

December 1998

No. 133

TAUNTON'S

Fine Woodworking

**3 bookcases:
three levels
of difficulty**

**Shop test:
tablesaw fences**

**What's new
in water-based
finishes**

Shop heating

**James Krenov
on using grain**

**Period trim
dresses up
dull windows**

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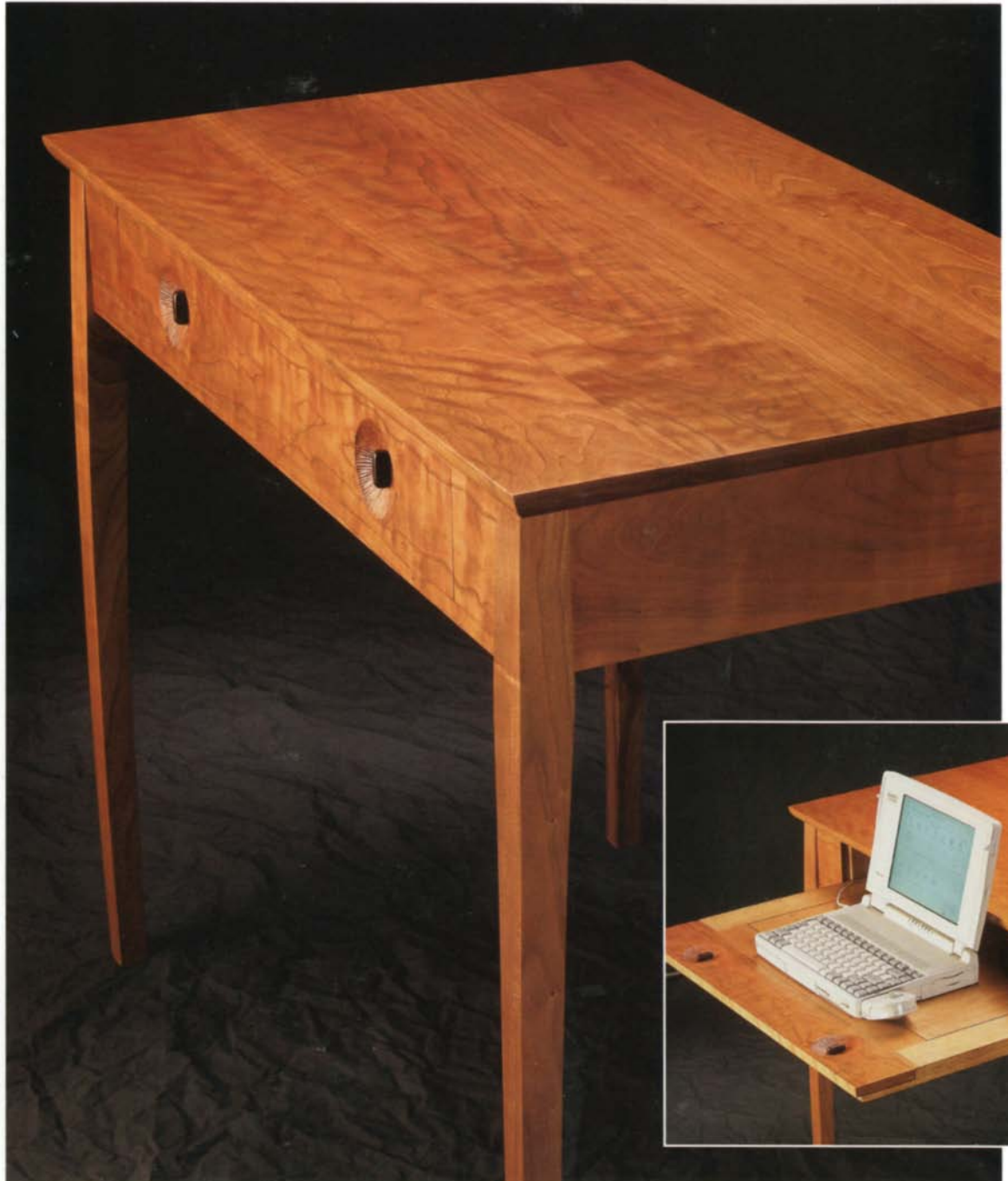


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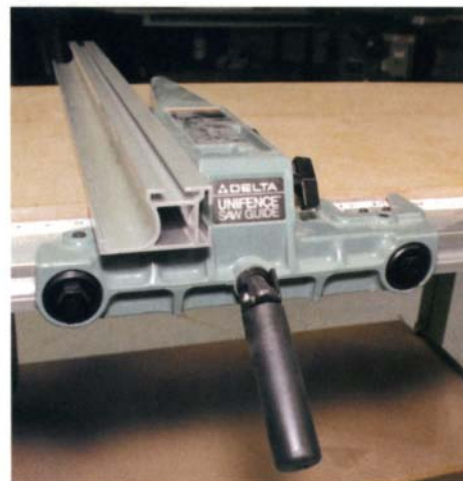
Stephen Lauziere's friend, a writer, needed a place to hide his laptop computer from his young children. So Lauziere designed and built for his friend a side table with a slide-out tray that houses the computer (see p. 58). Photo: Scott Phillips



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Contributors

James Krenov (Master Class) was born in Siberia to Russian parents, raised in Alaska and Seattle, and lived for 30 years in Sweden, where he studied under furniture designer Carl Malmsten. He has written four influential books on furniture making, including *A Cabinetmaker's Notebook*, and is working on a fifth. Since the early 1980s, he and his wife, Britta, have lived in Fort Bragg, Calif., where he teaches furniture making at the College of the Redwoods. On the tennis court, he deploys a nasty backhand slice.



Ian Agrell ("Carving Tool Tune-up") first learned carving while in the British army. After that, he spent many years working in London restoring antiques. He moved to the United States in 1988, but his work often takes him to different corners of the globe. Agrell's work can be found in Kensington Palace, the Vatican, cathedrals and the homes of the rich and famous. His workshop recently completed a 20,000-hour project restoring the wood and stone carvings at the governor's mansion in Utah, which was damaged by fire. Agrell teaches at The School of Classical Woodcarving in Mill Valley, Calif. His hobbies are cooking, gardening and sailing.



Robert W. Lang ("Take the Plunge") has been a professional woodworker since 1975. He was trained in wooden-boat restoration and commercial cabinetmaking. Along the way, Lang has worked on wooden jewelry and solid wood furniture and accessories. He currently builds cabinets and architectural millwork for Michael Matrk, Inc., a high-end renovation company in Columbus, Ohio.

Jim Barefoot ("Make a Comfortable Slip Seat") took a turn away from his original route toward becoming a professional woodworker. He decided to pursue a career in furniture design instead. He spent several years working for a number of large contract furnishings manufacturers before venturing out on his own as a freelance designer. He has given classes at the Anderson Ranch Arts Center in Aspen, Colo., and at the Center for Furniture Craftmanship in Rockland, Maine. He now works out of his home in Winston-Salem, N.C.



Stephen Lauziere ("A Laptop Computer Desk Doubles as a Side Table") lives in Ascutney, Vt., in a house high above the Connecticut River. He has made furniture since 1977. He spends four days

a week as a stay-at-home dad for his 2-year-old son Joseph. Much of the rest of the week he's in his basement shop, if he is not first tempted by the cold-water trout streams of northern New England. He ties an awesome Ausable Wulff.



Philip C. Lowe ("A Choice of Three Bookcases"), a professional woodworker since 1968, is the author of many FWW articles.

He is featured in the Time-Life series on woodworking and in several Taunton Press videos, including, *Measuring Furniture for Reproduction*. He was an instructor at Boston's North Bennet Street School from 1975 to 1985, the latter five as head of the furniture-making department. He now owns and operates a furniture-making and restoration shop in Beverly, Mass.

Ken Textor's ("Shop Heating Choices") woodworking experience includes building traditional sailboats, post-and-beam houses and barns, furniture and kitchenware, cabinetry and inlay work. At 47, he has written two books and been published by more than two dozen woodworking, boating and general-interest magazines. Having first attended college as a geology student, he is still wondering where he went wrong—or right, as the case may be.

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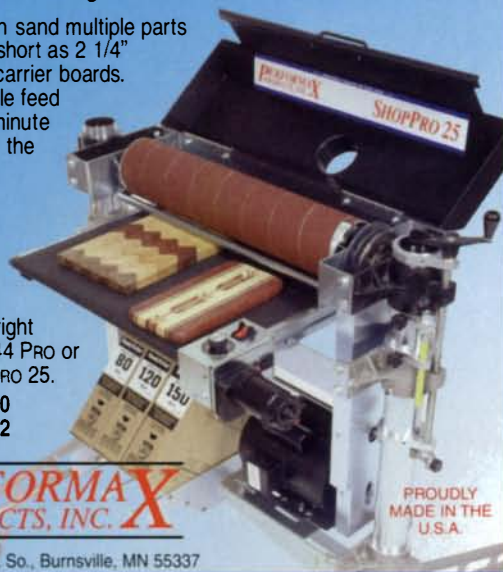
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Letters

Another surgeon; another woodworker—Orthopedist E. Jeff Justis (*FWW* #132, p. 24) is not the only surgeon to note the similarities between his vocation and avocation.

In my parallel careers as general surgeon and woodworker, I have sometimes borrowed from one to solve problems in the other. When recently faced with having to amputate a leg across a steel dowel identical to the one pictured in your article, I found it too slippery to grip and too hard to be cut by any of the manual or air-powered saws in our operating room. A quick call to the engineering shop produced a pair of heavy-duty locking pliers, which we promptly sterilized. After locking it on the protruding dowel after the bone was trimmed away, a sharp rap with a steel mallet on the pliers loosened it, and I pulled the dowel out.

His answer to “Why woodworking?” is the same as mine: It doesn’t bleed, and it doesn’t sue, but I always add that it never calls in the middle of the night.

—Robert M. Richter, M.D., Brooklyn, N.Y.

Not all boatbuilding requires a license—In the recent article on table-saw safety (*FWW* #132, pp. 84-89), author Howard Lewin says “you have to pass a test” to sail a boat. While this might be true in a handful of states and a few countries, it is a poor choice of an activity to compare. Indeed, one of the raging debates in the boating world is whether requiring licensing would make the sport safer. Having seen poorly trained operators endanger other people in many places, I have swung to favor licensing. I would not, however, favor licensing tablesaw operators, as one is unlikely to injure anyone other than oneself.

—James L. Woodward, Somerville, Mass.

Subscription cost is too high—I just received my renewal notice for your magazine. I am not going to renew, and I thought I would tell you why.

I think most of the articles are very good, and I even like much of the changes you are making in the layout and subject matter. But I don’t think the cost of your magazine is justified, as it is becoming more and more of an advertising vehicle.

In a recent issue, one-third of the pages contained advertising. I don’t feel I need to pay that kind of money to read more ads each month. I do read ads as a means of keeping up with what is new, but I shouldn’t have to pay so much for the privilege of doing so. —Robert L. Renear, Vineyard Haven, Mass.

Keep caliber of projects high—I have enjoyed your publication for many years now. And although your publication is always a first-class magazine, I have to agree that the content has become rather basic in its scope. In prior years, your material was far more consistently geared toward the higher levels or standards of woodworking. I miss the higher caliber of projects covered and reviewed. What has made you stand out has been the quality of the projects presented. Set the higher standard that so many of us are striving for. —Ron Nelson, Carrollton, Texas

A prickly bunch?—I just finished going through your August 1998 issue (*FWW* #131), and the continuing debate over your editorial changes rages on. I would just like to weigh in and agree with those who generally enjoy the inclusion of some basics in the diet.

You stand on a particularly slippery editorial slope, so I figure you must have had some significant internal skirmishes to bring about change. As readerships go, you also have a pretty prickly bunch.

All the same, I feel that more of the content is within the grasp of a mortal like me. Yet there’s still a healthy dose of “woodworker porn,” as my wife unsympathetically calls it. (“What’s this month’s back page girl?” she always asks. “Ooooh, ‘A bench that cranks!’” In fact, she’s leering over my shoulder right now sing-songing, “Dear *Fine Woodworking*, I never thought this would happen to me, but ...”)

Anyway, this is meant as a sympathetic note, as you will never attain unanimous praise.

—David Benjamin, Melbourne, Australia

Give us some difficult projects, some not so difficult—I have collected more than 30 different woodworking magazines over the last few years. *Fine Woodworking* is very well written, easy to

understand and full of pictures and drawings that are a joy to look at.

I started woodworking only at the age of 40. But with a very patient teacher who had more than 65 years of woodworking experience, I have learned to appreciate many of those wonderful old, and not so old, hand tools. Needless to say, I subscribe only to your magazine.

I suggest you give us a few projects that are a bit more difficult and a few that are less difficult, leaving the decision up to the reader. He or she will have to decide how to achieve it best according to their ability. Just keep up your excellent work and your high standards.

—William Neugebauer, Cape Town, South Africa

I like it, but less—I am renewing my subscription to *Fine Woodworking*, although I do not enjoy it as much as I used to years ago. Back in the days when it was more of a craft publication and less of a how-to magazine, I was far more interested in it. Yes, it is tough to be all things to all people. Why can’t *Fine Woodworking* go back to its roots?

—Gary Van Rheenen, Pella, Iowa

Last issue was an improvement—

After issues #130 and #131 (June and August, 1998), my neighbor and I were discussing the demise of the only true woodworking magazine left. But issue #132 (October 1998) returned to the true *Fine Woodworking* magazine I have enjoyed since my first issue, #23. Please don’t change. Thank you.

—Robert V. Ratts, Bedford, Texas

Smaller grit sometimes necessary—

The article by Chris Minick, “All good finishes begin with sandpaper” (*FWW* #132, pp. 116, 118), states that “sanding bare wood past 180 grit is usually wasted energy.” I turned an Osage orange bowl that split slightly on the bottom and raised

Writing an article

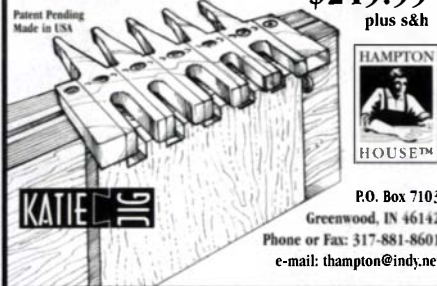
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Letters (continued)

slightly on one side of the split. The 320-grit paper that I sanded it down with left visible scratches. I finally had to use 400 grit and then 600 grit to remove them. Sometimes finer grits are needed.

—Henry Fisher, Columbus, Ohio

Finishing technique worked great—

Thanks to Brad Lewis for his tip in Methods of Work (FWW #131, p. 14) on knockdown stands that make it easier to put finish on doors. I am currently refinishing all of the doors in my house. His method is great for applying the finish. However, you still need a sturdier table or support for the sanding prep work.

—Mark Thompson, Indianapolis, Ind.

A better winding stick needed—

In Gary Rogowski's article on milling lumber (FWW #131, pp. 56-61), he uses a 1x2 piece of wood as a winding stick to test

whether another piece of wood is straight. A board that small could move and become twisted. A similar method would be to use a factory edge of a strip of plywood, then rough-cut it on the bandsaw and clean it up with a router and a bearing-over, flush-cutting bit.

—Dan McGuire, Pemberton, B.C., Canada

Use technical words correctly—In the piece "Hand-sanding block uses belts made for power tools" in your Tools & Materials department (FWW #131, p. 36), you use the word "detent" incorrectly. The article says, "Detents on the tool's edge make for a comfortable grip." This is a lapse in your usually excellent editing.

A detent is a catch mechanism, something that stops a moving part temporarily at one point in its travel. The word you ought to have used is "groove."

Reading further in the issue, I see that some excuse can be made for the misuse of the word, because David Ashinghurst (pp. 76-78) talks about screwdriver bits "with a detent on the end of their shafts." I think the word here ought to be "cove." The detent is the catch mechanism that holds the bit in the chuck, and the cove is only part of that mechanism.

That the shape of the cove on the end of a driver bit has broadened the misuse of a word such as detent to mean the grip on a sanding block is understandable. However, your magazine has a reputation of being a reliable source of technical and practical information. Misusing a technical-sounding word in place of a simple, clear and correct word does not enhance that reputation.

Part of learning a craft is acquiring and correctly using the vocabulary associated with that craft. To retain your status in the

woodworking community, you have a responsibility to use the vocabulary correctly.

—Doug Peterman,
Victoria, B.C., Canada

No wonder woodworking is healthy in America—I came across your magazine for the first time today. I was shocked by the advertisements. By that I mean the low prices and the selection available in your country.

It is clear from the ads that prices in your country are about half what they are in England. Machinery is not exactly the same, but the wide selection of jointers and planers available to you is noticeable. Prices of lumber—we call it timber—are as ridiculous. Now at least I can understand why amateur woodworking is flourishing on your side of the pond and is dying here in England.

I obviously wasted an opportunity last year while touring your West, where I could have saved myself a pile of cash by investigating local tool shops.

—John Crosby, Milton Keynes, England

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Special-interest publisher seeks a technical journalist to join the *Fine Homebuilding* magazine staff. The successful candidate will have a strong aptitude for working with the written language and several years' experience in building or remodeling houses. Photographic skills and drawing ability are pluses. Travel required. We offer a competitive salary, excellent benefits and pleasant work environment. Send letter and resume to:

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—Timothy D. Schreiner, editor

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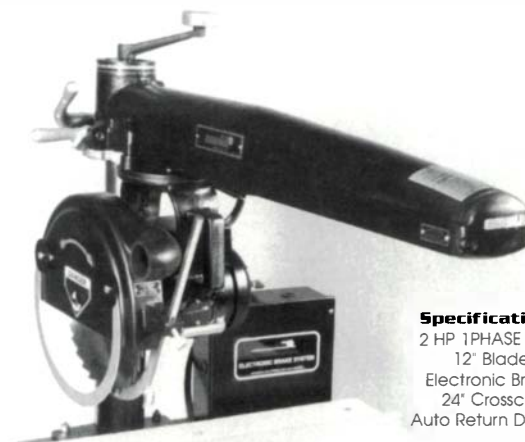
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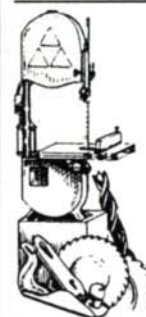
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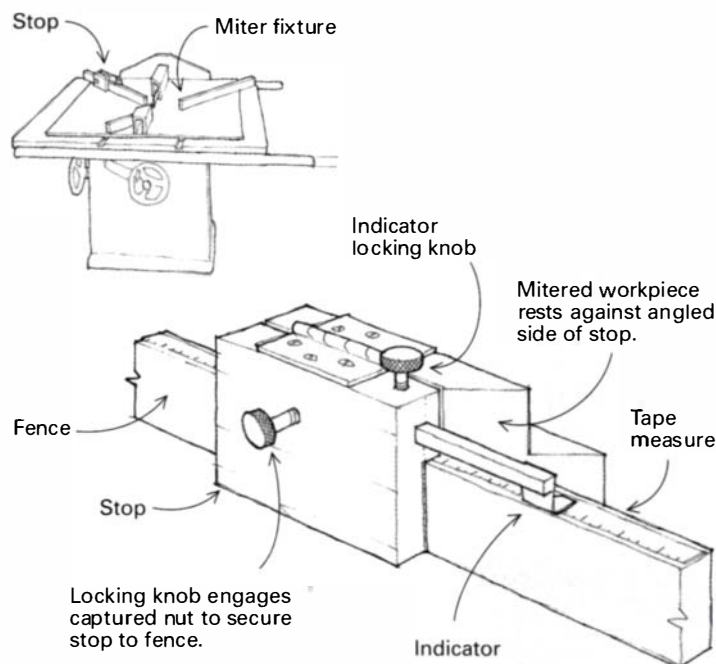
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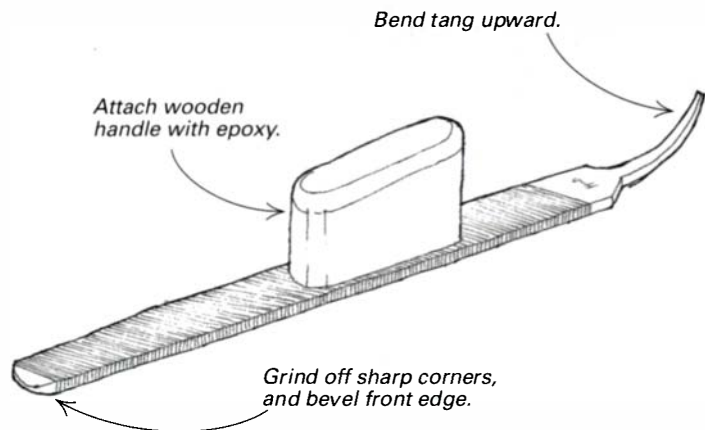
Miter fixture for cutting moldings



This tablesaw miter fixture has an adjustable stop to cut picture frames and other moldings simply and quickly. The fixture itself is fairly standard with rails on the bottom that run in the miter-gauge slots, fences set at 45° angles and blade guards. The stop has an adjustable indicator that runs through the body of the stop. With the indicator, I can adjust the length of the cut to account for the width of the frame pieces plus clearance for the glass. Once this extra length (for any given frame material) is set into the indicator, I slide the stop along the fence and clamp when the indicator points to the actual size of the artwork. A tape measure on the fence makes it easy to read dimensions.

—James R. Thomson, West Vancouver, B.C., Canada

Smoothing tool



A flat file is a good tool to smooth a wooden plug or an errant nail tip that projects from the flat surface of a woodworking project.

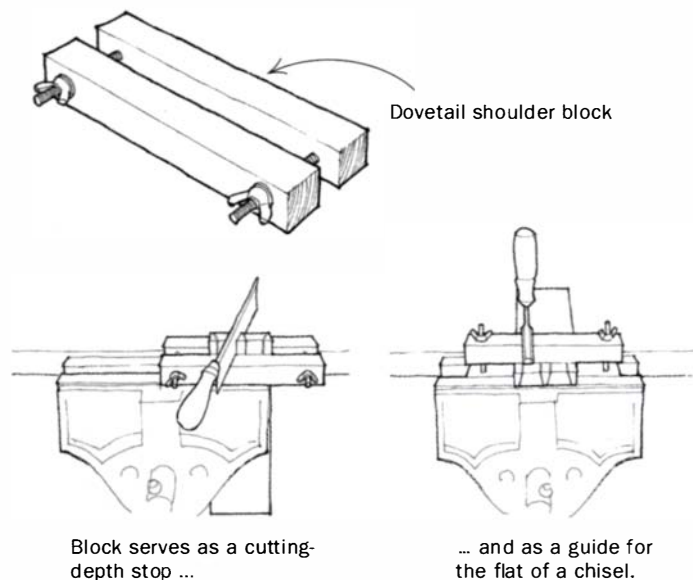
But a file is often awkward to use in this situation, and the sharp corners scratch. So I modified a file for this application by bending the tang upward, rounding off the sharp corners and gluing, with epoxy, a small wooden handle to the top of the file. It works great.

—Howard E. Moody, Upper Jay, N.Y.

Quick tip: Floral designer's foam, that green stuff they stick flowers in, makes a great storage system for router bits. Simply cut a block whatever size you want and press the shafts of the bits into the block. The holes are clean, and this material seems to prevent rust on the shafts of the bits.

—Jeffrey N. Sales, Tucson, Ariz.

Shoulder block for hand-cut dovetails



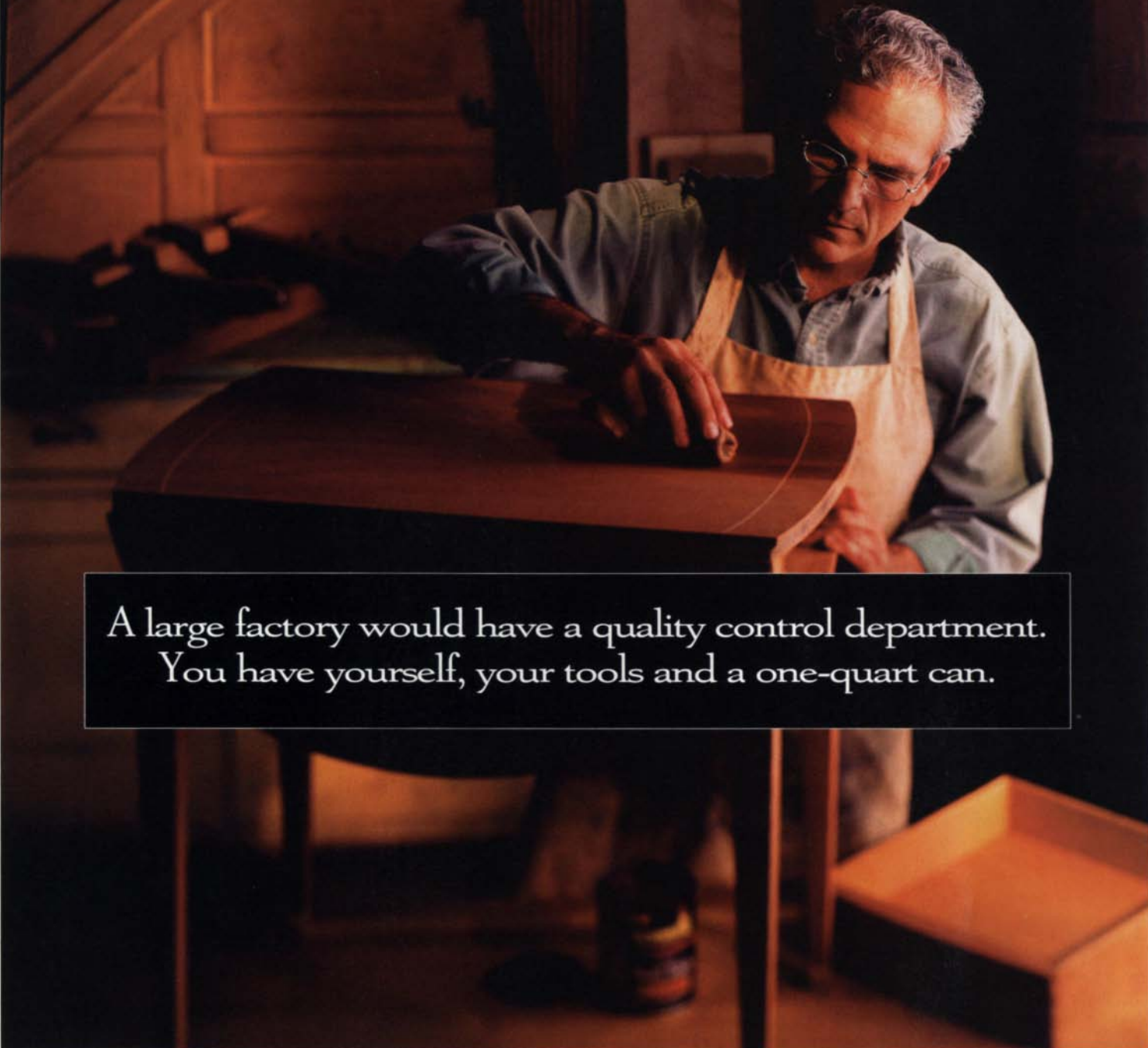
This simple little shoulder block is not my idea, but I've adopted it and now have several different sizes for different situations. To make the block, start with two 1¼-in.-sq. sticks of hardwood, about 4 in. longer than the widest dovetail you normally cut. Drill through the ends and install carriage bolts and wing nuts, as shown in the sketch above.

To use the block after you've marked out the pins, carefully tighten the block on the workpiece at the base of the pins. The shoulder block serves two purposes: as a cutting-depth stop and as a chisel guide for removing the waste.

With the block in place, simply saw the pins until the blade touches the block. After sawing, clamp the block and workpiece in a wood-faced vise, lay the chisel's flat side against the block and begin tapping away the waste. The block will guide the chisel up to the line. This shoulder block is also useful for paring the shoulders of tenons and cleaning up through-mortises.

—Len Crane, Basin View, N.S.W., Australia

Quick tip: To embellish one of your wooden creations with a name, initials or numbers, use dry-transfer lettering sheets, commonly available at art supply stores. Simply place the transfer sheet on the workpiece and rub the back of the sheet to transfer the letter. The method I prefer is to seal the wood with a coat



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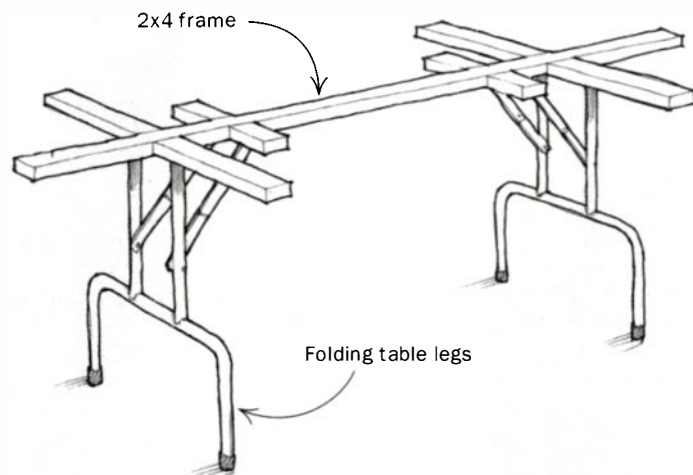
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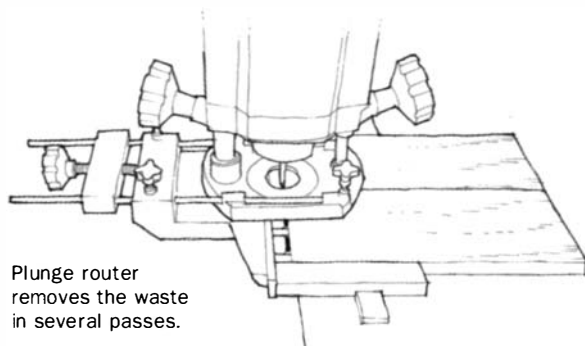
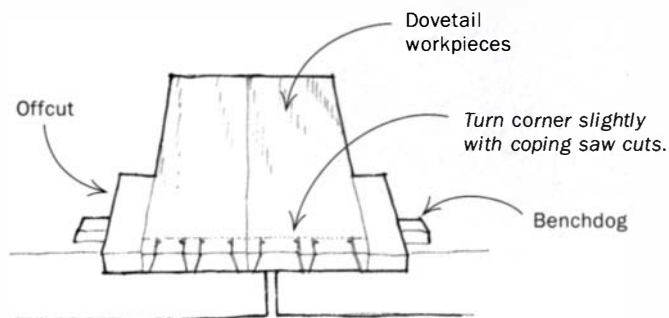
of varnish, apply the letters, then add another coat of varnish to protect them. —*H. Norman Capen, Granada Hills, Calif.*

Folding sawhorse



Conventional sawhorses never seemed to fit my needs. So I made a skeleton table frame from 2x4 stock and attached metal folding legs, offsetting each pair so that they would both fold up flat for storage and transport. This table frame will support an entire sheet of plywood. And in a pinch, you can use plywood to turn this set-up into a worktable. —*James E. Taylor, Brevard, N.C.*

Removing dovetail waste with a router



Using a chisel to chop out the waste between dovetail pins and tails is both tedious and time-consuming. So I speed up the operation by using a router fitted with a fence and a small-diameter

bit. This technique works especially well with large dovetails.

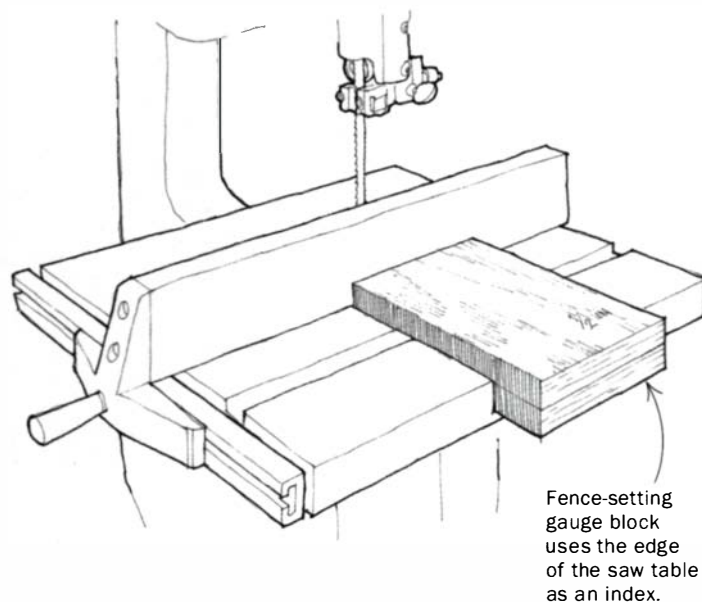
To use this technique, lay out and cut the pins first. With a coping saw, turn the corner slightly at the bottom edge of the waste piece. This will allow the waste to drop out cleanly when routing. On the edge of the bench, sandwich two workpieces between two offcuts of the same thickness and clamp them all together with benchdogs. Orient the workpieces so that the widest part of the pin is up; otherwise, you'll cut off part of the pin as you plunge through with the router.

Set up a small plunge router with a fence so that the bit cuts exactly on the line. Plunge through the waste starting as near to the dovetail sawcuts as you dare. Do this in as many steps as required, nibbling away a small amount at a time. To complete the joint, chop out the corners left by the router with a wide chisel, guiding the chisel on the flat areas removed by the router.

—*Richard Jones, Houston, Texas*

Quick tip: An X-Acto hobby knife, the one with the larger, red plastic handle, makes a perfect marking knife. Blades are replaceable and held rigidly in the chuck. The knife is inexpensive and can mark light or heavy lines. —*Anthony Guidice, St. Louis, Mo.*

Fence-setting gauge block



When I found myself setting the bandsaw fence to the same resaw setting again and again, I figured there must be a better way. Now I avoid the time-wasting exercise of measuring from the blade to the fence, starting the first cut, shutting off the saw to check my measurement, adjusting the fence, taking another test cut, and so on. I use simple gauge blocks made from scraps of $\frac{3}{4}$ -in. plywood.

To make a gauge block, set and lock your fence exactly where you want it. Cut and clamp two plywood strips, 2 in. wide, so that the top strip butts against the fence, and the bottom strip hooks the edge of the saw table. Glue and screw the pieces together. Mark the measurement you're using on the gauge block, and you'll be able to return to the same size cut every time, with ease. Also, you can use this same concept on your tablesaw by modifying the de-

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330	speed block finishing sander	67
332	Quiksand 5" rndm orb w/stikit pad	58
333	Quiksand w/hook & loop, dustls	64
333VS	5" var. speed Quiksand ros, dstls	84
352VS	3" x 21" belt sander dstls w/var sp	174
360	3" x 24" belt sander w/dust bag	213
360VS	3" x 24" belt sander, vs with bag	228
362	4" x 24" belt sander w/dust bag	222
362VS	4" x 24" vs dustless belt sander	236
505	1/2 sht fin sander	138
556	bisc joiner w/case & tilt fence	134
557	deluxe plate joiner kit	197
690	1 1/2 hp router	138
691	1 1/2 hp "d" handle router	159
693PK	1 1/2 hp plunge router, fixed base, cs	194
693PKD	693PK w/D, fixed & plunge bases	242
697	router table with 1 1/2 h p motor	232
698	router table only	134
6931	plunge router base	82
7116	new 24" omnijig	308
7336	6" random orbit var. speed sander	142
7518	3 1/4 hp fixed base router-5 sp	288
7539	3 1/4 hp plunge router-5 speed	289
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9444VS	Var. speed profile sander kit	111
9543	Quick-Change bayonet saw kit	159
9862	12v cordless kit w/2 batteries, case	152
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1615EVS	3 1/4 hp plunge router	298
1617	1 3/4 hp router	158
1617EVS	2 hp electronic var. speed router	179
1618	1 3/4 hp D-handle router	169
3107DVS	5" random orbit sander with case	114
3294EVS	in line grip jig saw	122
3315K	12v cdis t handle w/2 bat, cs & chrp	158
3615K	14.4v cdis drill kit w/2 batteries	174
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3727DVS	6" dustless vs random orbit sander	148
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DW991K2C	14.4v drill & recip saw combo kit	372
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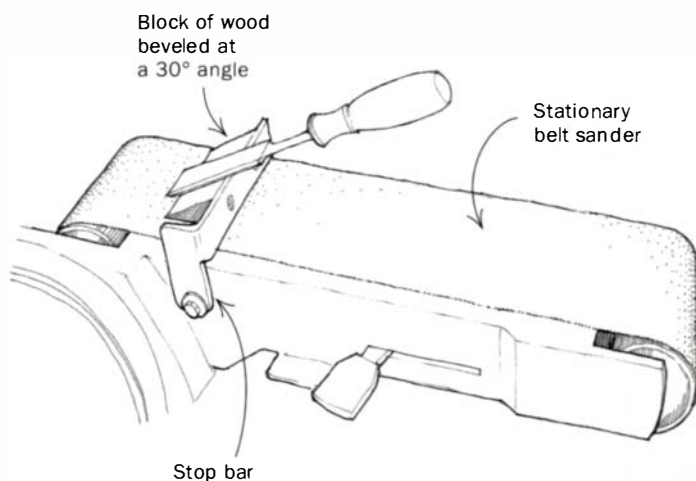
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Methods of Work (continued)

sign slightly so that the gauge block pops right into one of the miter-gauge slots.
—Bob Gleason, Hilo, Hawaii

Sharpening jig for a stationary belt sander

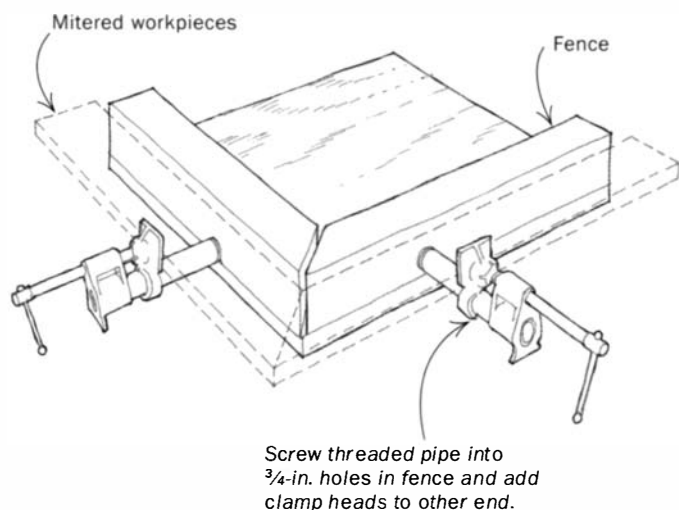


To sharpen chisels and other tools, I screwed a small 30° block of wood to the back side of the stop bar on my stationary belt sander. I use a 220-grit belt and make sure the back of the tool is flat against the block when I press the blade against the moving belt. The longer belt on the stationary machine helps prevent overheating and softening the edge of the tool.

Because I grind most of my tools at 30°, I usually leave the block at that setting (it does not interfere with the normal use of the sander). But if I need a different setting, I can loosen the stop-bar attachment and pivot the block to any angle between 25° and 40°. One thing to remember: If you have a dust collector connected to your sander, disconnect it when sharpening tools. The sparks could start a fire.

—Bob Kelland, St. John's, Newfoundland, Canada

Vise for clamping miters



Faced with the need for clamping up miters in large stock, I made this miter vise with a piece of Baltic-birch plywood, a couple of

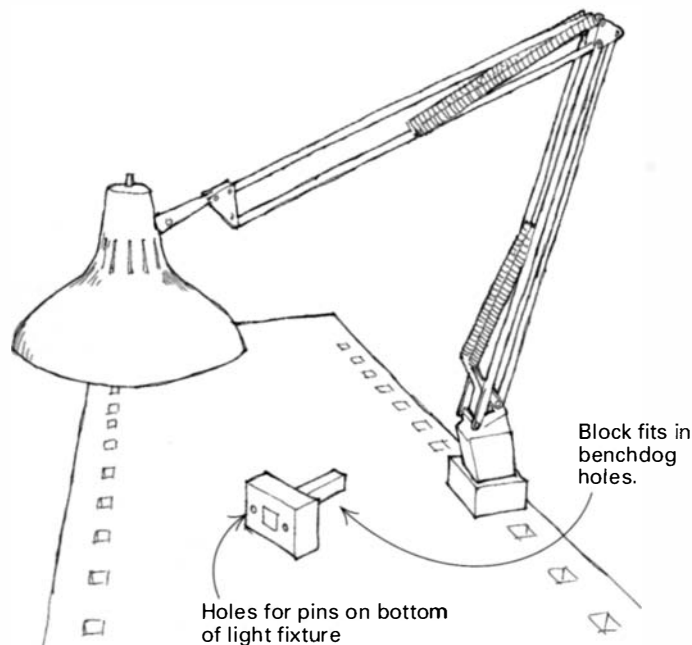
blocks of hard maple and two pipe-clamp heads. To make the fixture, drill 3/4-in. holes through the maple blocks. Miter the ends of the blocks and glue and screw them to the plywood base. Make sure they are square to each other and leave a slight gap between them at the miter. Thread 3/4-in. black pipe into the holes. (There's no need to tap the wood first because the threads on the pipe will cut female threads into the maple. A pipe wrench and wax will help with this step.) The length of pipe you choose can vary according to the width of the stock you will be clamping. I used 5-in.-long pieces. Screw the pipe-clamp heads onto the protruding pieces of pipe to complete the vise.

