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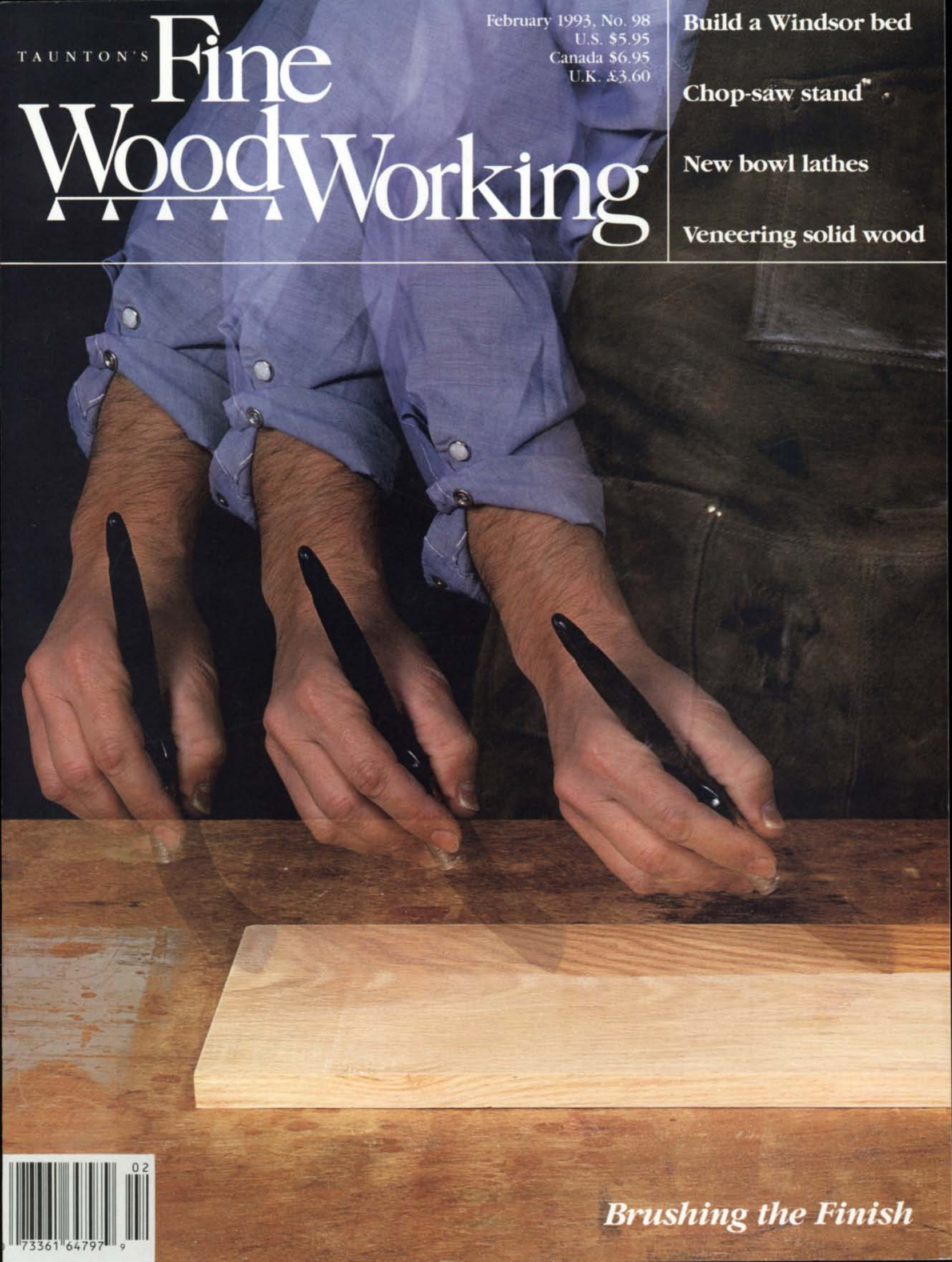

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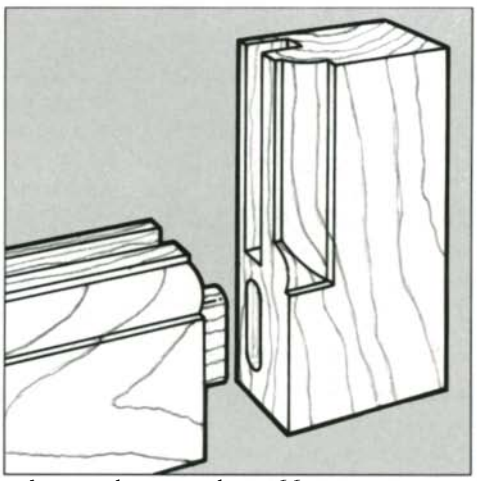

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On the Cover: *Stop-action photography shows how proper hand position and smooth brush handling are the keys to a slick finish, as Chris Minick explains on p. 54. Photo: Susan Kahn.*

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Editor's Notebook

by John Kelsey

Working on your house—So we move the household from one side of town to the other, and I start over: cardboard boxes crammed with tools and supplies, piles of lumber, tarped jumble of machines. At the old place, I'd built a workshop bigger than a two-car garage. Here I'm starting with a one-car garage and I can't even get all my stuff under cover.

On the first day, I need blocks to prop up some crummy built-in shelving. I rearrange the box mountain until I find the one labeled handsaws, root out a saw and a square. Aaarrgh! Now clear the boxes off the sawhorses to make enough room for knifing a line and sawing those blocks of wood. Go back to the house to nail them in—no, go back outside to find the box containing nails, hoist it onto the sawhorse....

I'm taking three or four steps sideways for every inch forward. Sometimes when I'm wildly shifting piles of boxes, I can't remember what I was looking for. I forget that my goal is not to move boxes, not to make little blocks of wood, but to get past moving in and on to setting up my new shop. As my goal recedes into the infinite distance, I realize that I can't do anything without my workshop. Having a workshop is what defines the woodworker.

A trim carpenter operates out of his truck, taking toolbox and materials to the job site to cut and fit parts. But the woodworker takes measurements and materials into the workshop to make parts, which he then carries back to the job site.

My frustration at being shop-less illustrates this interesting difference and leads me to a new series of articles about how shop-based woodworkers approach utility projects. The first in the series, on p. 62 of this issue, describes the pine shelving I built as soon as I got my tools wrestled into that little garage. In our next issue, we'll describe basic drawermaking with a Sears-type dovetailing jig.

These articles aren't about making fine furniture, but they're not about rough carpentry either. They're about utility woodworking from a shop-based point of view. If you'd like to participate in this series, please write me about how you use your workshop to solve problems around your place.

News about tools—Our new department, "Tool Forum," rummages through the heap of new tools we saw at the International Woodworking Fair held last August in Atlanta. It appears on p. 112 of this issue. If you know a lot about some tool category and you'd like to try working with us on these brief tool reviews, please get in touch with us.

Index to back issues—You know we published it someplace in a back issue of *Fine Woodworking*, but you can't remember when? Cheer up, we can't either. That's why we publish a detailed annual index. The index to our 1992 magazines—*Fine Woodworking* #92 through #97—appears on p. 95 of this issue, along with a key to all our previous indexes.

Still too many places to look? You're right about that, and we're working on a long-range solution. In the meantime, two outside sources offer useful indexes to *Fine Woodworking*.

The PC Index, which actually is a computerized table of contents of all our back issues and reprint books, is available on diskette from Meredith Associates, P.O. Box 792, Westford, Mass. 01886-0792. It costs $34.95 and can be updated.

The Guide to Published Woodworking Plans and Techniques is a loose-leaf binder that lists 5,200 articles from ten woodworking magazines, including *Fine Woodworking*. It's the $20 brainchild of reader Art Gumbus, 5629 Main St.-Putney, Stratford, Conn. 06497. *—J.K.*

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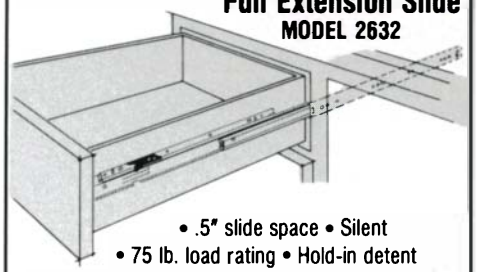

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Titebond and Titebond II—I've used Titebond aliphatic resin glue for many years with good results, but one aspect of it has always bothered me. During atmospheric changes, which are pretty severe here in the Midwest, I've noticed the gluelines on my finished pieces of furniture shift slightly. The result was that you could feel a bump where two or more boards had been joined, and in addition, the glue seemed to swell slightly and form a ridge. This problem was especially noticeable after a piece had been subjected to damp summer weather and then to the dry heat of winter.

When Titebond introduced their Titebond II waterproof wood glue, I wondered whether it might overcome the problem I had been having. I'd been working on a series of tables with solid wood parquetry tops, glued onto a base of laminated walnut. I tried this new glue on a piece that had a top surface comprised of small, geometrically shaped pieces of domestic and exotic woods of various densities, which were very precisely fitted together and individually glued. I planed, scraped and sanded this surface after allowing the glue to set for several weeks and then finished it. It's been a year now, and there has been absolutely no movement or shifting of the glue joints.

Apparently this product, because of its high resistance to moisture, has solved the problem of glueline movement in furniture. I'd be curious to know if other craftsmen have had similar results, and I'm keeping my fingers crossed, and hoping my tables will continue to stay together.

—Tom Wisshack, Galesburg, Ill.

Because Titebond II is new on the market, Chris Minick (*FWW* #96) made no mention of shelf life. I have written the manufacturer to ask if there is some way to know how old the glue is when you buy it. For example, I dated the last bottle (1 qt.) I bought, and after four months in my shop unopened, I had to throw it out. It was so thick it would hardly pour out of the container. *—Fred H. Vanderhoof, Hamburg, N.Y.*

THE EDITORS' REPLY: Our bottle of Titebond II has an expiration date stamped on the back label, and yours should have one too. The manufacturer, Franklin International (800-347-4583), told us that Titebond II has a shelf life of about a year, that a bottle should keep for a few months beyond its expiration date, and that you can extend its life by cool storage. Franklin has dated all its glue since 1984. They can't stamp gallon jugs, but the manufacturing date of the jug itself is molded into its bottom. The glue should be good for about a year after that date.

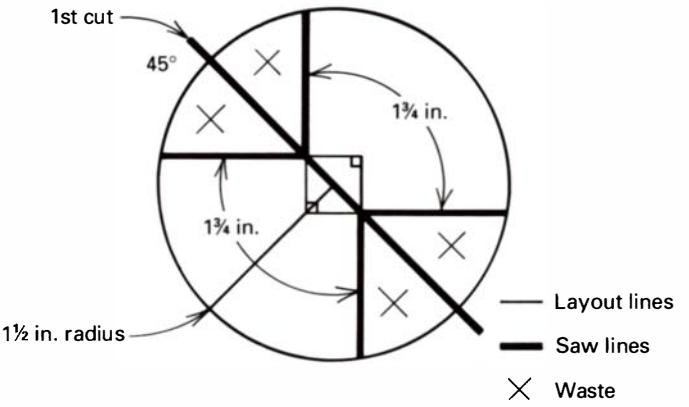
Finding the center—I read with great interest the article on use of the combination square (*FWW* #96), a tool I use every day for layout work in my pursuits of wood, sheet metal, and machinist work.

One tip not included in the article is how to quickly and accurately locate the center of any material that has two parallel sides. This is easily accomplished by setting the square blade by eye to a distance just over what you estimate the center to be and marking that point on the work. Turn the square around and mark from the opposite side of the material. The two lines on the workpiece should be very close together. Now you can easily mark the center of your workpiece with a pencil or awl by estimating the center between the two lines. This centerline measurement can be transferred to your square for layout on the rest of the work.

The key to accuracy is to make sure the setting of the square is over (not under) one-half the width of the material and setting it just a tad over. *—Scott R. Bailey, Plymouth, Mass.*

Bigger quarter columns—I enjoyed Joseph Beals' tip on making quarter-columns slightly larger than 90° for fuller appearance (*FWW* #95). I recently toyed with the idea on a chimney piece that I was working on. I discovered a way to economize on his technique and get two quarter-columns from one turning.

Using his same example of a 1¾ in. required radius, first turn the column to 1½ in. radius and lay out two 1¾ in. right angle sections exactly opposite one another, as shown below. Then saw the column in half, separating the two sections. The final step consists of setting the tablesaw to a 45° angle and trimming the edges of the sections to form the final quarter columns.



The quarter columns that result from this technique will be flat on the inside corner, but this is not bad because the clearance will actually help you seat the column in place.

—Bryan R. Kohn, Montgomery, Ala.

Posture and chair design—Because I'm a chair designer who has a bad back, I found the article on chair design (*FWW* #96) very interesting. Chairs are the greatest challenge in furniture design. The variety of body types, postures and uses make it impossible to create an all-purpose chair.

The adjustable rig used by the Grew-Sheridans might be helpful, and likely impresses the clients, but I think you could get the right measurements with just a yardstick. My experience has shown the shape of the back support to be the most important part of a comfortable chair. It does little good to determine that shape by measuring a subject who already has poor posture. The man shown seated in the photograph has his head, shoulders and hips too far forward. Putting him in a chair with the same shape won't help his aching back.

I would suggest a few changes. The first step to comfortable seating is to position the buttocks as far to the back of the chair as possible. The weight actually rests on the backs of the thighs. The sacral support is unnecessary, even harmful because it pushes the hips forward and causes flexing of the lumbar. The head support should be farther back; the position shown in the article would cause strain on the neck and upper back.

The most important adjustment is the thoracic. It should be at a height and angle that will lift and spread the rib cage. You can test a chair for good thoracic support by placing 6 in. of rolled-up towel vertically between your shoulder blades and leaning against the backrest. If that feels better, the thoracic support should be moved forward.

Many of us spend our days in activities that cause strain on our backs. Leaning forward, bending over a bench or carrying heavy loads can all cause back pain. A well-designed chair can help by allowing us to rest and stretch the spine while relieving the pull of gravity. Before investing the time to build this rig, talk to a chiropractor about posture, or you might even try a class in yoga. *—Lawrence G. Lindenberger, Webster Groves, Mo.*

Removing milk paint—In the October issue (*FWW* #96), there was a question on removing milk paint, with suggested solutions of not removing the milk paint or having a commercial re-

storer do the job. I suggest that neither is the best alternative if the milk paint is in bad shape or is particularly objectionable.

As a chemical engineer, I respect Chris Minick's problems with strong alkaline removers, but there are at least two available alkaline removers that are relatively mild, as far as the person is concerned, but are satisfactory for removing milk paint. Mohawk Finishing Products in Amsterdam, N.Y., and Behlen (sold by Constantine's in Bronx, N.Y.) both make such a product, which I have used with good results. There is always the possibility of the walnut wood darkening from contact with the alkali, but with care, it should be controllable.

—Bill Cannell, Woodstown, N.J.

Wood does move—Are we woodworkers or metalworkers? I wonder when I read of various woodworkers who virtually rebuild their machines just to gain a few thousandths of an inch. Yes, I agree we should have our equipment as true as possible for safety and accuracy. But let's not forget that wood does move. The swelling/shrinking of wood is far more than any machine tolerances alone. A dry glue joint averages the thickness of thin paper. Sanding removes a sizable thickness of wood.

I would look at the general size and type of work you intend to do, then ask yourself whether it's worth the time, money and effort just to gain a thousandth of a inch. Make your tools as safe and smooth running as you can, and you will find accuracy comes as a welcome result without having to do metalworking on almost every machine. *—Edward J. Mattson, Norwalk, Conn.*

Chairs for playing pool—I am interested in finding a pattern for the old-time pool hall chairs, the ones that had a notch for the cue stick and a place to set a bottle so it wouldn't tip. They have an arm on them similar to an old school chair.

Does anyone out there know of these or know where a pattern can be found? *—Ray O. Burton, Clinton, Mo.*

Drilling steel bands—Jeff Greef writes (*FWW* #96) of drilling holes in the spring steel band from a defunct tape measure. He succeeded, but the job would have been much easier (and easier on the drill bit) if he had first spot-annealed the material.

You might be converting a broken bandsaw blade into a bowsaw blade or an indexing plate (bandsaw blades have pretty uniformly spaced teeth; wrapped around a plywood disc of the right size, they make good index plates with a positive click/lock action) or a piece of steel strapping being converted to a sandpaper cutter or whatever. Here's how to do it:

Cut the head off a nail.

Chuck the nail in your drill press, point down.

Clamp the steel strip to the drill-press table on top of a piece of board with the spot where the hole is to be drilled under the nail point.

Turn on the drill press, and lower the nail point onto the steel strip. The nail's tip will very quickly come to a glowing red heat and, in fact, is likely to melt and stick (not weld) to the steel strip.

Raise the quill, switch to the desired size drill and drill the hole.

—Guy Lautard, West Vancouver, B.C., Canada

Which plastic is which—Regarding F.J. Germanowski's letter in *FWW* #95, on polycarbonate vs. acrylic plastic, I believe he has the two materials mixed up. Polycarbonate is softer, flexible and very tough. If you drop it, it bounces. It machines like butter. Acrylic is harder, inflexible and less tough. If you drop it, it can shatter. If machined without care, cracks can develop while

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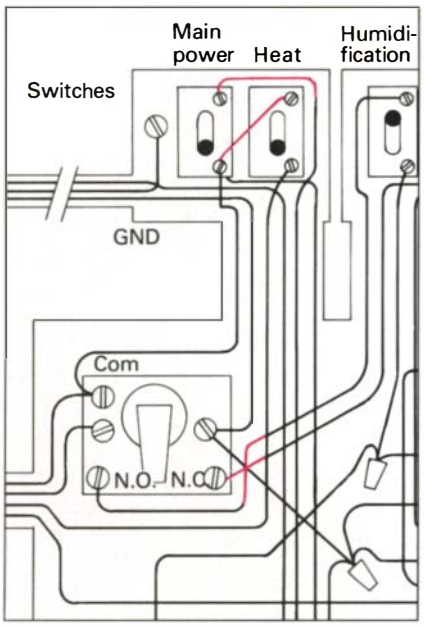
drilling a hole. Cracks easily develop at stress points, such as around screw holes and at internal sharp corners. In terms of creep, polycarbonate will deform under prolonged stress while acrylic will break. Maybe F.J.'s samples were mislabeled.

–Sid Ladenson, Tustin, Calif.

Errata

Since my article "A Dehumidification Kiln" appeared (*Fine Woodworking* #91, p. 83-86), I have had the pleasure to talk to a dozen or so woodworkers who are building the kiln. Several errors have shown up in figure 2, "Kiln Control Wiring Diagram." Specifically, the N.O. and N.C. relay connections are reversed, the "heat" switch is wired wrong and the "heat" switch is not labeled. The first error will cause incorrect operation of the dehumidifier and humidifier, and the second will allow the heater to stay on even when the "power" switch is off.



I have also received questions about the humidistat. The unit specified in the article has a maximum setting of 50%. This is an acceptable starting point for lumber that has been air-dried for a season. If one wishes to dry green lumber, which requires a higher starting point, there are three approaches: use the humidistat on the dehumidifier, which probably has a range higher than 50%, purchase a humidistat with a higher range or recalibrate the unit.

–William H. Bolf, Myersville, Md.

In *FWW* #97, our review of chisels made by Barr Specialty Tools gives the wrong address. It's P.O. Box 4335, McCall, Idaho 83638; (208) 634-3641.

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

–John Lively, publisher

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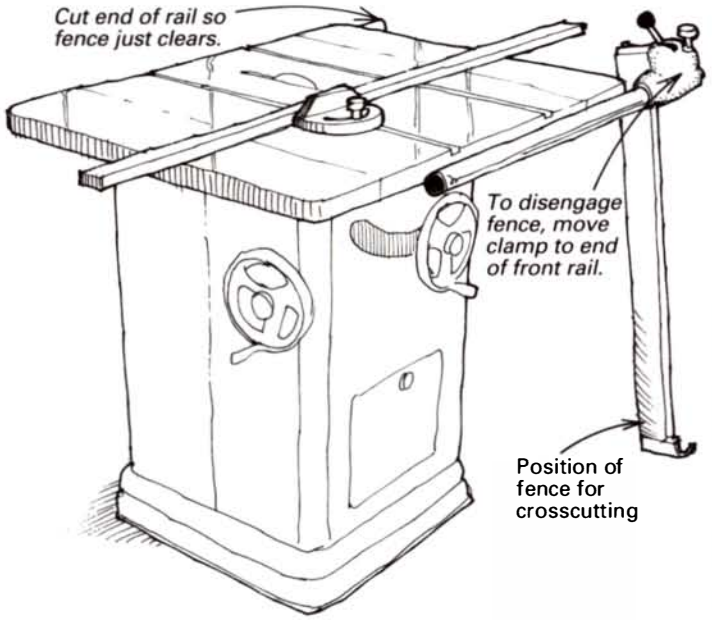
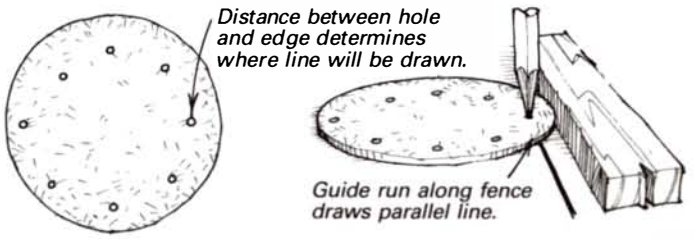
Hanging rip fence



Removing and then reinstalling the rip fence from my saw each time I crosscut a long board was time-consuming and awkward. My solution was to cut the rear rip-fence guide as shown to allow the fence to hang from the front guide. After the cut, I simply swing the fence up and reinstall it on the rear guide.

—R. Coady, Picton, Ont., Canada

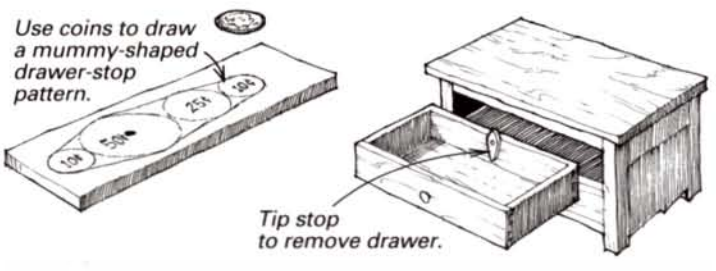
Guide for drawing parallel lines



Here is a tool used by old-time patternmakers and draftsmen to lay out parallel lines. Strangely enough, I don't think this tool was ever commercially available; the old craftsmen just made their own. The tool is simply a flat, 1-in.- to 2-in.-dia. steel, aluminum or brass disc with 1/16-in.-dia. holes drilled around the edge. The space between each hole and the edge of the disc determines the distance between the drawn line and the fence guiding the disc. I bored my holes in from the edge at points that mark the decimal equivalents of fractions commonly used in woodworking. The 1/16-in.-dia. holes are just large enough to accommodate a scribe point or sharp pencil point.

—Devore O. Burch, Fort Worth, Texas

Drawer stop

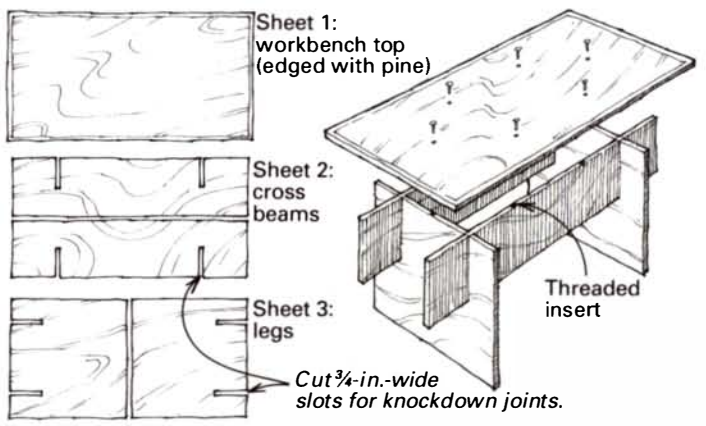


Years ago, I built some 9-in.-deep drawers into a bookshelf. Because they were so shallow, the drawers were always at risk of being pulled out of the case. I thought about it for a while and came up with the drawer stops shown in the illustration.

First, make a mummy-shaped pattern by connecting the outlines of a dime, a half-dollar, a quarter and then a dime again on a piece of thin stock. Make the pivot hole in the center of the half-dollar. Trace, cut out and sand as many 1/4-in.-thick wooden drawer stops as you need. Install these in the drawer back with a round-head screw over a small brass washer. Mount the stop low enough on the back so that when it is tilted, its edge does not go above the top. The stop should swing freely. In a wide drawer, two stops might be better than one.

—John B. Moon, Mount Vernon, Wash.

Knockdown workbench



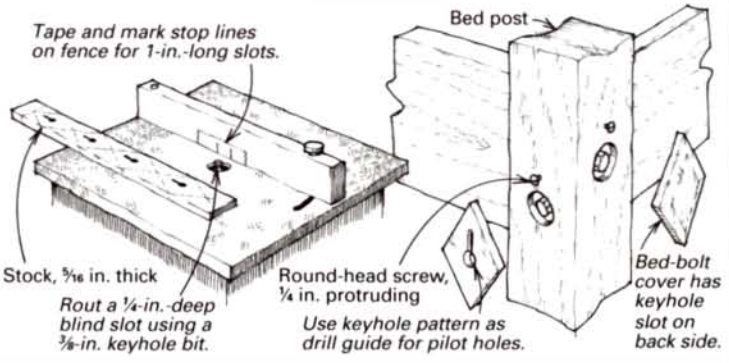
A professional cabinetmaker friend of mine discovered this workbench system that is light, compact to store, quick to break down and can really take heavy abuse. To make the workbench, pick up three sheets of 3/4-in. plywood on sale. Rip one sheet in two vertically to make the cross beams and slice another sheet in two horizontally to make the legs. Edge the third sheet with pine to make the workbench top. Cut mating 3/4-in. slots in the legs and cross beams, so they can be assembled into the workbench's undercarriage. Fasten the top to the undercarriage with screws into threaded inserts.

—Nicholas S. Tyler, Manotick, Ont., Canada

Quick tip: Add strips of plastic laminate to the bottoms and sides of drawer guides. The drawers will slide easier and wear forever.

—Boles M. Derenda, West Seneca, N.Y.

Wooden bed-bolt covers



Not long ago, I made a pencil post bed and covered its eight bolt heads with traditional brass bed-bolt covers. When the next project, a pair of bunk beds, required twenty-two bolt covers, I abandoned the brass tradition in favor of hardwood covers. After making wooden covers, I'm now convinced that they're better than their brass predecessors in several ways—they're easily made in any size, shape and color, their attachment

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screws are concealed and they're certainly less expensive.

