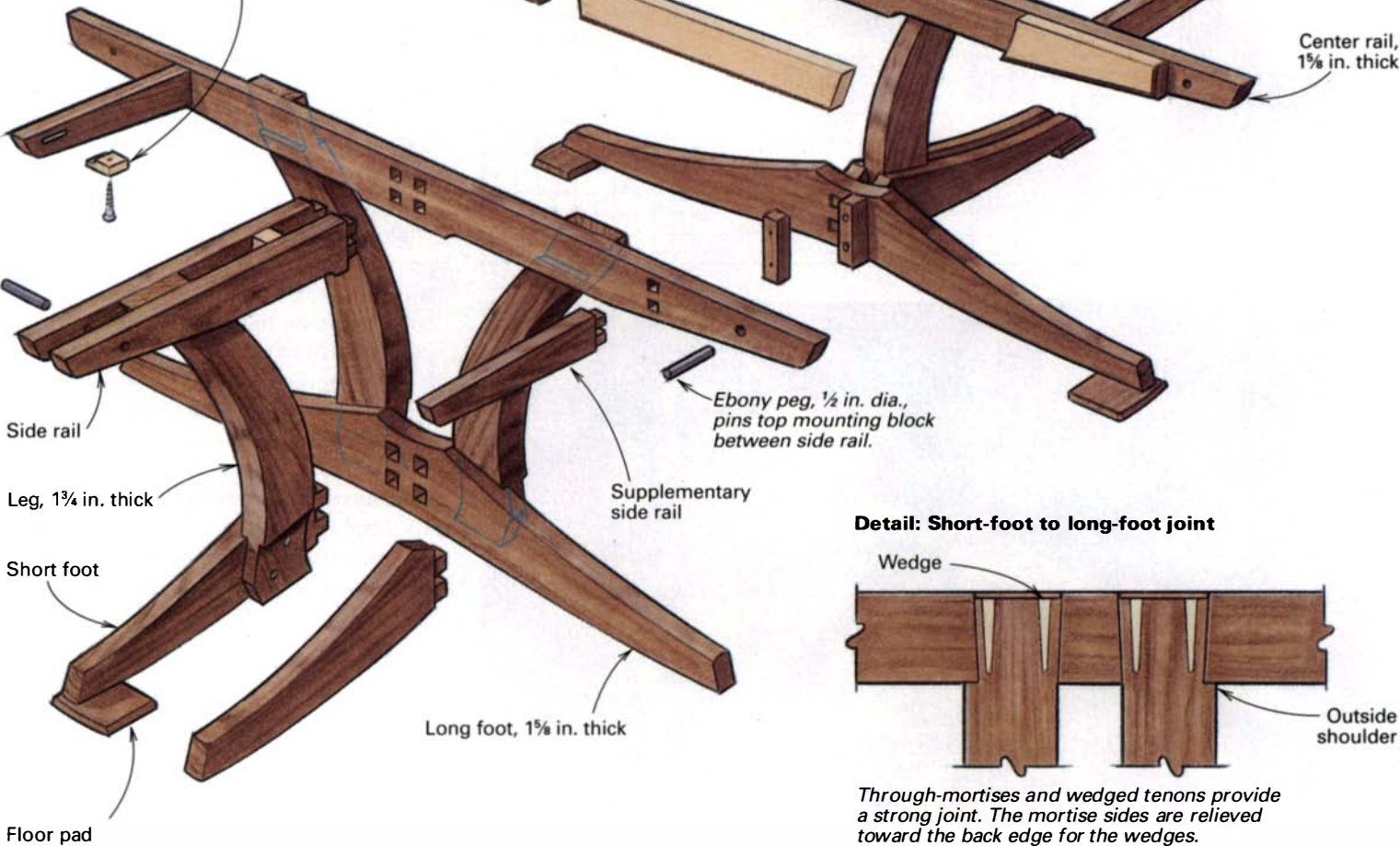
**Fig. 1: Open-pedestal table**

*Straightforward joinery makes assembling this table quick and easy.*

*Top mounting block is glued and screwed to underside of tabletop. Elongated mounting hole allows top to expand and contract.*

*Filler blocks, low-grade stock edged with walnut veneer, are glued in the space between the two center rails.*

*Carpenter's button in elongated slot secures top to supplementary arm.*



part, so it's worth some extra time to be sure that the templates are perfect.

From the full-sized front and side elevations of the table's base (see figure 2 on p. 74), I made templates for each part from 1/4-in.-thick medium-density fiberboard (MDF). I also made a quarter-arc template of an ellipse for cutting and shaping the top. I allowed the template to extend slightly beyond the quarter of an ellipse limits and outside the true circumference. That eliminates the possibility of the router cutting a depression where one quarter meets another when moving the template to shape the four quarters of the top.

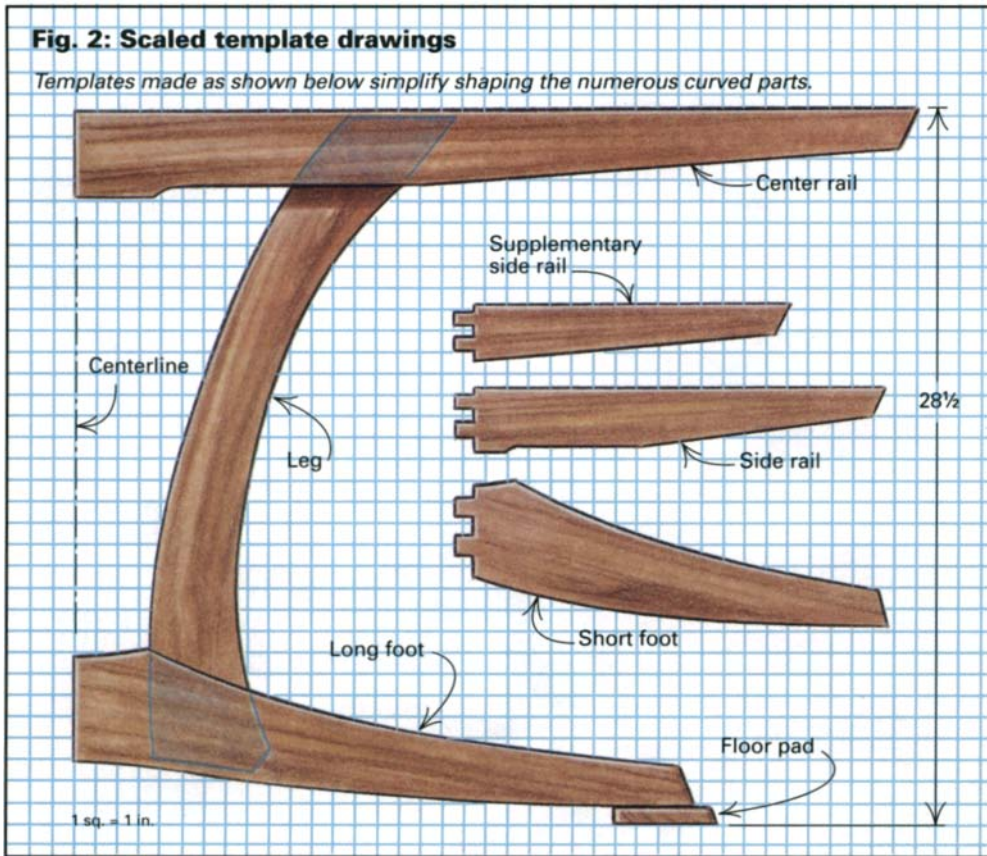
I've also found templates helpful for selecting stock and laying out the cuts. I jugged the templates around to find the most satisfying grain configuration and economical use of timber before cutting out the blanks of American walnut. Then I surfaced and thickened the blanks for shaping. I also machined the boards for the top, so they could settle before re-machining.

When shaping large pieces, I prefer to use a hefty, hand-held router guided by a collar or bearing. But for pieces small enough to handle comfortably, I prefer a spindle shaper. The larger table, arbor and cutters of a shaper produce a smooth,

clean cut. A shaper fitted with an ordinary pair of straight-edged steel cutters and a shopmade ring fence works great for template shaping. A different fence is needed for each diameter cutter used, as shown in the photo on p. 74.

I make my ring fences from birch plywood with an arc to match the cutter's diameter and infeed and outfeed areas. The infeed and outfeed areas make shaping safer because the template can be registered against the fence, and the stock is supported before it reaches the cutter. I set the height of the ring fence with plywood spacers of varying thickness.





**Ring fence makes shaping easier**—It's easier to spindle-shape curved pieces with a shop-made ring fence that follows a template attached to the stock.

The templates are screwed to the blanks in areas that are cut off later. With the machine set perfectly and the waste to be removed at a minimum, the operation is safe and pleasant. After the joints were cut, I molded gentle curves on all the show edges with the shaper. I left the edges square at the leg intersections.

### Cutting the joints

Ordinarily, I cut my joints before shaping a piece, so I can lay out from flat and square faces. But for this table, the base framework was bandsawn from large slabs and tem-

plate-shaped to conserve timber. The only pieces that had straight reference edges were the top rails. For laying out joinery on the feet, I established a reference surface by extending a straightedge from the flat floor-contact area of the foot to the joint area. A block between the straightedge and the foot's curved section (see the top photo on the facing page) kept the straightedge positioned while I marked the joint lines with a try square.

The first joints I cut were the tenons of the short feet and their mortises in the long feet, using the full-sized drawings to deter-

mine joint positions, as shown in the drawing detail in figure 1 on p. 73. The tenons on the short feet and side rails are wedged. I left them about  $\frac{1}{16}$  in. shy of the full thickness of the long foot and center rail to allow for any possible shrinkage in the thickness of the mortised members. The mortises were cut with a square, hollow-chisel mortiser, and I relieved the sides of the mortises at the back with a chisel to allow for the expansion of the wedges.

To mark the tenons at the bottom of the four legs, I clamped each leg between its corresponding feet and scribed the curved shoulder line on each side of each leg. I hogged off the tenon waste on the radial-arm saw and cleaned up the tenon surface with a shoulder plane. The convex curves of the shoulders were pared with a chisel.

I dry-assembled and clamped the legs and feet to mark the tenons at the upper ends of the legs. The shoulders were scribed and the tenons cut as before. At this stage, I marked and cut one joint at a time and assembled and clamped it together while I marked the next joint. Assembling a project one step at a time seems the only way to proceed in custom work involving curved shapes. In fact, this is the way I approach most of my cabinet work. Still, I've found it necessary to make small adjustments to the top joints at final assembly after the bottom joints were glued.

### The assembly procedure

To simplify assembly, I glued up the base into two units, each consisting of a long foot, a pair of short feet and a leg.

Clamping shaped work calls for some ingenuity, but I find it is this sort of challenge that makes woodworking interesting. I overcame the problem of clamping the short feet to the long foot by adding blocks to the outside faces of the short feet, as shown in the bottom photo on the facing page. These blocks provide a bearing surface for clamps to pull the joint together. A softwood block between the pair of short feet holds the feet at the correct spacing. I glued abrasive to the blocks on the outside of the feet to prevent slipping when the joint is clamped. I checked this assembly dry and pulled the joint apart with the short feet still clamped together with their spacing block. Then I glued the mortises and reinserted the tenons. The two main clamps were tightened, everything checked for alignment and the wedges driven home. I cut the wedges flush with the ends of the tenons. The same clamping arrangement was used to glue the side rails and the supplementary side rails into the long rails.

I checked the accuracy of the shoulder



lines of the legs to the feet and made fine adjustments to the tops of the feet using a scraper rather than trying to alter the shoulders themselves. To clamp the leg in place during glue-up, I screwed through a block spanning the bottom of the feet and into the end of the leg to pull the shoulder tight to the top of the foot.

The upper part of the frame was fairly straightforward; it glues into two half-assemblies consisting of one center rail, a pair of side rails and two supplementary rails. One of the half-assemblies was glued and clamped in place to three of the legs. Filler pieces, their lower edges already veneered with walnut, were then glued and screwed in place, as shown in figure 1, to form tight-fitting mortises at the tops of the legs. The second half-assembly was then glued in place.

Apart from making the four floor pads, the only remaining work on the frame was shaping and drilling the four walnut blocks that attach the top. These blocks, which fit between the ends of the paired rails, are screwed, counterbored and plugged on the underside of the tabletop. The blocks are held to the rails with ½-in.-dia. ebony pegs. The holes in the blocks between the short rails are elongated to allow the top to expand and contract.

### Gluing up the top

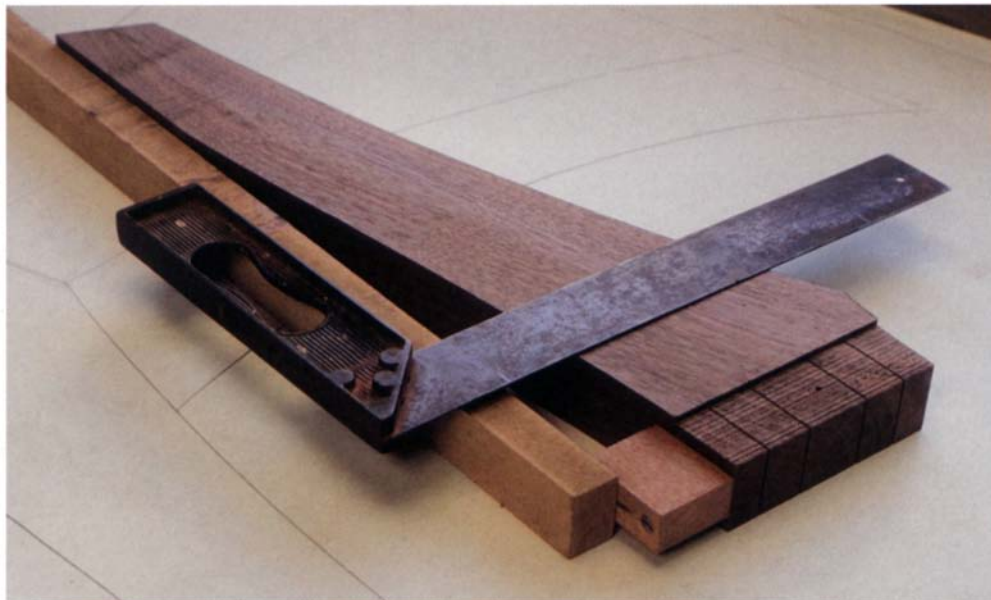
I handplaned the edges for the simple butt joints I used to glue up the top. Two details are worth mentioning when handplaning or shooting a joint: controlling the plane and checking for square.

To control the cut, the left hand does not hold the plane's foreknob but grips the plane's side near the front with thumb on top and index finger rubbing against the side of the wood being jointed. The rubbing finger provides the control needed to move the plane either left or right to adjust the squareness of the cut.

When checking for squareness, the square should be held with its body on the planed edge and the blade extended down the face of the timber. The angle between the long blade and the face exaggerates error, making inaccuracies obvious.

I glued up the top with the heartwood facing up to avoid any exposed sapwood on the tabletop. That way, any cupping would be convex on the upper surface and easier to restrain than a concave top.

After edge-gluing the timbers, I cut the completed slab to a rough elliptical shape and handplaned it flat, planing first across the grain and then along the grain. I cut the slab to a true ellipse with a straight, two-flute router bit using the ellipse template



*Laying out joinery on curved pieces is difficult because there are no straight reference surfaces. The author adds blocks and straightedges as needed to overcome this problem.*



*Clamping long and odd-shaped pieces—Blocks are clamped to the sides of the short feet with a properly sized spacer between each pair of feet. The blocks provide surfaces parallel to the long foot to apply clamping pressure during glue-up.*

and a collar-guided router. I couldn't find a stock router bit to cut the gentle curve I wanted on the top's edge, and I didn't want to wrestle the heavy top across the spindle shaper. So I reground a straight router bit and worked the lower part of the curve first with the top upside down. Then I reground the cutter to a slightly more pronounced curve before turning the top over to work the upper part of the curve. I finished off this asymmetrical scotia shape by fairing the two cuts together with a curved scraper, constantly referring to a template to keep the edge uniform.

### Finishing up

I gave the underframe a couple of coats of linseed oil and polished it off with three coats of dark wax. Because the top receives more abuse, I applied several coats of a mix of linseed oil, polyurethane and mineral spirits as a base for 14 coats of hand-rubbed, hot, raw linseed oil applied over a month. The client continued the finishing process by applying a coat each month for the next 12 months. □

*John Burchett is a custom furnituremaker in Copnor, Portsmouth, England.*



# Comparing Jointer-Planers

*Do combination surfacers match cost, space and performance of separate machines?*

by Robert M. Vaughan



**Two types of jointer-planers:** Side-by-side models include Makita's 2030N and Hitachi's F-1000A and P 12RA (1st, 2nd, 5th from left); over-and-under units are Inca's 570, Kity's 637 and Elektra Beckum's HC 260-ESH (3rd, 4th, 6th). Two others are below and on the facing page.

Owni<sup>O</sup>ng a combination jointer and planer is a heady temptation for anyone with a small shop. And the wide jointing capability some of these machines offer makes the idea more alluring. So I put eight jointer-planers through their paces (see the photos on these two pages). Five were shared-cutterhead European models (Elektra Beckum's HC 260-ESH, Inca's 570, Kity's 637, MiniMax's FS 30 and Robland's XSD 310) that have a jointer above and a planer underneath, which I term "over-and-under" machines. The other three were Japanese offerings (Hitachi's F-1000A and P 12RA and Makita's 2030N) that have the two elements bolted together running off the same motor ("side-by-side" machines).

To keep the comparison aimed at the needs of the small shop, I reviewed machines that list-priced under \$5,000 and weighed under 500 lbs. I focused on the units' initial setup, changing from jointer to planer, operating in each mode, and I speculated on the long-term maintenance prospects. I compared each to the American-made jointers and planers I service.

## Power requirements

The chart on p. 78 shows most of the head-to-head specifications of each machine. They all operate on single-phase alternat-

ing current; some require 220v and others 110v. The Makita and the two Hitachis have universal (brush-type) motors, and the rest have capacitor-induction motors. With any of these jointer-planers, you'd better be well-versed in metric fasteners and belts.

## Over-and-under machines

The over-and-under machines offer a satisfying sequence of mechanical ceremony for those who enjoy fooling around with their machinery. Like Transformers, the children's toy, the over-and-under units undergo a sort of metamorphosis to assume their other identity (see the photo at left). The idea of using a single cutterhead for both the jointer and planer has been around for many years. Popular in Europe, it never caught on big in North America because the space savings are marginal, and the changeover time is significant.

Say that you've just face-jointed your



Photo: author

**Robland's tables swing out for planing**—Changing the Robland XSD 310 from jointer to planer involves swinging the in-feed and outfeed tables aside, lifting the dust chute into place and then cranking up the bed for the desired depth of cut.





**The MiniMax can plane and face-joint boards nearly 12 in. wide. With the MiniMax FS 30's jointer tables up, FWW publisher Jim Chiavelli thickens a piece of 16/4 cherry.**

stock, and you are ready for the planer. With the flyweight machines (Inca and Elektra Beckum), you have to position the over-arm-style guard out of the way. Then the infeed jointer tables must be completely removed and set aside. On the larger machines (Kitty, Robland and MiniMax), you unhook one side of both tables and swing them to an angle off the side of the machine, as shown in the photo above. (To do this on the Kitty, first you have to remove the fence.) Next you pivot the dust hood in place. Then turn the depth-setting crank 30 to 50 revolutions to get the bed up to where the board can be planed. A dust collector then should be hooked up to the hood. After you've thickened the lumber, crank the table down, so the hood can be positioned for jointing. Finally, you must replace the tables, so you can edge-joint.

At this point, I'd want to use a dial indicator to check that the out-feed table didn't get moved in relation to the arc of the knives or get misaligned due to dust buildup between the contacting parts. I can't imagine that a busy woodworker would bother checking this, but even without this step, the whole changeover procedure is rather involved.

When you consider the space required for a dust collector and the space occupied by the tables sticking out the side (or on the bench), there doesn't seem to be much of a space savings. In addition, these machines need a shop large enough for you to move around all four sides because you have to feed in opposite directions when jointing and planing. Despite their shortcomings, however, the over-and-under machines offer some unique, worthwhile features. Here's a close look at the individual machines.

**Elektra Beckum HC 260-ESH and Inca 570**—The Inca 570, list-priced at \$2,395, has more features than the less expensive Elektra Beckum HC 260-ESH, but I found their overall performance to be about equal. The 570 is engineered to pack a lot into a small package, which makes it fit easily on a bench. It comes without a stand, and the instructions specify it should be mounted on a rigid, flat base. This is a sensible prerequisite to keeping the aluminum sides from distorting when it is bolted down. The Elektra bolts to the sheet-metal stand that comes with it. The stand's rubber bushings compensate for any distortion caused by being set up on an unlevel floor. A mobile stand is optional.

Desirable features that are similar on the Elektra Beckum and the Inca are a 10¼-in.-wide cutterhead, a stiff aluminum jointer bed, a steel-surfaced planer bed and a lightweight aluminum body. The planers on both machines have steel feed rollers and beds that raise and lower by threaded corner posts. On the down side, neither planer has height-adjustable feed rollers and neither jointer can rabbet. Though both machines come with either nylon or plastic drive sprockets and pulleys that work well mechanically (and are quieter than steel), I question how durable they will be.

The Inca has a patented Tersa cutterhead, which is designed with replaceable knives that can be changed in minutes. The cutterhead consists of a central steel rod that has sheet-metal plates stacked along its length and held by snap rings. This is unlike the Elektra, which has a solid-steel cylindrical cutterhead. The Inca's knives are thin and have a shallow full-length groove that matches a lobe in the cutterhead. The lock-shim is also profiled so that when the machine is running, centrifugal force drives the shim against the knife and locks it. To remove a knife, simply knock the lock-shim down, and slide out the knife (see the center photo on p. 81). Though the knives were set fairly accurately on the Inca I tried, I'd still rather be able to adjust the height of the knives if needed.

The Elektra Beckum is light enough to be shipped UPS, which also makes it convenient for a job site. But the directions state that the machine should be moved by the base, not by grabbing the ends of the jointer bed. The jointer has a depth-of-cut scale, but the graduations don't say whether they are in millimeters or in fractions of an inch.

The Inca comes with a powerful 2-hp motor and a 220v plug. The Elektra has a flange-mounted 220v capacitor-start motor,



Jointer-planers compared				Jointer specifications		
Machine	Make/model Distributor	List price *	Shipping weight	Number of knives	Max. jointing width (in.)	Depth of cut (in.)
		Motor amps/volts	Overall l x w (in.)	Type of knives	Table length (in.)	Cutterhead speed (rpm)
Over and under	Elektra Beckum HC 260-ESH Elektra Beckum USA Corp. (609) 784-8600	\$995 11/220	132 lbs. 43¼ x 29½	2 S,S	10¼ 39¾	¾ 7,200
	Inca 570 Garrett Wade Co., Inc. (800) 221-2942 or Injecta Machinery Corp. (818) 797-8262	\$2,395 10/220	135 lbs. 47 x 31	3 D,R	10¼ 42	⅛ 6,000
	Kity 637 Farris Machinery Co. (800) 872-5489	\$1,495 11/220	220 lbs. 49 x 21½	2 D,R	10¼ 47¾	⅛ 7,320
	MiniMax FS 30 SCMI Corp. (800) 292-1850	\$2,880 16/220	418 lbs. 59 x 22	3 S,S	11¾ 58½	⅜ 5,000
	Robland XSD 310 Laguna Tools (800) 234-1976	\$2,575 16/220	476 lbs. 58⅝ x 25½	3 S,S	12¾ 55⅞	⅜ 4,500
	Hitachi P 12RA Hitachi Power Tools USA (800) 706-7337	\$2,018 15/110	99 lbs. 28⅝ x 28⅝	2 S,S	6⅞ 28⅝	⅛ 10,400
Side by side	Hitachi F-1000A Hitachi Power Tools USA (800) 706-7337	\$4,600 15/110	320 lbs. 62½ x 30¾	2 S,S	6⅝ 63	⅛ 10,400
	Makita 2030N Makita USA, Inc. (714) 522-8088	\$3,350 13/110	330 lbs. 59 x 30¾	2 S,S	6⅞ 59	⅛ 7,000

**Notes:** \* Actual selling prices may be lower. Price does not include shipping. D,R Disposable, reversible

which cam-locks onto a direct-drive coupling that protrudes from the side. Because of the motor location, the Elektra can be placed against a wall. But when jointing, the motor seems awkwardly situated (see the top photo on p. 80). It's a good idea to wear a tight leather apron so that loose clothing or threads won't get caught in the motor's cooling fan.

Jointer fences and cutterhead guards were quite different for the two units. The Elektra guard slides aside to expose the cutterhead for edge-jointing, rather than pivoting when stock is pushed into it. For face-jointing, the guard can be raised easily with a lever. Elektra's fence is aluminum. The Inca's jointer fence is faced with a smooth phenolic, and the guard is a complicated but well-made articulating device. However, jointing a large assembled drawer won't work unless the guard is removed. For jointing wide stock on both machines, you feed the wood under the guard. This keeps fingers out of harms way, but it leaves a little ridge in the stock when you change hands to reapply down pressure.

When jointing, finger grooves in the throat of Inca's tables (see the center photo on p. 81) reduce noise. The cutterhead dumps chips down in the planing bay, so it must be cleared out before planing. Likewise, the planer cavity of the Elektra needs frequent cleaning. The jointer infeed tables on both machines have to be removed before planing, which is inconvenient. While planing with the Inca, I found its scoop-shaped plastic chip pan worked okay, but not great. Its planer bed raises and lowers easily but slowly. The two-speed drive system worked smoothly, too, but the flat belts do some contortions. Inca's directions were thorough in explaining how to lubricate this sensitive system. The directions also say that it's normal to expect some (.05 mm) end snipe. Stock

3 ft. to 5 ft. long worked comfortably on the Elektra and the Inca, and they'll both handle 4/4 stock as a regular diet. But longer, heavier stock was cumbersome to machine because of their short beds and tables.

**Kity 637**—The Kity 637 may be the best over-and-under machine for a tight shop. It fits well against a wall for jointing and the aluminum tables and planer bed make it light. The manual says not to move the machine by the tables, so the stand should be mobile.

The steel infeed and outfeed rollers were dainty—approximately ⅞ in. dia.—the same as Elektra's and Inca's. The 220v capacitor-start motor is an aluminum-housed European size, and it comes with a plug. Because the motor is enclosed by the stand, it's difficult to get to. The motor has an overload feature, but the problem is that if the motor overloads and shuts down and you accidentally leave the switch on, it may restart automatically when things cool down. There is a rod for feed engage and disengage, but I needed to remove the side panel to observe what was supposed to be happening. The maximum recommended cut of ⅞ in. seemed about right for the drive system.

Like the Inca, the Kity's jointer tables are slotted to reduce noise, but again there's no rabbeting ledge. Its two knives can be set with the included straddle-type gauge. The extruded aluminum fence has no precise detents to register 90° or 45°. Also, the fence has to be tilted and then removed before planing, which means you have to square it up (see the bottom left photo on p. 80) when going from planer to jointer. When reinstalling the fence, carefully roll the cutterhead, so the knives are out of the way and won't get dinged.

The planer bed is stable, riding on four metric-thread posts.



Planer specifications			Comments
Max. planing width (in.)	Depth of cut (in.)	Feed rate (ft./min.)	
Bed length (in.)	Max. thickness (in.)	No. cuts per in.	
10¼	5/32	19	Comes with stand, optional mortiser Remove tables to change over. Motor location is awkward for jointing.
15¾	65/16	63	
10¼	1/8	11½ or 16½	Tersa cutterhead allows quick knife changes. Motor also operates at 110v at 20-amps. Dust chute is awkward. Remove tables to change over. No stand
15¾	65/16	86 or 61	
10¼	1/8	29	Comes with stand; good dust chute Tilt tables and remove fence to change over. Feed lever is confusing. Optional mortiser
207/8	77/8	42	
11¾	3/16	23	Tables tilt to change over. Sensitive to feed; ineffective dust chute Optional mortiser Two-knife Tersa cutterhead is available.
21½	8	54	
123/16	3/16	23	Tables tilt to change over. Guards and dust chute are poorly designed. Optional mortiser
215/8	9	49	
129/32	3/32	26	Good size for job site Jointer unbolts easily for portability. No stand; need wrench to adjust fence
1911/16	65/8	55½	
125/16	1/8	26	Work height is low. Jointer tables have folding extensions. Good dust evacuation; nice scales Has only one top roller to pass lumber over
397/8	65/8	55½	
12½	3/32	17 or 26	Work height is low. Good dust evacuation Adjustable infeed and outfeed jointer tables Has two top rollers to pass lumber over
41▲	7¼	69 or 51	
S,S Sharpenable, single edged    ▲ Measured between extension rollers			

There was a bed-locking knob, but it worked marginally. For planing, you tilt the infeed jointer table (with guard) to the side, and then pivot the dust chute up from beneath. The hose attachment on the chute can be removed in case no dust collector is available. This is handy and works quite well. The planer is capable of dressing stock just over 7¾ in. thick. I preferred limiting jointing to 5-ft.- or 6-ft.-long boards.