—Eric Derry, St. Louis, Mo.

Quick tip: The mildly abrasive nature of baking soda can be useful in the shop. Mix the soda with water to form a thick paste that will clean router bits, sawblades and saw tables. Scrub the item with the paste, wipe away the residue and then dry and buff.

—R.B. Himes, Vienna, Ohio

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—Frederick Wilbur, Lovington, Va.

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



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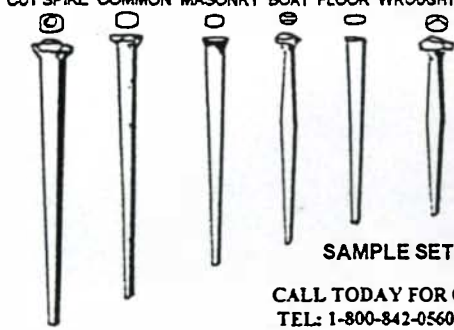
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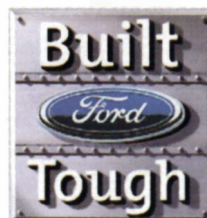
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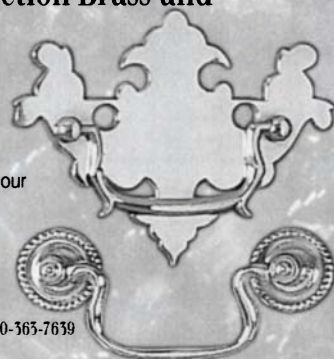


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18V



Lee Valley and Veritas® Tools bring you a selection of Christmas gift ideas from their full-color, 252-page catalog.

A. Veritas® Sliding Bevel

We got the germ of the idea for the cam locking mechanism on this sliding bevel from a turn-of-the-century model. We improved it substantially, making a better mechanism of bronze (using the lost-wax process), combining it with a 10" stainless-steel blade and housing both in a resin-impregnated wood body; it could be used under water without damage. The obvious benefit of this design is that the locking mechanism is completely flush, allowing the bevel to be used on either side. But more important, it can be used in the most restricted places since the lever cam lock can be operated with a single finger. You can reach way back into a corner to measure angles. Since the locking mechanism operates by compression with no rotary movement, accuracy is perfect. This is the best sliding bevel design on the market.



Bevel has a quick-release locking mechanism.

FW465 10" Sliding Bevel

\$19.95

Stainless Insulated Mugs

Insulated and indestructible, these stainless-steel mugs function much like a vacuum bottle. The double-walled construction prevents rapid temperature change of contents. They will keep coffee hot and, possibly more important, keep cold drinks from perspiring, which can ruin a table finish (or leave a rust ring on your table saw or jointer bed). Even better, if you knock one of these off the bench, it won't break. The 10 oz coffee-mug style and the 15 oz stein are fully polished. The 20 oz travel mug has a satin finish and a rubber ring base. The low center of gravity defeats most attempts at tipping. All mugs come with a plastic lid that has an O-ring seal. These mugs will quickly become favorites.

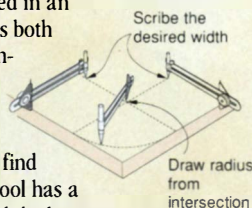


Double-walled construction

- B. FW429 Stainless 20 oz Travel Mug \$16.95
- C. FW427 Stainless 15 oz Stein \$14.95
- D. FW425 Stainless 10 oz Mug \$10.95

E. Veritas® Carpenter's Gauge

The Veritas® Carpenter's Gauge was specifically designed to be carried in an apron or pocket. It is both a direct-reading compass and a marking gauge, two things that carpenters frequently need but find hard to carry. This tool has a rotatable head, which locks

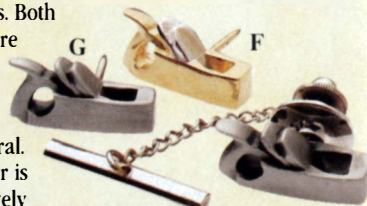


vertically for use and horizontally for storage and tip protection. It is direct reading, both for radius and diameter, in inches and centimetres. It is useful in a cabinet shop because of the direct-reading feature, which substantially reduces errors, as well as for the fast corner radiusing. Made of brass, stainless steel and high-impact ABS, it is 7½" long overall, and will scribe circles up to 12" diameter. FW414 Carpenter's Gauge \$14.95

Tie Tack/Lapel Pin

These tiny planes (made by the lost-wax process, a classic way of making jewellery) are from a model made by Paul Hamler. Paul is a superb craftsman who makes limited runs of miniature tools for collectors. Both

planes are solid pewter. One is left natural. The other is successively plated with copper, nickel and, finally, 22-carat gold with the blade and wedge rhodium plated for a bright silver color. Each pin comes with a backing clasp that can be used as a tie tack with chain and bar, or as a lapel pin without the chain and bar. Pins come in a small, velvet-finish presentation box. This is a classy gift for any woodworker. About ¾" long by ⅜" high.



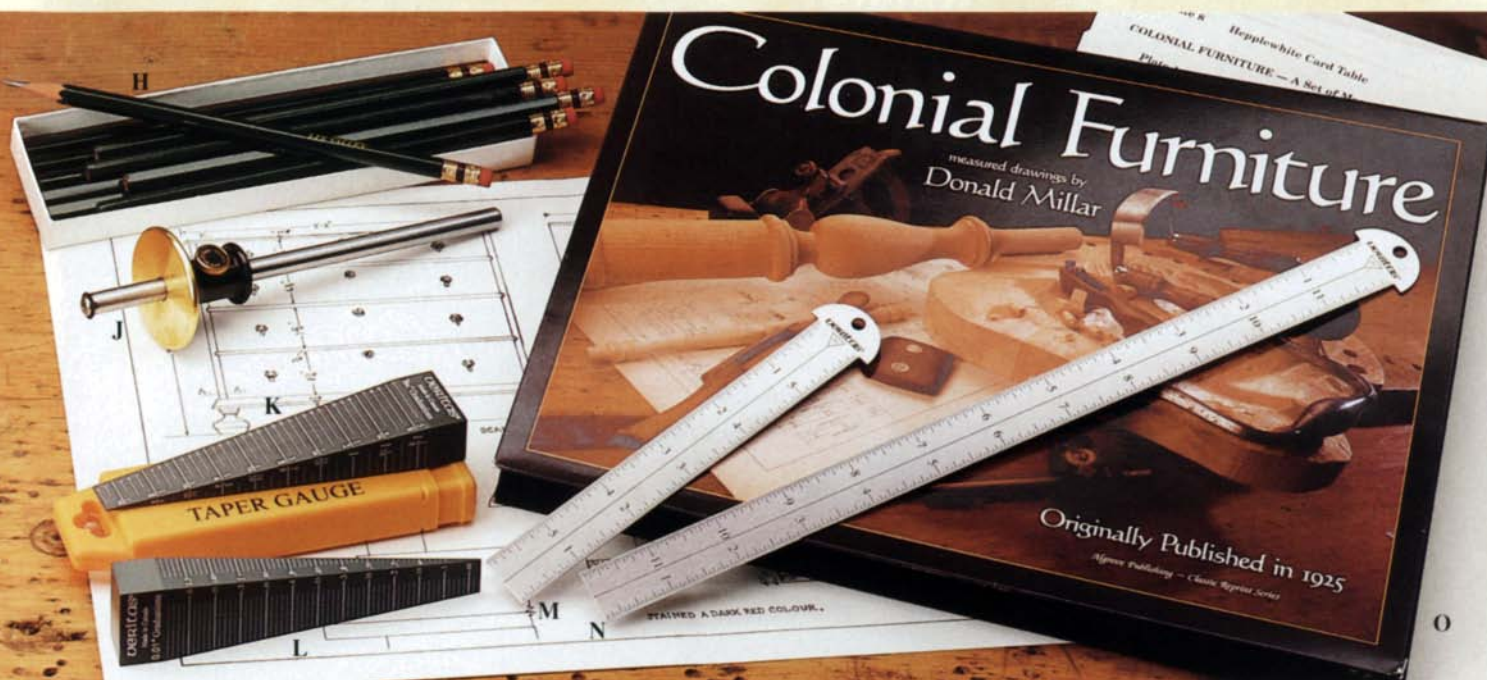
- F. FW430 Tie/Lapel Pin – Gold Plated \$7.95
- G. FW431 Tie/Lapel Pin – Pewter \$7.95

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H. Lee Valley Pencils

Many years ago you could buy decent pencils, but today, even some of the well-known brands are of dismal quality with rubbery wood and gritty gray graphite. Lee Valley pencils are made in Tennessee in the traditional way with incense-cedar bodies and refined graphite leads that are silky smooth and black. Not only are they easy to write with, but the light, stiff cedar body keeps the lead in one piece. Since you may have forgotten the luxury of different lead hardnesses (a 2B writes like a Belgian chocolate tastes), we offer a six-pencil sample pack with one each of 4B, 2B, B, HB, H, and 2H.

FW410 Sample Pack of 6 Pencils **\$1.75**
Box of 12 Pencils: **\$3.50**

FW401 4B Pencils **FW404** HB Pencils
FW402 2B Pencils **FW405** H Pencils
FW403 B Pencils **FW406** 2H Pencils

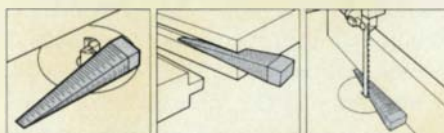
J. Veritas® Wheel Marking Gauge

Avoid the shortcomings of standard pin marking gauges. Our marking gauge will perfectly scribe at any point of its circumference. Since the hardened steel wheel is both sharp and bevelled only on the inside, it cuts through grain and forces the gauge face against the stock, maintaining accuracy. It cuts rather than tears and leaves a clean mark, even on cross grain. The gauge is easy to set since it has an internal O-ring to keep light but constant friction on the stem. The anodized aluminum head has a 1/8" thick brass face and a brass thumbscrew.

FW420 Wheel Marking Gauge **\$18.95**

Veritas® Tapered Gauges

A tapered gauge gets its accuracy by effectively stretching any scale for accurate reading. These stretch the standard scale by a factor of seven. When a thickness difference of 1/8" is stretched over 7/8" of the scale, small differences in thickness can easily be measured with fine accuracy. The aluminum gauges can be used many ways



Router – Setting height of router bit
Joinery – Measure groove for tongue thickness.
Bandsaw – Check fence setting.

– for setting fences, router bits and drill-press stops, as well as making any gap easy to measure and, therefore, easy to fill – if you happen to be repairing work. All are hard anodized, a process that makes the surface as hard to scratch as tool steel, yet leaves it easy to write on with a pencil. In most uses accurate to ±0.002", they are guaranteed to have no greater error than 0.005" in any measurement. Simple, effective tools in the scale of your choice – fractional in 1/64" graduations, decimal in 0.010" graduations, and metric in 0.2mm graduations. All have fine tips (1/32" thick) and measure up to 1 1/8" (or equivalent) thickness. Case included.

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FW452 Tapered Gauge – Metric **\$19.95**
FW455 Tapered Gauges, set of 3 **\$52.00**

Veritas® Hook Rules

Hook rules have always been popular in woodworking since they are handier than either tape measures or standard rules for most cabinet work. These hook rules are stainless steel with a matte finish and have ground edges.

The 6"/15cm Imperial/metric rule is graduated in 32nds on one face and millimetres on the other. Both the hook and free end are zeroed on each face. The 12" Imperial rule has one face zeroed at the hook end, the other at the square end. It is graduated only to 16ths for easier reading and fewer errors. The clutter of fine graduations can make a rule very difficult to read in shop light. Your eye is a fine instrument and can easily do the interpolation that will bring you to an accuracy of 0.010".

M. FW474 6" Imp./Metric Hook Rule **\$ 9.95**
N. FW473 12" Imperial Hook Rule **\$11.75**

O. Colonial Furniture

measured drawings by David Millar

These measured drawings were made from museum-quality pieces. Forty-nine items are on 31 plates, each measuring 10 3/4" x 16 1/2", all folded with file headers showing and presented in an accordion storage dossier. The range is considerable but it leans heavily to chairs (11), tables (6), cupboards (5), chests (4), desks (4) and chests of drawers (3). The plates contain all the information needed to build each piece, often having as many as ten drawings per plate. Printed on acid-free 80 lb stock. Published under our Classic Reprint Series; originally published in 1925.

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Notes & Comment

A tool for hitters

On June 19, *The New York Times* ran a story on the Sam Bat, a rock maple bat that's handcrafted by Ottawa woodturner Sam Holman. Although nearly all the bats used in the major leagues are made from northern white ash (almost 70% are Louisville Sluggers), Holman's maple bat has begun to win converts, not the least of which is Baltimore Orioles heavy hitter Joe Carter, an outspoken Sam Bat evangelist. In the *Times* article, Carter claims that with a Sam Bat, he "can get just as good a wood and use a lighter bat." Holman's denser, sleeker, tighter-grained maple bats have a 2¼-in. barrel, compared with the 2½-in. barrel typical of ash bats, "so you're not pushing as much wood through the air," says Holman. "That's bat speed. That's an edge." Maple bats also last longer than ash bats, about a month. In the majors, ash bats last about a week.

Though currently the only one turning maple, Holman is just one of about 20 smaller manufacturers that supply bats to major league players. When designated hitter Geronimo Berroa hit 36 home runs for the Oakland A's in 1996, he hit 31 of them with an ash bat made by Barnstable Bat Co. in Cen-

terville, Mass., on Cape Cod. Thomas Bednark started Barnstable in 1992 as an outgrowth of his architectural millwork operation. Bednark says he can make a thin ash bat with the density of rock maple simply by starting with a heavy billet (ash billets vary by as much as 2 lbs.). When Bednark turns a big, long bat for the likes of Mo Vaughn, however, he needs to use a light billet so that the long bat won't be too heavy.

With two automated copy lathes, Barnstable turns out almost 8,000 bats a year, 25% of them headed for the majors. The key to a great bat, according to Bednark, is good wood and precision. "You can feel a difference in diameter of 1/20,000 in.," he says, "your hands are that sensitive."

The upside, if you think you'd like to try turning a pro bat: "Basically, if you had a lathe in your garage and made bats, as long as they were solid one piece of wood, weren't synthetic or glued together and complied to the sizing requirements, they would get approved," says baseball's director of operations, Bill Murray, in the *Times* article. The downside: Try convincing a superstitious, tradition-bound, major-league slugger to swing your bat instead of the one he's used all his life.

Turn it, and they will come.
Quite a few pros have switched to Barnstable Bats, along with legions of amateurs who appreciate the personalized touch.

Wanted: A few good chairs

The Southern Highland Craft Guild is seeking applicants from the United States for The Chair Show III, its third biennial competition of handmade chairs, on exhibit from Sept. 5 to Nov. 14, 1999, at the Folk Art Center in Asheville, N.C. The show, open to chairs of any style and in any medium, will be juried by three design and craft professionals: Kenneth Trapp, Martha Connell and Bob Trotman. For a prospectus, call (828) 298-7928, or send e-mail to shcg@buncombe.main.nc.us. The deadline for submissions is March 15, 1999.

Wood Webs

Need somewhere to go on a rainy day (besides your shop)? Visit the Museum of Woodworking Tools at www.antique-tools.com. According to the museum's curator, Robert Mathison, the site (or, rather, the museum itself) has just completed an 18-month expansion. If you've visited before, you might want to return for another look. You can visit a mini-exhibit, a featured exhibit and the permanent collection. There's also a museum store and a chat room. You could spend the better part of an hour tooling through an exquisite exhibit titled Iron Side Rabbet Planes (1860 to 1938) in the permanent collection.

Got a woodworking question? Ask fellow woodworkers at Knots, which is the discussion board at *Fine Woodworking* online (www.taunton.com). An example of how it works: On June 28 at 12:04 p.m., Erik Sweet posted a message looking for plans to a scale Viking ship. At 3:40 p.m. the same day, Russell S. Floyd replied, suggesting a Web site to visit. A few hours later, someone recommended an article from *WoodenBoat* magazine. And at 3:16 a.m. on June 29, just 15 hours after Sweet posted his message, Kjell Stokkeland responded from Norway with the Web address of a center for Viking ships run by Ragnar Thorseth of Aalesund, famous in Norway as a builder of full-sized Norse vessels.

Found any interesting woodworking Web sites? Send the Internet address to mvassallo@taunton.com.

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A 70-year-old Soviet secret

It seems the remains of Czar Nicholas and his family are not the only old bones to resurface recently in Russia. Earlier this year, Willie Drake, whose Virginia-based company Mountain Lumber reclaims old wood, was searching in Germany for a source to replace the French oak he could no longer obtain. He was offered a supply of 400-year-old Chinese elm, but, no, that wasn't quite it.

Someone told Drake about a supply of antique Russian oak, stashed away in a St. Petersburg warehouse. Drake pursued the lead and eventually acquired some samples. According to the story, in the early 1920s, during the first years of communist rule, the wood was cut in the forests of Mongolia and hauled to what was then Leningrad for use in state building projects. Then it became mired in red tape, so to speak, and all but forgotten.

Markings indicate the wood was inventoried into the 1930s, and it was expertly stickered, with metal pins tacked to the ends of each board to prevent splitting. Curiously, the wood was never used. Today, this Russian white oak, with tight heartwood that makes it harder than most American oak, is as sturdy as it was when cut, and it's free of nail holes.

Mountain Lumber has purchased several hundred thousand board feet, most of it to be milled into flooring, some of it to be sold as rough planks, typically 1½ in. to 2 in. thick and between 3 in. and 8 in. wide. As this magazine goes to print, the rough wood is priced at \$9.36 per bd. ft. Call Mountain Lumber Co. (800-445-2671), or visit their Web site (www.mountainlumber.com).

Mired in red tape. Mountain Lumber Co. has reclaimed this Russian white oak, stored for 70 years in a St. Petersburg warehouse.

Marquetry on parade



Footed box with bird's-eye maple lovebirds and snake. The front of this diminutive box (7⅞ in. x 11⅞ in. x 8⅝ in.), the work of an unknown marquetry maker, features the symbol from the first official American flag, raised in 1775.

The Museum of American Folk Art in New York will house an exhibition of American marquetry dating from the early 19th century through the 1970s. Masterpieces of American Folk Marquetry is the first large-scale examination of the history of folk marquetry in America. First brought to America during the 1840s by German immigrants, marquetry is an overlay tech-

nique in which wood chips and veneers are used to create intricate patterns on wood items. The catalog is authored by Richard Muhlberger and, according to the museum, will be the first major book on folk marquetry in decades. The exhibition runs through Jan. 10. For more information, call the museum (212-595-9533) or visit its Web site (www.folkartmuse.org).

Chairmaking book and video win Stanley Awards

Jeff Miller's book *Chairmaking and Design* and his video *Chairmaking Techniques* (The Taunton Press, 1998) both garnered top prizes in this year's Stanley Awards. The awards are given annually by Stanley Tools in conjunction with the National Association of Home and Workshop Writers to promote excellence in the field of how-to writing. This year was the first time the same person has won in both the book and video categories. Jeff Jewitt's *Ap-*

plying Topcoats (The Taunton Press, 1998) shared the top honors in the video category. Miller, whose work appears occasionally in *Fine Woodworking*, has been making furniture for 16 years. He came to woodworking after a career as a classical musician and now spends his time making furniture, writing and teaching. Miller is hard at work on his second book for The Taunton Press, *Designing and Building Beds*, due to be released in the fall of 1999.

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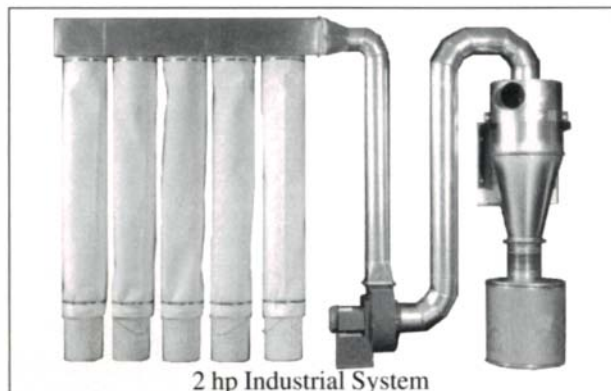
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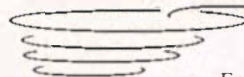


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San Diego wood-design show awards

At the San Diego Fine Woodworkers Association's Design in Wood competition this year, *Fine Woodworking* sponsored and judged two awards: Best Workmanship and Most Creative Use of Materials. The latter honor went to Ray Allen of Yuma, Ariz., for a tour de force in which he glued up 2,329 separate pieces of maple, citrus, ziricote and pernumbuco and turned the piece on a lathe to create a 30-in.-high vessel with Native American designs. For Best

Workmanship, we chose an unassuming but elegant mahogany blanket chest made by Jeff Braxmeier of Oceanside, Calif. We could not find a hint of an open miter or a flawed inch of finish on this inspiring piece by a first-time entrant in the competition. Best of Show went to Pat Edwards for his reproduction Boston pier table. To get a look at these and the dozens of other winning entries, check out the group's Web site (www.sdfwa.org).



Two winners. Ray Allen's 30-in.-high turned vessel won Most Creative Use of Materials, and Jeff Braxmeier's blanket chest took the prize for Best Workmanship at the San Diego Design in Wood Competition.



Acorn to heirloom

All too often, lumbering ends up a purely extractive enterprise, especially from a local perspective. Teeming forests of mature trees are clear-cut down to the stumps, or the best timber is selectively plucked, leaving behind shivering stands of weed trees. Even when whole forests aren't laid to waste, the harvested sawlogs might be whisked away to some distant land or city, their impact on the local economy no better than the cheap price paid for standing timber. The real money is made, and the fullest economic benefits felt, thousands of miles away, where the logs are sawn into lumber, kiln-dried, milled and crafted into furniture, flooring or some other value-added product. It's an old story, and a controversial one—a tale environmentalists have been telling for decades now. What's refreshing, if not exactly new, is Ron Highsmith's approach to the matter.

In 1986, Highsmith began Full Cycle Woodworks as a logging and sawmill operation. Located in Rogersville, Tenn., the family owned business now includes kiln drying and the manufacture of flooring, paneling and custom moldings. Each step in the cycle of tree to finished product now benefits the local economies of Hawkins and Hancock counties, which reap the full value of their own resource base. In addition, Full Cycle Woodworks uses Best Management Practices (voluntary guidelines recommended by the state), works with second-class species, such as maple, hickory and beech, and sponsors educational workshops for local landowners and woodworkers. "When logs leave the area," bemoans Highsmith, "jobs go with them."

To learn more about Full Cycle Woodworks, check out their Web site (www.sustainablelumber.com).

Notes and Comment

We welcome news stories, anecdotes about the triumphs and pitfalls of woodworking, photographs of unusual work—anything that you think other woodworkers would like to know about. We pay for the material we use. Send submissions to Notes and Comment, *Fine Woodworking*, P.O. Box 5506, Newtown, CT 06470-5506.

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You'll be glad you have a bunch of them around your shop. You will be able to work faster and more efficiently because you won't have to search for those clamps you need.

	Regular	Sale
37F01.10 4" Cab. Clamp (10)	\$59.95	\$42.50
37F01.20 8" Cab. Clamp (10)	\$65.95	\$46.75
37F01.30 12" Cab. Clamp (10)	\$71.95	\$49.95

Combination Set consists of 10 of each of the 3 sizes of clamps. 30 Clamps total- only \$4.40 each.

37F10.10 Combination Set	\$197.85	\$132.25
--------------------------	----------	----------

B / Add A FastTrack Metal Mitre Guide Slot To Your Router Table Or Machine Jig

Simply rout or dado a 1" wide, ½" deep groove and install the Mitre Track inside of it. Instantly you have a ¾ x ¾" slot that will fit your standard table saw miter guide. By tightening the screws that hold the Mitre Track in place, you adjust the inside width of the slot. This gives you a perfect fit. Made of precision extruded aluminum. Cuts easily to length. Mounting holes are pre-drilled.

67K11.07 FastTrack 42" Mitre Track	\$24.95
------------------------------------	---------

SALE C / The Historic Stanley "1 Odd-Job" Layout Tool Is Born Again

Originally made by Stanley from 1888 to the early 1930's, as useful to us today as it was then. Made in the USA of solid manganese bronze casting, carefully machined to .0015" tolerances on all sides. The screws are stainless steel.

It's an inside mitre and try square, a depth gauge, a scribing tool for arcs and circles, a T-square, a depth marking scribe, a plumb level, and a 6" brass bound rule (also marked in mm). A 12" rule is an option. Rules are laser engraved.

A special package of the #1 Odd-Job plus the optional 12" Rule is available at a big savings.

	Regular	Sale
23N02.02 #1 Odd Job	\$54.95	\$49.95
19S11.03 12" Wood/Brass Rule	\$29.95	
23N02.10 Odd Job & 12" Rule	\$84.90	\$72.50

D / Solid Brass-Headed Calvo Mallets

They feel great in your hand. Fitted with a solid brass head attached to a maple handle, they have a phenomenal balance.

There are two sizes: 1½lbs, and 2lbs long.

18R03.01 1½lb Brass Calvo Mallet	\$44.95
18R03.02 2lb Brass Calvo Mallet	\$49.95



SALE E / Iron Backed Tenon Saw Combines The Best Of Western & Japanese Style Saws

This new saw, with its unique tooth design, works astonishingly well – with a very smooth finish and an exceptionally fast cutting action.

This is a classic Western style tenon saw but with precision diamond cut Japanese-pattern teeth. (A Japanese-pattern tooth design is noted for its very fast cutting properties.) The 12" long blade has 15 tpi, and is set into a ¼" thick solid soft iron back. Depth of cut 3". The body of the blade is .025". Kerf is a narrow .035".

Like all Japanese saws it cuts very smoothly and quickly, but in the Western fashion, on the push stroke. The specially hardened teeth should last a lifetime. Must be used to be believed.

	Regular	Sale
93K01.01 Japanese Tenon Saw	\$37.50	\$29.95

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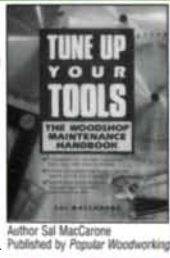
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12"x30Tx1"	\$162	\$119	\$107	\$95
10"x40Tx1/8" or 3/32"	\$156	\$119	\$107	\$95
30T 1/8" or 3/32"	\$135	\$99	\$89	\$79
9"x40T	\$146	\$109	\$98	\$87
30T	\$125	\$99	\$89	\$79
*8-1/4"x40Tx3/32"	\$136	\$99	\$89	\$79
8"x40T 3/32"	\$136	\$99	\$89	\$79
30T	\$115	\$89	\$80	\$71
7-1/4"x30T 3/32"	\$112	\$69	\$62	\$55
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Sears 8-1/4" & Delta 8-1/4"x60Tx5/8"	\$170	\$99
Hitachi 8-1/2"x60Tx5/8"	\$179	\$109
DeWalt 8-1/2" & Ryobi 8-1/2"x60Tx5/8"	\$179	\$109
Delta 9"x80Tx5/8"	\$204	\$119
Ryobi-Makita & all 10"x80Tx5/8"	\$207	\$129
DeWalt, Makita, B&D, Hitachi 12"x80Tx1"	\$229	\$139
Ryobi-Makita 14"x100Tx1"	\$266	\$179
Hitachi 15"x100Tx1"	\$277	\$189

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WOOD® Magazine test, Sept. '93, pg. 45

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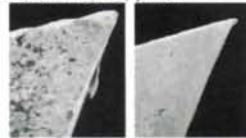
SIZES AVAILABLE	LIST	SALE	SIZES AVAILABLE	LIST	SALE
7-1/4" x 60T x 3/32"K	\$149	\$129	300mm x100Tx1/8" x30mm	---	\$189
8" x 80T x 1/8" & 3/32"K	\$202	\$169	12"x100T x 1-1/8"	\$253	\$215
220mm x 80T x1/8" x 30mm	---	\$159	14" x 80T x 1"	\$232	\$197
9" x 80T x 1/8" & 3/32"K	\$207	\$179	14" x 100T x 1"	\$266	\$226
10" x 80T x 1/8" & 3/32"K	\$207	\$159	16" x 80T x 1"	\$262	\$223
12" x 80T x 1-1/8" K	\$212	\$181	16" x 100T x 1"	\$294	\$243

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8" D. 5/8" Bore	\$321	\$289	\$260	\$245
10" D. 5/8" & 1" Bore	\$389	\$349	\$314	\$297
12" D. 1" Bore	\$499	\$449	\$404	\$382

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Fine Woodworking Magazine test, Oct. '96, page 43

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American Woodworker, April 1998, pp. 64-69.

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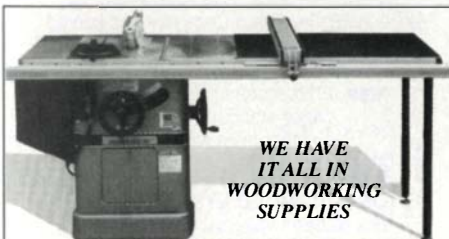
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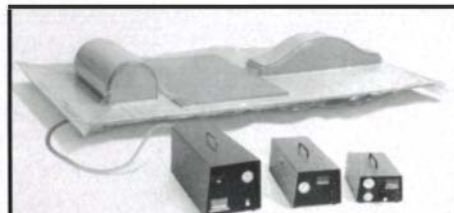
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Tools & Materials

Panel-raising bits from Freud eliminate tearout



Clean-cutting bits. Freud's 2+2 panel-raising bits, which have four cutting wings instead of the usual two, leave a tearout-free edge where the ramp meets the field.

Freud has a new line of carbide-tipped panel-raising bits designed to leave a clean, crisp profile. The 2+2 bits have four cutting wings per cutter, rather than the usual two.

The new bits do indeed leave a tearout-free edge at the top of the profile where the ramp meets the field. Freud accomplished this by dedicating two of the cutter's wings to cutting most of the profile. The other two wings, which are slightly wider and angled differently, cleanly slice the edge of the profile.

Tearout usually isn't a big deal in solid-wood panels, which can be sanded. But for a paneled wall, where I might use large veneered panels with applied hardwood ramps, clean-cutting bits are essential.

The newer bits are also better balanced than their predecessors. Large bits require a large router and reduced speeds. I used a 2-hp router and would not recommend anything smaller. Freud's 2+2 bits come in a variety of profiles and can be purchased for about \$60 to \$90 each. For a distributor, call Freud at (800) 334-4107. —Steve Latta

Bosch power saw lets you make flush cuts

The Bosch fine-cut finishing saw is the perfect power tool for trimming the bottoms of installed moldings to fit a new floor or carpet. The tool is also pretty good at trimming the bottom of a door without removing it from its hinges.

Unlike anything on the market today, this small saw has a blade-mounting system that allows you to make flush cuts on either side of the tool. Although you can also use the saw to accomplish some tasks meant for a circular saw, jigsaw or reciprocating saw, the Bosch saw is really meant to replace a small handsaw.

Among the saw's other uses are cutting off small stuff, such as trim, protruding shims in door jambs, dowels, splines or through-tenons in framing joints. You have to be careful when making flush cuts, however, because the teeth on the side of the blade will scratch any surface they contact. Although versatile, the fine-cut saw is not a substitute for a good, old, hand-powered tenon saw when making delicate cuts. This electric tool will never



A saw for tight quarters. Bosch's fine-cut saw makes quick work of trimming the bottoms of door casings to fit a new floor or rug.

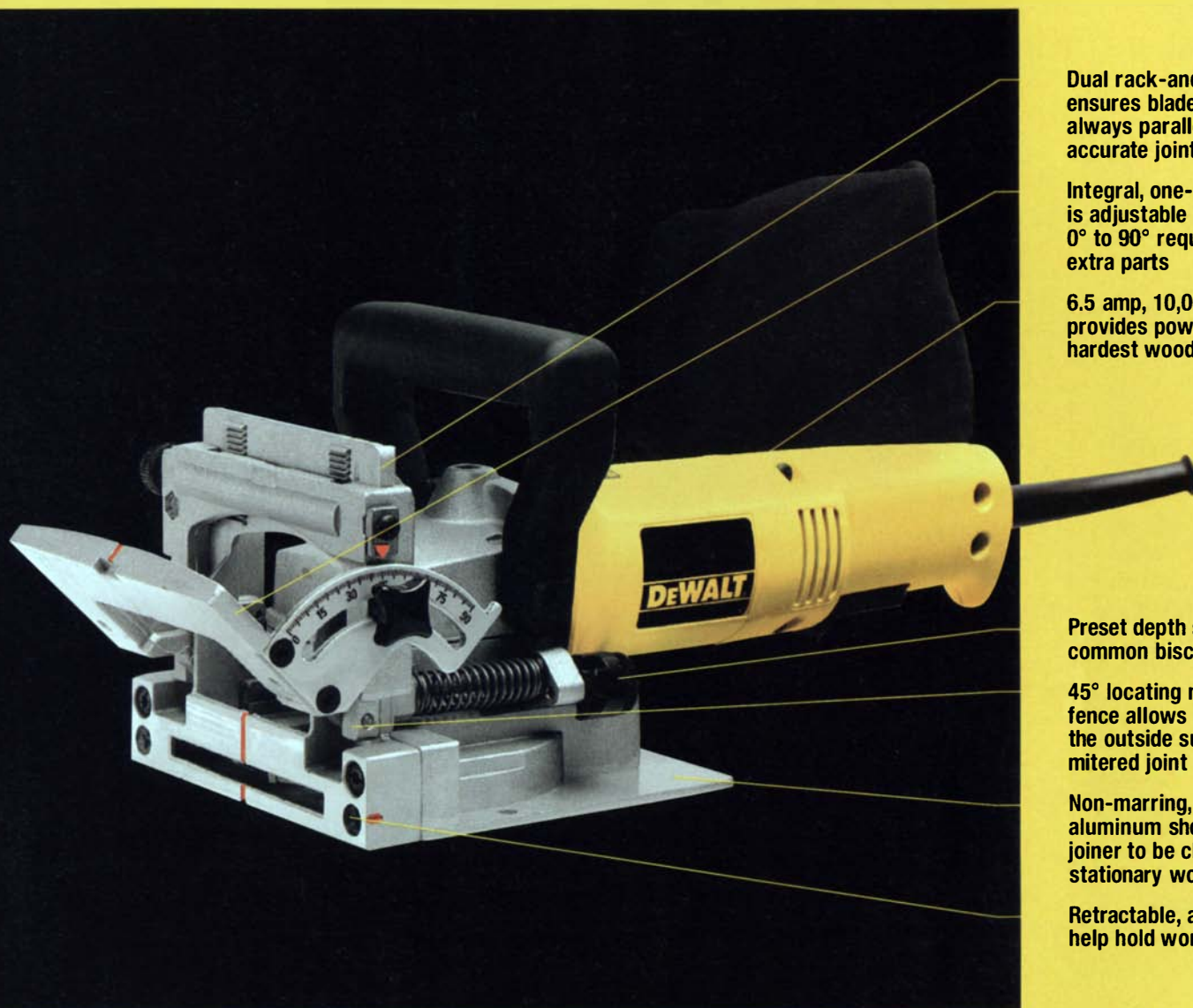
provide the kind of control you get cutting wood joints by hand.

The blades that come with the saw cut relatively quickly and finely. Best of all, the tool has a positive and quick-acting lock mechanism that makes blade changes secure and easy.

A miter-box accessory is available but this tool is meant to complement, not re-

place, a chopsaw. The miter box works fine when cutting square or rectangular-shaped moldings, but it is difficult to use with profiled moldings. The problem is twofold: The fore and aft cutting action of the tool induce considerable side force, causing the workpiece to creep during the cut. Second, the miter box's clamp bears horizontally against the workpiece, a

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READER SERVICE NO. 17

DEWALT
High Performance Industrial Tools

problem in thin moldings. I think a vertical clamp would improve the miter box.

The saw is due out at the beginning of 1999, but some retailers may have it earlier. The saw will cost about \$120; the full package—saw and miter box—will sell for about \$220. —*Jim Tolpin*

Wild veneers from Italy

Want to give your furniture that well-dressed, Euro look? Try some stylish Italian veneers that look more like woven fabric than wood. *Caleidolengo*, which means “kaleidoscope wood” in Italian, is composed of many thin strips of different colored woods in a variety of geometric patterns, including stripes, waves and herringbone. The effect is achieved by slicing, stacking and reslicing veneers. There are about a dozen patterns available.

Caleidolengo can be worked like any wood veneer—glued with yellow glue and sanded. Don't worry about sanding through the dye—the color bands are saturated through the material. I generally lay up the veneer on medium-density fiberboard (MDF) and use a vacuum press. Because caleidolengo is very porous, it's a good idea to use a clear-pore filler or heavy-solids finish. It will accept solvent or water-based finishes equally well.

The veneer, which is about 1/32 in. thick, comes in rolls about 2 ft. wide by 10 ft. long. Cost runs from \$1.50 to \$2.50 per sq. ft. Caleidolengo can be ordered from Herzog-Elmiger Veneers in High Point, N.C. (336-434-4053). —*Jay Wiggins*



Products to improve dust-collection systems



Dust bags for a cleaner shop. Grizzly Industrial's high-efficiency dust bags capture more fine dust than standard bags.

The stock bags that come with most dust collectors do a fine job of collecting chips, but they're not very efficient at capturing fine dust particles, which blow through the bags back into your shop. Several companies now sell replacement dust bags that do a good job of filtering most of the fine dust. Another way to improve a dust collector is to separate the chips before they enter the bags. For small shops, a plastic cyclone might be the answer.

Bags from Grizzly Industrial

Grizzly's bags are made of polyester with a felt lining. These bags are very stiff and will stand upright without help from the blower. The stitching is tight, and there doesn't seem to be any blow-through at the seams.

Although I wasn't able to measure precisely the size of dust particles floating in my shop when running the collector, I did notice less dust settling out in the shop after using the new bags.

Besides less dust, I noticed that my dust collector's chip-gathering ability improved. To verify that, I borrowed a gadget called a Magnahelix flow meter. The tool can measure the volume of air moving past a fixed point. Using the Magnahelix, I learned that the airflow through my dust-

collection pipes dropped by about 22% when my old bags became caked with dust. The new bags don't have this effect on airflow because they seem more resistant to dust buildup.

Using the flow meter, I learned another important lesson that has nothing to do with dust, but rather ducts. A machine rated for 610 cu. ft. per minute (cfm) may draw that kind of air at the intake manifold, but as soon as you attach a length of duct, hose or a cyclone separator, airflow takes a nosedive. A 9-ft. run of hose to my jointer reduces the collector's ability to suck air by more than half. So keep those runs of hose as short as possible, and avoid sharp bends. High-efficiency dust bags range in price from \$35 to \$50, depending on the size, and are available from Grizzly Industrial (800-541-5537). —*James Wynne*

Another source for dust bags

When my stock dust-collector bags started getting a bit ragged, I purchased a set of high-efficiency bags from Oneida Air Systems. These bags are much larger and



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Tools & Materials (continued)

Low-cost cyclone separator. Lee Valley's plastic cyclone lid fits over a trash can and reduces the amount of larger shavings going into the collector's dust bags.



thicker than the stock bags that came with the machine. My 1-hp dust collector now looks like a toddler wearing a chef's hat. It may look silly, but the machine performs better than ever. I haven't had to clear a clogged planer dust chute since the changeover, something that used to plague me constantly.