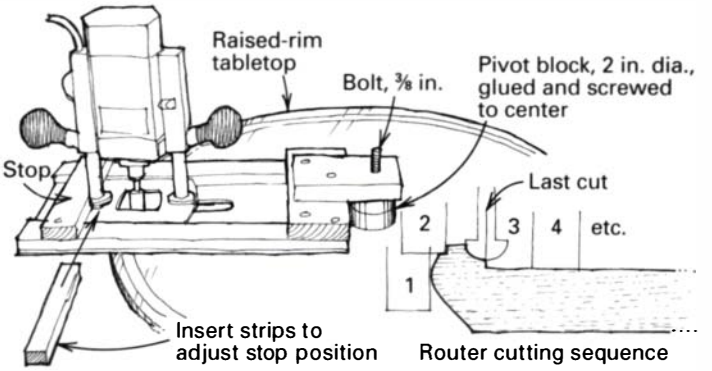
To make diamond-shaped covers, mill a piece of wood 5/16 in. thick and long enough to cut all the covers. Lay out a centerline on the underside, find the centers of the diamonds and draw their shape. Using a 3/8-in. Forstner bit in a drill press, drill a 1/4-in.-deep hole into the center back side of each diamond. This leaves about 1/16 in. undrilled. Next, using a 3/8-in keyhole bit in a router table, carefully set the fence so the bit fits the holes just made (see the sketch on p. 14). As before, set the bit's height 1/16 in. shy of the wood's surface. Stick some tape to the fence, and make a mark to denote the center of the keyhole bit. Make a second mark as a stopping point for a 1-in. blind cut.

After you've made the guide marks, lower the workpiece onto the bit and make the first keyhole cut. With the router still running, carefully draw the board back to the bit's insertion point, and lift it off the bit. Then make repeated keyhole routings right down the board. Now you're ready to cut out the diamonds, plane off their corners and smooth them. Using a jig like the one shown in the sketch, drill pilot holes into each bed post and install round-head screws (about 1/4 in. proud) to hold the wooden covers. Because the bed bolts (for headboard and footboard) on the sides of most beds are higher than the rail bolts on the ends, the neighboring bolt covers will be at different heights. If this presents a problem, make the covers long enough to conceal either bolt hole, and install them at the same level.

—John B. Moon, Mount Vernon, Wash.

Quick tip: Use Post-It note pads to identify the parts of a woodworking project (lower left stile, bottom drawer front, for example). If you clean the wood before applying the note, it will stick without leaving a residue. *—Anthony P. Matlosz, Howell, N.J.*

Routing a raised-rim tabletop



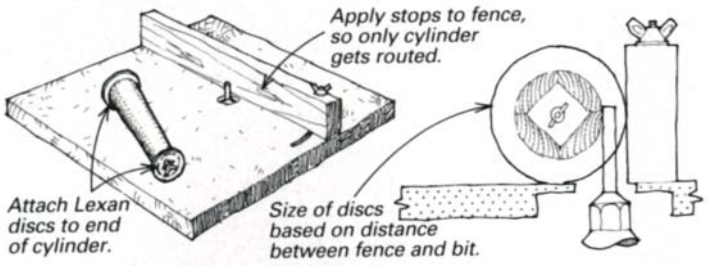
In reproducing an 18th-century pedestal table, I was faced with the problem of forming a raised-rim top. The traditional method was to use a lathe for this process. But even my small 25-in. top was far beyond the capacity of my lathe. So I devised this router jig to shape the table's top.

First, I cut the top to the required diameter on a bandsaw and then screwed a pivot block holding a countersunk 3/8-in. bolt to the center of the top. The sinking was to be 5/16 in. deep, so I made sure the pivot block's screws only penetrated 1/4 in. Then I made the fixture to pivot on the bolt. With a two-flute straight bit in the router, I initially used the setup to true the edge of the top to a perfect circle; I made subsequent cuts from the outside in. To avoid having to move the stop for each cut, I inserted spacing strips to position the router for up to four sweeps of the jig before I had to reposition the stop. When as much as possible of the sinking had been done in this way, I used a core box bit to form the cove on the rim. To sink the central part of the

table, I removed the pivot block and lengthened the base of the jig to span the width of the top. Finally, I smoothed the entire recessed top with a plane and a scraper.

—Dr. Ralph Sinnott, Wolverhampton, England

Making tapered cylinders without a lathe

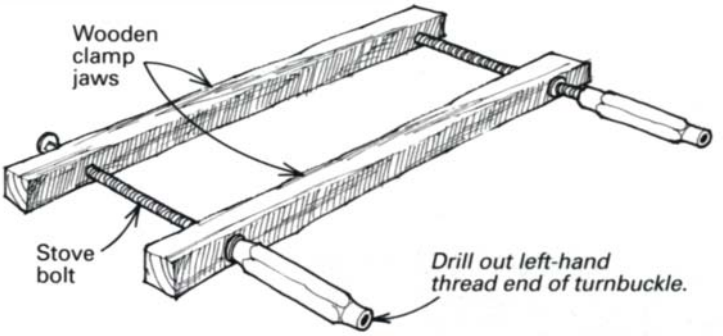


I use a router table to make tapered cylinders for kaleidoscopes, but the method could be adapted to make table legs or large dowels. I start by gluing up four pieces of wood into a column. Then I attach two ¼-in. Lexan plastic circles to the ends of the column using a threaded rod and wing nuts. If the workpiece is solid, you can attach the circles with screws. I press the assembly against the router-table fence and make repeated passes, turning and sliding, to produce the cylinder. Stops on the router-table fence keep me from routing into the circles.

Note that two equally sized circles produce a straight cylinder, and unequally sized circles produce a taper. The circles should be larger than the cylinder by the distance of the router bit from the fence. In my case, I use 5-in. and 4½-in. circles to cut cylinders that taper from about 3 in. to 2½ in.

—John Grant, Palmer, Alaska

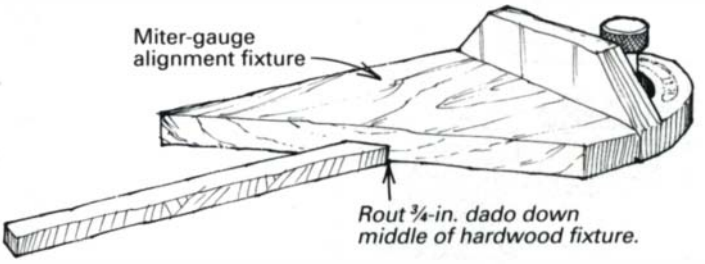
Turnbuckle clamp



I make an inexpensive box clamp from turnbuckles, long stove bolts, washers and scrapwood. Remove the ring bolts from the turnbuckles and drill out the threads on one end.

—Dan Wilson, Chesterfield, Mo.

Miter-gauge alignment fixture



Years ago, I read that you could easily adjust a miter gauge to 90° by turning the gauge upside down, pushing it into the ta-

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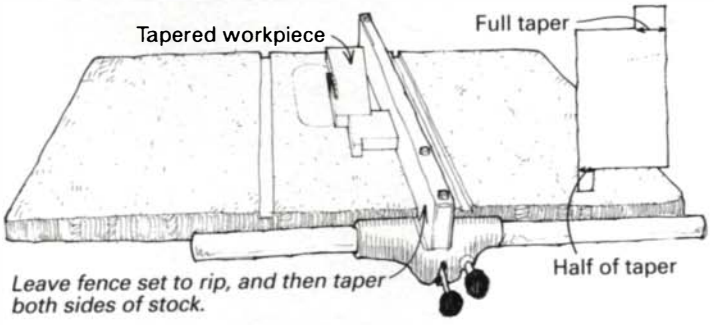
blesaw slot and tightening the bar. Perhaps this method works on some saws but not on mine.

As an alternative, I built a hardwood alignment fixture slightly wider than my miter gauge. I routed a ¾-in. slot down the middle underside of the fixture to fit the miter-gauge bar. With the help of a square and a plastic triangle, I cut one end of the fixture to a perfect 90° and the other end to a perfect 45°. I've since added a second fixture for 30° and 60°. To adjust the miter gauge, I place the fixture, slot down, on the miter-gauge bar and tighten the face to the setting. It's fast and accurate.

–Clyde Hunter Jr., San Jose, Calif.

One-minute taper jig

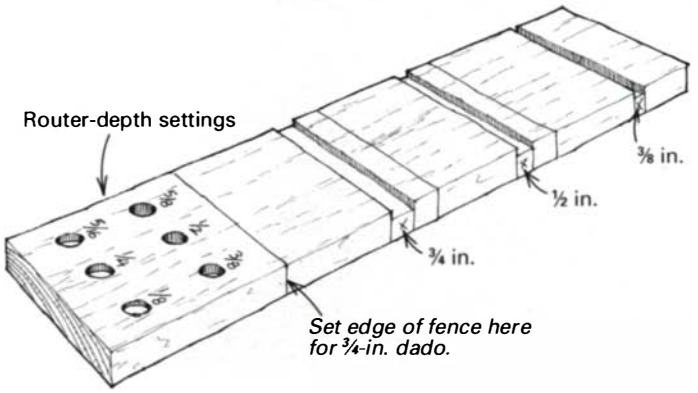


I use a jig to taper a guitar's fingerboards, but the jig could be adapted to table legs or any short tapering job. The limiting factor is the length of the rip fence.

Start with a piece of hardwood scrap that's narrower than the work. Cut a notch into both ends of the jig to leave two fingers. One finger should be half as wide as the taper, and the other finger should be as wide as the taper. To use the jig, first rip the workpiece. Then, without changing the fence setting, insert the half-taper notch between the fence and the workpiece, and trim one side. Flip the workpiece over and flip the jig end for end to trim the second side. The resulting workpiece will have square ends and equal tapers. *–Phil Clark, Homestead, Pa.*

Quick tip: A magnet from a junked radio speaker makes an excellent stop block on the tablesaw. Just plop the strong magnet where needed. The magnets require no clamps and are infinitely adjustable. *–R.A. Bolster, Ashland, Ore.*

Storyboard for routing dadoes revisited



I added a couple of improvements to Keith Schubert's dado routing jig (*FWW* #91, p. 16). Rather than measuring and transferring the edge-to-bit distance from the router to the jig, I just clamped a fence to each of the lines and routed a dado with the

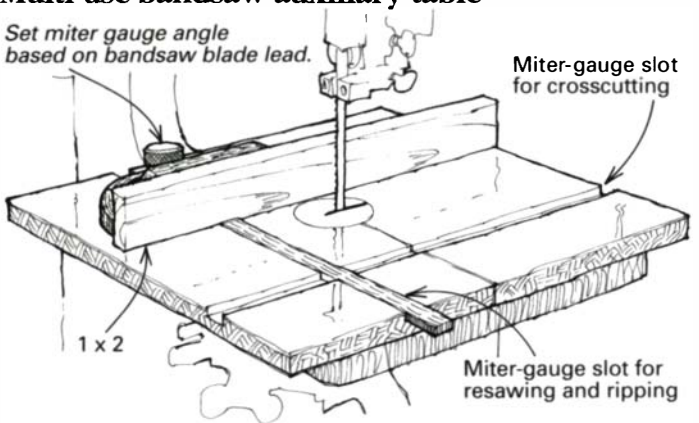
appropriate bit. This quick and accurate approach also makes it easy to see the location of the dado when using the jig.

An improvement for gauging bit depth (instead of making marks along the board's edge) is to bore holes of the appropriate depth in the end of the jig. Use your largest diameter bit and a plunge router to drill the holes. The holes will ensure exactly the same depths every time, literally in seconds, without any measuring. *—Gerard R. Mack, Badalasco, Italy*

Quick tip: For shop vacuum system fittings, use regular 2-in PVC couplings. Just cover the inside of the joining area with felt (using PVC cement) for a perfect fit.

—Walter Sheard, Horsehead, N.Y.

Multi-use bandsaw auxiliary table



Ripping and resawing on the bandsaw is always a problem because of the tendency of each blade to naturally lead the cut in a slightly different direction. The traditional method of compensation is to find the lead angle, mark a line on the table, and then clamp a makeshift fence parallel to this line. The auxiliary table shown in the sketch improves on that solution by borrowing your tablesaw's miter gauge for ripping as well as crosscutting on your bandsaw.

I made my auxiliary table from a discarded laminated kitchen countertop, but a good grade of plywood would work just as well. Size it a little larger than the original table, then drill through both tables and fasten them together with four countersunk carriage bolts. Cut a slot for blade entry and a hole with a recessed edge for the throat plate. Now cut two ¾-in. dadoes to fit the miter gauge. Cut one parallel to the blade for standard crosscutting operations and then a second dado at a 90° angle to the first for ripping and resawing.

To find a blade's lead angle, mark a centerline on a piece of 1x2 scrap stock. Carefully rip freehand along this line until the stock reaches the rear of the table. Leave the 1x2 in this position and insert the miter gauge in the second slot as shown. Loosen the protractor adjustment knob, and slide the miter gauge up to the workpiece. Adjust the fence angle to the lead angle you just found, then tighten the protractor knob. Remove the 1x2, position the miter gauge for the desired cut width, measuring from the front of the blade, and clamp the gauge in place. You're now set up for accurate, repeatable ripping or resawing.

—Anthony P. Matlosz, Howell, N.J.

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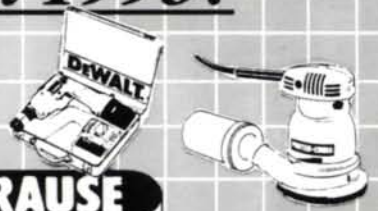
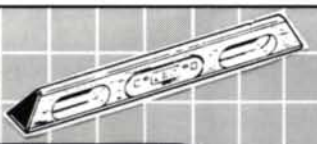


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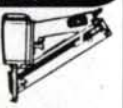

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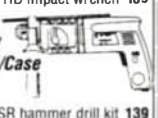

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1609KX laminate trimmer kit **209**
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1613EVS NEW!
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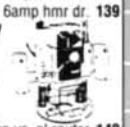

1614EVS 1-1/4 hp,vs. pl router **149**
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1289D NEW 1/4sheet plm sander **64**

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6011DW 12v keyless vsr kit **169**
6211DW 12v MakPac drill kit **179**
3612BR 3 hp plunge router **165**
9820-2 blade sharpener **199**
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JR3000V VS recip. saw kit **128**
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2204 work bench **41**
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1272D 3x24 sander with bag **175**
3270D 3x21 sander with bag **139**
1290D 1/2 sheet finish sander **144**

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1609K 3 in one trimmer kit **174**

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1024VSR 3/8" 0-1000 m. midget **109**
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1420VSR 0-4000 hd drywall dr **84**
1421VSR 0-2500 hd drywall dr **89**
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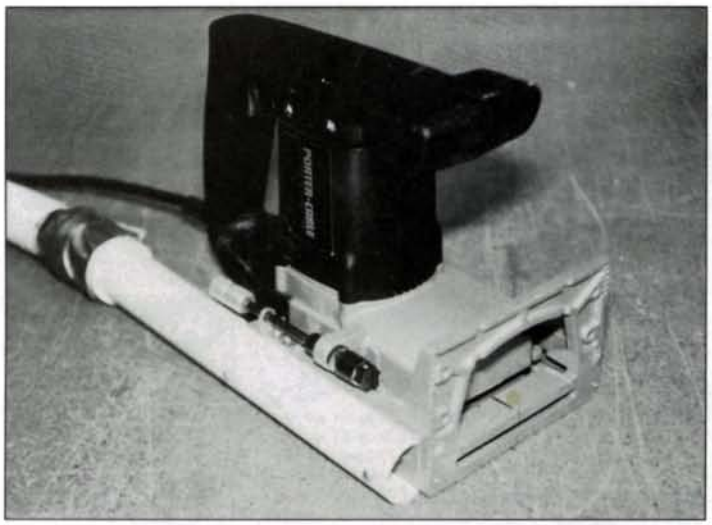
Fitting a biscuit joiner for dust collection

I love biscuit joinery: It's the fastest way to create strong plywood carcases that I've found. The only trouble is, my portable machine doesn't have built-in dust collection, and that little devil can churn up a cloud of dust faster than I can keep the floor swept. Is there some sort of universal dust-bag kit or hose attachment that I can get to remedy the problem?

—Horace Greenstreet, El Paso, Texas

Kenneth Pickering replies: The biscuit joiner is a wonderful tool, but sometimes the copious amounts of wood chips and dust it produces makes cleanup an unwelcome chore. My solution to this dilemma is to use a short length of plastic pipe to create a hookup port on my Porter-Cable biscuit joiner, allowing it to be connected to my shop vacuum's hose (see the photo below). Start by slicing off one side of the pipe to create a flat area that can be mounted flush on the machine's casting on the side where chips are ejected. The pipe can then be attached by



drilling and tapping holes in the machine's base casting for two small machine screws. Care must be taken that the machine screws extend no farther than the body of the casting, so they don't foul the blade. To mate the pipe with your shop vacuum hose, you might be able to find a PVC reducer fitting of suitable diameter for a friction fit, or you can secure the hose with duct tape. I've found it best to leave the other end of the pipe open to allow a larger volume of air flowing to the shop vacuum. I can even stow my Porter-Cable machine away in its metal case without having to remove the pipe; I simply invert the machine in the case.

[Kenneth A. Pickering is a retired automotive engineer in Birmingham, Mich.]

Bloodwood basics

A friend of mine recently bought some lumber listed by the dealer as Bloodwood **(Brosimum Rubescens)**. ***This wood is almost vermillian in color, with tight, straight grain, and I'd guess it weighs 50-55 lbs. a cubic foot. What can you tell me about this species (how well it works and finishes, for example)? Also, are there any problems with toxicity?***

—Albert Kauslick, Burlington, N.C.

Jon Arno replies: That the trade name *bloodwood* leads to confusion is not at all surprising. Upwards of a dozen species belonging to at least four separate botanical families are sometimes called bloodwood. Perhaps the most common in today's market is muninga, *Pterocarpus angolensis*. The heartwood of this West African timber is a rich red color with soft purple highlights, so the name bloodwood is certainly apt. As a member of the pea family, Leguminosae, muninga shares the same genus with Andaman padauk, *P. dalbergiodes*, and narra, *P. indicus*, which are also woods with vivid red color. Some Australian members of the eucalyptus family, Myrtaceae, produce some bright red timbers. A few of these (primarily *E. corymbosa*) have been marketed as bloodwood and were popular timbers with 19th-century English cabinetmakers. The only bloodwood native to this country is cyrilla, which belongs to the family Cyrillaceae. Native to Florida and southern Georgia, cyrilla can be a real find for carvers and turners who forage their own blocks or bowl blanks, but this shrubby tree seldom grows to be more than 30 ft. tall, making it too small for commercial lumber production.

There are Latin American bloodwoods belonging to the genus *Brosimum* in the mulberry family, Moraceae. Native from southern Mexico, through Central America and southward into the Amazon basin, only about half of the dozen or so species in this genus consistently produce woods that are bright red in color. The lumber trade generally sorts these timbers out regardless of species and lumps the more attractively colored ones together under various trade names. The bloodwood of the *Brosimum* variety could come from any species in the genus. As a result, from shipment to shipment, these woods can be quite variable not only with respect to their color but also in terms of their working characteristics.

Although these woods are usually straight grained and fine-to-medium textured, their specific gravities range between 0.55 and 0.72 (oven dry weight/green volume). In other words, some may be as workable as sugar maple (0.56) while others will be harder than rosewood (0.70). With an average volumetric shrinkage in excess of 15% (green to oven dry), some of them tend to be a little unstable, but they finish well and do not appear to pose any serious problems with respect to toxicity. In fact, the sap of the cow tree *Brosimum*, *B. utile*, from Venezuela is used as a milk substitute and extracts of the Panamanian species called bloodwood cacique, *B. caloxylon*, have been used in medicine. The wood of this Panamanian species is exceptionally attractive in that it often has bright yellow and black streaks highlighting its otherwise vivid red heartwood. Unfortunately, it is quite rare and difficult to source, even in small quantities.

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

Clearing the air about cabinet odors

I bought a beautiful old oak armoire at a musty antique store. Upon delivering the piece to my home, I discovered that my lovely armoire was permeated with the scent of age. I tried wiping it down in succession with bleach, water, vinegar and pine oil, and then I tried dusting it with baking soda, all to no avail. I even tried littering the inside of the piece with floral sachets, which only served to mingle newer odors with the old. Is there anything I can do to neutralize the undesirable odor? ***—Leslie McElderry, Fairhope, Ala.***

Bruce Schuettinger replies: Not having seen the interior of your armoire, I can only guess the source of the odors. But, based on my experience with wooden objects, the culprit is one or more type of fungi or mold. Fungi consists of a large group of non-green plants (some 100,000 species). The fungi that most likely infested the interior of your armoire is alga-like fungi called phycomycetes. Fungi in general grow quite well in areas of moisture and darkness, which your situation has provided.

The odors could also be caused by deposits of rancid food lodged in the pores of the wood (or the decaying wood itself). Armoires, as a form of furniture, have been built for approximately the last 250 years and have not always been used for the storage of clothes or linens. Consequently, food items, oils or chemicals could once have been stored in your cabinet and leaked into the pores of the wood during its life.

There are numerous techniques and solutions that are treatments for this problem. Unfortunately, some of the most effective methods require using potentially harmful materials that are cost-

ly or not available to a lay person. I have had some success with the following treatment. First, buy from a paint or hardware store denatured alcohol (ethanol with a small quantity of methanol added), vinyl gloves (the disposable kind are okay) and an organic vapor respirator (available from Lab Safety Supply, P.O. Box 1368, Janesville, Wis. 53547-1368; 800-356-0783). Working in a well-ventilated area, saturate a cloth with the alcohol and rub the entire interior surface of the armoire, frequently rinsing the cloth in fresh alcohol. Allow these surfaces to dry for between 8 and 12 hours. Then seal the interior surfaces with a 2-lb. to 2.5-lb. cut orange shellac. Most prepackaged shellac comes as a 3-lb. cut, which can be thinned with the same alcohol used for the cleaning. Apply the shellac by brush. If the first coat is quickly absorbed into the surfaces of the wood, an additional coat will be required. The rubbing of the surfaces with ethanol will kill most fungi and the application of shellac on the interior surfaces should seal in any offensive odors that are left in the wood and prevent them from leaking into the air.

[Bruce M. Schuettinger is Wooden Artifacts Conservator at the firm of Antique Restorations, Ltd. in New Market, Md.]

Is an old Unisaw worth fixing up?

I have the chance to get an old Delta/Milwaukee Unisaw for just about free (its present owner said, "Move it and it is yours"). The saw has been well-used, but still looks sound. I would like to know how to determine how old the saw is, and if it is worth the time and effort involved in cleaning it up. Also, are there are any drawbacks with this particular series within this model? ***—Doug Redmond, Brooklyn, N.Y.***

Robert Vaughan replies: You are most fortunate to have an opportunity to acquire an older Unisaw. If I had such a choice, I would have moved the saw so quickly that the positions of surrounding objects would be threatened by the vacuum left in the space previously occupied by that saw.

However, as with any used machine, there are a few caveats. The first is the condition of the machine, which from your description, seems to be fairly good. The second consideration concerns your own abilities to restore and repair an old machine. If you have a fair amount of mechanical skill and fix your own car and things like that, you should have no problems at all. If you don't, then an older machine is a waste of your time and money. Also, consider your costs in both time and money compared to what a similar machine would cost new or already restored. Then, look at the long-term value of the machine in regard to your needs: It wouldn't pay to invest days to restore a saw that you only plan to use a couple of times a year.

A machine in good condition can usually be restored to smooth-running condition by the replacement of components that normally wear out, such as pulleys, drive belts and bearings. The bearings in that saw are the old felt-seal variety and are a bit more expensive and sometimes slightly more difficult to obtain.

The saw you are considering has many features that make it most desirable, but it has a few drawbacks. The entire saw is going to be much heavier than the current models, and that's a big plus. As a rule of thumb, older Unisaws (20-30 years old) are built using heavier castings than newer models. The motor is probably one of the brush types, which is also an advantage because it has all kinds of torque compared to a capacitor-start motor of equal current capacity. However, if you want to fit the saw with a more powerful motor, there's a rub. To put a larger, say 3 HP, motor on that saw, you will have to modify that old oval cutout in the side.

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97310	Laminate Trimmer Kit	345	192

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334	Above Sander w/ Dustbag	125	74
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352	3"x21" Belt Sander w/ Bag	255	142
352VS	3"x21" Belt Sander w/ Bag V/S	280	164
360	3"x24" Belt Sander w/ Bag	330	178
361	3"x24" Belt Sander w/o Bag	310	174
362	4"x24" Belt Sander w/ Bag	345	188
363	4"x24" Belt Sander w/o Bag	330	184
503	3"x24" HD Belt Sander w/ Bag	550	345
504	3"x24" HD Belt Sander w/o Bag	535	335
330	Speed Bloc Sander 1/4" Pad	102	58
505	1/2 Sheet Pad Sander	210	114
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6615	6614 w/Keyless Chuck	220	122
6640	0-4000 Drywall Screwdriver 5.5A	190	112
6645	0-2500 Drywall Screwdriver 5.5A	195	114

SAWS

315-1	7-1 * Top Handle Circular Saw	210	118
9315-1	315-1 w/Case & Carb. Blade	240	137
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9617	7-1/4" Push Hdle w/Case & Carb. Blade	210	137
314	4-1/2" Trim Saw	240	138
9314	4-1/2" Trim Saw w/ Case	265	148
345	6" Saw Boss 9A	180	102
9345	6" Saw Boss w/Case	220	124
9647	Tiger Cub Recip Saw w/Case	195	119
9637	Recip. Saw V/S w/Case 8A	250	138
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34-080	10" Miter Saw	308	198
34-330	Deluxe 8-1/4" Bench Saw	343	235
36-220	10" Compound Miter Saw	350	235
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33-990	Deluxe 10" Radial Arm Saw	818	549
34-444	10" Contractor's Saw	923	575
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36-751	10" Cab. Saw w/30" Unifence	1487	1025
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37-154	6" Precision Jointer w/ stand	1420	999**
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1609KX	Lam. Installers Kit w/Underscribe	361	199
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1582VSC	New Clic Barrel Jig Saw	265	136
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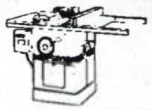
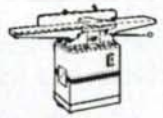
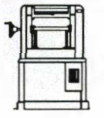


#66 - 10" Tilting Arbor Saw

#27 - Shaper



#60 - 8" Jointer



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If you have the old cast-iron motor cover, that will have to be trashed if the cutout is modified. Another point is that your saw probably does not have T-slots in the table, so it probably won't handle modern miter gauges and accessories. If your Unisaw's fence is original, then it will align quite precisely because the mechanism locks the front, then the back in two separate operations rather than one as with the current jet-lock type.