**Robland XSD 310 and MiniMax FS 30**—The Robland XSD 310 and the MiniMax FS 30 are heavyweights. They have large cutterheads, and the planer beds and the jointer tables are made of cast iron. Like the Inca and the Kity, the MiniMax has quieting grooves in the tables. The Robland and the MiniMax have integral sheet-metal stands and can be fitted with an optional mortiser. The long tables and wide cutterheads make both jointers useful for long, wide stock. To plane, the jointer tables swing out to the side. I wasn't able to lock the Robland's tables in this position, which puts them at risk of getting bumped when you're moving big lumber around. For overall stability, the MiniMax has a concrete counterweight mounted in the base. I was comfortable jointing heavy 7-ft.- and 8-ft.-long boards on both units.

The motors in both machines use large European capacitors for starting and both are 220v only. The Robland has a switch that indicates reversed rotation for the horizontal mortising attachment. But never try to joint or plane when the motor is reversed. The MiniMax has provisions for a security padlock on the switch. Like the Kity, both machines have motor overload disconnects, but neither came with a cord. Each has a lever to disengage the feed rollers and a lock for the planer bed position. Like the rest of the over-and-

under gang, no rabbeting can be done on the MiniMax or the Robland jointers.

A weak point on both machines is their aluminum fences. Robland's was difficult to adjust, and MiniMax's stuck out and was in the way when I walked around the back to turn the machine off. Robland's off button is located conveniently near the jointer infeed table. I appreciated MiniMax's conventional (pivot-type) jointer guard that lets me face-joint any thickness lumber. The Robland's plastic and aluminum guard was awkward, but a company spokesman said a new guard was being developed.

The MiniMax's planer bed is mounted atop a single cast-iron post as is the Robland's. This configuration may not be as rigid as the corner-mounted beds. I was able to rock the bed when planing a long hefty plank. On real rough lumber, I had some difficulties feeding the MiniMax. Part

of this could be due to its lack of bed rollers and rather small infeed rollers, which have helix-shaped serrations that tend to cock the board to one side. But after fiddling to get the FS 30 feeding evenly, it easily handled a 1/8-in.-deep cut. The Robland's planer bed has no guide on one side to prevent a skewed board from sliding out from underneath the cutter. This left a raised edge that had to be surfaced by a second pass at the same setting. During planing, Robland's dust hood left the spinning cutterhead dangerously exposed on one end. Without a dust collector, the hood clogged after taking 3 ft. of a 1/16-in.-deep cut off an 8-in.-wide pine board. Similarly, using the MiniMax without a dust collector caused planer shavings to build up quickly inside. So keeping a good vacuum or compressed air line around is a good idea if you aren't going to use a dust collector with either of these two.

### Side-by-side machines

Coming from the Orient, the side-by-side machines offer a planer on one side and a jointer on the other. One deficit with these units is the 6-in. width limit for face-jointing. Another drawback is they are noisier than the over-and-under type. But with the side-by-siders, the motor fans evacuate the dust, vigorously exhausting shavings off the cutterhead. A single universal motor runs the planer and jointer cutterheads on 110v current. The Makita and both Hitachis have aluminum cutterheads. Unlike the over-and-under group, most of the side-by-sider's components, such as the bed rollers, also can be adjusted—a real plus.

**Hitachi P 12RA**—Though I was expecting another cheaply built suitcase planer, I was pleasantly surprised by the gutsy and ag-



*The Elektra Beckum joints cleanly but takes getting used to. The Elektra Beckum (right) HC 260-ESH's powerful 220v induction motor was easy to mount, but it has a delayed start, is rather loud and is located in an awkward spot for jointing. The machine has a convenient lever for raising and lowering the guard.*



gressive Hitachi P 12RA. The machine is virtually ready to go out of the crate save for a little cleanup. A toolbox is included that has all the tools needed for adjustments. The manual is clear and extensive, including information about changing brushes. The on/off switch is convenient for both jointing and planing and has a removable lockout. The double-insulated motor comes wired with a two-pronged plug. The 110v electricals and the small size make it perfect for a job site or a space-starved workshop where a woodworker needs to stash things under a bench.

The Hitachi P 12RA's 6-in.-wide jointer has a conventional pivot-style plastic guard, which can be removed for rabbeting, and the cast-iron fence must be adjusted with a wrench. Although the little jointer did well on 4½-ft.-long stock, it's a bit awkward for longer stock because of the short (28¾ in.) tables. The jointer is simple to remove to make things more portable (see the far right photo).

The P 12RA's 12-in. planer bed is supported by four corner posts, and a hand crank raises and lowers the bed by a central screw. The neoprene infeed and outfeed rollers wear quicker than steel but stay grabby if kept clean. The planer's depth of cut is ¾ in. I found the all-metal drive train to be as heavily built as the large over-and-under machines, but the feed rollers' chain drive is exposed to sawdust and should be blown out from time to time. Although the planer bed does not have bed rollers, both the planer and jointer surfaces are laminated with slick chrome-plated metal. On curly maple, the planer's high-speed cutterhead surfaces very well. You can't hog off a great deal of stock at once, but it produced less tearout than other portable planers I've tried. A dust hood comes as an accessory.

**Hitachi F-1000A and Makita 2030N**—The Hitachi F-1000A and the Makita 2030N combine a 12-in.-plus planer and a 6-in.-plus jointer. These are relatively heavy machines with lots of steel and

*On its rigid base, the Kity runs smoothly. The Kity 637 has a small footprint and an easy-to-use guard. Here, Vaughan sets the fence and infeed table.*



*The little Hitachi is ideal for a job site. The Hitachi P 12RA is small and light, and its jointer can be removed. Double-insulated, it will run off a 110v generator.*

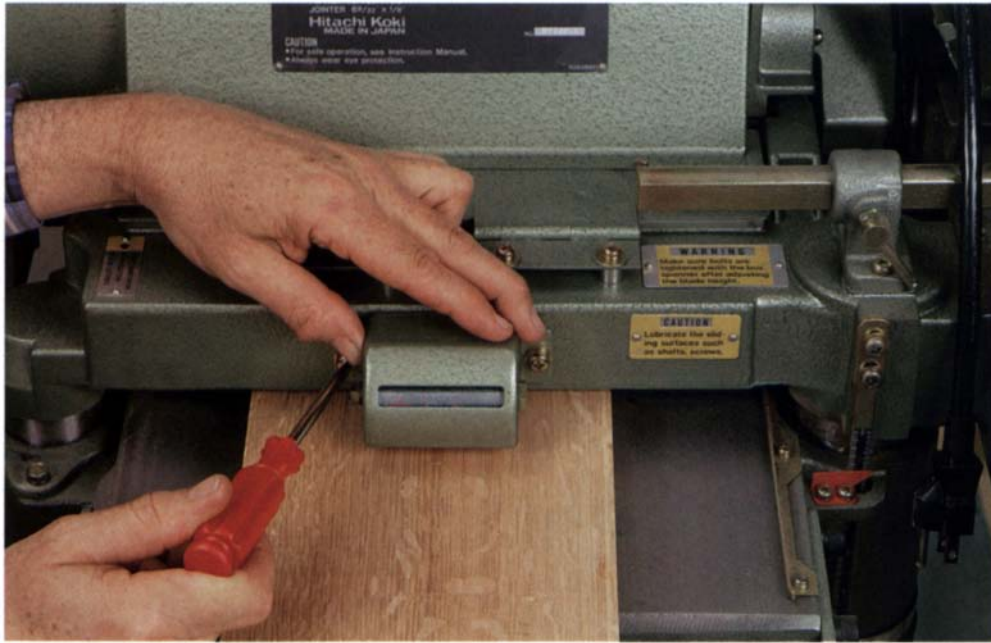


cast-iron and a minimum of aluminum and plastic. Like the small Hitachi, the big side-by-siders have a four-post structure, are almost ready to run from the crate and offer excellent instructions. All that's needed for installation is to clean them up, mount them on a heavy stand (unless you like to work at knee level) and zero the depth-of-cut gauge (see the top photo on the facing page).

Both jointers can do rabbeting. After unplugging the Hitachi F-1000A, you open the head cover to gain access to the knives. To lock the cutterhead, you rotate a knife to top dead center, and then turn a locking lever. This model comes with knife-setting blocks, and the Makita knives can be set similarly. With the head closed and the motor running, both machines blow out dust and chips through their discharge chute.

During planing, both machines' motor speed routinely drops about 20% as soon as a board is inserted. But because of the high cutterhead speeds, these machines do a smooth job on figured



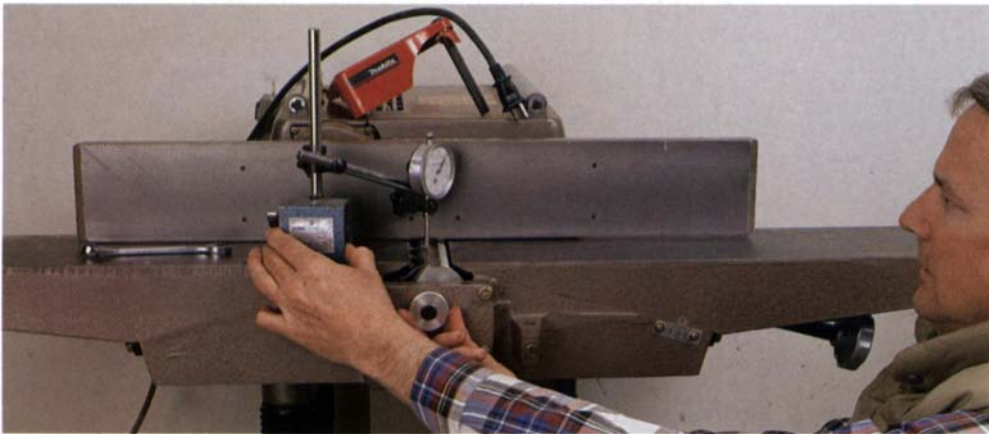


*Depth of cut is simple to calibrate on the big Hitachi (left). After the author zeroes the Hitachi F-1000A's depth of cut, he snugs the gauge's two screws. The fast cutterhead (10,400 rpm) produced a glass-smooth surface on this highly figured white oak board.*

*The Inca 570's knives replace quickly (right). Centrifugal force locks the knives in the Inca's Tersa cutterhead.*



*The 2030N has long jointer tables that are adjustable (below). The Makita jointer tables measure 59 in. long. Despite having a 6-in.-wide jointer, the adjustable tables make the machine simple to set precisely. Vaughan found the height of the jointer knives to be quite accurate.*



### Which machine to buy

As expected with new machines that have sharp knives, I was able to get smooth surfaces and accurately thickened boards using each unit. So to pick a favorite model, you have to look at other factors.

If I knew I'd be moving it frequently, then I'd consider either the Elektra Beckum HC 260-ESH or the Inca 570. The Inca is more compact, but the Elektra is less complicated and less expensive. If my shop was used for other things, such as a garage, then I would probably select the Kity 637 because of its small footprint. If I planned to do lots of wide, long jointing and I owned a dust collector, then the Robland XSD 31 or the MiniMax FS 30 would be good choices because of their substantial construction.

The biggest objection I have about any of the over-and-under units, however, is that they don't lend themselves well to precision tuning. For example, if the knives are exactly set to the jointer outfeed, they aren't necessarily parallel with

the planer bed and feed rollers. That's why, for overall performance and durability, I would choose one of the side-by-side machines. If I did lots of work in the field or small furniture work, then I might go for the little (P 12RA) Hitachi. But as long as I could spare the space, I would select either of the big side-by-siders. Of these, the Makita 2030N wins over the Hitachi F-1000A only by the slimmest of margins, mainly because the Makita has two feed speeds, a long all-cast jointer bed and an adjustable outfeed table. But after looking at all of these machines, I'm still glad I have my big old Powermatic planer and Delta jointer. I like my jointer against the wall, and the planer rolling around on a stand. This way, I keep the mainstay of my shop, the tablesaw, in the middle of the floor where it should be. □

wood, especially if you take a light final pass. To further reduce tearout, the Makita offers a slower feed speed, and the Hitachi has one feed speed to go with its quicker cutterhead. Neoprene feed rollers come on both the units, but neither machine offers a way to disengage the rollers during planing. A feed shutoff would be helpful if something should get jammed. The Hitachi has only one roller on top of the planer for passing lumber back and forth, but the Makita has two, which allow you to balance the stock if you're working alone. The Hitachi has flip-up aluminum table extensions on its jointer, whereas the Makita has full-length cast tables. The Makita's jointer has a moderately adjustable outfeed table (see the bottom photo), and the Hitachi's outfeed table is fixed. I prefer having adjustability on the outfeed table. The Hitachi had the better switch location. It can also be locked off. The Makita has a two-part switch for safety. And though the Makita has a slightly less powerful motor, it does have an electronic brake.

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*Robert Vaughan is a contributing editor to FWW, and he rehabilitates woodworking machines in Roanoke, Va.*





**Working under a legacy of craftsmanship**—Duane Mendenhall (above) carves shell drawer fronts for slant-top desks. He's surrounded by sample carvings from past Irion Company carvers. Specializing in 18th-century reproductions, Irion Company does its work in this former hardware store (right) in Christiana, Pa.





# A Visit to Irion Company Furniture Makers

*Passion for period furniture creates a brotherhood of joiners*

by Jonathan Binzen

**I**rion Company Furniture Makers is 17 going on several hundred. Walk into the shop, and you can feel a direct connection with the roots of American furniture. Patterns, samples, templates and story boards hanging from the walls and rafters spell out the aesthetic of the 18th century. Half-made highboys, tea tables, secretaries, beds and chairs fill the first floor bench room. The furniture is made with scrupulous fidelity to the originals, and the wood it's made from is extraordinary. But what's most striking is the brio with which the furniture is made, the complete immersion of the craftsmen in their work. "Making 18th-century furniture is a real charm. A labor of love," said Kendl Monn, nine years at Irion. "We've been lucky—we've grown slowly and ended up with the people who really live this stuff."

Lou Irion founded Irion Company in 1977 after working in his father's cabinetmaking shop for a year or so. He was soon joined by Chris Arato, a college friend, and together the two built the business over the next 15 years. Arato left in 1992 and opened a small shop of his own in Maine, but he is still a presence at Irion, recalled by everyone I spoke to as a master at the bench and an inspiring mentor. When the two pitched their lots together, neither one had much experience in woodworking or business. "We set out to survive," Irion said. "There was no grand plan. If we'd had one, we would have failed miserably." Their survival strategy was to take any work they could get. At the beginning, that meant mostly furniture repair, refinishing and restoration. As the company grew, they built more furniture, but restoration and repair remained the engine of the business.

That was a lucky thing, according to Monn, because in addition to paying the freight, that work also paid the tuition. "Dealers would bring in this great stuff, and everyone would be all over it. We'd see great pieces and great ideas every day, and that's absolutely the way to learn. You see the real stuff, and you see it the right way—you're not looking at somebody's interpretation."

Perhaps because the company's founders discovered firsthand that passion and not prior experience was the key to success, they've fostered an atmosphere of learning. Irion has rarely hired fully trained cabinetmakers. "For some reason, we seem to do best with people who learn most of what they know with us," Irion said. The learning occurs off the job as well as on. If an employee wants to make something for himself, Irion gives him lumber and free run of the shop after hours. A number of Irion employees said that's how they got from one level to another. "As we see you can do something effectively," Monn said, "you'll get to do it for the shop. Then you have to do it *cost-effectively*, and you get a raise."



**Irion's broad range is evident in the prep room—At one end of the room is a Chester County highboy in tiger maple, a mahogany Chippendale corner chair and samples of bedposts.**



**"Working wood like this is a privilege," says Brian Shultz as he carves the fluted knee block on a figured mahogany Chippendale hall table.**



**Replicating a finish—Jeff Rath applies a coat of orange glaze to a Dutch cupboard. Coats of sprayed shellac and hand-rubbed wax will follow.**





**Reproducing furniture with a reproduction plane**—Gerald Martin, building an 18th-century Chester County slant-top desk, smooths end grain with a reproduction Stanley #9 plane made by Maine planemaker Lie-Nielsen.



**Hand-crafted detailing is important to the work**—Jeff Williams does final spokeshaving on the crest rail of a Chippendale camel-back sofa in tulip poplar and Cuban mahogany.

The variety of work Irion does keeps even the most experienced furnituremakers interested. Different types of furniture are rotated, so everyone gets a shot at the more involved or unusual pieces. Irion explains, “It was obvious early on that you either challenge the guys or you lose them.”

Irion also keeps his furnituremakers happy with the outstanding wood he obtains. Even very wide tops and case sides are made from single boards, and grain is always carefully matched. On practically every piece that leaves the shop, the wood’s color is rich and the figure is stunning.

Brian Shultz, an Irion employee for 14 years, still gets excited by the wood. “It felt like Christmas,” he said, when he planed the one-piece mahogany top of the Philadelphia Chippendale hall table in the bottom left photo on p. 83 and revealed the full effect of the crotch figure. “I went and bragged it around the shop.” He stopped carving the volute on one cabriole leg to fetch a rag and some mineral spirits to rub on the top, so we could see the feathered depths of the figure. “If I had to glue up four or five boards to make a top for this piece, I might be going through the motions, just getting it out the door. But when you get to work with wood like this, you feel like you’re letting it down if you don’t give it your best.” □

*Jonathan Binzen, formerly the assistant editor of Fine Woodworking, is now assistant editor of FWW’s new sister publication, Home Furniture.*



# Hand-picked wood for handmade furniture

"Wood is at the heart of our business," Lou Irion says. From what I saw on several visits to his shop and his nearby farm, the heart is healthy. Irion, on the tractor in the bottom right photo spends three-quarters of his 70-hour week working with wood—and that's before the wood ever reaches the shop. He buys by the log and has the logs custom cut by small sawyers who understand his needs. "Most lumbermills saw for clear," he says. "They constantly turn the log to find a clear board. And they're paid by the board foot. There's no incentive to cut wide boards or boards with figure." After much fighting with mills, Irion found some small local sawyers who understand his needs and have the same feeling for the wood that he does. "Instead of grinding a great tree up into hamburger," he says with satisfaction, "they'll cut it for me like a butcher." —J.B.



Photo: Gerald Martin

**"We've made wood the focus of our furniture."** Lou Irion seeks wild figure and wide boards and regularly finds both, as in this Pennsylvania Dutch cupboard in flame birch. The sides of the upper and lower cabinets are cut from the same board. Doors, drawer fronts and face frames are cut from the same plank or the same tree. "You can only make a cabinet so well," says Irion's Gerald Martin. "At the end of the day, what sells people is the wood."

**Planks are carefully selected—**Lou Irion personally picks the primary wood for all the furniture his company makes. In the central bay of one of his two larger wood-storage barns (below), he lowers boards he has picked from racks of shorts on the upper level. He has planks stacked in five smaller outbuildings as well, including one shed dedicated to pieces with crotch figure.



**Controlling the wood from stump to workbench—**Lou Irion buys logs and has them custom sawn to yield wide boards with the best figure. He air-dries the boards in stickered stacks at his farm (above) for a year or more and then kiln dries them. To make loading and unloading his dehumidification kiln easier, Irion had an Amish neighbor build this special steel-wheeled wagon. It stays in the kiln and is guaranteed against flat tires.







*Scratch stocks—old, new and shopmade—Whether old like the Stanley #66 (right), new like the Lie-Nielsen #66 reproduction (left) or shopmade (top), these scratch stocks are a simple way to reproduce moldings or create new designs accurately and economically.*

## Simple Tools Can Reproduce Most Moldings

*Scratch stocks are quick  
and easy to use and make*

by Robert S. Judd

Scratch stocks function beautifully, quickly and economically to duplicate handworked wood trim. By simply grinding or filing a cutter to the appropriate profile, you can reproduce almost any shape molding up to about 1 in. wide. Scratch stocks, or beading tools as they are sometimes called, are readily available new (Lie-Nielsen Toolworks, Inc., Route 1, Warren, Maine 04864; 800-327-2520 or Veritas Tools Inc., 12 East River St., Ogdensburg, N.Y. 13669; 800-667-2986), used (antique tool dealers, garage sales or flea markets) or shopmade (see the photo above). I make mine from a 6-in.-long, L-shaped piece of stock. The cutter fits into a sawkerf, and it is clamped in place with a few screws, as shown in the photo above. The cutters for all of these tools are easily shaped from old scrapers and sawblades or new blanks from Lie-Nielsen or Veritas.

In my repair and restoration business, I often need to duplicate broken or missing moldings. Usually, only a foot or two of the molding is needed: hardly worth the effort of setting up the router and definitely not worth having a cutter ground to match one of the myriad of molding shapes. Besides, no power tool can match the irregularities of the handworked wood found in older pieces.

### **Scratch stocks and beaders**

First made by users as a simple holder for a scraper blade, scratch stocks included a fence arrangement to work a measured distance from an edge. The beading tool was essentially an improved, factory-made scratch stock and included a range of cutters in different sizes and several blanks, custom-filed to fit the user's needs. Adjustable fences for both straight and curved edges were often included. A scratch stock or beader can produce a carbon copy of the original molding by using a cutter that's simply filed to shape.





**Filing a cutter to shape**—Almost any profile, up to 1 in. wide, can be filed into blade blanks made from old cabinet scrapers, sawblades or new blank stock (above).

**Beading is simple with a scratch stock**—Just hold the fence against the stock and make repeated passes (right), about 1/16 in. per pass, until the appropriate depth has been reached.



**Matching a molding to a cutter (below)** is crucial to reproducing old moldings. File the cutter to the negative image of the molding. Check the cutter frequently while filing to make sure it is an accurate match.



### Shaping the cutter

To make a basic beaded molding, take a sample piece of beading, a file and a blade blank and set to work filing a negative pattern of the molding, as shown in the top left photo. As you file the pattern into the blade, keep testing its fit (see the bottom right photo). Check the fit frequently because it is fairly easy to file past the desired shape. It's a good idea to leave a 1/8-in.-wide metal strip at either edge of the cutter. Narrower strips tend to bend and lose their effectiveness. Old cabinet scrapers or sawblade sections make good cutters for shopmade scratch stocks. But for my 100-year-old Stanley #66 hand beader, the blanks that Lie-Nielsen makes for his gem-like bronze replicas of the #66 work well. The steel of the new blanks is not hardened, so the blanks are easy to file to shape. After filing them to shape, hone just the cutter's faces in a whetstone to provide a clean cutting edge. I've never found it necessary to harden a cutter once it's filed to shape.

### Making moldings

When producing short moldings, I've found it easier to work the edge of my board, as shown in the bottom left photo. For making small beads or moldings, I cut two lengths at once by working both corners of the same board edge. Begin the scraping process by firmly gripping the handles, and push or pull the tool across the board's edge, keeping the handles at 90° to the work. Take small scrapings initially, only 1/16 in. or so at a time. Because stock removal is done by scraping, a small cut gives much more control and does less damage if you slip. As the cutter starts to bottom out, you can continuously adjust the blade so more is exposed. In a surprisingly short time, the molding will start to appear on the edge. If the cutter starts to chatter or jump, you are probably trying

to remove too much material, or the grain might be changing; use a little less pressure, or try changing the direction of cut.

One of the handy features of the #66 or the Lie-Nielsen reproduction is the adjustable fence. When cutting two lengths of molding on a board edge, the fence can be set to cut the opposite corner without moving the blade. This lets you produce a surprising amount of molding in a relatively short time. I make several extra moldings, so I can pick the best match to the original.

I like to start the staining and coloring process at this stage because the strips are far easier to handle while they are still attached to a board. Often, I will even do the preliminary finishing and filling at this point for the same reason. It's then a simple matter to trim the finished molding off on the table saw. I set the saw fence to leave a little extra material, which I later trim off with a utility knife.

When repairing antique pieces, mark your name and date on the back of the new molding for historical reference. After all, with a matching stain and finish, the repair should be almost invisible.

### Other applications

In addition to producing molding patterns, this highly functional family of tools is also effective for routing and inlay work. Because you create the cutters to fit the situation at hand, you are no longer limited to standard router bits.

When using these tools to rout cross-grain, however, it's a good idea to lay out the material to be removed by lightly cutting in the lines with a sharp craft knife. The scored lines help prevent tearout, which could ruin your project. □

*Robert Judd is a professional furniture repairer and refinisher in Canton, Mass.*



# Shopmade Rip Fence

## Assembles Easily, Stays Aligned

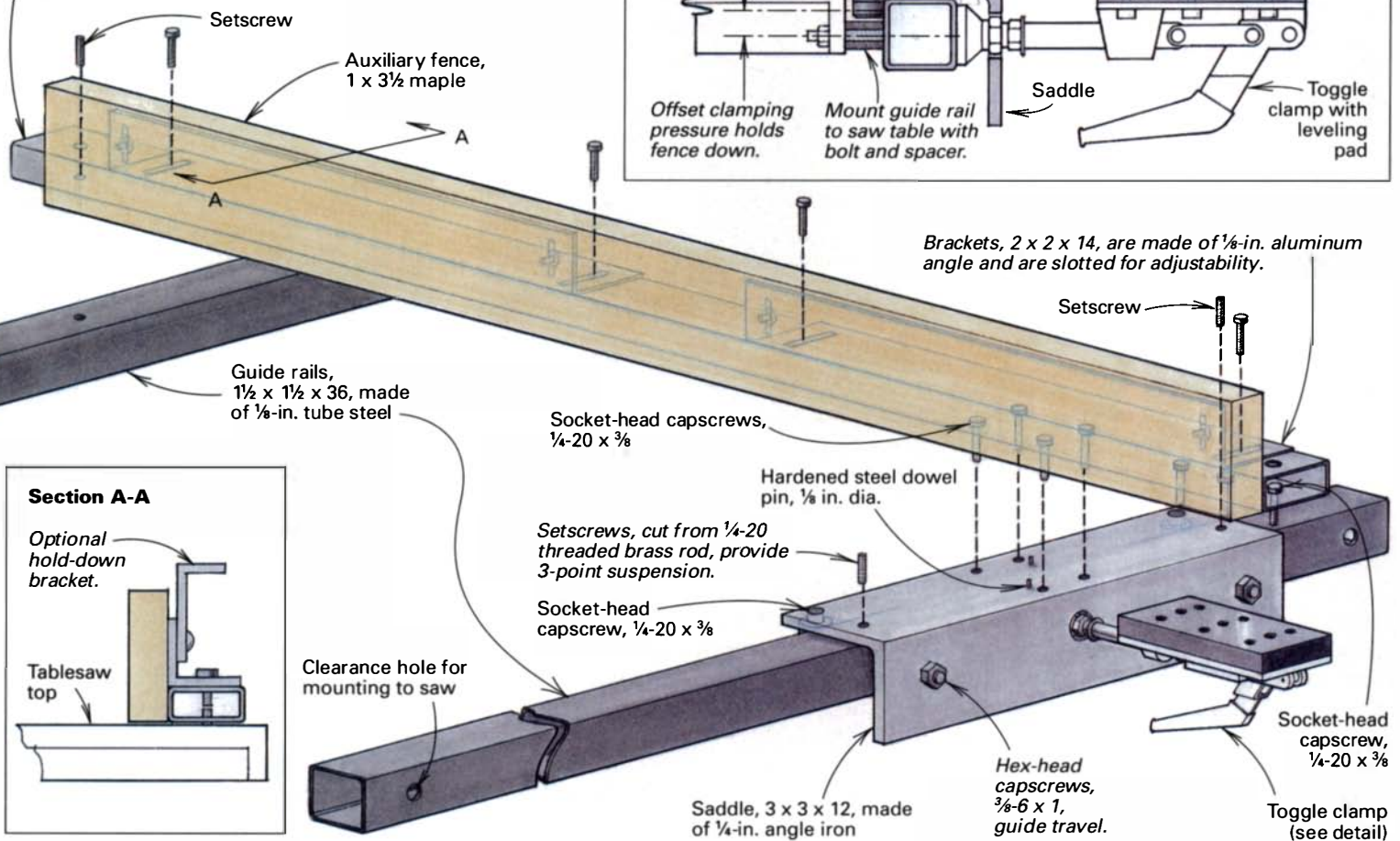
*Bolted steel components, setscrews and a toggle clamp are keys to accuracy*

by Worth Barton

### Rip fence construction

Note: Modify dimensions to suit your tablesaw.

Fence, 1 x 2, made of 1/8-in. tube steel



Brackets, 2 x 2 x 14, are made of 1/8-in. aluminum angle and are slotted for adjustability.

#### Section A-A

Optional hold-down bracket.