According to an Oneida Air Systems spokesperson, most imported dust collectors are sold with undersized bags. By installing a pair of larger bags, you can enhance the machine's performance. Additionally, a tightly woven filter fabric allows fewer small particles to be blown into the shop. My shop is visibly cleaner. I know that to be fact, but a visitor might still disagree. Oneida's bags range in price from \$40 to \$50, depending on the size. For more information, call (315) 476-5151.

—Anatole Burkin

Low-cost cyclone simplifies cleanup

Lee Valley Tools recently introduced its version of the plastic cyclone, a device that separates large sawdust particles into a secondary container before they reach the filter bags. Industrial dust-collection systems are equipped with metal cyclones, but they cost hundreds of dollars. The Lee Valley cyclone costs a fraction of that.

The cyclone is built very simply: It's a black plastic disc the size of a large trash-can lid. The cyclone has two ports for attaching hoses; one goes to a dust collector

or shop vacuum, and the other connects to a tool or duct system.

You have to be careful when installing hose or pipe into the thin lid because too much force may cause it to crack. The instructions supplied with the cyclone, however, offer good tips on installation and avoiding problems. Once installed, there's not much handling involved, and the cyclone ought to survive just fine in a small shop. Just don't use it for a stool.

Under vacuum, it will conform to the rim of a trash can because the cyclone is thin. I improved the fit by adding a strip of waterproof weatherstripping to the underside of the cyclone along the rim.

Lee Valley claims that the cyclone will sidetrack 90% to 99% of jointer and planer shavings into the trash can. I found that it sidetracked about 65% of heavy shavings (jointer, planer, floor sweepings) into the trash can; the rest bypassed the can and went to the collector. Because the trash can is a lot easier to disconnect than the lower dust bag, I don't have to empty the bag as often. It appears that the efficiency of the cyclone declines as the trash can fills up, so I empty it before it gets half full.

For \$29.95, the cyclone lid is a decent value, though I wish it lived up to its claims of 90% efficiency. Two versions of the cyclone are available: one has 2½-in. ports (for shop vacuums), and the other has 4-in. ports, for larger dust collectors. Contact Lee Valley Tools at (800) 871-8158. —A.B.

What's new in woodworking tools

Here's a sampling of new products that were unveiled in August at the Hardware Show in Chicago and at the International Woodworking Machinery and Furniture Supply Fair in Atlanta. Although some of these tools are available now, others may not appear until sometime in 1999.

Bosch showed off its 6.3-amp jigsaw, with an upgraded toolless blade changer and soft-start motor, and a magnesium-base router with innovative mechanisms for dialing in depth and centering the base.

Carter Products introduced a shop-vacuum-powered hold-down fixture that's powerful enough to keep small pieces in place when routing.

Delta showed off a new 6-in. jointer that comes with a rack-and-pinion fence adjusting mechanism and a quick-locking depth lever. There's also a new tablesaw miter-gauge with an easy-to-read scale. Delta also unveiled a bench random-orbit



Circular saw sees the light. Hitachi's cordless 18v circular saw has a built-in headlamp.

sander with a 9-in. disc. The disc is mounted horizontally on the machine.

DeWalt used a tower of water to demonstrate the increased suction of its quiet, new 15-gal. and 20-gal. capacity vacuums. They feature a double filter system that allows wet and dry pickup with no changeover. The company also doubled its tablesaw blade line with 26 new woodworking blades for all kinds of materials and cutting situations.

Excalibur by Sommerville Design has a beefed-up overarm tablesaw blade

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guard with a built-in dust extraction port.

Hitachi's new 18v cordless circular saw with a 6½-in. blade includes a nifty, thumb-operated light that illuminates the cutting line and blade for those cuts made in the dark corners of your shop or when age or dusk reduce visibility.

Jet unveiled a limited-edition run of white woodworking machines, a ½-hp horizontal mortiser as well as a 1-hp oscillating spindle sander and a 24-in. dual drum sander. Jet is also getting into the hardwood lumber-selling business.

Makita appears to have won the race to get new, longer-running, environmentally better nickel-metal hydride (Ni-MH) batteries for cordless tools on store shelves. But watch for an explosion of these batteries of the future around the beginning of next year.

Ryobi unveiled a clever, new router-table insert plate. The plate rotates within its own framework, which is graduated in ½-in. increments. The router is mounted off center, so by rotating the insert plate, you can dial in the distance between the fence and bit (after taking into account the diameter of the bit).

Quick-Fold sawhorses are light but strong



Sturdy folding sawhorses. Quick-Fold sawhorses flatten to 2¼ in. when stowed.

Seventy bucks for a pair of folding sawhorses? You've got to be kidding! But figure this: In each pair of Quick-Fold sawhorses (802-674-2554), there are five pairs of butt hinges and 10 bd. ft. of hardwood. Add to that the time required to design, dimension the stock, lap and glue the

joints, and \$69.95 seems like a good price. Also, figure that the sawhorses support 1,500 lbs. per pair, fold flat to 2¼ in., open and close with a one-handed flick of the wrist and come with a money-back guarantee; then the price is, without a doubt, a terrific deal. —Jefferson Kolle

Versatile spray gun from Binks Sames



An HVLP gun with many uses. The Binks Sames M1-G can handle a variety of materials, including furniture finishes and automotive paints.

I have an old spray gun that I've used for years to apply finishes to furniture, porches, even cars. The gun requires high air pressure from a compressor and creates clouds of overspray.

I decided that it was time to look at high-volume, low-pressure (HVLP) spray guns, which create less overspray. I tried out a gravity-fed gun made by Binks Sames, the M1-G, which works off an air compressor. The company promised me that it was fine for all types of finishes. I tried it for several months, putting all types of finishes through it: oil stains, waterborne sealers and topcoats, nitrocellulose lacquer, automotive urethane, and heavy-viscosity clearcoats, even latex house paint. The gun handled all the materials nicely, except the paint. It isn't made for latex, but I was curious. Big mistake. I had to disassemble the gun completely and clean out the congealed gunk.

Atomization is the key to a good finish, and I was surprised that a gun that operates at 10 psi or less at the tip was able to

do it so well. Low pressure means there's less finish that bounces off the surface of the workpiece. Binks says the gun has a 65% transfer efficiency. A range of fluid tips and air nozzles are available to accommodate materials of various viscosities. I tested it with a 3.5-hp compressor; Binks says all you need is a 1.5-hp compressor.

To get good results with thick materials, some thinning and careful dialing in of air and fluid screws is required. Holding the gun 5 in. to 6 in. from the surface usually provided the best results. All the visible parts of the gun are made of metal, mostly aluminum, and appear very durable. The M1-G costs about \$320. For a distributor, call Binks Sames at (800) 992-4657. —A.B.

Steve Latta builds custom furniture in Oxford, Pa. Jim Tolpin is a writer and woodworker in Port Townsend, Wash. Jay Wiggins builds custom furniture in Atlanta, Ga. James Wynne makes furniture in his home workshop in Victoria, B.C., Canada. Anatole Burkin is an associate editor of Fine Woodworking. Jefferson Kolle is a senior editor of Fine Woodworking.

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READER SERVICE NO. 158



Aftermarket Tablesaw



If a tablesaw is only as good as its fence, there are a lot of bad tablesaws out there. Case in point: I have a 1950s-era Delta Unisaw with the original fence. With minimal maintenance, the saw has continued to work flawlessly. With constant fussing and adjusting, the fence continues to make me crazy. It works pretty well until it gets bumped. Then I get out the instructions and make adjustments. The alternative is to fuss with the fence, checking measurements at the front and back of the fence, giving it a little tap one way or the other, measure again. Arrghhh! Drives me nuts.

All a tablesaw fence has to do is lock parallel to the blade. Simple function but a complicated procedure given that the fence must lock parallel at an infinite number of distances from the blade an infinite number of times.

Since Bill Biesemeyer introduced his T-square fence in the 1970s, lots of manufacturers have come up with their own fences,

New fences on old saws. We bought eight fence systems, then mounted them on cabinet saws and evaluated them.

Fence Systems

There are many ways
to keep a rip fence
parallel to a sawblade

BY JEFFERSON KOLLE

including many that are almost identical to Biesemeyer's (see the related story at right). Rather than review all the Biesemeyer clones, I looked for fence systems with significantly different designs. I found eight, including the Biesemeyer. (John White, the Taunton shop steward, assembled and helped evaluate the systems.)

I chose to review "commercial" fence systems. Some companies make "home-shop" fence systems, which typically have shorter fences and smaller components than commercial systems.

This is only a test

A spokesman at Delta Manufacturing told me the company has sold more than 600,000 Unisaws since the tablesaw was introduced in 1938. To get as close as we could to an apples-to-apples fence comparison, I amassed seven Unisaws of varying vintages. The eighth saw was a General cabinet saw. In an attempt to avoid being sent ringers, we bought all of the fence systems anonymously either from the manufacturer or from a local retail outlet.

Before we start, a few definitions are in order: *Rails* are the metal bars that attach to

the tablesaw table. The *head assembly* rides along the front rail. The *fence* is the straight metal bar attached to the head assembly along which you push wood when ripping. For the purpose of this article, and to avoid confusion, a *fence system* is a combination of the above components.

Rough around the edges

While the tops of most older saw tables are beautifully machined, the edges of some tops are rough from the casting process. Cast-iron table-extension wings, like those on the Unisaw, are often slightly longer or shorter than the main table, adding to the problem. To be fair, the rough edges don't affect the saw's performance, but they can have a bearing on how easy it is to attach an aftermarket fence system.

Some of the system's rails get their rigidity by their attachment to the edge of the table. Thus, a saw with an unstraight, unsquare table edge (or edges) can make it difficult to attach some rails. It was necessary to shim some fence rails and to file away at some saw tables to get the rails to attach in a straight line. Check your saw; if the edges of the top are rough and the ex-

Biesemeyer's fence spawned many clones

BY WILLIAM DUCKWORTH

Bill Biesemeyer made his fortune the old-fashioned way: He earned it. More than any other individual, Biesemeyer revolutionized the way woodworkers in small shops throughout this country use their tablesaws. Now, at 71, he is, as he says, "trying to retire." The day we called to get his take on fence designs, he was tinkering in his shop—where he has a contractor's saw equipped with the small version of his own fence—building a radio-controlled model airplane.

Biesemeyer spent the better part of his working life as a cabinetmaker and boatbuilder. He came to his new career out of frustration. Tired with time wasted and inaccurate cuts made with the old fence designs, he

Continued on next page



Continued from previous page

set about making a fence that is a joy to use and that would fit any saw. To provide customers with front and back guide rails that were predrilled to fit right onto their machines, he eventually made 175 different patterns.

After working out the kinks in several prototypes, Biese-

meyer applied for a patent on his design in 1978. The approved patent, No. 4206910, was issued two years later. But after only four years, on the advice of a lawyer, he chose, as he says, "to deny the patent" to avoid any possibility of protracted litigation. With that decision, he essentially gave up the exclusive rights to manufacturing his design. What is

surprising is that it took over 10 years before word got around and the inevitable clones began to appear.

IMITATION: THE SINCEREST FORM OF FLATTERY

Calling a saw fence a clone of a Biesemeyer is no insult. We know of at least seven manufacturers that make either commercial-grade or smaller

home-shop models that very closely resemble the original Biesemeyer design: **Excallbur** (IN41R72 and IN61R72), **General** (T-fence and Home Shop), **Jet** (Xacta and Xacta Home Shop), **Modulus** (SSF-100 and SF-10), **Powermatic** (Accu-Fence and Accu-Fence Home shop), **Rousseau** (SF 2050) and **Voss** (Evolution I and Pro Rip). For the purposes of narrowing

tension wings don't line up flush with the table, it might behoove you to spend some time with a sharp file or grinder.

Lock up

There are two schools of thought about fences. One school says the fence should lock only at the front rail (the front being the side the operator stands closest to), and the other school says a fence that locks to both the front and rear rails is better. Both schools make sense.

A fence system that forms an absolutely rigid connection to the fixed front rail needs no other connection. And, in fact,

having another connection on the rear rail can throw another possibility for error in the parallelism equation.

On the other hand, a fence that locks on both the front and back rails has double the number of connection points. Another advantage of a front-and-rear locking fence is that it can't lift off the rear of the saw table if you have clamped a hold-down or other ripping device to the fence.

The importance of being square

After carefully installing and adjusting all the fence systems, John set each fence at 1 ft., 2 ft., 3 ft. and, where possible, 4 ft. from the blade and measured at the back edge of the saw in thousandths of an inch (.000 in.) to find out whether the fence stayed parallel. Our first thought was to include these statistics in a chart. Then we had second thoughts.

With a few exceptions, noted in the comments on the individual fence systems, most of the saws did very well tracking parallel from the blade along the course of their cutting width. Thousandths of an inch should be put into perspective. The thickness of a page of this magazine is .002 in., so a fence that is .010 in. out of parallel at 3 ft. from the blade is out a distance equal only to the thickness of five pages. And the relative accuracy of a cut you'll get with any fence can be compromised by many factors. Both the trueness of a board being ripped and human error play into how straight a rip you'll get, and think of this: The truest tablesaw blades have a runout of .003 in. (see *FWW* #120, p. 43).

To get an idea of how an out-of-parallel fence can affect the quality of a cut, we ran some 5/4 oak through a saw with a carbide blade and a fence we purposefully adjusted out of parallel. With the fence adjusted



Getting whacked. Swinging a 2-ft.-long, 3-lb. pendulum at the outfeed end of each fence approximates what happens in a shop when a fence gets knocked by heavy sheet goods. After whacking the fences, they were checked for parallelism. All but one fared well.



Measuring for parallelism. John White measured each fence at 1-ft. increments to check whether the fence was parallel to the saw blade. He clamped a straightedge to the table, locked the fence and then used a razor knife to mark the fence-to-straightedge distance on a piece of masking tape on a smaller straightedge. After measuring at the front and the rear of the fence, he used an inspection microscope to measure the distance between marks in thousandths of an inch (.000 in.).

.024 in. in from parallel toward the back of the blade, the ripped edge showed considerable burning. When we adjusted the fence out from parallel away from the blade, the findings were different: At .010 in. out, the edge wasn't burned at all. In fact, the cut was slightly smoother than the cut we got with the fence set absolutely parallel to the blade. At .024 in. out of parallel from the blade, we got a smooth cut with no burning, but it was getting hard to keep the oak tight to the fence because it wanted to track with the blade.

The results from the out-from-the-blade setting raise an interesting point—one that is addressed in the instructions for the Mule fence system and the system made by Shop Fox (and one that has been suggested by several *FWW* authors over the years). The suggestion is that adjusting the fence slightly out of parallel away from the blade avoids binding and makes a better cut.

Another important aspect of squareness

the focus of this article, we decided to accept all of these Biesemeyer clones as good copies of a good master.

Though some of their particulars vary—knobs rather than levers to lock the fences to the rails, additional rear-lock mechanisms to use the fence with power feeders that put a great deal of pressure on the rear end of the fence, rails and

steel angle of different thicknesses, faces of polyethylene or plastic laminate—these fences function the same as the original Biesemeyer T-square system.

Prices are all over the map, so if you're considering one of these models, check with at least two or three woodworking equipment suppliers. You can often buy from them cheaper

than you'd get buying directly from the manufacturer.

Biesemeyer's story is an inspiration to many. He didn't set about trying to become a millionaire; he just wanted to make a fence that would do away with the inconvenience inherent in readjusting his tablesaw for a new cut. By the time he sold his business to Delta in 1995, he estimates

that he'd made around half a million fences. Clearly, Biesemeyer is proud of his fence design, and he doesn't mince words about others. "Any fence that has to lock to the back side of the saw [table] stinks," he said, "because it will never set up parallel to the blade." □

William Duckworth is an associate editor of Fine Woodworking.

is that the height of a fence be perpendicular to the saw table. For operations like cutting panels or tenons, where you hold wood on its side against the fence, a fence that's significantly out of square to the table can affect the trueness of your cut. Some fence systems can be adjusted for vertical squareness; others cannot. This feature is noted in the chart on p. 57.

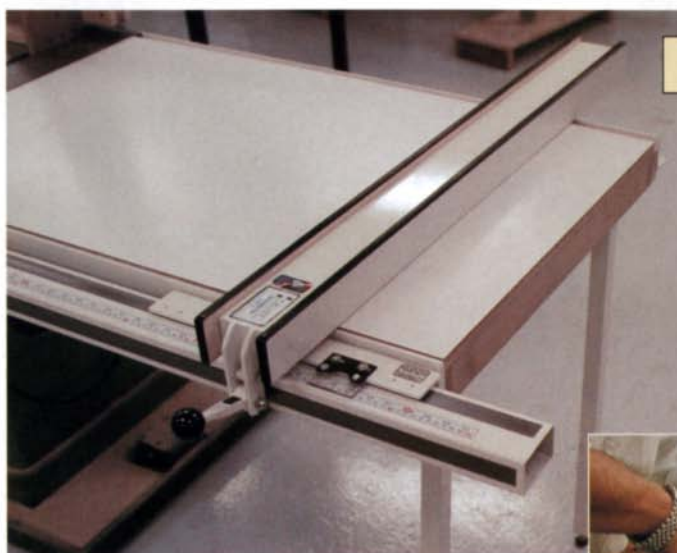
Whack test

All of the fences we looked at have a ripping capacity that will handle sheet goods. In the course of wrestling 90-plus-lb. 4x8 sheets of medium-density fiberboard (MDF) onto your saw table, it's likely that, now and again, you're going to bump your saw fence. We wanted to test each fence system's ability to withstand a good, solid whack. A fence that recoils from a whacking is okay; it's kind of like a 5-mph bumper on a car. We wanted to see whether any of the fence systems were knocked out of alignment.

We set each fence 1 ft. from the sawblade and rigged up a 2-ft.-long, 3-lb. pendulum to swing at the back of each one. After whacking, we slid the fence out to the end of its rail and then reset it at 1 ft. to see if the fence was knocked out of alignment. With one exception, none of the fences deviated by more than a few thousandths of an inch. The Craftsman Exact-I-Rip fence was knocked out of alignment by .035 in.—an amount we thought was substantial.

The Lineup

Biesemeyer—Biesemeyer's status is legendary among woodworkers. It's the stuff of metaphors: I once overheard a cabinet-maker telling a peer about the rugged quality of a new power tool he'd bought. "It's the Biesemeyer of routers," he said.



BIESEMEYER

Biesemeyer fence rides on a rectangular steel front rail. The plastic-laminate-sided fence is welded to an angle-iron head assembly. The fence slides loosely along its front rail until the lever is pushed down, locking the fence securely.

No attachment to the back rail. The back rail serves only to support an extension table. The back of the fence slides along the saw table on a nylon block. Because the fence doesn't attach to the back rail, an outfeed table can butt tightly to the saw table.

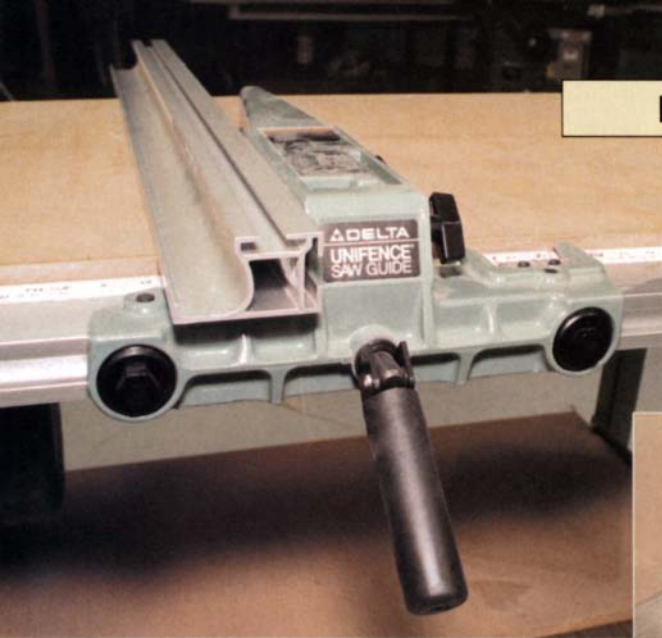


CRAFTSMAN EXACT-I-RIP



Craftsman's looks are deceiving. This fence system is well finished, and it has some nice features, like a T-slot fence and a microadjust mechanism attached under the head assembly. The problem is that the fence doesn't always lock square to the rails, and it gets racked out of alignment.





DELTA UNIFENCE

Delta Unifence has a cast-aluminum head assembly. The fence attaches to the assembly with two toggle bolts. Loosen them, and you can change the height of the fence from ½ in. (left) to 3½ in.



Fence slides back for use as a cutoff gauge for crosscutting. Used in the 3½-in. setting (right), the fence slides back on the head assembly—just loosen the toggle bolts—for use as a cutoff gauge. The back of the head assembly slides on the saw table on a height-adjustable nylon bushing.

A massive head assembly is welded to the fence, and the fence locks only to the equally massive rectangular steel front rail by means of a lever-operated cam. The fence, faced on both sides with plastic laminate, glides on the front rails. On the back of the saw table, the fence slides on a thin nylon block. The back rail is steel angle iron that serves only to support a side ex-

tension table. The fence slides loosely along the front rail until the cam-actuated lever is pushed down, locking the fence square to the rail with the rigidity of a locomotive's brakes.

It seems the Biesemeyer reputation is well-deserved. Of all the fence systems we tested, it had no error (.000 in. at 4 ft. from the blade) when we measured for paral-

lelism, and it deviated only .002 in. in the whack test.

Craftsman Exact-I-Rip—An extruded-aluminum fence is held with four bolts to an extruded-aluminum head that slides on nylon inserts along a substantial extruded-aluminum front rail. A lever mechanism clamps the rear of the fence against the back rail, which, in turn, snugs the head tightly to the front rail. The finish quality of this fence system is excellent, and the fine adjustment mechanism works well.

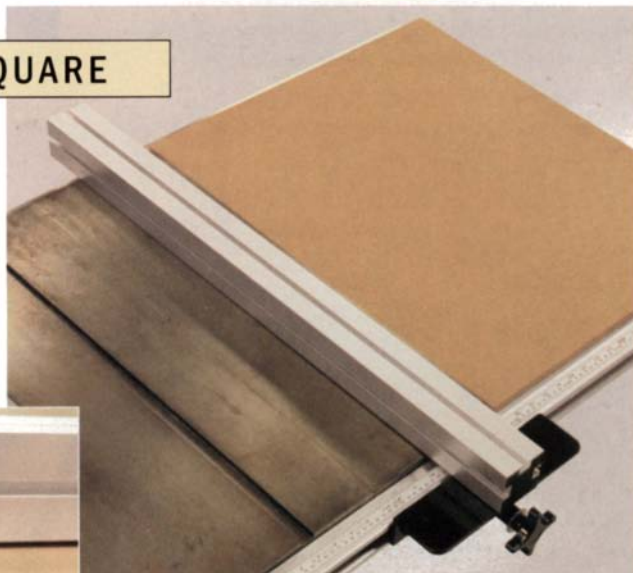
It should be noted that the Exact-I-Rip fence system will fit only on saws with 27-in.-wide tables. Once we figured out how far below the table edge to drill the rail mounting holes (1½ in.), the Exact-I-Rip was easy to install.

The Craftsman fence slides loosely along its front rail until it is locked with its lever. And here is where the fence system's major flaw becomes apparent. If the fence is not pushed tightly to the front of the saw, and it is skewed on the rail when the locking lever is pushed down, the fence can lock out of parallel to the blade. Worse yet, locking the skewed fence twists it permanently out of line by ¼ in. or more.

It is our feeling that the four bolts that hold the fence to the head are undersized and too close together to hold the fence and head in alignment. We believe that the undersized bolts are also the cause for this fence system's poor performance in the whack test. If Craftsman addressed this problem, the Exact-I-Rip could be an excellent fence system.

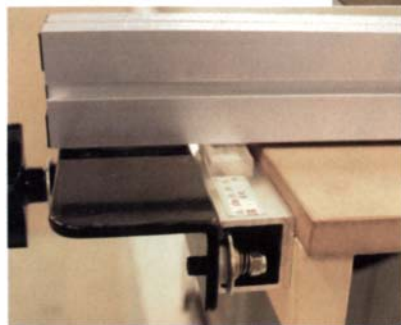
MULE ACCUSQUARE

Mule has a locking knob instead of a lever. At \$199, this is the least expensive fence we tested. The Mule doesn't have a lot of the bells and whistles of other systems, but a redesigned front rail makes this an adequate fence system.



Mule's spring-loaded wheels ride in a U-shaped channel. Turning the locking knob compresses the springs and holds the head assembly to the front rail. The fence locks to the front rail only, but it slides along the back rail on a nylon block.

Delta Unifence—This is an excellent and unique system with lots of bells and whistles. The extruded-aluminum fence can be affixed to the massive cast-aluminum head assembly in numerous positions. Two large toggle bolts hold the fence to the head assembly. By loosening the bolts, you can turn the fence around so that it acts as a ½-in.-high fence (useful, the manufacturer says, for ripping veneers or offset materials) or as a 3½-in.-high fence. The fence can be mounted to either side of the head assembly—a possibly handy feature for cutting operations made on the left side of the blade. Perhaps the most useful aspect of the fence is that it can be locked anywhere along its length, making a handy guide for crosscutting with a miter gauge (see the inset photo above).



The cursor is easy to read, but there are two hairlines on it: one for reading the fence in its 1/2-in.-high setting and one for the 3 1/2-in.-high setting. We thought we would rarely use the 1/2-in.-high setting and would end up putting electrician's tape over that cursor line to avoid confusion.

Mule Accusquare—At \$199, the Mule Accusquare is the lowest priced fence system we reviewed. The extruded-aluminum fence has a T-slot made from angle iron. The fence is attached to the angle-iron head with four bolts. Unlike the other fences, the Mule locks by turning a large knob instead of a lever. Turning the knob tightens a T-bolt in the fence, locking it to the front rail.

The front rail relies on attachment to the saw table for its straightness and rigidity. In fact, the instructions address this: "The front guide rail must be straight after it is bolted to the saw. Most, if not all, front rails on replacement rip fences are not straight and only become straight when bolted to your saw." We think other manufacturers would take exception to this statement.

When John assembled the fence system, he couldn't get it to slide easily on the rail. Close inspection revealed some poorly machined washers on the rollers that caused the fence to abrade the aluminum front rail. A little work with a file and flipping over the washers alleviated the problem. The instructions are very good, aided by an overview of the installation process on the cover page.

Paralok 2—Deryl Waters is an architect who hated the fence on his tablesaw. He modeled his Paralok fence after an architect's parallel-rule drafting table. Since introducing his fence in 1983, Waters has sold more than 10,000 units, with no complaints from any of his customers, he says.

The Paralok 2 fence is held parallel to the sawblade by its attachment, front and rear, to braided stainless-steel cables that travel in ball-bearing pulleys mounted under the steel angle-iron rails. When you move the fence, the cables move around the pulleys. A lever clamps the anodized-aluminum fence to the rails.

This system is quite different from the others in that there is no real head assembly; it is simply a fence with a locking lever at one end. Theoretically, if the fence is set parallel to the sawblade and the cables



PARALOK 2

Paralok 2 operates like a parallel-ruler drafting table. Unlike other fence systems, the Paralok 2 fence doesn't rely on its attachment to a head assembly for its rigidity. The fence attaches front and rear to braided stainless-steel cables that ride on pulleys under the rails' four corners.



The cable rides in pulleys. The pulleys are mounted out of the way, underneath the four corners of the rails. Unless the cables stretch or the cable-lock blocks loosen—neither of which is likely—the fence stays parallel.

don't stretch, the fence should never go out of alignment. The fence did very well in both the parallelism and whack tests.

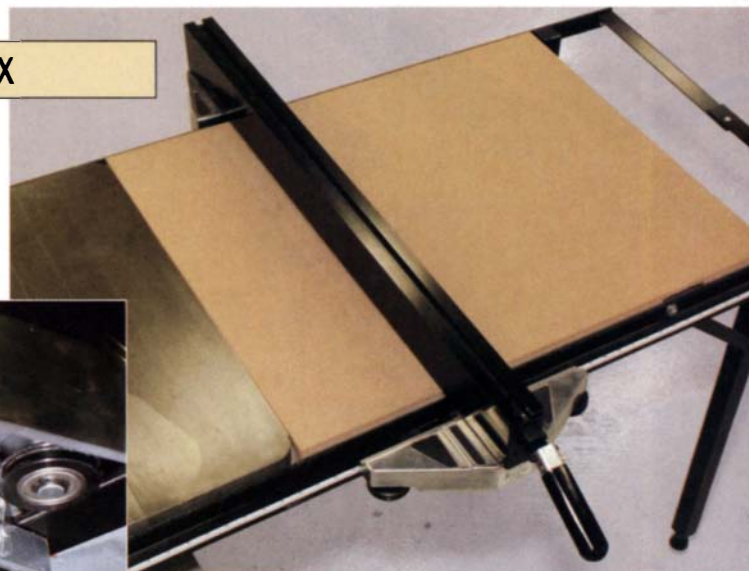
The measurement scale is easy to read; a steel cursor fits close to the adhesive tape rule. The cursor has a vernier scale mounted to it. The cursor allows simple, precise settings between the graduations on the tape, in this case 1/64 in. on a tape that reads only to 1/16 in. It's odd that the vernier scale

is not mentioned or explained in the instruction manual; it's very useful.

Shop Fox—The Shop Fox is marketed by the same company that sells Grizzly tools. A black, anodized, extruded-aluminum fence, connected to a substantial polished aluminum head, rolls on grooved ball-bearing wheels that roll on angle-iron rails. The fence locks by means of a Vise-Grip-

SHOP FOX

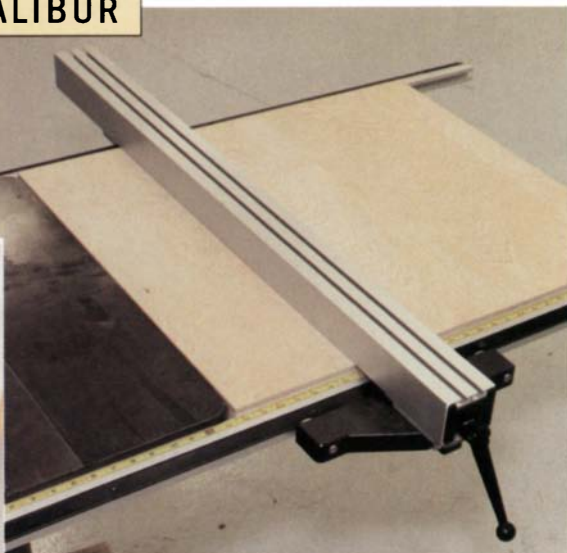
Nice knurls. The knurled guide wheels on the front of the Shop Fox also work as the system's clever micro-adjust mechanism.



Shop Fox has a complex locking mechanism. The locking mechanism has more than 40 moving parts, making it the most complex system we looked at. Adjusting the mechanism requires major disassembly.

SOMMERVILLE EXCALIBUR

Sommerville Excalibur has excellent finish and well-written instructions. The fence rolls easily along its rails. Fence adjustments are simple and easy.



Fence moves on flanged wheels. The aluminum front rail looks and feels substantial, but mounting it to an uneven saw table can cause it to warp and allow the fence to slip when locked. Finicky and exacting shimming will cure the problem.

VEGA PROFESSIONAL

Front rail hangs off saw table. The chromed steel tube rail attaches to the saw table at only two places, doing away with the need to shim an uneven table. Bolts under the two aluminum angles make it easy to adjust the rail height.



Lock the microadjust lever and dial in a precise setting. After dialing in a precise setting, you then lock the main lever. The Vega fence locks on the front rail only.

type clamp that grips the front and rear rails. Locking the lever requires some effort, and it unlocks with a violent snapping motion that surprised us.

The Shop Fox is by far the most complicated fence system we looked at. Although the fence moves smoothly and locks solidly on its rails, the overall accuracy of the system is compromised by the lightweight

angle-iron front rail that came from the factory bowed and rippled. In our parallelism test, the measurements were unacceptable: At 1 ft. from the blade, the fence measured .038 in. out of parallel toward the blade; at 4 ft. from the blade, the fence had drifted .105 in. out of parallel away from the blade. The fence locking system has more than 40 moving parts, and the instruction manual

SOME SPECS AT A GLANCE

Make and model	List price/warranty	Locking system
Biesemeyer (800) 782-1831	\$360/ Two year limited	Front rail
Craftsman Exact-I-Rip (800) 377-7414	\$270/ One year limited	Front and back rails
Delta Unifence (800) 223-7278	\$454.50/ Two year limited	Front rail
Mule Accusquare (905) 898-4110	\$199/ Lifetime for home use*	Front rail
Paralok 2 Quintec Mfg. (800) 423-9611	\$350/ Two year limited	Front and back rails
Shop Fox Woodstock Intl. (800) 523-4777	\$315/ One year limited	Front and back rails
Sommerville Excalibur (800) 357-4118	\$379/ Unlimited	Front and back rails
Vega Professional (800) 222-8342	\$325/ One year limited	Front rail

*Two-year for commercial use

devotes six pages to adjustments and troubleshooting. Adjusting the fence requires major disassembly.

Sommerville Excalibur—This T-slotted, Canadian-made fence slides on front and rear, flanged ball-bearing wheels that ride on flat steel bars that are set into extruded-aluminum rails. A light touch of your finger slides the fence along its way. A lever locks the fence by clamping against the rear rail, which, in turn, compresses stiff springs behind the flanged wheels in the head assembly and forces the head casting against the front rail.

The instructions for the Excalibur fence system say it is important that “the front and back edges of your saw’s table provide a flat mounting surface.” The Excalibur’s front and back rails are surprisingly heavy, but their cross sections are small, making

SUBJECTIVE RATINGS

Rail length (other lengths available)	Fits saw sizes	Instruction manual	Finish quality	Rail installation: (1) on machined table; (2) on rough table	Fence adjustments: (1) parallelism; (2) locking mechanism	Vertical adjustment	Vertical squareness from factory
84 in. (64 in., larger sizes by custom order)	Any	Good	Excellent	(1) Fairly easy; (2) requires shims and/or filing of table edges	(1) Excellent and simple; (2) easy	Not adjustable	Fence slightly out of square to table
70¾ in.	27 in. deep only	Some sections clear; others are confusing	Excellent	(1) Fairly easy; (2) requires shims and/or filing of table edges	(1) Fairly easy; (2) easy	Not adjustable	Fence square to table
83¾ in. (62 in., 128 in.)	Any	Fair; adjustment instruction inadequate	Excellent	(1) Fairly easy; (2) requires shims and/or filing of table edges	(1) Excellent: simple and precise; (2) simple	Simple	Fence square to table
48 in. (60 in., 72 in., 96 in.)	Up to 28 in. deep	Very good; contained overview of installation	Very good, except for chipped cursor	(1) Fairly easy; (2) requires finicky shimming and/or filing of table edges	(1) Fairly easy; (2) no adjustment, due to design	Impractical instructions	Fence very slightly out of square to table
60 in. (48 in., 72 in., 80 in., 96 in.)	Order to fit your saw	Good	Excellent	(1) Fairly easy; (2) requires shims and/or filing of table edges	(1) Very easy; (2) easy	Not adjustable	Fence slightly out of square to table
72¼ in. (48 in.)	27 in. deep only	Fair; numerous small mistakes	Good; some bad spots on anodizing	(1) Fairly easy; (2) will need carefully fit shims or grinding to avoid warping front rail	(1) Slightly complicated; (2) requires major disassembly	Complicated	Fence slightly out of square to table
78 in. (up to 144 in.)	Up to 32 in. deep	Easy to follow and well organized	Excellent	(1) Very easy; (2) difficult: rails can still bow after precise shimming	(1) Very easy; (2) very easy	Not adjustable	Fence slightly out of square to table
62 in. (72 in.)	Up to 32 in. deep	Fair	Poor	(1) Excellent; (2) installation unaffected by rough edges	(1) Fairly easy; (2) no locking adjustment	Not adjustable	Fence square to table

them prone to deflection. Therefore, bolting the rails to a rough or uneven saw table warps the rails. And if you shim the rails off the tail with washers, the extreme pressure exerted by the fence's locking mechanism will cause the rails to deflect. This can cause the fence to slip on the rails or fall out of alignment. Likewise, it is imperative that any extension table you install fit tightly between the rails.

All in all, the Excalibur is a substantial, easy-to-use fence. If your saw's edges are so rough that the rail will need lots of shimming, it might not be the fence for you. (Please note that another manufacturer makes a fence called the Excalibur, which is one of the many Biesemeyer clones. See the related story on p. 51.)

Vega Professional—The front rail on the Vega Professional fence system is a heavy-

duty, 2-in.-dia. chromed steel tube. The rail stands off the saw table on hefty aluminum brackets, thus doing away with any rough-table-attachment problems other fence systems might have. The brackets have built-in height adjusters that make aligning the front rail very easy.

The anodized-aluminum fence is bolted to a painted, extruded-aluminum head assembly. A smaller secondary head, attached to the main head assembly, has a knurled thumbwheel that is used for fine adjustments. The fence locks only to the front rail by means of a cam-operated lever. It rides on, but does not lock to, a square-tube rear rail.

The Vega Professional is an excellent fence system that's very solidly built. It is easy to attach, especially to saw tables with poor mounting surfaces. It may seem like quibbling, but we were a little disappoint-

ed with the sloppy finish on this otherwise well-machined fence system.

Better fences make better woodworkers

As these fence systems show, there are many ways to keep a rip fence parallel to a tablesaw blade. An accurate fence system can eliminate a lot of fiddling. Read the chart, check your pocketbook and decide which features are important to you.

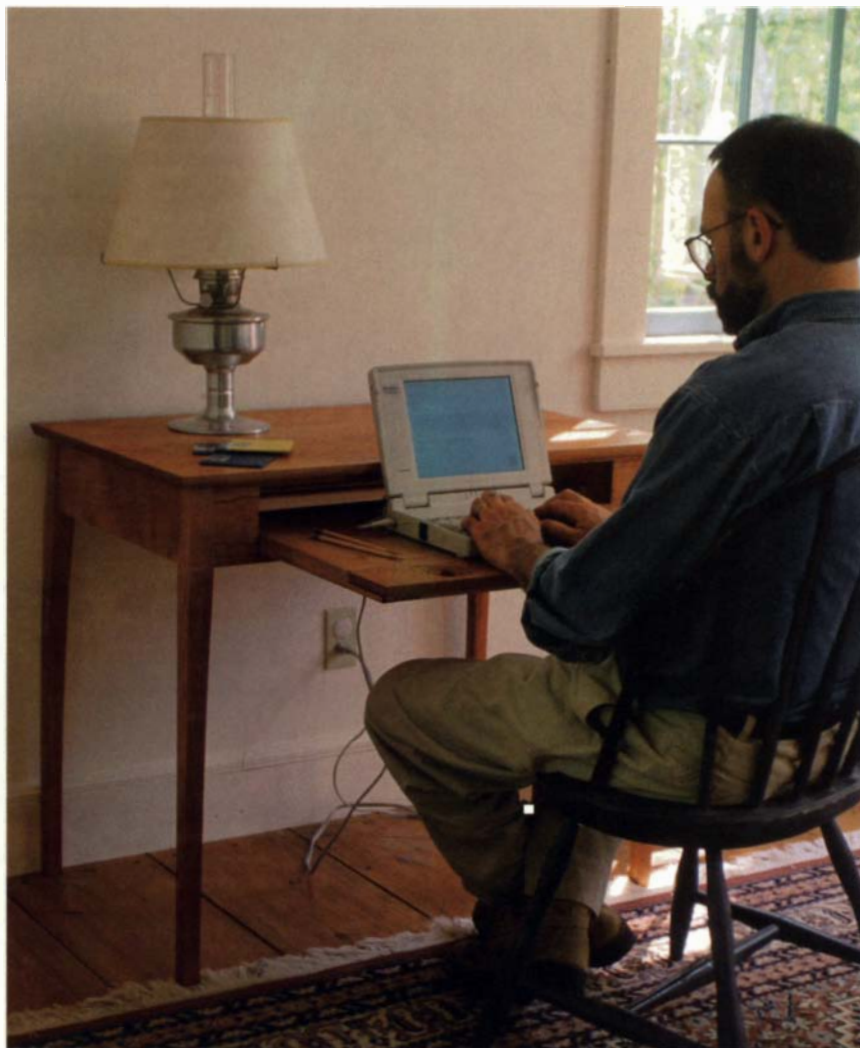
In the same way that a seat belt doesn't make you a safer driver, a good after-market fence system doesn't make you a safer woodworker. Be careful: Just because you have a new fence on your tablesaw doesn't mean you can send boards willy-nilly through the blade at 100 mph. □

Jefferson Kolle is a senior editor at Fine Woodworking.