Old machines can be better than new ones, but it is up to the owner to make them that way. If you buy an old machine and completely tear it apart and replace, repair, and renew anything that needs it, then you own that machine and also own all the knowledge that it takes to keep that machine going. However, it is too simplistic to say categorically that older machines are better. I have seen numerous people buy an old rag of a machine thinking that the older machines are good, but they have a poorly performing machine. An old DeWalt radial-arm saw with worn out tracks is a good example of this. Until those tracks are remachined to be true and good carriage bearings are installed, that hunk of old iron is worth just about its weight as scrap. Another problem with older machines is that a lot of companies are no longer in business or are not making parts for them.

[Robert Vaughan is a contributing editor to *Fine Woodworking* and a woodworking machinery rehabilitation specialist in Roanoke, Va.]

Problems with warping cherrywood

I recently purchased about 60 board feet of kiln dried and surfaced 4/4 black cherry. The boards were flatsawn, almost entirely heartwood and defect free, most measuring 4 in. to 6 in. wide and 6 ft. to 7 ft. long. The lumber was allowed to acclimate to my shop for four months before being worked. As I ripped the lumber to width, some pieces immediately warped along the freshly cut edge—in the most severe cases, warping exceeded three inches over a five foot length! I experienced this problem with more than 35% of the stock. There were no visible differences in these "problem boards," such as the presence of knots or wild grain patterns

Is this a common situation when using cherry? Or did I get a bunch of boards from a tree with some unusual internal stress? Could casehardening from improperly kiln drying have been the culprit? And is there anything I can do in the future, whether in the procurement or the processing, to prevent this from reoccurring? ***—James Clark, Garland, Texas***

Bruce Hoadley replies: I would dismiss uneven moisture content as the cause of your warping problem in light of the fact that the cherry lumber was kiln dried and then stored in your shop for four months before sawing commenced. Four months is more than enough time for the moisture content of the wood to achieve equilibrium with the climate inside your shop.

As you suggest, it's likely that the boards were case hardened by being improperly kiln dried. Casehardening occurs when the outside, or shell, of a board is dried faster than the inside (core) during the middle stages of the kiln-drying process. Even when the board has eventually reached a uniform moisture content inside and out, stresses created by casehardening will cause warping problems when the board is ripped or resawn. If the casehardening stresses are great enough, the wood will develop internal separations, called "honeycombs," which are voids and pockets in the core of the lumber that might only show up as small checks on the outer shell. My book *Understanding Wood* gives a more detailed explanation of how drying stresses develop.

Another possible cause of the warping you experienced is

reaction wood, a type of abnormal wood that traces back to circumstances present in the living tree at the time of cell formation. Reaction wood in hardwoods is called *tension wood,* and one of the critical characteristics of tension wood is abnormally high amounts of longitudinal shrinkage. The uneven severity of tension wood formation results in uneven longitudinal shrinkage in drying that produces internal stresses. When these stresses are released by sawing, the wood on opposite sides of the cut warps. Tension wood is often difficult to recognize in lumber, but any boards showing figure indicating that the tree had grown crookedly should be suspect. However, if tension wood were the problem, I would expect that many of the boards would have warped overall before resawing.

[Bruce Hoadley is a contributing editor to *FWW* and a professor of wood technology at the University of Massachusetts at Amherst.]

The right 230v plug for the wrong receptacle

I bought some old 230v plugs that had been salvaged from a remodeling job and discovered that the prongs are arranged in exactly the opposite positions from the 230v receptacles in my shop. I thought one horizontal blade and one vertical blade was standard. What gives?

—Wyatt Jones, Toronto, Canada.

Robert Vaughan replies: The reversed mirror-image configuration between your plugs and electrical outlets is understandable. While both types of plug/receptacles are intended to handle 20 amps, the difference is in the voltage they're designed for. One type (known as NEMA 6-20) is for 230v, 20-amp applications, and the other type (NEMA 5-20) is designed to handle 125v, 20-amp uses. The fine print on the plug or receptacle should say which voltage is intended. The difference in prong configurations is to ensure that you will never accidentally plug a 125v tool or machine into a 230v outlet—a dangerous and costly situation.

[Robert Vaughan is a contributing editor to *Fine Woodworking* and a woodworking machinery rehabilitation specialist in Roanoke, Va.]

Durable outdoor finishes for teakwood

I recently bought a speed boat with teak brightwork that had been neglected by the previous owner. I have many friends who claim that teak oil is not a long-lasting finish and needs recoating after almost every outing. I decided to finish my teak parts with several coats of tung oil instead. The teak looks great; however, another friend told me that this could promote decay in the teak because tung oil seals the wood so well. Is this true? If not, will the tung oil prove to be a more durable finish against sun and water than teak oil?

—Keith W. Gansel, Chicago, Ill.

Chris Minick replies: Contrary to the name, teak oil products purchased at a marine supply store do not contain extracts or oils from any part of the teak tree. In my opinion, the name is merely a marketing ploy to justify the higher price of these finishes. Usually, these products are solvent-based solutions of common drying oils, like tung oil or linseed oil. The better brands of teak oil (which are usually more expensive) may also contain a UV absorbing chemical to minimize the effects of strong sunlight. Even so, I don't think they are worth the price.

Pure tung oil, the kind used for finishing woodwork, will give your teak boat the same protection as marine teak oil at substantially reduced cost. Boiled linseed oil is another alternative and may be easier to find at your local hardware store than tung oil. Before application, thin the linseed or tung oil with mineral spir-

its (1:1 mixture of mineral spirits to oil works well). Wipe on a coat of thinned oil, then wipe off the excess after about 15 minutes. Allow the wood to dry for 24 hours, and repeat the process. Three or four coats will give you sufficient protection for most of the boating season. Periodically, wipe down the teak with an oil-soaked rag. This quick wipe will maintain optimum protection and keep the teak from graying.

Your friend's suggestion that tung oil might cause rotting is fallacious because even if you sealed the wood with a thick film of oil, teak is naturally decay resistant. However, you should avoid building up a visible surface film on the wood because this film may check or peel when exposed to high moisture and strong sunlight. [Chris Minick is a product development chemist and amateur woodworker in Stillwater, Minn.]

Countering wood cleaner discoloration

A bottle of Windex glass cleaning solution spilled on a teak veneered table and stayed on it for about 40 minutes. The table, which is about 30 years old, is finished with some type of oil finish like Watco. The spill created a discolored spot, which looks pale brown as opposed to the rich orange-brown color of the teak surrounding it. I tried wiping the area with a vinegar-soaked cloth (to neutralize the ammonia in the Windex), then lightly scrubbed with #000 steel wool, to no avail. I suspect that oxidation and exposure to UV light will bring most of the original teak color back, but I'd like to help it along if I could. ***—Tom Griffin, Dublin, Calif.***

Chris Minick replies: It's not unusual for alkaline materials like Windex to discolor wood. Chemically speaking, alkaline reacts with the natural tannic acid found in many woods to form a colored chemical complex. Oak exposed to ammonia vapors turns a pleasing brown (also called fumed oak). Cherry treated with lye also turns brown and sodium bicarbonate (baking soda) will turn birch gray and change blond butternut to green. Generally, woods with high tannic-acid content—like oak—produce darker stains.

You were on the right track when you wiped the table with vinegar since this kind of chemical stain is usually reversed by treating the affected area with an organic acid. But acetic acid isn't strong (concentrated) enough to do the job. Citric acid (lemon juice) is a better choice. Citric acid will remove the stain if the stain is fresh and not too dark, but will not bleach the natural color from the surrounding teakwood. Severe stains may require an even stronger acid. Oxalic acid (available in hardware stores) almost always removes stains of this type. Unfortunately, oxalic acid may also remove the color from the adjacent wood. Try the lemon juice first. If the stain persists, you may have to use an oxalic acid wash. Prepare a dilute oxalic acid solution by dissolving one or two tablespoons of acid crystals in one pint of warm water. Wear gloves and flood the entire surface with the liquid. Keep the table wet with the acid solution for about 20 minutes. If the stain still remains, retreat the area with a more concentrated oxalic acid solution. Once the stain is gone, wash the table several times with clear water. Allow the wood to dry, then finish with Danish oil or a polyurethane varnish. A word of caution, oxalic acid is poisonous, so keep children and pets away from the work area.

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

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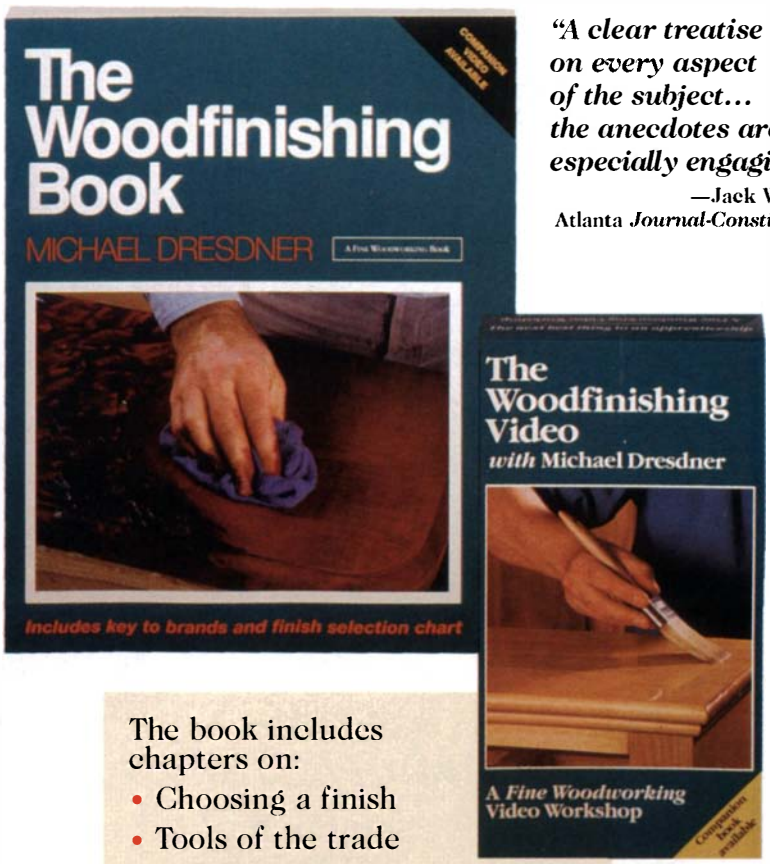

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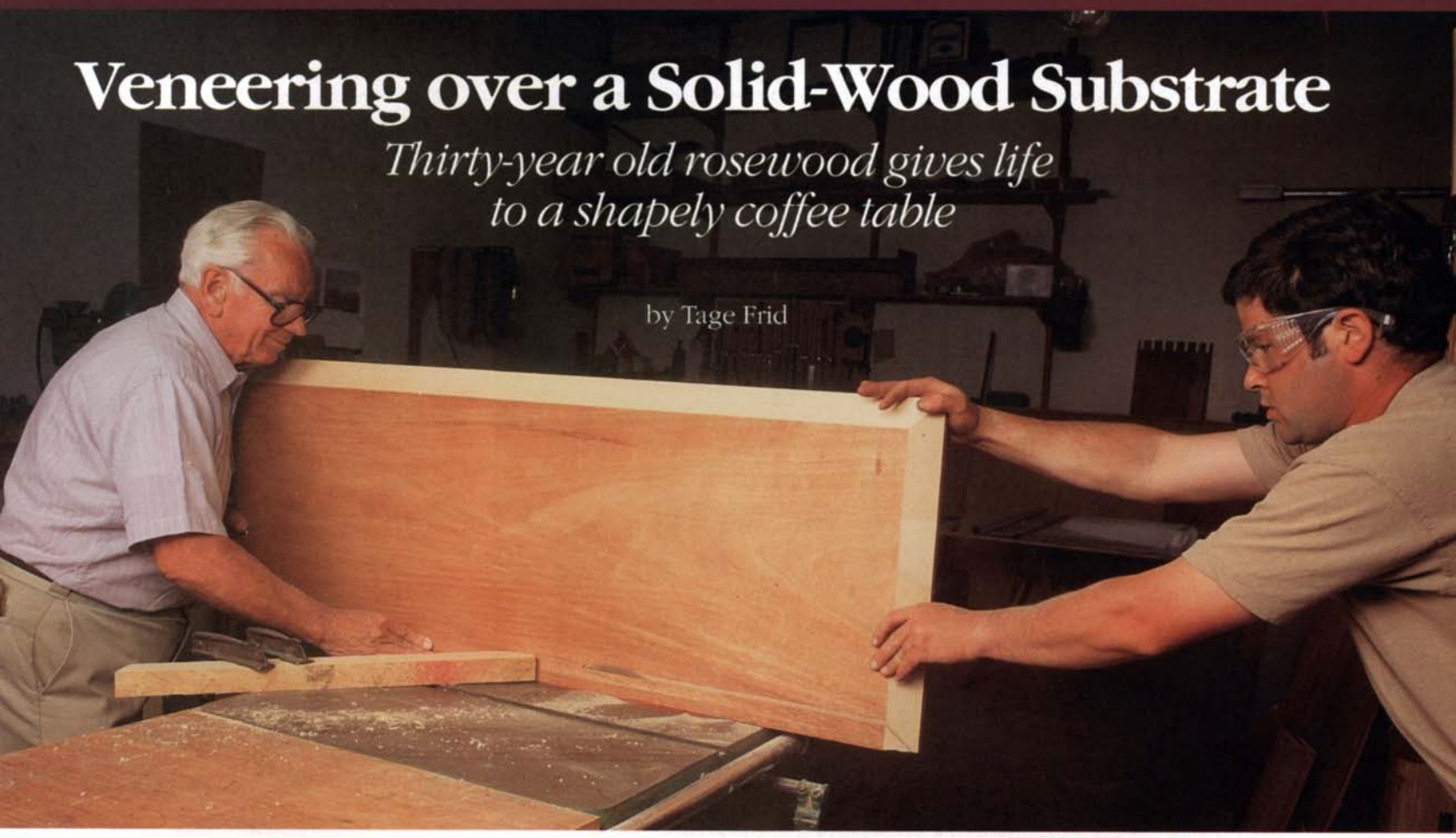
Veneering over a Solid-Wood Substrate

Thirty-year old rosewood gives life to a shapely coffee table

by Tage Frid



I've been experimenting with veneering over solid woods for a while and have discovered some interesting design possibilities. One of them, which I've used on the table shown below, involves removing wood in such a way that I expose a graduated portion of the substrate along its edge. By first beveling the veneered tabletop and then bandsawing gentle curves along both sides and ends, the exposed maple seems thinner in the center and wider at the ends. The effect can be very dramatic or much more restrained. For this table, I wanted to maximize the contrast with the veneer—some prize rosewood I've been saving for 30 years—so I chose maple for the substrate. Whether you're looking for a subtle distinction or a loud contrast, the veneer adds an element to the design that would be impossible without it.

Some people think real woodworkers don't use veneers. This is small-minded thinking. Veneering has been around almost since man first started cutting trees. Indeed, some of the finest furniture ever made—fabulous 18th- and 19th-century pieces from France and England—used veneers extensively and over solid wood. Many of those pieces have stood the test of time.

When veneering over solid wood, orient the veneer in the same direction as the substrate. I used a vacuum veneer press, but clamps and cauls (wooden blocks to spread the clamping pressure) can also be used. Although I normally use regular yellow glue for veneering, I used plastic-resin glue for this table because it works better with oily woods like rosewood. In either case, it's essential that you spread the glue evenly and not too thickly. I use a paint roller with a rough, woven (washable) pad, which is designed for spreading contact cement. It's important to veneer both the top and bottom of the tabletop so that the wood can exchange moisture with the air evenly on both sides. I glued mahogany veneer on the bottom of this table.

***Graceful curves and beautiful veneer** combine to give Tage Frid's most recent coffee-table design a classic, timeless look. The table, on display last fall at the Newport Art Museum, was one of several pieces by Frid in the Nine Rhode Island Masters of Modern Furniture show.*

I designed the legs of the table to complement the top. Because they're curved, I made sure the grain runs full length, so there are no short-grain sections that could be vulnerable. After shaping, mortising and veneering the legs, I spokeshaved the corners to expose a little bit of the maple.

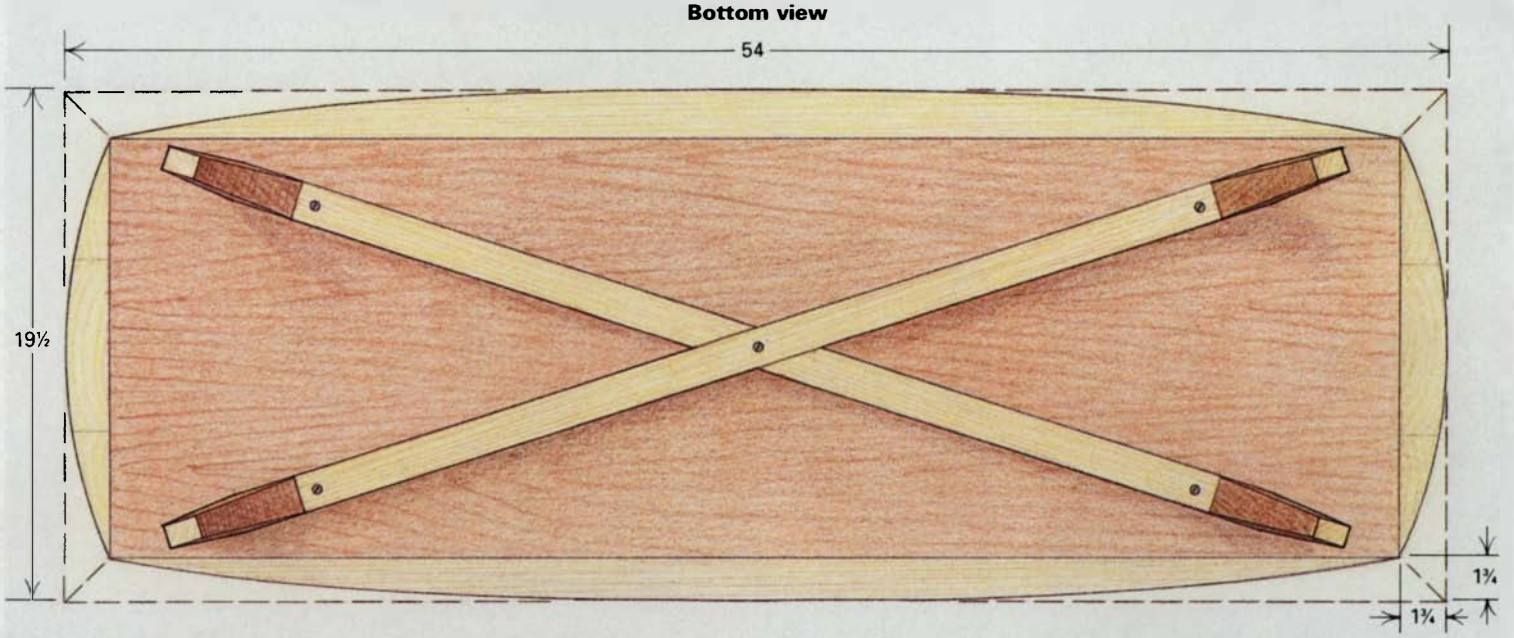
The table's finish is Watco Danish Oil Finish—the simplest to apply and the easiest to repair. That's important, especially if you put your feet up on the coffee table as much as I do. □

Tage Frid is a contributing editor to Fine Woodworking.

Photos: Vincent Laurence

Fig. 1: Rosewood-veneered coffee table

The most elegant designs are often the simplest. Tage Frid's most recent table design relies on fair curves, appropriate proportions and contrasting wood colors for its beauty.



Stretchers are screwed to tabletop at center and just inside of each leg. Half-lap joint where stretchers overlap allows them to move with the tabletop, preventing any wood movement problems.

To mark the tabletop's curves for cutting, Frid tacked small brads 1¼ in. in from each corner, sprung a batten (centered on the middle of the table's edges) and penciled a line.

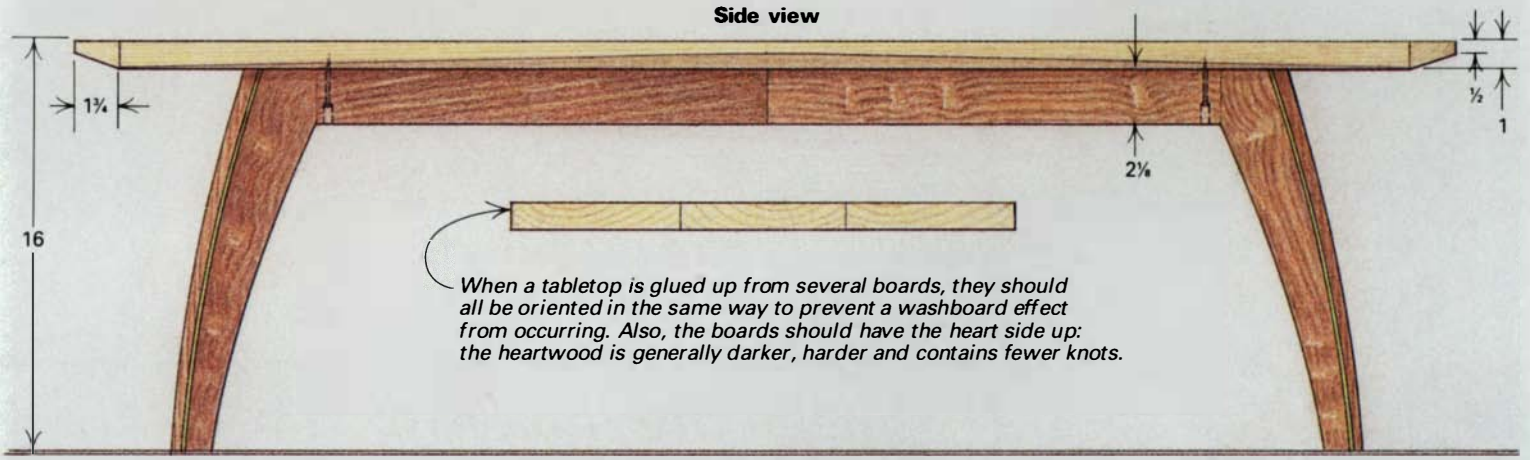
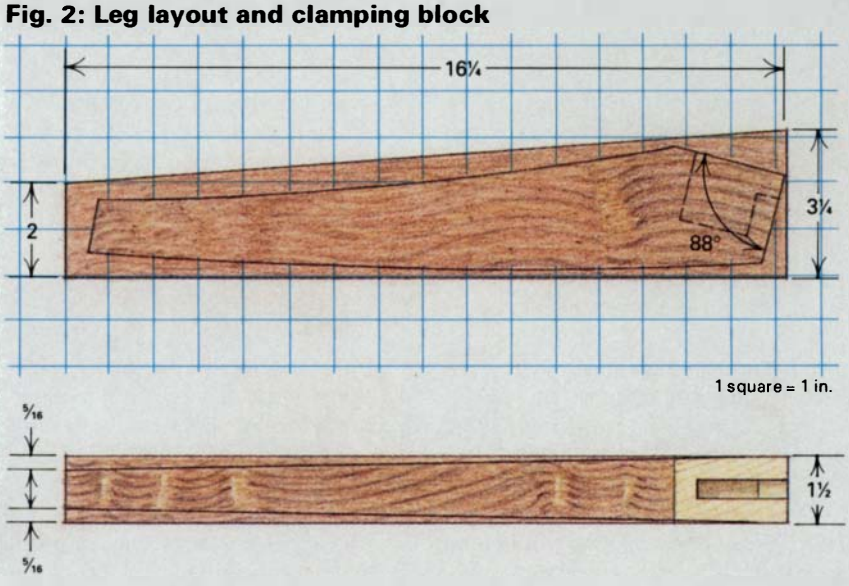
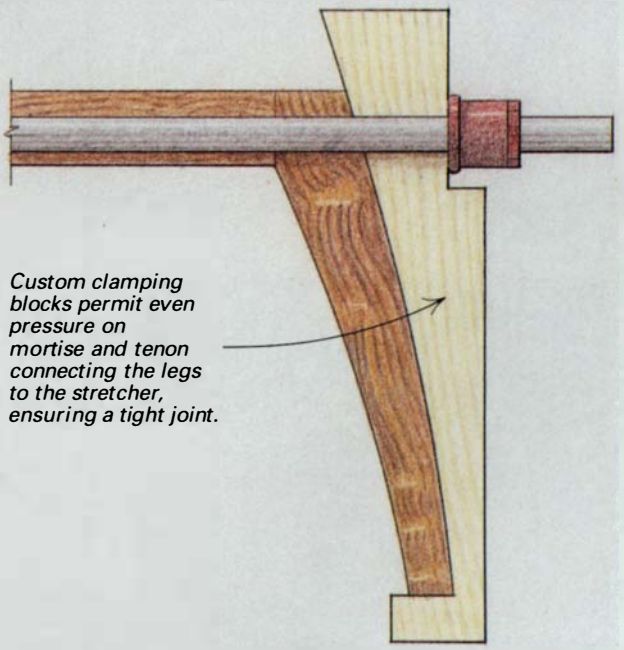


Fig. 2: Leg layout and clamping block





Drawing: Vince Babak

1) Truing the edges of the veneers

2) Frid pins the veneers

5) Frid scrapes the package tape from the veneer

3) Gummed package tape holds the veneers in place

4) Eliminating air pockets

Veneer the tabletop, then shape its edges

1) Truing the edges of the veneers takes only a few seconds on the jointer. Frid aligns the veneers so that they're just barely protruding from a wooden sandwich, clamps the veneers between the two boards and then runs the clamped assembly over the jointer knives. Alternately, Frid could have used a hand plane, but the jointer is convenient and works as well or better.

2) Frid pins the veneers temporarily into place with small brads after carefully aligning the trued, book-matched sheets of veneer.

3) Gummed package tape holds the veneers in place while they're being transferred onto the substrate and into the vacuum bag. Frid doesn't use masking tape because its adhesive could tear the veneer's fibers or leave a residue that would interfere with finishing the table. Once he's taped the veneers together, Frid removes the brads he used to pin the veneers.

4) Eliminating air pockets that would interfere with even pressure on the tabletop, Frid presses the bag in at the corners. A sheet of plywood goes over the top of the

7) Bandsawing to a line drawn along a sprung batten

8) Frid tapers both sides of each leg

9) Frid cleans up the curves

piece being veneered, and extends just beyond its edges, to prevent the slightly oversized veneer from shearing on the edge of the substrate.

5) Frid scrapes the package tape from the veneer with a cabinet scraper after removing the veneered tabletop from the vacuum press.

6) Frid bevels the edge of the tabletop (see the top photo on p. 40) after he's ripped it to width and crosscut it to length. An auxiliary plywood fence, a firmly clamped, solid featherboard and the assistance of his apprentice (and grandson), Ben Randall, keep Frid safe and the bevel true.

7) Bandsawing to a line drawn along a sprung batten, Frid exposes a graduated section of the solid maple substrate from the center of each side to the ends; a few passes with a compass plane take care of any rough edges. The result is an interesting treatment achieved with simple means.