Tablesaw top

Clearance hole for mounting to saw

Socket-head cap screws, 1/4-20 x 3/8

Setscrews, cut from 1/4-20 threaded brass rod, provide 3-point suspension.

Socket-head cap screw, 1/4-20 x 3/8

Saddle, 3 x 3 x 12, made of 1/4-in. angle iron

Hex-head cap screws, 3/8-6 x 1, guide travel.

Socket-head cap screw, 1/4-20 x 3/8

Toggle clamp (see detail)

When I bought an older-model 10-in. Craftsman table saw, I was pleased with the saw's operation, but I was frustrated by its rip fence. It was a pitifully thin zinc die-casted saddle that soon broke. I could have bought one of the many after-market rip fences that are available (see *FWW* #68, p. 41). But I knew that I could make a sturdy, accurate rip fence fairly inexpensively (mine cost about \$65) following a few simple ideas (see the top photo on the facing page).

### Design

Building a first-rate replacement rip fence is pure fun—good for the shop and for the ego. I began by making a “got to have” list:

- Strength, durability and deflection resistance
- Reasonably available components
- Construction requiring only a drill press and hand tools
- Repeatable settings with low-friction movement
- Consistent clamping behavior
- Quick removal

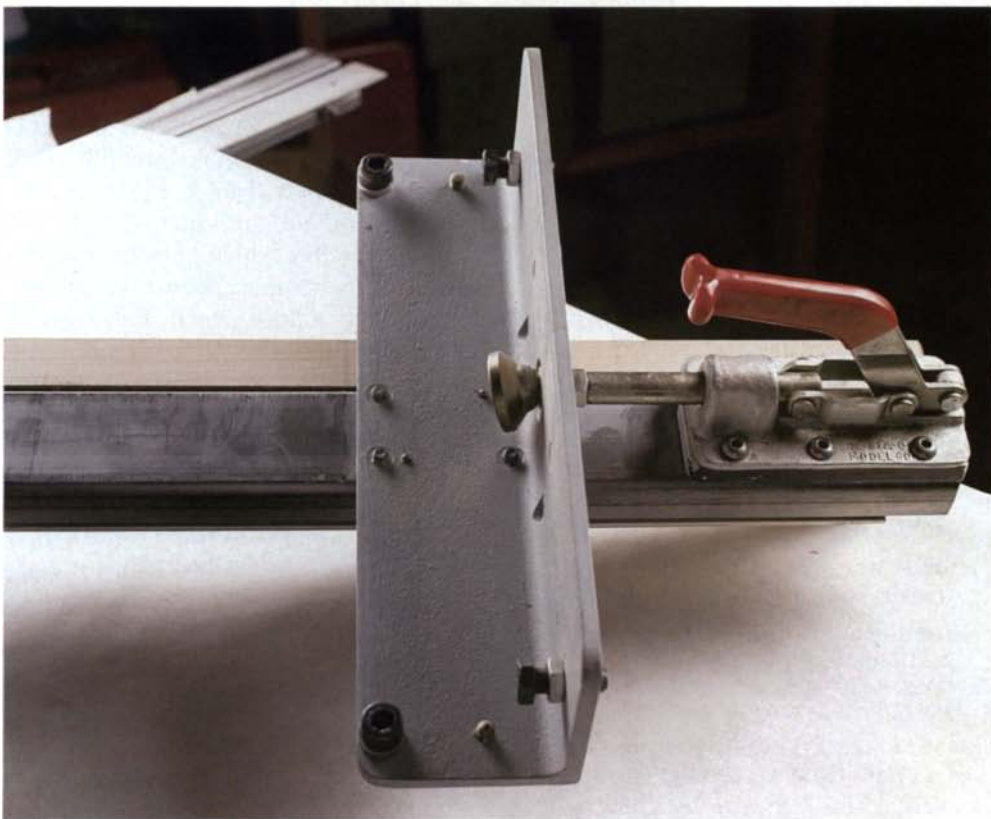
Using square tube steel for the fence took care of the first three items, and a toggle clamp in the saddle satisfied the last three.

**Steel parts plus single-rail locking equal precision**—Most impressive of the commercial rip fences are the cast-iron and steel ones that marry precise surfaces to smooth movement. I decided





**Rip fence slides smoothly, locks positively**—Barton, setting up for a rip cut, snugs his fence in position using the saddle's toggle clamp. The fence, which has a hardwood auxiliary fence, was made out of standard steel sections and hardware. The fence slides on three brass setscrews that contact two square-tube guide rails.



**The underside of the saddle reveals how the fence stays aligned.** Two socket-head screws (left side of angle) and a toggle clamp (right side of angle) sandwich the front guide rail. The saddle is fixed squarely to the fence by bolts and steel dowel pins. The two other bolts (with nuts) guide the fence during positioning.

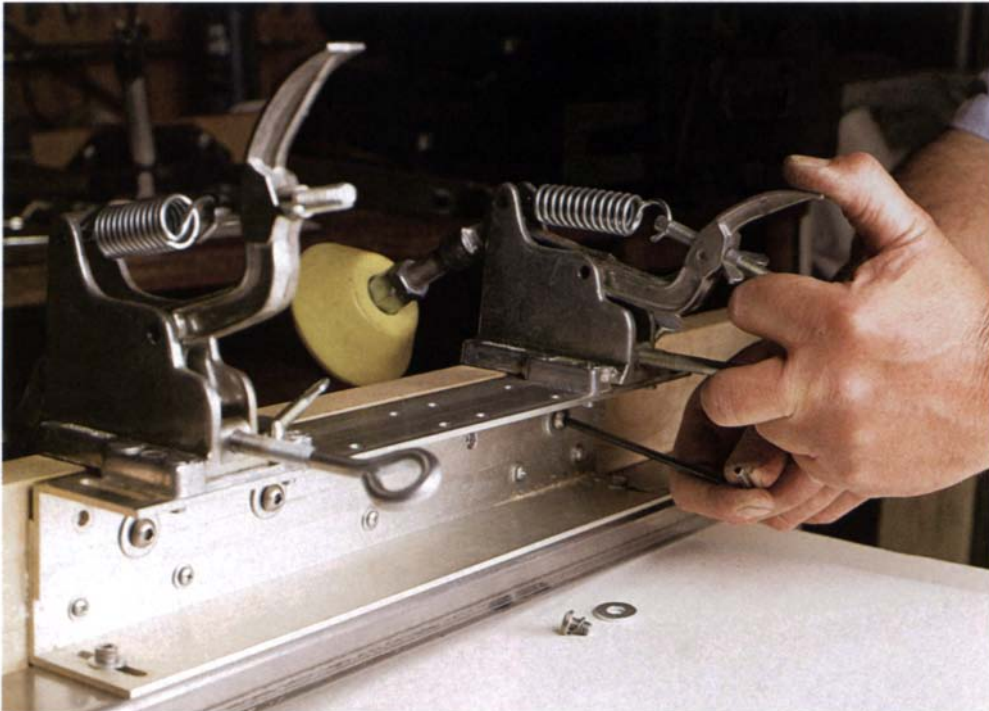
**The saddle**, the piece that connects the fence to the front guide rail, is really the key. I chose a long base for the saddle to control what aircraft and boat designers call pitch, roll and yaw. To picture these phenomena, think of the fence as an airplane's fuselage. Pitch refers to the degree of nose-to-tail level. Roll is side-to-side (port to starboard) level. On the saw, these motions are relative to the table, the horizontal reference plane. To understand yaw, think of the fence's saddle as the tail of the airplane. The tail can swivel back and forth while remaining level with respect to the fuselage, as though the airplane was pivoting about a vertical axis. Yaw is similar on the saw, though it is greatly diminished; the rip fence can twist from side to side in the plane of the saw table, like a washing machine agitator.

to capitalize on those principles using common steel sections bolted together. I also decided to use a single-rail locking mechanism. Here's why: Many commercial rip fences, once positioned, get locked to both the front and rear guide rails. But when I checked a couple of fences of this type using a dial indicator, I found that the locking action would slightly skew the fence out of parallel. So on my rip fence, I made a saddle that has a toggle-clamp plunger offset below two guide bolts at the front rail (see the drawing detail on the facing page). This provides the fence with the necessary down pressure (to the table), which means that I don't need a clip at the rear rail. Though the rip fence still requires a rear rail, it is for guidance only—not for latching the rip fence in position.

To control yaw when the saddle position is fixed, I mounted two guide bolts (behind the front guide rail) and an adjustable De-Sta-Co toggle clamp between the two bolts (ahead of the front guide rail). The front rail is sandwiched between the ball-and-socket pad on the end of the clamp's plunger and the heads of the screws. That keeps the fence perpendicular to the rail. Because the screws in the saddle are above the plunger, clamping pressure forces the fence onto the saw table. This pressure enables the rip fence to resist the uplift action of a hold-down device. I use Shophelper hold-downs (available from Woodworker's Supply, 1108 N. Glenn Road, Casper, Wyo. 82601), which have anti-kickback rollers. Two



**Brackets secure the auxiliary fence and a hold-down accessory. The author used aluminum angles to attach the auxiliary fence to the main fence. The brackets are slotted to allow adjustment and to set minute tapers for ripping. Similarly, the add-on top bracket is for mounting the yellow-wheeled (Shophelper) hold-downs.**



additional bolts, widely spaced and adjustable (see the bottom photo on p. 89), control yaw when I slide the saddle. This allows the motion to be smooth and free from lock-up.

**Contact points: setscrews and guide rails**—To restrict pitch and roll, I made the fence so it contacts the guide rails at three places: Two saddle points ride on the front rail (see the bottom photo on p. 89), and one point on the end of the fence rides along the rear rail. For the contact points, I installed three brass setscrews, which provide a means of leveling and act as low-friction bearings.

The guide rails must be square or rectangular because the saddle has to lock positively to the front guide rail, and the setscrews must slide on flat surfaces at both the front and rear guide rails. If your table saw has pipe rails or angle-iron rails, replace them with square-tube sections (see the drawing on p. 88). To attach the rails, drill through the flange (edge) of your saw table, so you can use bolts and spacers to hold the rails perpendicular to the miter slots and parallel to the table surface. Set the rails lower than the table, so the rails don't interfere with the miter slots.

### Materials, fasteners and assembly

Because steel has three times the stiffness of aluminum, I used standard structural steel box shapes for the long members (the two guide rails and the fence). The tube steel is dimensionally uni-

form, has a high resistance to twisting and is readily available at most metal-supply houses (see sources of supply). I used 1/8-in.-thick wall tubing to avoid bolt tear-out in the tapped holes. Have your steel vendor cut the tubes to the exact length you need. For the saddle, I used a 12-in. length of 1/4-in. by 3-in. by 3 in. angle iron. A model #607 De-Sta-Co toggle clamp locks the saddle; a piece of straight maple, attached by aluminum angles, serves as an auxiliary fence (see the drawing).

I bolted the parts together rather than welding them. Struggling with welding distortion can ruin your day. By contrast, bolts are easy to drill and tap for and are easy to remove. Suppliers offer a wondrous variety of fastening and clamping devices (see sources of supply). I use short fasteners because they reduce connection springiness and still afford some adjustability. Socket-head capscrews are ideal because they are made of high-quality steel and install easily.

The saddle-fence assembly is essentially a T-square, which glides on the front and rear rails. A .005-in. to .015-in. gap between the table and the fence allows clearance for sawdust and promotes smooth movement. As a safety feature, I extended the fence over the toggle clamp (see the top photo on p. 89), which prevents me from accidentally bumping the actuating lever.

Slotted brackets attach the auxiliary fence to the main fence (see the photo above). A similar bracket attaches the optional hold-down. The main brackets are symmetrical so that the auxiliary fence can be placed right or left of the fence. The slots, unlike holes, allow the fence to be adjustable and skewed for 2° or 3° tapers. It also enables the fence to be opened slightly at the rear of the saw (mine skews .020 in. over its length), as opposed to being parallel to the blade. A flared rip fence lessens the likelihood of kickback when you're ripping wet or unstable wood.

### Setup for use

Make sure your sawblade and miter slots are parallel. Then set the fence parallel to the slots. To do this, place the assembly on the saw and attach a dial indicator to a miter-slot guide. Run the guide back and forth in the slot as you check the fence for runout. Tighten the screws joining the saddle to the fence. To ensure that the fence-saddle squareness won't be lost through rough handling, match-drill the parts so that you can press-fit hardened-steel dowel pins to lock the assembly: First clamp the saddle and fence together, and then drill and ream them to receive the pins. You can press in the pins with a drill press or tap them in with a hammer. □

*Worth Barton is a design engineer, inventor and hobbyist woodworker living in San Jose, Calif.*

## Sources of supply

### Clamp

De-Sta-Co, PO Box 2800, 250 Park St., Troy, MI 48007; (313) 589-2008.  
(Note: modify thread to 3/8-16 for stud-type plunger pad.)

### Aluminum and steel

Adjustable Clamp Co., 417 N. Ashland Ave. Chicago, IL 60622; (312) 666-2723

Castle Metals, 3400 N. Wolf Road, Franklin Park, IL 60131; (708) 455-7111

### Tooling accessories and fasteners

Reid Tool Supply Co., 2265 Black Creek Road, Muskegon, MI 49444-2684; (800) 253-0421

Vlier Corp., 2333 Valley St., Burbank, CA 91505; (818) 843-1922



# Bowback Windsor Step by Step

*Green woodworking lends its strength to this classic design*

by Harriet Hodges

**T**he rewards of building Windsor chairs are sweet indeed. From logs, I create objects of beauty and utility, strong but graceful, steeped in tradition and destined to last generations (see the photo at right). The process isn't difficult as long as you take it step by step.

## Preparation

Before you start to make a bowback (or any other style) Windsor, you have to get green wood, preferably in whole log form. Split out, square and then round blanks for the back-bow, spindles, legs and stretchers. I use sugar maple for legs and spindles, pine or basswood for the seat and hickory for the back-bow.

You'll need to make a crude kiln to dry the tenons that go into wet mortises: Wet-dry joinery gives Windsors their characteristic strength. A cube of folded foil-faced insulation with a light bulb inside and plywood ends works well for me. Shape your spindles (see figure 6 on p. 96 for dimensions), and dry them for at least 24 hours. If you don't want to build a kiln, you can put the spindles in a gas oven with a pilot for 48 hours.

## Drilling and shaping the seat

Using the seat pattern from figure 2 on p. 93, scale the pattern onto a piece of cardboard or heavy paper. Now set the blank on the bench, heart side down, and trace the pattern on it. Mark the centers of spindle, back-bow and depth holes. Mark leg centers on the top for reference in carving. You want to leave a lot of material around the legs for strength. Mark spindle sight lines (see figure 2). They will be used later to help drill the spindle mortises at the correct angles.

Cut the front profile of the seat, but leave the back waste intact so you'll have corners to clamp. Then set the pattern on the bottom, lining it up at the front and marking leg centers for drilling. Also, transfer the sight marks for the legs from the pattern (marks FL and



*Strength belying its delicacy is the hallmark of a Windsor chair, a trait it derives from the wet-dry joinery and the long, unbroken grain of the drawknifed, not sawn, pieces. The Windsor's classic good looks fit in almost anywhere.*

RL in figure 2), and then draw sight lines, as shown. Next mark the centerline of the gutter, which defines where the seat carving begins and the plateau for the back ends.

Start drilling with the center spindle mortise. Set a bevel gauge to 8° back from perpendicular, and center its blade on the sight line. Use a 1/2-in. auger bit, and set a depth stop for 1 1/2 in.

Drill with a mirror set to the side of the bit and bevel gauge, so you can sight both angles at once (see the photo on p. 92).

After the center spindle, drill in pairs, one mortise to each side of center. Change the bevel gauge's angle setting for each pair. Use a 3/8-in. bit to drill the back-bow mortises.

Turn test tapers now to match your reamer (see figure 5 on p. 95). The reamer tapers leg and back-bow mortises. Ream the back-bow holes from the top until the test taper protrudes below. Check angles repeatedly, aligning the center of the test taper, the blade of a try square and the sight

line to get one angle right in one plane. Use the bevel gauge to check the angle in the other

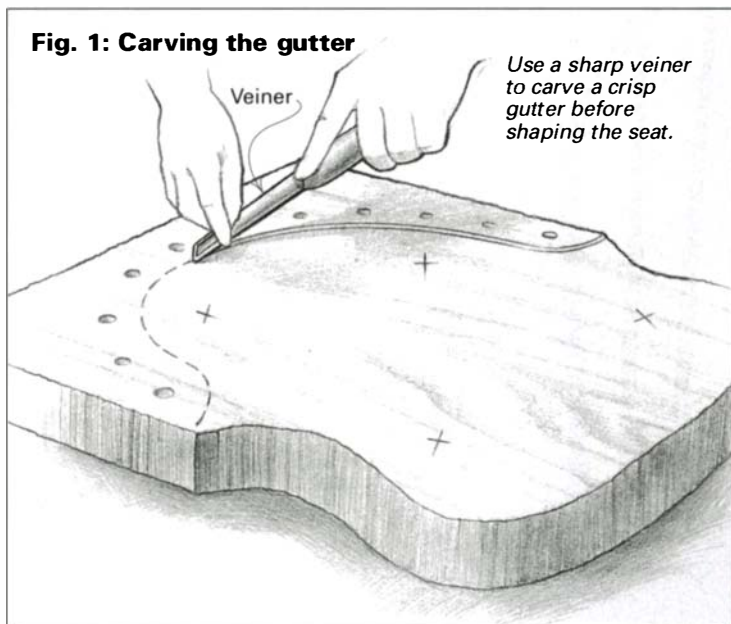
plane (see the bottom photo on p. 93).

The first step in shaping the seat is to carve the gutter. Carving a crisp gutter requires a scalpel-sharp veiner (a carving tool that cuts a V-groove), see figure 1 on p. 92. Before you start removing more seat material, draw contour lines along the front of the seat and the forward part of the sides (see figure 2 on p. 93). Bore depth holes to 7/8 in. with a Forstner bit. Then have at it with an adze, inshave or large gouge. Proceed evenly, from the middle of the inner circle in figure 2, aiming for a shallow bowl that gradually deepens and widens. Bring in area A. Drawknife the front, spokeshaving when close to the line. Round the seat



## DRILLING AND SHAPING THE SEAT

*Aligning brace and bit in two planes isn't difficult, but it takes practice. Hodges positions a bevel gauge, set at 8° off perpendicular, along the sight line she'd marked previously for each spindle mortise. By keeping her bit in line with the bevel gauge in front of it and checking the mirror to make sure the bit remains parallel to the gauge, she can bore all the spindle mortises in about 10 minutes.*



over slightly below the gutter. Undercut the underside at the front deeply, tapering into the areas under the gutter edge. Finish up with scrapers on the top, leaving the bottom spokeshaved. Saw the waste off the back.

The side S-curves are difficult, undulating in two planes, perpendicular to the floor at the back and twisting subtly. Use rasps and files as necessary. Look for symmetry between the two sides and for fluidity (see the top photo on the facing page).

Once you've shaped the seat, turn it over and bore leg holes, using the same mirror technique as the spindle holes. Ream them from the bottom until the test taper protrudes slightly all the way around, testing frequently for angles with the test taper.

### Preparing legs and stretchers

I chose simple bamboo-style turnings for this chair. Bamboo turnings can be done with a gouge and just the tip of a skew, which is good news if you haven't done much turning. Note the positions of the bamboo nodes in figure 3 on p. 94. Be sure to sand the legs while they're still on the lathe.

Once you've turned the legs, lap them to mate with their mortises. Mark a heavy line down the reamed hole with a soft pencil. Twist the leg in the hole, re-chuck it and remove high spots. The end of the tenon should protrude slightly all around. Mark and match legs and holes for a permanent match; they're *not* interchangeable. I use stick-on colored dots.

Insert all four legs in the seat with light mallet taps. You'll need to get the seat up on blocks, so the leg tenons will go to depth in

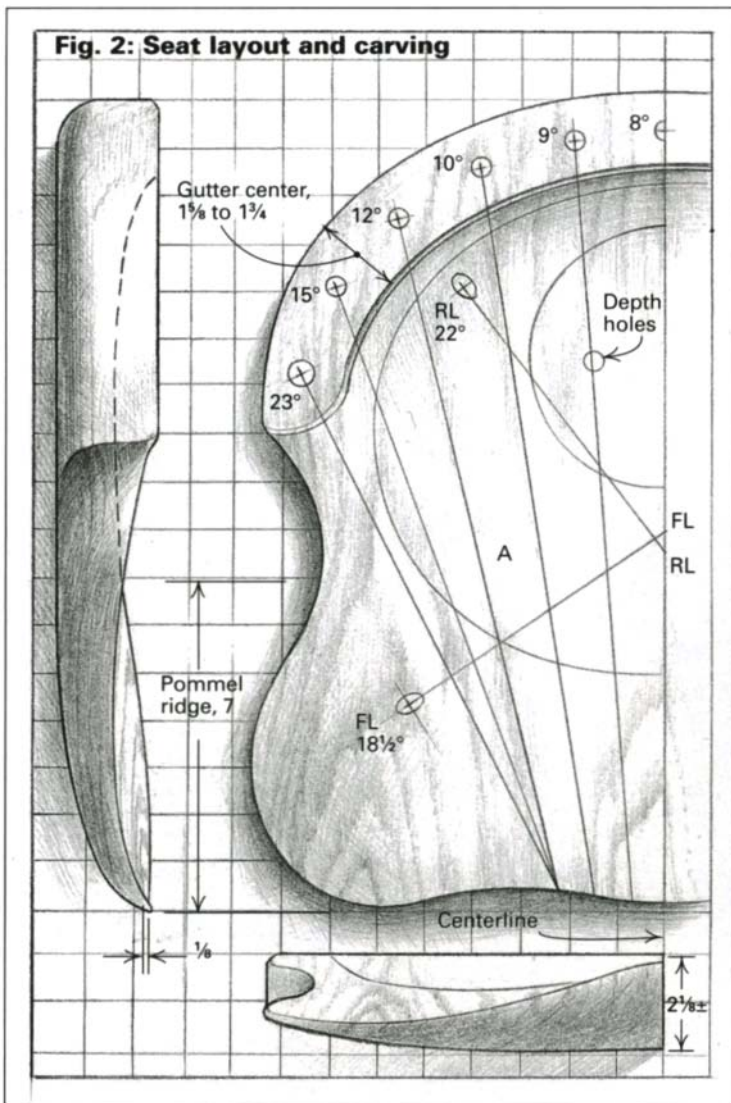
their mortises. Orient the legs properly, turn the assembly upright and mark the top of the leg tenons for the direction of the sawkerf (note the orientation of legs and stretchers in figure 4 on p. 94). Kerfs must be perpendicular to seat grain.

Now flip the assembly back over, so the seat is back on blocks on your bench. Measure for stretchers at the centerline of the bottom node of the bamboo. To do this, choose a front-back pair, and mark the center of the mortise in one with an awl as you sight "through" its mate. Flip the assembly around and repeat. Now measure the distance between the two marks, add 2½ in. (for the tenons and chamfered shoulders) and you have the length of your stretcher. Repeat for the other side. It doesn't matter if the two stretchers are different lengths.

To get the length of the medial stretcher, first measure the distance between the front legs and the distance between the back legs. Use the same awl marks you made to drill for the side-stretcher mortises. Add those two lengths, divide by two and add ½ in. That's the length of your medial stretcher.

Cut stretcher stock to exact lengths and turn, making tenons exactly 1 in., chamfers ⅛ in., but leave the tenons slightly thick. Center the nodes on the side stretchers; space two equidistant from each other and the chamfers for the medial stretcher. Sand them on the lathe, and make sure to turn a couple of extras for test-fitting. Now wrap legs and stretchers tightly in aluminum foil, leaving just the tenons exposed, and dry them in your kiln for 48 hours—no more. Then re-chuck all legs and stretchers, and sand lightly to take down the grain raised by heating them in the kiln.





*Much of a Windsor's alluring grace is found in the seat, particularly in the S-curve on the side. The transition from a horizontal to nearly vertical surface over just a few inches requires a good eye and sharp tools to make it feel natural. Hodges uses a drawknife for starters, followed by rasp, file and spokeshave.*



*A reamer (to the left, on the seat) is used to taper the chair-leg mortises. Bore the mortises for the chair legs, using a mirror to get the angles right. Then use a bevel gauge, protractor, square and test taper to check the angles and mortise depth as you ream. A reamer in a tap wrench can be used to pare selectively within the mortise to get the angles just right.*

### Assembling the undercarriage

Boring and assembly require concentration and speed. Assemble the chair upside down on the bench on blocks, orienting each leg properly in the correct mortise. Scribe around each leg at the seat.

To check the leg-stretcher angles, set a rule along each side pair of legs. Then set a bevel gauge against the rule, and adjust it so the blade is in line with the center of a leg, rear first, then front (see the photo on p. 94). Record these angles for boring the side-stretcher mortises.

Lay another rule across the first, snugging it against either both back or both front legs. With the bevel gauge, record the acute angle where the two rules meet. This is the medial-stretcher angle.

Place side stretchers on the seat with their tangential planes up. Put the medial stretcher between them, radial plane up. Pick up side stretchers with your thumb and middle finger opposing, each in the middle of an "ellipse," right at the center of the tangential face of the stretcher. Now prick a mark with an awl on the node ring halfway between your fingers, or right in the middle of the radial face, to locate the mortise for the medial stretcher.

The next step is to size tenons. Accuracy is a must. Use test pieces until you get a perfect fit, and *then* go for the real thing. File a test tenon very slightly in the radial planes, exaggerating the oval. Chamfer ends slightly, so they won't bind just as your tenon enters a test board. Use a piece of scrap maple with a 5/8-in. hole in it to test the fit. If the tenon slips right in, try a smaller bit. If it won't penetrate with moderate blows, it's too wide. A drive plate is wonderful for sizing tenons because it removes such a small amount at

a time. Failing that, either file or re-chuck in your lathe. When you have a tenon that fits well, record its diameter with dial or vernier calipers. Then file flats on its radial planes, swab glue in the 5/8-in. hole in the maple test board and on the end of the tenon, and pound it home in the test mortise. Wait a minute. Try to pull it out or twist it. If you can't—and the mortise didn't split—that's your tenon dimension. Now size all tenons for real.

To avoid confusion in drilling, point the leg tenons toward you. For the two stretchers you'll mortise, draw arrows that will point toward you as you drill at an acute angle. You don't need jigs: Hands and eyes are capable of more than enough accuracy. Set the seat on blocks upside down on the bench for test fits. Do the stretcher assembly first. Pick up a side stretcher, note the angle you wrote down for the medial stretcher, set your bevel gauge and place the stretcher in a vise to hold it without rocking while you drill. I use a three-peg vise, which works well and takes only minutes to make (see the photo at left on p. 95). Place the bevel gauge alongside the stretcher, the acute angle pointing toward you. Set a mirror to the side, so you can see both bit and bevel gauge simultaneously while drilling. Don't worry about being a little off. This step is forgiving, too.