A Laptop Computer Desk

A sliding tray
with a fold-down
drawer front hides
a laptop computer
in a living-room table

BY
STEPHEN LAUZIERE



A friend of mine is a writer and the father of three little kids. The hard drive on his computer got loaded up with kiddie computer games, and the keyboard got loaded up with spilled juice and Cheerios. As he put it, the whole machine was sticky enough to support an ant colony. So he got a laptop that he could move around the house when he worked, out of harm's way of the sticky kids. When he wanted to work, he'd set up his laptop on a table, and at the end of a writing session, he'd put his laptop back in the case and hide it somewhere.

He came to me because he wanted a laptop computer table where he could leave his machine set up all the time. He had in

mind some kind of presto change-o piece of furniture that he could work at in the morning before anyone else woke up. And during the day, the furniture would serve as a regular table in his living room, computer concealed. He wanted something with a spring-loaded, lift-off top that was hinged at the back. He also wanted a lid support with a light inside that swung into place. It sounded like Rube Goldberg's nightmare. I told my friend to stick to designing sentences and paragraphs, and I'd design and build furniture.

Table and computer height differ

The proper height for a computer keyboard is about 26 in., and standard table

height is up to 30 in. It occurred to me that the difference between the two heights is about the vertical dimension of a drawer, a drawer that could hold a laptop computer. Phase one of the design process: I would make a table with the computer concealed in a drawer, and the drawer bottom would serve as the work surface for the laptop. Without asking, I knew my friend didn't want to rest his wrists on the top of a drawer front, fingers dangling over the edge to the keyboard. It sounded like carpal tunnel syndrome waiting to happen.

I needed a drawer front that somehow folded out of the way when the drawer was slid open. Also, the drawer bottom had to extend far enough forward to make a

Doubles as a Side Table



decent work surface, and it couldn't cant or fall forward under the weight of the computer and my friend's hands and forearms.

One last request from my friend: "I want the table to be light and delicate looking." Simple and sturdy would have been easier.

Inner frames support a slide-out tray

As it slides out, a drawer's sides and back, bearing on runners, keep it from falling forward. I knew that drawer sides, like a drawer front, would get in the way of my friend's hunting and pecking. I decided that a pull-out shelf—like the pull-out breadboard in the kitchen cabinets of the house where I grew up—was the way to go. Supporting the shelf was the design conundrum. The

dimension of the table between the insides of the front and back skirts would be only 18½ in., and I needed 13½ in. for the slide-out work surface for the laptop. Quite a cantilever! I knew I needed some support. A strong internal box that fits under the top and between the four legs was the answer. (Along with supporting the slide-out tray, the inner frames act as stops for the fold-down drawer front.)

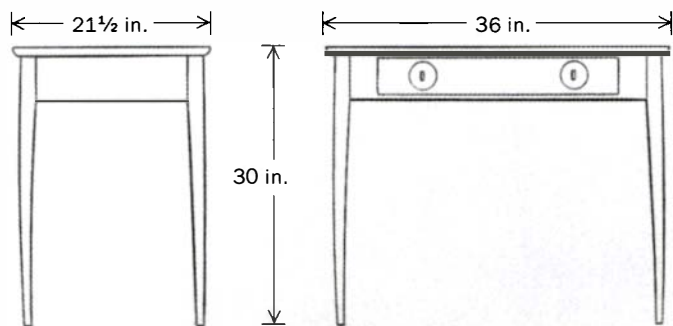
Tongues, grooves and polyurethane glue—I made a pair of tongue-and-grooved inner frames, the top one from ⅝-in. stock and the bottom one from ⅜-in. stock. I used ⅝-in. stock for the upper inner frame because I was concerned about keeping the

drawer narrow so a person sitting at the table wouldn't bump his knees. As you can see in the drawing on p. 60, each frame has two stiles at each end instead of one. I used double stiles to avoid wood-movement problems that might have occurred if I had used one wider stile at each end.

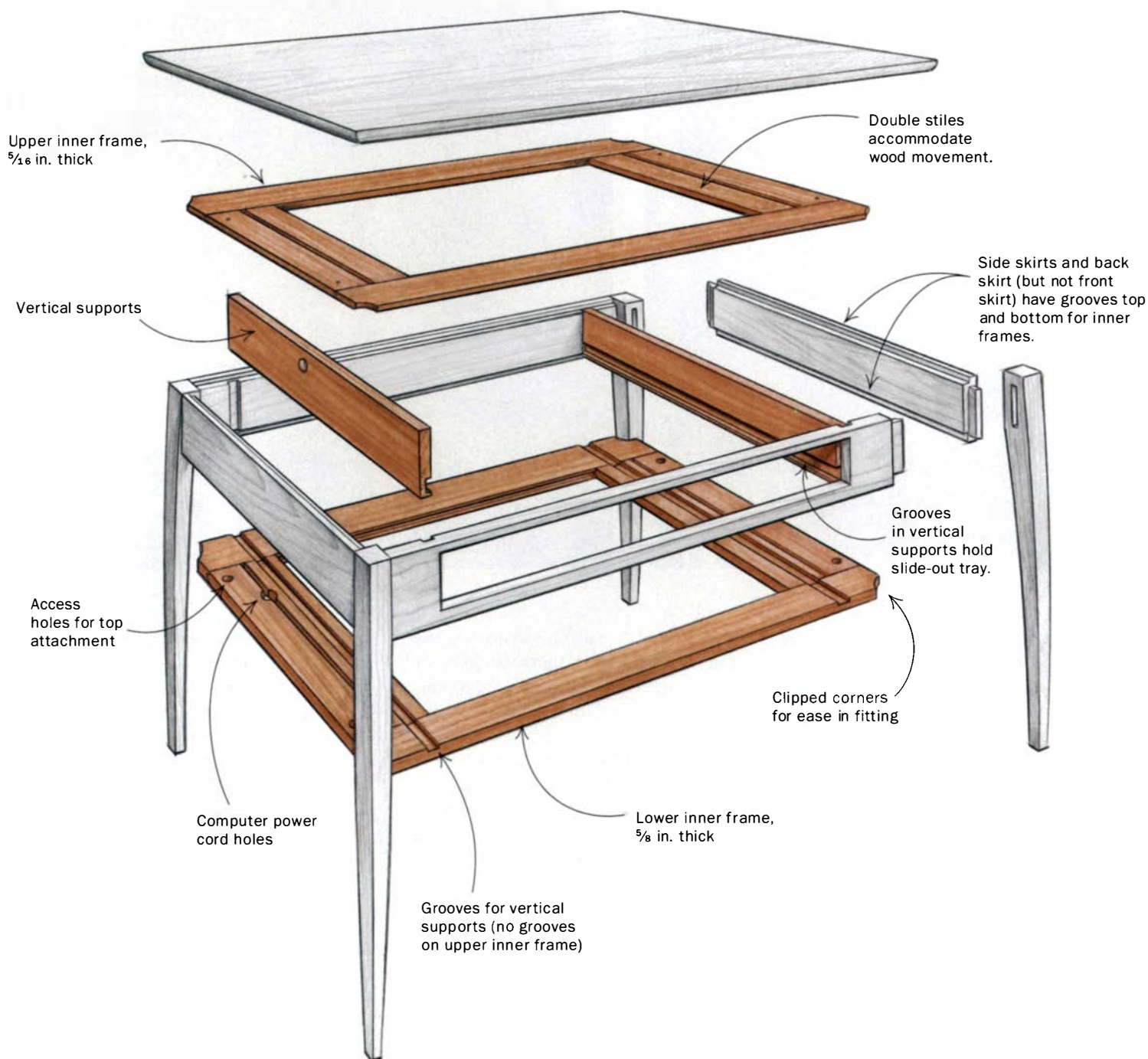
The frames are glued into grooves in the back and side skirts. In a similar way, two vertical supports that run the depth of the table are glued between the top and bottom frames. I made vertical supports with grooves cut into them that act as slides for the slide-out tray.

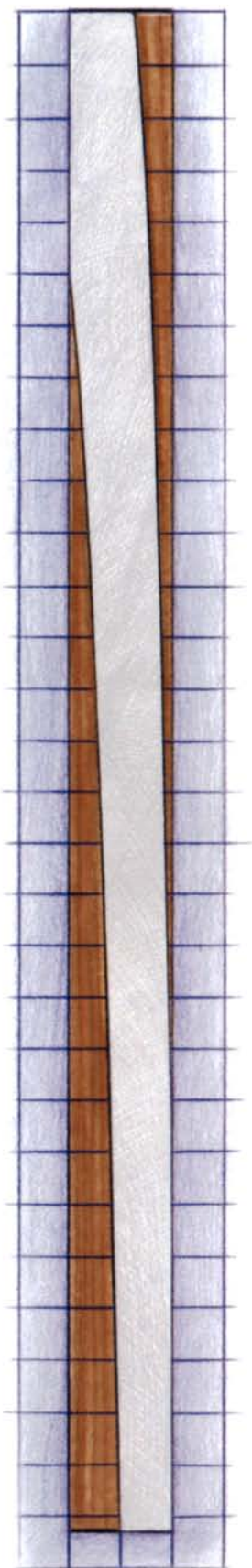
Extended stiles strengthen tray—Flat, ½-in.-thick panels captured in a 1-in.-thick,

STRONG INNER FRAMES SANDWICH A BASIC TABLE



To give support to the slide-out tray (see the drawing on p. 62), an upper and lower inner frame hold vertical support pieces (all shown in color). The tray slides in grooves cut in the vertical supports. The author first glued the four skirts to the four legs. He then glued the lower inner frame to grooves cut in the bottom of the back and side skirts. After sliding into place and gluing the vertical supports, he glued the upper inner frame to the grooves in the top of the three skirts.





Scale: 1 square = 1 in.



Make no mistakes about it. Before making any cuts, the author appraises each square leg billet to determine what will make the best outside edge for each curved tapered leg. Clamping the billets together for mortise marking reduces confusion and the chance for error.

Mark a little, cut a little, mark a little more. Because bandsaw cutting removes some of the marked lines on the opposing faces of the legs, it is necessary to re-mark part of the lines after cutting. A flexible template, made from thin wood, bends easily along the already-cut surfaces of the legs.



mortised-and-tenoned, stile-and-rail frame give the slide-out tray strength (see the drawing on p. 62). A solid board top could warp with the weather, and a plywood tray would have looked wrong. Also, plywood would have presented problems when mounting the fold-down drawer front.

The paneled frame is built in an unconventional manner. At the back side of the frame, three stiles butt a single rail. At the front of the frame, two short rails are sandwiched between the three stiles. The front-to-back stiles extend $3\frac{1}{2}$ in. past the two front rails, and they are relieved to $\frac{3}{16}$ in. A $\frac{3}{8}$ -in.-thick subrail is half-lapped onto the end of the extended rails to make a surface against which the butt-hinged drawer front can rest when it is folded down to become part of the laptop computer work surface.

Curved tapered legs

To add to the delicate look of the table, I made curved tapered legs from 2-in.-sq. billets. Before tracing the outline of the tapers with a template, I assessed each billet for the run of wood grain I thought would look best at the outside edge. While the billets were still square, I cut mortises for the skirts perpendicular to the edge I'd selected for the outside edge.

The outside curve on the legs runs full length. As you can see from the scaled drawing at left, the curve of the leg has a tighter camber at the top of the leg—a slight hip, if you will. The inside curve doesn't run the full length of the leg, rather it ends 5 in. down from the top of the square billet, leaving a straight uncurved area on the inside of the legs to accommodate the square-cut skirts.

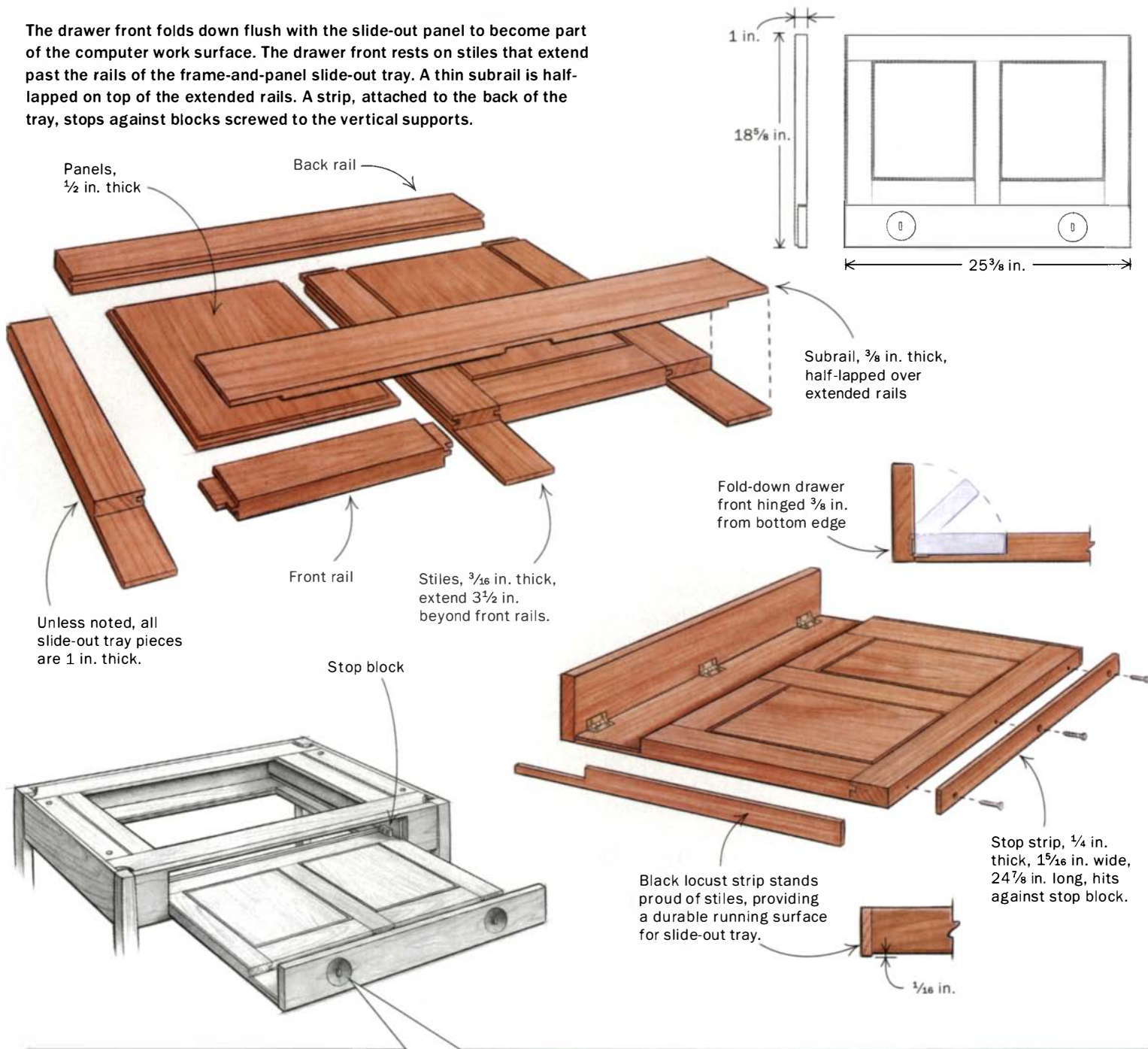
Each leg requires four bandsaw cuts. It can be tricky running a concave surface against a bandsaw table, so I made the two outside, convex cuts first. After roughing out the outside convex cuts, I dressed them with a compass plane so I would have a smooth surface flat against the bandsaw table when I made the two inside, concave cuts. If you have a compass plane, great; if you don't have one, a jack plane and a scraper will achieve the same effect. In the process of cutting the curves, you'll cut off portions of the lines you traced on perpendicular sides. After cutting one curve, you'll need to retrace portions of some lines using your thin, wood template (see the right photo above).

Assemble table; then build inner box

Once the legs were finished, I made the four skirts. In the drawing, you'll see that a series of dadoes and grooves are cut in the skirts to receive the frames and vertical members of the interior box. Assembling

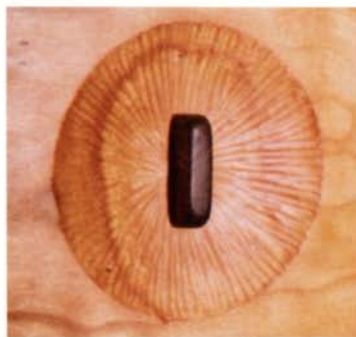
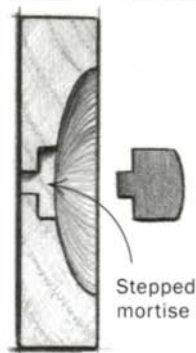
FRAME-AND-PANEL SLIDE-OUT TRAY HAS EXTENDED RAILS

The drawer front folds down flush with the slide-out panel to become part of the computer work surface. The drawer front rests on stiles that extend past the rails of the frame-and-panel slide-out tray. A thin subrail is half-lapped on top of the extended rails. A strip, attached to the back of the tray, stops against blocks screwed to the vertical supports.



RECESSED PULLS DON'T INTERFERE WITH TYPIST'S HAND

The author roughed out the recesses with a gouge and mallet and then finished them with a small veining tool. The carved black walnut pulls are glued into stepped through-mortises that maximize the gluing surface area.





Finessing screws. The lower inner frame encloses the bottom of the table, making it necessary to drill large holes through the frame to screw the table's top to the upper inner frame.

the legs and skirt is straightforward; I used polyurethane glue on all the joints.

I trimmed the two interior frames so that they fit tightly into the skirts. I used a jigsaw to cut off the four corners of each frame rather than notching the frames around each leg. There is no structural benefit to having a tight fit around the legs; what's more important is that the frames fit tight to both surfaces of the skirt dadoes.

I glued the bottom frame in place, installed the vertical members and then glued in the top frame.

Walnut pulls don't interfere with work surface

Because the drawer front folds flat to become part of the computer work surface, I didn't want to make pulls that stuck beyond the plane of the drawer front and thus interfered with typing. The recessed pulls I made added some texture to the table's otherwise plain front facade.

I made the pulls' spherical recesses by first drawing large circles on the drawer front and then using a Forstner bit to cut a $\frac{7}{8}$ -in. hole in the center of the circle to a depth of $\frac{3}{4}$ in. The small hole gave me an approximate depth gauge for the carved walnut pulls.

I roughed out the recesses with a large gouge and then finished them with a small veining tool. The walnut pulls are T-shaped. For maximum gluing area, each pull is glued into a stepped mortise: a rectangular mortise the length and width of the pull and a smaller, square through-mortise that

accepts what would be a vertical leg of the T (see the drawing on the facing page).

Details

Because of the way the lower inner frame encloses the underside of the table, it's a little tricky to get screws through the upper inner frame into the top. I drilled large holes through the lower frame so that I could access slots cut in the upper inner frame (see the photo above). The slots allow for tabletop movement. I found that using a magnetic screwdriver made it easier to poke the screws through the large holes into the slots.

Over time and with constant sliding, the cherry slide-out tray would wear against the grooves cut into the vertical supports. I glued strips of black locust against the sides of the tray. The strips are a shade wider than the thickness of the tray so that it rides on the strips instead of the cherry. The extreme hardness of the locust provides a very smooth and durable running surface for the tray.

To accommodate a laptop computer's power cord, I drilled two $1\frac{1}{2}$ -in. holes in the table—one through the lower inner frame and one through the vertical support. The holes are drilled at the midpoint of the sliding tray's travel.

The power cord pulls into the table when the tray is slid open, and the weight of the cord dangling to the floor pulls it out of the way when the tray is closed. Simple, no-fuss cord control.

Stop blocks screwed to the sides of the vertical supports and a stop strip screwed to the back of the slide-out tray keep the tray from being pulled too far forward. The last thing my friend needed was to end up with his laptop in his lap. □

Stephen Lauziere is a furniture maker in Ascutney, Vt.

Suntanned cherry

When I worked in a furniture shop in Boston, my boss had a neat trick. After we finished a piece of cherry furniture, we'd haul it out in the sun before applying the topcoat. Bright sunlight darkens cherry very quickly, giving it some desired patina without staining.

Applying a coat of hard finish, such as lacquer or urethane curtails the darkening process of cherry. Most finishes are compatible with an undercoating of oil, but check the label on the can for your particular finish. To hasten the darkening process, I apply a coat of oil to cherry immediately before I set it out in the sun. The piece of wood in the photo above sat in the sun from 9 a.m. until noon. There's a dramatic difference between the color of the suntanned wood and the patch that was protected from light by a scraper.

Here's a word of caution. One Saturday, I was working in the aforementioned shop, trying to catch up. I'd finished a table the night before, and when I got to the shop I carried it into the sunlight. On his morning rounds, the paper boy was kind enough to leave the Boston Globe on the table right where I would find it when I took lunch. —S.L.





Carving Tool Tune-up

With keenly honed tools, you'll sharpen your skills as a carver

BY IAN AGRELL

Learning to sharpen carving tools takes time, patience and practice, much like carving. I tell my students to treat sharpening as an art in itself. Of course, the real joy comes when they use a wonderfully sharp tool, which doesn't just cut wood but leaves the surface beautifully burnished—shiny, smooth, without any nicks or scratches.

There are a great variety of sharpening materials available—all manner of electric grinders, natural and man-made stones and honing compounds. I hold no brief for any particular machine or

stones. More important than the choice of sharpening system is knowing what shape is required for a carving tool's edge. Outside and internal bevels and the angle of the cutting edge relative to the tool's shank all have a vital bearing on how well the tool will behave in wood. I recommend that most tools be honed with inside and outside bevels of about 10°.

Now this isn't rocket science, so a degree or two off won't blast your carving skills out of orbit. But aim for consistency. Later on you may wish to experiment with different angles to see what

suits your style of work, and you may indeed find that changing some angles will be advantageous.

All tools require an edge that's square to the shaft

Sharpening by hand is of course the traditional method for getting a good edge. If you're a beginner, this method can be instructive because you can see the tool's edge taking shape, albeit slowly. It's easy to make corrections without removing too much metal or overheating the tool, which can destroy its temper.

There are two basic steps to sharpening carving tools. First, you have to shape the edge of the tool relative to the shaft (see the photos at right). Second, you must hone and strop the bevel(s).

Most carving tools work best with a cutting edge that is square to the shaft. If the corners or wings are rounded, you cannot get the entire cutting edge to arrive at the same depth when setting in (cutting down into the ground of a carving). Or, if you try to slide the edge of a rounded gouge into a small corner to remove wood, the nose or tip of the tool will get in the way. You will also have problems if the nose of the blade is ground away more than the wings. Skew chisels, whose blades are purposely angled, are the only exception.

A blade is easily squared by holding the tool vertically and dragging it back and forth over a coarse stone. Don't worry about the bevel now; just square the cutting edge relative to the shank.

The next step involves honing the bevel edge(s). Some tools have bevels on both sides of the edge; other tools have only an outer bevel. Much of the honing can be done on the same benchstones you use to sharpen other tools, such as bench chisels and plane irons. For honing the inner edges, you will need smaller stones, called slip stones, and these come in a variety of shapes to fit different tools. Go through successive grits, as you would when sharpening your other bench tools.

After an edge has been honed, a sliver of metal, called a wire edge, remains on the opposite side just sharpened. To remove it, and finely sharpen the edge even more, I strop the edge using a piece of leather (2-oz. shoe sole leather, which is available from a cobbler) to which has been added a small amount of metal polishing compound, such as jeweler's rouge.

Chisels are the easiest of tools to sharpen

Although a straight #1 is not used much in the European style of carving, it is useful for lettering. The #1 is therefore sharpened on both sides, which also helps it reach into nooks and crannies.

Grip the chisel in your right hand, and place your index finger atop the blade (see the top photo on p. 66). Place the fingers of your left hand over the right index finger, and move the tool back and forth, sideways across the stone, holding it at 10°. Work from coarse to fine. Both sides of a chisel can be sharpened in this manner. For skew chisels, hold the chisel at the skew angle to the stone, and swipe it back and forth. Finish by stropping with leather charged with metal polish.

Gouges require a smooth, rotating technique

To carve smooth, long sweeps, gouges require shallow bevels that allow the tool to be held at about 25° to the work. I recommend a continuous 10° outside bevel for most gouges.

It's best to practice your sharpening on a shallow gouge first, such as a #3. (For more on selecting carving tools, see *FWW* #122,



BAD

BAD

GOOD

The edges of most carving tools should be square. Gouges with convex (left) and concave (center) edges will give you fits when carving. A square edge (right) provides the best control.



Grind a crooked edge square. Hold the tool vertically, and rub it back and forth across a stone, maintaining a 90° angle.

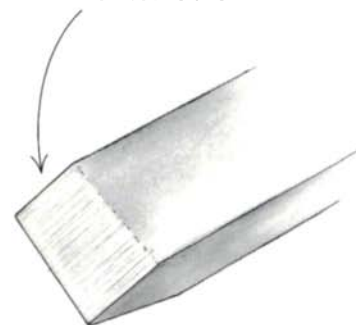
pp. 80-83.) To hone the outside bevel, grip the gouge with your right hand, and lay your index finger inside the flute. Allow the handle to run up the under side of your right wrist so that your whole forearm and chisel address the stone at a consistent angle. Place your left hand over your right to apply extra pressure (see the bottom left photo on p. 66).

Slide the gouge from side to side while simultaneously rotating it so that you reach the end of each sweep at the corner of the blade. Continually check the blade to make sure that the metal is being

CHISELS

Sharpening chisels is fairly simple. Hold the chisel 10° to the stone, and slide it back and forth. Do both sides this way.

10° bevels on both sides



removed evenly, paying attention to those areas that need more work. With high-section, deep-fluted tools like a #11 gouge, you will have to split the task into three actions, the two sides and the middle section. The bevel from the heel to the cutting edge should be straight and neither convex nor concave.

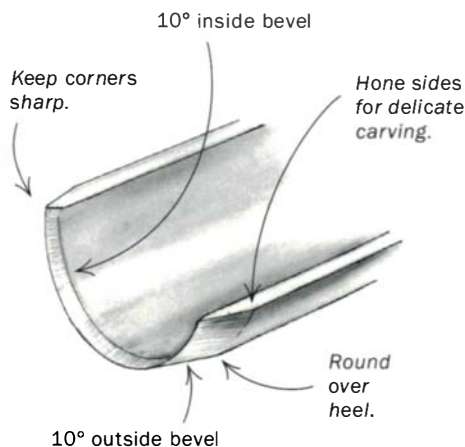
I also remove the ridge at the heel, where the bevel meets the shank, by swiping it across the benchstone in a rolling motion. Rounding this region will make your carving flow better, particularly when using spoon gouges. For delicate carving, it's also a

good idea to remove a small amount of metal on the side of the gouge (see the bottom right photo), which will prevent the tool from becoming a wedge in deep, stabbing cuts. Finish by stropping the bevels with leather and metal polish.

To check for sharpness, I hold a tool so the blade is facing me. A sharp edge will look like a thin smile and not reflect light. If it looks good, I make a test cut on a piece of soft pine, cutting at an angle across the grain. If the tool leaves scratch marks, it means the edge has a dull spot or a nick, and I sharpen that area some more.

GOUGES

Sharpening gouges requires two coordinated motions. Grip a gouge as shown, hold it 10° to the stone and slide it back and forth while simultaneously rolling it so that you remove the same amount of material along the entire bevel.

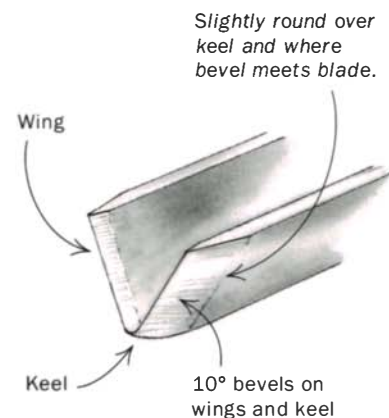


Sides of some gouges need dressing, too. Remove a small amount of material from the sides to keep the tool from acting like a wedge when making deep, stabbing cuts.



V-PARTING TOOLS

Sharpening V-tools. After grinding the bevels on both wings, grind back the keel at the same angle.



Looks sharp. A properly sharpened V-parting tool as seen from the front. Note the slightly rounded bottom edge.

A gouge with only a back bevel is delicate because the cutting edge is very thin and will snap off when carving hardwoods. That's why you have to open the mouth or hone a narrow bevel on the inside face of the cutting edge. An inside bevel strengthens the cutting edge and enables you to carve with the inside of the gouge.

The easiest way to hone the inner bevel, which should also be 10°, is to move a slip stone from side to side. Alternately, you can clamp your stone to the bench and move the gouge across it. Again, if the bevel is too steep, you will not be able to work at a low enough angle to get smooth, flowing cuts. This method will create a good everyday gouge.

When your bevels are crisp, hone them using a piece of leather charged with metal polish. For the inside bevel, fold a piece of leather, or wrap it around a dowel.

V-parting tools require the most patience

V-shaped tools such as parting tools and veining tools cause carvers the most misery because they are unforgiving when sharpened poorly. They need to be sharpened keenly and evenly. First be sure the edge is square to the shank. Then sharpen each bevel separately, being careful to remove the same amount of material on both wings. Hold the tool as you would a chisel, tilted up 10° and perpendicular to the stone, and move it from side to side.

Be careful not to round the outer edges or hook the base. Once the wing bevels are ground, you will have what could be described as a keel at the bottom where the two sides meet. Hone back the keel about 10° (see the photo at left above). Finally, round the edge of the keel to give it a U-shape (see the photo at right above). To prevent both sides of the tool's heel (where the outside bevels meet the shank) from catching, slightly round these areas, too (see the drawing above).

You do need a V-shaped slip stone, of the same angle or less, to remove the burr on the inside face, but don't hone a bevel on the inside. Finish off by stropping. Expect the V-tool to require more stropping than other carving tools before it creates a clean cut.

Maintaining and storing carving tools

Your tools will retain their edge with an occasional stropping. Every now and then they will have to be rehoned. They should be picked up separately and put down in such a way to prevent them from knocking together and chipping an edge. When you carve, place the tools you are using in a line with the cutting edge facing you. In this way, you will immediately be able to select the tool you require, then pick it up and carve. □

Ian Agrell carves and teaches in Mill Valley, near San Francisco, Calif.

New Water-Based Finishes

They're more durable, easier to apply and look a lot better, too

BY ANDY CHARRON

A lot of woodworkers won't get near water-based finishes because they believe these products cause excessive grain raising, don't adhere well over oil-based stains and look like plastic. When I first began using water-based finishes about eight years ago, these products were indeed difficult to use and didn't look so hot. That's not the case anymore. Water-based finishes are getting better all the time. Also, they don't give off noxious fumes, they dry fast, and they aren't flammable.

A prior survey in the magazine (*FWW* #115, pp. 48-53) evaluated 15 water-based finishes. Manufacturers have been busy, and there's a whole new crop of finishes on the market. I tried nine new finishes and compared them with a couple of time-tested finishes: nitrocellulose lacquer and shellac. I also compared the new finishes to Famowood Super Lac, a water-based finish that did extremely well in the previous evaluation, especially when measured on appearance.

The new finishes really stand out when it comes to stain resistance. Most were bulletproof. Grain raising wasn't objectionable with the majority of the finishes, and a few barely raised the grain at all. Some of the finishes



TARGET ENTERPRISES

OXFORD HYBRID GLOSS VARNISH

Good depth, warm tone. Closely approaches lacquer in appearance. Doesn't do well over oil-based stain.



GENERAL FINISHES HIGH PERFORMANCE POLYURETHANE

Slightly cloudy, plastic appearance. Flows out well.



COMPLIANT SPRAY SYSTEMS ENDURO WAT-R-BASE POLY OVERPRINT

Top-rated finish with a warm tone and good depth. Closely approaches lacquer in appearance.



J.E. MOSER COOL-LAC
The first water-based shellac. Has a warm color, but finish is very thin and doesn't build well, which makes it difficult to rub out without cutting through coats.

PARKS PRO FINISHER POLYURETHANE
Only a very slight blue tint (approaching neutral) and good depth. Fills pores well.

SHERWIN WILLIAMS KEM AQUA
Commercial spray finish, available only in 5-gal. containers. Slightly blue tint and cloudy. More difficult than average to apply.



HYDROCOTE RESISTHANE PRE-CATALYZED LACQUER
Slightly blue tint, cloudy. Easy to apply.



FSM CORP. CLEARLY SUPERIOR 455
Slightly blue tint, cloudy. Fills pores well but difficult to rub to an even gloss.



VAN TECHNOLOGIES VANAQUA URETHANE
Neutral tone but slightly cloudy. Builds and fills pores quickly.

WATER-BASED FINISHES



Finishes were tested on mahogany plywood. The author applied an oil-based stain to half of each panel, then three coats of finish.

Product	Manufacturer	Adhesion over oil-based stain	Stain resistance (22 max.)
Clearly Superior 455	FSM Corp. (800) 686-2006	Pass	19
Cool-Lac	J.E. Moser (Woodworker's Supply) (800) 645-9292	Pass	22
Enduro Wat-R-Base Poly Overprint	Compliant Spray Systems (800) 696-0615	Pass	21
High Performance Polyurethane	General Finishes (800) 783-6050	Pass	20
Resisthane Pre-catalyzed Lacquer	Hydrocote (800) 229-0934	Pass	20
Kem Aqua	Sherwin Williams (800) 474-3794	Pass	22
Oxford Hybrid Gloss Varnish	Target Enterprises (800) 752-9922	Fail	22
Pro Finisher Polyurethane	Parks (800) 225-8543	Pass	22
VanAqua Urethane	Van Technologies (218) 525-9424	Pass	22
BENCHMARK FINISHES			
Solvent-based nitrocellulose lacquer	Various	Pass	21
Super blonde shellac	Various	Pass	16
Famowood Super Lac	Eclectic Products (800) 349-4667	Pass	22

were difficult to apply, although most went on without a hitch.

Rating the products on appearance is the most subjective test, but an important one, and several finishes scored very high. Even the finishes that scored low on appearance are light-years ahead of what I was using five years ago. It's fair to say that water-based finishes are getting better, and I imagine the trend will continue.

Resins and additives have been improved

Traditional finishes such as lacquer and shellac have very few ingredients, primarily resins (solids that form the finish film) and solvents (also called carriers), which

dissolve the resins. Water-based finishes are similar in that they, too, contain resins and solvents. But water-based finishes have many more additives than traditional lacquers, sometimes as many as 20, to deal with the basic incompatibility of water and resin. The other chemicals, especially ones called surfactants, allow water and resins to mix together, forming an emulsion. As the water evaporates, alcohols or cosolvents soften the resins, allowing them to coalesce and form the finish film.

Although manufacturers are unwilling to give away trade secrets, they did tell me they've made headway with the types of resins and additives used in finishes. These improvements translate to finishes that

bond better to solvent-based products and are tougher, yet easier to sand and rub out.

With the exception of one water-based shellac, the resins in the water-based finishes I tested are acrylic, urethane or a combination of both. These finishes go by many descriptive terms, including lacquer, polyurethane or varnish, but for purposes of discussion, most water-based finishes are technically lacquers, meaning they can be redissolved by their own solvents.

Finishes were all tested the same way

I used squares cut from the same sheet of mahogany plywood to test all the finishes (see the photo above left). First, I applied a coat of Minwax red-mahogany oil-based

Heat resistance	Raised grain	Sanding	Best applicator	Appearance
Fail	Moderate to heavy	Moderate	Brush or spray	Poor
Fail	Moderate	Easy	Brush	Good
Pass	Minor	Easy	Spray	Excellent
Pass	Minor	Easy	Brush or spray	Good
Pass	Heavy	Moderate	Brush or spray	Fair
Fail	Moderate	Moderate	Spray	Fair
Pass	Moderate	Moderate	Brush or spray	Excellent
Pass	Moderate	Moderate	Brush or spray	Good
Fail	Moderate	Moderate	Spray	Good
Pass	Minor	Easy	Spray	Excellent
Fail	Moderate	Easy	Brush or spray	Good
Pass	Moderate	Easy	Spray	Excellent



Testing adhesion over an oil-based stain. A sharp knife was used to slice into the finish, then packing tape was placed over the cut. After five minutes, the tape was pulled off.

stain to half of each panel. I allowed the stain to dry for two days, then applied three coats of finish to each panel, using either a brush, a spray gun or a combination of both, going by manufacturers' recommendations. I let each coat dry for a minimum of two hours before lightly sanding and applying another coat. Although some manufacturers offer sanding sealers, all of the products I tested can be used on bare wood, and that's what I did. Then I subjected the panels to common household chemicals to see how they would hold up.

After I had finished with the various tests, I sanded the topcoats using 240-grit, 400-grit and 600-grit sandpaper, then rubbed them with pumice and rottenstone. I also

Finishes impress FWW editors

To see how the two best-looking water-based finishes looked on furniture, we applied them to small tables. A third table was sprayed with nitrocellulose lacquer for comparison.

The Oxford finish on the maple has a lot of depth and makes the grain of the wood pop, although it has a heavy yellow bias. The cherry also looked good with a more natural tone. The lacquer actually seemed to have less clarity than the others.

—Matthew Teague, assistant editor

The Enduro and Oxford finishes both impart a nice, warm tone to the wood and are not muddy like other water-based finishes I've used. When I ran a fingernail across the three tables, the Oxford finish was fairly easy to scratch, unlike the other two. I'll try the Enduro on my next project.

—Anatole Burkin, associate editor

The three finishes are indistinguishable to me. They reflect light with the same clarity, and they all give a good sense of depth. Also, the water-based finishes don't have that bluish "skim-milk" cast to them.

—Jefferson Kolle, senior editor



Three tables, three finishes.

Walnut table has a nitrocellulose-lacquer finish. Cherry table is finished with Enduro Wat-R-Base Overprint. Maple table has an Oxford Hybrid Gloss Varnish finish.



Food-stain test. Finishes were subjected to a variety of common foods and cleaners. Most finishes held up very well. Cleaning products, however, were hardest on the finishes.



Hot-spoon test. Several finishes were marred when a hot spoon was allowed to cool on the panel.

tested traditional shellac, nitrocellulose lacquer and a previously tested water-based product for comparison.

Testing adhesion over an oil-based stain—The adhesion test determines if a water-based finish will stick to an oil-based stain. I used a sharp knife or razor to slice an X into the finish where it was applied over the stain. Then I placed a piece of packing tape over the X and pressed down firmly. I let the tape sit for about five minutes and then yanked it off (see the left photo on p. 71). The finish held fast on eight panels. Only one finish chipped off, failing the test.

Common foods were used for the stain test—I gave each finish what I call the kitchen-table test. Tables are subjected to food spills, and a good finish should survive the onslaught as well as the chemicals used to clean up the mess.

I placed a small amount of the following common household products on each panel: milk, orange juice, hot coffee, mustard, ketchup, red wine, grape jelly, vinegar, olive oil, Windex and Fantastik (see the photo above). After one hour, I wiped each spot off, checking for damage. If there was no damage, the finish received 2 points. If the finish was slightly damaged (dull), it got 1 point. If the finish was severely stained, damaged or eaten away, it got no points. All of the finishes I tested scored at least 19 points, and several got a

perfect 22. Windex and Fantastik caused the most damage.

A finish for a table needs to withstand heat—Tables are often exposed to hot pots, cups and spoons. To re-create this scenario, I put a spoon in boiling water for a few minutes, then placed it on a test panel (see the right photo above). After the spoon had cooled, I removed it. If the spoon left no mark, the finish passed the test. If the spoon stuck to the finish or left a dull impression, it failed.

New products are easier to sand and rub out—Water-based finishes have a reputation of causing excessive grain raising and of being difficult to sand. A simple way to gauge the roughness is to brush a finger across the first coat after it dries.



Too-thin finishes are tricky to sand. Some finishes, such as J.E. Moser's Cool-Lac, a water-based shellac, go on so thin that it's difficult not to sand through to previous coats.

The first coat of finish causes most, if not all, the grain raising. In my test, if a panel felt rough, like medium-grit sandpaper, I rated the raised grain as "heavy." If the panel felt more like fine sandpaper, I rated it "moderate." If it felt like very fine sandpaper, I rated it "minor."