8) Frid tapers both sides of each leg by 5/16 in. from top to bottom, cutting away the bulk of the taper on the bandsaw and then jointing to the line. He uses a shopmade push block to keep his hands safely away from the jointer knives.

9) Frid cleans up the curves with a spokeshave after veneering the jointed sides of the legs and marking and bandsawing the curves for the legs. A smooth surface is essential because these two faces are also veneered.

Editor takes video of Frid making table

Still photos and the written word don't always do justice to process-oriented information. That's why I went back to Tage Frid's shop and shot video footage of him building an end table to match the coffee table featured in this article.

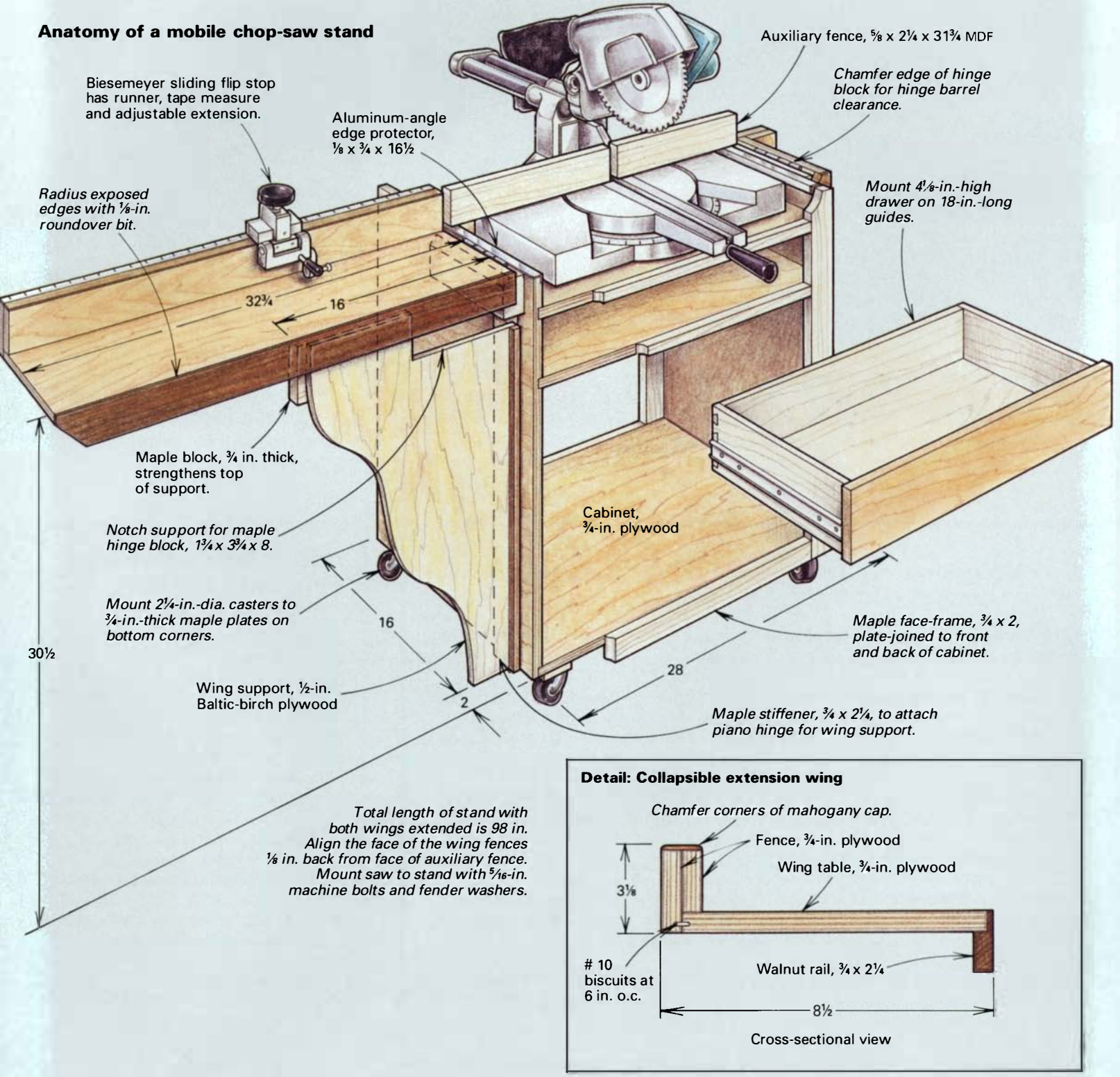
The result isn't a polished video. It's an experimental, no-frills, ten-minute companion piece to the article, showing highlights of Frid preparing substrate and veneers, using a vacuum veneer press and shaping the tabletop on the tablesaw and bandsaw. If you'd like a copy of the video (VHS only), it costs $7. To order, call (203) 426-8171, or write FridVid 11030, The Taunton Press, P.O. Box 5506, Newtown, Conn. 06470.

—Vincent Laurence

Rolling Chop-Saw Stand Saves Space

Folding wings support long stock

by Charles Jacoby



My shop is pretty crowded, so when I acquire a new tool, I have to create efficient ways to store and use the tool. Such was the case after I bought a new sliding compound-miter saw. The saw needed a permanent, but mobile, home where I could do accurate cutoff and miter work. I first tried using the saw on planks and horses. This worked fine for single cuts, but I really needed a fence with a stop for cutting multiples. And the extensions that came with the saw limited its cutting to short pieces. Also, I still had to break things down to put the saw away.

About this time, my wife, Rosemary, gave me a benchtop oscillating-spindle sander. Again I wondered where I would store the tool. Building a stand to house both tools was the answer—make that a movable stand with folding extension wings. I designed the stand with crosscutting and mitering in mind but with a place to store the sander. I also left room for a top drawer to hold my shaper cutters and accessories. When I'm not using the saw, I drop the wings and roll the stand into a corner (see the photo). And even with the wings folded down, I can still do short chop-saw work by clamping a stop block to the saw's auxiliary fence.

Cabinet construction—For the stand's carcase, I made a ¾-in. birch-plywood box. To make storing the sander easy, I left the stand's lower compartment open (back and front). I dadoed the box's top, middle and bottom ¼ in. into the sides. Then, using #10 biscuits and glue, I plate-joined maple face frames to the front and back of the carcase to make the box rigid. Because my miter saw has its own base with four feet, I recessed the top of the cabinet so that the saw's work surface would be at the same height as the wings (see the drawing). I also fastened four 2½-in.-dia. casters (two of them locking) to hardwood plates that I glued to the bottom of the cabinet. The added height of the casters puts the top of the stand at a comfortable working level. To protect the top edges of the plywood sides, I mounted strips of ¾x¾ aluminum angle.

Collapsible wings—What makes the stand accurate and maneuverable are the folding pair of wings attached to the side of the cabinet. Each wing basically consists of a table, a support and a fence. The tables are ¾-in. plywood and the supports are made from ½-in.-thick Baltic-birch plywood for strength. To stiffen the wing tables, I made front rails using walnut I had on hand. The wave-like curves of the supports aren't necessary, but I wanted to use my new spindle-sander. To strengthen the top of the supports, I glued and screwed on a maple block to the back side of each. Finally, I made the fence for each wing from two pieces of ¾-in. plywood, staggered and glued together to form a rabbet (see the drawing detail). I glued and biscuited the fences' rabbets to the wing tables, and then I capped the top of the fences with mahogany. I chamfered the caps' edges, so there would be enough clearance for the runner block of an adjustable stop.

A flip stop for the fence—By securing a flip stop to the left fence, I'm able to measure precise lengths. The stop I use is made by Biesemeyer Manufacturing Corp. (216 S. Alma School Road, Suite #3, Mesa, Ariz., 85210; 800-782-1831). I purposely made my fence higher than what the flip stop requires to permit a full 2x4 to go under the stop. Because of the extra height, I had to make a metal stop extension to get it low enough for thin boards.

Aligning the wings and mounting the saw—The collapsible wings are strong; I can crosscut 14-ft.-long 2x8s in half on a fully extended stand. To achieve this kind of load, I had to first add blocks and stiffeners to reinforce the cabinet where the wing-table and wing-support hinges attach. I secured 1¾-in.-thick support blocks to the top of the cabinet sides. Then I fastened ¾-in.-thick strips of maple to the plywood sides. For the hinges, I fastened two Corbin ball-bearing (large door) hinges to the wing tables and mounted a pair of 2-in. by 24-in. piano hinges to the wing supports.

Before I screwed the hinges to the cabinet, I lined up the tables and fences as follows: First, I propped each wing assembly in place with buckets and blocks. Next, I set my saw down at the rear of the cabinet top and laid a 6-ft.-long straightedge across the front of the fences. After I had shimmed each wing so its fence was properly aligned (an extra pair of hands are a big help), I flipped the straightedge 90° to set the height of the wing tables. Once the wings were in position, I carefully clamped the hinges in place, so I could make pilot holes. Finally, I screwed the table hinges to the support blocks and the piano hinges to the stiffener strips.

I offset the saw's auxiliary fence about ⅛ in. ahead of the wing fences so that they won't influence the alignment of long boards held snugly to the saw's fence. I fastened the saw to the cabinet top using 5⁄16-in. machine bolts with large fender washers under the plywood. With the wings extended, I originally figured I'd have to clamp the supports to the front rails. But the wing tables are heavy and rest on the supports unaided.

Finishing touches—To complete the stand, I made a simple drawer for the upper cabinet opening. Before installing the drawer on a pair of 18-in.-long slides, I notched the top of the drawer back to clear the ends of the saw-mounting bolts. Finally, I sealed the drawer, cabinet and wings with clear Watco oil. Once my mobile stand was finished, I put the saw right to work, cutting everything from baseboard to pull-out dish racks for the kitchen. □

Getting sent to the corner *doesn't always mean you've been bad. After a well-executed cutting performance, Jacoby's cutoff-saw stand (with a sander stowaway) gets its wings lowered and is rolled to a tidy corner in the shop. The stand, with its wings extended, makes a level assistant when mitering the ends of long stock or crosscutting exact-length workpieces.*

Charles Jacoby is a retired men's clothing store owner who enjoys making furniture for his family in Helena, Mont.

Photos: author; drawing: David Dann

***Loose-tenon joinery** is simple and quick. With precut tenon stock, joinery becomes a matter of router-mortising all the parts and then clamping up, with no difficult tenon cutting and no need to square the mortises or round the tenons.*

Loose-Tenon Joinery

Separate tenons are quick, easy and strong

by Ken Picou

The mortise and tenon is one of the strongest joints in a woodworker's repertoire. Traditionally favored, it remains today the joint of choice for chairs, doors and most other applications where strength is essential. Both the layout and cutting of mortise-and-tenon joints can be time-consuming, requiring much patience and concentration. Switching from the traditional mortise-and-tenon to a loose-tenon (or spline-tenon) system can save you time and effort and ensure consistent results, without sacrificing joint strength.

In loose tenoning, both pieces of stock to be joined are mortised and a section of precut tenon is inserted into the mortises (see the photo above). Once you have a quantity of tenon stock made up, it's a simple matter of cutting the tenons to length and plunge-routing the mortises. A perfect fit is ensured because the width of a router-cut mortise is consistent, and the tenon stock can be planed to the *exact* thickness desired. Also, because your tenon stock is already rounded, the joint can be entirely machine made with no need to square up mortises or round over tenons.

Another advantage, in terms of layout, is that you cut rails to the exact length needed. There's no need to allow for the tenons and then work back to the length between shoulders. Because the rail is cut to final length in one pass, the shoulders of the joint are always crisp and never accidentally undercut.

Finally, an angled joint—even a compound-angled joint—is easier with a loose tenon. Instead of having to cut an angled tenon, you just rout an angled mortise in one of the pieces to be joined—something you can generally do by shimming the workpiece in your existing mortise fixture.

Mortising

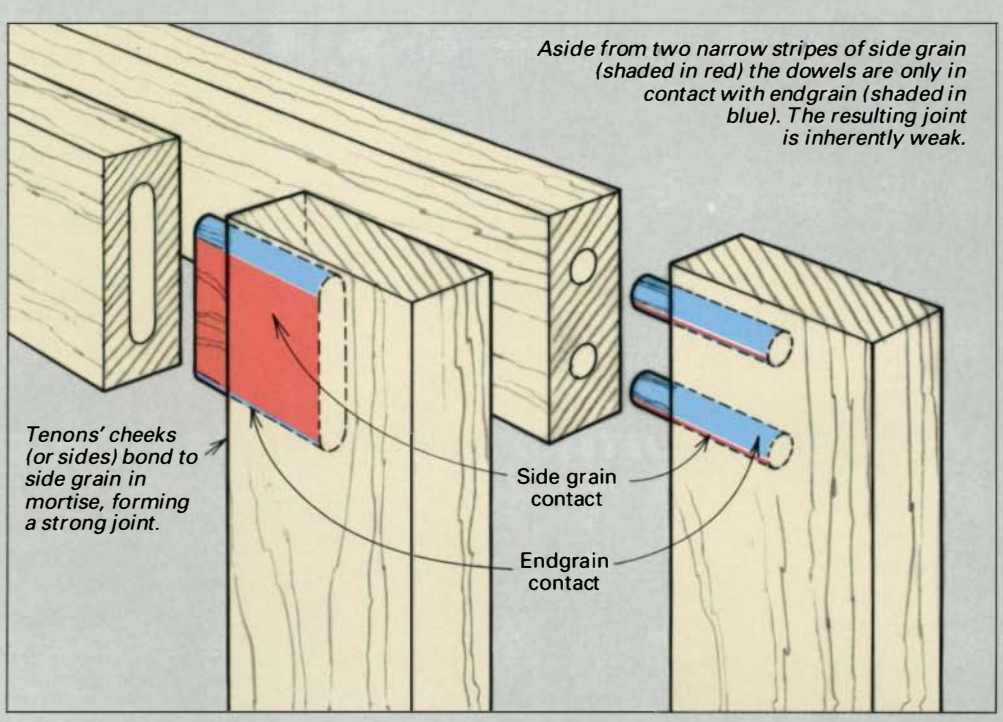
There are many ways to cut a mortise, but I find the plunge router hard to beat for speed and accuracy. On one-of-a-kind items and

Tenons vs. dowels: which is stronger?

Regardless of what the furniture industry would have you believe, a doweled joint isn't nearly as strong as a mortise-and-tenon or loose-tenon joint. There are two reasons for this .

First, endgrain to side-grain glue joints are always weak. The hole drilled to accept the dowel is almost all endgrain, except for two narrow stripes of side grain. There's very little surface that can be successfully glued to the dowel. But the sides of the mortise are all side grain and so are the cheeks of the tenon. These comparatively large surfaces may be glued with success. The resulting joint has the potential for a long life.

Second is the matter of what happens if the wood should shrink. The round dowel (and the hole) distorts into an oval shape. The most likely result is that one of those two narrow stripes of side-grain glue surface will pull loose. If the tenon shrinks a bit, it's less likely to become distorted, and more likely to stay glued. *—K.P.*



small production runs, I freehand the mortise using my router with a fence. After chucking the appropriate bit in my plunge router and securing it tightly (especially with spiral bits because they have the bad habit of pulling themselves out of collets if not properly tightened), I locate center on a piece of scrap equal in width to the stock I'm mortising. Then I set the fence and depth adjustment on my router and mark the mortise using a shopbuilt gauge (see the photo at right).

I like to rout the mortise to full depth with a series of closely spaced plunges, followed by a single cleanup pass. This eliminates the tendency of the bit to wander during a heavy cut and is much easier on the bearings of my router.

If the mortise is located near the end of the stock (which it almost always is), I find it helpful either to rout the mortise before cutting the stock to length or to butt the end of the stock against a piece of scrap of equal thickness to help support the router.

When mortising the end of a rail, I screw a piece of scrap at least 6 in. deep, perpendicular to the fence to ensure that the mortise is true. It's also a good idea to sandwich the end rail between pieces of scrap to help support the router. A simple fixture also can be made for this purpose.

Preparing tenon stock

One of the greatest timesaving features of the loose-tenon system is that you can make a quantity of tenon stock at one time, often from scrap. I maintain an inventory of the most-used widths—1 in., 1½ in. and 2 in.—to cover most of my joinery needs.

Before I start cutting and shaping tenon stock, I first make a long sample mortise with the bit I'll be using for the actual furniture mortises. I then run the scrap stock for the tenons through the planer until I get a perfect fit. I want the tenons to be snug, but not so tight that I can't push the joint together for a test dry-assemble and pull it back apart. I rip the stock to the required widths, then lower my tablesaw blade and cut a couple of channels about ⅛ in.

Using standard-sized tenons has many advantages. *Picou has accurate gauge blocks already made for 1-in., 1½-in. and 2-in. tenons—which cover most of his tenoning needs.*

After cutting the tenon stock to size *and cutting channels for excess glue to escape, the author routs the edges of the tenon stock to match the shape of the mortises.*

Photos except where noted: Sandor Nagyszalanczy

deep on both sides of the tenon stock. These channels give the trapped glue somewhere to go during assembly and go a long way toward eliminating squeeze-out around the base of the joint. Finally, I use a roundover bit in my router table to shape the edges of the tenon stock to the same radius as the ends of the mortises (see the bottom photo on the previous page).

Assembly

I glue up loose-tenon joints in the same manner as mortise-and-tenon joints, but there are a few things I do that make the job go smoother. I cut the tenons at least 1/16 in. short to leave space at the bottom of the mortise for excess glue and to allow for any mistake I may have made in measuring the mortise depth.

When applying the glue, I put only enough on the tenon to seal the grain. I apply a much heavier coat to the inside of the mortise by squeezing the glue in and then spreading it with a small plumber's flux brush. This minimizes the amount of glue that gets scraped off of the side of the tenon and deposited on the surface of the project. Finally, if my stock is thick enough, I sometimes run a small (1/16 in. or less) chamfer around the mouth of the mortise to help contain squeeze-out.

I use this system of joinery in my line of side chairs, and I find it to be a great time-saver in both the production and the fitting of the joints. □

Ken Picou is a designer and woodworker living in Austin, Texas.

Shop-built mortiser speeds spline-tenon joinery

by Ross Day

Spline-tenon (or loose-tenon) joinery is an easy, fast and strong alternative to the mortise and tenon. The mortises for a spline-tenon joint can be cut many ways, including with a plunge router, but I've found that a dedicated horizontal-mortising machine is a very efficient and enjoyable way of cutting mortises. What's more, the machine is simple and inexpensive to build.

The machine

Horizontal mortisers are available commercially, but they're usually quite expensive. Some tablesaws, European ones in particular, use the saw's arbor as the mortising shaft and have smaller tables that move in two axes mounted just below the shaft. There are also jigs on the market that use a router with a spiral-cutting bit for cutting horizontal mortises. They work quickly but take time to set up because of all the stops, levers and hold-downs, so they are more suited to a production situation than to the custom furnituremaker.

My horizontal mortiser consists primarily of a 1,725 RPM motor; a pulley and V-belt system; a mandrel, shaft, chuck and end mill; and a height-adjustable, flat torsion-box table (a wooden grid with sheets of plywood glued top and bottom). The pulley and V-belt system steps the arbor speed up to 3,450 RPM. The end mill cuts cleanly, spews the chips from the mortise and leaves a flat-bottomed mortise, and the adjustable table allows me to position my mortise.

End mills

It's necessary to use end mills with my mortiser—*not* router bits. I use a single-end mill made of high-speed steel (HSS) with four flutes designed for bottom-centered cutting. These end mills are fairly cheap, and they last a long time. There are three standard lengths: regular, long and extra-long. I find the regular too short for some work, and the extra-long can flex and throw off your joinery. Long mills are best for most work. They come in increments of 1/16 in.; I have a range of them from 1/8 in. through 1/2 in. I generally make my tenons one-third (or slightly greater) of the stock thickness.

Mortising

I mortise freehand. It takes a little practice, but with end mills it's as safe as any cutting operation can be, and when running only a few pieces, it's as fast as setting stops and so forth. You may be nervous when first trying this method, but if you take it slow, you'll gain confidence. You still need to be conscious of safety, so keep your fingers far away from the end mill, and use a holding jig if you're mortising small parts or if your fingers would have to wander near the mill without one. Remember: This method only can be used with end mills. Never try this with a router bit because it would be *extremely* dangerous.

To use the horizontal mortiser, first chuck the end mill and set the table height, so the mill is centered in the piece receiving the tenon. (I always glue the spline tenon into one piece first and then treat that piece as though it were normally tenoned.) I begin the mortise, with the workpiece securely in hand or held by a jig, taking light passes, staying just inside the layout lines. Taking light cuts will keep the bit from flexing and creating a mortise that's not square to the stock. Also, it will keep the bit from grabbing. In most cases, the mill will have created a shoulder after a few passes against which the non-fluted portion of the cutter can bump up. Compressed air keeps chips from building up in the mortise, but if you don't want to rig up something similar or don't have compressed air in your shop, you should still clear the chips often.

I sometimes mark my depth of cut on the mortiser table with a pencil line or a piece of tape. I always cut about 1/16 in. deeper than my intended mortise depth on each piece to allow room for the glue in the bottom of the mortise. I keep my mortise sides straight—with no taper—and square at the bottom. This is fairly easy to do by watching the workpiece to keep it perpendicular to the bit. After all my mortises are cut, I break the edges of the mortises with a file. This slight shoulder will help ensure that the joint remains clean at the base and not bind when you begin glue-up.

Special applications

One major advantage of spline-tenon joinery over conventional mortise-and-tenon joinery is that it makes angled and curved work much simpler. Instead of having to devise torturously complex jigs and fixtures to cut the tenons, I just use a simple jig consisting of an angled block or two (with sandpaper glued on to prevent the workpiece from slipping) and maybe a hold-down clamp (see the photo at right).

You also can use your horizontal mortiser as a lathe to turn small things such as door and drawer pulls. Standard chucks usually have three jaws and won't accept square stock, but a two-jawed chuck will. I just drop the table and clamp a piece of wood to it as a tool rest. □

Ross Day is a custom furnituremaker in Seattle. He also teaches fine furnituremaking at Seattle Community College.

Sources of supply

Chucks and end mills

MSC Industrial Supply, 151 Sunnyside Blvd., Plainview, NY 11803-1592; (800) 645-7160

Mandrels

Mooradian Manufacturing Co., 1752 E. 23rd St., Los Angeles, CA 90058; (213) 747-6348

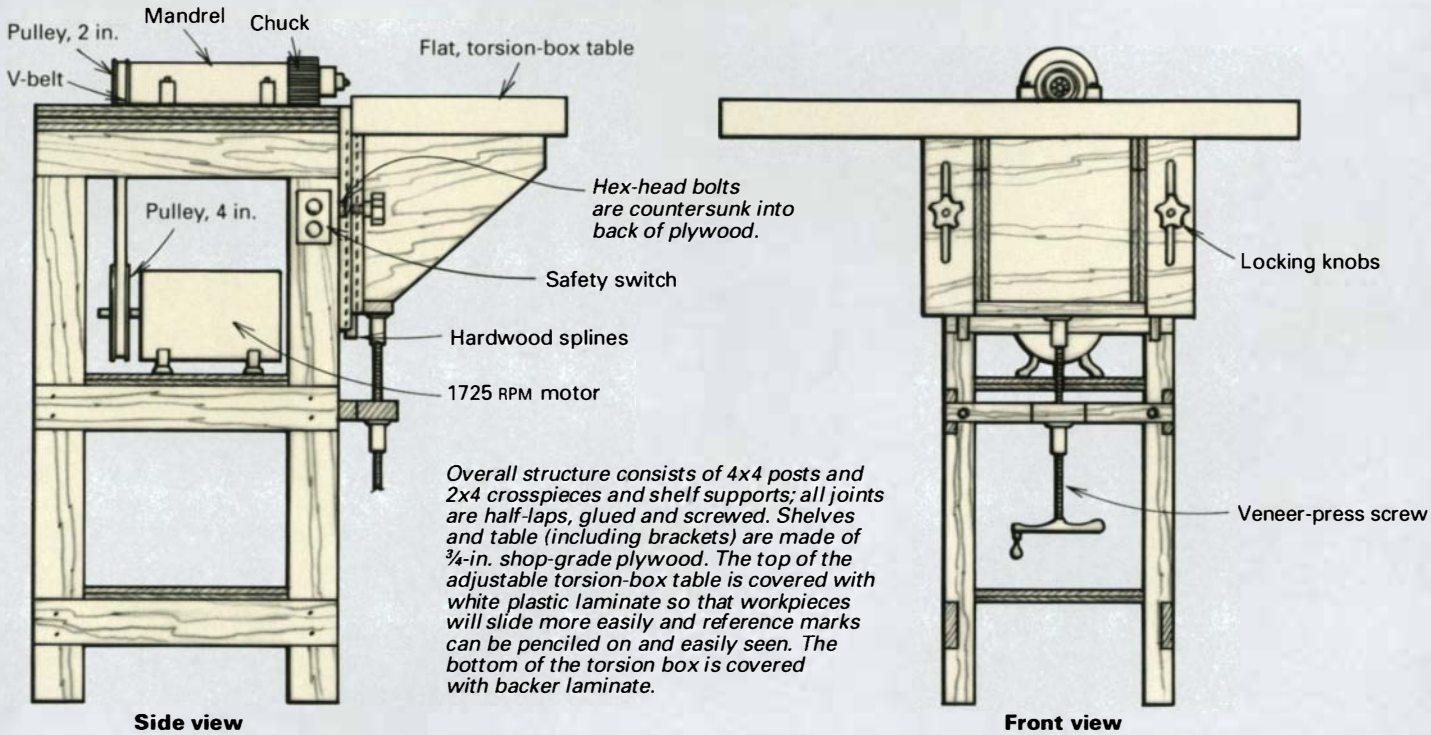
Note: It's essential that the chuck be centered on the mandrel if the end mill is to run true. For a small charge, Mooradian Manufacturing Co. will thread the shaft end on a chuck you supply and make sure it runs true.

Even curved work is relatively simple to mortise *with the author's horizontal mortising machine. A couple of blocks and a toggle clamp hold the workpiece in place, and the mill does the work.*

This same setup, used with wedges, could be used to cut an angled mortise. By inserting a length of regular precut tenon stock, you'd then have an angled tenon without the hassle of sawing one.

Shopmade horizontal mortiser

A high-quality horizontal mortiser can be built inexpensively and without much difficulty. The critical elements are a precisely adjustable, flat table (hence torsion-box construction and veneer-press screw) and a mandrel and arbor that run true. Torsion box must be parallel to the bit, front to back.



Overall structure consists of 4x4 posts and 2x4 crosspieces and shelf supports; all joints are half-laps, glued and screwed. Shelves and table (including brackets) are made of ¾-in. shop-grade plywood. The top of the adjustable torsion-box table is covered with white plastic laminate so that workpieces will slide more easily and reference marks can be penciled on and easily seen. The bottom of the torsion box is covered with backer laminate.