Bore the mortise so it's at least 1 1/8 in. deep. Relieve the acute-angle side of the mortise, so the chamfer on the medial stretcher doesn't get hung up. Clean any chips or sawdust out of the mortise. Orient the medial stretcher correctly, and coat its tenon thinly with glue, particularly the end. White glue's a good idea until you're confident you can deal with the quicker set-up time of yel-

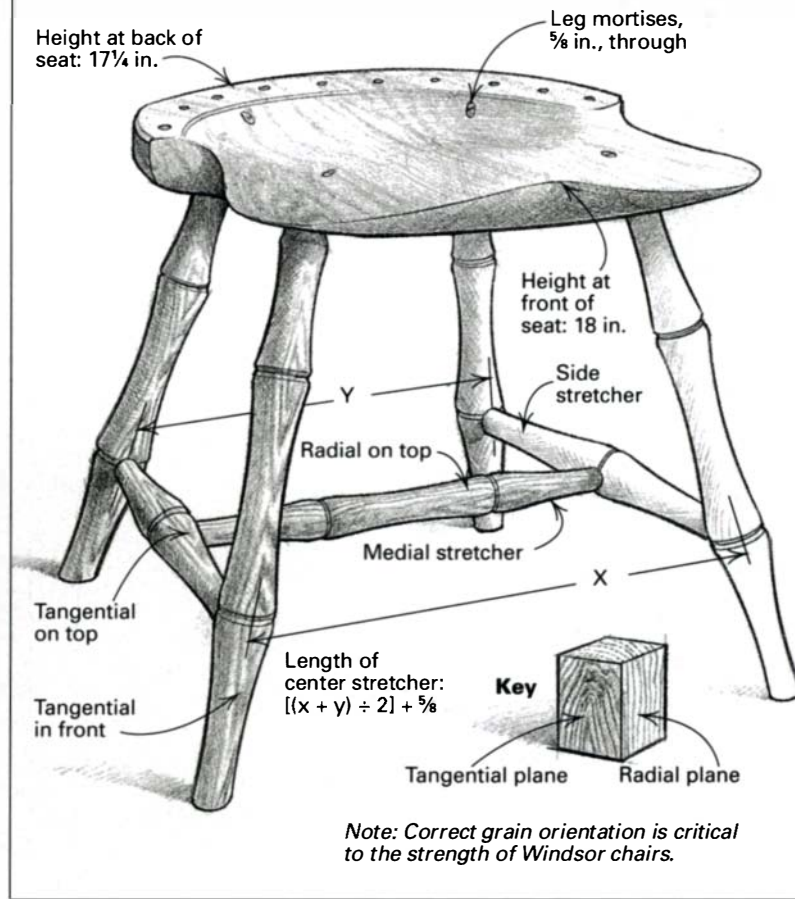


## MAKING THE UNDERCARRIAGE

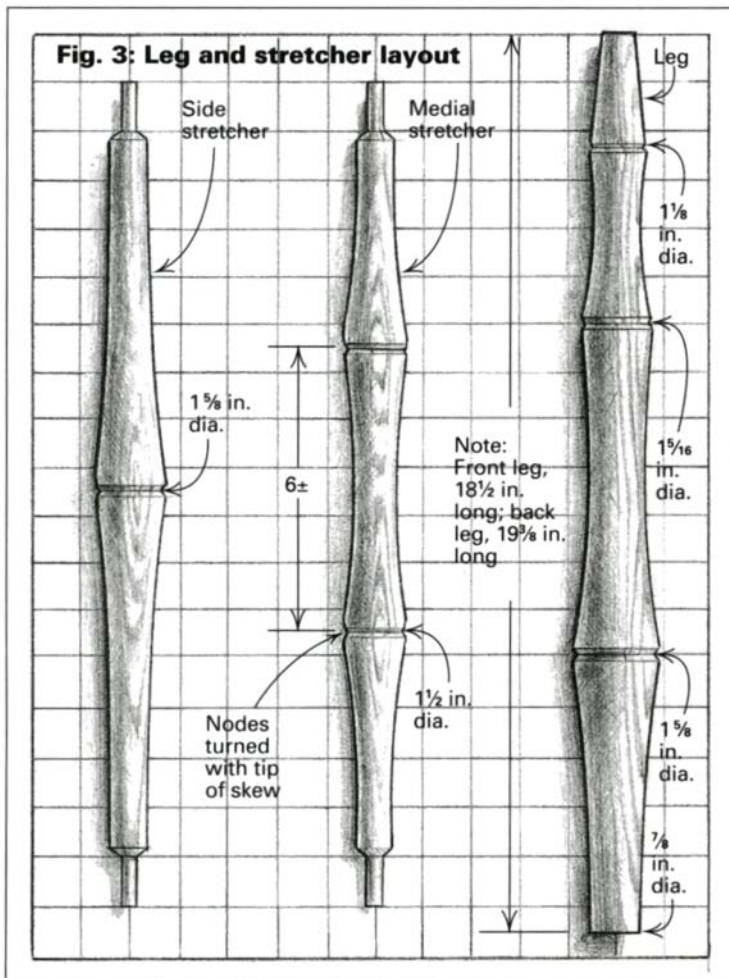
*Double-check the leg angles before boring the stretcher mortises. Using a straight-edge to establish a plane between the front and back legs, the author checks the leg-to-seat angles to make sure that the stretchers will be parallel to the seat.*



**Fig. 4: Seat and undercarriage assembly**



*Note: Correct grain orientation is critical to the strength of Windsor chairs.*



low glue. Pound the tenon home with a mallet. Now bore the other stretcher, and pound in the other tenon in the same plane. If it needs correction, twist as you pound.

Take up a rear leg, bore the side-stretcher mortise, glue its tenon and pound it into the leg mortise a little. Seat the leg (dry) in its hole with the stretcher assembly attached. The medial stretcher should be parallel with the seat. It probably won't be, so correct it by pounding at the other end of the stretcher assembly while twisting it (see the photo at right on the facing page). Check again. Remove the leg from the seat, and pound the stretcher home. Be quick because the kiln-dried tenon is swelling from the moisture reintroduced by the glue. Bore the other rear leg, and keeping both legs in the same plane, pound the glued stretcher tenon home.

Reset the bevel gauge for a front leg, bore the mortise, glue its tenon and insert it in a little way. The top of the front leg should fall slightly to the outside of the line described by the back leg as you look across the pair. Treat the last leg in the same way—except now you can use its mate for alignment.

Kerf the leg tenons almost to the scribe line you marked showing their depth in the seat. Turn the seat upside down on blocks, swab the mortises with glue and work glue into the sawkerfs. Set the lower assembly in place, each leg tenon in its mortise. Pound legs down alternately, listening for the thunk that says it's done. Turn what is now half a chair over. Hammer in glue-smear wedges.

### Back assembly

The next step is to bend the back-bow. I steam the piece for about 45 minutes in a length of 4-in., schedule 40 PVC pipe with a cap glued on one end and a couple of rags in the other end. My steam generator is a tea kettle on a hot plate. The steamed back-bow goes into a plywood bending form the shape of the interior of the bow.





*Holding parts securely is more than half the battle. Hodges uses three pegs and a wedge in her shaving horse, but a shoulder vise with wooden jaws also could be used. Either way, blocks should be used to keep the workpiece from rocking while you're drilling.*



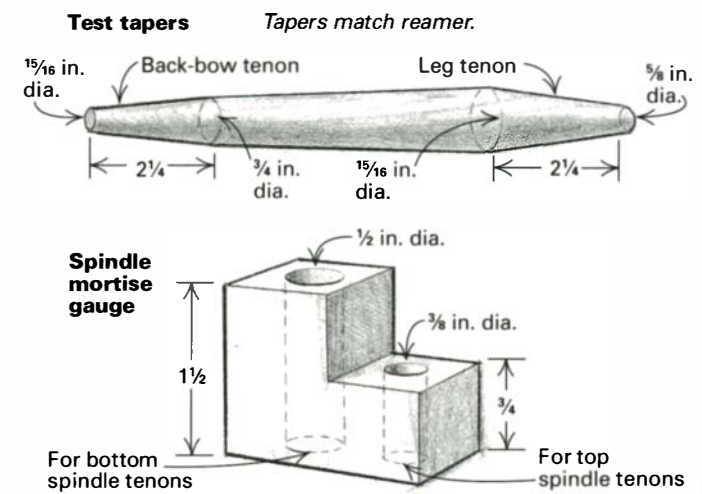
*Work quickly once you've started attaching the legs to the stretcher assembly because glue in the leg joint will cause it to swell in no time, freezing the joint in place. Once you've adjusted the stretcher assembly so that it's parallel with the bottom of the chair, pound the tenon home.*

After drying the back-bow in the bending form for about a week, stick its tenons into hot sand or under a light bulb in an aluminum reflector for at least four hours. Sand can be heated easily in a cake pan or skillet on an electric range top. After four (or five or six) hours, test-fit the back-bow tenons in the seat mortises. Pare the tenons until they protrude below the seat at least  $\frac{3}{16}$  in. Mark tenons left and right, scribe around them at seat level and mark kerflines, perpendicular to the seat grain. Chamfer the tenon ends.

While the tenons are drying, make a simple support fixture to steady the back while you drill for spindles (see figure 7 on p. 96), but wait to notch the top until after you've fitted the bow. Set the back-support fixture in place  $90^\circ$  to the seat in the center-spindle mortise. If the top of the back's arc doesn't coincide with the center of the seat, mark the true center. The center spindle must be perpendicular. Mark off spindle locations with dividers and pencil using the measurements in figure 2 on p. 93. Fix each line with your eye over its respective spindle mortise in the seat, and without moving your head or your gaze, use an awl to mark on the line at its center on the bow. This center is important because there's not much wood to spare.

Bore the spindle holes with a  $\frac{3}{8}$ -in. auger bit. In addition to the back-support fixture, I sometimes use a  $\frac{1}{2}$ -in. dowel or a pair of all-thread rods connected with washers to steady the bow further and to drill true (see the photo on p. 96). I also use the mirror to stay true in the other plane. What you're trying to do is to sight "through" the bow to the spindle mortise in the seat, even though the bow's obscuring it. Begin perpendicularly to an imaginary tangent at the bow's surface, and then bring the bit gradually up to the correct angle within 10 turns. Bore until you can just feel the tip of the drill. Repeat for the rest of the spindle mortises in the bow, and then remove the back and finish the holes from the other side.

**Fig. 5: Test tapers and spindle gauges**



Make a spindle-tenon test gauge (see figure 5), and size all the bottom ends of spindles to fit snugly. Insert them in the spindle mortises in the seat, place the back just behind the spindles and arrange the spindles, so they're lined up with their corresponding back-bow mortises. Mark spindles with a pencil where they intersect the back-bow bottom and again  $\frac{1}{2}$  in. above the back-bow top. Cut them at this top mark. Now mark them, L1, R1 and so on, and scribe a line around each at its penetration into the seat.

Remove the back-bow. Remove the spindles and shave their tops, so they will slide easily into the spindle mortises in the back-bow down to the lower intersection. Chamfer the spindles heavi-



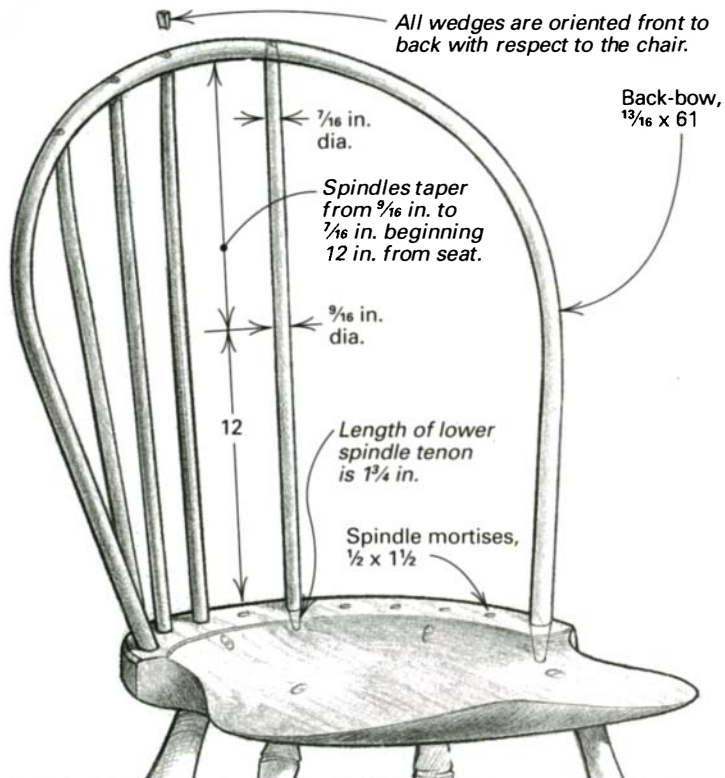
## ASSEMBLING THE BACK

A wooden back-support fixture keeps the back-bow steady as Hodges drills spindle mortises in it. Two pieces of metal rod connected with nuts serve as a visual guide to keep her bit aligned with the spindle mortise in the seat.



**Fig. 6: Back assembly**

Thickness dimensions are green and will shrink.



## Further reading

### Magazine articles

"Working Green Wood" by Harriet Hodges, *Fine Woodworking* #108, pp. 90-93

"Steam-Bending Basics" by Andrew K. Weegar, *FWW* #107, pp. 62-66

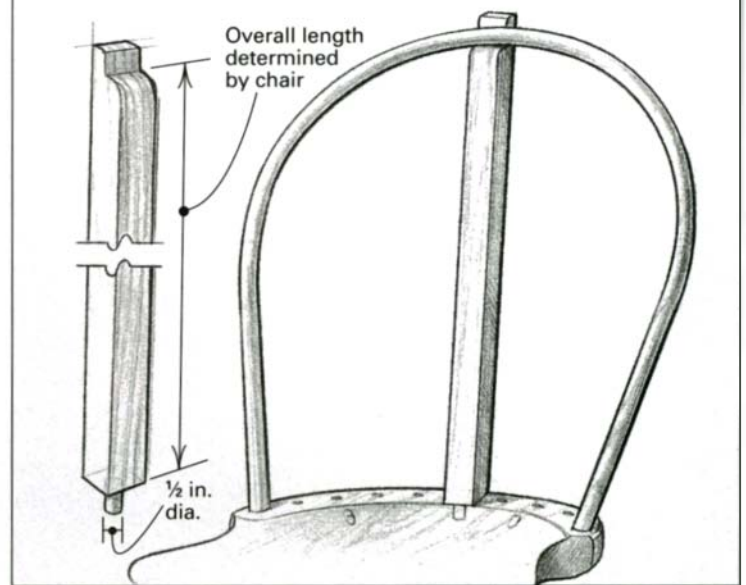
"Milk Paint" by A. Richard Fitch, *FWW* #91, pp. 62-65

### Books

*Make a Chair from a Tree* by John D. Alexander Jr., Astragal Press, Mendham, N.J., 1994

*Make a Windsor Chair with Michael Dunbar*, The Taunton Press, Newtown, Conn., 1984

**Fig. 7: Back support fixture**



ly on top, and replace them in the seat. Test-fit the back, reaming spindle holes very lightly or shaving from a spindle as necessary. Draw a line down the spindle fronts and onto the seat, so you can replace them in the same orientations. Now cut them off level  $\frac{1}{4}$  in. (on the short side) above the chair, and mark for a kerf across their tops—perpendicular to the grain of the back-bow. Make sure the line at the intersection of the underside of the bow and the spindles is well-marked. Now disassemble the back; re-chamfer the spindle tops; kerf all spindles at the top, nearly to the line below the bow; and kerf the back-bow tenons nearly to the seat-depth scribed lines.

Lightly brush glue in seat holes, two at a time. Insert spindles. Brush glue in the back-bow holes, and with a mechanic's feeler gauge (or anything else that's thin, flexible and won't self-destruct with glue on it), work glue into all the wedge kerfs. Start spindles into their mortises in the back-bow, and then start the back-bow into its mortises in the seat. Pick up the mallet and a scrap of wood, and moving from side to center to alternate side, hammer the back down. Wiggle recalcitrant spindles. Sometimes the sharp points of the bow tenons hang up in their holes. If they do, pull forward on the bow while hitting it. When the bow tenons reach their depth mark, that's it.

Smear glue on the spindle wedges, and hammer them home. Turn the chair upside down, and insert wedges in the bow tenons. Look for gaps in the fit, inserting little wedges wherever you can get them. When the glue has set, saw the spindle, back-bow and leg tenons almost flush; then chisel, scrape and file to finish. Level the legs, and chamfer their bottom edges so they won't split when great-grandchildren skate the chair over a floor. Finally, sand, raise the grain, sand again (to 180-grit) and fill small gaps.

## Finish

Paint makes the chair read as sculpture. I use milk paint, which is not like other paints. Practice with it. Penetrating-oil topcoats will make a chair water resistant. This finish gives off a soft glow and is extremely durable. Virtually unchippable, it is only burnished by the years. □

*In addition to building Windsor chairs and settees, Harriet Hodges raises sheep and harvests chair wood on a Craig County, Va., farm. She is also the indexer for Fine Woodworking.*



# Spline Joinery

*Stronger, quicker and more versatile than biscuits*

by Steven Cook



*A router and slot cutter substitute for a plate joiner (left). A steady hand and a keen eye (protected by safety glasses) will yield a strong, quick spline joint.*

*Splines can be used as a decorative element in addition to their structural role, as is the case with the ebony splines in the lids of the author's boxes below.*



In 20 years as a professional woodworker, churning out cabinets, making custom furniture and even some musical instruments, I've always looked for ways to make my two-man shop productive and profitable. One technique I use in virtually all my work is the spline joint.

The spline joint is simply the joining of two boards with a piece of scrap plywood or hardwood that's set into grooves routed in the two boards. Whether you need to align boards to be joined for a large tabletop, make face frames for a set of cabinets

or join rail and stile for a frame-and-panel or glazed door, spline joints are useful.

The spline joint is easier than doweling and stronger, too. Locating the splines is easy because the critical dimension is controlled by the depth setting of the router (see the photo at left). Just be sure to index from the same face, and whatever you're joining with splines will be in the same plane. Since I already have several routers, it's a lot cheaper to use a slotting cutter and splines than to buy a dedicated plate joiner, which makes a similar, though less

adaptable, joint. Also, I use mostly scrap plywood for my splines, so there's less chance of swelling or having the spline telegraph through to the surface than with conventional compressed birch biscuits.

## **The right equipment: a good slotting cutter**

Other than a router, the only item you need for spline joinery is a slotting cutter, a generally available router bit. These come in many diameters and slot widths, but choosing the right one needn't be confus-



*You can shape splines in seconds on a variety of common shop machines, including a stationary belt sander (right).*



*Slots for frame joinery and panel can be routed simultaneously with a pair of 3/32-in. cutters separated by a thin washer (right). The result is a strong frame and a snugly fitting panel.*



*Use solid end pieces with plywood splines to get maximum strength without sacrificing looks or speed (far right).*



ing. There are two general rules. First, select the largest shank size your router will accommodate—usually 1/2 in. And second, go with the smallest diameter cutter you can find because a 1/4-in. shank and a 1 3/4-in. cutter make a weak and dangerous combination. I have a couple of bent shanks in my collection, as well as ruined router bases, due to the mass of the cutter being too great for the shank.

My favorite bit has a 1/2-in. shank, 1 5/16-in. cutter and a 3/4-in. pilot bearing. That means there's just over 1/4 in. of cutter in the wood, and the 1/2-in. shank can handle that easily. Also, the depth of cut, which is actually 3/32 in., means that your spline is more than 1/2 in. wide (3/32 and 3/32 are 3/16), making for a strong joint.

Cutter widths vary from 1/32 in. up to 1/2 in. or so. Most of my structural joints are made with a 1/4-in. cutter. When joining a frame that is also taking a 1/4-in. plywood panel,

it's necessary to use two 3/32-in. cutters with a thin washer between them to make a slot that hugs the undersized plywood.

### **Making splines**

Splines can be made from a variety of materials, including medium-density fiberboard (MDF), plywood and solid wood. My favorite is planed-to-order Baltic birch. I use it all the time for drawers, so there's plenty of scrap. When joining solid boards edge to edge, as for tabletops, I rip thin sections of spline material. When I'm using biscuit-shaped splines to join rail and stile to make frames, I bandsaw the splines to rough size and shape them on either my stationary belt sander or a sanding drum on my drill press (see the top photo).

If you use solid wood for splines, make sure the grain runs across the joint, rather than parallel to it, for maximum strength and to allow for seasonal wood move-

ment. Frequently, I'll use plywood splines for all but the ends of a long joint, particularly large panel glue-ups, and just use small bits of solid wood at the ends where they'll show. This makes for a strong joint that looks nice and works well for tabletops and box lids (see the bottom right photo and the photo at right on p. 97).

### **Frame joinery, panel alignment and decorative edging**

I've used slotting cutters for many purposes other than what they were intended for, including rabbeting all around the top edge of a tabletop to inlay a strip of contrasting wood. The most common uses of the slotting cutter in my shop, however, are to join frames and to align and strengthen panels I'm gluing edge to edge.

When I'm joining a frame that takes a flat plywood panel, I make the panel and spline the same thickness and rout both





## SPLINES FOR A GLAZED DOOR

*A slot cutter makes a blind spline recess in the end of the rail (left). The author makes the cut freehand, using a pencil line to set the limit of the spline groove.*



*Mating slots are cut in the stiles. With the router and slot cutter at the same setting, the author makes the stile slot (left). The depth setting of the router keeps everything in line as long as all cuts are from the same side of the frame.*

*Plywood makes a biscuit-style spline. A piece of plywood sanded to shape fits snugly in the finished slot (below). The author will reset the depth of cut for a rabbet to create the recess for the glass.*

the panel groove and the recess for the spline simultaneously. To do this, I stop just shy of the ends of the stiles and rout right around the ends of the rails, stopping shy of the outside edge (see the bottom left photo on the facing page).

For glazed cabinet doors, I want to be able to remove it if it ever breaks, so I use the router and slotting cutter just as I would a plate joiner: I make blind slots in the ends of the rails and the top inside edges of the stiles (see the photos on this page). Then I come back later, adjust the router's depth of cut for a rabbet rather than a groove and create a recess for the glass. The corners will be round, but most glass shops will be glad to radius the corners of a sheet of glass for you. □

*Steven Cook is a professional woodworker and musical-instrument restorer in Edmonds, Wash.*





# Krenov Student Show

*Thoughtful design, superlative craftsmanship*

by William Sampson

The beauty and power in James Krenov's work is in the details. Sensitivity to the nuances of grain and figure, precise joinery, finishes that beckon the touch and often a bit of hand-carved work, such as drawer pulls, that reward the tactile sense: That is all part of what makes his pieces unique. But there is more. The understated elegance the work achieves invites viewers to explore its details over and over again.

Much of those traits are also apparent in the work of Krenov's students in the College of the Redwoods Fine Woodworking Program. When I visited the school in Fort Bragg, Calif., earlier this year, all the students I met spoke of the inspirational power of their teacher. And that inspiration shows in their work, which was displayed at the Highlight Gallery in Mendocino, Calif., for an annual show. But Krenov also encourages his students to find their own way, and that was also apparent in the variety of unique designs the students exhibited. The photographs on these pages offer just a taste of the more than 30 pieces 18 students entered in the show. □



***Subtle details appeal to eye and touch—This table and chair made by Shelley Flanagan in European cherry show the clean lines and sensitivity to materials important to the work of James Krenov and his students. The apron and drawer front are crafted from the same board with careful grain matching. The hand-carved drawer pull and the chair's rounded crest rail invite touch.***

*William Sampson is editor of Fine Woodworking.*





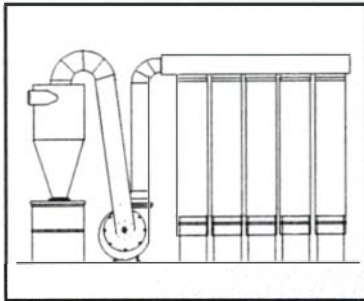


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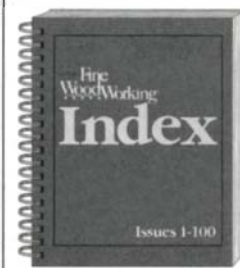
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**(Total Savings \$82**  
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**Outperformed 36 other**  
**premium blades.**

Wood Magazine test, Sept., '93, pg. 45.



**The One Blade**  
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**As-Sanded**  
**Surface!!!**

Dear Sirs,  
 Never before had I seen your blade in action, but I wouldn't have believed it if I had not seen it! I was so impressed with the glass-like cut the Woodworker II blade made on various wood types that I went to "Woodworking Unlimited" the next day and bought your dado set!!  
 David Sharp  
 Sugar Land, Texas

Mr. Forrest,  
**YOU ARE THE BEST!**  
 Your blades are the best!  
 Your service is the best!  
 Your sharpening of my (cheap) dado set made it a new set.  
 It's a pleasure to do business with you - (I have told this to all of my friends, colleagues and family.)  
 Herbert Needlman  
 Greenlawn, NY

Gentlemen,  
 I have used many different blades during my forty plus years of working - there is absolutely no comparison to any other blades on the market and your WW I & II blades.  
 Kenneth L. Salisbury  
 Huntsville, AL 35811

(From Another Customer)

In closing I would like to add that the Woodworker II blade is by far the finest saw blade that I have ever used. I also have the Forrest dado set which is without a doubt, the king of all dado sets. I work exclusively with red oak and oak veneer plywood and the dado set performs splinter free cuts as advertised.

It is a pleasure to purchase a product that does what it is advertised to do. Thanks for making such a fine product.

Dennis R. Schule, Owatonna, MN

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WOODWORKER II	List	SALE
14" x 40T x 1"	\$215	\$149
14" x 30T x 1"	195	139
12" x 40T x 1"	183	129
12" x 30T x 1"	162	119
10" x 40T x 1/8" or 3/32"	156	119
30T 1/8" or 3/32"	135	99
9" x 40T	146	109
30T	125	99
*8-1/4" x 40T 3/32"	136	99
8" x 40T 3/32"	136	99
30T 3/32"	115	89
7-1/4" x 30T 3/32"	112	69
**NEW 6" x 40T 3/32"	136	89

**\*NEW For Sears & Makita Table Saws \*\*For Saw Boss**  
 5/8" holes, boring thru 1 1/4" add \$7.50  
 Larger at Time Basis Shipping \$4.50

FOR BETTER CUTS on all brands of blades, use our large 1/8" DAMPENERS-STIFFENERS against one side.

- Parallel and flat to .001
- Stop vibration, flutter, CUTTING NOISE and blade ring
- Tryable and returnable for full cash refund

4" ...	\$21
5" ...	24
6" ...	25

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## UPGRADE YOUR CHOP AND SLIDING MITER SAWS WITH OUR CHOPMASTER



New specs, 5° Neg. Pts. & flat, dial .001/.002 for perfect, tight, smooth, splinter-free miter joints.  
**NEW AVAILABLE SIZES**

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Sears 8-1/4" Delta	8-1/4" x 60T x 5/8"	170	99
Hitachi 8-1/2" DeWalt 8-1/2" & Ryobi	8-1/2" x 60T x 5/8"	179	109
Delta	9" x 80T x 5/8"	204	119
Ryobi-Makita & all	10" x 80T x 5/8"	207	129
Makita, B&D, DeWalt & Hitachi	12" x 80T x 1"	229	139
Ryobi-Makita	14" x 100T x 1"	266	179
Hitachi	15" x 100T x 1"	277	189

For good general purpose cuts use Woodworker II 30T & 40T or Woodworker I

Use small stiffener where possible

**QUIET!** Also help all your other blades to cut better.

Use our 1/8" DAMPENERS-STIFFENERS, against one side

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5/8" holes std. Boring up to 1-1/4" \$7.50 extra  
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 • All 60T and 3/32" THINkerf 30° ATB and 5° face hook on 10" dia and under. 12" and 14" are 20° ATB 1/8" K.  
 • DOUBLE HARDER and 40% STRONGER carbide.  
 • THIN KERF:

- Saves 1/3 wood loss on each cut, radial or table. Feeds easy when used for moderate rip and crosscut on table saw. Reduces "JUMP IN" greatly for better "PULL CONTROL". Practically eliminates bottom splinter on RADIAL-CROSS CUT.
- Totally stops ALL bottom and top splinter on ply veneers in push-cut mode on RADIAL.
- Our STIFFENER STRONGLY RECOMMENDED AGAINST outside of blade only for best cuts.

Made and serviced in USA for your benefit.

	List	SALE
14" x 60T x 1" 1/8"	\$224	\$159
12" x 60T x 1" or 5/8" 1/8" K	198	139
10" x 60T x 5/8" 3/32" K	162	129
9" x 60T x 5/8" 3/32" K	156	119
8" x 60T x 5/8" 3/32" K	150	109
New 8-1/4" x 60T x 5/8" 3/32" K	150	109

RYOBI RA200 TS200 SEARS  
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**NEW DADO KING DELUXE DADO SET** cuts ALL 1/8" - 29/32" flat bottom grooves WITH or CROSSGRAIN all woods. OAK, BIRCH, VENEER PLYS, and MELAMINE. NO SPLINTERING due to unique 4T Neg. Face fillers and 24T outside saws.

**OUT PERFORMS 29 + 32 OTHER DADO SETS** Wood Mag. Oct. 91, pg. 62, 63 "Best Value"

Boring up to 1-1/4" SALE! 10% OFF NEW 3/32 Chipper Woodworking \$25 per set \$5.50 Per Set Shipping & Shims Incl. July/Aug. 1991

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(very good on chop saw too!) STOP SPLINTERING those SPLINTERY OAKS, HARDWOOD VENEERS and thin 2 SIDE LAMINATES ON PARTICLE BOARD. FOR FASTER FEED RATES AND MORE ABSOLUTE SPLINTER CONTROL.

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### DURALINE Hi-AT

Note: Fine Woodworking Editorial Nov./Dec. 1988 No. 73, pg. 65, S.N. recommends high alternating top bevel (ATB) thin kerfs and large blade stiffeners for smoothest cuts on RADIAL SAW, etc.



Jim Forrest, President and designer microscoping cutting edge.