To determine whether a finish was easy or difficult to sand, I sanded all three coats with varying grits of fresh paper. I not only looked at how easily the finish powdered up and how much it clogged the paper, but I also considered how hard I had to work to achieve a smooth, flat surface. Thankfully, all of the finishes I tested fell in the easy to moderate range. In fact, several of the finishes were as easy or easier to sand than lacquer and shellac. For a high-gloss, rubbed-out finish, I found that using 1000-grit and 1200-grit wet abrasive paper (available at auto-body supply shops) prior to rubbing out with pumice and rottenstone gave me the best results.

Appearance is the most subjective test—Because most of the finishes scored well in the kitchen-table tests, the deciding factor comes down to looks. Admittedly, this is subjective. Something that looks good to me may not look good to you. To give a fair evaluation, I showed the panels to a couple of other professional woodworkers and weighed their opinions as well as my own. I used solvent-based lacquer as the benchmark against which all the finishes were judged for appearance.

Lacquer imbues wood with a warm tone, what I call a light amber color, and the finish also has clarity, which adds depth, especially after three coats or more. The best of the finishes approached this look. I downgraded finishes if they had a slightly cool or blue cast and were dull or cloudy.

Overall, the new products tested well

If the color of the finish were not an issue, I would consider using any one of these products, with the exception of J.E. Moser's Cool-Lac. Although the Cool-Lac scored well on the tests (better than traditional shellac) and had a true shellac color, I found it difficult to apply. The product is very thin, nearly the consistency of water, and contains a low level of solids. As a result, the coats go on very thin and don't build well. Building a deep, protective finish requires half a dozen coats or more.

My two favorite finishes are the Compliant Spray Systems Enduro Wat-R-Base Poly Overprint and Target Enterprises Oxford Hybrid Gloss Varnish. Enduro and Oxford look virtually identical to solvent-based lacquer. They give wood a warm tone and highlight the grain because of their clarity. Both are easy to apply, but the Enduro requires only three coats to develop a good build. When I went to rub out the Oxford after three coats, I cut through to bare wood before achieving a nice shine. You need to apply at least five coats if you plan to rub this finish out to a high gloss.

If I had to choose between the two, I would opt for the Enduro, because it dries incredibly fast and because it passed the adhesion test. I think most people would be hard-pressed to tell the difference between Enduro and solvent-based lacquer. The Oxford finish—which, like the Enduro, has a nice, warm tone—didn't adhere well over an oil-based stain (it held fine over bare wood). You can solve this problem by using a water- or alcohol-based stain or by applying a sealer of shellac between the oil stain and the finish. Not to be forgotten, Eclectic Products Famowood Super Lac, a finish that tested well in the previous article, ranks right up there with the Enduro and Oxford. It's easy to handle and apply. It rubs out extremely well, has good depth and a color very similar to that of nitrocellulose lacquer. □

Andy Charron operates Charron Wood Products in Windsor, Vt.



The color of some water-based finishes can be improved. To bring more warmth to a finish, dewaxed shellac can be applied as a sealer coat to bare wood. Or you can add universal tinting color (tube) or dissolved dye (bottle) directly to a finish to change its tone.

TINTING THE WOOD

Using shellac for a first, or sealer, coat will impart a warm glow to wood. It will also raise and stiffen the grain, making it easy to sand. Use fresh-mixed shellac that is dewaxed. You can also color the wood using dyes. A thin coat of a highly diluted water-soluble dye should give the wood just the right hint of color.

COLORING THE TOPCOAT

In some cases, you may want to color the topcoat itself. What you are actually doing is using the finish as a toner, which can be a bit tricky.

Pigments should be used in small amounts: You can use universal tinting colors (UTCs), which are available at paint stores, to alter the appearance of a clear finish. A small drop or two of an earthy tone like burnt umber or raw sienna goes a long way toward giving an otherwise bland finish a sense of color and warmth. However, pigments are opaque and may give the finish a dark, cloudy or muddy appearance. If you use pigments to color a clear coat, use them sparingly and take great pains to apply the finish as evenly as possible.

Water-soluble dyes are preferred: A better alternative to pigments are water-soluble dyes. Dissolve a small amount of dye in water first and then add a few drops at a time to the finish until the color is right. Remember, water will thin the finish, so use it sparingly. Because dyes are transparent, they won't give the finish a muddy look. Dyes, however, will not penetrate the resins; they really only color the liquid part of the finish, which will evaporate, leaving the dye in place. This can cause some blotching.

Alcohol dyes are the best way to tint finishes: Dyes that have been dissolved in alcohol will actually penetrate the resins in a finish and change their colors. The resulting finish is even in tone and uniform in color. I like to use TransTint honey amber from Homestead Finishing Products (440-582-8929), which comes in concentrated liquid form. Add four to six drops per quart of finish as a starting point to impart a warm tone.—A.C.



Add dye sparingly. A few drops of amber dye added to a neutral or slightly blue finish will give it a warm tone.

Improving the color of water-based finishes

Although some water-based products have improved to the point where they appear comparable in color to traditional lacquer or shellac right out of the can, others still have a way to go. Some look a bit bland, and others suffer from a very slight bluish cast. If you happen to like everything about your finish except its color, consider toning the wood or the finish.

Some finish manufacturers tone their products for customers who prefer a warm look. The Enduro Wat-R-Base Poly Overprint has an additive that gives the finish a slight amber tone. Hydrocote offers an amber additive that can be added to its finishes. There are other products available to help you color topcoats. Whatever you do, don't thin the finish beyond what the manufacturer recommends.

Dress Up Any Window with Period Trim

Arts-and-Crafts, Federal
and Victorian treatments
made in the shop

BY MARIO RODRIGUEZ

When it comes to windows, most homeowners, even woodworkers, don't put much thought or effort into the window trim. Trimwork is usually the final phase of construction and renovation projects, so it often bears the brunt of last-minute cost cutting. Workers settle for a bland 3-in. clamshell molding from the lumberyard. But once the job is completed, the trim actually comes under the closest scrutiny. As the focal point of a room, windows offer the perfect opportunity to showcase your woodworking skills. A distinctive period trim made in the shop begs to be noticed, not overlooked.

When I'm lucky enough to find old homes with original window trim in place, I'm always impressed with the unique design and quality. A few years ago, I worked on several New York City homes that were constructed in the early 1900s. The windows were trimmed with impressive Victorian designs that demanded your attention. Although the designs were intricate and seemed like difficult work, a closer look showed me that all the components were easily made in the shop and just as easily attached.

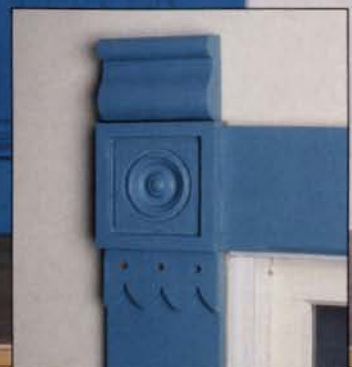
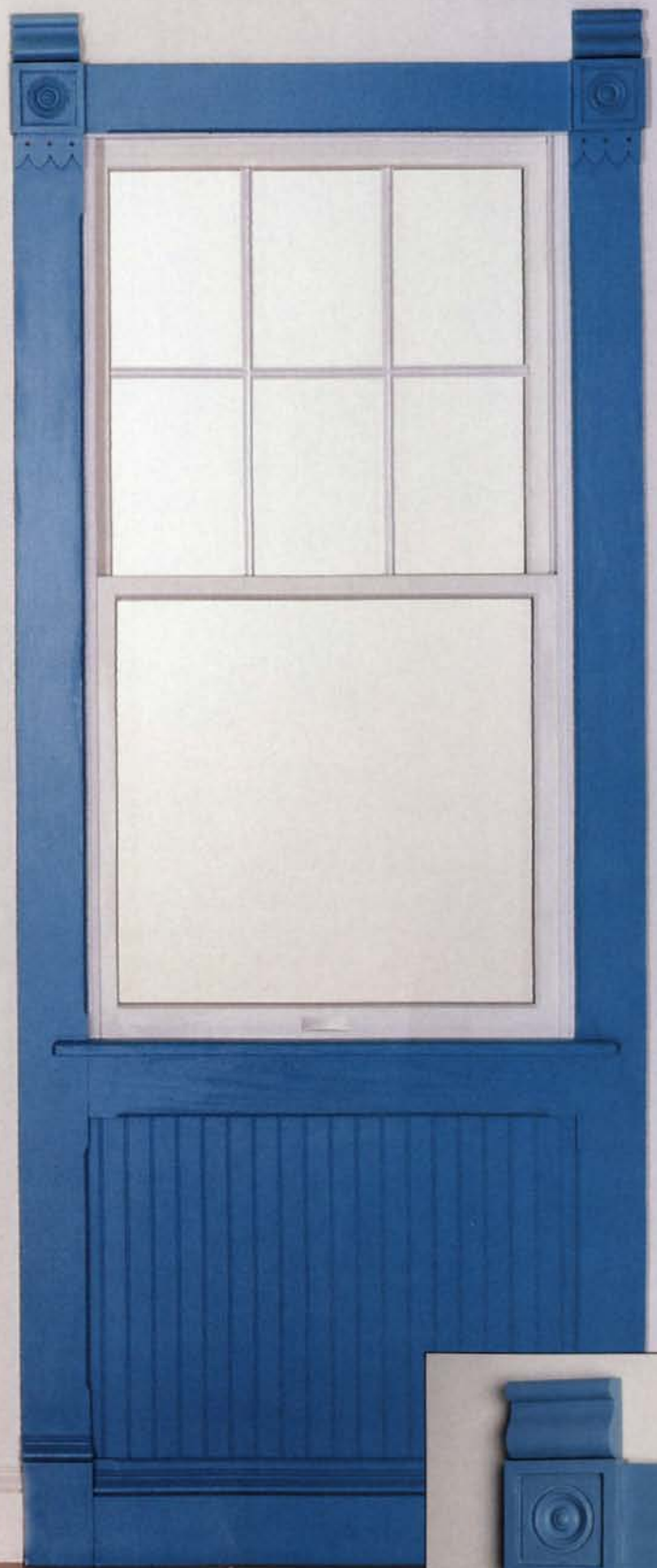
By exploring various techniques and compositions—combining shopmade moldings with manufactured pat-



Arts and Crafts

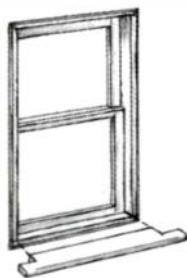
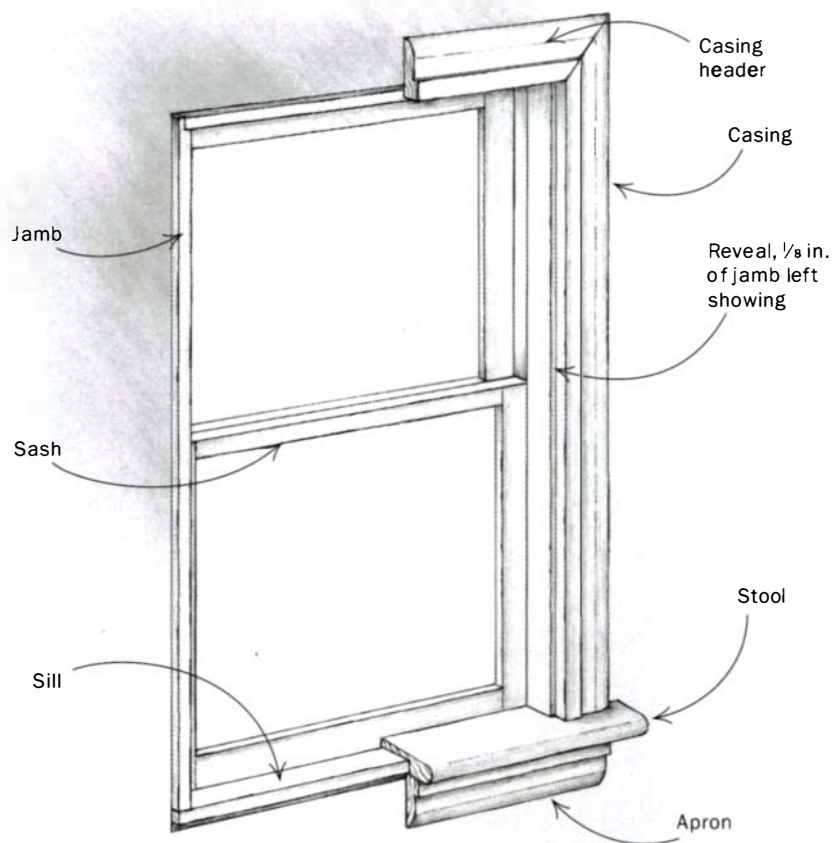


Federal



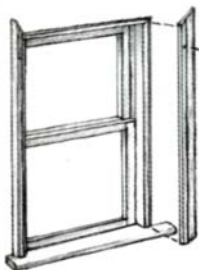
Victorian

ANATOMY OF A WINDOW

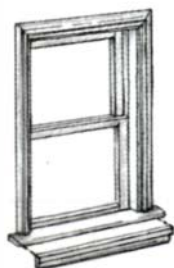


TRIMMING OUT A WINDOW

The first step in trimming out a window is to install the stool. When in place, the ends of the stool typically project $\frac{3}{4}$ in. past the edge of the casing. The next step is to scribe and cut notches on the ends of the stool so that it fits snug within the opening and against the sash. After cutting the stool, check it for level and fasten it to the sill of the window jamb with 6d finishing nails.



Now cut one end of your casing square and rest it on the stool. Then measure for the intersecting cut at the corner of the window unit. I like a good, visible reveal—about $\frac{1}{8}$ in.—where the edge of the casing meets the window jamb. This reveal provides a nice accent and also disguises any wood movement. When cutting the piece to final length, remember to leave it $\frac{1}{8}$ in. long at the top to allow for a reveal once the casing header goes into place. Tack the casing in place with a single nail toward the top. Then repeat the process on the other side.



The last piece to be measured and cut is the casing header. By simply tacking the pieces in place, you can make small adjustments in the position of the casing parts to close any gaps and to better align the molding patterns. When you're satisfied with the corner joints, nail everything down with finish nails spaced about 10 in. apart. The last piece to go up is the apron. Although purely decorative, the apron gives the window visual weight and balance. The apron's length should extend at least to the outside edges of the casing.

terms, employing simple appliques or using a biscuit joiner—a wide range of distinctive trim designs can be achieved. Each of the designs in this article exemplifies a particular period by using characteristic details to create a distinct look.

The purpose of window trim

The primary and most practical purpose of window trim is to keep out air and dampness by closing gaps between the wall opening and the window. But window trim does more than seal off a house from the outside—it also dresses up a window and integrates it into the room's decor.

Historically, interior trim designated the importance of a particular room. Fancy mantels and high baseboards were used in the front rooms reserved for business or entertaining guests. Simple trim and plain moldings were relegated to the back rooms of a house.

Different periods, different woods—

When trimming out a window, be careful to select a wood that fits the design. Not only is there a cost difference between species, but to be historically authentic, certain designs also call for certain types of wood. During the Federal period (1790-1830), pine was exclusively used for trim. In this preindustrial era, every stick of molding had to be tediously handmade with molding planes. Pine was readily available in large, clear slabs, and it was easy to work with hand tools.

In the 1860s, when mills mass-produced moldings, oak most often was the wood of choice. It was plentiful and posed no problems to the large industrial shapers and molders of the day.

In the 20th century, as the Arts-and-Crafts movement flourished, designers such as Greene and Greene turned to dark woods for their trimwork. They still employed the traditional Arts-and-Crafts oak, but for formal rooms, they chose mahogany and teak for their exotic, almost Oriental appearance. Designers also chose these rich and dark woods for the avant-garde structures of the time.

The wood you select must fit the style you're trying to create. However, with modern shops and tools, strict adherence to period wood selection isn't always necessary. If the trim is destined to be painted, for instance, the choice of wood is almost arbitrary. When you choose, keep your

budget, the wood's workability and the period style in mind.

Linear moldings for casings and stools—One advantage of designing your own window trim is that you can customize your own linear moldings. Whether you mill them yourself with a molding plane or router or buy them ready-made from the lumberyard, there are few limitations to what you can achieve.

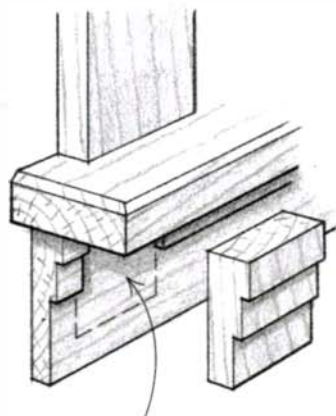
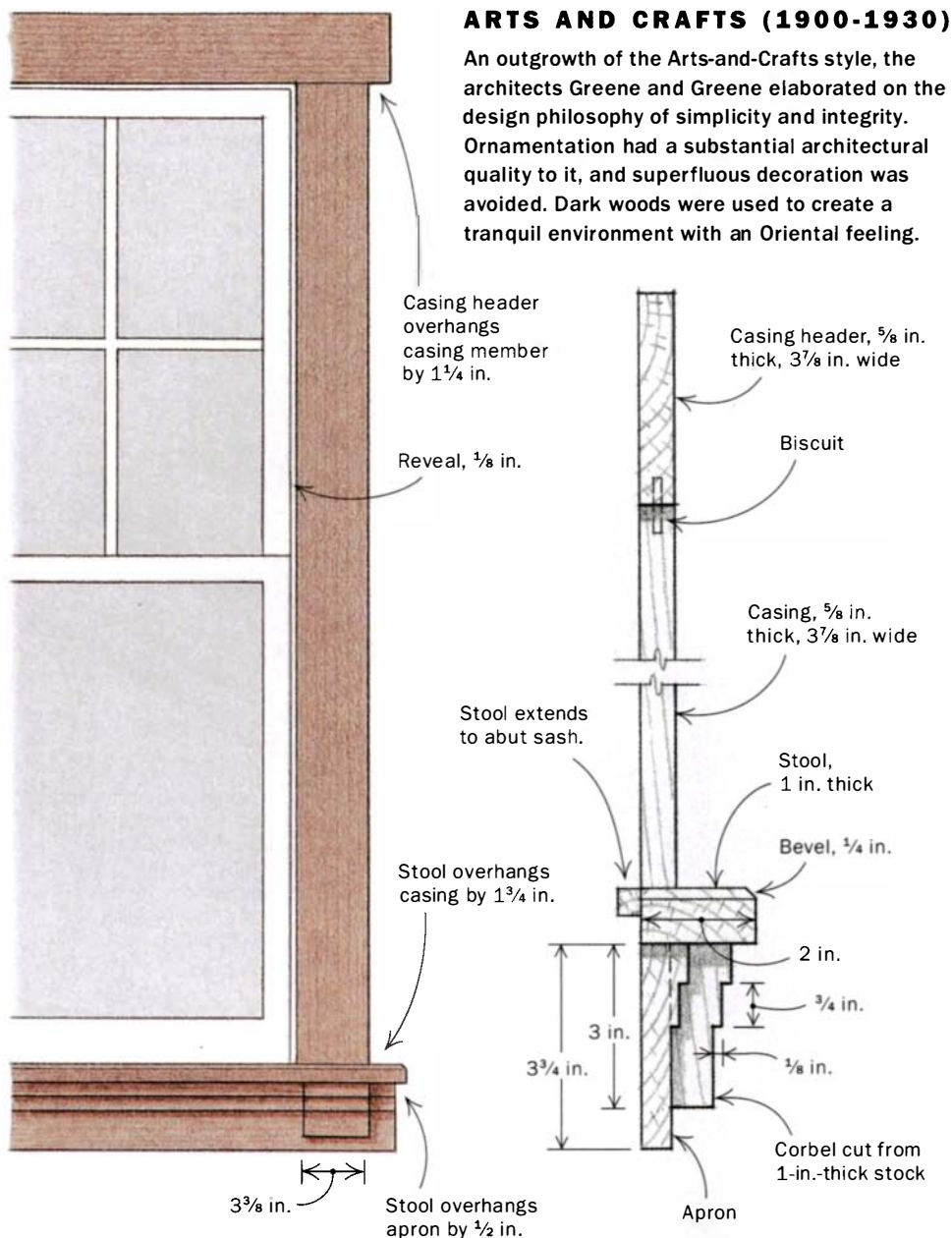
Because windows are rectangular, linear moldings are the simplest and quickest way to trim an opening. For the past century, most builders have purchased ready-made moldings instead of milling them in the shop. These moldings, priced by the running foot, are available in a variety of woods and dimensions, but the selection is limited to a few popular patterns. These patterns are sufficient for trimwork, but for a truly unique look, ready-made moldings can be altered or augmented with shop-made additions. For example, you can add back bands to increase the width of a window casing, as in the Federal window on p. 78, or gang up smaller moldings to create an altogether new pattern.

Another option is to have molding custom milled. If you need a specific profile in quantity, a millwork shop can produce the molding at a surprisingly reasonable price.

The quickest and most versatile method for producing small to medium quantities of molding is to mill the material in your own shop. Using router bits or shaper cutters enables you to create an endless variety of molding patterns on any wood.

Ornaments to suit your style

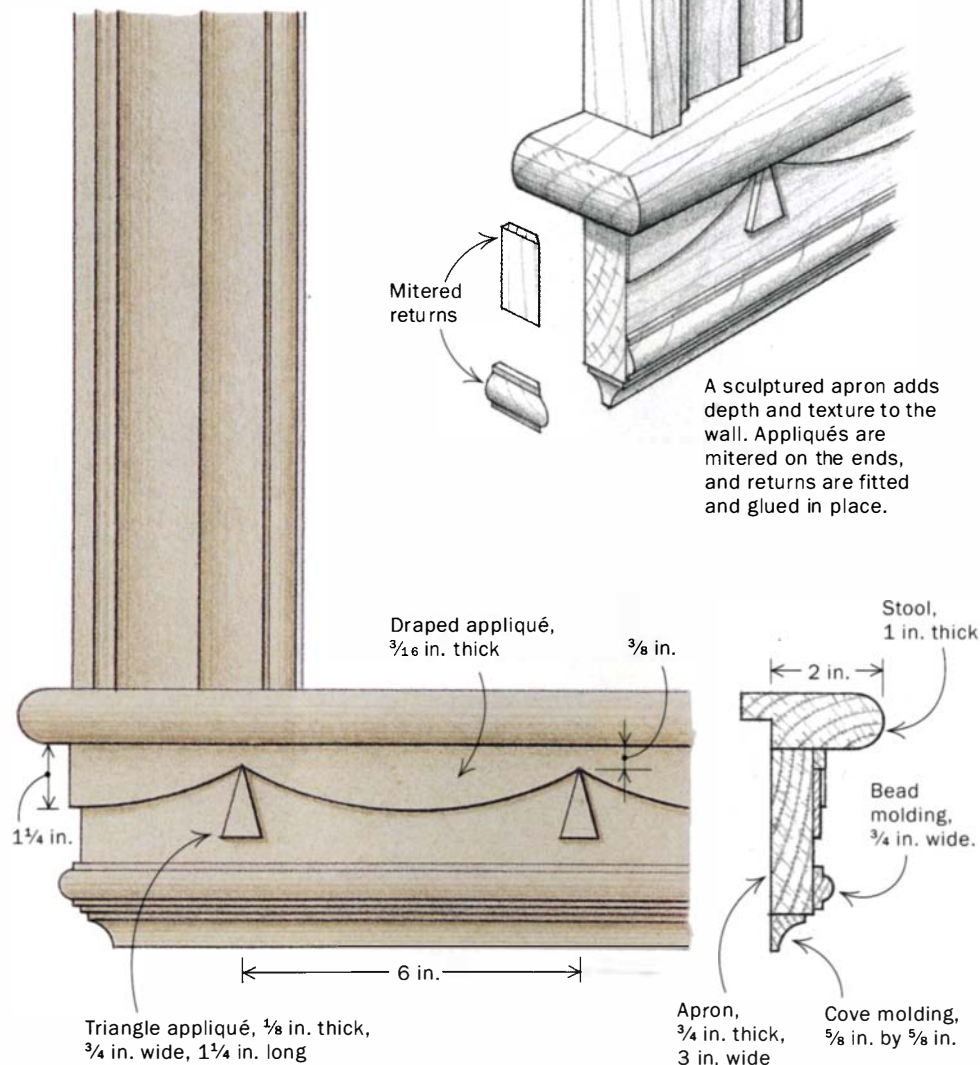
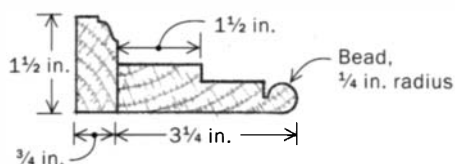
The use of architectural components is a good way to achieve a distinct period effect. Instead of simply running the molding around the window, the addition of ornaments, rosettes and fretwork turns an ordinary design into a period one. You can use ready-made ornaments as is, such as rosettes (or decorative corner blocks), plinth blocks, finials, corbels (or brackets) and cast fiberglass architraves. Or you can modify them to suit a particular purpose. For the Victorian window on p. 79, I bought ready-made rosettes, but I used a backing block to make them stand farther off the wall. I also framed the rosettes out in a simple mitered box. These additions draw attention to the woodwork and supply a focal point on the trim.



A strong and simple joint. Biscuits not only align the casing header to the left and right members, but they also offer plenty of strength to the basic butt joint.

FEDERAL PERIOD (1790-1830)

This was the first truly national style of the United States. While it employed symmetry and a classical vocabulary, it rejected the elaborate Georgian style that was popular in England. Some regional expressions of this style possess an energy that was characteristic of the American spirit. Woods were often painted bright, vivid colors—mustards and mossy greens.



A sculptured apron adds depth and texture to the wall. Appliqués are mitered on the ends, and returns are fitted and glued in place.



A beaded trim. After one edge is cut with a beading bit, the second pass on an adjacent side completes the bead. This bead covers the 1/8-in. reveal once it goes on the wall.



A shopmade touch. An appliqué that matches a period design is cut from 1/8-in.-thick stock on the bandsaw and glued to the apron.



Tight miters. The first miter is cut on the casing header. Then the opposite end is marked to ensure a perfect mitered joint when the final side is cut.

Decorative appliqués are another simple and commercially available option. But you can easily cut them in your own shop on a bandsaw or on site with a jigsaw. For the apron on the Federal window, I cut the scalloped drapery out of 1/8-in.-thick pine and simply glued it to a solid board. On the Arts-and-Crafts window, I cut out stepped brackets to echo the stepped apron. These are small and quick touches that add tex-

ture to the work and create shadow lines that draw your eye to the trim.

Options for casing joinery

The most common method of handling the connections between the casing members is to miter the intersecting joints (see the Federal window above). The mitered joint is attractive and quick to execute. But when you use wide moldings (over 3 in.),

miters are problematic. In dry conditions, as the wood shrinks, the mitered joint tends to open up. Often, no amount of caulk or filler shoved into the void can conceal the gap. The most reliable way to keep your miters tight is to season your material on site for several weeks, allowing it to acclimate before installation.

Another quick method is simply to butt your pieces together (placing the end of

one piece against the edge of another). If the cuts are clean and square, a butt joint gives a nice look.

The use of corner blocks is another way to add substance and weight to the intersection and to avoid miters. Using ready-made rosettes or making your own imparts a traditional feeling to the trim without a lot of work (see the Victorian trim at right). As with the butt joint, the ends of the linear stock are cut square and then placed against the corner block. It's a simple method with a powerful effect.

Methods of fastening

Traditionally, carpenters use finish nails to fasten interior trim. Workers countersink the nails and fill the small holes with putty or wax. It's often a good idea to predrill a hole for the nail to avoid splitting the work, especially if the wood is particularly hard or the piece is small.

These days, most carpenters use pneumatic nailers. Pneumatic nails look and function like wire nails, but they are much easier and faster to use.

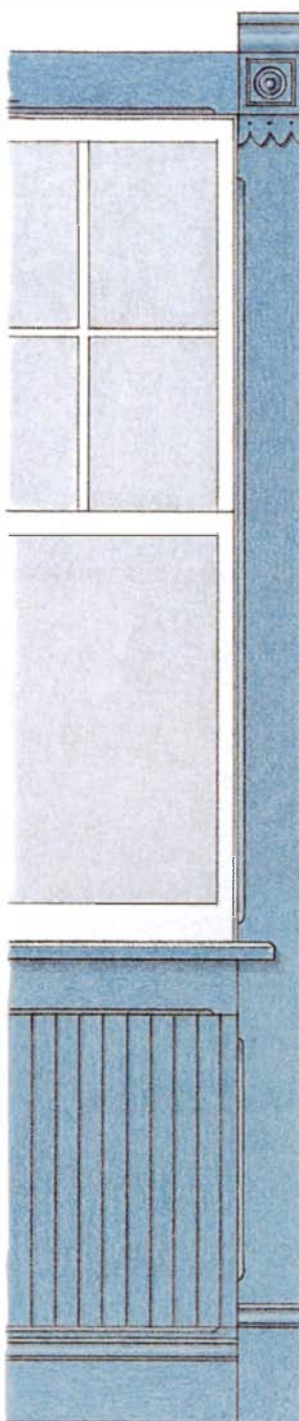
Screws can add extra strength to parts that come under stress. Whenever possible, I locate screws where they will be covered later by another layer of molding. On the Federal trim, I used screws to secure the edge of the casing to the stool. On the Arts-and-Crafts trim, I drove a hidden screw from the back of the apron through the corbel to ensure that this cross-grain intersection doesn't fail.

Prefinishing saves time

Most window trim is quickly finished in place. But your working time can be shortened and your results dramatically improved by prefinishing your trim in the shop. Molding and trim can be laid out horizontally, stained or painted—without any drips or runs—then easily can be rubbed out, touched up or matched for color.

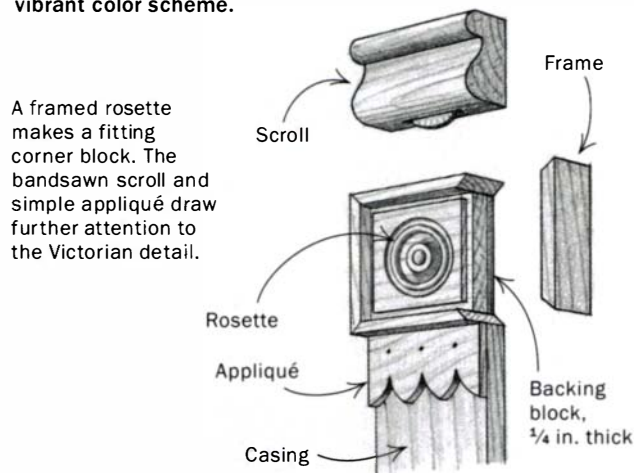
With a little work, you can replace a bland clamshell molding with an impressive period-style trim. You can even give the trim a tabletop finish before it goes on the wall. Then choose an abbreviated drapery, or even leave the window bare, for a clean, light look. There's no need to hide the trim. □

Mario Rodriguez is a woodworker living in Haddonfield, N.J. He is a contributing editor to Fine Woodworking.

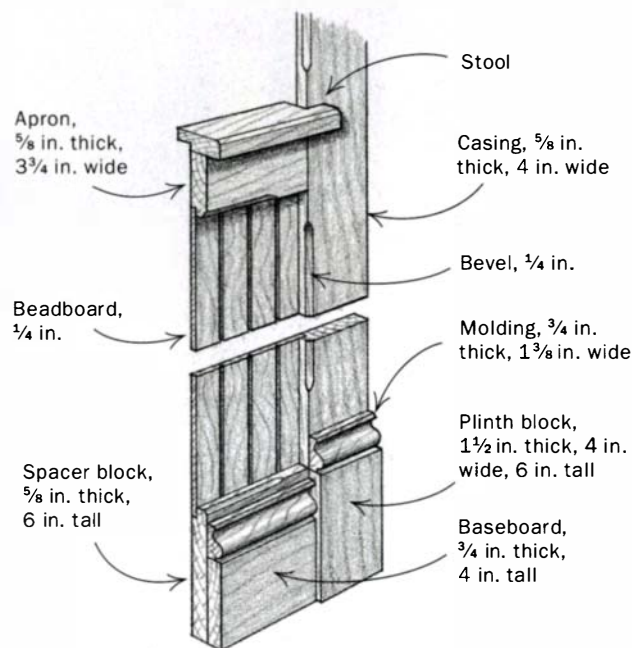


VICTORIAN PERIOD (1860-1900)

This energetic architecture freely borrowed from other periods to create an eclectic style. When this freedom was coupled with the availability of mass-produced ornaments and regional expressions, Victorian homes typically sprouted an abundance of gingerbread decoration, as well as a vibrant color scheme.



Typical of the period, window casing extends all the way to the floor. A beadboard panel, basic moldings and routed bevels create interesting shadow lines a rich color only accentuates.



Wainscoting to the floor. With the base and one side of the casing affixed to the wall, the panel is let into grooves.



A final touch. Biscuits are used to attach the scroll to the rosette, then the whole unit to the casing.



A close-up photograph of a person's hands operating a yellow DeWalt biscuit joiner. The person is wearing a white t-shirt and a watch on their left wrist. The machine is being used to cut a slot into a piece of light-colored wood. The DeWalt logo is visible on the yellow handle.

Take the Plunge

The biscuit machine's ability to turn butt joints into strong, accurate spline joints in a heartbeat has revolutionized the way cabinets are built. Biscuits are usable in practically any woodworking material, but they are ideally suited for joints in sheet goods such as plywood, flakeboard and medium-density fiberboard (MDF), where they are faster and better than just about any other joint. Biscuits are the Volkswagen Beetle of woodworking joints: inexpensive, dependable, uncomplicated, unfinicky. No one would mistake them for hand-cut dovetails, but when you need basic transportation, they're hard to beat.

A bit about the machine

There is a good deal of variation in quality and price among biscuit machines. Without getting into a full-scale comparison of the many machines available, there are a few things I can recommend to anyone sizing up the field.

First, take a test plunge. You can get a feel for a machine's plunge action without even turning it on. Avoid any machine with excessive play in the plunge action, as any slop here will result either in a joint that does not come together easily or in one that won't perfectly line up. Then examine the fence. It should operate easily and accurately and lock down positively. The best machines have a fence that folds out of the way without losing its height setting. Look for a fence that locks down parallel with the cutter. You can get by with one that isn't self-aligning, but it means extra work every time you set the fence. Be wary of fences that are difficult to tighten securely or that require an additional tool to tighten them.

A convenient dust bag or vacuum-hose connection is important both for keeping the shop clean and for keeping wood chips and dust from flying back at you. Finally, although the biscuit machine's blade does not have to be changed very often, ease of changing it, and the number of settings that need to be readjusted afterward, should also inform your selection.

Safe grip, good posture

To cut an accurate biscuit slot, the fence of the biscuit machine must be held perfectly flat on the face of the board. If the fence is not being used, the base of the machine must be placed along with

Getting good at using a biscuit machine

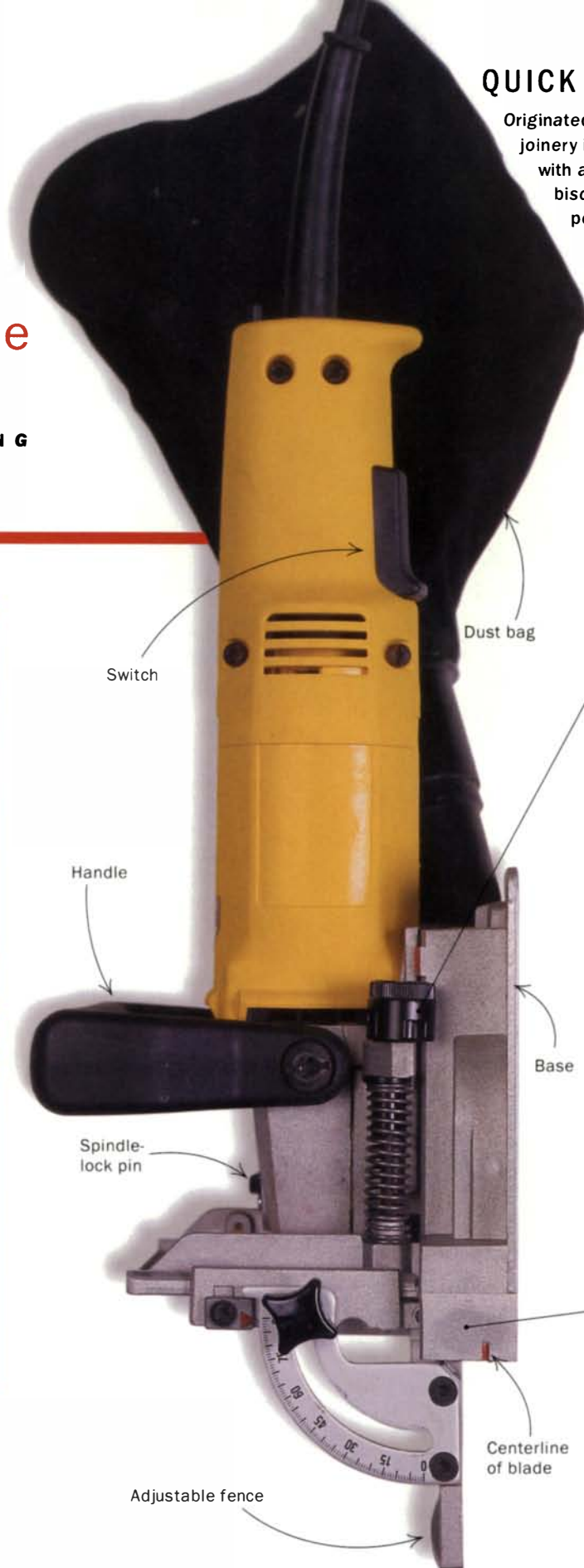
BY ROBERT W. LANG

QUICK TOUR OF THE TOOL

Originated in Switzerland in the 1950s, biscuit joinery is a powerful technique executed with a simple tool. Learning to use biscuit joinery efficiently and to its full potential takes experience, but a single session is sufficient to learn how to operate the machine.



Lightning-fast layout. The speed of biscuit layout is one of the prime advantages of the system. A freehand pencil slash across the joint is all it takes. Even if the slash isn't square to the joint, the slots will be aligned.



Plunge-depth adjustment knob. The knob has settings for the three primary sizes of biscuits. M is for maximum depth.

#20



#10



#0



Nice teeth. The biscuit machine's blade is nearly always out of sight, but for safety's sake, it should never be out of mind. The vertical red line marks the center-point of the blade. Align it with the layout lines to cut a slot.

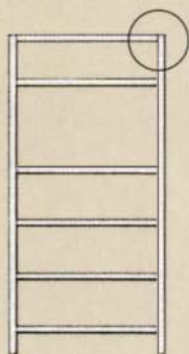


BISCUIT BASICS

In his job as a cabinetmaker with a high-end renovation company, the author relies heavily on biscuit joinery in the many custom cabinets and built-ins he makes. Here, he builds a small plywood shelf unit to demonstrate how he lays out and cuts some essential biscuit joints.

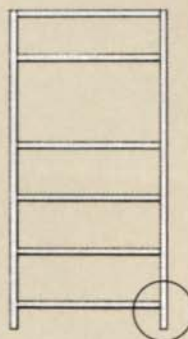
BEGINNING AT THE END

Cutting slots into the face of a board near one end takes good posture and a steady stroke. There is very little bearing surface, so it is easy to let the machine tip, which will result in a mislocated slot. Mark layout lines on the face of the board rather than on the end so you can see them easily without bending down.



GET TO KNOW GUIDE BOARDS

For slots in the face of a board, guide boards provide both a reference surface and a place to strike the layout lines. Here, a guide board establishes the distance from the floor to the underside of the bottom shelf. Stops stapled on one edge and one end make it a cinch to align.



the workpiece on a reliably flat surface. If the machine or the workpiece is tilted at all, the two sides of the joint will not line up.

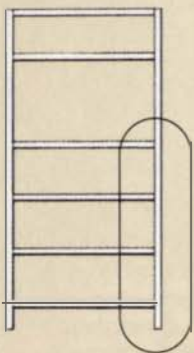
For cuts using the fence, it is common practice to hold the fence down with one hand while using the other hand to push the machine forward. But this should be avoided because it places your fence hand directly above the path of the blade. As with any sawblade, keep your hands away from the blade's path. It takes practice and a bit of finesse to hold the machine by the handle and still get a feel for keeping the fence properly mated against the workpiece throughout the plunge, but the increase in safety makes the time spent developing this skill well worthwhile. When plunging

the cutter horizontally, hold your arms still and push forward with your whole body to reduce the chance of tilting the machine.