Photo: Jim Boesel; drawings: Maria Meleschnig

Investments in Furniture

by Ben Bacon

Two recent London shows of contemporary woodworking demonstrate the impact that new and established woodworkers are having on the worlds of design and art investment. Gone are the days when woodworkers showed their work wherever they could and hoped for the best. Last February, Bonhams, the London art auction house, put on the first show of contemporary furniture design by a major auction house. They believe that contemporary handmade furniture is a sound investment and are promoting it aggressively. And the Society of Designer Craftsmen has put on its own show at the Mall Galleries, aiming to promote the work of its members.

All the work exhibited, ranging from pieces by established masters to this year's crop of furniture school graduates, is exciting and beautifully made, demonstrating the deep impact of several decades of emphasis on quality in making and design. Bonhams organized their show chronologically, featuring work from designers trained in the 1950s to this year's graduates. In general, the more established designers, like John Makepeace and David Field, had the grander and more polished pieces, but the newer designers showed no lack of verve and imagination.

The shows were aimed at collectors and both reported good sales. Whether or not these pieces are the antiques of tomorrow, it was nice to see modern, handmade furniture given such good exposure and attracting so much national interest. □

Ben Bacon is a woodcarver and writer in London, England.

Photo below and inset: Stuart Brown

The immaculately made, *highly original, very expensive table produced by Senior and Carmichael (above and at right) is astounding both in quality and price (£24,000, $46,000). Made in walnut and burr walnut, it features a bronze and steel winding mechanism that, as the table is rotated by hand, opens the top so that wedge-shaped leaves can be inserted.*

This twisting chaise *(right), made of scorched oak and upholstered in hand-printed silk, shows the fanciful side of Glen Hinton. Hinton, who also produces more restrained craftsman-like designs, has exhibited in both the Bonhams and Society of Designer Craftsmen show.*

Photo: Mike Murless

Among the more fantastic and eye-catching designs *is the* Rhythm & Snooze *maple rocker (facing page) made by Cato Furniture of Bristol. Last year, this prize-winning design won Cato the Master's Young Enterprise Award from the Worshipful Company of Furniture Makers. Priced at £974 ($1,850), it isn't that much more expensive than an uninspiring piece of factory furniture. Bonhams' advice: "Buy it, it's a good investment."*

Photo facing page: Eddy Fawdry

Reminiscent of Arts and Crafts *furniture of the turn of the century, Martin Grierson's Thai cabinet is given a modern twist by his clever use of Bombay rosewood veneer on the two doors. The technique and design are simple, but the doors have a shimmering, fascinating quality entirely due to Grierson's imaginative and wonderful use of materials.*

The organic approach *of Petter Southall's table is based on his Norwegian training as a boatbuilder. He uses no glue in his construction but relies on boatbuilding joints and copper rivets to hold his work together. Slatted supports fan out in graceful arcs to form delicate box constructions. The result is interesting, soothing designs that are robust and relatively cheap.*

Simple and stylish ash hanging shelves *by Trannon Furniture are typical of their practical yet innovative work.*

The two side tables *by John Makepeace deliver what we expect of him: immaculate craftsmanship combined with good, solid design. The drawers open from either side, and round pad feet give the table a whimsical air.*

Photo this page: Martin Grierson

Photo: Petter Southall

Photo: Roy Tarn

Photo: Mike Murless, Courtesy of John Makepeace

***Brush a complicated surface** in several stages, working from the deepest surfaces, like the bevel on this raised panel door, to details, like the molding the author is brushing here with a sash brush. Apply finish to the panel field and door frame last.*

Brushing on a Finish

Good preparation and flowing strokes yield smooth results

by Chris A. Minick

If you learned to use a brush by painting your house, the clear finish you brushed on your latest woodworking project probably doesn't look too good. Why? Because paint and varnish are very different materials. Paint needs to be vigorously brushed back and forth to get it to lay out thin because it's *thixotropic*, meaning that it's thicker when at rest, thinner when energy is applied to it. But varnish applies most evenly when it's gently flowed onto a surface.

My flow-and-go method for brushing a clear finish on woodwork was taught to me by my grandfather who was a professional finisher. I've found his combination of finish preparation and brush handling to give my projects a final appearance that rivals the smoothness of spraying. The method works for most common wood finishes like oil-based varnish, brushing lacquer, water-based finish and shellac. But before dipping the brush in the can, we must choose and prepare the finishing material.

Picking and preparing the finish

Fast-drying finishes are harder to apply by brush than slower drying finishes. Oil-based varnishes dry slowly enough to allow ample time for leveling, allowing you to work at a leisurely pace. For that reason, oil-based polyurethane varnish is my favorite brush-on finish. At the other end of the spectrum, shellac is probably the most difficult common finish to apply, especially to large areas—it just dries too quickly. I limit my shellac brushing to small projects that I can completely coat in about 10 minutes. Likewise, most water-based finishes brush well but require a quick hand. Solvent-based lacquers are easier to brush, and retarders can be added to them to slow down drying.

Most finishes are too thick to brush right out of the can. Thinning with the appropriate solvent is usually necessary. Brushing a too-thick finish will show brush marks and streaks while an over-thinned finish tends to run, sag and drip. To get the ideal mix, start by transferring the finish to a clean coffee can, so you can thin only the amount you want to use. Now measure the finish's thickness with a viscosity drip cup and a stopwatch. A viscosity drip cup holds a predetermined amount and has a precisely sized hole in the bottom; you fill it up with finish, then time how long it takes all the finish to drip out through the hole (see the photo at right). Cups are available in paint stores and, unfortunately, come in many sizes (in other words, there's no simple standard). I usually work with about a pint of finish, thinning it a little at a time and checking its viscosity as I go. If I over thin it, I add a little finish from its original container. I find a reading of 13-14 seconds with a Zahn #3 cup, 48-50 seconds with a Zahn #2 cup or approximately 20-22 seconds with a Wagner cup seems about right.

Begin brushing

Before dipping into the finish, wet your brush with the thinning solvent to condition the bristles and to prevent the buildup of

dried finish at the base of the brush. This minimizes the likelihood that any dried finish will flake off the brush and contaminate the freshly varnished surface, and it makes cleaning the brush easier. Strike off the excess solvent by dragging the bristles across the edge of the container.

Fill the brush with finish by dipping it so no more than half the bristle length is submerged. Capillary action will automatically fill the brush's reservoir (near the ferrule) with the proper amount of finish. Now tap the bristles on the inside of the can to remove the excess finish and to prevent dripping. Don't drag the brush over the edge of the can—this might cause bubbles to form.

Using the basic brushstroke described in the box at right, I always finish the unseen areas of my project first. This gives me a chance to judge the flowing and leveling properties of the finish before I've committed myself to the show side of the piece. If the viscosity doesn't seem right, I add more finish to increase the thickness or more solvent to decrease it.

If you're brushing a complicated surface, such as a carving or a raised panel door, it's best to brush the areas farthest away first, working outward from the center. I apply a coat to both sides of a door in one session by setting it on a nail board (a piece of thin plywood the size of the door with one nail in each corner).

Normally, I scuff-sand between each coat with 220-grit sandpaper to remove nibs or dust specks. Three or four coats is about right for most projects. After the final coat has dried for a few days, I rub out the finish and apply a coat of paste furniture wax.

Dealing with defects

Drips, runs and sags are a normal part of any finishing operation. Fresh runs and sags can be removed from the surface by back brushing the affected area with an unloaded brush; capillary action draws off the excess finish. Hairs, brush bristles or other goobers should be picked out immediately. A quick tipping off (see the box at right) blends and removes your fingerprints.

Sanding out a dried drip or run flush with the surrounding finish can create a halo around the defect. It's better to slice the drip off with a sharp chisel to remove the drip quickly and cleanly; only a little touch sanding is needed with 400-grit paper. □

Chris Minick is a chemist and woodworker in Stillwater, Minn.

The basic brushstroke

A smooth finish depends on smooth brush handling. My basic method begins with a back stroke 3 in. to 4 in. from the leading edge of the panel (right). Pull the brush smoothly, and lift it just before it goes over the edge. This back stroke virtually eliminates runs along the edge. I finish the stroke by starting just behind the back stroke's wet edge and pulling the brush in one slow and continuous motion across the panel (left). Pull the brush along slowly enough to allow an even sheet of finish to flow out of the brush, but fast enough to prevent pooling. My 2-in. brush holds enough finish for a single stroke about 20 in. long, which takes between five and seven seconds.

I hold the brush loosely by the ferrule with the handle cradled between thumb and index finger. I start with the brush at about a 45° angle and gradually increase the angle to almost 90° by the end of the stroke. As the bristle angle increases, more varnish flows out. When my brush approaches the trailing edge of the panel, I decrease the pressure slightly so the bristles don't run over the edge. Each successive stroke just barely overlaps the previous one. After the whole panel is coated, I tip off the finish by lightly dragging the bristle tips through the wet finish. Tipping off with an unloaded brush levels any uneven areas and removes bubbles. Any small bubbles left can usually be dispersed by lightly blowing on them from close range. *—C.M.*

Checking the viscosity of a finish *is the best way to know how much thinner you need to add to get the best finish flow. A stopwatch clocks the time it takes for a viscosity drip cup filled with finish to empty. Add more thinner until the time is optimal (see the section "Picking and preparing the finish" on the facing page).*
Remove the excess from a loaded brush *by tapping the bristles lightly on the sides of the can, side to side. This prevents the brush from dripping and doesn't create air bubbles, which can end up on the finished surface.*
Slicing off a dried drip with a sharp chisel *is probably the cleanest way to remove the defect.*

Photos: Sandor Nagyszalanczy

Choose the right brush for the job, and keep it clean

Practically any brush you can buy at a paint or hardware store is capable of applying a finish to woodwork. But if you want to brush on a smooth finish with an even, streakless appearance, you must choose the right brush for the job (see the photo at right). The best brush has the correct type and style of bristles for applying the particular finish you choose. Generally, heavy-bodied finishes should be applied with a stiffer bristle brush while softer bristle brushes are better for applying thin finishes. Natural bristle brushes work best for applying solvent-based finishes.

A good-quality **China bristle** (hogs hair) brush has the proper stiffness and flexibility for applying oil-based varnishes, such as alkyd varnish and polyurethane. **Ox-hair** brushes, which are slightly stiffer than China bristle, hold their shape better when used for extended periods of time. Their stiffness also makes ox hair an excellent choice for smaller brushes of one inch or less. Softer **fitch** (skunk hair) brushes work best for applying thin finishes but **camel-hair** (actually, pony hair) brushes can be used.

Synthetic bristle brushes are best for waterborne finishes because natural bristles quickly splay in water and become unusable. The softness and flexibility of these brushes is determined by the polymers used for their bristles. **Nylon bristles** are the softest and are good for general-purpose finishing. If you can afford only one brush, it should be nylon. **Nylon/polyester bristle blends** are slightly stiffer, and like ox hair, make excellent small-sized brushes. Pure **polyester bristles** are very stiff, generally too stiff for applying thin furniture finishes and should only be used for applying heavy-bodied paints.

In addition to bristle material, brushes come with one of three tip styles: **blunt cut**, **flagged** and **tapered**. Some tip styles are better for certain finishing jobs than others (see the box below).

Most finishing projects require using more than one brush. I use a 1-in. sash brush for coating small or intricate areas like moldings, spindles or tight inside corners. A 2-in. brush is my favorite for large flat areas. Brushes wider than 2 in. are inappropriate for furniture finishing. They're just too hard to control.

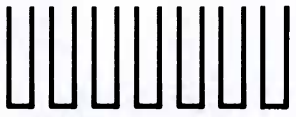
Cleaning brushes

Proper care and storage of any brush ensures optimum performance and longevity. Each brush needs to be thoroughly cleaned and wrapped for hanging storage between uses. First, remove excess finish by scraping the brush's bristles across the lip of the finish container followed by wiping off the residue with a paper towel. Wash the bristles in the same solvent used to thin the finish. Periodically, check your cleaning progress by bending the bristles with one hand and feeling along their base with the thumb of your other hand (see the photo at right). A slimy feel indicates more cleaning is needed. Once all the finish has been removed, wash the brush in soap and water (I use dishwashing liquid, but any soap will do). After a clean water rinse to remove soap residue, wrap the brush tightly in brown paper to dry. Storing the wrapped brush by hanging it vertically on your shop wall prevents the bristles from taking a set and prolongs brush life. —*C.M.*

***Woodworkers can choose** from many brush types and styles including from left to right: nylon tapered bristle, nylon sash, ox hair, China bristle, nylon/polyester flagged bristle and nylon/polyester sash.*

***Keep a brush clean and properly stored** and it will last for years. After thorough solvent cleaning, bend the bristles and feel for remaining finish. Wrap the washed brush in brown paper and hang it up.*

Choose the right synthetic bristle type for the job



Blunt cut
Also called straight cut, these bristles are usually only found on cheap, low-quality brushes that are better used for dusting than varnishing furniture.

Flagged bristles
With each filament broken into several small fiberals, flagged bristle tips have a fuzzy feel and appearance. Flagged nylon/polyester brushes are excellent varnish brushes.

Tapered bristles
These bristles taper from base to tip and end in a sharp point closely resembling natural bristles. Good for all varnishing, especially with water-based finishes.

Drawing: staff

Biscuit Joinery Gets More Versatile

New hardware for fast joints, even without the machine

by Sandor Nagyszalanczy

When biscuit joiners first became popular in America more than a decade ago, it was nothing short of a revolution. Even so, many woodworkers haven't climbed on board—perhaps because they think those little pressed-wood plates are less effective for solid-wood furniture and other framing tasks or perhaps because they can't justify the expense of another dedicated machine.

However, all that a regular biscuit-joining machine does is run a 4-in.-dia. sawblade a little way into the work in a controlled way. The biscuit fits into a pair of 4mm-wide slots, the biscuit's grain runs diagonally across the glueline, and the water-based glue makes the biscuit swell up tight. Slotting for biscuits never seemed complicated enough to require a special machine, and now there is a new group of devices that adapt common workshop power tools, such as the router, angle grinder and drill press, to do biscuit joinery. Given the modest prices ($35 to $120) of these devices, I was anxious to see what awaited buyers who might be considering them (for more on this, see the article below).

For those of us who can't remember what we did before biscuit joinery, there's a whole slew of new gadgets to support every aspect of biscuiting, from slot positioning to glue application to carcase clamping. These accessories are discussed on page 59

To make biscuiting more versatile, there's a gamut of special biscuits in new sizes, shapes and materials, and there's ingenious and useful cabinet hardware that fits into biscuit slots, as discussed on pp. 60-61 (also see the sources of supply on p. 61).

A couple of years ago, all you could buy was the expensive original machine, the Lamello, or less-expensive machines from Freud, Porter-Cable and Virutex. Now you've got a number of very affordable alternatives, plus a lot of ingenious ways to get the most from the simple slot. If you've avoided biscuit joinery up to now, you're just about out of reasons not to try it.

Sandor Nagyszalanczy is senior editor at Fine Woodworking.

Biscuit joinery with a router, grinder or drill press

You might not be ready to shell out the price of a dedicated biscuit-joining machine ($150 to $400), but with one of the following devices, you can easily convert a portable power tool you already own into a serviceable slot-cutting machine.

Right-angle grinder—You can buy attachments for converting that refugee from the auto-body shop, the right-angle grinder, for woodcarving, corner sanding, random-orbit sanding (see *FWW* #92, p. 51) and now, biscuit joining. The German-made Wolfcraft model 2920 shown at right comes ready to connect to most small (4 in. and 4½ in.) right-angle grinders. Several adapters match arbor sizes. Two metal brackets bolt the mostly plastic device to the grinder's handle-mounting holes. For convenient handling, I mounted my Bosch angle grinder's side handle in lieu of one bracket bolt.

The Wolfcraft has practically all the features of a regular biscuit joiner, including a standard-sized carbide-tooth blade, a quick-set knob for changing slot sizes and an auxiliary front fence that's reversible for square

***Wolfcraft biscuit joiner** attaches to right-angle grinder.*

Photos: Sandor Nagyszalanczy

edges or for 45° miters. Wolfcraft also has a dust bag, which didn't work very well, especially when plunging slots vertically.

Unlike conventional biscuit joiners, the Wolfcraft lacks the spring-loaded pins that help keep the stock from creeping sideways. This wasn't a problem on plywood, but when edge-slotting smooth maple, I had to press hard to keep the machine from creeping. This is a small minus for a machine that's lightweight and very nicely designed. If you already own a right-angle grinder, $50 isn't much to pay to add biscuit joinery to your repertoire.

Router—Manufactured for Sears by Vermont American, the plastic Bis-Kit replaces the subbase of a standard or plunge router to provide many—but not all—features of a conventional biscuit joiner. The Bis-Kit's spring-loaded carriage rides on guide rods attached to the base with a depth rod for different-sized slot cuts. The kit's ¼-in. shank, three-winged, carbide-tipped cutter chucks into the router's collet. It's called a kit and so it is—there's about 20 minutes of assembly and adjustment needed.

To use the Bis-Kit, you bring the carriage face against the workpiece and plunge the machine forward. The router's depth of cut locates the slot in the thickness of the work. It's a lot like running a regular biscuit joiner with a couple of important exceptions. First, the cutter is small, so the unit must be plunged and then moved side to side to form each slot. Second, the base overlaps the face of the workpiece by about 2¼ in., so you must mark long centerlines for the slots (see the top photo). Third, because of the overhanging router, you can't make cuts in the center of a panel. It's very awkward, but you can clamp the work vertically to the side of the workbench to make slots near the edges of a face for joining cabinet sides, tops and bottoms. What you can't do is join a center partition or shelf. At about $40, the Bis-Kit is an inexpensive way for the hobbyist to try basic biscuit joinery. Its limitations, however, are liable to dissuade the buyer from getting more deeply into this joinery method.

***Sears Bis-Kit device** replaces the router subbase.*

***Shopsmith attachment** converts the drill press to a biscuit joiner.*

Router table—If you own a router and a router table with a fence, all you need to start slot cutting is Woodhaven's Biscuits and Bits kit. Developed by router wizard Brad Witt, the system uses a non-standard biscuit and two carbide-tipped cutters. A two-winged slot cutter (available with either a ½-in. or ¼-in. shank), with a ball-bearing pilot, mounts in the router table for slotting the ends and edges of work. For edge-joints, set the bit's height, mark the center of the slot on adjacent workpieces and slide the stock into the spinning bit until the mark hits the bearing. For endgrain slots, set the router-table fence to guide the cuts (see the bottom photo).

The second cutter is a straight bit used in a plunge router to make slots in panel faces for joining tops, bottoms and dividers to sides. Set the plunge depth, mark the slot positions, clamp a fence to the stock as a guide and you're ready. The straight bit's diameter of 6mm is slightly more than the thickness of the kit's biscuits to yield a snug fit.

The Woodhaven system excels at something other biscuit systems aren't much good for: face-frame joinery. Woodhaven's 1½-in.-dia. piloted cutter makes a 6mm slot that just fits their oval-shaped 15/16-in.-wide (the same as a #20 biscuit) by 1¼-in.-long biscuits, allowing strong end-to-end or right-angle joints in parts as narrow as 1½ in.

The Woodhaven kit also comes with spline strips made from the same compressed composite wood as biscuits, so you can use the kit's router bits to cut continuous slots for spline joints. At $60 for the router bits, 100 biscuits and 10 ft. of spline (plus a metal can), I think the system is a bargain. You can buy just the two-winged slot cutter and 100 biscuits for $35.

Drill press—The Shopsmith Universal Biscuit Joiner is essentially a stationary biscuit machine designed to install on any standard drill press that's capable of spindle speeds between 2,000 and 4,100 RPM. The cast-alloy unit comes preassembled. All you need to do is screw it to the 14-in. by 18-in. baseplate, clamp the baseplate to the drill-press table and connect the ½-in. shaft directly to the drill-press chuck.

Just like a regular portable machine, the Universal Biscuit Joiner's face is spring loaded and retracts to expose the blade when you push the workpiece into it. By design, however, the machine primarily allows slotting on ends and edges. It can only

***Woodhaven router-table system** uses non-standard biscuits.*

slot the face of a narrow strip, so it can't be used to join up a plywood carcase. Also, because the workpiece must be brought to the tool, I found the unit best for slotting small- and medium-sized parts. To assist end-grain slotting, an auxiliary fence screws to the baseplate (see the center photo on the facing page).

To keep the workpiece from slipping around, the face of the Shopsmith attachment is covered with strips of coarse abrasive paper and also sports spring-loaded pins. I found these worked well, and the overall feeling during plunging was one of control and comfort. The blade was a little grabby when I ran it around 2,200 RPM, but the action smoothed out with the drill press stepped up to around 3,200 RPM. The rear of the head unit has a built-in dust collection port, which worked exceptionally well. Shopsmith also includes a plastic push block for holding down the stock without getting fingers too close to the blade.

My only real peeve with the Shopsmith is the setting for various biscuit sizes. The process requires adjusting two Allen screws while lining up marks on two plunge rods. It's just tedious enough to have made me want to use only one size biscuit during my trials. But beyond this inconvenience, and provided that you accept the limitations of the unit, Shopsmith offers a quality tool for a reasonable price (about $120).

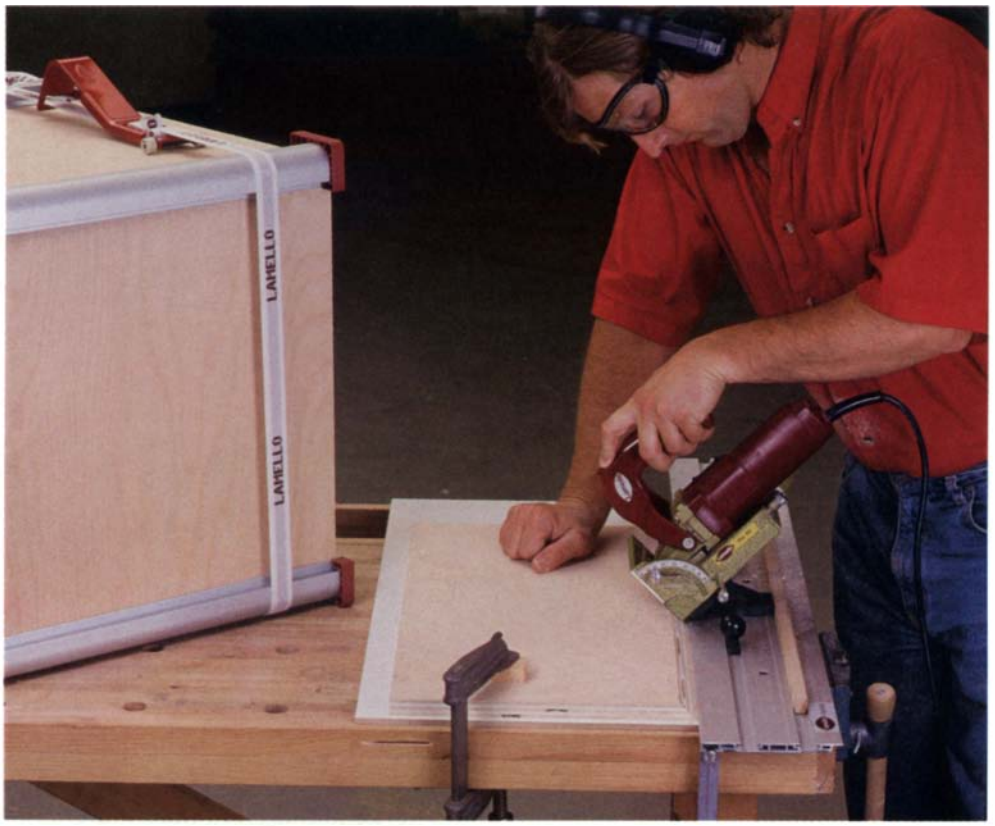
Accessories for biscuit joinery

Whether you run a professional cabinet shop or have a hobby-woodworking studio in your garage, here's a collection of accessories and devices that can make biscuit joinery less hassle and more productive.

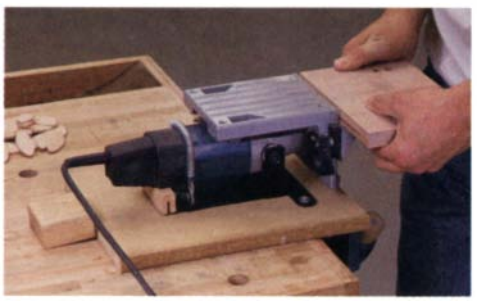
Benchtop stand—Woodworker's Supply sells a $20 pressed-steel device that converts your portable tool into a stationary machine. Mounting is straightforward: Two bolts screw into the machine's handle holes, and a spring stretches over the barrel to secure the rear end of the tool. The catalog says the stand fits Freud, Lamello and Virutex machines, but I had to redrill holes and add a small spacer block to get my older Virutex to work. With the biscuit joiner's front fence as a little table, workpieces can be plunged into the stationary tool for slotting (see the bottom photo). I used the setup to slot smaller parts for a jewelry box, but with auxiliary side supports, you could probably slot the edge of longer stock.

Positioning jig—If you use biscuits to join lots of cabinet parts and find you're all too often engaged with the tedious task of marking standard biscuit positions, the Lamello Assista positioning jig may be just the ticket. Made in Switzerland, the Assista features a 39-in.-long extruded aluminum track in which rides a carriage that you bolt to your biscuit joiner. Lamello machines attach directly, the baseplates on other machines may need to be drilled and tapped. A spring-loaded bullet catch on the back of the carriage engages notches on wooden sticks held in a groove at the back of the track. The spacing of these notches determines biscuit spacings; you make new sticks to fit your application.

To use the Assista, first fasten the track to any worktable (or workpiece), 40 in. or narrower, with two special clamps that slide in grooves on the underside of the track. Then you butt the workpiece—usually a carcase panel—up against the track and clamp it down. Then you slide the carriage along the track, stopping at each notch to plunge



***Lamello system includes the Assista slot positioning jig,** the Spanbox clamping set and an optional pistol handle for the biscuit joiner. Woodworker's Supply stand (below) converts portable biscuit joiner to a stationary tool.*



a slot. The apparatus allows horizontal or vertical plunging as well as slotting 45° beveled edges (see the top photo).

Because the jig supports the weight of the biscuit joiner, I found the Assista very comfortable to use. It performed flawlessly for me as I slotted a half dozen cabinet sides in about five minutes. Even though this convenience doesn't come cheap—the Assista sells for about $300—it still could be a good investment for a small cabinet shop.

Miter jig—Designed for precisely slotting the ends of mitered stock, the Woodhaven miter jig is designed to work with the router table. Set the angle of the jig's white plastic fence, then mount the fence on the right or left side. Place the workpiece against the jig fence with the tip of the miter against a stop, and tighten a keeper post to prevent the work from sliding around. Then push the jig into the router bit. If you join a lot of picture frames, the jig's $44.99 price quickly will be paid in time saved.