All 5/8" holes. Boring up to 1-1/4" \$7.50 extra

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7-1/4" x 60T 3/32"

5" x 80T 1/8" & 3/32"

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10" x 80T 1/8" & 3/32"

**SPECIAL SALE 10" ONLY \$159**

12" x 80T x 1" 1/8"

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# 'TIS THE SEASON



*Dear Santa;*

*'Twas the night before Christmas and all through the house, was the sound of Mom sneaking Dad's gifts, as quiet as a mouse.*

*Dad gave Mom a list of the machines he wanted most and told her of all the great things he could make if he only had these tools.*

*Dad told Mom to make sure it was TRADESMAN tools, like the old Table Saw that he has been using for years.*

*Boy, will he be surprised when he sees the list of things Mom wants him to make.*

*Thanks, Santa.*

*Your pal, Joey*

*P.S. Hope you like the Milk and Cookies!*

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Model # 8030  
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15" miter saw and the portability of a 10" saw. This exclusive sliding fence allows you to make 45 degree bevel cuts up to 7-7/8" wide, will miter cut crown mouldings up to 6-5/8" wide and 5-1/4" high in a single cut and will make compound cuts up to 45x45 degrees.

Weighs 38lbs.  
#DW705

**379.**



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**12V Keyless 3/8" Dual Range VSR Drill/Driver Kit with two batteries**

Deluxe features include 11-position Versa-Clutch, pressure activated clutch, ClutchLock, that allows changing from screwdriving to drilling without changing clutch setting, and fan cooled, 140 watt high torque motor. #DW945K-2

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Our most popular 9.6 volt cordless drill. While supplies last, a free extra battery is included in this kit. #6095DWE

**149.**



**Wap Turbo Drywall Vacuum**  
Clean filter without removing head assembly from canister. Features 10 gallon, all-poly canister, quiet 59.8 dbA, clean exhaust to 1 micron, auxiliary outlet, handles wet applications, 10-foot hose, metal wands and floor nozzle. #48784

**529.**

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Maintained constantly under load by electronic feedback circuitry, soft start, rack and pinion depth adjuster, micro-adjuster and easy-to-read magnified scale. 15 amp motor. #3339 List \$475

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**Ryobi Oscillating Spindle Sander**

Perfect for all finish sanding operations when intricate contour sanding and quality finishes are essential. #OSS450

**189.**



**Milwaukee**

**10" Miter Saw**

This new workhorse of a miter saw is built for professional accuracy and ease of use. With a powerful 15 amp motor, a super smooth rotating table, large capacity and lightweight (32lbs.) this saw is perfect for jobsite use. #6490

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**Quicksand Random Orbit Finishing Sander**

Random orbit efficiency in the palm of your hand and sets new performance standards for finish sanders. Will sand nearly as fast as a belt sander yet produces a finish smoother than an orbital finishing sander #332

**68.**



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2640	VSR Drywall Driver, 4.5 amp	\$135
6611	3/8" VSR Drill 55 amp	\$125
6614	1/2" VSR Drill, 5.5 amp	\$128
6615	1/2" Keyless VSR Drill, 5.5 amp	\$128
6623	VSR Screwdriver, 0-750 rpm, 5.5 amp	\$149
6625	VSR Screwdriver, 0-2500 rpm, 5.5 amp	\$149
6633	VSR Screwdriver, Adj. Clutch, 5.5 amp	\$159
6640	VSR Drywall Driver, 5.5 amp	\$119
6641	TEKS Driver, 0-2500 rpm, 5.5 amp	\$135
6642	TEKS Driver, 0-2000 rpm, 5.5 amp	\$135
7405	5" Angle Grinder	\$109
7739	1/2" VSR Hammer Drill, 6.0 amps	\$129
73505	Sandtrap Dust Collector Kit for #505	\$39

**SKIL**

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2736-04	3/8" VSR 12v Cordless Drill Kit, w/ 2 Bat., Keyless Chuck	\$129
6520	3/8" VSR Drill, 3.5 amp	\$44
6635	3/8" VSR Drill, 5.0 amp	\$99
6650	1/2" VSR Drill, 5.0 amp	\$109
9611	4-1/2" Drill Grinder	\$65
5510	5-1/2" Trim Saw	\$114
5660	8-1/4" 60-degree Circular Saw	\$145
5825	6-1/2" Wormdrive Saw	\$159
77	7-1/4" Wormdrive Saw	\$145
5860	8-1/4" 60-degree Wormdrive Saw	\$169
3810	10" Miter Saw	\$225
7484	Dustless Random Orbit Sander	\$89
3330	New 16" Scroll Saw	\$135
3370	New 4" Belt/6" Disc Sander	\$135
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**DEWALT**

DW945K-2	12v Cordless, Keyless, 2 battery	\$175
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DW270W	Drywall Screwdriver w/ 50' cord	\$127
DW280K	Screwdriver Kit	\$117
DW290	1/2" Impact Wrench	\$175
DW705	12" Compound Miter Saw	\$358
DW306K	V Redip. Saw Kit 8 amp	\$159
DW318K	VS, VO Jigsaw Kit	\$148
DW402	4-1/2" Mini-grinder, 6 amp	\$94
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3339	3 HP VS Plunge Router	\$269
3337	3 1/8" Planner	\$159
4024	3'x 21" VS Belt Sander	\$179

**Makita**

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6093DW	3/8" VSR Driver/Drill Kit, 9.6v	\$139
6095DWE	3/8" VSR Cordless Driver/Drill w/ Keyless Chuck, 2 batteries	\$149
6201DWE	3/8" VSR Hi-Torque Driver/Drill	\$159
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6404	3/8" VSR Drill 0-2100 RPM	\$58
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**129.**

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Just what you need for all those hard-to-sand corners and small areas where other Sanders can't reach. Standard dust-free design makes this ideal for home or shop. A variety of optional accessories are available to fit your needs. #B7000

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Unisaw® 10" Tilting Arbor Saw with 52" Unifence®

3HP, 230v, 1 phase motor, magnetic motor starter, 52" Unifence®. A special edition Unisaw in limited quantities at a very special price. Reg. 2099. Shown with accessory table and shelfboard. UL approved. #36-820

**1549.**

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9118	Porta-Plane Kit	\$205
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9652	Versa Plane Kit	\$299
556	Plate Joiner Kit, tilting fence	\$184
100	7/8 HP Router	\$109
690	1-1/2 HP Router	\$138
691	1-1/2 HP D-Handle Router	\$155
693	1-1/2 HP Plunge Base Router	\$169
7310	Laminate Trimmer	\$95
7312	Offset Base Laminate Trimmer	\$128
7319	Tilt Base Laminate Trimmer	\$100
7399	Drywall Cut-Out Tool	\$275
7518	3-1/4" HP 5-speed Router	\$239
7519	3-1/4 HP Router	\$205
7536	2-1/2 HP Router	\$208
7537	2-1/2 HP D-Handle Router	\$275
7539	3-1/4 HP VS Plunge Router	\$198
97310	Laminate Trimmer Kit	\$58
330	Speed-Bloc Finishing Sander	\$169
352 VS	3x21" Dustless Belt Sander, VS	\$194
360	3x24" Dustless Belt Sander	\$205
362	4x24" Dustless Belt Sander	\$339
504	3x24 Wormdrive Belt Sander	\$128
505	1/2 Sheet Finishing Sander	
7334	5" Random Orbit Sander	
7334	5" VS Random Orbit Sander	
7336	6" VS Random Orbit Sander	
314	4-1/2" Trim Saw	
315-1	7-1/4" Top Handle Circular Saw	
345	6" Saw Boss Circular Saw	
7549	VS Var-Orbit D-Handle Jig Saw	
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NT65A	16 Ga. Finish Nailer	\$328

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SCN200R	Coil Roofing Nailer	\$419
SN70	New Framing Nailer	\$475
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**paslode**

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**Makita**

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LS1011	10" Compound Miter Saw	\$549
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4320 VS	Jigsaw	\$85
5007NBA	7-1/4" Circular Saw Elec. Brake	\$129
5077B	7-1/4" Hypoid Framers Saw	\$155
5402A	16" Circular Saw	\$599
2012	12" Portable Planer	\$539
2708W	8-1/4" Table Saw	\$299
2711	10" Table Saw w/ Brake	\$559
DCS330S	14" Gas Chainsaw, 2.0 ci.	\$219
DCS390	16" Gas Chainsaw 2.4 ci	\$259
DCS430	15" Gas Chainsaw, 2.7 ci	\$289
DCS52011	18" Gas Chainsaw 3.1 ci	\$339
S012B	11-3/8" Electric Chainsaw	\$140
G1200R	1200 Watt Generator	\$589
2030N	6" Joiner/12" Planer Combo	\$1995
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AM39HC4V	3/4 Vertical Twin Tank	\$295
AM78HC4	1-1/2 HP Twin Tank	\$299
AM78HC4V	1-1/2 HP Vertical Twin Tank	\$309
AM99HC4	2 HP Twin Tank	\$369
AM834HGHC4V	4 HP Gas Twin Tank	\$529
K15A8P	2 HP Portable Compressor	\$669
KSHGA8P	5 HP Honda Gas Portable Compressor	\$729

**SIoux**

690 5"	Air Random Orbit Finish Sander	\$139
690V 5"	Dustless Air R/O Finish Sander	\$159
8000 3/8"	VSR Angle Head Drill	\$129
8020 VSR	Angle Head Screwdriver	\$189
8050 1/2"	VSR Angle Head Drill	\$169
8300 VS	Reciprocating Saw	\$159

**RYOBI**

RS115	4-1/2" VS Random Orbit Sander	\$75
TFD220VRK	12v Cordless Drill Kit	\$165
L1323ALS	3-1/4" Planer Kit, Long Base	\$125
JM100K	Biscuit Joiner Kit	\$218
RE600	3 HP VS Plunge Router	\$235
BE321	3x21" VS Belt Sander	\$129
BE424	4x24" VS Belt Sander	\$165
TS254	10" Miter Saw	\$198
BT3000	10" Sliding Table Saw w/ Stand	\$579
JP155	6-1/8" VS Jointer	\$295
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3724	24" Steel Bar Clamp	\$8.39	\$47.75
3730	30" Steel Bar Clamp	\$10.39	\$58.75
3736	36" Steel Bar Clamp	\$10.39	\$58.75
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#2	Wooden Handscrew, 8"	Open \$15.95	\$81.89

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TOP-10	Deluxe Joining Machine w/ Ass't Biscuits	\$589
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The motor's integrated turbine vacuums dust through the pad and straight into the dust bag. Powered by a 400 watt industrial motor with 8000-11000 rpm, this tool will handle all of your sanding or polishing needs. #TXE150 List 208.

**159.**

**KP Framing System**

Clamps feature steel jaws encased in a non-marring, glue resistant material. Jaws remain parallel throughout the clamping range and pressure is evenly distributed over the entire jaw surface.



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K3-540 40" clamp	39.95	<b>144.</b>
KP Set of four mounting blocks		<b>19<sup>95</sup></b>



**Biscuit Joiner**

Lightweight and powerful, it is designed for versatility with a standard tilting fence and rack & pinion adjustments. Comes with carbide blade, dust bag, and steel carrying case. #3379K

**239.**

**MARPLES**

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**44.**



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1021VSR	3/8" HD VSR Drill, 0-1100 RPM	\$109
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1348AE	5" EFC Mini Grinder, 5/8" #11 Spindle	\$118
11212VSR	3/4" VSR SDS Bldg Rotary Hammer	\$209
11214VS	1-3/4" EFC VS Rotary Hammer	\$629
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11305	Demolition Hammer	\$689
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3270DVS	3x21" Dustless Belt Sander	\$169
3283DVS	5" Dustless Random Orbit Sander	\$105
1587DVS	VS Var. Orbit Jigsaw, Dustless	\$194
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15804VS	VS Var. Orbit Jigsaw w/ CLJC	\$149
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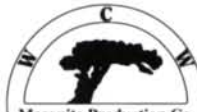
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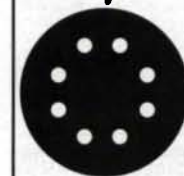
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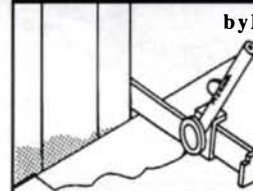
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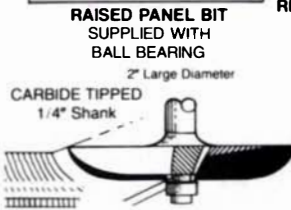
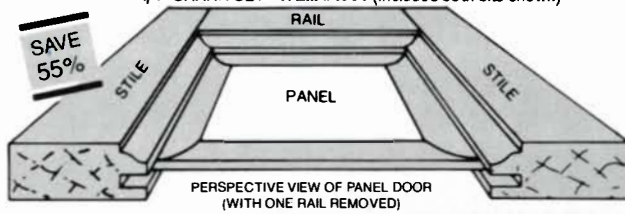
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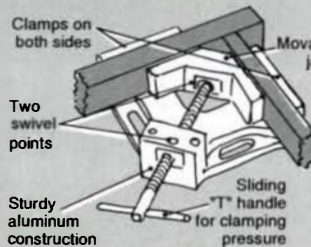


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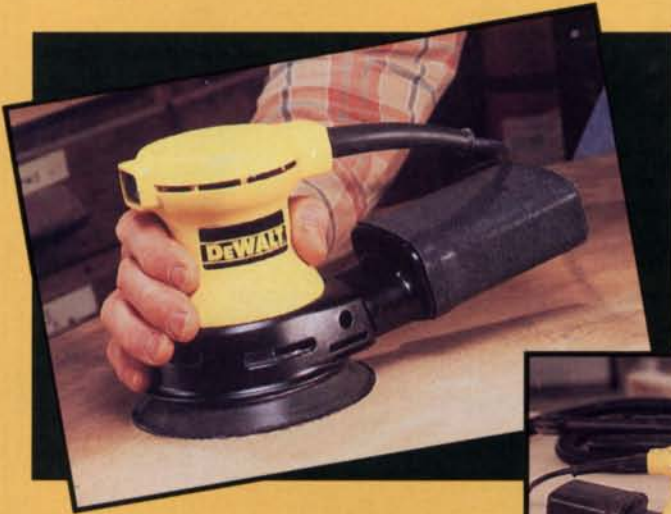
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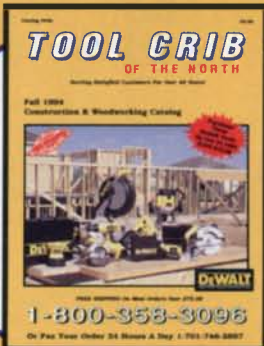


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# It's Time to "Turn" to the Tool Crib

<p><b>RYOBI</b></p> <p><b>OS5450</b> Oscillating Spindle Sander \$169</p> <p>DS2000 New 2 spd detail sander 64 DC500 New detail wood carver 64 ML618 VS mini wood lathe 249 RE600 3 hp VS plunge router 229 JP-155 6-1/8" jointer/planer 309 TS260 10" comp. miter saw 245 TS320 8-1/2" sliding comp. mit 489 TS380 15" miter saw 389 RAS02 New 8-1/4" radial saw 399</p> <p><b>AP12</b> 12" Portable Planer \$399</p> <p>BT3000 10" sliding table saw w/ds39 RT3000 laminate trimmer 89 BE321 3x21 VS belt sander 149 DS1000 triangle detail sander 44 JM100K plate jointer 219 FD2020VSR 12v dcis kv2 bat. 154 BS900 New 9" bench bandsaw 169 RE175 1-3/4hp vs plunge router 124 SC162VS New 16" vs scroll saw 174</p>	<p><b>PORTER-CABLE</b> The Woodworker's Choice</p> <p>333 NEW! Quicksaw™, 5" Dustless Random Orbit Sander \$179</p> <p>332 New 5" Quicksand PSA snidr 69 334 5" dustless PSA sander 78 332 3x21 vs belt sander 159 7116 New 24" Omni jig w/video 299</p> <p><b>7335K-2</b> 5" VS Sander w/Case, Pad, Dust Kit &amp; 2 Rolls \$179</p> <p>Holed Paper \$179</p> <p>7336K-2 6" sander kit as above 189 7334 random orbital sander 124 7333 5" VS random sander 134 7335 5" VS random sander 134 7336 5" VS random sander 134 505 1/2 sheet finish sander 124 330 speed block finish sander 64 340 1/4 sheet sander w/bag 54 97310 laminate trimmer kit 199</p> <p><b>9352VS</b> 3x21 VS Sander w/Case \$169</p> <p>NEW pocket outter 185 3x24 sander with bag 199 4x24 sander with bag 204 503 3x24 wormdrive w/bag 399 504 3x24 wormdrive sander 349</p> <p><b>2 Speed Drill Kit</b> w/Keyless Chuck &amp; 2 Batteries \$164</p> <p>9855 12v, 1/2" kit w/2 batteries 189 6611 3/8" VSR 5.5 amp drill 124 6614 1/2" VSR 5.5 amp drill 129 6615 1/2" VSR 5.5 amp, keyless 134 6645 0-5000 VSR 5.5 amp dr. v. 109</p> <p><b>347 NEW!</b> 7-1/4" 15 Amp \$129</p> <p>New left hand 7-1/4" saw 129 9743 left hand 7-1/4" saw w/cs 149 9347 7-1/4" 15 amp saw w/cs 149 447 7-1/4" 15 amp saw w/bkt 144 7536 2-1/2 hp router 204 7537 2-1/2 D handler router 214 7538 drywall cutout 84 7399 laminate trimmer 99 7310 laminate trimmer w/cut 219 9118 porta plane kit w/cut 219</p>	<p><b>DELTA</b></p> <p>36-220 2 hp dust collector 629 50-180 1 hp dust collector 429 50-179 3/4 hp dust collector 349 34-897 50" Delta uniface 299 34-915 30" Delta uniface 239 32-100 plate jointer 259</p> <p><b>22-661K</b> 13" 2 HP Planer w/Stand \$1124*</p> <p>37-190 New 6" jointer w/stand 489 34-995 3 phase stock header 879 34-994 1 phase stock header 829 31-280 1 phase stock header 549</p> <p><b>NEW Sanding Center w/Stand \$749</b></p> <p>36-755 10" cabinet saw 979 36-751 10" cab w/30" uniface 1119 36-752 10" cab w/50" uniface 1229 70-200 20" floor drill press 799 50-901 4x132" edge sander 1499</p> <p><b>3 HP, 230V Cyclone 2 Stage Dust Collector \$1,679</b></p> <p>50-902 5 hp3 ph cycl collector 1799 50-903 3hp 230v cycl collector 1999 43-155 New 115v invtd pin rr 1399 43-156 New 220v invtd pin rr 1399</p> <p>*Price includes rebate</p>	<p><b>TELPRO INC.</b> Drywall Lift \$579</p> <p><b>PORTER-CABLE</b> The Woodworker's Choice</p> <p>9690 1-1/2 HP Router w/Case \$145</p> <p>9345 6" Saw Boss kit 129 556 plate jtr w/cs &amp; tilt fence 189 555 plate jointer w/case 159 5116 16" Omni jig 259 345 6" Saw Box w/cut blade 109 314 4-1/2" trim saw 144 9314 4-1/2" trim saw kit 158 9315-1 7-1/4" saw w/cs, ct. bid 144 7700 LaserLoc 10" mitre saw 345</p> <p><b>7539</b> 3-1/4 HP 5 Speed Plunge Router \$269</p> <p>690 1-1/2 HP router 144 691 1-1/2 hp D handler router 154 696 router-shaper table 134 695 router table w/router 224 7518 3-1/4 hp 5 speed router 269 7519 3 hp production router 244 7538 3-1/4 hp plunge router 244</p> <p><b>7549</b> Top Handle V/S Jigsaw \$134</p> <p>9637 electronic vs tiger saw kit 149 9647 tiger cut with case 119 693 1-1/2 hp plunge router 174 6931 plunge router base 79 9751 1/2" 2 spd hmr dr kt 159</p>	<p><b>ESB</b> NEW Panel Saw \$889</p> <p><b>POWERMATIC</b></p> <p>1660760 66 Saw 3 HP w/50" Biesemeyer \$1899</p> <p>1120001 beasaw 12" pin/mtr 1499 1270100 #27 shaper 3hp 1ph 1979 1000099 #100 planer/12" 2hp 2399 1800205 5hp 18" pl. w/knit or 5399 1500040 6" jointer 3/4hp 1 ph 1279 1610050 8" jointer 1.5 hp 1ph 1599 1310001 6x48 belt/12" disc sdr 1249 1152825 15VS dr. press 3/4hp 1499 1410040 14" hndsw 3/4hp 1ph 1399</p> <p><b>63 Artisan Saw w/Vega Fence \$679</b></p> <p>1791001 63 Artisan w/50" Vega 779 1791208 oscillating spindle sdr 299 1791209 New 15" planer 1299 1791020 3/4" wood shaper 1hp 479 1791040 14" floor drill press 369 34-782 3hp unisaw w/mitr &amp;mc 1599 34-763 3hp Jet-Lock unisaw 1499 34-777 3hp Jet-Lock unisaw 1599 34-778 5 hp unisaw w/52" uni 1799 1791200 6x48 belt/10" disc sdr 449 1791100 6x89" edge sander 639</p>	<p><b>DELTA</b></p> <p>22-540 12" Portable 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<p><b>ELU</b></p> <p>3338 2-1/4 HP Electronic VS Plunge Router \$199</p> <p>3339 3 hp vs plunge router 269 3330 joiners/plner w/case 175 3379K plate jointer w/case 239</p> <p><b>DELTA</b></p> <p>36-820 3 HP Unisaw w/52" Uniface &amp; Motor Cover \$1549</p> <p>36-830 3hp unisaw w/30" unit 1449 34-782 3hp unisaw w/mitr &amp;mc 1599 34-763 3hp Jet-Lock unisaw 1499 34-777 3hp Jet-Lock unisaw 1599 34-778 5 hp unisaw w/52" uni 1799</p> <p><b>10" Contractor's Saw w/30" Uniface &amp; Motor Cover \$769*</b></p> <p>34-445K 34-445K sliding table attachment 399 34-444 10" contractor's saw 619 34-670 10" motorized table saw 399 33-880 12" radial arm saw 1429 33-990 12" radial arm saw 649</p> <p><b>28-283K 14" 3/4 HP Bandsaw w/Fence &amp; 3 Blades \$749*</b></p> <p>33-055 8-1/4" sawbuck w/joints 619 37-280 6" motorized jointer 399 37-154 6" jointer DJ-15w/stand 1124* 17-900 16-1/2" floor drill press 409 34-080 10" mitre saw 199</p> <p><b>43-379 3 HP HD Two Speed Shaper \$1499</b></p> <p>43-375 3hp LVC 2 spd shaper 1749 43-355 1-1/2 HP wood shaper 769 31-730 6" belt/12" disc sander 1199 46-540 6" jointer/DJ-20 w/stand 1499 46-541 12" V.S. wood lathe 1529 40-601 16" V.S. scroll saw 769</p> <p>*Price includes Rebate</p>	<p><b>DELTA</b></p> <p>22-540 12" Portable Planer w/Dust Collector Chute \$399</p> <p>36-210 New 10" cmpt mitr saw 259 28-190 New 12" bandsaw w/30 399 11-990 12" bench drill press 419 36-380 XL-10 table saw 439 46-700 12" vs wood lathe 439 43-505 routers/shaper 289 14-650 New mortising machine 299 28-245 14" bandsaw w/stand 599</p> <p><b>40-560 16" 2 Speed Scroll Saw \$179</b></p> <p>29-710 Newshaping center 179 36-250 New 10" sid cmptd sw CALL 37-070 6" vs bench jointer 249 33-060 steckit trim saw 379 40-640 20" VS scroll saw 299 31-460 4x36 belt/disc sander 134 28-180 bench bandsaw w/nc 159 28-200 3 hp plunge router 249 11-950 3 hp plunge router 159 36-090 10" Sidekick miter saw 219</p>	<p><b>DELTA</b></p> <p>36-220 2 hp dust collector 629 50-180 1 hp dust 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21 48" I-bar clamp 23 60" I-bar clamp 25</p> <p><b>SMARTLEVEL</b></p> <p>SMPR2 4" Pro Rail w/mood. w/cs 105 PR4 78 Pro Rail w/mood. w/cs 139</p>	<p><b>EMQLO</b></p> <p>AM78-HCAV 1-1/2 HP Vertical Twin Tank \$299</p> <p>AMDDL78-HCAV 1-1/2hp pilluss 299 AM99-HCAV 2hp ver twin tank 389 AM99-HCA 1-1/2hp twin tank 379 AM78-HCA 1-1/2hp twin tank 289 AM99-HCAV 3/4hp v twin tank 289 K15A9P 1.5hp wheelbarrow 999 K2A8P 2hp wheelbarrow 669 K5HGA-8P 5hp Honda withbrw 749 045 3/8" x 50' Goodyear hose 20</p> <p><b>TROJAN</b></p> <p>TWC-24 14" Wood Bandsaw w/Enclosed Stand \$524*</p> <p>WBS-14CS 14" Wood Bandsaw w/Enclosed Stand \$524*</p> <p>JBS-18 18" bwdsaw 2hp w/stand 999 WBS-20 20" wdctng bandsaw 2399 DV-10 oscillating spindle sdr 1899</p> <p><b>AIRLINE™</b></p> <p>230-01-15 Filtered Air Dust Visor Pkg \$229</p> <p>231-01-14 Air Mate 3 system 329</p> <p><b>Nikon</b></p> <p>AX-1 Auto Level Package \$499</p> <p>AZ-2 24X auto level package 699</p> <p><b>Jorgensen</b></p> <p>8" Handscrew \$12</p> 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**freud**  
JST100 Plate Joiner w/Case & Dust Bag \$139\*  
EDS132 12v cdds dr kit, 2 bat 219  
EDS120 12v cdds dr kit, 2 bat 199  
JST102 jointing sys w/ad, fence 189  
JST2000E 3.25 hp vs router 179\*  
EB-1000 edge banding system 229  
UC-900 5 pc shaper cabinet set 349  
94-100 5 pc router cabinet set 159  
91-100 13pc 1/4" router bit set 189  
90-100 15pc 1/2" router bit set 159  
SD506 New 6" super dado set 159  
SD508 New 8" super dado set 179  
\*Price includes rebate

**BOSCH**  
11212VSR 3/4" Bulldog SDS Rotary Hammer \$199  
11214VSR 1.75 VS rotary hmr 749  
11304 Brute breaker hammer 1199  
11305 demolition hmr 10 amp 729  
11219EVS 1-1/2" spline hmr 499  
11219EVS 4-1/2" spline w/stop 569  
11310EVS vs demolition hmr 549

**SKIL**  
HD77M 7" Worm Drive Saw \$179  
5657 7-1/4" circular saw 99  
2736-04 12v, 3/8" dr, kt w/2 bat 139  
1605 plate joiner w/case 139  
77-1/4" worm drive saw 144  
5525 New 6-1/2" circular saw 119  
5660 8-1/4" 60" pro bevel saw 149  
5860 8-1/4" 60" roller master 179

**BOSCH**  
B7000 New Corner Detail Sander \$69  
3272 3-1/4" planer, 4.2 amps 89  
1608U underscribe trim, tmr 149  
1609XK laminate trimmer kt 219  
1195VSR 3/8" Gamp hmr drill 139  
119AVSR 1/2VSR Gamp hmr dr. 159  
1613EVS Microline Plunge Router Includes Edge Guide \$199  
1614EVS 1-1/4 hp vs, pl router 159  
13700EVS 6-hd random sander 229  
B450 New in-line jig saw 124  
B160K New plate joiner, kt 179  
B7300 6 random orb. sander 139  
B9250 5.85 amp grinder, 149  
B2300K 12 V vs 3/8" drill kit 179  
12890 1/4 sheet palm sander 69  
1347AK 4-1/2" grinder, kit 09  
1655 7-1/4" circular saw 129

**VEGA**  
U26 Utility 26" Fence \$169  
U50 utility 50" fence 189  
PR040 professional 40" fence 239  
PR050 professional 50" fence 249  
DU-36 utility 36" duplicator 395  
D-36 prof. 36" duplicator 569

**AEG**  
TXE-150 6" EVS Random Sander \$142  
HSBE-755 3x21 V belt sander 179  
BSPE-100X New barrel grip jigsaw 159  
BSPE-100X New top hnd jigsaw 159

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JST100 Plate Joiner w/Case & Dust Bag \$139\*  
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EDS120 12v cdds dr kit, 2 bat 199  
JST102 jointing sys w/ad, fence 189  
JST2000E 3.25 hp vs router 179\*  
EB-1000 edge banding system 229  
UC-900 5 pc shaper cabinet set 349  
94-100 5 pc router cabinet set 159  
91-100 13pc 1/4" router bit set 189  
90-100 15pc 1/2" router bit set 159  
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5525 New 6-1/2" circular saw 119  
5660 8-1/4" 60" pro bevel saw 149  
5860 8-1/4" 60" roller master 179

**PERFORMAX S/T**  
16-32 NEW Drum Bender \$799  
16-32" Bench Drum Bender  
Powerfeed attachment  
Per-ST100 radial saw s/rf, smdr 319  
ProMax III stationary sander 1589  
SuperMax 25" stationary sander 2268  
SuperMax-25 25 dual drnd smdr 2749  
SuperMax 37 37 dual armsndr 3445