Dead-simple layout

One of the great advantages of biscuit joinery is that the location of the slot along the vertical axis is determined by the fence or by the base of the machine—no layout is needed. When working with $\frac{3}{4}$ -in. material, the simplest method of setting the fence is to place the machine and a piece of stock on a flat surface and bring the fence down to the face of the stock. This way, the machine will be registered to cut both from the fence and from the base of the ma-

PERFECT SPACING



When you have parts that are equally spaced, you can cut the slots for them by "stepping" a guide board. The guide board's width will determine the distance from the bottom of one shelf to the bottom of the next. Cut slots along one edge of the guide board and fit



them with biscuits. Mate those biscuits with the first row of slots. By using the upper edge of the guide board to register the machine against, you can now cut the second row of slots. To cut the third row of slots, mate the guide board with the second row. The guide board's top and bottom edges must be perfectly parallel with each other, or the error will accumulate with each new row of slots you cut.

Continued on next page

chine. In the horizontal axis, a pencil slash across the joint is often all the layout that's needed. For example, to edge-join two narrow boards, layout is a matter of placing the boards edge to edge and making pencil marks freehand, estimating the distance between marks by eye. There is no reason to make the lines square to the joint, because the machine will be lined up with the first fraction of an inch of the layout line—even a line drawn diagonally across the joint will produce accurately mating slots. Also, because of the shape of the slot and the biscuit, there is some room for adjustment side to side. As to eyeballing the distance between the slashes, unless there is some compelling reason for locating a biscuit exactly

(as in gluing up blanks for raised panels, where a biscuit might be revealed during machining), extra time spent in locating biscuits precisely will not improve the quality of the finished joint.

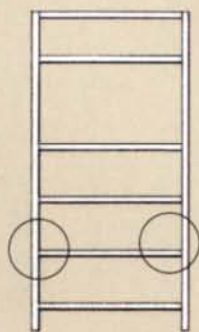
Parts to be biscuited should be marked with a slash or an X to indicate which face is the top (in relation to the machine). This will ensure that parts are oriented correctly as you cut the joints and also during assembly.

Nobody likes soggy biscuits

However you cut the slots for them, you want your biscuits nice and dry. That's because biscuits are made to expand. They are

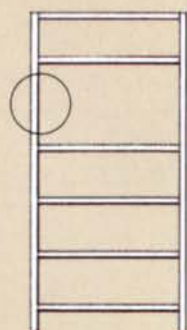
OUT ON THE EDGE

For slots to be cut at the ends of boards, identical parts can be stacked and marked with layout lines. After doing this with all the shelves, the author screwed a block to his work surface to act as a stop while he cut all the slots.



ADDING EDGING

Solid edging can be added to a piece either before or after assembly. Here, the author lays out and cuts the slots for a poplar face frame after the birch plywood shelving unit is together. He registers the cuts from the outside of the unit because the face frame will be flush on the outside, its overhang to the inside.



stamped out of sheets of beech in the factory, and the die compresses them. When glue hits biscuits, they absorb moisture and swell in thickness, producing an extremely tight joint. Because biscuits are like little sponges waiting for a spill, they must be stored in airtight containers. I store the bulk of my biscuits in the twist-tied plastic bags they come in. I decant them a pint at a time into a wide-mouth plastic bottle with a screw-on lid. For biscuiting on site, I'll sometimes fill a resealable sandwich bag with biscuits and drop it in my tool belt.

Snack on this: biscuits and water-based glue

It is best to use water-based glues (yellow or white) for biscuit joinery, because they provide the moisture required to make the compressed biscuits swell. Epoxies and reactive polyurethane glues (Gorilla glue, for instance) don't provide this necessary moisture. They'll hold a biscuit joint together, but it won't be as tight as it would be with a moisture-expanded biscuit. If, for exterior work, for instance, you need a truly waterproof adhesive, try using urethane glue and spritzing the biscuits with water before gluing them in. One test has shown this to strengthen such joints (see *FWW* #118, p. 110).

It is important to use the proper amount of glue. Too much glue in the slots, and it will squeeze out everywhere. Too little, and it won't provide enough moisture for the biscuits to expand, reducing the strength of the joint. It will take practice to get the right amount of glue in the right places. Basically, you want the glue on the sides of the slot, not puddled at the bottom. There are dedicated glue applicators available, or you can use a brush or a stick to spread the glue evenly, but I just lay a line of glue at the top of each side and let it drip down. Glue should be placed in all the slots of the first workpiece before any biscuits are inserted. If you insert a biscuit each time you glue a slot, the biscuits begin swelling before the joint can be put together, making alignment and assembly difficult, if not impossible. After putting glue in all the slots in one workpiece, I insert biscuits and then put the second ration of glue directly on the biscuits and assemble the joint. If you put glue in the slots on both workpieces, you get a lot of dripping glue when you invert the second workpiece to assemble the joint.

After assembly, clamps can be removed fairly quickly. Depending on the temperature of the materials and the room, the biscuits will swell up enough in a few minutes to prevent the joint from creeping apart. Adequate drying time should be allowed, however, before stressing the joint, to permit the joint to achieve its full strength. □



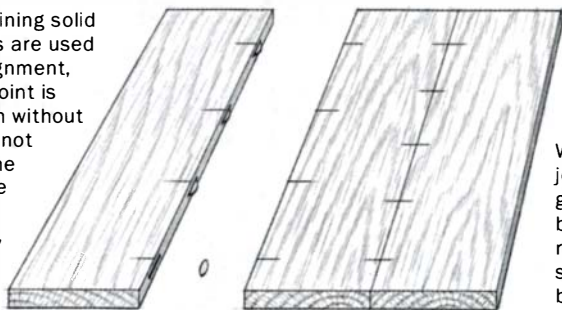
All puffed up. Because the machines that stamp out biscuits compress them, biscuits absorb water-based glue and expand to lock a joint. The biscuit at right puffed up so much after a quick immersion in water that its stamp marks disappeared.

Robert W. Lang works in Columbus, Ohio.

BISCUIT-JOINT OPTIONS

EDGE JOINT

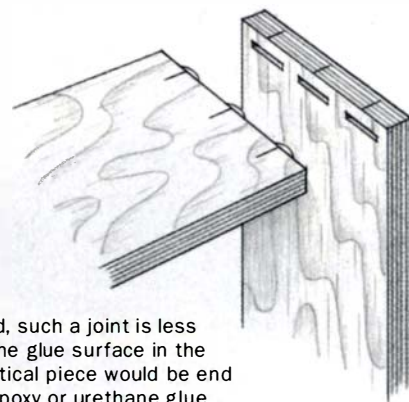
When edge-joining solid wood, biscuits are used mainly for alignment, because the joint is strong enough without them. Glue is not required on the biscuits. Place biscuits every 6 in. to 12 in., depending on the flatness of boards to be joined.



When edge-joining sheet goods, glued biscuits are required for strength. Place biscuits every 6 in. or so.

CORNER JOINT

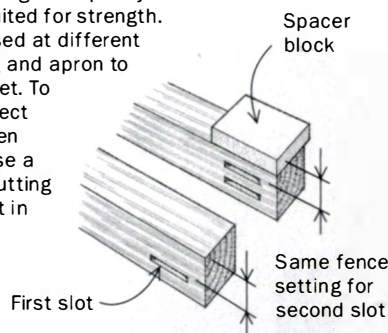
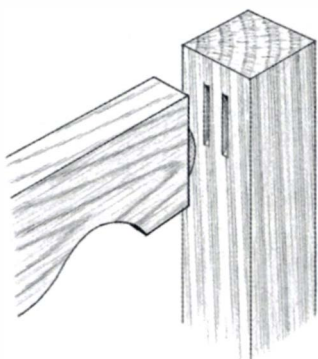
In sheet goods, this is a reliable corner joint for cabinetry. It is typically made in 3/4-in. stock with one #20 or #10 biscuit placed every 3 in. or 4 in.



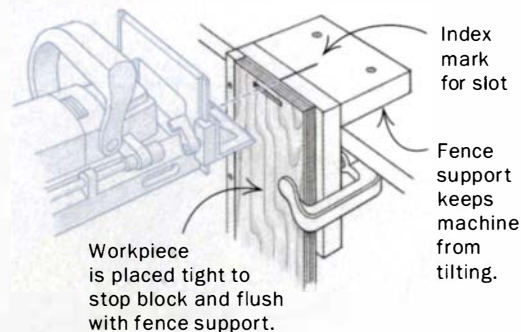
If made in solid wood, such a joint is less sound, because all the glue surface in the slots cut into the vertical piece would be end grain. Perhaps use epoxy or urethane glue.

OFFSET JOINT

Here, a typical leg-and-apron joint is double-biscuited for strength. The fence is used at different settings for leg and apron to create the offset. To guarantee correct spacing between paired slots, use a spacer when cutting the second slot in each part.

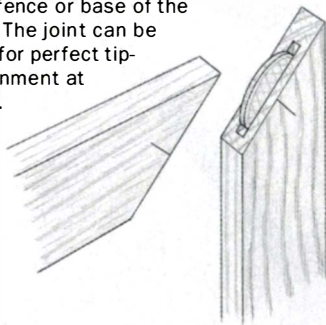


A simple jig stabilizes an unsteady operation.

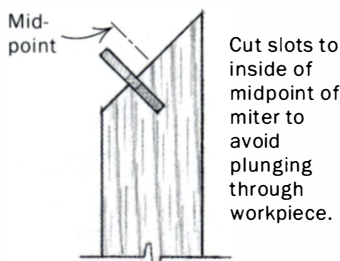
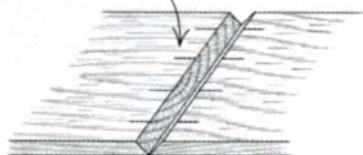
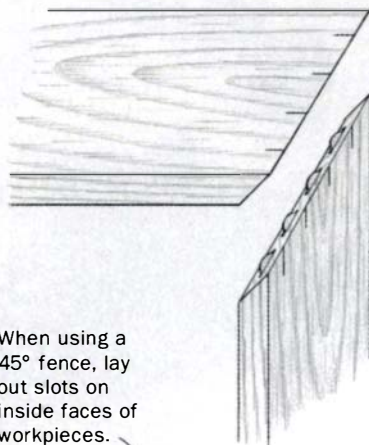
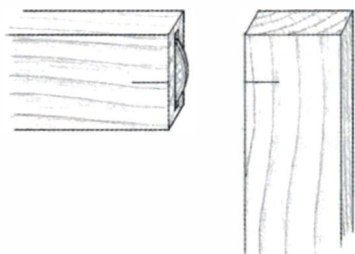


FRAME JOINTS

Mitered—Excellent in solid stock or sheet goods, a miter joint can be used in picture and mirror frames, cabinet doors, window and door casings. Slots can be registered from the fence or base of the machine. The joint can be adjusted for perfect tip-to-tip alignment at assembly.

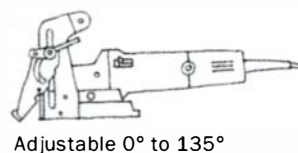
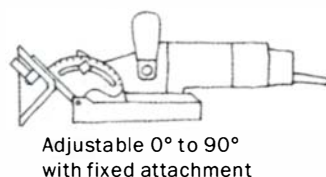
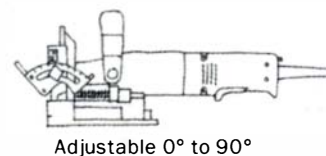
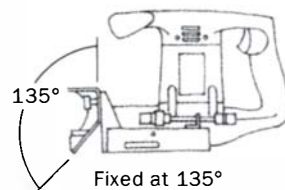
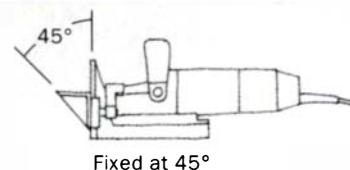


Butted—Suitable for solid stock or sheet goods, a butt joint is commonly used for face frames on cabinets. The smaller-sized biscuits now available considerably reduce the minimum width of the frame members. Consider double-biscuiting joints under stress.



MITERED CORNER JOINT

This joint is usable in solid stock, but it's better in sheet goods, especially MDF, where grain direction is not an issue. Layout lines go either on the inside or outside faces of the workpieces, depending on the type of fence used. No tip-to-tip adjustment of the parts is possible once the slots are cut.



Miter fences—Fences for miter slotting come in many types: some with the angle fixed, some adjustable, some combining fixed and adjustable. Slots can be cut with the fence set at 45° or 135°. Either will work, but a fence set at 135° registers off the outside edge, or tip of the miter, and ensures excellent alignment of the tips.



Make a Comfortable Slip Seat

Tips for a quick and easy approach to build or replace a chair seat that's strong and cushy

BY JIM BAREFOOT



I am not an upholsterer, but I design chairs for a living. And I often build and live with the prototypes for several months before finalizing drawings for a manufacturer. As I work out the kinks, what matters to me most is comfort and strength. Whether you're repairing an ailing antique or building a new chair from scratch, the seat is the point of contact that must absorb considerable stresses.

Many woodworkers are needlessly intimidated by the prospect of applying upholstery. But by using the methods I describe, mak-

ing a slip seat that is both strong and comfortable can be easier than you might imagine. Remember that you may not get the comfort exactly right on the first try, so it's important to be willing to rework it. Also, the process will go more smoothly with the right tools and materials.

Cut and fit the core of the seat frame first

The slip seat on the chair I designed shown in the photo above is slightly curved and rests on the front rail, level with the side and

back rails. You could just as easily have a flat seat that rests inside the rails all around or on top of all the rails, as it does on many armless side chairs. Keep in mind that you have to be sure you can actually fit the slip seat into place after upholstering it.

Because this seat has a slight curve and does not rest on all the rails, it had to have a strength of its own. So I laminated the seat in a vacuum press from four pieces of 1/8-in. plywood and made a cutout in the middle of the seat where the tailbone will fall.

I put corner blocks in the frame of this chair to strengthen it and to provide support for the seat. Using 1/4-in. machine screws, I drilled holes in the corner blocks to attach the seat later. I placed the plywood seat on the chair frame and marked it to drill holes for T-nuts to hold the machine screws. I rounded over the sharp front edge with a 3/8-in. radius bit so that it won't cut off circulation to the underside of legs. I also rounded over the cutout edges so that the webbing wouldn't get cut or worn.

Stretched webbing absorbs and releases energy

Elastic webbing is the spring system for this seat. I've used several brands (Pirelli, Intes, Matrex and Ultraflex) with pretty much equal success. The flexibility in the webbing absorbs most of the energy from sitting down in the chair. This eases the load on the foam, so it lasts longer.

I apply the webbing in a basket-weave pattern (see the top photo at right), which distributes the load to all the strands, using 2-in.-wide webbing stapled about 3 in. on center. That leaves a gap of about an inch between strands. The foam can easily span that size gap without any problems. You could mark the spacing for the webbing, but I simply eyeball the locations of the first layer and work from there.

Unroll a few feet of webbing, position it on the seat and drive pneumatic staples or tacks into one end. Use enough staples to catch each elastic strand in the webbing. I drive the staples into the webbing at a 45° angle to the weave, using as many as a dozen staples at each end. Always clamp the plywood seat to the bench before stretching the webbing, or it can quickly flip up into your face.

Pull the webbing fairly taut until you feel the elasticity stop. Pull the webbing out, then down over the edge to hold it in place. Fasten the webbing with staples or tacks; then release the tension and trim it to length. Repeat across the seat. Turn the seat 90°, and lay the second layer in a basket-weave pattern. Don't stretch the second layer quite as tight—just enough so it sounds like a drum. You can vary the spring of the seat by adding more webbing or by not stretching it as tightly. Experiment. Try it out by tossing your foam onto the webbing and sitting on it.

Firm foam is the best cushion

You can buy polyurethane foam in a wide range of density and stiffness values. Denser foam has less air and more polyurethane to support the load. I look for densities of at least 2.1 lbs. per cu. ft. for slip seats. The stiffness is measured by a ratio called the Indentation Load Deflection, or ILD, which is the measure of the amount of force required to compress the foam by 25%. You have to specify this number when you order the foam. Higher ILD numbers mean stiffer foam. Keep in mind that the thinner the

WEBBING, FOAM AND PADDING



Stretch the webbing until you feel it stop. Ribbons of elastic webbing woven in a basket-weave pattern are what absorb the major stresses on the chair seat.



Spray adhesive bonds foam to seat. By lowering the seat onto the foam, you can better control the alignment before the tacky glue takes hold.



Wrapping edges for a neat look. After back-beveling the bottom edges of the foam and spraying them with at least two coats of adhesive, the author wraps them to make a neat, soft edge all around the seat.



Polyester blanket keeps leather from sticking to foam. This lightweight polyester fiber is applied with spray adhesive and trimmed after wrapping it around the top of the seat.



Start in the middle. The author stretches and staples the finish cover (in this case, leather) along the middle of each edge.

UPHOLSTERING THE SEAT



Next pull and tack each corner. Depending on the thickness of the cover material, you may need to fold in a visible pleat at the corners.



Fill in the border with staples. Stretch and staple the cover between corners and middle edges. The author is not stingy with staples and tacks.



Black fabric finishes the bottom of the seat. Fabric for the underside of the seat is folded and tucked under itself before being tacked into place. Afterward, the author found the holes for T-nut fasteners and snipped cutouts in the fabric as clearance for the machine screws that hold the seat to the chair frame.

foam pad, the stiffer the foam should be. For a $\frac{3}{4}$ -in. or 1-in. seat, I use foam with an ILD of 65 lbs.

Using an electric carving knife, I cut the 1-in.-thick foam for this chair about $\frac{3}{4}$ in. larger than the plywood core on all four sides. I cut the edge at a 45° bevel, with the bevel facing down, and use 3M Super 77 spray adhesive to attach the foam to the plywood. Spray the adhesive lightly in the middle of the seat—webbing included—just to tack the foam down; then spray the edges well, even twice. Let that dry until tacky, and press the edges of the foam into place.

For a little extra cushion, I put a layer of polyester fiber, or quilt batting from a fabric store, over the foam (see the bottom photo on p. 87). Besides making the seat a little more plush, the polyester

fiber relieves the friction between foam and leather. It will also help to keep bumps or edges from telegraphing through the leather.

Stretching the finish cover

Every upholsterer has a preferred method for how to apply a fabric or leather cover to a slip seat. Here's one that works for me (see the photos above). Center the cover on the seat, flip the seat over and baste-tack the front in the center. Then pull the cover snugly to the rear, and tack that edge in the center. Do the same side-to-side, making sure the fabric pattern is correctly aligned. Then pull and tack each corner. Work between tacks, pulling and tacking until the cover is smoothly fastened. Some fabrics or seats will look best if a pleat is neatly folded at the corner.

I use both a magnetic tack hammer with no. 4 upholstery tacks and a pneumatic stapler. Because you'll need to pull out tacks and staples to rework the cover, place the tacks lightly so they are easier to knock out. I finish off the bottom by cutting a piece of black fabric 1 in. larger than the seat, folding the edges under $\frac{1}{2}$ in. or so, and neatly stapling the fabric to the bottom of the seat. □

Jim Barefoot works as a freelance designer for the contract furniture industry out of his home in Winston-Salem, N.C.

SOURCE OF SUPPLY



MinuteMan
Upholstery Supply Co.
1905 S. Elm St.
High Point, NC 27260
(800) 457-0029

Shop Heating Choices

Winter is on the way.
Is your workspace
ready?

BY KEN TEXTOR



Clouds of breath vapor sometimes obscured my cutting line but never seriously bothered me. Nor did 20 years of wearing long johns and two pair of wool socks significantly slow down productivity in my Maine-based woodworking shop. But the day I picked up some #6 steel screws and they stuck fast to my ungloved fingers, building some sort of heated shop space moved way up on my priority list.

Of course, Yankee frugality was what got me into tundra woodworking in the first place. That wasn't about to change, so I

quickly dismissed grandiose plans for a T-shirt-and-jeans-style megashop. Experience had taught me that you can cut, plane and sand wood just as well at 20°F as at 60°F. But you can't glue, finish and do intricate woodwork in arctic conditions. Right off the bat, I decided to heat only enough space to allow me to do these warmth-dependent operations, regardless of January's nastiness.

How much shop to heat?

An unwilling student of the energy crises of the 1970s, I knew that choosing a heat-

ing source is a secondary question in the winter-warmth game. Minimizing the amount of heat needed was my top priority. With that in mind, the first question was, how big an area do I really need to heat? To generate some actual dimensions, I started with the assumption that the largest project I would build, and therefore need to maneuver in my new heated shop space, would be something like a custom door. To work comfortably on projects of this scale, I determined that I'd need roughly 160 sq. ft., a relatively modest space.

Because my existing, to-remain-unheat-

More than one way to heat a shop

Most of us have a choice about how to heat our workshop, and for those of us in colder climes, the choice can be critical. Three of the four woodworkers whose shop-heating choices are featured here hail from chilly Maine, and the fourth lives so far up a dirt road in Connecticut's rural Litchfield County that he might just as well be from that northeastern-most state.

KEROSENE HEATER

Down the road from L.L. Bean in Freeport, Maine, Tom McDermott crafts wooden signs in a shop heated with his pride and joy, a Monitor kerosene-fueled, direct-vented heater from Monitor Products, Inc. (800-524-1102; www.monitorproducts.com). No bigger than a typical radiator, the 40,000-Btu unit heats the 1,500-sq.-ft. shop,

high ceilings and all, for \$700 a year.

McDermott swears by the Monitor, which has garnered a loyal following in Maine (up the coast in Tenants Harbor, woodworker and FWW author John McAlevey is almost reverential about the Monitors that heat his shop and home). Like the Empire propane heater Ken Textor writes about in the accompanying article, the Monitor has a flame that's sealed from inside air; its combustion air is brought in from the outside and expelled outside as well. McDermott's unit (its current incarnation, the Monitor 441, costs about \$1,500) is fed by gravity from a 250-gal. tank situated outside on a hill above the shop, but in many situations,



ed shop already occupied the best solar area, with a southerly exposure and lots of glass for solar gain, I opted for the next-best solar space: the second floor. Because warm air rises, of course, a second-floor location takes advantage of solar gains generated below *and* avoids the lion's share of dust created on the first floor.

With the second floor ready for insulation, I got a timely and invaluable tip from a delivery-truck driver who had converted his garage into a heated shop. "Don't use fiberglass insulation," he warned. Evidently, the local mouse population had moved into his spun-fiberglass insulation during the first winter. He recommended solid-foam insulation. The 2-in.-thick, 4-ft. by 8-ft. sheets took longer to install than spun-fiberglass batting and cost about \$200 more, but I've yet to hear the patter of little feet in my shop walls.

Fuels for thought

To decide which heating option would be best for me, I began with some thoughts about safety, economy and simplicity. Immediately, I dismissed wood heat. Although I know woodworkers whose shops have been heated for generations with wood, safety and insurance considerations steered me away from it.

All woodstoves burn with an open fire. In the heating business, an open fire is any combusting fuel that has direct access to air in the space being heated. An open fire spells danger in a woodshop. Even with a so-called airtight woodstove, every time



you open the door to feed the fire, the flames have direct access to shop dust and volatile vapors from finishes.

Regardless of the fuel type I chose, I decided that the heating unit's flame had to be completely segregated from the air in the shop.

To my delight, I found that every dealer of every major type of heating fuel was more than willing to pay me a visit and answer all my questions. The cheapest and easiest way to heat a shop, they all agreed,

was simply to extend the home's heating capabilities. Many existing oil- or gas-fired home furnaces have enough capacity to heat an additional modest shop space. Baseboard heat is preferable, though, because forced hot air would stir up too much dust. The shop should also be zoned separately from the home, with its own thermostat and an independent draining system. But because my shop was in a building well away from my house, extending my home system wasn't feasible.

Monitors can be fed kerosene by an electric lifter pump (as McAlevy can attest).

WOOD-BURNING STOVE

In nearly 20 years of heating his New Gloucester, Maine, shop with a wood-fired stove, *FWW* Contributing Editor Chris Becksvoort has heard all the arguments against an open flame. Still, he has found that for his shop, a wood-burning stove makes sense. Becksvoort's small Tempwood heats the 24-ft. by 40-ft. shop without driving him out into the snow, as a larger stove might. Scrap provides about 20% of the firewood. What Becksvoort likes best about his woodstove is the dry heat it throws off, perfect for drying chair parts. Becksvoort feels that so long as he keeps a tidy shop, he need not worry about safety beyond what is reasonable. He of course exercises a good deal of common sense: keeping the stove



clean, running a dust-collection system that empties into a separate shed and not keeping a fire burning when he leaves the shop.

RADIANT FLOOR SYSTEM

Although there are commercially manufactured radiant floor systems for most types of new or existing construction, from wood to concrete, Joe Tracy chose to engineer his own system for his new 2,000-sq.-ft. shop on Maine's Mt. Desert Island. His latest system is a variation on the one mentioned in *FWW* #129, p. 61. He could hardly have come up with a more elegant homemade design in terms of simplicity, cost, adaptability, ease of installation and ease of use: 2-in. rigid insulation on grade, a 4-in. concrete slab, 2x6s on edge (to make room for his electrical and dust-extraction systems) and 1½-in. particleboard as a finished floor, with inexpensive ½-in. polyethylene pipe run-





Warmth where it's needed most. Rather than heat his whole shop, the author insulated an area on the second floor just large enough for heat-dependent activities like gluing, finishing and intricate woodwork. A wall-mounted, direct-vent propane unit does the trick. A propane tank and the small vent hood (by the window) are all you see from the outside.

Instead, I considered a number of stand-alone heating units.

Kerosene was at the top of my list because I had heard that the new generation of heaters for this highly refined oil does indeed keep the flame independent of the indoor air. (Older kerosene heaters don't.) New kerosene heaters are also very efficient. But they have one big shortcoming. Most use a fuel-delivery system that depends on gravity. Because I would be building my heated shop on the second

floor of my barn, a gravity-fed system was out of the question.

Electricity held some appeal because electric heating units lack a flame and are therefore very safe. Baseboard electricity is an especially safe, easy and inexpensive means of installing a heating system in a shop. But in many cases, mine included, the local cost of electricity is prohibitive.

Why I chose propane

For me, propane was the least-expensive and most-convenient option. The local sales representative was accustomed to writing up orders for home heaters, however, not for heaters intended for shop use. The first unit he recommended had a flame that we soon discovered was not fully segregated from the indoor air supply. He had to call several heater manufacturers before he could find one that would guarantee the safety of the unit in my proposed shop area. I eventually chose the DV-215-SG Direct Vent Wall Furnace made by Empire Comfort Systems (800-851-3153; www.empirecomfort.com).

We also had to adjust Btu requirements. The home specifications didn't account for a shop space in which much of the heated air would immediately be vented right back out of the room. (Removing the shop's warm air is necessary when I use some types of finishes. The fumes are too flammable and toxic to be allowed to dissipate on their own.) Although a 10,000-Btu heater would otherwise have been adequate for my small, well-insulated space,

figuring on increased ventilation, I opted for a 15,000-Btu unit. The larger-output unit cost a little more (\$727 fully installed), but it has been well worth the investment.

In the first winter of operation, I kept the thermostat at 50°F when not using the shop space and at 65°F to 70°F when in residence. By the time Mother Nature's spring warmth took over the heating job, I had spent a mere \$135 for fuel.

Although there are books filled with specifications for ventilating areas like my heated shop, experience has taught me that there's no substitute for a good respirator. Without exception, I put my mask on every time I open a paint or varnish can. So while I knew I'd have to ventilate my new space to some extent, I also decided I was not going to try to make the air as clean as a June day under the maple tree. I opted for a blend of mechanical ventilation from a 125-cu.-ft.-per-minute (cfm) fan and natural ventilation from my barn's cupola.

Good ventilation has earned my heated workshop a new nickname: The Men's Room. In the depths of winter, when my cigar-smoking buddies and I need a place to indulge ourselves, my new heated shop fills the bill. A couple of old easy chairs promotes no end of future woodworking ideas. But more important, the heated shop has allowed me to do some of the best and most enjoyable finishing and intricate woodworking I've done in years. □

Ken Textor writes, builds furniture and messes about in boats in Arrowsic, Maine.

ning on the slab. To heat the water that runs through the pipe and, in turn, heats the shop, Tracy relies on a standard oil-fired water heater. Tracy was wise enough to consult an in-floor heating specialist for help with details. The system is quick to heat up, and if Tracy turns it off at four in the afternoon, it keeps heating until six. "It's real simple," Tracy says, "real effective."

RADIANT CEILING PANELS

The electric radiant-heat panels in the finish room above Franklin Nichols' shop in Washington Depot, Conn., are as simple to install and operate as the lights that share the ceiling. After trying every imaginable heating system and finding them all discomforting in the finish room for safety reasons, Nichols hit upon Enerjoy Peopleheaters, manufactured by SSHC, Inc. (800-544-5182; www.sshcinc.com). Nichols figures he pays a little more for electricity, but he has nothing but praise for the five, 1-in.-thick, 4-ft. by 8-ft. panels that heat his cavernous upstairs. Like Tracy's

radiant floor, the panels warm people and objects first, keeping materials at a constant working temperature and allowing the air itself to be cooler without a loss of comfort. The electric panels are noncombustible, which gives Nichols peace of mind. The radiant panels heat up quickly, they don't take up floor or wall space, and they're light enough to be lowered closer to you or your work. Peopleheaters are available in panels as small as 1 ft. by 2 ft. The standard bearer, a 2-ft. by 4-ft. panel, costs about \$200. Nichols' five much larger panels together cost less than \$1,500, a steep discount from full price because they're cosmetic seconds, ideal for a shop and available from SSHC. □

Marc Vassallo is an associate editor of Fine Woodworking.



A Choice of Three Bookcases

BY PHILIP C. LOWE



Spend a day,



a weekend



or a week—
it's up to you

When customers arrive at my shop inquiring about having a piece of furniture made, it's part of my job to ascertain what quality of furniture they're looking for and to translate their desires into a dollar amount that will equal the time and materials needed to complete the piece. We all know that more time spent equals more dollars. The quicker the joinery and construction and the cheaper the materials, the less expensive the piece, and vice versa. The woodworker working in his or her home shop faces this same dilemma. Regardless of your skill level, you must decide how much time and materials are worth putting into a piece.

Imagine three scenarios. In scenario one, your floors are piled high with books, you need a handful of bookcases, and you need them in a hurry. It's pretty hard to justify building bookcases that are going to take two weeks a piece to complete. But in a day, you can knock together a sturdy bookcase with premilled pine from the lumberyard and simple dado construction.

In scenario two, you want something more substantial than a pine case, but you don't have the time or the money for a solid hardwood piece. In this instance, a bookcase made from hardwood plywood with solid wood facings is the ticket.

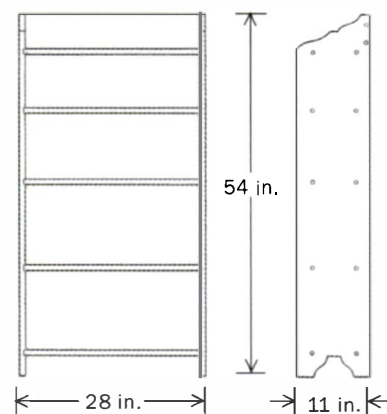
In scenario three, you have only a few books to house, no time constraints, and a pile of mahogany left over from another

project. In this instance, it makes sense to build a fine, hardwood bookcase with adjustable shelves, dovetail joinery, a face frame and curvaceous ogee bracket feet.

I'll show you how to make all three bookcases, and I'll leave it up to you to decide which case is the right one for your time, budget and circumstance.

A quick case

If you have a tablesaw with a dado blade, a quick bookcase is as close as your local lumberyard and a day's work. At the yard, purchase 1-in. by 12-in. D select pine, which is the most expensive but has the fewest knots. Make sure the boards are relatively free of cup, bow, twist and crook and that the thickness of the boards is consistent. When you mill the boards back at the shop, cut the shelf pieces $\frac{1}{4}$ in.



A man with glasses and a blue shirt stands between two wooden bookcases on a wooden deck. Behind him is a brick fireplace with a dark opening. The bookcase on the left is made of light-colored wood and has three shelves. The bookcase on the right is made of a darker wood and has four shelves. The man is leaning on the top of the darker bookcase.

The right bookcase is a matter of circumstance. The author regularly makes decisions about how much time and materials to put into a piece.

narrower than the sides to accommodate the back.

Locating the shelves on each side piece is crucial. To make sure the dados line up properly, stack the side pieces on top of each other and mark each shelf location on the edge of both boards. At the tablesaw, install a dado blade of a width corresponding to the thickness of the shelves. Add paperboard shims (or even playing cards) to the dado set if its width needs to

be increased just slightly. A sample cut will help ensure the fit. Cut the dados $\frac{1}{4}$ in. deep or one-third the thickness of the board (see the photo on p. 94).

Change to a $\frac{5}{16}$ -in. dado blade and rabbet the rear edge of each side to accept the back. I like to draw the decorative shapes at the top and bottom of the side pieces with a compass or by grabbing a can, cup or anything round that will form the shapes. Cut the shapes with a jigsaw and

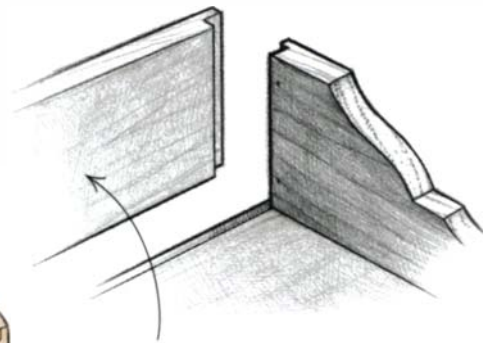
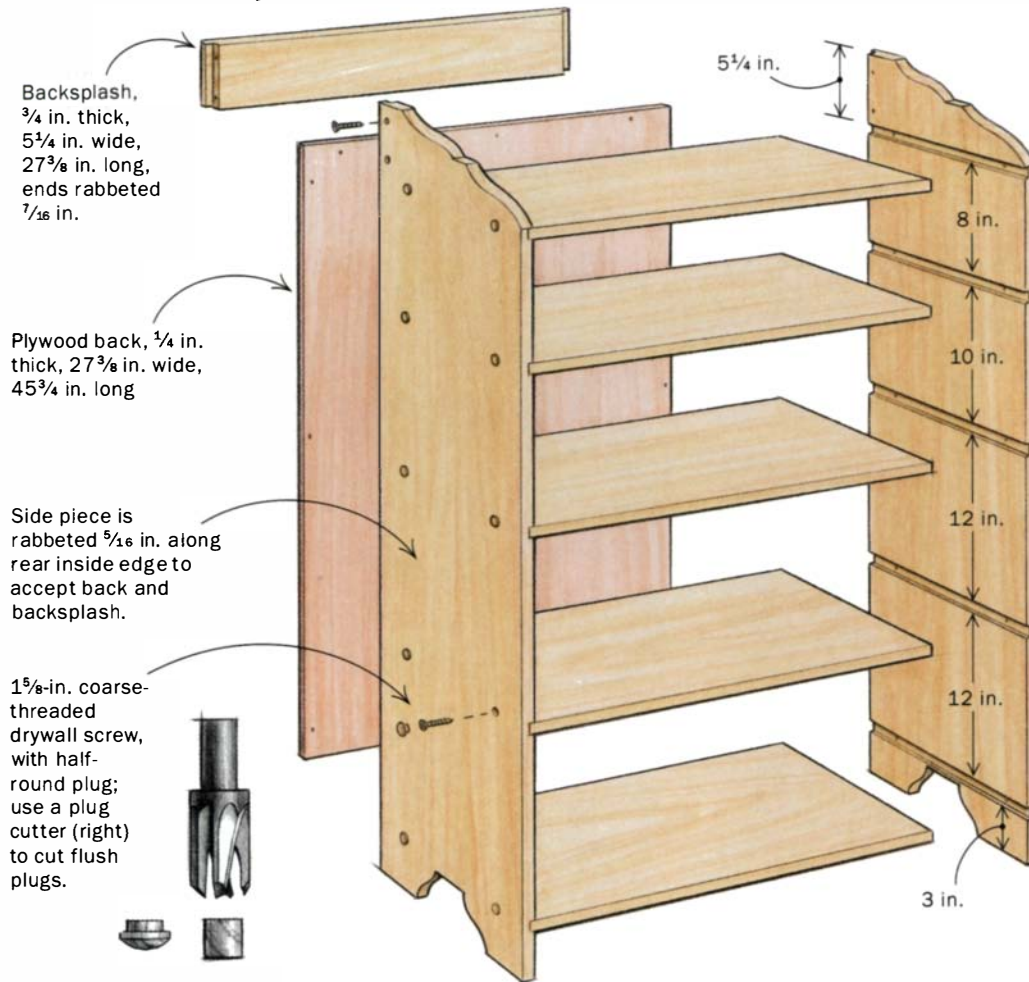
clean them up with a file or drum sander. Sand all of the parts before joining them.

To assemble the case, run a bead of glue in each dado, set the shelves in place, drill pilot holes with countersinks and drive in $1\frac{5}{8}$ -in. coarse-threaded drywall screws. Screwing the back into position will square the case as the glue dries.

Finally, glue and screw a rabbeted backsplash above the back (see the top right drawing on p. 94). After a final

ONE-DAY BOOKCASE

Books piling up on the floor? Build this bookcase from 1x pine in a day using a tablesaw and jigsaw.



Rabbeted backsplash hides top edge of plywood back and joins cleanly to side piece.

DADOED SHELVES



To avoid having too much of the side pieces overhanging the tablesaw top when cross-dadoing, work from each end toward the center.

sanding and the easing of all the sharp edges, the case is ready for a coat of paint.

A better bookcase in a weekend

If you can spare a weekend to build a hardwood plywood bookcase with adjustable shelves, then you'll end up with a piece that's more gratifying and versatile than a bookcase made of simple 1x pine. Preparing a scale drawing—with full-sized details of the dados, rabbets, facings and moldings—and selecting the right materials will help the process move along smoothly and efficiently.

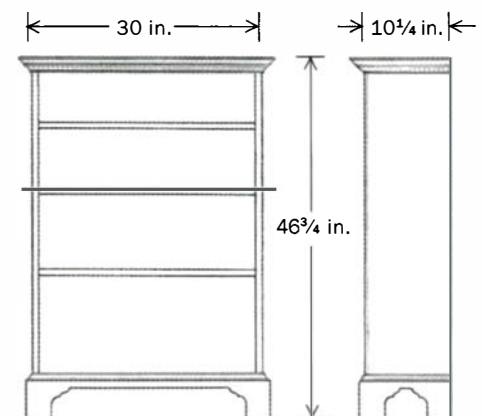
A good-quality sheet of hardwood plywood won't be cheap—the curly maple sheet I used cost about \$200—but you'll only need one sheet. To determine the overall size of the bookcase, divide the 4-ft. by 8-ft. sheet of plywood lengthwise four times, taking into account the saw kerf. That means the case can be 10 in.

deep, plus the thickness of the facings. To figure the height and width of the case, determine the number of parts you can get from the four 96-in. lengths. You'll need only a couple of pieces of solid wood, for the facings and the base.

A tablesaw with a fine combination blade works well for cutting the parts from the sheet of plywood, leaving edges with very few saw marks. Rough-cut the solid lumber to length and joint the pieces on one surface. The parts for the base should be planed to their finished thicknesses, but the parts that will become the facings should be planed only to within $\frac{1}{16}$ in. of their finished thicknesses. The facings are left thicker than the plywood so they can be scraped to the same thickness after they are glued to the edges. When gluing the facings to the front edges of the sides and shelves, bar clamps and a large batten will help you apply even pressure along the

length. Once the glue has cured, cut away any extra length to even the facings up with the ends of the plywood pieces. Note that the wider facings applied to the top have mitered front corners.

With a marking gauge set to the thickness of the plywood, scribe lines across the side pieces to locate the rabbets for the carcass



top. Scribe with a heavy hand so that the gauge will cut through the face veneer and help prevent chipout as the rabbets are cut. Also, scribe lines across the side panels to locate the dado for the bottom piece of the carcass. Because plywood doesn't measure exactly $\frac{3}{4}$ in., add an auxiliary fence and cut into its face or shim the dado set to match the actual thickness of the panels. Once you've cut rabbets and dados across the side panels for the top and bottom pieces, cut dados from top to bottom for the metal shelf standards and then rabbets along the rear inside edges for the back.