Strap clamp—The Lamello Spanbox strap clamping set consists of two buckles, two 25-ft.-long web straps and four 23¾-in.-long extruded aluminum corners. To clamp up a basic cabinet, you put the corners in place, thread the straps into the buckles and then lever over to apply tension. The Spanbox works with odd-shaped carcases and furniture assemblies as well. Two special tension hooks are included, for clamping flat pan-

***Woodcraft glue bottle** (left) and three different Lamello bottles.*

els, and shorter (5 in.) corners are also available. It's a fast and effective clamping system, but at $175 a set, it's an expensive proposition if you need to clamp lots of boxes at one time.

Pistol grip—Lamello also makes a pistol grip-style handle, which sells for $18.95, and is designed to replace the stock D-handle on most plate joiners (see the top photo on p. 59). I found its large size comfortable in my big hand, one-hand controllable and less tiring than the regular handle.

Glue applicators—One of the more tedious, not to mention messy, aspects of biscuit joinery is squirting glue in all those slots—two for every biscuit. You can use a small, stiff brush, but to make this a quicker and neater operation, there are four special glue applicators on the market, three from Lamello and one from Woodworker's Supply (see the photo above). The flagship of the line, the Dosicol ($57) is designed for more serious production users. Its special tip is shaped like half of a biscuit and works in #6, #10 and #20 slots. After slipping the tip into a slot, a gentle push on the bottle pumps out a precise amount of glue. I found I could easily apply glue to more than a dozen slots in about 15 seconds. The amount the pump expels is adjustable, and when you're done, a locking ring closes the pump. The applicator head sets into a special base equipped with a sponge to prevent drying out between uses. I especially liked the bottle's large removable end cap, which allows refilling while the Dosicol rests in its stand.

Lamello's two other glue bottles, the Servicol and the Minicol, are lower priced ($12.50 and $28.50) and designed for general gluing of all size slots. They'll also get glue to the bottom of dowel holes, small mortises and Woodhaven biscuit slots. While both models have straight applicator tips that distribute glue to the sides of the slot, the metal Minicol tip is more durable and easier to clean. And while the Minicol stand is heavier and more stable, both models offer an air-tight seal to keep the tip from drying out and clogging.

Woodworker's Supply glue applicator set (an identical set called G100 is offered by Freud with their biscuit joiner) comes with a flat-tipped plastic glue bottle that fits into slots for any size biscuit. While this dispenses glue more quickly than the straight-tipped bottle, you must mush the tip around to distribute the glue on the sides of the slot; otherwise, you end up with a gooey mess. The bottle has its own cap, permanently attached with a short plastic cord (a nice touch, no lost cap and dried-out tip). So that you don't have to cap the bottle during a longer gluing session, there's also a special bottle holder that contains a large moist sponge.

New biscuit sizes

Lamello and Woodhaven recently released several new biscuit sizes, as shown in the photo below, designed to fit situations beyond the capacity of standard-sized #0, #10 and #20 biscuits and expand the repertoire of this already versatile joinery method.

Lamello #6—The #6 biscuit is a big football that costs $63 per 1,000 and is designed for heavy-duty joinery in large, thick stock. Measuring 1⅜ in. wide and almost 3½ in. long, #6 biscuits are standard thickness. With Lamello and DeWalt machines, you simply turn the slot selection dial to MAX, and move the machine about ½ in. side to side to cut the long slot. Other biscuit joiners can also be adjusted to cut the deeper, wider slots, although you may have to remove their anti-slip pins to allow smooth sliding.

Lamello #H9—If you need to make edge-to-face joints in stock that's thinner than about 5/16 in. (too thin for #0 biscuits), the diminutive #H9 biscuits are your choice ($41.50 per 1,000). The same setting that's used to cut slots for Lamello's largest (#6) biscuits also is used for the smallest, except that you have to install a special blade. It's both thinner (3mm instead of 4mm) and smaller than the regular blade.

Lamello #11 round biscuits—Unlike the biscuits previously discussed, slots for #11 round biscuits can't be cut with a regular biscuit joiner. Colonial Saw (the U.S. Lamello distributor) sells a special piloted four-winged, carbide-tipped bit ($45 with ½-in. shank) to cut these slots with a router or in the router table. Colonial's manager, Bob Jardinico, told me these round biscuits are popularly used for joining stair railings and banisters, but I think they could be really useful for frame joinery in stock 2 in. and wider. At $64 per 1,000, round biscuits would be an economical alternative to dowels or loose tenons.

Woodhaven mini biscuit—A special router cutter ($25) is also used to make slots for Woodhaven's Itty Bitty biscuits, which are shorter than the Lamello #H9 (13/16 in.) but thicker (⅛ in.). Like the #H9, Woodhaven minis ($4.99 per 100) are for joining small parts made from thinner materials and would be a good choice for joining the face frame and dividers on that jewelry box you've been promising your spouse or significant other for Christmas.

***New biscuits** (from left): Lamello #11 rounds with four-winged router bit, Woodhaven Itty-Bitty bits with cutter, Lamello's smallest #H9 and jumbo #6 biscuits.*

New hardware fits old slots

***Knapp hardware** (from left): Quick detachable fasteners and insertion tool, Mobi-Clips, for creating removable panels, and screw-held Metal knockdown fasteners. Shown in front, Champ self-clamping plates and insertion tool.*

***Lamello biscuit-slot hardware** (from left): Paumelle hinges with spring-loaded awl for starting screw holes, translucent biscuits for joining solid-surface materials, red K-20 self-clamping biscuits, hook-shaped Simplex knockdown plates with insertion tool.*

If you're using only regular compressed-wood biscuits, you're missing half the fun. There's an assorted collection of cabinet hardware and knock-down fittings available from Lamello and Austrian manufacturer Knapp, all designed to work in standard biscuit slots (see the photos at right).

Lamello's Paumelle hinges—Paumelle hinges have to be among the easiest to install. Set the biscuit joiner for a #20 cut, and set the fence so the blade makes a 1/16-in.-deep mortise on the surface of the work. The hinges hold 10 kilograms (22 lbs.) each and come in packages of 20 hinges (10 right-left pairs) and three finishes: chrome and black ($39) and solid brass ($53). Mounting screws have special heads that must be driven with a #10 Torx bit. Each hinge comes apart (the pin is fixed in one leaf), so the doors are removable. Lamello also has a special spring-loaded awl ($32) for rapidly punching screw-starting holes (see the photo at right).

Self-clamping biscuits—These plastic biscuits fit into regular #20 slots to secure a joint without glue. They're designed to be interspersed with regular glued biscuits along a joint where the parts are hard to clamp. Lamello's K-20 self-clamping biscuits ($14 per 50, shown in the bottom photo) are made of red plastic with small angled serrations on the sides; one K-20 grips both halves of the joint. In contrast, Knapp's Champ orange nylon clamping biscuits must be used in pairs ($49 per 100 pairs). To lock together correctly, each half of a pair must be correctly oriented and epoxied into its slot before the joint is assembled, making Champ biscuits more time-consuming to use than the Lamello K-20s.

Knockdown fittings—A variety of detachable fittings are available that work in standard-sized biscuit slots to create surprisingly strong, tight joints between plywood or solid wood parts. Lamello's pressed-aluminum Simplex knockdown plates (see the bottom photo) are driven into slots with a mallet, using a special insertion tool that provides correct alignment and positioning. The surface of each plate is serrated to grip in the slot, so no glue is needed. Knapp's Metal knockdown fasteners (see the top photo) are steel plates with small screws that lock the ends of each plate. Either brand of plates is driven into both halves of a joint, but reversed end for end, so their fingers can interlock. Slightly pricey at $47 per 100 for the Simplex, $55 per 100 for the Metal (including screws), these fittings allow clean, sophisticated knockdown casework to be rapidly built.

For less-demanding applications, such as mounting removable moldings on a case or panel, Knapp also offers the Quick disconnectable fastener (shown in the top photo). Sold in male-female pairs, these plastic fittings are driven with a plastic insertion tool and epoxied into their slots. They cost $49 for 100 pairs.

Removable panel clips—Knapp makes a set of fittings called Mobi-Clips (see the top photo) that allow you to create removable kick plates and access panels (which could function as secret compartments) in your casework. Consisting of a clip half and a stud half, these plastic fittings are epoxied into #20 slots cut into the panel faces. Available in either white or brown plastic ($48 for 50 pairs), Mobi-Clips allow some fine-tuning of the distance between the edge of the removable panel and the carcase.

Plastic biscuits—Compressed-wood biscuits can be used to join countertops made of Corian and Avonite, but they may show through these translucent materials. Lamello C-20 plates (see the bottom photo) are milky plastic, specially made for joining these solid surface materials. □

Sources of supply

Wolfcraft 2920
Trend-lines, 375 Beacham St., Chelsea, MA 02150; (800) 767-9999

Shopsmith Universal Biscuit Joiner
Shopsmith Inc., 3931 Image Drive, Dayton, OH 45414; (800) 762-7555

Sears Bis-Kit
Local Sears stores and catalog sales

Woodhaven biscuits, bits and accessories
Woodhaven, 5323 W. Kimberly Road, Davenport, IA 52806; (800) 344-6657

Woodworker's Supply joiner stand and glue bottle
Woodworker's Supply, 5604 Alameda Place, N.E., Albuquerque, N.M. 87113; (800) 645-9292

Lamello accessories, biscuits and hardware
Colonial Saw, 100 Pembroke St., Box A, Kingston, MA 02364; (617) 585-4364

Knapp hardware
Select Machinery Inc., 64-30 Ellwell Crescent, Rego Park, NY 11374; (718) 897-3937

Quick and Clean Bookcases

Lumberyard pine with biscuits make a sturdy bookcase

by John Kelsey

Sure, I like to show off my finest pieces of hardwood furniture, but they're only some of what I build. Much of the output from my home workshop is what I'd call useful and sturdy rather than highly refined or fancy.

Bookcases, for example. In a lifetime of woodworking, publishing and book collecting, I've had to house yards and yards of books. I've evolved a design and a technique that's right for the task and also right for my tools and for my own style of working.

The last points, appropriateness to my shop and how I like to work, are perhaps the most important. I don't have a big investment in machinery, and I don't have to earn a living woodworking. I do it because making things with my hands helps me stay sane.

Basic bookcases

When your books are breeding uncontrollably, what defines an appropriate design solution? A bookcase performs an essentially utilitarian task, so these units should be economical of materials and time. The shelves have to be as deep as the books and adjustable in height, or else they waste space and the books will gather dust; shelves can't sag under the considerable weight of art books, LP records or magazines; the case should be reasonably sized and not too big—you don't often move them, but when you do, they have to thread through doorways, up stairs and down hallways. Finally, wood surfaces should be worked to a quality that can be painted, varnished or left unfinished.

The way I approach utility problems like this is not through function but through material. The question is, what's the best local deal you can find? When I lived in Ohio, 4/4 poplar offered the most wood for the buck. Farther north in New England, it might be maple or birch. But around here in Connecticut, it's 5/4 #2 western white pine from the local lumberyard. This wood has all the right characteristics: it's sturdy, it's cheap, it's already planed and it's available. Books are heavy, so the wood's thickness is important. The approach I'm describing here does not work with 4/4 #2 pine, which is just not stiff enough.

The basic bookshelf design I've evolved, as shown in the drawing on p. 65 and the photo at right, is a face frame-less, back-less case with two cross braces to resist racking. The case sides extend beyond the top and bottom shelves, which join to the sides with plate-joinery biscuits. Adjustable shelves held by hand-whittled pegs (see the bottom photo on p. 65) make the case more versatile and also lend it a touch of crafty charm.

The bottom brace below the lowest shelf finishes off the front

***A simple, sturdy 5/4 pine bookcase** gets magazines, books and records off the floor with a minimum of fuss. This bookcase represents a kind of utility woodworking that all of us do, but which is rarely written about.*

Photos: Sandor Nagyszalanczy; drawing: Bill Jurgens

edge of the case at the floor. But the location of the top shelf and brace depends on the case's height. When the case is shorter than about four feet, the brace goes on top of the top shelf to form a lip that keeps small stuff from rolling off. If the case is tall, the brace goes under the top shelf. When it goes against a wall, a single nail through the brace and into a stud keeps the unit in place.

Shorter bookcases can be left freestanding or hung on the wall. The bottom edge of the top brace is beveled and hooks over a matching hanger board screwed into two studs, as shown in the drawing detail on p. 65. A taller freestanding case needs a back, so I run a groove for ¼-in. plywood and glue it in during assembly. Hinge doors on this construction, and you've got a cabinet.

Most books will be at home on a 10-in.-wide pine board—that's *nominally* 10 in. wide, actually 9¼ in. wide. LP records measure a full 12 in., whereas the widest lumberyard pine, nominally 12 in. wide, actually measures about 11¼ in. A nominal 8-in. board glued to a nominal 6-in. board comes out about 12½ in. wide.

In most regions, #2 pine is relatively cheap, but on the East Coast, 10-in. boards still cost $1.60 per running foot. My friend Jim thinks it's cheaper to make bookcases out of birch plywood, which he can buy for $35 a sheet. But look: To fill a 6-ft. by 6-ft. wall space, I'd make two cases out of six 14-ft. planks, which would cost about $130. Jim would make a trio of 2-ft. plywood cases (the ply sags when it's wider), he'd have to glue a finished edge onto all those exposed edges and by the time he'd bought shelf hardware, he'd have spent $165. Even so, his method suits his needs, as mine suits me.

Sizing and crosscutting the parts

What dimensions should a bookcase be? A lot will depend on your needs and the size and layout of your room. I don't make

Selecting #2 pine is a knotty problem

My local lumberyard stocks 5/4 #2 western white pine, kiln dried and planed on all four sides, in a variety of sizes. The designation *5/4* means the roughsawn boards were 1¼ in. thick after drying. The actual thickness varies from a bare 1⅛ to a full 1 3/16 after planing. I could save money by buying roughsawn lumber and planing it myself, and when I'm broke, that's what I do.

My local lumberyard allows me to pick through their racks as long as I leave everything neatly restacked. I start by scanning the endgrain for boards that do not contain the pith, or center of the tree, all of which I pull out for a closer look. I always take the time to turn through the entire pile to find boards without too many defects, such as spike knots and pith, crotch grain, loose black knots, waney edges and mill damage.

Once I've selected the best boards, I'm ready to load them on my car's roof rack. Fourteen-footers are the longest planks I can comfortably lug and load; the rack can support 16 planks before it slumps. After I buckle the pile down with a pair of canoe straps, it's ready for the trip to my shop and the radial-arm saw where crosscutting begins the building process. Here is a glossary that explains some of pine's attributes (also see the photo below).

Pith of the tree: All branches radiate from the center of the tree, so all knots point toward the pith, and the pith side of a plank is liable to show more knots than the bark side. A plank sawn through the pith usually includes some whole branch stubs, encased or cut lengthwise: these are spike knots. Also, a plank sawn with the pith on one surface is liable to warp. Avoid the pith when you want wide, flat boards. But when you want narrow quartersawn stock for rails and stiles, buy these same pithy boards. If you rip the juvenile wood out of them, you'll have premium quartersawn stock at #2 prices.

Loose knots: All knots were once branches, so there's stress and wild grain in the wood around them. Black knots are dangerous because they're often loose and liable to fall out and hang up on a machine's fence or table, causing a misfeed. Crosscut the loose knots out of your stock, or knock them out before you rip or joint. Tight red knots may crack and split, but they won't fall out. You can't cut any joint on the end of a board that was sawn too close to knots, so crosscut the knots out, and keep these resinous scraps for starting your barbecue. Otherwise, organize your cuts so that tight red knots will fall into the center of your parts, leaving clean wood for joinery at the ends.

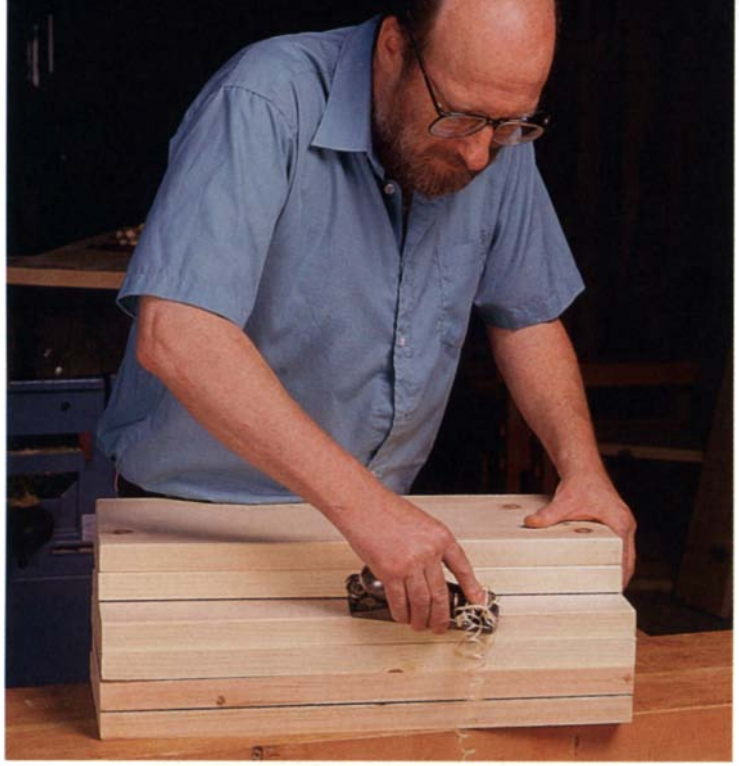
Pitch pockets: Pine is a notoriously resinous wood, and its gooey sap often collects in pockets that can ooze out during machining, gumming up sawblades and table surfaces, and your hands. Worse, pine can bleed sap from these pockets after the piece has been completely finished, even years later. Avoid problems by cutting around obvious pitch pockets. If your tools get gummy, clean them off with mineral spirits or turpentine.

Mill damage: The #2 grade often includes boards that were mangled during manufacturing and shipping. In particular, watch out for deep scars left by the steel dogs that clamped the log during sawing. Also, reject boards with edge dents left by steel shipping straps. Sometimes you find a honey of a plank, clear and clean, but with a single hideous ding. If you can cut around the ding or use most of the board, take it.

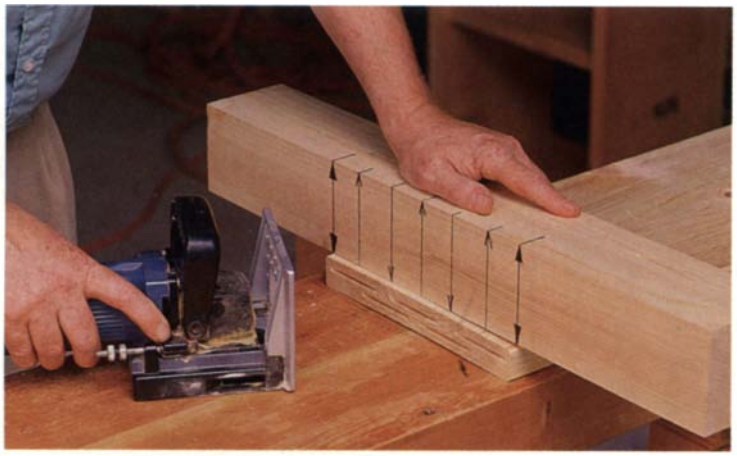
Fast growth: Pine grown in favorable conditions, on a tree plantation for example, grows very rapidly. This is good for the tree farmer but bad for the woodworker. This pine is liable to be soft, even punky. Slow-grown timber, with closely spaced annual rings, is denser, stronger and firmer under tools.

Strays: The label *western white pine* can encompass several species of pine. Most of it is quite uniform in texture and color, but you often find stray boards that are denser, or darker in color, or very hard-and-soft across the grain lines. Depending on what you are making, you might or might not want these strays. *—J.K.*

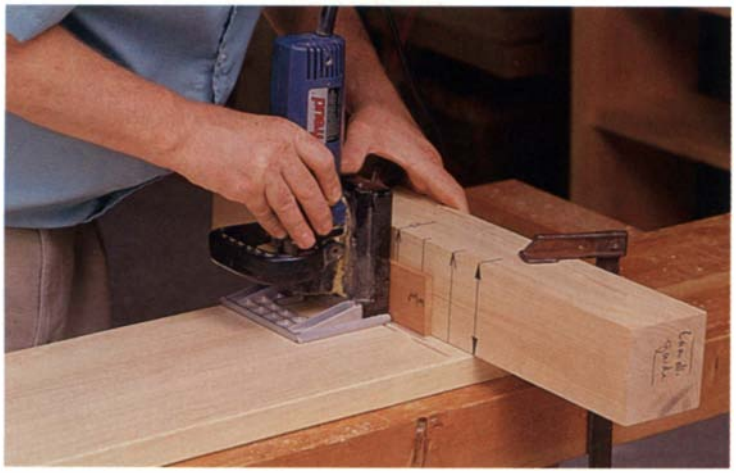
***Defects in pine boards** can cause problems. All knots radiate from the tree's center, so boards containing pith also contain spike knots (top). Black knots (bottom) are encased stubs of broken branches. They're dangerous if they fall out during machining. Tight red knots (center) may crack and split, but they don't fall out.*



The block plane makes short work of chamfering edges. *Chamfer the top board in the stack, offset it a few inches to get at the next board, and carry on down the whole stack before turning or rotating to a new corner.*



To slot the ends of shelves, *the author relies on the plate joiner's fixed distance of 5/16 in. from the baseplate to the cutter. With the stock flat on the bench, a smooth chunk of 4x4 serves as a layout gauge and hold-down, with arrows to mark edges of stock and slot centers. Flip the stock over for the second row of slots.*



To slot the faces of the uprights, *square a line that locates one edge of the fixed shelf. Clamp the 4x4 gauge right on the line, and with the machine vertical, run the first row of slots. Then place a spacer—5/16 in. thick in this example—between the machine's base and the 4x4 to cut the second row of slots.*

bookcases wider than about 40 in.; they're hard to clamp, awkward to move, and heavy books on spans wider than 40 in. will cause even 5/4 stock to sag. Better to make two cases standing side by side. How many shelves? Once you've decided how tall the sides are, round down to the nearest ten inches, divide by your closest shelf spacing, and add one. The extra shelf gets ripped in half for cross braces. Add another if you plan closely spaced shelves for paperbacks or tapes.

Crosscut the clearest, cleanest wood to make the two case sides. But before you cut anything, take five minutes to square up your radial-arm saw (see Mark Duginske's adjustment method in *FWW* #73). If you're using a chop saw, it's probably square already, but check anyway. If you're sawing by hand, knife a good line and pause to square up your self.

To determine the final length of shelves for the top, bottom and braces, subtract 2⅜in. from the case's finished width. Clamp a stop block to the saw fence, and crosscut and mark two pieces for the top and bottom, plus a third piece to rip for the braces. Brush the chips away before each cut. Now tap the stop block an eighth of an inch closer to the blade, and saw all the adjustable shelves.

Knock the corners off

I take the cut pine straight from the saw to the bench to remove the millmarks, manufacturing dings and grade stamps. Because I don't like noise and dust, I rarely sand anything. Instead I handplane the wood, and it's not because I am nostalgic for the old days. It's just that a quick and quiet once-over with a sharp #4 or #4½ smooth plane leaves a gleaming surface. I plane out the worst of the deviations from flatness, but what I'm after is cleanliness and smoothness, not perfection. I like to plane the whole stack of boards, faces and edges, in a sweaty burst of shavings that leaves a gleam on me, too.

Planing the boards puts me in touch with their defects, so I decide now which way to orient each board in the case. I mark the fixed shelves so their heart side goes down; if they cup, the concave side will be on top. It's just an idiosyncrasy, but whenever possible, I turn the case sides so they are oriented the way they grew: pith toward the center of the case, crown end (if I can figure it out) upward and, if possible, edge knots to the back.

Now I chamfer all the ends and edges of every board, except the ends of the two shelves marked for top and bottom, and the braces. I take off about 3/16 in., so nobody will rap a knuckle on a sharp corner and if the case will be painted, to let the paint stick better. The chamfer not only leaves the boards hand-friendly but also makes them eye-friendly because it disguises variations in stock thickness and width.

To chamfer, I set a block plane cockeyed, so the iron takes nothing on its left edge, a lot on the right (see the top photo at left). After stacking up the boards, I whack several thick shavings plus a thin finishing cut off the far edge of the top board, pull it a couple of inches toward me, and whack the corner off the next board down. If the wood tears, I plane from the other direction. Then I turn the stack and do it again.

Biscuit joinery

Plate-joinery biscuits and yellow glue hold this case together. The plate-joining machine may be noisy and dusty, but it's quick, and the resulting joint is strong. The 5/4 pine is thick enough for a double row of #20 biscuits, offset from one another, so in ten inches of width, one row has three plates and the other has two (see the center photo). To avoid error, I always locate the row of three toward the bottom of the joint. I use a chunk of 4x4 as a layout gauge, fence and hold-down, to guide the plate joiner for all the slot cuts.

Before assembling the case, I make a layout stick to mark and drill the half-inch holes in the case sides for the pegs that support the adjustable shelves. It's tedious to drill every inch or two all the way up, so I mark two vertical lines on each side and drill only two sets of holes: One for spacing shelves 10½ in. apart and a second set for 13 in. spacing. Drill each hole at least halfway through the wood.

When you glue the sides to the top and bottom shelves, brush glue on the endgrain and the mating face grain; make sure to work the glue well down into the biscuit slots, and then go back over the endgrain. Clamp with cauls to avoid dents, measure the diagonals of the case for squareness and adjust the case, if needed, soon after clamping. Let the glue dry, and take off the clamps before you glue the braces in place.

Square pegs in round holes

I don't like the cheesiness of metal shelf hardware, so I whittle good-looking support pegs out of scraps that are always left over from a project such as this. A ½-in. square peg about 1¼ in. long, with the corners whittled off, plugs tightly into a ½-in. hole. I like to whittle them with a crooked knife that's shaped like a hockey stick but sharpened on the edge that could never scrape ice (see the top photo below). No doubt many suppliers carry such a knife; I got mine from Highland Hardware in Atlanta, Ga. (800-241-6748). Four long cuts make the insertion end of the peg, and four short cuts chamfer off the sharp corners at the other end, very quick and easy. Four pegs hold up one shelf.