**HITACHI**  
NR83A Full Head Stick Nailer \$399  
NR83AA clipped head stick nlr 414  
NV83AA full head coil nailer 419  
NV45AB coil roofing nailer 419  
NS009AA 5/8" to 2" HD stapler 329  
NTE5A 5/8" to 2-1/2" brad nailer 324  
NTE5A 3/8" to 1-3/4" brad nailer 274

**B. BAUER**  
30406 30406 3/4" yellow, 300 lb Fiberglass Stepladder \$79  
30405 5' fiberglass ladder 69  
30404 4' fiberglass ladder 59

**VEGA**  
U26 Utility 26" Fence \$169  
U50 utility 50" fence 189  
PR040 professional 40" fence 239  
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DU-36 utility 36" duplicator 395  
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610-50 10 gal. S.S. cont. vac 174  
750-01 300 CFM Tool Mate 239  
464-38 12 gal. poly. cont. vac 189

**DEWALT**  
D17705 12" Compound Miter Saw \$359  
DW6615 1-1/4 hp vs plg router 159  
DW3647 7-1/4" saw w/bk rear pvt 149  
DW675K 3-1/8" planer w/case 169  
DW6610 1-1/2 hp, 1/2" router 149  
DW306K 8 amp. vs. recip saw 164  
DW421 5" Random Orbital Sander \$79  
DW420 5" PSA random sander 69  
DW431 37-21" vs belt sander 184  
DW411 1/4 sheet sander w/bag 59  
DW160 3/8" RA shory drill 139  
DW318K top hnd vs jigsaw kit 154  
DW280K all purpose sdrwrt kt 119  
DW290 1/2" impact wrench 169  
DW510K 1/2" vs hmr drill kit 169  
DW402 4-1/2" angle grinder 89

**Wap**  
766RDF Turbo Vacuum \$429  
DW972K 2 1/2v, 3/8 vsr dr, w/2 bt 189  
DW982K 2 9v, 3/8 vsr dr, 2 bt 179  
DW945K 2 12v, 3/8" drill kt 2 bt 169  
DW944K 2.9 6v, 3/8 vsr dr kt 2 bt 149  
DW947K 13.2v, vsr drill kt 219  
DW106 3/8 4 amp keyless drill 74  
DW250 0-4000 drywall driver 89  
DW254 0-2500 deck screwdriver 89

**KRAUSE**  
12" Multitmatic Alum. Ladder \$129  
121482 16 foot ladder 149

**ROTOZIP**  
RTM01 Rockin Router Drywall Cutout \$70  
DW443 6" RA h&l random sdr 149  
DW444 6" RA random sdr 149  
DW930K 12v trim saw kit 199  
DW9350 12v trim saw only 129  
DW935K 14.4v trim saw kit 239  
DW936 14.4v trim saw only 159  
DW462 11" random orb polisher 179  
DW673K laminate trim kit 209

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DW421 5" Random Orbital Sander \$79  
DW420 5" PSA random sander 69  
DW431 37-21" vs belt sander 184  
DW411 1/4 sheet sander w/bag 59  
DW160 3/8" RA shory drill 139  
DW318K top hnd vs jigsaw kit 154  
DW280K all purpose sdrwrt kt 119  
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DW510K 1/2" vs hmr drill kit 169  
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DW944K 2.9 6v, 3/8 vsr dr kt 2 bt 149  
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DW106 3/8 4 amp keyless drill 74  
DW250 0-4000 drywall driver 89  
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DW6610 1-1/2 hp, 1/2" router 149  
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DW421 5" Random Orbital Sander \$79  
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DW160 3/8" RA shory drill 139  
DW318K top hnd vs jigsaw kit 154  
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DW250 0-4000 drywall driver 89  
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DW510K 1/2" vs hmr drill kit 169  
DW402 4-1/2" angle grinder 89

**Wap**  
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DW982K 2 9v, 3/8 vsr dr, 2 bt 179  
DW945K 2 12v, 3/8" drill kt 2 bt 169  
DW944K 2.9 6v, 3/8 vsr dr kt 2 bt 149  
DW947K 13.2v, vsr drill kt 219  
DW106 3/8 4 amp keyless drill 74  
DW250 0-4000 drywall driver 89  
DW254 0-2500 deck screwdriver 89

**KRAUSE**  
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121482 16 foot ladder 149

**ROTOZIP**  
RTM01 Rockin Router Drywall Cutout \$70  
DW443 6" RA h&l random sdr 149  
DW444 6" RA random sdr 149  
DW930K 12v trim saw kit 199  
DW9350 12v trim saw only 129  
DW935K 14.4v trim saw kit 239  
DW936 14.4v trim saw only 159  
DW462 11" random orb polisher 179  
DW673K laminate trim kit 209

**shop-vac**  
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610-50 10 gal. S.S. cont. vac 174  
750-01 300 CFM Tool Mate 239  
464-38 12 gal. poly. cont. vac 189

**DEWALT**  
D17705 12" Compound Miter Saw \$359  
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DW3647 7-1/4" saw w/bk rear pvt 149  
DW675K 3-1/8" planer w/case 169  
DW6610 1-1/2 hp, 1/2" router 149  
DW306K 8 amp. vs. recip saw 164  
DW421 5" Random Orbital Sander \$79  
DW420 5" PSA random sander 69  
DW431 37-21" vs belt sander 184  
DW411 1/4 sheet sander w/bag 59  
DW160 3/8" RA shory drill 139  
DW318K top hnd vs jigsaw kit 154  
DW280K all purpose sdrwrt kt 119  
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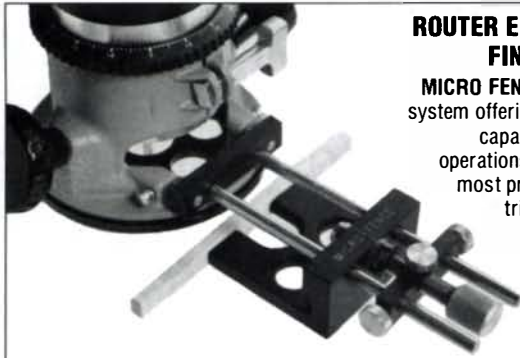
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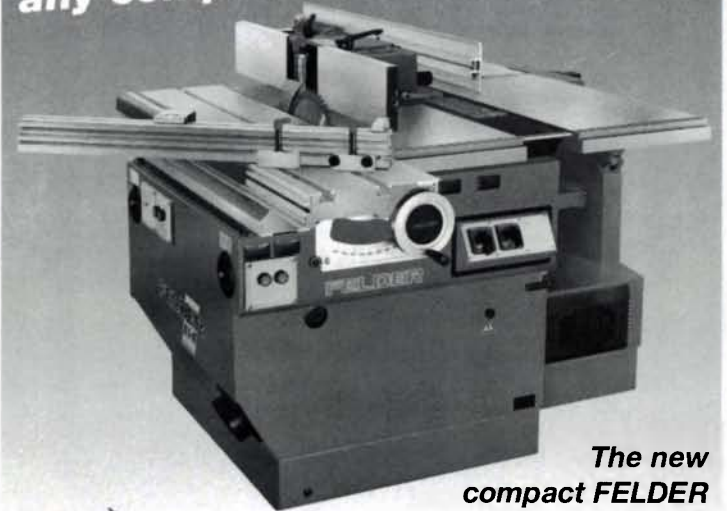


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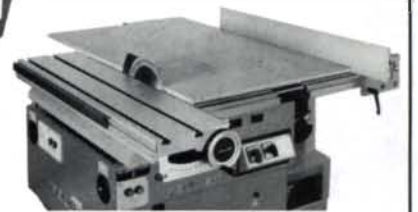
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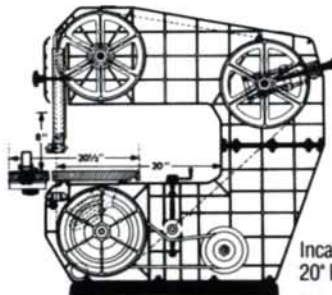


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| 3270 DVS 3x21 Dustless Belt Sander VS .....                 | \$158 |
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READERSERVICE NO. 175



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READERSERVICE NO. 135



### Oscillating spindle action

There's a new alternative to the four benchtop oscillating spindle sanders *Fine Woodworking* associate editor Charley Robinson looked at in *FWW* #108. As he was finishing that article, but too late for inclusion, we found out about a unique oscillating spindle-sander attachment for the drill press (see the photo at right). Designed by Gene Paules, a retired mechanical engineer, it costs \$169, takes less than a half-hour to install and can be connected or disconnected from the drill press in about two seconds without any tools.

This unit offers two advantages over any of the machines featured in the article in *FWW* #108: First, it's not a dedicated machine, so woodworkers with limited space can have the function of an oscillating spindle sander without the space consumption of a dedicated unit.

Second, because your drill press has a number of speed settings, so does your oscillating spindle sander. Paules' unit replaces one of the stock feed levers with one that attaches via a ball-and-socket joint to a fixed speed motor. The motor raises and lowers the quill, effectively oscillating a sanding drum in the chuck, but the speed at which the drum is turning is determined by the drill press' speed setting. By experimenting to determine optimal speeds, you can soon sand burn-free on any wood, whether face grain, edge grain or end grain.

For more information, or to purchase a unit, contact Paules at GP-Designs Inc. (24 Willard Road, Shelton, Conn. 06484; 203-929-8158). —Vincent Laurence



**Big benefit in a compact package.** GP-Designs' oscillating spindle-sander attachment connects to almost any drill press and provides oscillating spindle-sander function without compromising the drill press's main function: drilling. The retrofit unit sells for \$169.



Photo: Tom Wisbeck

### Citristrip paint and varnish remover

Anyone who has used traditional paint and varnish removers will be aware of the paradox they present: The ones that work best have the most noxious fumes and are often highly flammable. Having worked with such products for the better part of thirty years, and having been warned by my doctor that I needed to limit my exposure to them, I began looking for alternatives to these old-fashioned strippers a couple of years ago.

But none of the water-based strippers that I tried could compete with the methylene-chloride-based products of old. The water-based formulations worked slowly, and they attacked only one layer of varnish or lacquer at a time. For someone who wants to strip old furniture or architectural woodwork at home on the weekend, this might be all right, but for a refinishing business, it just won't do.

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6507	Sawzall Kit VS with case, 4 amp	\$264/\$147
6365	7 1/4" Circular Saw 13 amp motor	\$218/\$124
5397	3/8" Hammer Drill Kit VSR, 5.0 amp motor	\$255/\$144
6755-1	Drywall Screwdriver VSR, 5.0 amp motor	\$170/\$99
0235-1	1/2" VSR Hoeshooter keyless chuck, 5.2 amp	\$237/\$132
0407-1	3/8" Cordless Drill Kit 2 batteries, 12 volt	\$354/\$179

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7/8 Horsepower Router  
 Model 100  
 Mfg. Sug. Price \$190.00  
 TDT Price: \$106.00

Model	Description	List/TDT
347	NEW 7 1/4" Circlesaw 15 amp motor	\$225/\$128
447	NEW 7 1/4" Circlesaw 15 amp with brake	\$245/\$138
330	Block Sander 1.2 amp motor	\$110/\$60
505	Finishing Sander orbital action 2.3 amp	\$230/\$128
333	Quicksand Dustless Sander, 1.7 amp	\$135/\$75
7549	Bayonet Jig Saw VS 1" stroke, 4 amp motor	\$270/\$151
555	Plate joiner with case 5 amp motor	\$320/\$179
7334	Random Orbit Sander 3.7 amp motor	\$225/\$126
7335	Random Orbit Sander 5" vari-speed, 3.7 amp	\$245/\$137
9647	Tiger Cub Saw Kit 4.5 amp motor	\$210/\$117
690	1 1/2" H.P. Router 10 amp motor	\$260/\$145
9637	Tiger Saw Kit VS, 8 amp motor	\$270/\$151

Call for pricing on other Porter Cable tools.

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 TDT Price: Call for Current Price

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3000VSRK	3/8" Drill Kit w/case 2 batteries, 9.6 volt	\$261/\$137
3050VSRK	3/8" ScruDrill w/case 2 batteries, 9.6 volt "Click" Jig Saw	\$288/\$149
1582VS	VS orbital, 4.8 amp	\$275/\$149
3283DVS	5" Dustless Sander random orbit 2.3 amp	\$169/\$93
1273D	Dustless Belt Sander 4" x 24", 10.5 amp	\$380/\$213
1615EVS	VS, 15 amp motor 3 1/4" H.P. Plunge Router	\$505/\$285
1604A	1 3/4" H.P. Router 11 amp motor	\$250/\$140
B1650K	NEW Plate Joiner Kit 5.8 amp motor	\$289/\$165
B4050	NEW In-Line Jigsaw VS, 3.6 amp motor	\$199/\$114
1614EVS	1 1/4" HP Plunge Router VS 7.8 amp motor	\$283/\$159
3054VSRK	3/8" ScruDrill w/case 2 batteries, 12 volt	\$330/\$179

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nish and lacquer remover I've tried that strips aggressively but without an offensive odor or potentially dangerous chemicals. It does a magnificent job of stripping, and it has an orange scent from one of its solvents, d-limonene, which is derived from citrus peels.

I tried Citristrip on some very tough stripping jobs including gloss-white enamel and a black varnish that's often found on furniture finished around the turn of the century (see the bottom photo on p. 120). Liberal coats of Citristrip dissolved both of these right down to the wood in approximately 20 minutes. A pad of coarse steel wool saturated in Citristrip removed the remaining residue.

For surfaces that have multiple layers of paint or varnish, a good technique is to apply a heavy coat of Citristrip and allow it to stand overnight. Unlike traditional removers, which tend to evaporate and quickly become gummy, Citristrip stays wet and continues to work on a finish for up to 48 hours. And because it stays wet longer, Citristrip can be applied to an entire project, rather than to just one small section at a time. Citristrip also does a superb job of cleaning hardened paint and varnish from brushes.

Citristrip is available from Woodworkers Supply, Inc. (1108 North Glenn Road, Casper, Wyo. 82601; 800-645-9292), or you can contact the manufacturer, Specialty Environmental Technologies Inc. (4520 Glenmeade Lane, Auburn Hills, Mich. 48326; 313-340-0400) for the name of a retailer near you. —Tom Wisshack



### Veritas tapered plug cutter

Several years ago, I helped a friend plug his boat, which means that over the course of two days I cut and then tapped little round pieces of wood into hundreds of counterbored screw holes. Some of the plugs—maybe a quarter of them, fit very well, blending in so thoroughly that you couldn't tell there was a screw behind the plug. About half were so-so, and the other quarter—the last plugs I bored—were ter-

**Veritas plug cutter makes tight plugs.** By drilling tapered plugs .015 in. larger than the nominal size, Veritas' cutter ensures a snug, neat fit every time.

rible, showing a gap around the entire perimeter of the plug. What happened is that as the plug cutter dulled, it required more pressure from the drill press's quill to cut the plugs, and the runout increased. Because the plug cutter was designed to cut straight, cylindrical plugs, the plugs were undersized and fit poorly.

The Veritas plug cutter (see the photo at left) is designed to curb this problem. Because the tool's cutting edge is at a slight taper, the resulting plugs come out .015 in. oversized at one end. This allows you to start the plug at the narrow end and then drive it in until the tapered sides fit snugly all around the counterbored hole.

In experimenting with the cutter, I found that the plugs did fit well, as long as I counterbored deep enough to allow the taper to do its thing—around ¼ in. I was also impressed with the smoothness of the cut: The cutters' four prongs leave a glass-smooth finish on the plug, making for a very tight fit.

The cutter is available in a variety of sizes, both metric and imperial, and lists for between \$11 and \$13. Order directly from Veritas Tools, 12 East River St., Ogdensburg, N.Y. 13669; (800) 667-2986 or, in Canada, Lee Valley Tools, Ltd., 1080 Morrison Drive, Ottawa, Ont., Canada K2H 8K7; (800) 267-8767. —Jim Tolpin



Photo: Abigail Reed

**Sanding sticks are an ideal solution for sanding in tight areas and into corners.** Two brands of sanding sticks, each have their strengths: The Heritage sticks (left) excel at sanding into tight corners; the Simpson sticks (right) are good for sanding long, flat areas in close quarters.

### Sanding sticks

I make musical instruments, so I often need to sand or deburr small, intricate pieces of wood and other materials. That's why I was glad to give these sanding sticks a shot (see the photo above). These sticks, small plastic devices for holding strips of abrasive, are easy to use and worth having

on hand. The three sticks shown on the left in the photo are made by Heritage Industries (4605 Spring Road, Cleveland, Ohio 44131; 216-398-8776) and the four on the right by Simpson Specialty Tool (190 Alameda de la Loma, Ignacio, Calif. 94949-6005; 415-382-0658).

All of them work like files and are about the same size. They're easy to hold and

useful for rounding edges, deburring and smoothing small surfaces. It's easy to replace the abrasive on either brand when it's worn. You can use any grit on the Simpson, and five grits are available for the Heritage. The samples came with cloth-backed abrasive strips, but I also tried the Simpson with paper-backed strips with no problems. Both the Heritage and Simpson models are available in different widths (¼ in. to ¾ in. for the Heritage; ½ in. to 1 in. for the Simpson). At the far end of each tool, the abrasive strip passes around a thin edge, letting you get into tight corners.

The biggest difference between the two is the way in which the abrasive strips are mounted and tensioned. The Simpson tool takes a strip of abrasive, which can be cut from the length of a standard sheet. You



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position the strip so its ends are caught under the jaws of a metal clip, and then tension the strip by turning a knurled knob on the end of the handle. The Heritage tool uses a closed loop of material, which completely covers the outer surface of the tool. The strip is held in tension by a spring-loaded plunger with a rounded end, which forms the rear end of the tool. You need to buy the replacement loops from Heritage. They start at around 30 cents each. One strip will last nearly forever because all you need to do when it becomes worn is compress the plunger slightly, and rotate the strip to a new position. If you need to sand primarily into tight corners, this is the stick for you.

Though you can't rotate the Simpson stick's strip, different profiles are available, including a curved blade that's ideal for sanding the insides of curved surfaces. And the Simpson sticks are excellent for sanding long flat areas in close quarters.

I found it useful to have both styles, and I see them as complementary, not competitive. They're both very inexpensive—\$3 to \$5 for the Heritage and \$8.95 for the Simpsons. There's good reason to have both of them handy at your bench.

—Abijah Reed

## Laminate-cutting guide

One problem with cutting plastic laminate on the tablesaw is that it tends either to slip under the fence and jam or to flex and ride up the fence and off the sawblade while being cut. The Laminatrol laminate-cutting guide designed by Burt Development Co. (4 Windward Lane, City Island, N.Y. 10464; 718-885-3314) solves both these problems.

The Laminatrol is an aluminum extrusion that slips under a tablesaw's rip fence and provides a channel for the laminate as it's pushed through the saw (see the photo at right). The inner edge slips under your tablesaw's rip fence and butts up against the bottom back lip of the fence, preventing the guide from sliding along with the laminate being cut. On after-market fences without a lip in the back, a few strips of sandpaper glued to the tongue of the Laminatrol under the fence help hold the guide in place.

I checked out the Laminatrol in my shop, and it did its job well. It was especially nice for cutting narrow strips because the channel in which the laminate rides is just high enough off the table for me to use a push stick, keeping my fingers away from the sawblade. One thing to remember is that,



**Simple extrusion guides laminates securely through tablesaw blade. The aluminum guide keeps sheets of laminate from slipping under the rip fence or riding up on the blade as the laminate is ripped.**

because of the thickness of the channel wall, your actual cut will be about 1/16 in. less than what the fence indicates.

A kerfed strip of wood clamped to the fence can do the same job, but it's convenient just to slide the Laminatrol under the fence. And at \$7.95, it's not a major investment. The Laminatrol is available in many woodworking catalogs, or call Burt Development for a retailer near you.—Ken Picou

## MiterMatic saw set-up square



**Set your miter gauge instantly and accurately with MiterMatic tablesaw set-up square. Angles are 90°, 45°, 30° and 22 1/2°.**

Miter-gauge scales are pathetically crude, regardless of the quality of the saw. But there *are* plenty of expensive and/or time-consuming ways of setting the miter gauge to a precise angle, regardless of the angle. Some involve dial indicators; some require sine-bars. All are complicated. But 99% of the time, you're concerned with only two angles: 90° and 45°. So what would you say about a device that's accurate to better than .001 in., takes you less than 10 seconds to use and costs you just \$20? It's called the MiterMatic.

The MiterMatic (available from Garrett Wade, 161 Avenue of the Americas, New York, N.Y. 10013; 800-221-2942) is a 3/8-in.-thick piece of acrylic that's machined by a computer-numerically controlled (CNC)

milling machine. In addition to the 45° and 90° positions, there are slots for 22 1/2° and 30°. The slots are milled slightly wider than most common miter gauges (3/4 in.) to allow for any slight variation. In use, you're indexing off just one side of a slot (either is fine), so accuracy isn't compromised.

To use the MiterMatic, you just put two pennies under your miter gauge, front and back, to raise it up a bit. Loosen the knob on the miter gauge, and place the MiterMatic over the miter-gauge bar, snug up against one side. Then pull the MiterMatic against the flat side of the miter gauge's head till it's snug in that plane, too, and cinch down on the miter-gauge knob (see the photo at left). Done. Remove the pennies, and cut your miters. —V.L.

## On the horizon

### Eliminator RC router chuck

Brainchild of Virginia inventor J.P. Walsh, the Eliminator RC is a revolutionary new chuck that eliminates the awkward business of tightening and loosening a standard chuck. A twist of a T-handled Allen wrench secures the bit. Removing a bit is just as easy.

The chuck has been tested extensively by the manufacturer, by a major American power-tool company and by a smaller specialty milling machine company. All the test results have been positive. I checked

out the chuck, and I didn't experience the least bit of slippage.

They're not available as of this writing, but they should be in some major woodworking catalogs by the holidays. For information on retailers carrying the chuck, contact Joe Marmo (J.P. Walsh & J.L. Marmo Enterprises Inc., 7649 Long Pine Drive, Springfield, Va. 22151; 703-644-5647).

### Norton waterstones

We've been in touch with Norton, the large American abrasives company, about getting a set of their new synthetic waterstones for evaluation. But as of this writing

(September 1994), they're still not available. They are reputed to last longer between flattenings than ordinary waterstones and provide good tactile feedback. We'll review them as soon as we can get our hands on a set. —V.L.

*Vincent Laurence is an associate editor for FWW. Tom Wisshack makes and restores fine furniture in Galesburg, Ill. Jim Tolpin is a writer and woodworker in Port Townsend, Wash. Abijah Reed makes musical instruments and furniture in Putney, Vt. Ken Picou is a designer and woodworker in Austin, Texas.*



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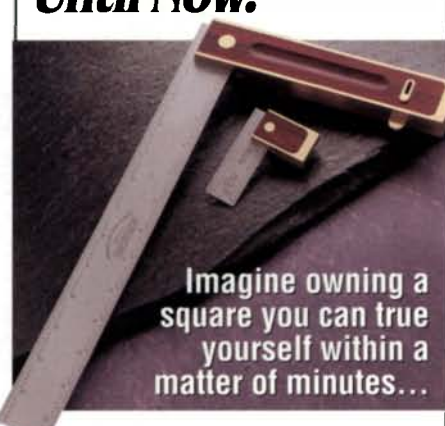
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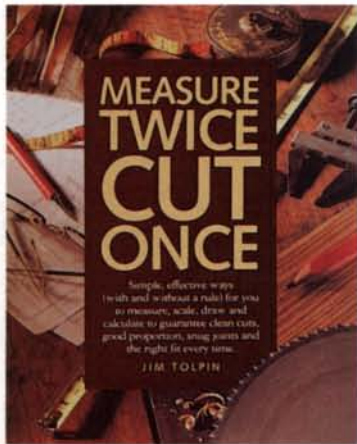
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**Measure Twice Cut Once** by Jim Tolpin. *Betterway Books, 1507 Dana Avenue, Cincinnati, Ohio 45207; 1993. \$18.95, paperback; 115 pp.*



This is a book about avoiding mistakes, both quantitative and aesthetic. As Jim Tolpin guides us from concept to cutting, his writing is always clear and readable and often amusing.

The first five of the seven chapters are about drawing lines—straight, angled and curved. The text progresses from concept sketches through working drawings and cut lists to layout on lumber and sheet goods. There is useful information on measuring and drawing tools, in-

cluding some interesting shopmade ones. The author makes a strong case for transferring measurements directly, rather than numerically, whenever possible.

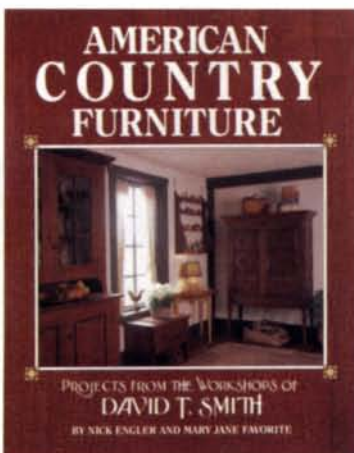
The creative process has been directed down a single, well-defined path, but I think it is the path on which the greatest number of woodworkers will feel comfortable. Those whose projects are relatively straightforward, however, will feel a need to rearrange or eliminate some of the suggested steps. For example, some might choose to broaden the role of story poles and skip the full-scale drawings.

The chapter on accurate cutting covers the relative merits of hand tools and both hand-held and stationary power tools for each type of cut. The book ends with a chapter on fixing mistakes. Mr. Tolpin's attitude is that mistakes represent interesting problems—rather than the end of the world, which suggests that he enjoys excellent mental health.

For such a compact book, there is a wealth of tips and techniques for everyone. I would especially recommend this book to woodworkers whose fear of mistakes is holding them back from building furniture of their own design.

—Richard Graybill

**American Country Furniture: Projects from the Workshops of David T. Smith** by Nick Engler and Mary Jane Favorite. *Rodale Press, 35 E. Minor St., Emmaus, Pa. 18098; 1990. \$29.95, hardback; 432 pp.*



*American Country Furniture* was written by Nick Engler, an experienced teacher and author, and is based on projects from David T. Smith's workshops in Ohio.

The book is handsome and a pleasure to browse. There are scores of photos, many in color, and hundreds of shop drawings in a clear straightforward style. The plans provide step by step instruction, as well as a bill of materials and hardware. And there are photo sequences illustrating special techniques, such as

punching tin panels for a pie safe and weaving a rush seat.

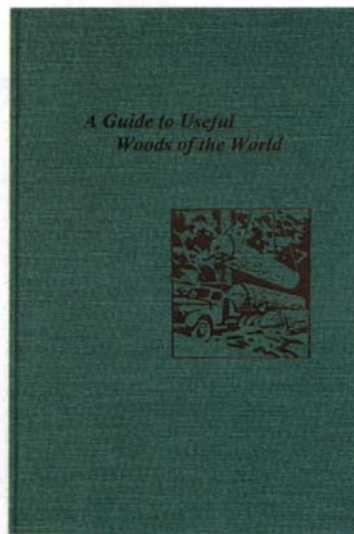
At the beginning of the book is an introduction on the history

of furniture styles and construction. It traces the evolution of furniture from its European roots to today's country revival. It is followed by a beautiful color portfolio of David T. Smith's furniture photographed by Mitch Mandel.

The projects are grouped by function, such as storage, sitting eating and drinking. The book includes projects such as a lap desk, candle stand, chimney cupboard and a ladder-back chair. With almost 50 projects in all, there is something for beginner to accomplished pro. I have built several projects from the book that are frequently mistaken for true period pieces. The projects are either faithfully copied or carefully designed, and I'm always surprised at how attractive, well balanced and functional the finished pieces turn out. With this book, someone could furnish an entire country house—and that's exactly what I'm doing.

—Mario Rodriguez

**A Guide to Useful Woods of the World** edited by James H. Flynn Jr. *King Philip Publishing Co. Distributed by James H. Flynn, 1704 Drewlaine Drive, Vienna, Va. 22182; 1994. \$24.95, hardback; 382 pp.*



*A Guide to Useful Woods of the World* is an interesting and handy compilation of about 20 years of the "Wood of the Month" column published in the journal of the International Wood Collector's Society, *World of Wood*.

More than 200 different woods are featured, each in about a page and a half, outlining the tree, its distribution, its timber, seasoning, strength and working qualities. There are many curiosities cataloged under the use heading. (What wood makes the best marimba? Which might be a source of digitalis, chewing gum, frankin-

cense or textile shuttles?) Finally, what are the prospects for the global supply in an age where some woods are endangered and substitutes are constantly appearing?