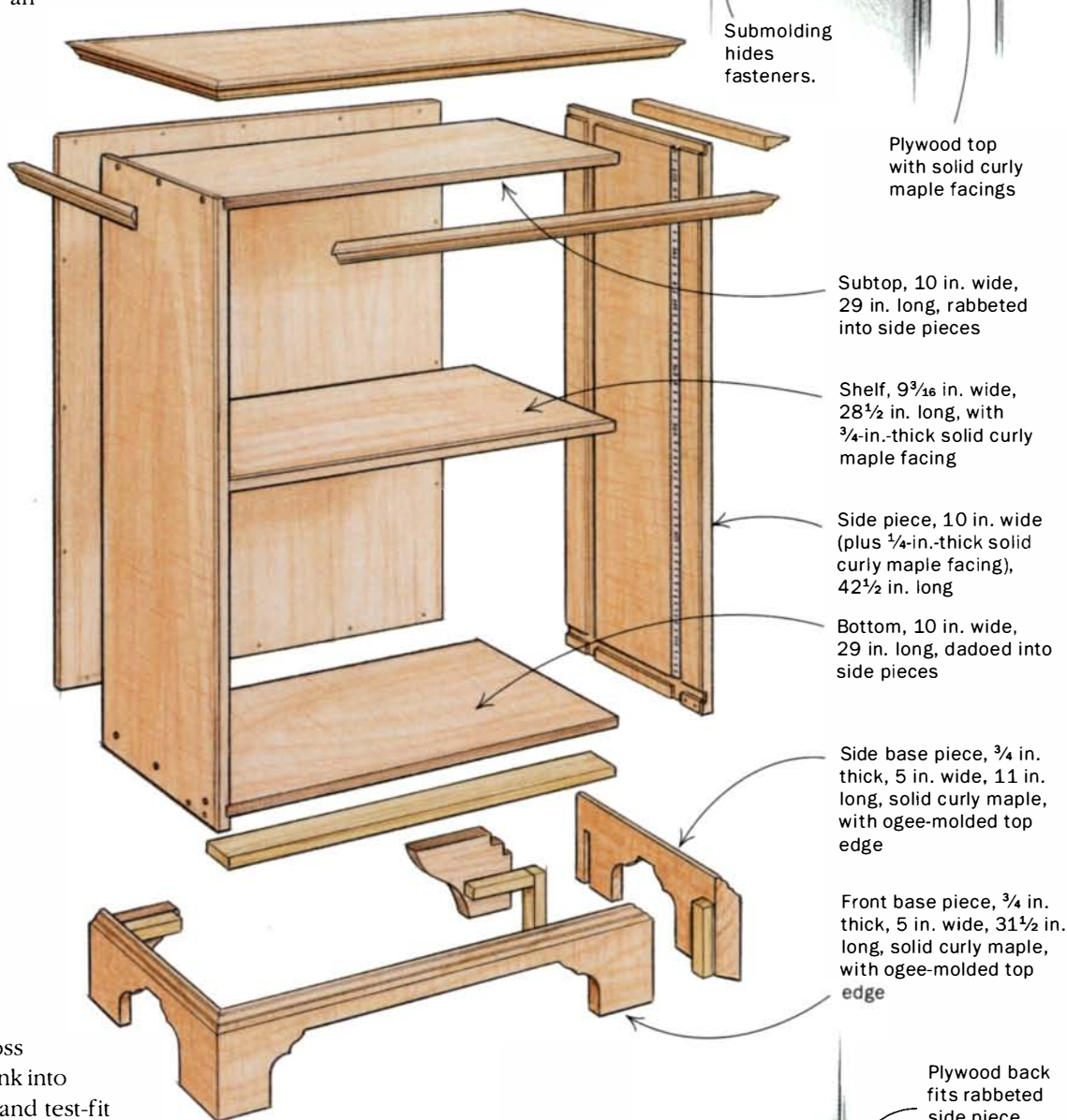
The construction of the carcass, prior to adding the molded top and base, is similar to that of the one-day case, in that dado and screw construction is used, as well as a rabbeted back. Before the top and bottom are glued and screwed to the ends, sand the visual surfaces to their finished state. Now the assembly can take place. Use $1\frac{3}{8}$ -in. coarse-threaded drywall screws, countersunk to keep the heads of the screws below the surface. The screws will be covered by the moldings.

For the base, mold one long blank before cutting the pieces to length, which makes for fewer passes across the router. Cut the molded blank into three pieces, miter the ends and test-fit the joints at the front corners. Then lay out the curves of the bracket feet. I made a plunge cut on the tablesaw for the straight section of the front base piece and cut out the curves on the bandsaw (see the photos on p. 96). Because the rear of the base has such short grain (see the drawing at right), cut a stop dado and install a bracket to help prevent the foot from breaking off if kicked. Glue the base to the bottom of the carcass and then rub glue blocks into the inside corner of the joints to add strength.

Using a router, shape the molding around the top piece into the extra-wide

TWO-DAY BOOKCASE

If you have a weekend, build this case from a single sheet of plywood, and dress it up with solid wood moldings, facings and base.



METAL SHELF STANDARDS



Numbers on the standards help align slots for the brackets (right).

Metal support bracket



Base hides fasteners.

Rear bracket is stop-dadoed into base.



CONSTRUCTION OF THE BASE

A plunge cut is the surest way to cut a straight line between the curves at either end. First raise the table-saw blade and mark the fence at the blade's farthest point. Retract the blade and position the base piece to the mark. Clamp a stop to the fence to avoid kickback.



Now, carefully raise the blade through the base piece (left), then push the base piece across the blade. Finish by cutting out the curves at the bandsaw (middle). Glue and clamp the front and side base pieces to the carcass at the same time (right). Add brackets at the rear and glue blocks to the inside corners.



facings that have been applied. The narrow submolding, which will be applied just below the molded top piece, should be shaped onto a wider board from which a narrow strip can be sawed off. I shaped the edge molding on the base and the top submolding with the same ogee bit (when applied, the submolding is turned upside down). The molded edge on the top piece itself is a cove and quarter round, run with the quarter round to the top.

When molding a top with solid facings, it's best to make the first cut across the left side, beginning at the front corner and working toward the rear. Make the second cut across the front, beginning at the right corner, and then the third cut across the right side, working from the rear to the front. This progression of cuts helps eliminate tearout at the corners.

Take your time for a real fine bookcase

Building an heirloom bookcase requires greater effort than building one that's daddied and screwed together, but the result is, well, an heirloom. Making a drawing of this bookcase is crucial. A scaled layout with full-sized details and a stock list will eliminate guesswork.

Dovetail joints are solid, and a face frame adds substance—Locking the carcass together with dovetail joints makes for a solid foundation onto which to attach the

top, back, shelves and ogee bracket feet. I chose to use lapped dovetails at the top of the carcass and housed, tapered half dovetails at the bottom.

The lapped dovetails leave a smooth surface onto which to glue the top molding; a through-dovetail, by contrast, has end grain that can interfere when you glue on the moldings. Using two narrower pieces at the top rather than one full-width piece saves stock and requires fewer dovetails.

Housed, tapered dovetails make sense at the bottom because a piece with lapped dovetails would have to be 1½ in. thick to enable the base to be applied—a waste of expensive stock. The taper allows the half dovetail to fit easily into its housing, without weakening the joint. By selecting both types of dovetail joints, you can make the length of the tails the same; thus, each of

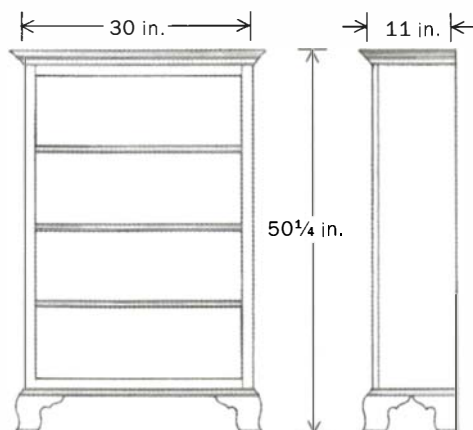
the three top and bottom pieces can be cut to the same length.

To make a housed, tapered half dovetail, start by cutting the housing itself into the side pieces. Two steps are required (see the top photos on p. 98): First, router-cut a full dovetail dado, then taper one side of the dado with a tablesaw.

Cut the tails onto the bottom piece back at the router. With the bit remaining at the same height as it was for cutting the housing, reposition the fence to cut a half dovetail onto one edge of the bottom piece. You'll need to run the bottom piece vertically against the fence.

Use a rabbet plane to taper the half dovetail on the bottom piece to fit the tapered housing on the side piece. Secure a fence across the flat side of the bottom piece, in line with the shoulder of the dovetail. With the rabbet plane against the fence, carefully plane a taper, starting at zero at one end and working down to ⅛ in. at the other end. Keep testing the dovetail in position until it fits snug in the housing. Before gluing up the frame, drill holes in the side pieces for brass shelf pins; space the holes using a predrilled board as a jig.

The face frame is of simple mortise-and-tenon construction. The top rail should be wider than the other pieces because a portion of it will be covered by the submolding below the top. A face frame gives the bookcase front a substantial appear-



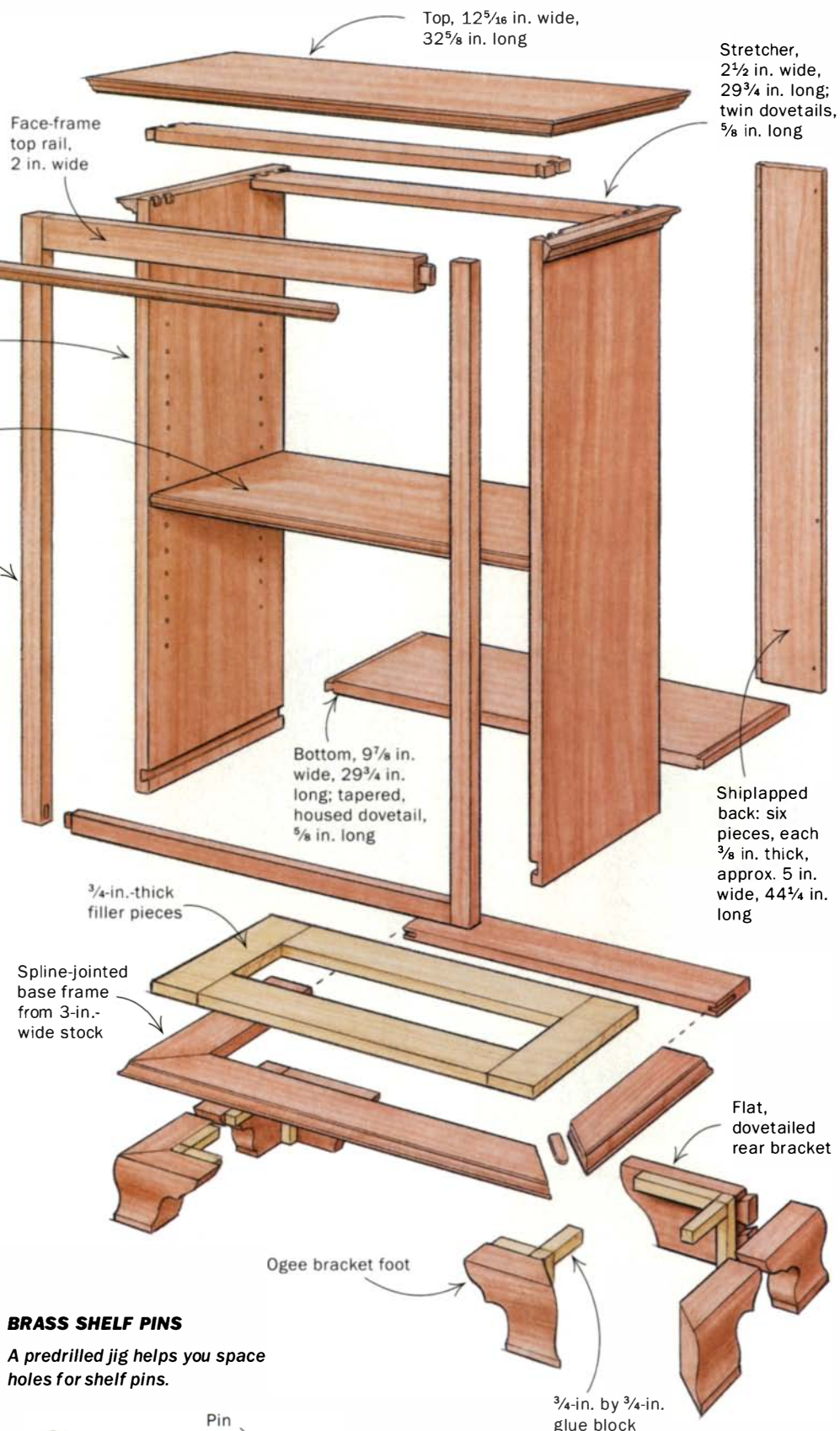
MULTIDAY BOOKCASE

If you have the time to make a truly fine bookcase, you can build this one from solid mahogany or another premium hardwood. Ogee bracket feet add complexity to the project but give the piece elegance and character.

ance. The drawback is that books can get trapped behind the frame.

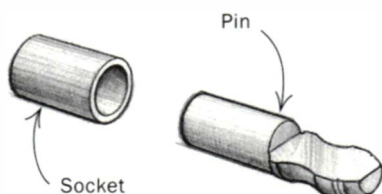
Ogee bracket feet add style—With the case glued and the face frame applied, add filler pieces to make up the thickness of the bottom. Now you can assemble a spline-jointed frame, onto which ogee bracket feet will be attached. Cut and fit the miters first. Next, cut grooves for the splines, using a 1/2-in. dado set on your tablesaw. Use a bandsaw to fashion pointed splines to fit the grooves formed where the four pieces come together.

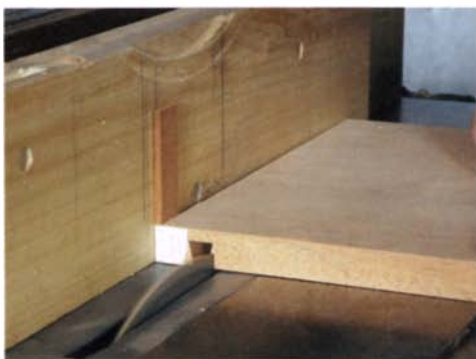
The ogee bracket feet added to this case certainly elevate its design. The feet are made from six pieces that start out as one long blank. These feet all stem from the detail that is drawn at the very beginning of the project. Transfer the outside curve of the foot from your drawing to thin, plywood pattern stock by stippling through the drawing onto the plywood with a stip-



BRASS SHELF PINS

A predrilled jig helps you space holes for shelf pins.





TAPERING A HOUSED HALF DOVETAIL

First router-cut a $\frac{5}{16}$ -in. dovetail dado across the side piece, then taper the dado. A $\frac{1}{8}$ -in.-thick, $\frac{3}{8}$ -in.-wide spacer taped to the end of the side piece allows you to taper one wall of the dovetail dado by running it across a tablesaw blade. Wax the tabletop and fence to avoid kickback.



Cut a half dovetail into the bottom face of the shelf piece, then taper the top face. With a board clamped to the bottom piece as a guide, plane a taper from zero at one end to $\frac{1}{8}$ in. at the other.



A tapered, housed half dovetail is easier to fit than a straight one. Properly sized, the tapered half dovetail will still lock tightly in its housing.



OGEE BRACKET FEET REVEALED

Multifaceted ogee bracket feet begin as one long blank. First mark the outside curve of the foot onto the end of the blank. To shape the concave curve, pass the blank diagonally across a tablesaw blade (top left), cutting just $\frac{1}{16}$ in. with each pass. To shape the convex curve, set the blade at an angle and make successive rip cuts (top middle). At the bench, shape and smooth the curves, first with a plane, then with a scraper (top right) and finally with sandpaper. Now cut the long blank into short lengths. Miter-cut the ends as necessary and cut the inside curve of the ogee feet at the bandsaw (bottom left). Glue up each foot from two pieces and then glue the feet to the base (bottom right).



pling tool. The plywood pattern can be cut out with a jigsaw. Use this pattern to transfer the ogee profile onto the two ends of the long blank. Now this shape needs to be cut into the surface. I like to do this with a series of cuts on the tablesaw, followed by a final shaping with a handplane and a scraper (see the bottom photos on the facing page).

Begin by cutting the concave portion of the ogee shape. I achieve this by raising the sawblade to the height of the concave curve and then positioning the blank diagonally until the tablesaw blade fills the curve. Clamp a straightedge to the table, parallel to the piece. Now lower the blade until it projects just $\frac{1}{16}$ in. above the table and pass the blank across the blade. Here, there is a safety issue. Angle the fence from the front left to the rear right of the saw table. As you push the piece across the sawblade, the rotation of the blade naturally pushes it against the fence. This will prevent any kickback from occurring. Raise the blade only $\frac{1}{16}$ in. with each subsequent pass. A telltale sign of an aggressive cut is the sound of the blade cutting. If it starts to sing wildly, the cut is too deep or the pass across the blade is too rapid. Altering one or the other will solve the problem.

Once you've completed this series of cuts, remove the temporary fence and replace it with the regular fence. Angle the blade to 45° and set the fence so that the square corner at the top of the foot can be cut away by running the blank on its top edge. Then adjust the blade angle to $22\frac{1}{2}^\circ$ and cut a second bevel, taking away the sharp corner of the angle you've already cut. Cut at this angle two more times, once with the blank lying flat on the table, profile down, and a second time with the fence moved to the left side of the blade and the blank run between the fence and the blade. For this final cut, raise the blade to remove the hard angle where the cove meets the round.

At the bench, plane the roundness of the ogee into the blank and scrape it free of sawmarks and facets left by the plane. Follow with a progression of sandings to achieve the final shape and smoothness.

Now that the blank has its finished shape, you can cut it into three lengths, each long enough for two halves of an ogee bracket foot. Each front foot is formed from two halves mitered together; the back feet each require a shaped half to be dovetailed to a



Shiplapping allows solid boards to move. A single screw placed near one edge of each board (at top and bottom) will enable each rabbeted board to hold down the board next to it, while allowing each board to move with seasonal changes.

flat rear bracket that has been shaped with a simple curve. Miter-cut four ends of the lengths for the front feet and leave two ends straight for the rear feet. Use a plywood pattern to draw the inside curve onto the lengths and cut out the shape on the bandsaw. Clean up the curves by rasping, filing and sanding. Gluing the feet together requires nothing more than a rub joint, if the miters are planed and fit correctly. Rub glue blocks into the inside corner of each ogee bracket foot to provide additional strength. You can then glue the feet to the mitered base frame.

Shiplapped back allows for wood movement—Shiplapping is an excellent means of attaching solid boards to the back while allowing each board to move with seasonal changes in the weather. Deter-

mine the width of the boards for the back by dividing the width of the opening by the number of pieces you feel is suitable without having to glue up any pieces. It's best to do a full-sized layout to determine the sizes of the boards, keeping in mind that the rabbets will overlap. I settled on six boards for my bookcase. The theory is that each rabbeted board will hold down the board next to it, if you position two screws (one at the top and one at the bottom) near the edge (look closely at the photo above). Two screws will leave each board free to move. And if you've had books piled on the floor, the bookcase itself will provide you the same freedom. □

Philip C. Lowe designs, builds and restores fine furniture and teaches carving and woodworking at his waterfront shop in Beverly, Mass.

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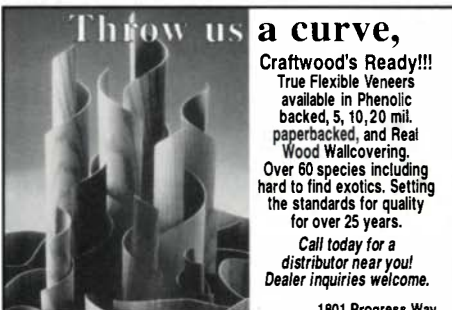
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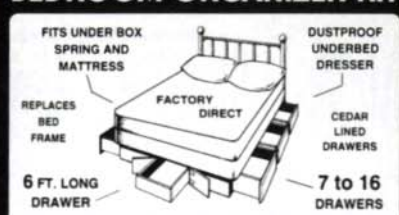
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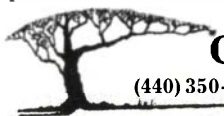
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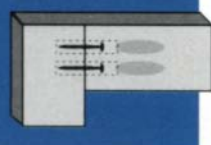
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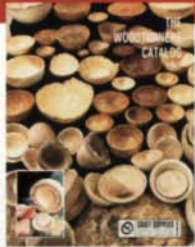
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Rules of Thumb

BY MICHAEL DUNBAR

Vises are a woodworker's third hand

I have watched a lot of frustrated beginning woodworkers attempt to saw a piece of wood while holding it against a workbench with their free hand or their knee. I even saw one diligent guy put a board on a workbench, then sit on the board while he tried to make a cut. Pity that all of them didn't clamp their work in a vise.

Vises are indispensable woodworking tools. Through the day, a woodworker has to hold any number of things, such as parts or tools, so that he can work on them.

Different styles of vises are made for a variety of different purposes. Thus, the longer you work wood, the more likely you are to own more than one vise. I started with one and now have six.

Vises are commonly built into woodworkers' workbenches. A typical joiner's bench has two—a side vise and a tail vise. A side vise is usually mounted along the length of a bench and is generally used for holding boards or parts on their edges. Holding a board for jointing with a handplane is a common job for the side vise. A tail vise—usually mounted on the end of a bench—holds boards or parts flat on the benchtop (see the left photo below). It

is generally used in conjunction with benchdogs. Planing or sanding a board's face and gluing panels are common jobs that involve the tail vise.

In my chair-making school's shop, we use two other types of vises on a daily basis. My favorite, the carriage vise, is similar to a machinist's vise but is made to much more exacting tolerances. It was manufactured early this century by the Prentise Vise Co. In the company's catalog, this model is listed as a "woodworker's vise," but it is intended more specifically for carriage makers.

The jaws are at chest level (see the right photo on p. 108), making it easier to work in a standing position, which is especially helpful for fine work. The jaws' faces are machined flat so that they do not mar the work, even when it is held very tightly. The screw has very little backlash, so I can tighten and loosen the jaws with a half twist. I have had the Prentise carriage-maker's vise for 27 years. It serves me as a third hand, and without it, I would feel handicapped.

The other type of vise used in our shop is the Record 53E. This model is so well known and so widely used by woodworkers



A tail vise is for working wood flat on the bench. Chopping mortises, face-planing or sanding is easy with a tail vise mounted so that the screw is parallel to the bench's length. The vise clamps the wood against a benchdog, the movable square peg at the front end of the new wood.



A side vise is used for working the end or edge of a board. The author copied the twin-screw vise—great for gripping long boards while working the ends—from an antique bench. Side vises are mounted so that their screws are parallel to the width of a bench.

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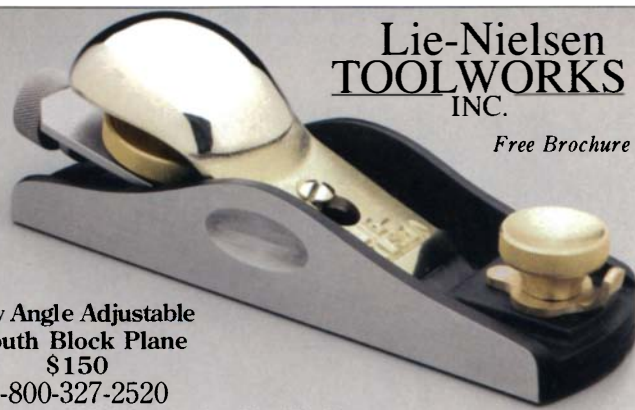
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Rules of Thumb (continued)



Side vises on the end of a bench. For his Windsor-chair-making classes, the author mounted two Record 53E vises on the short end of each bench (left), which allows him to work off the corner of the bench. Working the long edge of a board is easy with tandem-mounted vises.



Smooth operator. This antique Prentise vise (right) has smooth faces that won't mar wood.

everywhere that it is the standard add-on cast-iron bench vise.

A once-popular type, pattern-maker's vises were made in large numbers and can still be found (though they're expensive). Pattern makers worked with irregular shapes and frequently needed to revolve the work to place it in an advantageous position. Their vises were far more flexible and complicated than those used by other branches of woodworking. Veritas makes a modern version of a pattern-maker's vise called the Tucker Vise.

Use a vise to your advantage

When I visit other shops or watch students at work, I observe two common problems. Many woodworkers use vises that are inadequate, or they frequently do not use their vises to their best advantage. Whatever type of vise or vises are required in your work, they should all be high quality and strong. (Weak vises are spelled differently.) It is also usually a good bet to buy a brand you recognize. You will not be well served by a lightweight or undersized vise. Acquiring a good vise usually means spending the long dollar. However, the investment will pay dividends for as long as you work wood.

Using a vise to its best advantage is a regular part of our classroom instruction. It is easier to work wood if it is securely held by the vise. But avoid working in a way that allows the part to flex. It is usually best to lower the wood you are working on as far into the vise as possible so that it doesn't project a lot. Try to keep the area you are working as close to the jaws as possible to keep the workpiece rigid.

It doesn't matter whether the waste or the piece you are keeping gets clamped into the vise—whatever holds better is best. For instance, if you are cutting the waste off the end of a turned spindle, which would be hard to clamp securely because of the turnings, it will be easier to clamp the waste piece in the vise and hold the spindle in your hand as you saw with your other hand. And if you have to joint pieces too small to run across a jointer, clamp a #7 jointer plane upside down in a vise and push the piece over it.

With a little forethought, vises can be adapted to better suit your needs. In our school, we cannot provide each student with several types of vises, so we have mounted Record 53E vises in a versatile way that allows them to perform all the jobs we require, such as holding chair seats for planing, turned legs for drilling or spindles for shaping. Many shops mount a bench vise on the bench's long edge and set it in from the corner. Ours are located on the bench's short end and right on the corner. This allows us to use them as a tail vise for planing. A row of dog holes is aligned with the vise's dog (which is mounted in the outside jaw). And when jointing very long pieces, we can clamp the wood using two vises on the end of a bench.

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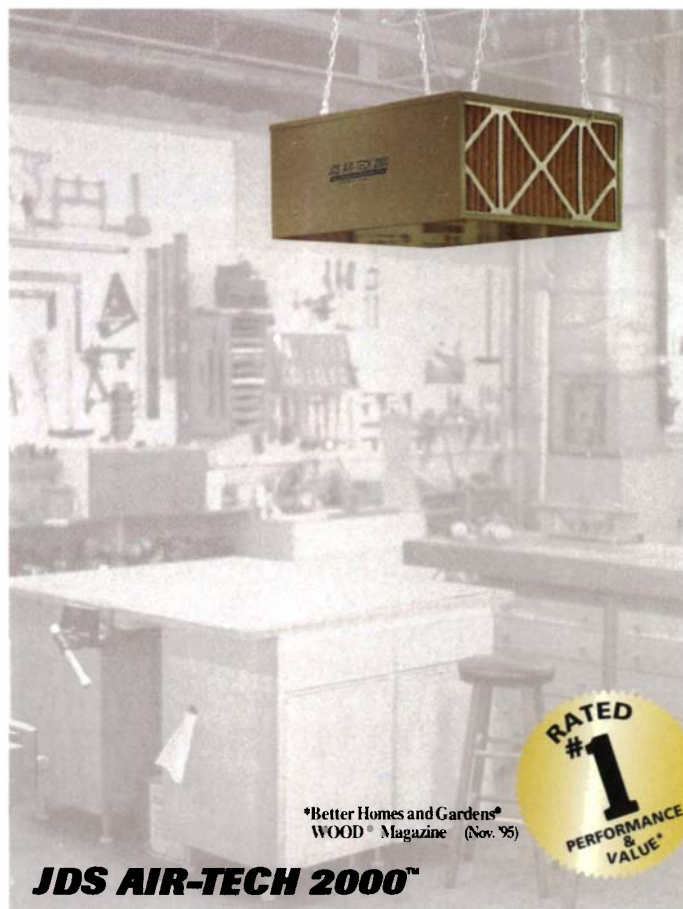
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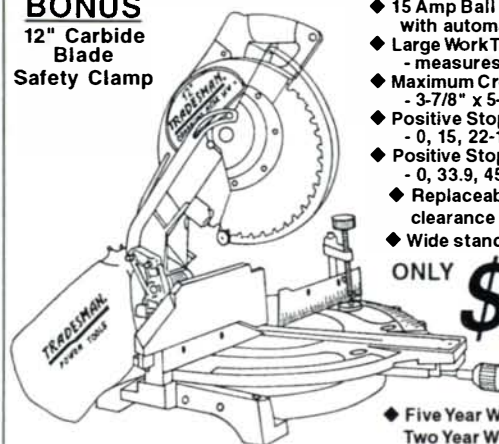
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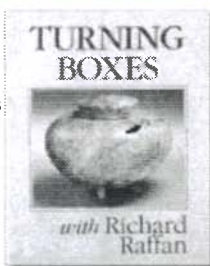
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READER SERVICE NO. 757

Push or pull a sliding miter saw?

I've been using my sliding miter saw for over a year now. Half the time I push it through the cut, and the other half I pull, as I would a radial-arm saw. Is one method recommended over the other?

—Jonny Miles, Abbeville, Miss.

Lon Schleining replies: Before you begin cutting with a sliding miter saw, you should position the saw up over the board and out toward you as far as it will go. First plunge into the work, then push the saw away from you to complete the cut, as you would when using a circular saw. Here's why.

A sliding miter saw differs from a radial-arm saw in at least two important ways. First, the blade on a radial-arm saw retracts completely behind the fence. The sliding miter saw retracts only so far when the blade is all the way down. Second, a sliding miter saw pivots up and down like a chopsaw. But a radial-arm saw stays at the same level as it moves. With a sliding miter saw, these two factors combine to make a push cut safer than a pull or climb cut.

Picture crosscutting some 8/4 hard maple. If the radial-arm saw is pulled too

hard into the cut, it might bog down or even jam. But you don't want to use the sliding miter saw like a radial-arm saw to make the same cut. If the sliding miter saw is pulled too hard, it could feasibly rise out of the cut and uncontrollably lurch across the top of the board.

By first dropping into the cut, then push-cutting the rest of the way through, the cutting action is more controllable, hence safer and more accurate. If you push too hard into that piece of maple, the sliding miter saw might bog down, but it will present less danger if it does. [Lon Schleining is a stairbuilder in Long Beach, Calif.]

Flattening a rolled veneer

I have had a roll of Carpathian Elm veneer for several years. How can I best unroll this veneer without it cracking?

—Morris Radin, Los Angeles, Calif.

Walter Raynes replies: Flattening veneer, particularly a burl like Carpathian Elm, is not difficult, but having it in a roll does present a few "wrinkles," if you will.

There are as many methods for flattening veneer as there are species of veneer. The simplest method is to moisten the veneer and unroll it slowly.

As the moisture is absorbed by the veneer, the inner face should begin to expand, forcing the veneer to unroll. The difficult task will be to introduce moisture to the inner surface of the roll without getting the veneer too wet. A lightly moistened paper towel or rag can be placed in the center of the roll.

Introducing moisture between layers of the roll is a bit more difficult but can be done by gently pulling strips of lightly moistened rag through the layers of the veneer. Water should be used sparingly and allowed to soak in. Placing the roll in a plastic bag for a few hours or overnight will allow the moisture to spread without evaporating. Once the veneer has begun to unroll, additional moisture can be applied to dry areas by misting with a spray bottle. Do not soak the veneer. It should be damp, not wet.

When the veneer is uniformly damp, it should be flexible enough to flatten by pressing. Place the veneer between two pieces of medium-density fiberboard (MDF) or plywood with two layers of clean newsprint or brown paper on each side of the veneer. Then weight it down or place it in a press. Change the paper twice the first day and then once a day for two or three additional days until the veneer is dry. Keep the veneer in the press until you are ready to cut it to size and glue it down.

By its nature, burl veneer is extremely brittle and will easily crack if rolled. In the future, you may have better luck with Carpathian Elm if you store it flat. But as long as you don't rush the process, the veneer should unfurl without a glitch. [Walter Raynes designs and builds furniture in Baltimore, Md.]

Black oak lumber

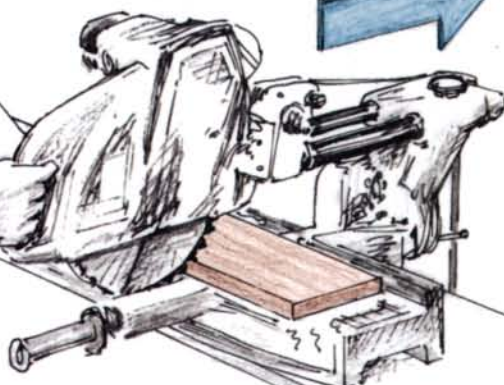
I have been lucky enough to be presented with a number of logs of what we call "black oak" in Sweden. This oak has been submerged in water for a number of years. It works just like ordinary oak, except that it has even more grains of sand in it. I would like to know a bit about the process that makes oak turn black.

—Thomas Fritz, Östersund, Sweden

Jon Arno replies: What you refer to as black oak is usually called "bog oak" in

PUSH, DON'T PULL

Before turning on a sliding miter saw, pull the blade toward you. Then start the saw, lower it into the cut and push the blade through the stock. The pushing motion prevents the blade from rising out of the cut and sliding across the stock.



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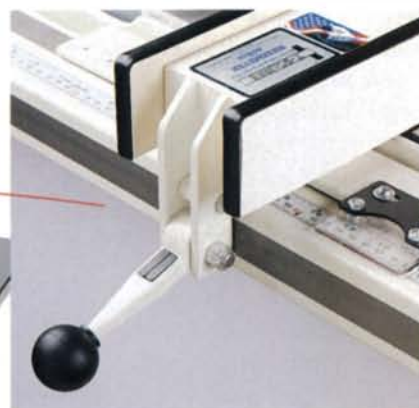
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READER SERVICE NO. 78



the British Isles and here in North America. It results when oak logs are submerged in water, usually for very long periods of time.

The logs are preserved because the water prevents aerobic decay organisms from getting in them. In the meantime, the tannic acid within the oak begins to react with dissolved minerals, predominantly iron in the water. In chemical terms, apparently what happens is that acid molecules give up some of their hydrogen atoms in exchange for iron atoms, producing a mineral salt that, in turn, pigments the wood. Just how fast this process occurs, or whether it occurs at all, is a function of what minerals are available in the water and how high their concentrations are. In nature, it indeed seems to be a very slow process, taking at least centuries if not millennia to maximize the pigmentation.

I have often wondered if this whole process could be speeded up, and there is certainly some suggestion that it could. The actual chemical reaction between tannic acid and iron seems to be almost instantaneous. As I'm sure you've experienced, working oak with steel tools will quickly cause black stains on your hands. Also, when iron fasteners are used in oak, the surrounding wood seems to blacken almost immediately when it is exposed to adequate humidity.

I've seen nothing in the technical literature to suggest that this subject has ever been scientifically explored, and I certainly can't offer any experienced-based insights on how to do it. However, given the scarcity of genuine black oak, maybe someday an enterprising woodworker will discover how to soak ordinary oak boards in some sort of strong solution of iron and tannins and come up with an overnight counterfeit. Who knows. Maybe it's already been done. How sure are you on the source of that black oak you have?

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

Do you have a question you'd like us to consider for the column? Send it to Q&A, Fine Woodworking, P.O. Box 5506, Newtown, CT 06470-5506.

In FWW #131, Gary Sullivan asked how to prevent rust from collecting on the tools in his unheated garage shop. The responses covered everything from quick fixes to the construction of tool storage rooms.

Years ago, my dad passed on a solution to rusting tools. Mothballs apparently give off fumes that coat the metal and retard oxidation. He lived in New Jersey, and I currently live in Southern California, where the climates are quite different. Any tools, his or mine, that have been kept in a cabinet or toolbox with mothballs have retained their shine and luster for over 25 years.

—F. William McCoy, Tustin, Calif.

I have found the best way to control rust is to spray my tools with TopCote and keep a small 8-in. fan running continuously. I have been doing this for three years and have cut my rust by about 90%.

—Cliff Goffar, Cape Coral, Fla.

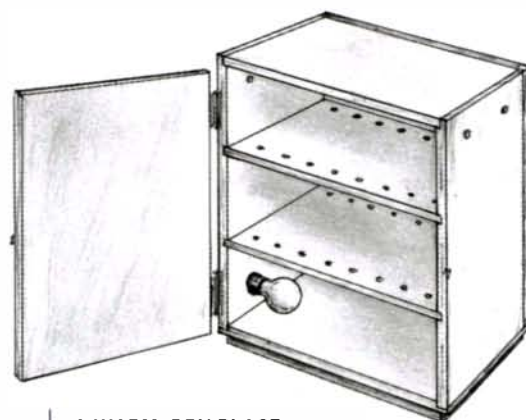
A dehumidifier should help, but if your floor is concrete, you need to seal it first.

—Jeff Tucker, Kill Devil Hills, N.C.

Tools should be stored in a cabinet that can be closed tightly. If the cabinet has shelves, they need to be drilled to promote air circulation. Cover the shelves with fiberglass window screen. In the bottom of the cabinet, place an electric dehumidifying rod or a 15w to 25w light bulb and keep it on. Because the rod or bulb gets hot, ensure that there is a minimum 1 in. of clearance from it to any of the wood parts of the cabinet. Keep the cabinet closed and return tools to the shelves as soon as possible.

—J. Robinson Krup, Oxnard, Calif.

When I bring a new tool into the shop, I clean off all the packing wax and cutting oil with paint thinner. Then I wax all the unpainted metal with Johnson's, Minwax or Renaissance Wax, available from Woodcraft (800-225-1153) or Highland Hardware (800-241-6748). I wax tools at least twice initially, then again in a week or so and periodically thereafter. Boeshield T-9 spray (PMS Products; 616-786-9922) works great between waxings and in hard-to-reach areas.



A WARM, DRY PLACE
Shelves drilled with holes distribute heat from a low-wattage bulb.

I place a piece of camphor, available at drugstores, in each tool drawer. I also use air-drier tins filled with silica-gel crystals, available from Micro-Mark (800-225-1066) or Woodcraft. The camphor gives off a protective gas that coats the tools. The air-drier tins absorb moisture from the air and are renewable by drying in an oven or microwave. Also keep a few Wonder Bars or Bright Bars handy for quickly removing any rust that manages to break through all this. Just remember to rewax after removing any rust.

—Michael Lee Stewart, Chambersburg, Pa.

Here is a solution that I have used for 20 years in Western Oregon, one of the wettest places in the United States.

I built a small, well-insulated closet (about 3 ft. deep by 5 ft. wide) with an insulated steel door in front. I heat it with a 500w baseboard heater with a built-in thermostat. Adjust the heater to keep this little closet between 70°F and 75°F.

If you frame this on a concrete floor, build a false floor to provide insulation. The concrete will suck the heat right out.

—Jon Marshall, Sherwood, Ore.

Unless they are airtight and provide dehumidification, using cabinets for tool storage actually increases rust formation. Instead, store the tools out in the open with good ventilation so you only have to deal with water vapor. I have good luck preventing rust by using DriCote on chisels, bits and blades. But the tedious and anxious race to rub every last grain of rust from your tools will probably do more harm than good. Rust does not cause rust; regard the occasional spot as graceful aging.

—David S. Wright, Greenville, S.C.