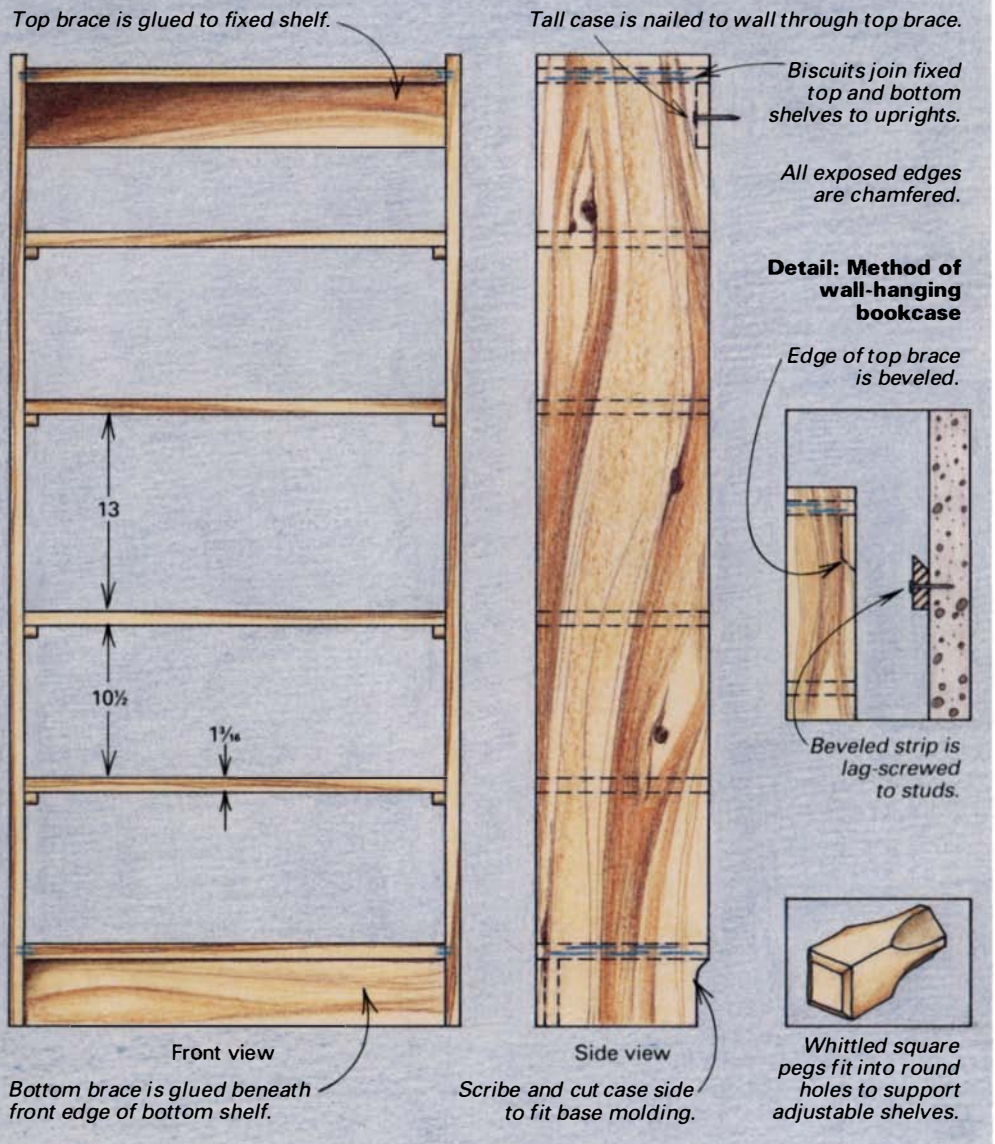
Pegs like these not only look good against the pine shelves but twisting them in their holes can make a shelf sit flat even when the wood is warped. After all, this is #2 pine. Tap the pegs in with a little hammer, plant the shelf and then twist a rear peg with pliers to eliminate rocking shelves.

As I said, this way of working suits my tools and my own workshop habits. Yet presenting my approach in this magazine may seem like another kind of square peg in a round hole: I risk a pounding by more highly refined woodworkers who might consider these pine cases somewhat crude. But along with any guff, I hope to receive some good and practical advice that will help me work more effectively. That kind of shop sharing is what I like best of all. □

John Kelsey is editorial director at The Taunton Press.

Basic bookcase of no. 2 pine

Basic bookcase is a backless, plate-joined frame with two cross-braces glued to fixed shelves at top and bottom. The same case can be made low or tall, to sit on the floor or hang on the wall.

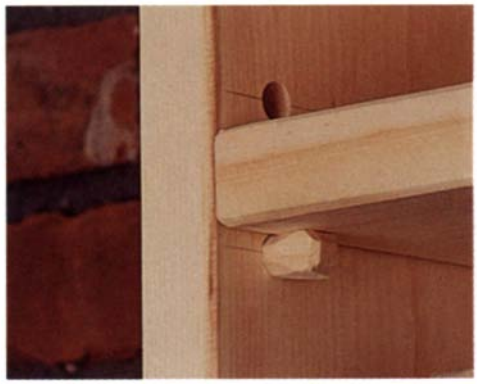


Detail: Method of wall-hanging bookcase

Whittled square pegs fit into round holes to support adjustable shelves.

Whittling with a crooked knife, *which is bent like a hockey stick, permits a controlled draw grip that melts the wood off a shelf peg. Power for the cut comes from clenching the fist so that the knife always stops short of the thumb holding the blank.*

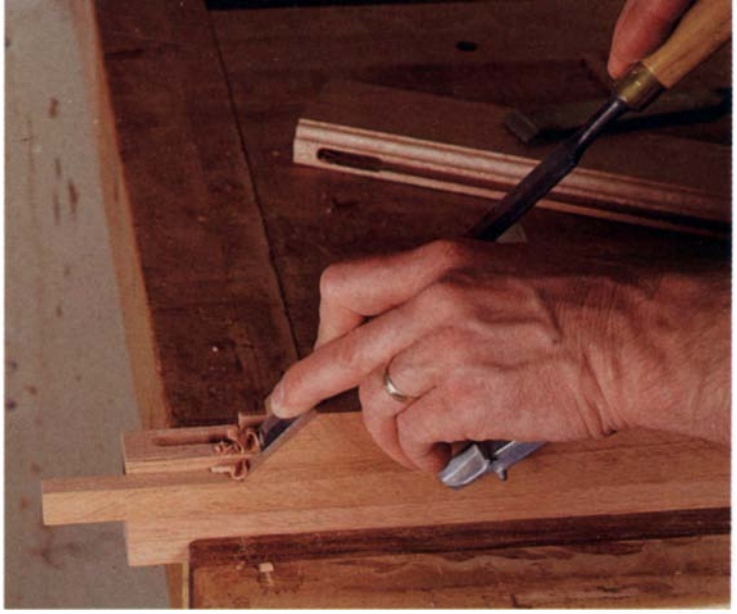
Adjustable shelves *are supported by square pegs whittled to fit in round holes drilled in the case sides. Twisting the pegs can level a warped shelf.*



Where Rail Meets Stile

Mitered sticking is strong and neat

by Mac Campbell

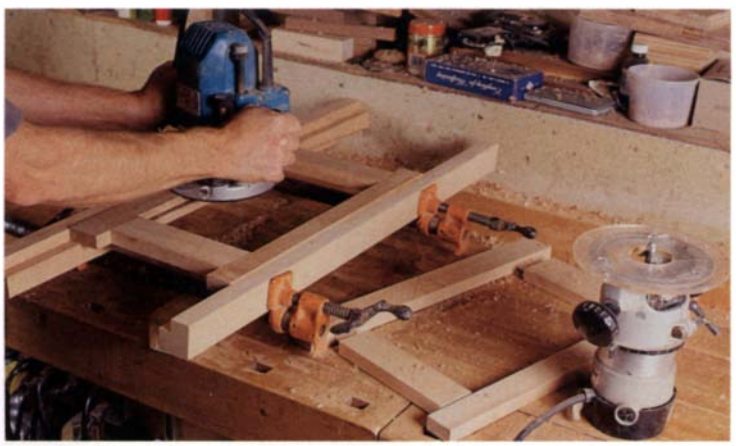


***Decorative moldings** running along the inside edges of joined frames interfere with one another at the corners. It's necessary to devise some form of non-structural joint. Here, the author uses a fixture to miter the molding (or sticking) with a paring chisel. There's a plan for the fixture on p. 68.*

Frame-and-panel assemblies, whether doors or panels in carcase work, are one of the basic building blocks of furniture. They're rigid, strong and stable. These assemblies also offer interesting design opportunities, particularly in the molding decorating the inside edge of the frame where the frame members trap the panel. This molding, known as sticking, can be as simple as a small chamfer or roundover for contemporary style work to a more elaborate ogee or other multi-curved form.

A separate molding can be added after the frame and panel is assembled, as discussed in the box on p. 69. But, I don't think applied moldings give as clean a look as molding cut directly into the frame members. Integral molding, however, quickly raises a question: How do you join the corners?

There are some alternatives. If the frame members are the same width, you can simply miter them, reinforcing the joint with dowels or a spline. Mitered joints have the advantage of simplicity but are not very strong. And they are useless if the frame members are of different widths (as is often the case with doors). A couple of alternatives that I'll mention in this article are the machine cut cope-and-cove joint and routed sticking on an assembled frame. However, my favorite technique takes advantage of the strength of mortise-and-tenon joinery but still has traditional mitered sticking.



***An easy technique for sticking** a frame is to dry-assemble rectangular stock for the stiles and rails, joined with either mortises and tenons or dowels, and to then rout the desired profile and the panel groove with bearing-guided bits.*

Cope-and-cove joints

Most modern shops use a cope-and-cove joint, in which the ends of the rails are routed or shaped to mate exactly with the sticking on the stiles (see figure 1). The cope-and-cove joint gives a clean look, appears to be mitered at each corner and is fairly strong when the cutters are carefully set up. It is also extremely fast to produce, especially in large quantities. The main drawback of this system is that the rails can fit anywhere on the stiles, so there is no automatic alignment of the assembly. There is little mechanical strength to the joint; it depends entirely on the glue, making assembly procedures much more critical. Another disadvantage is that the location of the panel groove on the inner edge of the frame is predetermined by the cutter you are using. Molding selections are also restricted by the limited variety of cope-and-cove cutter sets available and by the number of these expensive cutters you can afford.

Routed sticking on assembled frames

Another option is to join rectangular frame stock with mortises and tenons or dowels for strength and to align the corners. After cutting the joinery, dry-assemble the frame, and rout the sticking on all four frame pieces at once (see the photo below). With a wide variety of inexpensive router bits to choose from, almost any sticking profile can be developed. The panel groove is routed separately with a bearing-guided slot cutter. The groove can be inset on the frame's edge to suit the panel thickness or design. The frame is disassembled, glued and reassembled with the panel in place.

Routing the frame is reasonably efficient for small runs, and the mortises and tenons or dowels provide excellent mechanical joint strength. Routing, however, does leave the interior corners of the sticking rounded. I carve a miter into each corner with a couple of chisel strokes, as shown in the top photo on p. 68. The carved corners are known as mason's miters (see figure 2) and are not difficult unless the sticking profile is complex.

A mortised-and-tenoned joint with mitered molding

My favorite choice for joining fine work is to combine the strength of a mortise and tenon with the precision of mitered sticking, as shown in figure 3. This is the most flexible of all the methods because it will handle any shape of sticking, different widths of frame members, panels set anywhere within the thickness of the frame, and a host of other variables. The sticking and joint are cut sepa-

Photos: Alec Waters; drawings: Mark Sant'Angelo

Fig. 1: Cope-and-cove joint

Although the cope-and-cove joint is quickly machine cut, its strength is based on the glue bond because the short stub tenon provides no mechanical advantage.

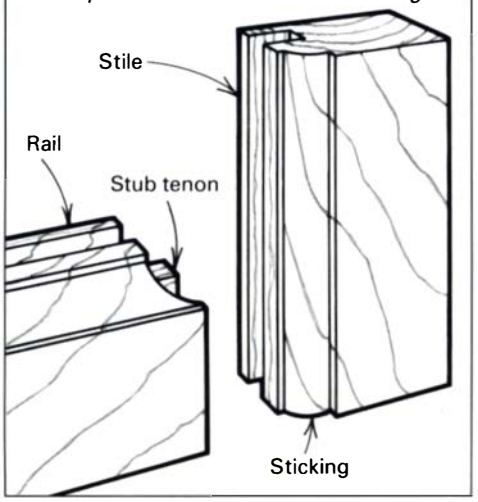


Fig. 2: Routed sticking on assembled frames

Sticking can be easily routed on an assembled frame, but the handcut mason's miter can be tricky if the sticking is a complicated pattern.

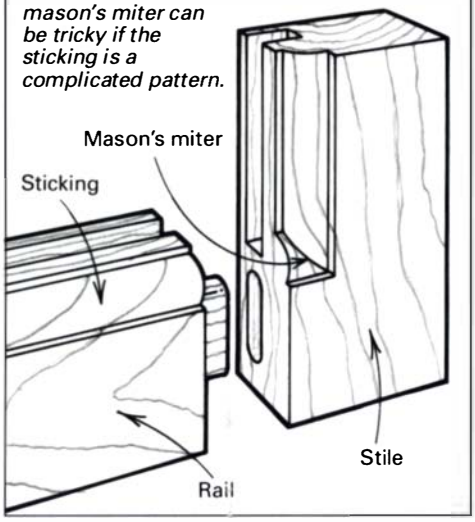
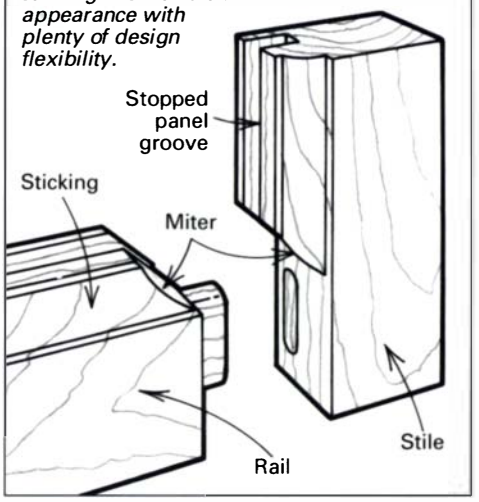


Fig. 3: Mitered sticking, mortise-and-tenon joint

The mortise and tenon provide a mechanically strong joint, and the mitered sticking has a traditional appearance with plenty of design flexibility.



rately, so you have many choices for molding cutters or router bits. Also, you can combine cutters for unique sticking profiles. Adding a new profile is not a major investment.

Cutting the joint—I follow a set procedure to make a mortised-and-tenoned frame with stuck molding. After preparing the stock, I cut the joints and then stick the rails and stiles. Next, I bandsaw the sticking from the stiles at the rail-stile juncture, and finally, I miter the sticking for a clean tight joint. Cutting the joint is not particularly difficult, though laying it out requires some care. A little time spent sketching the joint can save time and material in the shop.

Rails for a frame-and-panel door are normally cut to the door width minus the width of the stiles, plus the length of the tenons. For this joint, add in twice the width of the sticking. If you are using a dowel joint, do not add in anything for tenon length.

Begin by cutting the mortise and tenon as usual (see *FWW* #95, pp. 72-75). Though I usually leave 1-in.-long ears on the stiles of my frames, it's easier to cut the stiles to exact finished length when mitering the sticking. Once the mortises and tenons are all cut, stick each piece, using a router, shaper or molding plane. Both stiles and rails can be molded from end to end to simplify the process.

Once the sticking is completed, mark the full width of the rail (including the sticking) on the inside face of the stile to mark the point where the miter cut for the molding begins. A marking gauge, used very delicately, will do this job quickly.

Now cut the slots for the panel. If the sticking is wider (across the face of the stile) than the panel groove is deep, you can plow the panel groove from end to end on both the rails and stiles. The next step of trimming the sticking from the end of the stiles will also cut away the panel groove that runs out the end of the stile.

What's sticking? Here's a glossary

Cope ***(verb)*** To shape one part of a joint to conform to the shape of another member. Usually the rail is coped to the stile.

Cope-and-cove joint ***(noun)*** As an alternative to a mitered joint, the end of the rail is cut to match the profile of the molded and grooved stile. The rail mates squarely to the stile, yet the sticking appears to be mitered, as shown in figure 1 above.

Cove ***(noun)*** A piece of molding with a concave section. ***(verb)*** To make a hollow or concave form.

Frame and panel ***(noun)*** A door or carcase section composed of a frame that's made up of stiles and rails with a panel. The panel is often made of solid wood trapped within a groove in the edges of the frame pieces, so it can move with changing moisture conditions. The frame provides structural strength with minimum reaction to moisture changes.

Mason's miter ***(noun)*** Named for the stone masonry technique from which it is copied, the miter for the sticking is carved into the stile so that the rail can butt squarely to the stile, as shown in figure 2 above.

Molding ***(noun)*** A decorative profile worked onto the edge of solid stock (stuck molding) or applied as a separate piece to the edge of a workpiece.

Bolection molding ***(noun)*** An applied molding that is rabbeted along one edge, enabling it to fit over a frame work and thus stand proud of the face of the frame.

Rails ***(noun)*** The horizontal members of a door or panel frame or horizontal carcase members. Rails are usually tenoned at both ends.

Stick ***(verb)*** The process of cutting a molding profile along the edge of solid stock.

Sticking ***(noun)*** A molding that is cut along the edge of solid stock as opposed to a separate molding that is applied to the stock.

Stiles ***(noun)*** The vertical members of a door or panel frame. Stiles usually run the full length of the frame and are mortised to receive the tenons of the rails that run between the stiles.

***A few quick strokes of the chisel** will shape the rounded corners left when routing sticking. Although this technique works for all but the most complicated profiles, it can become tedious when making more than a few frames.*

***Bandsaw the sticking from the stile** to provide a clean mating surface for the rail for the mitered molding frame. A fence and a stop block clamped to the bandsaw table help ensure accurate cuts that are later cleaned up with a paring chisel.*

Otherwise, to avoid an exposed groove end on the outer edge of the assembled frame, make sure that the groove stops before emerging from the end of the stile (see figure 3 on p. 67).

The next step, trimming the sticking on the stiles, is most easily done on the bandsaw. Set the bandsaw's fence so the cut will just remove the stuck molding, and set a stop block so the cut ends about ⅛ in. shy of the mark made previously at the base of the miter, as shown in the bottom photo. After cutting both ends of all the stiles, make a perpendicular cut with the bandsaw or a handsaw to remove the end of the sticking. I usually just freehand this cut because it is not critical.

Cutting the miters—To cut the actual miters, make up a 45° fixture, as shown in the photo on p. 66. This can be made of any dense hardwood, but its accuracy is critical to the fit of the miters. An alternative fixture is described in the sidebar below. To use the fixture, place a stile in the vise, and clamp the fixture to the stile so the edge of the fixture lines up with the miter mark. With a very sharp chisel, gradually pare the stile down, using the 45° angled face of the fixture to guide your chisel for the last cut. The rails are mitered in the same fashion by lining up the angled surface of the fixture with the base of the sticking at the end of the rail. Because this process miters the stiles and rails across the inside edge of the frame on both sides of the panel groove, you can stick both front and back of the frame without altering the process.

Dry-assemble the stile and rail to check the fit of the miter. Square the two pieces accurately, and make sure that the outside of the rail lines up with the end of the stile. Make any needed adjustments, and then cut the rest of the miters.

Final assembly—I like to prefinish the panels to prevent unfinished areas from showing along the sides if the panels shrink slightly due to humidity changes. Prefinishing also helps prevent squeeze-out from gluing the panels to the frame during assembly. A panel that is glued in this way will surely split as it tries to move with changes in humidity. □

After 14 years of professional furnituremaking, Mac Campbell is now studying theology in Halifax, N.S., Canada.

A paring fixture for tight-fitting joints

by Tom E. Moore

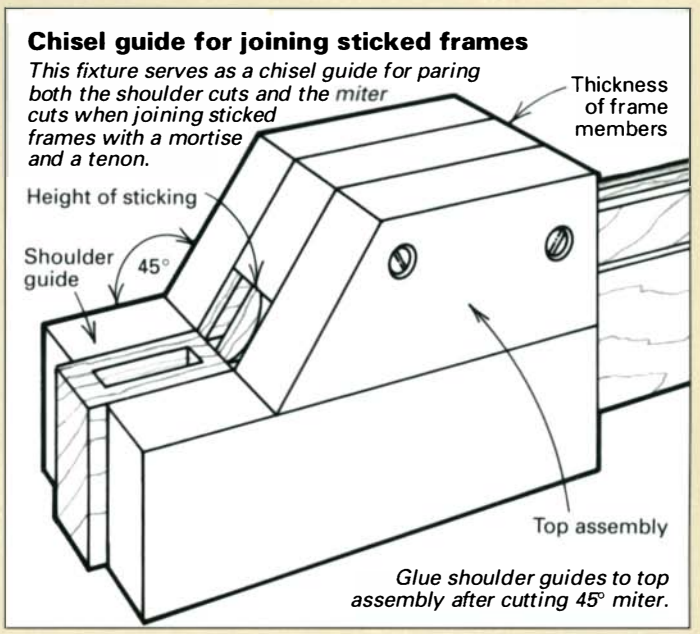
I use a process similar to Campbell's for assembling stuck frames with mortise-and-tenon joints. I found cutting a smooth, straight shoulder on the stile to mate with the end of the rail to be every bit as difficult as trimming the miters. My solution is the fixture shown in the drawing at right. This fixture not only provides a chisel guide surface for paring the miters but also cleans up the shoulder cut that has been bandsawn shy of my layout line.

For laying out consistently accurate joints, I made a metal template from some scrap duct metal. I cut the layout lines onto the frame stock using a sharp knife with the template, and then I use these lines for both cutting the joints and aligning my paring fixture for final trimming. □

Tom Moore is a woodworker in Clarksville, Va.

Chisel guide for joining sticked frames

This fixture serves as a chisel guide for paring both the shoulder cuts and the miter cuts when joining sticked frames with a mortise and a tenon.



Glue shoulder guides to top assembly after cutting 45° miter.

Applied moldings can stand proud

by Jeff Greef

Fig. 1: Molding applied around solid panel

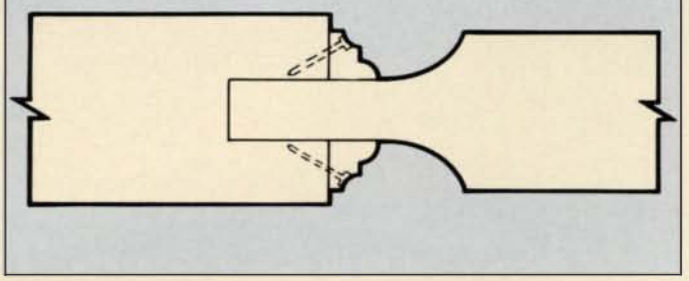


Fig. 2: Glass rabbet with applied molding

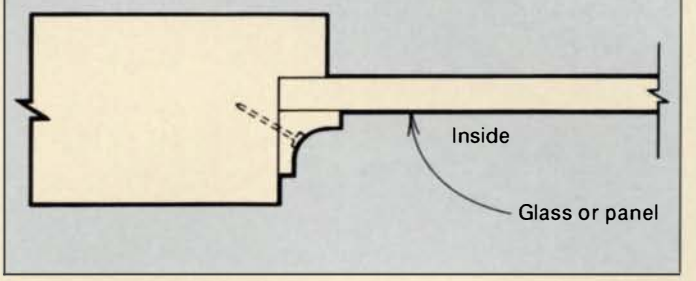


Fig. 3: Parallel sets of applied molding

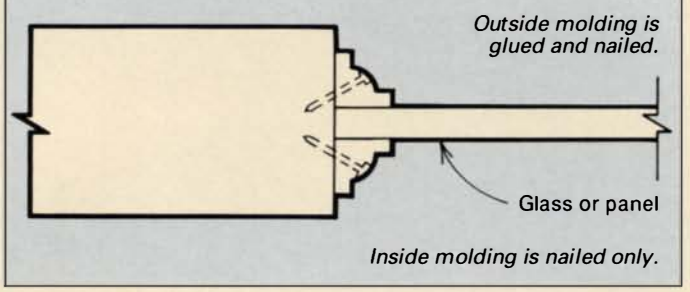
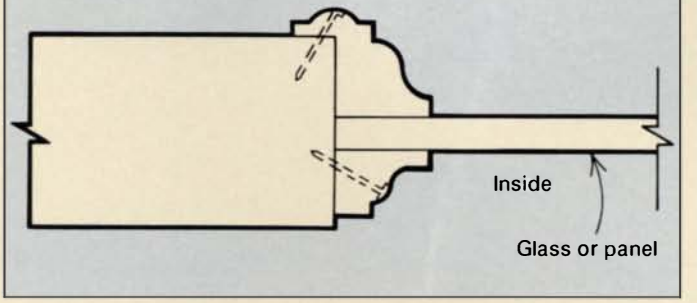


Fig. 4: Bolection molding



Applied moldings can be added to plain rectangular stiles and rails to achieve the look of cope-and-stick molded frames. And applied molding frames are easier to assemble. If the moldings are properly designed and carefully applied, these frames will be structurally sound with an appearance approaching that of integral moldings. Applied moldings also provide a design alternative that integral sticking does not—bolection molding. This type of molding has a profile that stands proud of the face of the frame, as shown in figure 4 above.

Applied moldings allow several options for making frames to suit the builder's tools and preferred techniques. The frames can be mortised and tenoned, doweled, mitered, half-lapped or even butted and screwed. The rails and stiles can incorporate a panel groove or rabbet, or the applied moldings can form the panel retaining groove. Whichever method you choose, the following tips will help you get the best results.

Grooved frame—Frames that include a panel groove also should have a stub tenon or haunch on the rail ends that fits into the groove in the stile. Fit the panels in the frame at glue-up, then make moldings and miter them to fit inside the frame against the panel, as shown in figure 1 above. Make moldings by cutting a profile on the edge of a wide board with a router or shaper, then rip the shaped edge off on a tablesaw or bandsaw. Use a molding pattern that can be easily nailed to the frame, like those shown in the drawings. A broad, flat profile, for example, may be difficult to nail. Glue and nail the molding to the frame only, not the panel. Otherwise, the panel can pull the molding away from the frame, creating an unsightly gap. If the molding is nailed to both panel and frame, it will restrict the panel's movement as humidity levels change and will likely result in a split panel.

Rabbeted frames—If you want to put glass in the frame (as in a cabinet door), you must make the frame with a rabbet rather than a groove, so the glass can be replaced if it breaks. You can cut a rabbet into the frame parts before glue-up, but this requires leaving a stub on the ends of the rails to fill the rabbet at the stile-rail juncture. An alternative technique is to glue up the frame with rectangular stock, rout a rabbet with a bearing-guided rabbeting bit and then square the rabbet corners with a chisel. Moldings are nailed to rabbeted frames (not glued), as shown in figure 2.

Applied moldings—Another possibility for making a glass rabbet or mounting a solid panel, is to apply two parallel sets of molding to the inside of a frame (see figure 3). In this case, glue and nail one of the two sets of molding onto the frame, but only nail the other so it can be removed to replace glass. Carefully align the outside set of molding with spacer blocks to position and hold the molding while it is nailed.

Bolection molding solves the problem of locating the first set of molding because this molding has its own rabbet that automatically positions the molding on the frame, as shown in figure 4 above. Because bolection molding protrudes beyond the plane of the frame face, it has a significant visual impact. For some furniture designs, this molding may be too ornate, but it could be just the ticket to dress up an otherwise plain frame. □

Jeff Greef is a woodworker and journalist living in Santa Cruz, Calif.