This is a practical book (1,372 common names are carefully cross-referenced), but it's also lively reading. The column has been variously conducted by Max Kline, whose entries have a tight, textbook quality; Flynn himself, whose experience as a luthier enlivens many entries; and Jon Arno, whose personable style is well-known to the readers of *Fine Woodworking*. Arno's descriptions are great reading: "Gumbo-limbo rates as a fillet mignon in fungus circles." Working hop hornbeam is a "masochist's dream." On sugar pine, he writes: "an aroma so good you could charge admission."

Of special value are notes on drying the woods and possible allergic reactions they can trigger. Flynn also includes 13 short subjects, such as importing wood (wood without dirt and bark clears inspection easier), end sealing and establishing a xylarium (a species collection).

Because wood collectors' interests go beyond woodworking, this book has the lowdown on many non-commercial species, like bristlecone pine, Russian olive and staghorn sumac, as well as dozens of little-known tropical woods.

*A Guide to Useful Woods of the World* is nicely illustrated with pen drawings of trees and leaves and nostalgic scenes of old-time logging. You won't find a handier reference, or one that is more fun to read.

—John Sillick



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330K	330 WITH CASE & 2-10 YD ROLLS PAPER	94
332	QUIKSAND 5" RNDM ORB W/STIKIT PAD	66
332K	332 W/CASE & 100 SHEETS PAPER	92
333	QUIKSAND W/HOOK & LOOP, DUSTLS	73
333K	333 W/CASE & 50 SHEETS PAPER	99
334	QUIKSAND W/STIKIT, DUSTLESS	73
334K	334 W/CASE & 100 SHEETS PAPER	99
340	1/4 SHEET DUSTLSS FINISHING SANDER	49
340K	340 WITH CASE & 10 SHEETS PAPER	72
345	SAW BOSS 6" CIRCULAR SAW	104
347	7 1/4" FRAMERS SAW 15 AMP, 10.25 LBS	127
351	3" X 21" BELT SANDER	148
351K	351 WITH 10 ASST BELTS & BELT CLNR	158
352	3" X 21" BELT SANDER W/DUST BAG	151
352K	352 WITH 10 ASST BELTS & BELT CLNR	161
9352VS3	3" X 21" VS DSTLS BELT SANDR W/CS	165
9352VSK	9352VS WITH 10 ASST BELTS & CLNR	175
360	3" X 24" BELT SANDER W/DUST BAG	189
360K	360 WITH 10 ASST BELTS & BLT CLNR	200
361	3" X 24" BELT SANDER	182
361K	361 WITH 10 ASST BELTS & BLT CLNR	193
362	4" X 24" BELT SANDER W/DUST BAG	195
362K	362 WITH 10 ASST BELTS & BLT CLNR	208
363	4" X 24" BELT SANDER	191
363K	363 WITH 10 ASST BELTS & BLT CLNR	204
447	7 1/4" FRAMERS SAW W/BRAKE 15 AMP	137
505	1/2 SHT FIN SANDER	123
505K	505 W/CASE & 2-10 YD ROLLS PAPER	159
550	NEW POCKET CUTTER	178
556	BISC JOINER W/CASE & TILT FENCE	168
556K	556 WITH 1000 ASSORTED BISCUITS	190
690	1 1/2 HP ROUTER W/1 1/4" & 1 1/2" COLLETS	132
690K	690 W/CS, EDGE GUIDE, & TEMP GD KIT	179
990	1 1/2 HP ROUTER W/CASE	144
691	1 1/2 HP "D" HANDLE ROUTER	148
691K	691 W/CASE, EDGE GD & TEMP GD KIT	204
693	PLUNGE BASE ROUTER, 1 1/2 HP	169
695	SHAPER TABLE W/ 1 1/2 HP ROUTER	216
696	SHAPER TABLE	128
2620	3/8" VSR DRILL, 0-1200 RPM W/CHUCK	88
2621	3/8" VSR DRILL, 0-1200 RPM, KEYLESS	89
5008	DOVETAIL TEMPLATE	78
5009	MORTISE & TENON JIG	47
5116	OMNI JIG	253
6931	PLUNGE ROUTER BASE	73
7116	NEW 24" OMNIJIG	293
7310	LAMINATE TRIMMER, 5.6 AMP	88
97335	5" RNDM ORBIT SANDER, VS W/CS	132
7335K	7335 W/CS, DUST EX SYS, 100 SHTS PPR	165
97336	6" RNDM ORBIT SANDER, VS W/CS	137
7336K	7336 W/CS, DUST EX SYS, 100 SHTS PPR	169
7518	3 1/4 HP FIXED BASE ROUTER-5 SPEED	267
7519	3 1/4 HP FIXED BASE ROUTER-1 SP	233
7538	3 1/4 HP PLUNGE ROUTER-1 SPEED	235
7539	3 1/4 HP PLUNGE ROUTER-5 SPEED	269
7549	TOP HANDLE BAYONET SAW	134
7549K	7549 W/CASE & 10 BLADES	152
7700	NEW 10" LASERLOC MITER SAW	338
7700K	7700 WITH BAG, VISE & EXT WINGS	377
9118	PORTA PLANE KIT W/CASE, CRBD BLD	209
9314	4 1/2" TRIM SAW KIT	152
9315	7 1/4" BUILDERS SAW KIT	139
9345	SAW BOSS 6" CIRCULAR SAW KIT	123
9347	7 1/4" FRAMERS' SAW W/STEEL CASE	138
9637	TIGER SAW VAR SPD RECIPI SAW KIT	144
9853S	12V CRDLS KIT W/2 BAT, CASE	169
97310	LAMNT TRIMMR KIT W/4 BASES & CS	194

### DELTA

14-650	HOLLOW CHISEL MORTISER	284
22-540	12" BENCH TOP PLANER	389
28-180	BENCH TOP BAND SAW	158
31-080	1" BELT 5" DISC SANDER	93
31-460	4" BELT 6" DISC SANDER	127
34-182	TENONING JIG	84
37-070	NEW 6" VS BENCH JOINTER	248
40-560	16" SCROLL SAW, 2 SPEED	178

### Milwaukee

0407-1	SAME AS ABOVE BUT 12 VOLT	173
6256	TOP HANDLE JIG SAW	144
6491	10" MITER SAW W/BAG & 80T BLADE	288
6507	VAR SPEED SAWZALL W/BLADES & CSE	144
6508	SAME AS 6507 BUT W PERMANENT CRD	144
6528	SAME AS 6527 BUT W PERMANENT CRD	172

### SENCO

SFN40	FINISH NAILER W/CASE 1 1/4" X 2 1/2" CAP	379
SKS	NARROW CROWN STAPLER 5.8" X 1 1/2"	269
SLP20	BRAD NAILER W/CASE 5.8" X 1.5" CAP	268
SN325+	STICK NAILER 1.78" X 3 1/4" CAPACITY	418
SCN200R	ROOFING NAILER	458

### AEG

TXE150	6" VS DSTLS RNDM ORBIT SANDER	138
BSPPE100	BARREL GRIP JIG SAW, VS W/CASE	155
FSPE100	TOP HANDLE JIG SAW, VS W/CASE	155
HBSE75S	3" X 21" BELT SANDER, VAR SPEED	174
EZ581	CORDLESS CAULKING GUN	159

### DEWALT

DW100	3/8" DRILL, 0-2500 RPM, 4 AMP	68
DW318K	4.5 AMP HVY DTY JIG SAW KIT W/CS	147
DW420	5" RNDM ORBIT SANDER, PSA	69
DW421	5" DSTLS RNDM ORB SNDR, VELCRO	79
DW430	3" X 21" DUSTLESS BELT SANDER	164
DW431	3" X 21" DSTLS BELT SANDER VAR SP	180
DW610	1 1/2 HP ROUTER, 9 AMP	147
DW615	1 1/4 HP PLUNGE ROUTER, VAR SP	158
DW625	3 HP HVY DTY PLUNGE RTR, VAR SP	269
DW675K	HEAVY DUTY PLANER KIT	164
DW682K	BISCUIT JOINER KIT	224
DW944K2	9.6V CORDLESS KIT W/2 BATTERIES	154
DW945K2	12V CORDLESS KIT W/2 BATTERIES	169
DW972K2	NEW 12V CRDLS KIT W/2 BATTERIES	189
DW991K	14.4V CRDLS KIT W/BATTERY & CASE	199

### HITACHI

DS10DVAK	12V CRDLS DRILL KIT W/1 BATTERY	149
DS10DVAKB	12V CORDLESS DRILL KIT W/2 BAT	192
C8FB2	8 1/2" SLIDE COMPOUND MITER	579
C10FC	10" COMPOUND MITER SAW	259
P20SB	3 1/4" PLANER, 3.4 AMP	92
TR12	3 HP PLUNGE ROUTER	189
M12V	3 HP VAR SPEED PLUNGE ROUTER	235
NT45A	18 GA. FINSH NAILER W/CASE	275
N5008AA	STANDRD CRWN CONSTRCTN STAPLR	319
NV83A	FULL HEAD CONSTRCTN COIL NAILER	414

### BOSCH

1003VSR	3/8" VSR DRILL W/KEYLESS CHUCK	92
1194VSR	1/2" VSR, 2 STAGE HAMMER DRILL	139
1273DVS	4" X 24" VS DUSTLESS BELT SANDER	219
1370DEVS	6" VS DSTLS RNDM ORB SNDR	224
1584VS	CLIC BARREL HANDLE JIG SAW, VS INCLUDES FREE CASE	150
1587VS	TOP HANDLE JIG SAW, VS W/CASE	150
1604	1 3/4 HP ROUTER	142
1608	LAMINATE TRIMMER	95
1608KX	DELUXE INSTALLERS KIT W/4 BASES	224
1613EVS	2 HP VAR SP PLUNGE ROUTER INCLUDES FREE EDGE GUIDE	199
1615EVS	3 1/4 HP VAR SP PLUNGE ROUTER INCLUDES FREE EDGE GUIDE!	269
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3400	10" TABLE SAW W/FREE CARB BLADE	179
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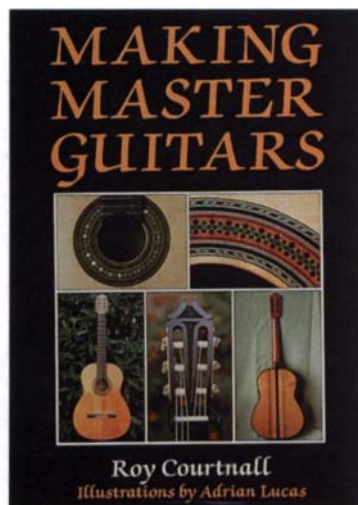
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**Making Master Guitars** by Roy Courtnall. *Robert Hale (London) and Stewart-MacDonald, publishers, 21 N. Shafer St., Box 900, Athens, Ohio 45701; 1993. \$99.50, hardback, 335 pp.*



*Making Master Guitars* is the latest lutherie book to emerge from the European tradition. It is divided into two principal sections: The first section profiles the work of eight European master guitarmakers, and it gives scaled plans and measurements of their guitars; the second section is a guided instruction in how to make a guitar based on these plans.

The first section is the more successful of the two, integrating archival photos of the master luthiers at their work with biographical and autobiographical information.

Unfortunately, this section contains many inaccuracies. There are discrepancies between the author's plans of instruments and features seen in photos of those instruments. There are inconsistencies in Mr. Courtnall's measurements and those of others who have examined the same instruments, or instruments of similar vintage or period made by the same makers. Courtnall ignores characteristic and distinguishing features of certain makers' work. In view of such lapses, one must consider the plans

and drawings in this book in general to be suspect.

The "how-to" half of this book falls short of the standard set by a work that calls itself *Making Master Guitars*. There is not sufficient nuts-and-bolts instruction for a beginner to avoid serious pitfalls. And what direction is given is often so sloppily presented as to ensure the creation of a mediocre guitar. There is no definition or analysis of what makes a "master guitar."

Mr. Courtnall omits reference to trimming off the soundboard overhang before going on to the next step. This can't be done in real life. Mr. Courtnall's breezy two-sentence treatment of leveling the fingerboard prior to fretting—without even a photo of the process—is unacceptable in a \$100 book. More discussion of neck/fingerboard relief is called for than "a straight-edge placed over the frets should reveal no gaps [but] some makers relieve the central area slightly so that the strings will have more free area in which to vibrate." The author's assertion that classic guitars need no neck relief to avoid fret buzzing with low action is wrong. His setup for gluing together the rosette log won't work: The subsections will be displaced out of alignment by clamping pressure if they are not contained on all four sides, and the log will be ruined.

I very much hope Mr. Courtnall decides to release a rewritten, second edition of this book. His concept is a good one, but it does not work in its present form. **—Ervin Somogyi**

*Richard Graybill works wood for a living in Santa Cruz, Calif. Mario Rodriguez, a contributing editor to Fine Woodworking, makes furniture and teaches woodworking classes in Warwick, N.Y. John Sillick is a teacher and woodworker who harvests and dries much of his own wood in Lyndonville, N.Y. Ervin Somogyi builds guitars in Berkeley, Calif.*

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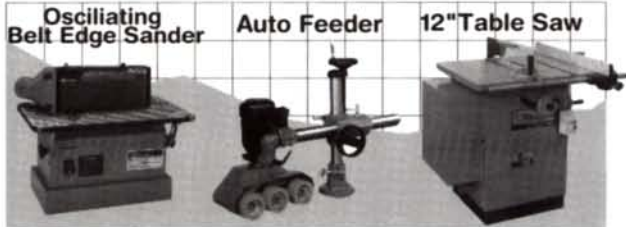
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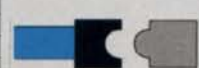
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C2033	2 5/8"	3/4"	\$29.65
C2034	2 5/8"	1"	\$32.35
C2035	2 5/8"	1 1/2"	\$33.25
C2036	2 5/8"	2"	\$53.95

## Bead

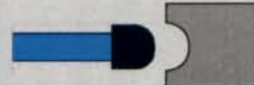
3/4" Bore



PART	CUTTER DIA.	CUTTING LENGTH	CUTTING DIA.	PRICE
C2052	2 5/8"	1/2"	1/4"	\$22.45
C2053	2 5/8"	3/8"	3/8"	\$24.25
C2054	2 5/8"	3/4"	1/2"	\$26.05
C2055	2 5/8"	1 1/8"	3/4"	\$29.65
C2056	2 5/8"	1 1/4"	1"	\$32.35

## Flute

3/4" Bore



PART	CUTTER DIA.	CUTTING LENGTH	PRICE
C2046	2 5/8"	1/4"	\$22.45
C2047	2 5/8"	3/8"	\$24.25
C2048	2 5/8"	1/2"	\$26.05
C2049	2 5/8"	3/4"	\$29.65
C2050	2 5/8"	1"	\$32.35

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3/4" Bore



PART	CUTTER DIA.	CUTTING LENGTH	CUTTING RADIUS	PRICE
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C2060	2 5/8"	3/8"	3/8"	\$24.25
C2061	2 5/8"	3/4"	1/2"	\$26.05
C2062	3 1/4"	7/8"	3/4"	\$32.35
C2063	3 7/8"	1 1/4"	1"	\$44.95
C2064	4 1/2"	1 1/2"	1 1/4"	\$44.95

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PART	CUTTER DIA.	CUTTING LENGTH	PRICE
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3/4" Bore



PART	CUTTER DIA.	CUTTING LENGTH	PRICE
C2099	2 1/2"	3/4"	\$35.95

## Ogee & Bead

3/4" Bore



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READER SERVICE NO. 115



Listings of gallery shows, major craft fairs, lectures, workshops and exhibitions are free, but restricted to happenings of direct interest to woodworkers. We list events (including entry deadlines for future juried shows) that are current with the time period indicated on the cover of the magazine, with overlap when space permits. We go to press three months before the issue date of the magazine and must be notified well in advance. For example, the deadline for events to be held in March or April is January 1; for July and August, it's May 1, and so on.

**ARIZONA: Call for entries**-Turning Plus... Redefining the Lathe-Turned Object III, Dec. 10-Feb. 5. For more information, send an SASE to Arizona State University Art Museum, Nelson Fine Arts Center, Box 872911, Tempe, 85287-2911. (602) 965-2787.

**ARKANSAS: Meetings**-Woodworker's Association of Arkansas meets the first Monday of each month at 7:00 p.m. at Woodworker's Supply Center, 6110 Carnegie, Sherwood, 72117. For more information, call (501) 835-7339.

**Workshops**-Wood-strip canoemaking, bamboo fly-rod making, forged toolmaking for the woodworker, thru November. White River Artisans School, 200 South Ave., PO Box 308, Cotter, 72626. (501) 435-2600.

**CALIFORNIA: Workshops**-Woodworking for women. Furnituremaking with hand tools using traditional joinery, weekends. San Francisco. For more information, contact Debey Zito (415) 648-6861.

**Workshops**-Various workshops including Japanese woodworking, joinery and sharpening. For further information, contact the Hida Tool Co., 1333 San Pablo, Berkeley, 94702. (415) 524-3700.

**Exhibition**-Sierra woodworking exhibition, thru Nov. 13. North Columbia Schoolhouse Cultural Center, Nevada City. For further information, send an SASE to N.C.S.C.C., 17894 Tyler Foote Road, Nevada City, 95959. (916) 265-2826.

**Show**-Celebration of craftswomen, Dec. 3-4 and Dec. 10-11, Fort Mason's Herbst Pavilion, San Francisco. For more information, contact San Francisco Women's Building, 3543 18th St., #8, San Francisco, 94110. (415) 431-1180.

**Show**-The Northern California Woodworking Show, Nov. 4-6, San Mateo Expo Center, Fiesta Hall, 2495 S. Delaware St., San Mateo, 94403. (800) 826-8257.

**Workshops**-Classes on woodfinishing and decorative painting for furniture and cabinets. For schedule, write to Studio 1829, 1829 Stanford St., Santa Monica, 90404. (310) 453-0230.

**Show**-The Contemporary crafts market, Nov. 4-6. Santa Monica Civic Auditorium, Pico Blvd and Main St., Santa Monica. For more information, call (213) 937-4021.

**Lectures**-American decoys, Nov. 8; Vermont furniture, Dec. 13. Trustees Auditorium, M.H. de Young Museum, Golden Gate Park, San Francisco. For more information, call (415) 383-0164.

**Workshops**-Shaker bench, sofa table, Mission lamp table, adirondack chair, firewood carrier, bookcase. Saturdays and Sundays. No experience necessary. Private instruction also available. For more information, contact the Woodworkers Place at (808) 952-3177.

**COLORADO: Classes**-Woodworking and related classes, year-round. For more information, write Red Rocks Community College, 13300 W. 6th Ave., Lakewood, 80401, or call (303) 988-6160.

**Seminars**-Woodworking seminars, September thru April. For more information, contact Schlosser Tool and Manufacturing Co., 301 Bryant St., Denver, 80219. (303) 922-8244.

**Juried exhibition**-10th annual exhibit sponsored by the Woodworkers Guild of Colorado Springs, thru Nov. 19. Smokebrush Center for Art and Theater. For more information, contact John Lewis, 918 N. Royer St., Colorado Springs, 80903. (719) 633-5015.

**CONNECTICUT: Exhibition**-The Celebration of American Crafts 26th annual juried exhibition, Nov. 12-Dec. 24. For more information, contact the Creative Arts Workshop, 80 Audubon St., New Haven, 06510. (203) 562-4927.

**Workshops**-Woodturning and advanced woodturning, carving wooden spoons, advanced handsawed boxes, thru November. Brookfield Craft Center, Route 25, PO Box 122, Brookfield, 06804. (203) 775-4526.

**DELAWARE: Exhibition**-James Mario, wood sculptor, thru Nov. 30. Creations Fine Woodworking Gallery, Garrett Snuff Mills, Route 82 and Yorklyn Road, Yorkly. For more information, call (302) 234-2350.

**DISTRICT OF COLUMBIA: Call for entries**-The James Renwick Fellowship Program in American Crafts, 1995-1996. Candidates must be knowledgeable in the history of twentieth-century American art, craft, or design. Deadline: January 15. For more information, contact the Renwick Gallery National Museum of American Art, Smithsonian Institution, Washington, D.C. 20560. (202) 357-2531.

**FLORIDA: Meetings**-South Florida Woodworking Guild meets every second Monday, 7 p.m. Constantines, 1040 East Oakland Park Blvd., Ft. Lauderdale. For further information, contact Woody McLane at (305) 565-2729.

**Meetings**-Central Florida Woodworkers Guild meets the second Thursday of each month at 7:30 p.m. Woodcraft Sup-

ply Corp, 246 East Semoran Blvd., Casselberry. For more information, contact Roger Lovell at (407) 841-6155.

**Meetings**-Palm Beach Country Woodturners, monthly meetings. For further information, contact Steve Blank (407) 747-7035.

**Show**-Coral Gables international festival of craft arts, Nov. 12-13. Coral Gables. For more information, contact Coral Gables International Festival of Craft Arts at (305) 445-9973.

**Exhibition**-Marriage in Form featuring Kay Sekimachi and Bob Stocksdale, Jan. 9-March 8. Tampa Museum of Art, Tampa. For further information, contact Kenna Moser at (415) 329-2605.

**Show**-26th Annual SFCC spring arts festival, April 1-2. Gainesville. Deadline: Dec. 22. For information, contact the Spring Arts Festival, 3000 NW 83rd St., Gainesville, 32606. (904) 395-5355.

**GEORGIA: Workshops**-Japanese woodworking by Toshihiro Sahara. One Saturday each month. For further information, contact Sahara Japanese Architectural Woodworks. (404) 355-1976.

**Meeting**-Woodworkers Guild of Georgia presents Power Tools by Redound and Son, Nov. 14, 7:30 p.m. Pre-meeting 6:30-7:15 on sharpening tools. For more information, write to the Woodworkers Guild of Georgia, PO Box 8006, Atlanta, 30306-0006, or call (404) 892-2487.

**ILLINOIS: Show**-The Belleville Wood Carvers Club 24th annual Midwestern wood carvers show, Nov. 5-6. Belle-Clair Exposition Hall, 200 South Belt East, Belleville. For more information, contact Don Lougeay, 1830 East "D" St., Belleville, 62221. (618) 233-5970.

**Show**-Artsy in Wood, 1994 woodcarving show, Nov. 5-6. Chicago Botanic Garden, Lake Cook Road, Glencoe. For more information, call (708) 394-1310.

**INDIANA: Classes**-Various woodworking classes and workshops. For further information, contact Woodworking Unlimited, 6038 E. 82nd St., Indianapolis, 46250, or call (317) 849-0193.

**Classes**-Various hands-on woodworking classes woodturning, furniture building, finishing and technique classes. For more information, contact Superior Woodworking Supply, 922 Ft. Wayne Ave., Indianapolis, 46202. (317) 635-5747.

**KENTUCKY: Workshops**-Woodturning and joinery instruction. For further information, write Jim Hall, Adventures in Wood, 415 Center St., Berea, 40403, or call (606) 986-8083.

**Meetings**-Kyana Woodcrafters Inc. meets the first Thursday of each month. Bethel United Church of Christ, 4004 Shelbyville Road, Louisville, 40207. For further information, call (502) 426-2991.

**Workshops**-Traditional Windsor chairmaking instruction. One-week courses. For further information, contact David Wright (606) 986-7962.

**Exhibition**-Linda Fifield and Jack Fifield: Shared Paths, thru Nov. 30. Carving, sculpting and beading. Contemporary Artifacts Gallery, 128 North Broadway, Old Town, Berea, 40403. (606) 986-1096.

**MAINE: Workshops**-Two-week basic and intermediate furnituremaking courses. The faculty includes Peter Korn, John McAlevey, Bill Thomas, Scott Hausmann and Owen Edwards. For more information, contact the Center for Furniture Craftsmanship, 125 W. Meadow Road, Rockland, 04841. (207) 594-5611.

**Meetings**-Guild of Maine Woodworkers meets the first Wednesday of every month. For time and location, call Guild of Maine Woodworkers at (800) 805-5100.

**MARYLAND: Meeting**-Chesapeake Woodturners regional conference '94. Annapolis. Featuring demonstrations by David Ellsworth, Giles Gilson, John Jordon, Bonnie Klein. For more information write to Conference '94, Chesapeake Woodturners, 403 Chesterfield Ave., Centerville, 21617. Written inquiries only.

**Festivals**-Sugarloaf Craft Festival, Nov. 18-20 and Dec. 9-11, Montgomery County Fairgrounds, Gaithersburg. For more information, contact Deann Verdier, Director, Sugarloaf Mountain Works, Inc., 200 Orchard Ridge Drive, Suite 215, Gaithersburg, 20878. (301) 990-1400.

**MASSACHUSETTS: Instruction**-Full-time program in fine furniture construction. Complete facilities. For more information, contact Wm. B. Sayre, Inc., One Cottage St., Easthampton, 01027. (413) 527-0202.

**Classes**-Woodworking classes, throughout most of the year. For information, contact Boston Center for Adult Education, 5 Commonwealth Ave., Boston, 02116. (617) 267-4430.

**Workshops**-Toolmaking for woodworkers. First three weekends of each month, registration limited to two students per weekend. For more info, contact Ray Larsen, Genuine Forgery, 1126 Broadway, Hanover, 02339. (617) 826-8931.

**Classes**-Winter 1995 classes. Woodworking for beginners, woodworking for women, intermediate woodworking. For more information, contact Michael Coffey, One Cottage Street School of Fine Woodworking, One Cottage St., Easthampton, 01027. (413) 527-8480.

**Exhibition**-Annual holiday exhibit and sale, Nov. 1-Dec. 31, Boston. For more information, contact Randi Lathrop, Society of Arts and Crafts Holiday Exhibit, 175 Newbury St., Boston, 02116. (617) 266-1810.

**Class**-Fundamentals of ornamental carving Nov. 5-Dec. 10. For further information, contact the North Bennet Street School, 39 North Bennet St., Boston, 02113. (617) 227-0155.

**Exhibition**-North Bennet Street School Open House, Nov. 4-5. For more information, contact North Bennet Street School, 39 North Bennet St. (at Salem St.) Boston. For more information, call (617) 227-0155.

**Show**-Danforth Craft Festival, June 22-25. Danforth Museum of Art, Framingham. Deadline: Nov. 1. For more information, call (508) 620-0050.

**MICHIGAN: Show**-Metro-Detroit woodworking show, Dec. 2-4. Novi Expo Center, Hall A, 43700 Expo Center Drive, Novi, 48375. For further information, contact the Woodworking Shows, 1516 South Pontius Avenue, Los Angeles, CA 90025. (800) 826-8257.

**MINNESOTA: Classes**-Woodcarving classes year-round. For information, contact the Wood Carving School, 3056 Excelsior Blvd., Minneapolis, 55416. (612) 927-7491.

**Classes**-Information, manuals and hands-on experiences are offered through Wild Earth Woodworking at a Minneapolis/St. Paul facility. Ongoing instruction in fundamental to advanced woodworking for the home hobbyist and corporate businesses. Lathe turning, safety and customized classes also available. Contact Wild Earth Woodworking, 401 Hunter Hill Road, #3 Hudson, WI 54016. (715) 386-3186.

**MISSISSIPPI: Classes**-Various woodworking classes. For more info, contact Allison Wells School of Arts & Crafts, Inc., Canton. (800) 489-2787.

**MISSOURI: Show**-St. Louis Area Wood Carver's fourth annual show, Nov. 26-27. Kirkwood Community Center, 101 South Geyer, Kirkwood. For more information, contact Ron Blanton, 412 Woodruff Drive, St. Louis, 63021. (314) 381-8670.

**Exhibition**-Marriage in Form: Kay Sekimachi and Bob Stocksdale, Nov. 18-Dec. 30. The Forum for Contemporary Art, St. Louis. For more information, contact Kenna Moser at (415) 329-2605.

**NEBRASKA: Meetings**-Omaha Woodworkers Guild meets at 7 p.m. the third Tuesday of every month. Westside Community Center, Omaha. For more information, contact John Cahill at 334-5550.

**NEW HAMPSHIRE: Classes**-Fine arts and studio arts. Manchester Institute of Arts and Sciences, 114 Concord St., Manchester, 03104.

**Classes**-Various woodworking classes. For information, contact The Hand & I, PO Box 264, Route 25, Moultonboro, 03254. (603) 476-5121.

**Auctions**-Antique and craftsman's tool auctions, year-round. Contact: Richard A. Crane, Your Country Auctioneer, 63 Poor Farm Road, Hillsboro, 03244. (603) 478-5723.

**Workshops**-Week-long Shaker-style furniture and chair-making workshops, year-round. For more info, contact Mary Sweet, Dana Robes, Wood Craftsman, Lower Shaker Village, Enfield, 03748. (603) 632-5385.

**NEW JERSEY: Call for entries**-Waterloo Arts and Crafts Festival, May 6-7. Waterloo Concert Field, Waterloo Road, Stanhope. Deadline: January 15. For more information, call the Stella Show Management Company at (201) 384-0010.