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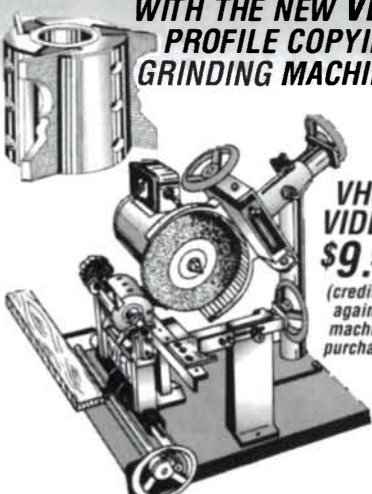
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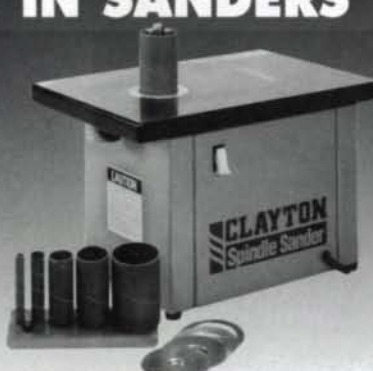
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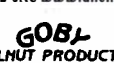
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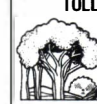
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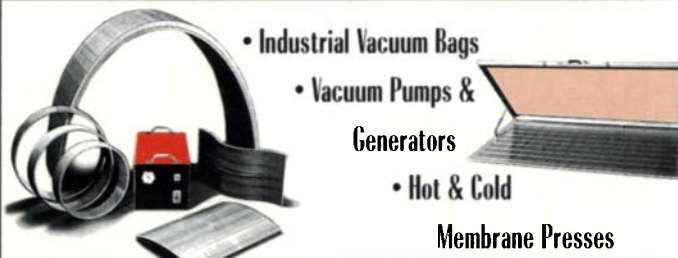
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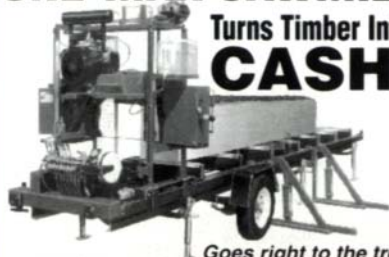
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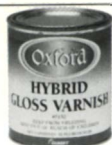


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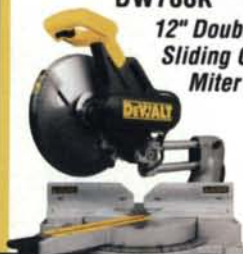


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Master Class

Krenov on grain: The story of his latest cabinet



James Krenov loves to read, and his conversation is laced with quotations from writers, artists and craftsmen. Much of Krenov's best reading, however, takes place, not with a book in his hand, but a plank. A close look at a piece of his furniture reveals his gift for reading the possibilities in a piece of wood. You see that the wood and the cabinet are beautifully blended. Only this particular plank could have made this piece. When we paid him a

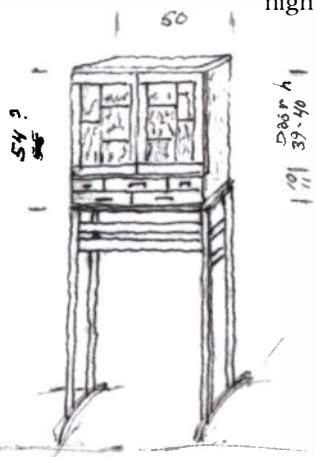
visit in late June, we found him working on a new cabinet-on-stand in teak, spalted maple and olive. He was nearly finished with the cabinet and was contemplating the stand. We asked him to explain how he'd chosen the wood for the piece and how the wood had affected the design.

I started with only a vague idea of what I was going to make. I knew it was going to be a small cabinet and that it would be made of a wood not too light—and not very dark. Medium, like this teak. I did a little sketch (see below), more of a doodle than a drawing. The sketch just gives me a line on a map—I can follow it, but I still have to take a look at what's on either side of the road.

From there, I went to the wood room and picked and poked my way to a sense of confusion, irritation. I looked through the wood I had in my bench room, but I didn't find what I wanted. I had some teak that was very dark brown and extremely straight lined. Teak like that seemed too good to be true—it didn't excite me. Then, back in the woodroom, I noticed a small, crooked, sawn-up log of teak lying partly hidden on the floor. We'd had it for several years, and nobody seemed to want it. It was no more than 5 ft. long and had been sawn into 8/4 planks. I scratched it a little bit and discovered it was rather a lively teak. It had nice color and a lot of motion in it. Once I found that log, I was off and running—it really gives me energy when the wood helps me with what I hope to do. But I have to take care. If I turn to one plank instead of another to start a cabinet, it can be the difference between night and day. Or maybe just night. ...

I sawed some of the teak into veneer and made up parts of the carcass with it, using pleasantly beige European cherry for the inside. Some people like to use high-contrast wood inside a cabinet to make it a surprise when you open the doors. I prefer a soft transition. There's a lot of movement in the cherry; it has rhythm and ripples in it. But it's not wild.

When I was working on the sides of the cabinet, it became apparent that something different from what I had anticipated was going on. I was making a perfectly rectangular cabinet, but here the grain was bending forward at the bottom: The crook in





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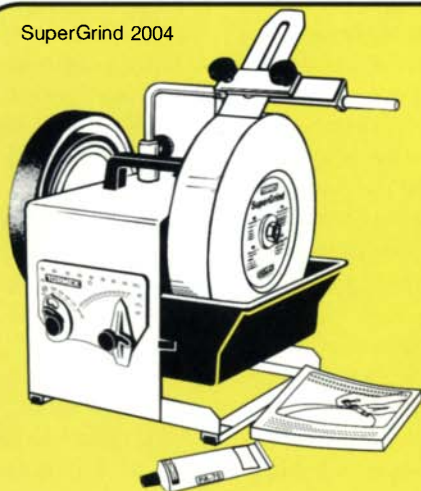
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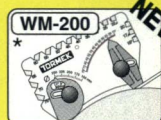
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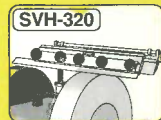
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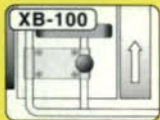
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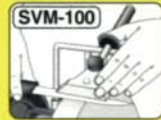
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the log of teak was now visible as a pleasing but definite curve in the grain of the veneer.

When I saw that the side of the cabinet created a forward curve, I decided to change the stand to one with front legs that swept forward (see the sketch below). Making this change is an example of observing what's happening with the wood as you work. But while you sometimes let the wood guide you, you shouldn't let it dictate. You have to refer to the wood without abandoning your intentions. There has to be a cooperation, a partnership between the two. The idea is to follow, but be careful.

It's a matter of getting acquainted with all of the properties of each wood you choose to work—a wood's colors; its hardness or lack of hardness; whether its grain is ornery or not. It's a very per-

While you sometimes let the wood guide you, you shouldn't let it dictate. You have to refer to the wood without abandoning your intentions.

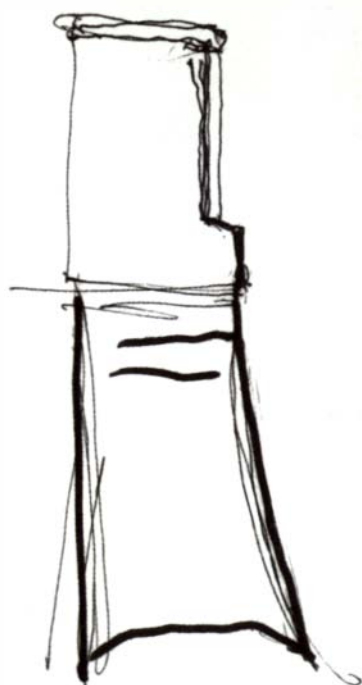
sonal thing, and not everyone pays such close attention. But if you do, you are more in harmony with the wood and the work. And the results seem to flow from this harmony, even though it is connected with periods of stress and doubt. In the long run, knowing about these things will help a person.

Making the drawers was dicey. I made them from one short, thick, lively piece of olive, and I had a knife at my throat the whole time, knowing I didn't have extra wood with the same pattern, or anywhere near it, so there was no way I could replace a drawer—if I spoil one, there goes the whole facade. The olive wasn't long enough to give me all of the drawers with the grain continuous from side to side. But it was thick. So I made end-to-end book-matches. The challenge was to piece these busy elements together without creating chaos. I may not have achieved quiet, but I think I avoided chaos.

The drawer sides, backs and bottoms are made of olive ash. It's a subdued tan color that goes well with both the olive and the teak. It looks much better than if I had used a high-contrast wood like maple. The olive ash just melted together with the other woods.

By the time I cut the door panels, I had made most of the cabinet. But again, I knew what I wanted—sort of. My friend Brian had given me two small pieces of spalted maple as a present, saying, "Make something with these someday." I like that. We have these little exchanges of wood going on. People share pieces of wood, and they become a story. The piece I used for this cabinet was 3 ft. long and about 8 in. wide. Part of it had crumbled, and only about a foot and a half was usable.

With spalted wood, the pattern often changes dramatically in ways you can't predict from one slice to the next. Just a bandsaw kerf away you sometimes find the pattern very different. That was the case with these panels. If you open the door and compare the inside with the outside, you'll see they are quite different. I had originally planned to set tiny pieces of ebony as straight lines dividing the door panels (see the original sketch on p. 128). But



Going with the grain. When he saw the curve in the grain on the cabinet side, Krenov rethought (and resketched) the stand's front legs. He gave them a complementary forward curve and selected a plank with a matching curve in the grain.

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Panel discussion. Krenov liked the pattern of spalting in another pair of panels he cut for the doors, but as he demonstrates in the photo above, the color was too pink for the cabinet. The finished cabinet (right), with its harmony of colors and patterns, proves again that when it comes to reading grain, Krenov wrote the book.



when I saw the pattern of spalting on the panels, I thought, “There it is; don’t mess with it.”

I should mention that earlier I tried a different set of panels. I had a piece of spalted maple of my own that I sawed up, with spalting in a very intricate pattern, like spiderwebs. The landscape they made was wonderful. But when I saw those panels next to the olive of the drawers, the panels were too pink (see the left photo above). There was no other pink in the cabinet—the rest of the wood went toward yellows rather than toward reds.

So I settled for the board my friend had given me. The composition may not be as strong, but the color is better. Once I get finish on them, the greenish cast will fade, and they will be much more mauve. I think it will be a nice complement to the olive in the drawers and to the teak. I still like the original panels, though. I’ll just have to build another cabinet for them someday. ... Maybe. ...

Later in the summer, we heard that the cabinet was finished, and we asked Krenov how the rest of the process of making it had gone.

When you were here, I hadn’t decided on the pulls, although I was thinking about wrought iron, some kind of Japanese-ish drop pulls. I contacted John Burt, a cabinetmaker and blacksmith, and he made these for me. They are in three sizes to suit the smaller, intermediate and larger drawers. John also made the handles for the doors. I placed them a little above the middle of the door because

there was already considerable visual weight down at the drawers with all their pulls.

When it came to making the stand, after I had abandoned the original sketch and gone for the forward-sweeping front legs, everything was rather simple. There was a little play with the grain. I used the natural curve in the grain for the front legs, and I tried to get some of the less curved, almost straight-grained wood for the back legs, which are themselves straight. On the stand’s front rail, you can see an upward curve to the grain. If you turned that upside down, it would look tired; with this gentle, upward curve, it lifts rather pleasantly.

So the stand was easy to make, but for a while I had some doubt as to the dimensions. I thought maybe the stand was a trifle heavy for the rest of the cabinet, and perhaps some will think so. But now, after coming back to see it at different times, sneaking up on it and turning on the lights, after asking my wife, Britta, to take a look with me and hearing from other people who have looked at it, I see the cabinet itself is not so delicate. In fact, it has a certain miniature sturdiness. So perhaps the stand and the cabinet are friends after all and get along rather well.

To finish things off, I just have to say that I’m pleased with the cabinet, and people seem to like it. And I’m very happy to admit that, in making it—whether it’s for the last time or not—I have once more been very lucky.

—James Krenov, Fort Bragg, Calif.

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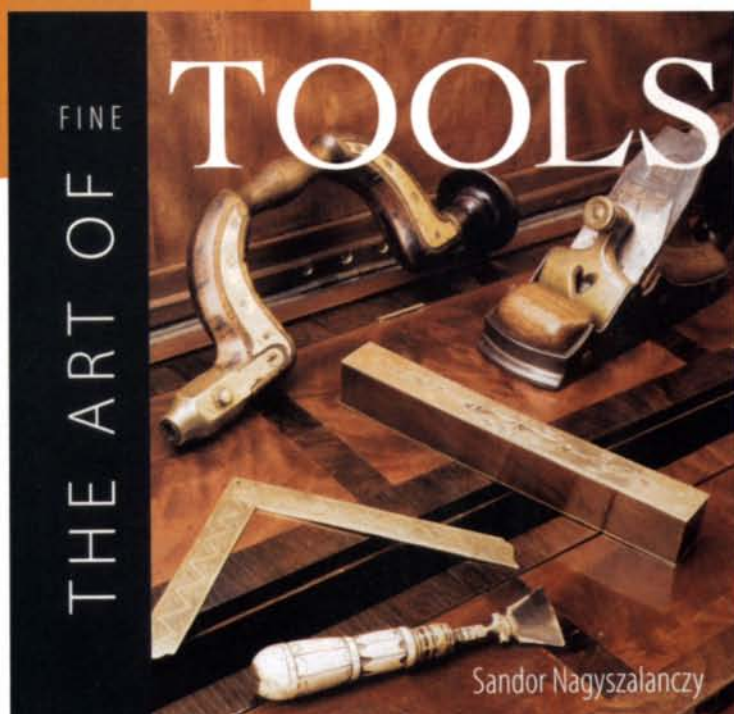
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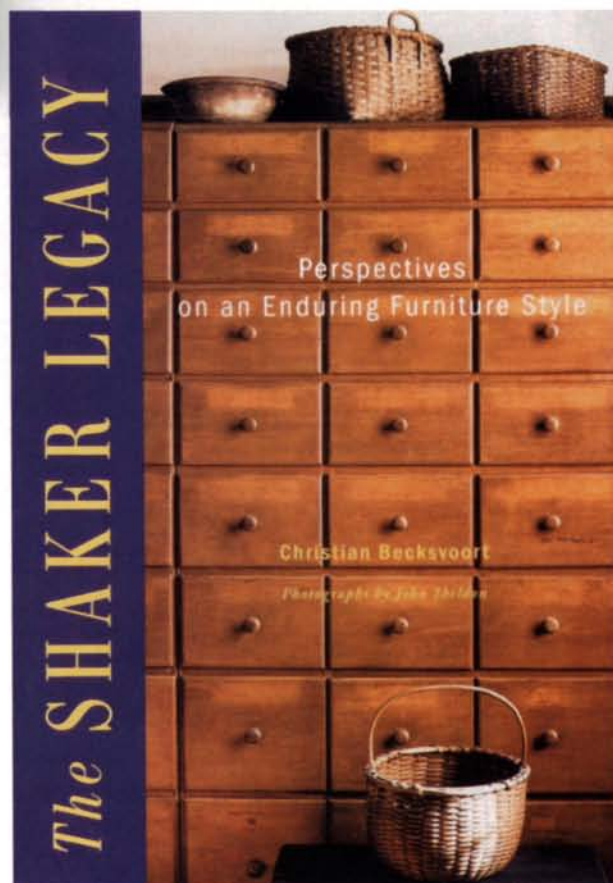
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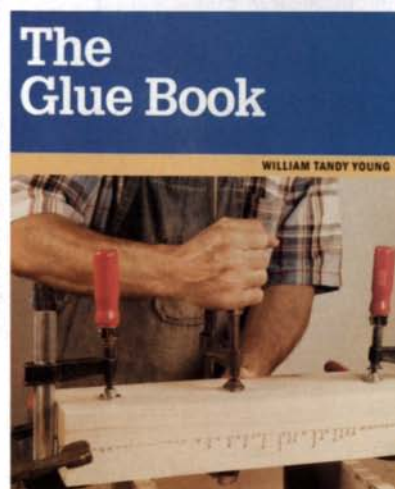
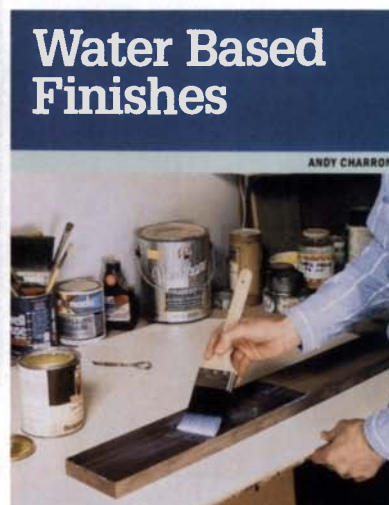
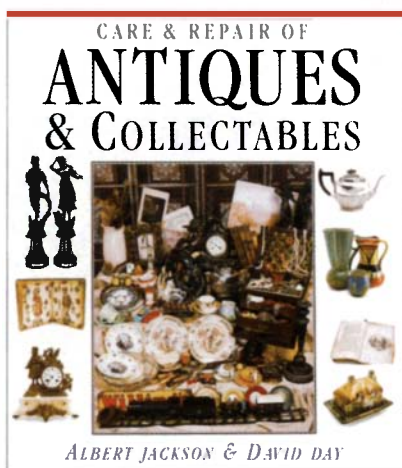
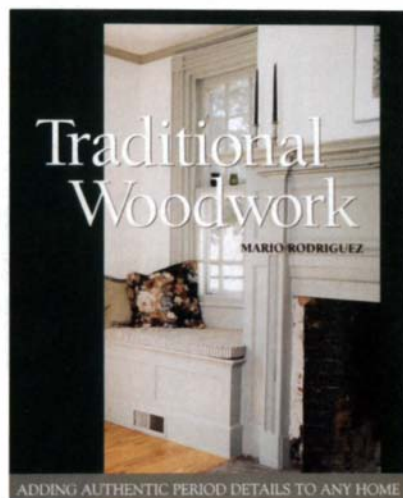
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Model	Description	List	Sale
50-860	NEW 850 CFM Air Cleaner	239	
31-695	6" Belt/9" Disc Sander	441	299
23-710	Sharpening Center	217	145
23-680	6" Bench Grinder 1/4 HP	80	69
31-460	4" Belt/Disc Sander	198	119
40-560	16" 2 speed Scroll Saw	230	129
40-540	16" var/spd Scroll Saw	249	179
11-990	12" Bench Drill Press	255	184
11-090	32" Radial Bench Drill Press	405	279
43-505	1/2" Bench Router/Shaper	398	269
22-540	12" Bench Top Planer	254	259
28-195	10" Band Saw	390	300
22-560	12-1/2" Planer w/ extra knives	329	
36-865	Versa Feeder Stock Feeder	249	
36-220	10" Compound Miter Saw	294	199
28-185	Bench Band Saw	213	168
36-240	10" Sliding Miter Saw	589	439
37-070	6" v/spd Bench Jointer	351	265
14-650	Hollow Chisel Mortiser	380	239
17-900	16-1/2" Floor Drill Press	490	349
36-285	8-1/4" Builders Saw w/ stand	254	269
34-555	Sliding Table	487	289
36-250	10" Slide Compound Saw	825	449
31-780	Oscillating Spindle Sander	253	194
31-780K	31-780 w/ 31-781 spindle set	209	
46-700	12" Wood Lathe	575	465
40-650	Q3 18" Scroll Saw	389	389
36-905	30" Unifence	346	255
36-906	50" Unifence	444	325
34-444	10" Contractors Table Saw	579	

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	unifence, cast iron wing, 34-9/16 table	
	board, & carbide blade	839
22-675	DC380 15" Planer	1175
28-275	14" Band Saw 3/4 HP	595
28-280	14" Band Saw 1 HP motor with	
	enclosed stand	739
28-270	14" Band Saw 1 HP w/ 50-274 mobile	
	base, 28-855 rip fence, & 28-266	
	cool blocks	839
31-280	Sanding Center w/ stand	789
37-190	6" Deluxe Jointer	603

NEW Single Stage Dust Collectors			
Model	Description	List	Sale
50-850	1-1/2 HP, 1200 CFM	285	
50-851	2 HP, 1500 CFM	455	

MILWAUKEE TOOLS			
Model	Description	List	Sale
6527	NEW Sawzall with case	343	169
6537-2	6527 w/quick lok blade change	224	175
0407-2212V	Drill w/kyls chuck&2 batt380	175	
0224-1 3/8"	Drill 4.5 amp magnum	236	132
0234-6 1/2"	Drill 4.5A mag 0-850 rpm255	134	
0235-1 1/2"	Drill w/lesschuck	255	142
0244-1 1/2"	Drill 4.5A mag 0-600rpm255	134	
0222-1 3/8"	Drill 3.5 amp 0-1000 rpm213	119	
0228-6 3/8"	Drill 3.5 amp 0-1000 rpm207	109	
0375-1 3/8"	close quarter Drill	255	148
0379-1 1/2"	close quarter Drill	288	165
6546-6	Screwdriver 200 & 400 rpm	150	89
6547-6	6546-6 w/bits, 1/4" chuck & cs185	108	
5399-1	D-handle Hammer Drill Kit 356	219	
5397-1	3-8" v/spd Hammer Drill Kit 275	145	
5371-6	1/2" v/spd Hammer Drill Kit 360	194	
3107-6	1/2" v/spd right angle Drill Kit141	234	
3300-1	1/2" v/spd right angle Drill	378	219
6142	4-1/2" Grinder w/case & acc.	224	129
6490-6	10" Miter Saw	496	265
6491	6490 w/ carbide blade & bag594	328	
6494-6	10" Compound Miter Saw	585	315
6266-6	Top Handle Jig Saw	315	159
6496-6	10" Slide Compound Saw	1050	569

FREUD CARBIDE TIPPED SAW BLADES			
Item	Description	Teeth	List Sale
LU72M010	Gen Pur. A.T.B.10"	40	69 42
LU82M010	Cut-off 10"	60	93 44
LU84M011	Comb 10"	50	78 45
LU85M010	Super Cut-off10"	80	115 59
LM72M010	Ripping 10"	24	69 38
LU73M010	Cut off 10"	60	84 49
LU87M010	Thin Kerf 10"	24	72 45
LU88M010	Thin Kerf 10"	60	88 49
LU89M010	Ultimate 10"	80	128 68
LU91M010	Compnd Mitr 10"	60	88 54
F410	Quiet Blade 10"	40	95 49
SD308 8"	Dado - Carbide	230	119
SD508 8"	carbide w/case & shims	344	168
FB100	16 piece Forstner Bit Set	338	194
94-100	5 pc. Router Bit Door System	320	169
FT2000E	Plunge Router	189	189
JS102	Biscuit Jointer	119	

HITACHI TOOLS			
Model	Description	List	Sale
CF8B2	8-1/2" Slide Compound Saw	169	449
C10FS	10" Slide Compound Saw	1627	579
C15FB	15" Miter Saw	1346	645
NV45AB	Coil Roofing Nailer	935	379
NT32AE	New Pinner 5/8" - 1-1/4"	85	
NT50AE	New Pinner 3/4" - 2"	129	
C10RA	NEW 10" Table Saw	632	319

MAKITA TOOLS			
Model	Description	List	Sale
5080DW	3-3/8" Saw Kit 9.6 volt	280	155
DA391D	3/8" angle Drill 9.6V	166	114
DA391DW	3/8" angle Drill Kit 9.6V	341	169
ML902	Incandescent Flashlight 9.6V	14.95	
6095DWE9	6 volt Drill Kit w/2 batt.	125	
6095DWE2	6095DWE w/flashlight	139	
632007-4	9.6 volt Battery	47	30
632002-4	7.2 volt Battery	39	28
NEW 18 VOLT MAKITA TOOLS			
6343DWE	1/2" Drill Kit	249	
5620DWA	6-1/2" Circular Saw Kit	259	
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6213DWE	12V 3/8" Drill Kit	325	169
6233DWE	14.4V 3/8" Drill Kit	358	205
9900B	3"x21" Belt Sander w/bag	347	179
9924DB	3"x24" Belt Sander w/bag	360	189
N1900B	3-1/4" Planer with case	263	142
1912B	4-3/8" Planer	352	205
N9514B	4" Disc Grinder 4.6 amp	119	65
DA3000R3/8"	Angle Drill	355	185
7085W	8-1/4" Table Saw	637	295
6405	3/8" Drill Rev. 0-2100 rpm	115	65
6013BR	1/2" Drill Rev. 6 amp	270	159
9401	4" x 24" Belt Sander w/bag458	230	125
5007NBK	1-1/4" Circ Saw w/case	255	125
LS1011	10" Slide Compound Saw	995	429
LS1211	12" Slide Compound Saw	1620	695
39101	Plate Joiner Kit	376	209
3612C	3 HP Plunge Router	492	269
LS1040	10" Compound Miter Saw	460	259
LS1013	10" Dual Compound Slide		
	Miter Saw	1088	599
BO5010	5" Random Orbit Sander	142	72
LS1220	NEW 12" Compound Miter Saw	379	
9227C	NEW 7/9" Polisher	350	195
JS401	NEW 7/8" Bench Scroll Saw	300	175
2702	NEW 8-1/4" Table Saw	299	
2703	NEW 10" Table Saw	319	

SENCO AIR NAILERS			
Model	Description	List	Sale
SFN1+	Finishing Nailer 1" - 2" w/ cs448	299	
SN325	Nailer 1-7/8" - 3-1/4"	665	365
SN120	Pinner w/cs 5/8" - 1-5/8"	422	229
SKS	Stapler 5/8" - 1-1/2"	390	279
SN70	Framing - Clip Hd 2" - 3-1/2"	725	449
SN65	Framing - Full Hd 2" - 3-1/2"	709	379
SN600	NEW Framing 2" - 3-1/2"	699	369
SNF40	Finish Nailer 1-1/4" - 2-1/2"	569	349

NEW Accusert Nailers by SENCO			
Model	Description	List	Sale
A100LS	Finish Stapler 1/2" - 1"	180	119
A150LS	Finish Stapler 1/2" - 1-1/2"	220	149
A125BN	Brad Nailer 5/8" - 1-1/4"	160	99
A200BN	Brad Nailer 5/8" - 2"	215	139

BOSTITCH AIR NAILERS			
Model	Description	List	Sale
N80S-1	Stick Nailer	325	
RN45	Coil Roof Nailer 3/4" - 1-3/4"	359	275
N60FN-2K	Finishing Nailer w/ case	557	275
BT35-2K	Brad Tacker 5/8" - 1-3/8"	with case, oil, & brads	279 125
MHFS	Flooring Stapler 15 gauge	902	529
S325X-1K	Finish Stapler 1/2" - 1-3/8" with case & oil	269	145

JORGENSEN ADJUSTABLE HANDSCREWS			
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10	8" 4-1/2"	20.35	12.10 66.95
#1	10" 6"	23.30	12.90 71.95
#2	12" 8-1/2"	26.75	14.90 83.95
#3	14" 10"	33.85	18.55 105.75

PONY CLAMP FIXTURES			
Model	Description	List	Sale
50	3/4" Black Pipe	15.45	85.00 92.50
52	1/2" Black Pipe	12.65	6.95 74.95

PANASONIC CORDLESS			
Model	Description	List	Sale
EY6100FQKW	12V 3/8" Drill kit w/ 2 Ironman batteries, 15 min. charger, & case	324	199
EY6101FQKW	12V 1/2" Drill w/ 2 Ironman batteries, 15 min. charger, & case	324	199
EY6230FQKW	NEW 15.6V Drill Kit with 2 Ironman batteries, 30 minute charger & case	425	209
EY3503FQKW	5-3/8" 12V Wood Cutting Circular Saw Kit	500	259
BIESEMEYER FENCES			
B-50	50" Commer. Saw	443	325
T-SQUARE 52	52" Homeshop	360	275
T-SQUARE 40	40" Homeshop	335	255
T-SQUARE 28	28" Homeshop	325	245

AIRY AIR NAILERS			
Model	Description	List	Sale
0241SK	Brad Nailer 3/8" - 1-9/16"	180	98
0626SK	1/4" Crown Stapler 3/8" - 1" 194	98	
Above nailers come w/case, fasteners, oil & wrenches			
0241/0626	0241 Brad Nailer, 0626 Stapler, case, fasteners, oil, & wrenches	Super Sale	129.95

STABILA LEVELS			
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25010	10" die cast Torpedo Level	43	29
24640	24" Level w/ hand holes	62.20	43
24670	48" Level w/ hand holes	79.70	58

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DW378GNEW	7-1/4" Framers' Saw	210	169
DW222	3/8" Drill, 0-1200 rpm	184	99
DW231	1/2" Drill, 0-850 rpm, 7.8 amp	240	129
DW236	1/2" Drill, 0-850 rpm, 7.8 amp with keyless chuck	264	149
DW124K	1/2" right angle Drill	590	329
DW321K	Top Handle Jigsaw Kit	300	164
DW364	7-1/4" Circ. Saw w/brake	294	162
DW610	1-1/2 HP 2 handle Router	266	148
DW411K1/4	sheet Palm Sander w/ case	588	58
DW582K	Biscuit Joiner with case	448	169
DW705	12" Compound Miter Saw	734	359
DW621	2 HP Plunge Router	400	218
DW621 comes with Free DW6956 line height adjuster!			
DW675K	3-1/8" Planer with case	292	164
DW677K	3-1/4" Planer w/ case	268	155
DW431	3 x 21 v/spd Belt Sander	338	188
DW421	5" Palm Ran. Orb Sander	144	74
DW423	Palmrip Random Orbit Sander - variable speed	170	94
DW421 & DW423 come with Free DW4317 case!			
DW677K	Laminate Trimmer Kit	364	188
DW272	Drywall Gun, 0-4000, 6.3 amp	160	95
DW276	Drywall Gun, 0-2500, 6.5 amp	160	95
DW935K	14.4V 5-3/8" Trim Saw Kit	444	237

DEWALT CORDLESS DRILLS			
Model	Description	List	Sale
DW952K-2	3/8" v/spd w/ two 9.6V XR batteries	284	129
DW972K-2	3/8" variable speed w/ two 12V XR batteries	362	182
DW972KQ-2	above drill kit with 15 minute charger	329	229
DW991K-2	3/8" variable speed w/ two 14.4V XR batteries	415	209
DW991KQ-2	above drill kit with 15 minute charger	329	229
DW994KQ-1	2" variable speed w/ one 14.4V XR batteries	458	239
Above drill kits come w/ charger & steel case!			
DW991KS-2	DW991K drill, DW935 trim saw, 2 XR batteries & case	444	345

DEWALT 18 VOLT CORDLESS TOOLS			
DW938K	Recipro Saw Kit	520	269
DW995K	1/2" Drill Kit w/ 1 battery	428	229
DW995K-2	1/2" Drill Kit w/ 2 batt.	544	249
DW997K	1/2" Drill/Hammer Drill Kit	454	249
DW936K	5-3/8" Saw Kit	458	249
DW995KS-2	DW995K Drill, DW936 Saw and case	544	385
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1. Publication Title: *Fine Woodworking*. 2. Publication No. 0361-3453
3. Filing Date: Sept. 19, 1998. 4. Issue Frequency: Bimonthly. 5. No. of
Issues Published Annually: 6. 6. Annual Subscription Price: \$32. 7.
Complete Mailing Address of Known Office of Publication: 63S. Main
Street, P.O. Box 5506, Newtown, Fairfield County, CT 06470-5506. 8.
Complete Mailing Address of Headquarters or General Business Office
of Publisher: 63 S. Main Street, P.O. Box 5506, Newtown, CT 06470-
5506. 9. Full Names and Complete Mailing Addresses of Publisher and
Editor: Jon Miller, Publisher, 63 S. Main Street, P.O. Box 5506,
Newtown, CT 06470-5506; Timothy D. Schreiner, Editor, 63 S. Main
Street, P.O. Box 5506, Newtown, CT 06470-5506. 10. Owner: The
Taunton Press, Inc., 63 S. Main Street, P.O. Box 5506, Newtown, CT
06470-5506; Stockholder: Taunton, Inc., 63 S. Main Street, P.O. Box
5506, Newtown, CT 06470-5506. 11. Known Bondholders,
Mortgagees, and Other Security Holders: None. 12. Not Applicable. 13.
Publication Name: *Fine Woodworking*. 14. Issue Date for Circulation
Data Below: July/August 1998. 15. Extent and Nature of Circulation:

	Average No. Copies Each Issue During Preceding 12 Months	Actual No. Copies of Single Issue Published Nearest to Filing Date
A. Total no. copies	346,172	343,015
B. Paid and/or requested circulation		
1. Sales through dealers and carriers, street vendors, and counter sales	67,865	67,151
2. Paid or requested mail subscriptions	178,460	177,164
C. Total paid and/or requested circulation	246,325	244,315
D. Free distribution by mail	7,038	7,919
E. Free distribution outside the mail	2,549	1,562
F. Total free distribution	9,587	9,481
G. Total distribution	255,912	253,796
H. Copies not distributed		
1. Office use, leftovers, spoiled	6,559	8,179
2. Return from news agents	83,701	81,040
I. Total	346,172	343,015
Percent paid and/or requested circulation	96.3	96.3

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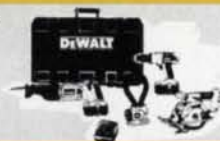
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Spraying on the cheap



An inexpensive spray gun and a quick-dry varnish make a perfect match. It is really not necessary to spend \$250 on a spray gun and upgrade to a 5-hp compressor to apply a great-looking spray finish to your furniture projects. You may find this hard to believe, but you can achieve a spectacular finish by using a low-priced spray gun (that costs \$40 or slightly less) powered by a 1½-hp compressor.

The trick is choosing the right spray gun and applying a finish that's compatible with the way the gun works.

Inexpensive guns look and work differently

Spray guns are divided into two broad categories, based on where the compressed airstream and the liquid finish come together. An internal-mix spray gun, as the name implies, mingles the air and finish inside the gun. A standard, more-expensive spray gun mixes air and finish outside the gun. This seemingly minor difference has a dramatic effect on both the complexity of the tool—and, consequently, the price difference—and the type of finish that can be sprayed (see the left photo below).

A standard high-pressure spray gun atomizes the finish by blasting a stream of liquid finish with a large volume of high-pressure air. This blast of air creates millions of very tiny liquid droplets that fall on the work surface and quickly coalesce to form a smooth finish film. A standard spray gun is very versatile.

Internal-mix spray guns are less complicated. Because air is mixed with the finish inside the gun, the mechanical components and the spray tip are different from those on standard external-mix spray guns, like the one on the left.



It can be configured to spray almost any liquid finish. However, it produces a large volume of overspray and should only be used in a self-contained, fully ducted spray booth. Also, it's not uncommon for a high-pressure spray gun to consume 10 cu. ft. per minute (cfm) of air at a pressure setting of 50 lbs. per sq. in. (psi). To deliver that much of an air supply, you'll need a 5-hp, or larger, air compressor.

By comparison, a typical internal-mix spray gun will operate effectively on an air supply of 2 cfm to 3 cfm delivered at 20 psi—well within the capacity of a small 1½-hp compressor. Air and finish are combined inside the fluid tip of an internal-mix spray gun and then blown through a slot in the tip, forming a gentle fan of rather large finish droplets in the process. The low atomization pressure and course droplet size of an internal-mix gun produce very little overspray, and a minimum amount of the finish bounces back off the surface of the workpiece. To catch the small amount of course overspray, spread out some plastic sheeting below where you're spraying. And by spraying outside on a clear, dry day, you can easily dissipate any fumes that might otherwise build up (see the right photo below).

If all this sounds too good, you should be aware that there is a downside: Conventional fast-drying finishes like nitrocellulose lacquer won't work with an internal-mix gun. The lacquer will dry before the finish droplets flow together on the workpiece, producing a surface that resembles a sheet of coarse sandpaper. Waterborne finishes sometimes form a kind of froth when sprayed with an internal-mix gun, leaving a built-up finish where you don't want it. It's not all bad though. An internal-mix spray



Use a spray booth or spray outside. Internal-mix guns generate less overspray made from tiny droplets of the finish, but they do not reduce the level of harmful fumes released into the air as solvents in the finish evaporate.

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Finish Line (continued)

gun is ideal for spraying most alkyd or polyurethane varnishes and oil-based paints. Choosing the right finish minimizes the limitations of an internal-mix gun.

Read the labels to know what to buy

You can apply any oil-based varnish with an internal-mix gun, but some varnishes are better suited for spraying than others. I usually select a quick-drying, vinyl-toluene alkyd varnish for spray finishing (see the photos below). These so-called one-hour varnishes have protective qualities equivalent to nitrocellulose lacquer, and they dry tack-free in 30 minutes. Most of them can be recoated in about one hour. A complete three-coat varnish finish can be applied in less than one day.

A vinyl-toluene alkyd varnish provides adequate protection for most projects, but with heavily used items like dining-table tops, I like to add a little more protection. I use a quick-dry varnish for the build-up coats, then spray on a standard alkyd varnish for the final coat. Although finish manufacturers do not condone the layering of different finishes in the same project, I have not experienced any adhesion problems with this method.

Oil-based varnish direct from the can is too thick to spray and must be thinned to atomize properly. Mineral spirits and naphtha are the most common thinners used for varnish. My choice between the two depends largely on the temperature in my shop. Naphtha evaporates faster than mineral spirits, so I use it when the shop is cool to speed up the drying time of the varnish. Conversely, mineral spirits is a better choice in warm weather because it will slow down the drying process and ensure that the finish flows out evenly.



Look for the right ingredients. If the contents of the finish include the words “alkyd resin” or “vinyl toluene”—highlighted on these three labels from three different manufacturers—the finish will work well with an internal-mix spray gun.

There's another little secret for getting finishes to flow out smoothly: An inexpensive plastic drip cup may be the best spray-finishing investment you can make (see the photo at right). I thin all of my spray finishes—varnish, paint or whatever—to a viscosity of 13 seconds with a No.-3 viscosity cup. I'm not just a neurotic-compulsive finish thinner—there's a valid reason for my fastidious mixing behavior. Because all of my finishes are thinned to the same viscosity, they all handle the same way in the spray gun. Consequently, the results are predictable even if I switch finishes or the manufacturer changes the finish formulation. However, there is nothing magic about a 13-second viscosity; it just happens to fit my spraying style. It's a good idea to establish a viscosity that fits *your* style. It will make your experience with spraying finishes progress a lot easier.

Keep oil and water out of the gun

When air is compressed, the water vapor contained in the air condenses to water in its liquid state. If not removed, the water that passes through the spray gun will cause all kinds of finishing problems. As a consequence, a water (and oil) filter is a critical part of any compressor-driven spray system. Water filters, or separators, are available as wall-mounted coalescing-type separators or as simple gun-mounted filters. Both work well; the main difference between them is one of capacity.

If you intend to spray a few times a week, invest in a good wall-mounted unit for \$50 to \$75. If you anticipate using a spray gun only occasionally, a gun-mounted filter for around \$5 should be enough to meet your needs.

The size and length of your air hose is important, too. When using a 20-ft., 1/4-in. interior diameter (ID) air hose, you'll get a pressure drop of about 8 psi. That's not a problem when you're filling up your car tires, but it's a big problem if you're spraying an heirloom you've spent months working on. A better choice would be to minimize any low-pressure drop by using a 3/8-in. ID air hose. Also, the best spray-gun performance is achieved when the air hoses are connected directly from the compressor to the gun without interruption. Quick-connect fittings, if used, must be sized properly to prevent excessive pressure loss.



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The exclusive formula micrograin carbide tipped teeth together with the new Teflon® blade body will give you smoother cutting performance with noticeably superior results compared to standard blades. And unlike unprotected blades, the new CMT Teflon® coated blade won't gum up or get rusty. Instead the self-lubricating Teflon® helps you glide through your cuts while it minimizes wear and tear your saw.

Call CMT USA today to find out more about our new line of orange Teflon® coated saw blades and other CMT products. Don't forget to ask for a free full color catalogue and the name and location of a CMT distributor nearest you.

CMT

the only ORANGE one™

The best thing
to happen to tooling
since

orange
router bits

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10" MELAMINE & FINE CUT OFF

Teflon®

Non Gumming
Energy efficient
Easier cutting
Rust resistant

Stays sharper longer

Item 210.08

10" x 80T AT

5° hook angle

5/8" bore

Micrograin ca

RECOMMENDED USE

	Rip wood	Rip plywood	Crosscut wood	Crosscut plywood	Melamine
EXCELLENT ←			▲	▲	▲
GOOD					
FAIR ←	▲	▲			

DO NOT USE TO CUT METAL OR FOR MASONRY WORK

Read important safety instructions enclosed.
Wear safety glasses and use blade guards

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READER SERVICE NO. 177



X-ray turnings



For years, San Diego amateur woodworker Gene Blickenstaff produced the usual array of cabinets, clocks and chests. In his professional life as a radiologist, he analyzes brain stems and appendages through X-rays. So it made perfect sense when he recently began studying tree stems and branches to see their effects on turnings, especially bowls. His curiosity, and his wife's love of windsurfing, took him to Hawaii, where he found the Norfolk Island pine (a.k.a. star pine). The wood's branches penetrate to the pith, and it has barely visible rings because of Hawaii's lack of seasons—giving bowls a sunburst quality. Blickenstaff, 62, turns the wood wet and produces eight garbage cans full of resinous waste on some days. He soaks his new bowls in a tub of Danish oil for a month, lets them dry for another three weeks and then wet-sands them. The result is a transluminating X-ray of a star pine's structure.