**Show**-South Jersey Wood Carvers 15th annual show to benefit Deborah Hospital. Nov. 19-20. New Jersey National Guard Armory, Mt. Holly. For more information, call (609) 853-7025 or (609) 468-6846.

**NEW MEXICO: Classes**-Woodworking classes. For more information, contact North New Mexico Community College, El Rito, 87520. (505) 581-4501.

**Classes**-Fine woodworking classes. For more information, write Santa Fe Community College, Santa Fe 87502, or call (505) 438-1361.

**Show**-Southwest Arts & Crafts Festival, Nov. 10-13. For more information contact Southwest Arts & Crafts Festival, 525 San Pedro NE, Suite 107, Albuquerque, 87108. (505) 262-2448.

**NEW YORK: Classes**-Various beginning and advanced woodworking classes. Constantine's, 2050 Eastchester Road, Bronx, 10461. (718) 792-1600.

**Call for entries**-19th Annual American Crafts Festival, July 1-2 and 8-9. Deadline: January 5. Lincoln Center for the Performing Arts, New York City. For more information, contact Paul Weingarten at (201) 746-0091.

**Classes**-Traditional 18th-century woodworking techniques with Mario Rodriguez. Contact: Warwick Country Workshops, PO Box 665, Warwick, 10990. (914) 986-6636.

**Meetings and classes**-New York Woodturners Association meets bi-monthly. YWCA, 610 Lexington Ave. (53rd St.) New York City. Contact Howard Alalouf (914) 337-0226.

**Classes**-Various gilding classes for fine furniture, antiques, frames, carvings, restoration. Center for the Gilding Arts, 381 Park Ave. South, New York City. (212) 683-4822.

**Classes**-Woodworking, traditional and contemporary; turning and finishing with Maurice Fraser and Bill Gundling. All levels. The Craft Students League at the YWCA, 610 Lexington Ave., New York City, 10012. For more information, call (212) 735-9731.

**Show**-Designer Crafts Council crafts festival '94, Nov. 5-6. The Schenectady Museum, Turnbull Gallery. For more information, call Martha Hubbard at (518) 463-6496.

**Fair**-Millbrook Crafts Fair, Nov. 25-26. Thorne Building, Millbrook. For more information, contact the Artisans Group, PO Box 468, Pine Plains, 12567. (914) 985-7409.

**Show**-Capital arts and crafts marketplace, Nov. 5-6. Thruway Inn, Albany. For more information, contact Quail Hollow





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**Show**-Annual Woodcrafters extravaganza, Nov. 4-6. New York State Fairground, Syracuse. Featuring Scott Phillips, Wayne Barton, Ernie Conover, Godlieb Brandli, Brad Packard, Sal Marino, Doug Kenney. For further information, call (315) 452-1903.

**NORTH CAROLINA: Meetings**-North Carolina Woodturners, second Saturday of each month. For more information, contact PO Box 1833, Hickory, 28603. (704) 324-5960.

**Show**-High Country Christmas art and craft show, Nov. 25-27. Asheville Civic Center, Asheville. For more information, contact Gail Gomez, High Country Art & Craft Guild, 13 Biltmore Ave., Asheville, 28801. (704) 252-3880.

**OHIO: Meetings**-Cincinnati Woodworking Club meets from 9:00 a.m. to noon on the second Saturday of September, November, January, March and May. Reading High School, 801 E. Columbia Ave., Reading. For more information, contact Cincinnati Woodworking Club, 5974 Gaines Road, Cincinnati, 45247.

**Show**-Cincinnati Carvers Guild Show, Nov. 5-6. Kings Island Conference Center. For more information, contact Bill Graham, 3559 S.R. #125, Bethel, 45106. (513) 734-4348.

**Classes**-Turning and carving, November thru January. The Hardwood Store, 1695 Dalton Drive, New Carlisle, 45344. (513) 849-9174.

**OREGON: Meetings**-Cascade Woodturner's Association meets every third Thursday. For information, contact Cascade Woodturners, PO Box 91486, Portland 97291.

**Classes**-Oregon School of Arts and Crafts, 8245 S.W. Barnes Road, Portland, 97225. (503) 297-5544.

**Show**-The Oregon Woodworking Show, Nov. 18-20. Portland Expo Center, Exhibit Hall C, 2060 N. Marine Drive, Portland, 97217. (800) 826-8257.

**PENNSYLVANIA: Classes**-Windsor chairmaking, weekly and weekends. Contact Jim Rendi, Philadelphia Windsor Chair Shop, PO Box 67, Earlville, 19519. (215) 689-4717.

**Juried exhibition**-Holiday ornament sale and exhibition, Nov. 18-20. Palmer Museum of Art, Pennsylvania State University, University Park. For more information, contact True Fisher, Friends of the Palmer Museum of Art, Pennsylvania State University, University Park, 16802-2507. (814) 865-7672.

**Show**-The Pittsburgh Tri-State Woodworking Show, Dec. 9-11. Pittsburgh Expomart, East Hall, 105 Mall Blvd., Monroeville, 15146. (800) 826-8257.

**Call for entries**-The Philadelphia Furniture Show. Deadline: Dec. 15. Send your name and address to receive application for this juried show to be held in late April to Philadelphia Furniture Show, 3605 Hamilton St., Philadelphia, 19104. (215) 440-7136.

**Show**-The Furniture Market at Valley Forge, Feb. 10-13, Valley Forge Convention Center, King of Prussia. For more information, contact Robert Goodrich at (717) 245-9051.

**Exhibition**-Antique Tool Discovery Day, Nov. 12. Mercer Museum, 84 South Pine St., Doylestown. For more information, call (215) 345-0210, ext. 27.

**Exhibition**-Harrisburg Woodworking Expo, Nov. 18-20, Pennsylvania Farm Show Complex, Harrisburg. For more information, call (914) 634-9401.

**Show**-The 19th Annual Mid-Atlantic Woodcarving Show and Competition, April 1-2. Pennsylvania State University, Abington campus gymnasium, Woodland Road, Abington. For more information call (215) 757-2152.

**TEXAS: Meetings**-North Texas Woodworker's Association meets the third Tuesday of each month. Contact Bruce May, North Texas Woodworker's Association, PO Box 831567, Richardson, 75083. (214) 271-0125.

**Classes**-Woodworking classes year-round. Bowl turning basics to advanced furniture and cabinetry. Woodshop, Inc. Woodworking School, 1225 W. College, Suite 612, Carrollton, 75006. (214) 466-3689.

**Show**-Rio Grande Valley Woodcarvers show and sale, Jan. 20-21. McAllen, Civic Center. For more information, contact Dorothy Chapapas, Route 2 Box 150, McAllen, 78504. (210) 581-2448.

**Exhibition**-20th annual Texas Crafts Exhibition, April 1-2. For further information, contact the University of Texas at Austin, Winedale Historical Center, PO Box 11, Round Top, 78954. (409) 278-3530.

**Meetings**-The Woodturners of North Texas meets the last Thursday of every month, 7:30-10 p.m. For more information, contact the Paxton Beautiful Woods Store, 1601 W. Berry St., Fort Worth, 76110. (817) 927-0611.

**Classes**-Carving classes every Thursday, 6:00-9:00 p.m. Classes are taught by master carver Don Schol. For more information, contact the Paxton Beautiful Woods Store, 1105 Sixth St., Carrollton, 75006. (214) 245-1192.

**VERMONT: Courses**-Yesterday Design and Building School. For more information, contact the school at Route 1 Box 97-5, Warren, 05674. (802) 496-5545.

**VIRGINIA: Show**-The Metro Richmond Woodworking Show, Dec. 2-4. Virginia State Fairgrounds, Old Dominion Building, Richmond. For more information, call Charles Harper, Harper Hardware Co., (804) 643-9007.

**Show**-30th Annual Richmond Craft and Design Show, Nov. 11-13. Richmond Centre for Conventions and Exhibitions. The show is sponsored by the Hand Workshop. For further information, contact the Hand Workshop, 1812 West Main St., Richmond, 23220, or call (804) 353-0094.

**Show**-Holiday in the Valley Arts and Craft Show, Nov. 4-6. Salem Civic Center, Salem. For info, contact Kathy Hudson, fair director, P.O. Box 1369, Salem, 24153. (703) 389-6163.

**WASHINGTON: Show**-The Western Washington Woodworking Show, Nov. 11-13. Seattle Center, Exhibition Hall, Mercer St. at 3rd, Ave., N. Seattle, 98109. (800) 826-8257.

**WEST VIRGINIA: Workshop**-Curves for the woodworker with David Finck, Nov. 11-13. Crafts Center, Cedar Lakes, Ripley, 25271. For more information, call (304) 372-7873.

**WISCONSIN: Show**-International Lathe-Turned Objects: Challenge V, Nov. 5-Jan. 8. Leigh Yawkey Woodson Art Museum, 700 N. 12th St., Wausau, 54403-5007. (715) 845-7010.

**Call for entries**-23rd Annual Festival of the Arts, April 2. Stevens Point. Deadline: Jan. 6. For more information, contact Festival of the Arts, PO Box 872, Stevens Point, 54481.

**CANADA: Workshop**-Traditional Windsor chairmaking. Weekly courses. For more info, contact David Goodwin, Village Chairmaker, Sparta, Ont., N0L 2H0. (519) 775-2751.

**Association**-The Canadian Woodturners Association. To receive our quarterly newsletter, Canadian Woodturners Association membership and benefits, send \$20 to 12A-4981 Highway 7 East, Suite 236, Markham, Ont., L3R 1N1, or call (905) 479-0755.

**Meetings**-West Island Woodturners Club (Montreal) meets every Tuesday, September thru May. For more information, contact Dennis Brown, 8817 Cure Legault, Lasalle, Que. H8R 2V9. (514) 366-6071.

**SCOTLAND: Workshops**-Ongoing workshops. For more information, contact the Myreside International School of Antique Furniture Restoration, Myreside Grange, Gifford, East Lothian, EH41 4JA. (062 081) 0680.

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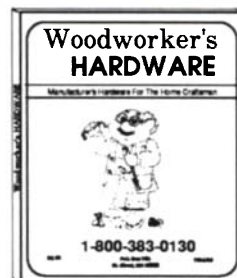
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**Wee machines make wee tools**—Using his precision mini-lathe (left), William Robertson shapes a match-head-size knob for a miniature hand drill (foreground). The full-scale original is placed so he can copy the handle profile.



**To give scale to his work**, Robertson uses tweezers (above) to unveil tiny architectural instruments over a turn-of-the-century drawing kit. A few items in front of the center box (a fully equipped watercolor set) are a lead sharpener, rosewood-lined T-square and triangles made of boxwood, pearwood and maple.

## To every little detail

They say that you can learn more in a small class. After seeing William Robertson's latest miniature creation (see the back cover), I would have to agree. But even before I visited the Toy and Miniature Museum (5235 Oak St., Kansas City, Mo. 64112) where Robertson's architect's classroom resides, I had a feeling that I would learn a great deal—and not just about diminutive woodworking.

Robertson is a big name in miniaturist circles. Besides being an expert about miniatures, he is an accomplished maker and a tool collector. He collects full-sized tools, especially 18th- to 20th-century measuring instruments, and occasionally reproduces them in one-sixth scale (see the photo above left).

One of his latest achievements, the 24x33x19-in. architect's classroom (see the photo at right), which has a vaulted ceiling and furnishings accurate to circa 1900, took about 2,000 hours to complete. The woodworking detail is impressive. Tables have mortise-and-tenon joinery and drawers have box joints. Stools raise, lower, turn and roll. Ebony and maple T-squares have working copies of Dietzen's patent micrometer adjustment, and the smaller ornate squares are patterned after ones made by L.S. Starrett. The scale cutaway model of the house is just 3½ in. high.

Robertson makes many of his own tools, including ½-in.-long handplanes for truing



**Rearranging the furniture**—Robertson's hand dwarfs the furnishings as he arranges them in his one-twelfth-scale architect's classroom. In making the cherry tables and stools, he cut authentic joinery and fashioned working hardware, such as the rolling casters.

¼-in.-thick edges and a foot-long lathe capable of cutting 200 threads per inch. But his most-used tool is a jeweler's saw (see the top photo on p. 136).

Robertson's wood is special, too. He can furnish an entire room with wood that most of us would consider kindling. Wood that is good for his work must have extremely tight grain, like old-growth cherry,

pearwood, apple and boxwood. His skills at metalworking come in handy to work such hard and dense materials. He often fashions his own cutters and bits to use on his tiny drill press and router.

Robertson rarely uses a magnifier. And if you think his eyes are good, his hands and actions are even more adept and precise. When I met him, he meticulously removed



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SPK-035	12-1/2"	12.25mm	1.53mm	2	Ryobi AP12 planer	\$33.90	\$30.50
SPK-040	12-5/8"	36mm	4mm	2	Ryobi AH-115 & AH-125	\$67.60	\$60.80
SPK-045	12-1/2"	35mm	3mm	2	Makita 2030N planer	\$47.40	\$42.70
SPK-055*	12-1/2"	19mm	1.80mm	2	Delta 22-540	\$33.50	\$30.20
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SSS-015	7/8"	1/8"	\$37.00	\$33.30	SSS-070	1"	5/32"	\$41.00	\$36.90
SSS-020	11/16"	1/8"	\$36.00	\$32.40	SSS-075	1-1/8"	5/32"	\$43.00	\$38.70
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a small plastic box from his shirt pocket, placed it in the palm of his hand and opened it with the care of a surgeon. He unfolded a bubble wrapped miniature chest and took out a special pair of tweezers. Next he unveiled the contents (see the top right photo on p. 134), first unlocking the latch and then withdrawing rice kernel-sized compass, protractor and other drawing instruments. He never missed the item he was after, adroitly turning knobs, opening drawers and plucking out dozens of diminutive implements. I was impressed, all the more so when I realized he had made each one of these items. Astonishingly enough, Robertson is 6 ft. 2 in. tall and has large hands.

Currently, Robertson is working on

Greene and Greene-style furniture for a recreated one-twelfth scale Gamble House (the original is in Pasadena, Calif.). It is a collaborative effort with a couple from Washington state who are making the house itself. Robertson also has plans to make a miniature Studley tool chest (see *FWW* #100, p. 52). For more about Robertson's work, see *FWW* #66 and #99.

—Alec Waters, associate editor

**"My most useful tool is a jeweler's saw with spare blades," says Robertson. Here he uses an 80-tpi blade to cut out fretwork for a Swiss pear Chippendale mirror (a finished one is on the right). The maple bird's-mouth fixture clamped to the bench steadies the work at a comfortable height.**



Photo: Alec Waters

## Quilted basswood (minus the figure)

Forty-two squares, 32 pieces per square, 15 stitches per piece. The thought of sewing a quilt is daunting. Now imagine carving one. But that is exactly how Fraser Smith of Tampa, Fla., makes his living. Smith not only carves and colors quilts, like the one in the near right photo, he also makes other intricate cloth-mimicking items, such as battered baseball caps, tuxedos on hangers and Civil War uniforms. All of Smith's sculptures are life-size and made almost entirely of wood—right down to the clothes pins and buttons. The belt loops in "Mr. Deets' Work Pants" (see the far right photo) are good examples.

Smith begins by designing a quilt pattern using a computer graphics program. Next he roughs out an appropriately sized panel (commonly 40 in. by 50 in.) of 5-in.-thick basswood. Using a Lancelot carving wheel, he shapes the folds, undulations and overlaps. Then, with the basic quilt plotted on a paper square, he transfers it to the wood.

To outline individual squares, Smith uses a utility knife and a scalpel. He carves stitches using an air-powered die-grinder and hand gouges. A light-duty sandblaster removes rough edges. These same tools produced the puckered texture of the

quilted pants (see the bottom right photo).

For smoothing, Smith uses a Fein sander, which he modified by adding a small, flexible sanding pad. He'll change the pad as many as 1,000 times for big works. Then, by hand-sanding with 150-grit garnet paper, he leaves a surface that resembles washed cotton cloth.

Smith uses paints, stains, shoe polish, even tobacco juice—whatever he finds

that produces the most realistic look. He often paints with watercolor inks because he finds they yield the brightest and deepest colors without obscuring the wood grain. As a final touch, Smith may rub oiled hands over areas to give a piece a worn, aged or faded appearance. The result always provokes a close inspection to convince disbelieving viewers.

—Jim Clement, Seattle, Wash.



Photos: Fraser Smith



**Fabric that was carved, not sewn—Careful carving and coloring of basswood by Fraser Smith of Tampa, Fla., produced "A Stadium Blanket" that looks real (left). The natural-looking folds, wrinkles and sags in "Mr. Deets' Work Pants" (above) beg viewers to see if it's made of wood.**

## "They's Metal Lint Summers"

We'll probably be burning cherry firewood for the next five years as the consequence of an experiment conducted by Mother Nature regarding an irresistible force (a wild black cherry tree) and an immovable object (the covered deck on the back of our house). The results of the test

indicate that not only did the object move, but it moved quickly as it was transmogrified in the twinkling of an eye from treated #2 yellow pine beams, joists and girders to kindling. Or what would be kindling if it weren't treated.

The tree was unscathed, except it was lying, in its 80-ft. glory, on the ground. And on the deck. At its base, it was 44 in. across; the first limb was 27 ft. up, and at that point, the trunk had tapered to a 32 in. dia.

While waiting for the insurance adjuster to arrive, I realized that I should at least try to find some more useful purpose for the trunk than firewood. Even if someone had to cut it into 8-ft. sections to get it out, he should still be able to get three clear logs from the main trunk.

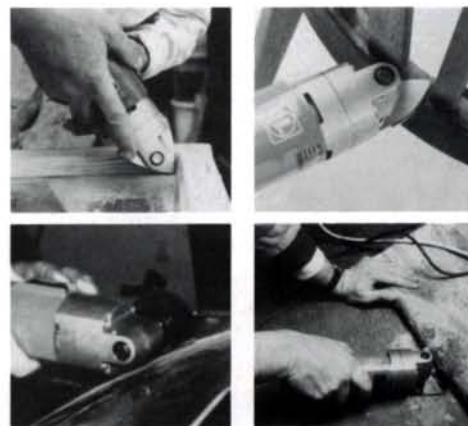
So I offered a nearby hardwood sawmill the trunk, either for free or in exchange for a small part of its contents. The sawyer listened to my story, thanked me for thinking



INDEX TO ADVERTISERS

A&I Supply	9	Furniture Designs	109	Oneida Air Systems	102
Abbey Tools	24	Furniture Medic	22	Panasonic Power Tools	40-41
Acme Electric Tool	115-117	GW Tool	48	Paxton Hardware	108
Adams Fine Woodworking	111	Garret Wade	25, 44	Performax	48
Adams Wood Products	5	Gatco Mfg.	9	H. H. Perkins	110
Ah-ha! Design Group	108	Gauge-It	13	Philipps Brothers	18, 23
Air Tool Systems	109	Gilliom Mfg.	44	Plaza Machinery	111
Amana Tool	37, 39	Gilmer Wood	113	Porter Cable	11
American Clamp	12	Gorilla Glue	13	Power Tool Specialists	104
American Coaster	109	Gougeon Brothers, Inc.	109	Powermatic Machinery	15, 102
American Woods	12	Granberg Intl.	109	<i>Practice of Woodturning</i>	42
American Workshop Series	111	Greenpoint Mfg.	111	Quality VAKuum Products	28
Anglewright	17	Grizzly Imports	2	Quicksand Constructionwear	18
Ashman Technical	108	Groff & Hearne Lumber	109	RBIndustries	125
Auton Co.	53	HTC Mobile Bases	17	RMC Mfg.	108
Aviation Supply	46	Handlogger	113	Red Hill Abrasives	109
Ball & Ball Hardware	31	Harbor Freight Tools	42	Ridge Carbide Tool	110
The Beall Tool Co.	108	JA Harchuck	10	Ross Industries	125
Berea HardWoods Co.	18	Harris Tools	128	The Roudebush Co.	108
Bethel Mills	17	Hartford Clamp	109	Rousseau Mfg.	7
Better Built	17	Hartville Tool & Supply	121	Ryobi	119
Blume Supply	31	Hida Tool	28	SECO	53
Bob Kaune Antique Tools	110	Highland Hardware	36	Sand-Rite Manufacturing	28
Bonhams Woodworking Supplies	17	Hirsch Carving Tools	108	Sandy Pond Hardwoods	110
Bosch Power Tools	17, 131	<i>Home Furniture</i>	19	Scherr's Cabinets & Doors	23
Boulter Plywood	44	Home Lumber	133	Senco	14
BRE Lumber	108, 110	Horton Brasses	34	Seven Corners Ace Hardware	50-52
Bridge City Tools	125	IFI Fasteners	7	Shaker Workshops	47
CFW Engineering	111	Imported European Hardware	102	Shapes & Surfaces, Ltd.	22
CMT Tools	21, 131	Incra Jig	133	Sunhill Enterprises	23
CP Tools	126	Injecta Machinery	118	Super Square	9
Carr Lane Mfg.	7	Integrity Micro Systems	23	Taunton Press	114 A-1
Carter Products	128	International Tool Corp.	39, 127	Talarico Hardwoods	108
Cascade Tools, Inc.	129	Japan Woodworkers	31	Technical Wood	47
Center for Furniture Crafts	111	JDS Company	53	Tepper Discount Tools	121
Certainly Wood	110	Jesse Jones Ind.	38	Terco	17
Classic Design	22	Jet Equipment	28	Timber King Sawmills	132
Classified	111-113	Jointech	47	Tool Chest Catalog	108
Clayton Machine	34	Kasco Sawmills	9	Tool Club	42
College of the Redwoods	109	Keller Dovetail System	48	Tool Crib of the North	115-117
Colonial Hardwoods	113	Kestrel Mfg.	109	Tools on Sale	50-52
M. L. Condon Co.	17	Laguna Tools	46	Tormek	12
Conover Lathes	10	The Landing School	110	Tried & Tue Oil Finish	110
Conover Workshops	111	Lane Import Co.	111	Unique Fasteners	109
Constantine	36	Laredo Tools	48	Univ. Rio Grande, Ohio	132
Craft Supplies U.S.A.	34	Leigh Industries	31	University of the Arts	110
Critter Spray Products	9	LeNeave Supply	121	Value Services	110
Crown City Hardware	108	Liberon/Star Finishes	110	Vacuum Pressing Systems	36
Custom Woodworking	111	Lie-Nielsen Toolworks	47	Vega	7
DML Sawblades	28	Lignomat, USA	18	Velvit Products	108
JB Dawn	108	Linden Publishing	109	Veritas Tools	44
Delmhorst Instruments	42	Lobo Power Tools	13	WCW Mesquite	108
Delta International	36, 48, 123	Mad Machinery	111	WGB Glass	102
Delta Point Machinery	118	Manny's Woodworkers Place	133	Wagner Electronic Prod.	37
Detroit Radiant Prod.	5	Marin Industries	5	Warren Tool Group	18
DeWalt Power Tools	26, 27, 31, 33, 43, 45	Marling Lumber	39, 125	Wayne's Wood	12, 121
Diamond Machining	23	Matlin Group, Inc.	18	Wesley Tool	44
Dust Boy	110	McFeely's Square Drive	38	West World Imports	111
Eagle America	48	McGrath Scribing Tools	110	Wetzler Clamp	110
Eagle Woodworking	108	Mercury Vacuum Presses	108	M. P. White Hardware	7
Ebac Lumber Drying Systems	47	Mesa Vista Design	111	Whole Earth	105-107
Econ-Abrasives	46	Micro Fence	118	Wilke Machinery	34
Electrophysics	7	Midwest Dowel	109	Williams & Hussey	37
Emmert Visers	112	Miller Woodworking	12	Winterwoods	113
Engraving Arts	109	MLCS	114	Woodcraft	14, 38
Enlon Import Corp.	25, 139	Moore Profiles	110	Woodcrafter's Supply	112
Fein Power Tools	137	New Age Products	108	Woodhaven	108
Fine Gold Leaf People	109	Niagara Lumber	113	Woodmaster Machinery	10
Firefly Books	5	Northland Woodworking Supply	42	Woodmizer Kiln	128
Florida Tool	37	Northwest School of Boatbuilding	108	Woodmizer Sawmill	34
Footprint Tools	109	Northwest Timbers	108	Woodworker's Hardware	132
Forrest Manufacturing	42, 103	NuResearch	110	Woodworker's Store	46
Franklin Ace Hardware	118	Nyle Dry Kiln	28	Woodworkers Source	9
Frog Tools	125			The Woodworking Shows	102
				Worcester Craft Center	109

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of him but declined the offer, explaining, "They's metal lint."

I nodded safely and reflectively while my mind raced: Putting aside who "they" were, what was "metal lint"? Suddenly it hit me. He was saying there was *metal in it*—a nail or spike—that would ruin his sawblade. So I assured him that this tree was in a ravine away from the house. "Yeah," he countered, expectorating a stream of Red Man, "but they's metal lint summers."

Well, I knew he was wrong. But I also knew that if you got into an argument with somebody from this neck of the woods, you ran the risk of him spitting tobacco juice in your eye—a painful lesson I learned years ago when I broke up with a cheerleader from the county seat.

So, while I stacked 426 cu. ft. of prime, clear cherry firewood, I at least had the satisfaction of knowing that I had tried to see it put to some better use. It wasn't my fault that the guy had declined the offer of a lifetime because he thought, "They's metal lint summers." What kept me from enjoying this feeling of smug superiority was the fact that there actually *was* metal in the trunk summers—I mean *somewhere!*

Several split-trunk pieces had the tell-tale black discoloration, and I (and the guy running the chain saw from the tree service) found at least three lag bolts in the trunk. Placed there, we guessed from the rings, some 30 or more years ago.

So a shorthand saying around our house for an offer that appears too good to be true is "They's proolly metal lint summers."

—David McWethy, Springdale, Ark.

Photo: Mark Salusbury



**Woodenware served up for wood symposium**—Mark Salusbury of Ontario, Canada, turned these five 10-in.-dia. maple plates for a conference. The plates were among 53 made by 18 turners. The plates were used to serve meals and were later sold at the event.

## Turned treenware highlights wood symposium

Treenware quietly stole the show at the annual conference of the Yale-Smithsonian Symposium Material Culture Study Group in late April. Organizers of "Wood: Timber, Transformations and Design," decided to provide turned wooden plates for serving meals (see the photo above). Ned Cooke, who coordinated the event, contacted Albert LeCoff, executive director of the Wood Turning Center, to obtain 53 plates. In four days, they had enough pledges to meet their treenware needs.

Turners included Andrew Barnum, Bonnie Klein, Robert Morelli and Alan Stirt.

"I watched people pick up those [plates] with the most brilliant figure and fine grain; then more people crowded about the table," said Cooke. And when he announced the plates would be sold at the end of the symposium, many participants left the last luncheon early to make sure that they could purchase "their" plate.

—Betty Scarpino, Wood Turning Center, Philadelphia, Pa.

## Chairs from Austin's historic Treaty Oak

Our day-to-day business is divided fifty-fifty between conservation of fine early pieces and making new furnishings to custom requirements. When I discovered the painting of Gen. Sam Houston seated in a magnificent throne-like chair, I immediately decided that this chair was an excellent candidate for a limited number of reproductions. While making the prototype, we heard the news that the Treaty Oak, a famous, 600-year-old tree in Austin, Texas, where an Indian treaty was signed, had been poisoned. Some pruning of limbs would have to take place.

I was one of more than 1,600 woodworkers who provided the city of Austin with ideas to make things from the wood. When the pruning took place, there were some very large limbs that were milled to

4/4 boards approximately 20 in. by 50 in. We selected three of these for some of the chair components. The chairs were joined entirely with mortise-and-tenon joints, except a blind dovetail on each end of the cross stretcher (see the photo at left).

Two Treaty Oak chairs were presented to the city of Austin and to the state of Texas on Oct. 23, 1993. One is to be placed in the Texas Capitol and the other in the City Hall in Austin.

—R.J. Simpson, Houston, Texas.

### Notes and Comment

Do you know something we don't about the woodworking scene in your area? Please take a moment to fill us in. Notes and Comment pays for stories, tidbits, commentary and reports on exhibits and events. Send manuscripts and color slides (or, black-and-white photos—preferably with negatives) to Notes and Comment, Fine Woodworking, PO Box 5506, Newtown, Conn. 06470-5506.

**Historic tree contributes to historic reproduction chair**—Wood from the poisoned Treaty Oak in Austin, Texas, was used by R.J. Simpson of Houston, Texas, to recreate two of these Sam Houston chairs.



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printing machine (near the window), to the stools, drafting tables and drawing tools, no detail is left out. Even through the window (see the photo at right), you can see scale models and blackboards like those instructors used. To learn about the room's maker and see it in scale, turn to pp. 134 and 136.