Bending a Big Curve

Laminations with spindles make this bed a Windsor

by Jeff Miller

***Like the familiar chairs from which it gets its name, this Windsor bed,** with its laminated curves and simple spindles, looks equally at home in either a rustic or a contemporary setting.*

When the idea for making a Windsor bed first came to mind, the basic form was obvious—classic and simple—but the details of construction most certainly were not. The first bed was a learning experience, and each subsequent version has improved execution. The key process is laminating the bent arches that define the headboard and footboard, and after building a hundred or so, we've solved most of the real problems.

The basic technique is to layer up a plywood form with fitted cauls for each bend, so you can clamp many thin layers of wood into the shape you want. This technique will work in any situation where you want a wooden curve, at virtually any scale. We've used it to develop a full line of beds as well as components in chairs, tables and other pieces of furniture.

There are a few tools you can't do without when working with bent laminations. First you will need a lot of clamps: a minimum of twelve 2-ft.-long bar clamps per bending (more is better here) and two 6-ft.-long bar or pipe clamps to span the full width of each bending. And second, I've found a jointer and planer indispensable for cleaning up the rough bendings. I suppose it's possible to do this some other way—but I'm not sure I'd have the fortitude.

Making the laminations

You can rip the many laminates you need from solid stock, or you can buy thick veneer and cut it up. For the queen-size Windsor bed, you need 34 strips of wood, each roughly 1/10 in. thick, 2¼ in. wide and 10 ft. long, as shown in the drawing on p. 73. Our Windsor bed is made of cherry, but most hard woods bend well, except oak, which tends to splinter. For the first Windsor bed, it took two of us the whole day to rip solid stock. We took frequent breaks for the motor on my 8-in. tablesaw to cool down, for resetting the tripped circuit breaker and for sweeping up the mess. After that, I swore off this method and ripped thick veneers for the next 70 beds. At first we ripped the veneer with a portable circular saw and a long straightedge, and then we found that the veneer was thick enough to cut on the tablesaw. Both methods are fairly messy, and a good portion of the expensive veneer was wasted (we used the waste on other projects, but much is unusable unless you need unlimited shims).

Eventually, we returned to ripping from solid stock with a more powerful saw, a better outfeed setup and dust collection. With our new setup, one person can do the whole job in a few hours. The results are better than the veneer method: tighter bendings and cleaner finished surfaces. After costing it out, we came out slightly ahead. Labor was higher, but material costs were lower.

To make these long rips of wood easier and safer to handle, mill the wood into manageable blanks; for the bed, make two 10-ft. blanks, 2¼ in. thick by 4½ in. wide. Mark layout triangles on the faces of the boards so that you can put the rippings back together in sequence. Then set your tablesaw fence so that a 1/10-in.-wide strip will be ripped off to the outside of the blade. Rip the two

Photo: S.A. Block

blanks, then reset the fence. If the blank starts to curve from the release of internal stress or if you burn or nick the edge by flinching when ripping, you'll have to joint the edge before continuing. Refer to your layout triangles to keep the strips in sequence as they come off the blanks. Do not try to rip those last couple of strips when the blank gets too narrow. It's much too dangerous.

Building bending forms

You will need two D-shaped bending forms: one for the headboard and one for the footboard, as shown in the drawing on p. 73. Each form is three layers of ¾-in. plywood, totaling 2¼ in. thick. You will need four sheets of plywood, and even this will require piecing scraps together. There are many ways to lay out an ellipse. I use a jig like the one described in *FWW* #86 (pp. 88-90) but with a pencil mounted on the bar instead of a router.

After laying out the form patterns on sheets of plywood, cut them out and sand them smooth. Then use these forms to mark out the other layers, piecing the middle layer together to save materials. Bandsaw slightly outside of the line, screw and glue the second and third layers to the faired form, and then flush-trim with a router and a bearing-guided bit.

Lay out the cauls by marking a line 1¾ in. outside the forms. To do this, make a 3½-in.-dia. disc from ¼-in. plywood, stick a pencil in the center hole and roll it around the edge of the form. The cauls for the curved sections are made in three pieces while straight 2x4s are adequate cauls for the straight sections.

After laying out the curved cauls, make a locating mark to line them up with the form. Once the cauls are bandsawn, smoothed and assembled, line up these marks and tack on guide strips (see the drawing). Mark the forms to show the bottom of the bendings, and then wax the forms, cauls and guide strips.

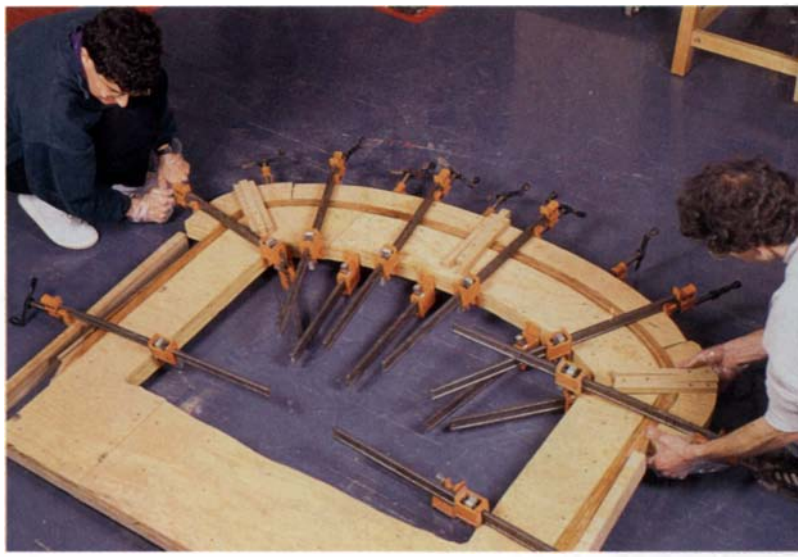
A methodical glue-up

Gluing up the bendings must be approached methodically. Everything must be ready and close at hand. It wouldn't hurt to do a dry run. The tighter curves of the footboard increase the difficulty, so start with the headboard.

We use Weldwood plastic resin glue for all bent laminations. The glue doesn't creep under tension and doesn't impart as much moisture to the wood as regular yellow glue. However, plastic resin, which is actually urea formaldehyde glue and which comes in powder form, does need to be handled with much more care. Wear a mask to avoid breathing the powder, and wear gloves and goggles to prevent contact with the mixed glue.

Spread out a bundle of strips on the cleanly swept floor, and set one strip (the top piece) a little apart from the other 16 strips to avoid spreading glue on it. Set the form on the floor (or on a large worktable) nearby, with cauls and clamps at hand. We've found that 1,000cc of glue powder and 400cc of water is about right for one bending. It is fairly difficult to stir all the lumps out, so we use a paint mixer in an electric drill. Spread the glue evenly over one side of the 16 strips, not both, with a short-nap paint roller. Then bundle them back up in order (don't forget to add the top strip), and lay the bundle at the top of the form. The clamping pressure will transfer the glue to the mating surfaces.

Start clamping from the center and work toward both ends, placing clamps alternately to the top and the bottom. Working around the sharp bends is most difficult because the clamps get in the way of each other. Sometimes you can use a block of wood as a spacer between the clamp and the caul to get some of the excess clamp outside the clutter (see the photo above). Leave the bendings to set overnight. If your shop will be cooler than 65°, you should cover the assembly with an electric blanket.



Apply clamps beginning at the center of the curve, and then work in both directions. An occasional block inserted between clamp and caul helps keep the clamp handles from interfering with one another. Guide strips screwed to the form interlock with similar strips on the cauls.

Before the bendings come out of the forms, mark the finished lengths on them. After removing the bendings, transfer your marks to the inside faces where they won't get planed off, and trim the bendings a couple of inches long for now. Running these unwieldy things over the jointer seems harder than it is. Placing supports at both ends will make the process easier, as will an assistant. A wider jointer is a help. Keep as much of the bending as possible over the jointer table at all times.

Thickness planing is probably the strangest looking procedure in the whole project, though it is actually straightforward and a lot of fun. You just steer the bending through the planer, as shown in the top photo on the following page, watching to make sure it doesn't bind on its way around the curve. Plane to 1¾ in., then cut the bendings to final length. Scrape and sand the outsides and insides, and beltsand the fronts and backs.

Joining rails and spindles to the bendings

Most projects involving bent laminations will require some additional edge-shaping, which you should leave until after you cut the joints. On our Windsor bed, through-mortises and wedged tenons join the rails to the bendings. We cut these joints with a plunge router and some simple templates. The mortise is a little easier to rout if you begin by drilling a few holes straight through the bending with the template clamped in place.

Before cutting the headboard and footboard rails to length, mark the face of the bending to show where the inside face of the side rails will fall. The measurement between side rails should be ¼ in. more than the width of the mattress to allow room for bedding. So make sure the tenon shoulders on the headboard and footboard rails will give you that dimension (59⁹⁄₁₆ in. for standard queen size). And don't forget to add length for the through-tenons before you crosscut the rails. Cut the side rails to length at the same time. For most queen- and king-size mattresses, 81 in. will allow a little room for tucking in the bedding and wiggling the toes.

The Windsor bed has 40 spindles totaling 90 lineal feet of dowel, which I would advise against trying to make from scratch. I made the dowels with a router jig for my first Windsor bed. It was a lot of work and the resulting spindles required much sanding and fussing. I've bought my dowel stock ever since. Midwest Dowel Works (4631 Hutchinson Road, Cincinnati, Ohio 45248;

Photos except where noted: Sandor Nagyszalanczy

***The author guides** the unwieldy bending through his planer (after jointing one face flat) to true up the other face and to mill the curved piece to the proper thickness.*

***Miller uses a shopmade** square to align the spindle holes in the curved parts. He also uses the wooden square to transfer the hole locations from the rail (which he temporarily clamps in place) to the curve. To start holes on the steep part of a curve, he uses a drill bit with a long center pilot.*

513-574-8488) carries a wide range of quality hardwood dowels.

It is very difficult to assemble the spindles when you glue the rail to the bending, so you insert them afterward. The trick is to drill deeper into the rail than into the bending to provide clearance and then to shove the spindles up into the bending and glue them tight.

Mark out 20 centers on the headboard and footboard rails 2¾ in. apart. Dry-assemble the rails with the bendings: insert one tenon into its mortise most of the way, and then spring the bending open enough to slip the other tenon in. With a large, shopmade square, transfer the marks onto the bendings. Remove the rails, and use the drill press to bore ⅝-in.-dia. holes, 2 in. deep, along the top edge of each rail. Drill the three outer holes on each side of the footboard rail 1 in. deeper. This will allow you to insert those spindles while gluing up the bendings with the rails, because they are quite difficult to install afterward.

The holes in the bendings have to be parallel to the straight legs, so clamp the part upside down in a bench vise with the legs perpendicular to the bench surface, as shown in the bottom photo above. Sight down a square resting on the bench surface to help drill straight, and then wrap a piece of tape around the drill bit as a depth indicator. You need a bit with a long pilot (we use a Powerbore bit) for drilling on the steep angles of the bend. On the two outermost holes on the headboard bending, you may have to start the bit at an angle, and you will probably have to fuss these holes with a small gouge or rasp. Check the alignment of these holes now—they're much harder to fiddle with later.

Assembling the headboard and footboard

With all the joints done, round over the edges of the bendings with a ¼-in.-radius router bit, and chamfer the edges of the rails. Cut sawkerfs in the tenons for the wedges that will be hammered in later, and cut the wedges from a contrasting wood. To determine the lengths of the outer three footboard spindles, which are inserted now, place the rail on the bending where it will be when installed, and measure from the bottom of the holes to about 1 in. below the bending. Make certain these spindles will fit in the holes—we drill up a test block—and insert them without glue.

Glue-up is fairly simple. Spread glue in the mortises, and very lightly on the rail tenons, slip one end in, and spring the bending to slip the other in. Two long clamps located above and below the joints are all that you need. Spread glue on the wedges and tap them home.

Now measure for the rest of the spindles, this time from the bottom of the holes in the rails to just below the bending at the corresponding hole. Cut spindles to length and number them. Then check for fit in your test block, and sand for fit and finish. With one hand near the bottom end of the spindle and the other near its middle, flex the spindle enough to insert it (without glue) into the proper hole. When it bottoms out, the spindle should just fit under its hole in the bending.

By now, the glue on the rail joints should be set, and the clamps can come off. The wedges need to be trimmed off and sanded flush. Then clamp the assembled headboard or footboard upside down in a bench vise. Spread a little glue in each spindle hole in the bending, and push the spindles all the way into the holes. Complete the spindling process by tacking ⅝-in.-long brads through the spindles from the inside of the rail.

Attaching side rails and cleats

There are numerous methods for attaching bed rails to a headboard and footboard. All manner of hardware options exist that claim to provide easy assembly and disassembly and a solid joint. I prefer the rock solid feel of bolts (either actual bed bolts or ⅝-in. by 5½-in. hex head bolts with washers), which are only slightly less convenient than instant, knockdown hardware. With bolts, there is no screwing into endgrain and so no worry that something will work loose. The key to this joint is a recess for the nut routed on the inside of the rail about 3¼ in. from each end of the rails. The recess could be large enough for an open-end wrench, but we prefer to allow just enough room for a screwdriver to be inserted alongside a flat on the nut to wedge it from turning. A wrench seems to encourage excessive tightening.

Two dowels in the side rail ends, one on either side of the bolt hole, provide additional strength, prevent the rail from twisting and help with alignment when assembling the bed. We finish the joint by counterboring the outside of the bolt holes, so the head of the bolt and a washer will seat below the surface. You can conceal the hardware with a plug if you want.

The bed is now ready for finishing. We usually finish with three coats of Watco Danish oil, rubbed on with progressively finer grit sandpaper (220, 320, 400) followed by a final coat of wax. After the rails are completely finished, you can screw on the cleats, set up the frame and measure the exact length of the slats.

We use 16 crosswise slats, ¾ in. thick by 4 in. wide, with their edges rounded over and their ends located by ⅝-in. dowel pins in the cleats, which fit notches in the ends of the slats. For a king-size bed, add a center strut from headboard to footboard. Drop the slats into place, and step back to admire your handiwork. □

Jeff Miller builds custom furniture in Chicago.

Bed basics

Standard mattress sizes are given in the chart below, but when building a bed, always measure the actual mattress to be used because industry standards can vary greatly. Don't forget to measure the thickness of the mattress (a concern that may not be immediately obvious). The measurements that are given in the drawing are for a queen-size bed with a 7-in.-thick mattress used without a box spring. For a box spring and mattress, use wider rails and increase the length of the straight part of the bendings to avoid having the mattress extend up over the bend in the footboard.

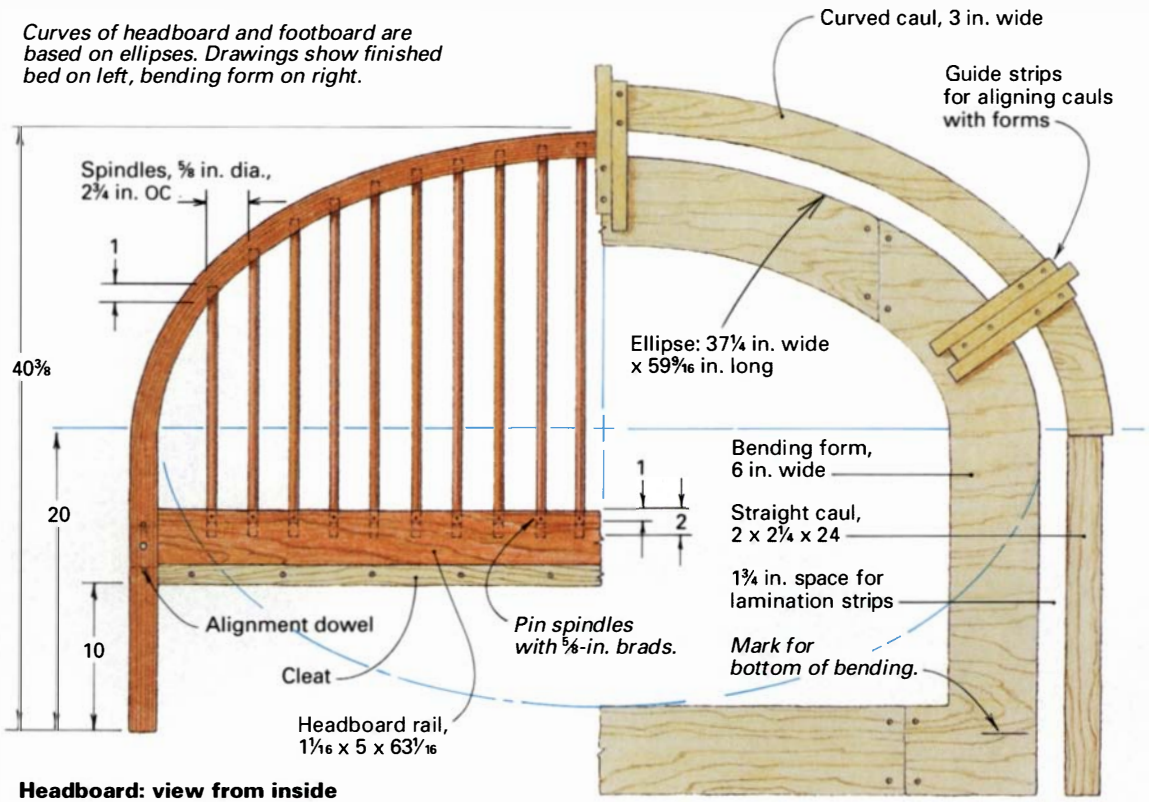
On our beds, we use cleats on all four rails to support a box spring and add 16 slats to create a platform for futons or mattresses without a box spring. To locate the slats and to keep them from sliding around (and to keep the mattress and you from falling through), we insert dowels along the side rail cleats (see the drawing detail). —*J.M.*

Standard mattresses

Twin	39 x 75
Double (full)	54 x 75
Queen	60 x 80
King	76 x 80

Headboard and footboard for a Windsor bed

Curves of headboard and footboard are based on ellipses. Drawings show finished bed on left, bending form on right.



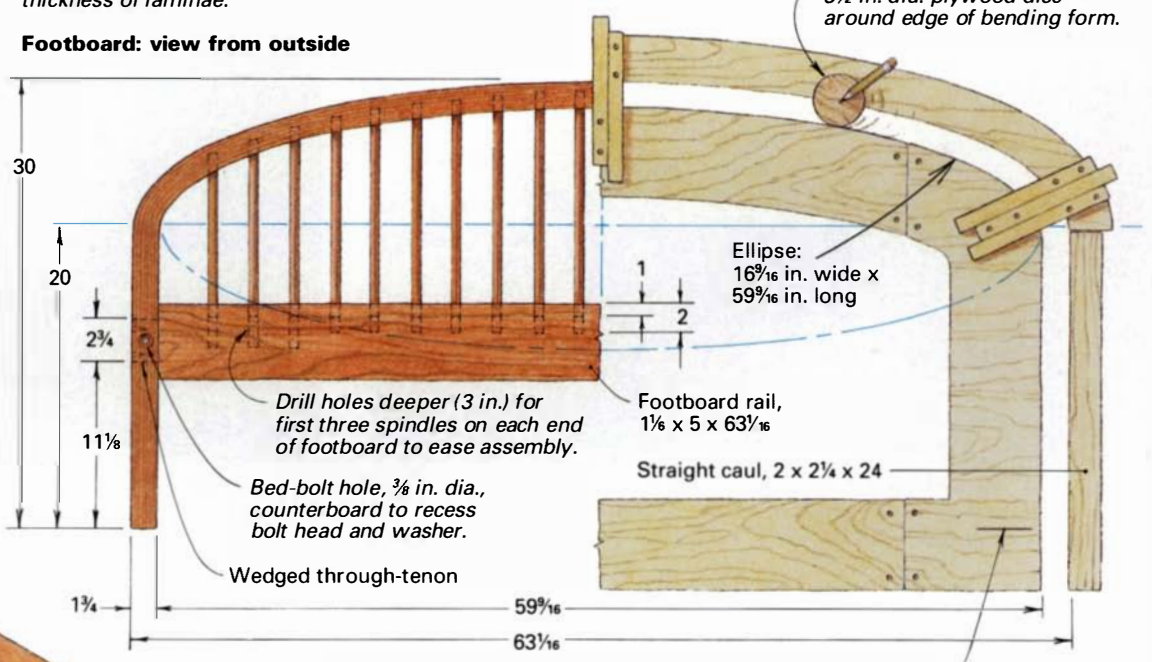
Headboard: view from inside

Laminated curves are 17 strips, ⅛₀ in. thick by 2¼ in. wide. After gluing, plane to about 1¾ in. thick. Finished width can vary depending on thickness of laminae.

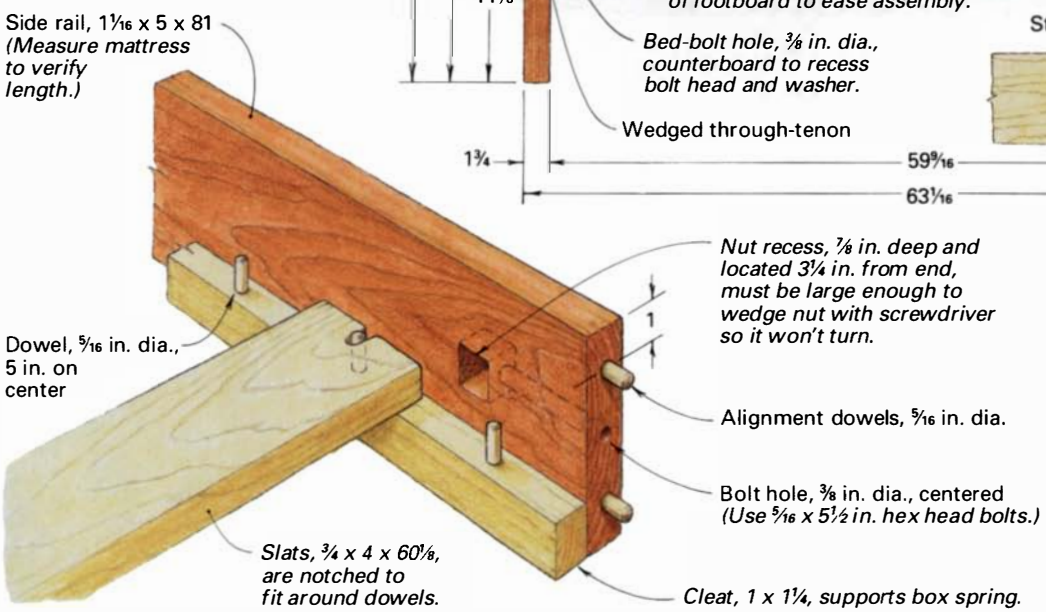
Note: Bending forms and curved caul sections are 2¼ in. thick, pieced together from three layers of ¾-in. plywood.

Lay out cauls by rolling a 3½-in.-dia. plywood disc around edge of bending form.

Footboard: view from outside



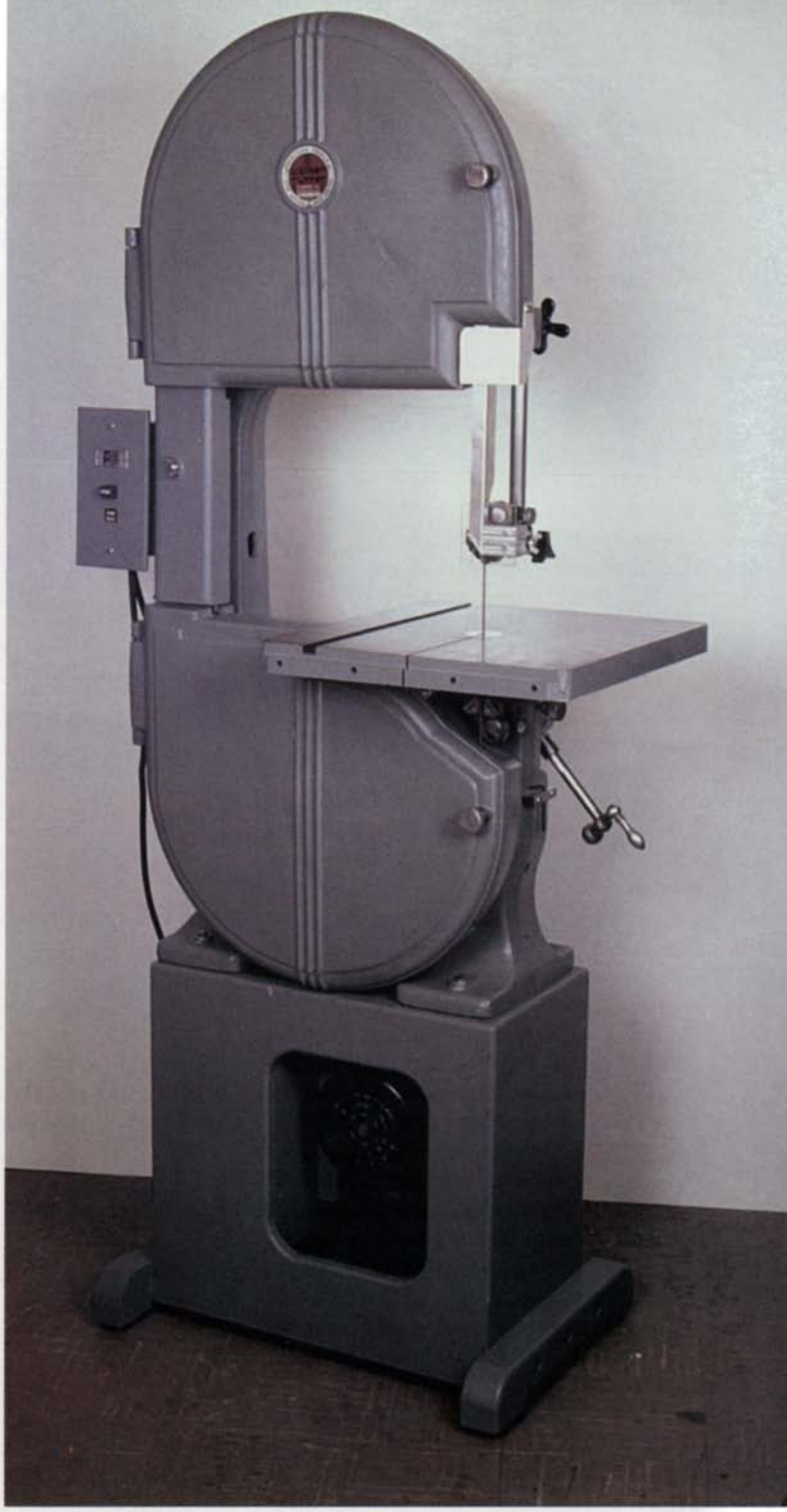
Detail: Side rails



Mark for bottom of bending.

Note: Length of rails will have to be adjusted if lamination is not exactly 1¾ in. wide. Measurement between side rails should be ¼ in. more than width of mattress. Overall height should be adjusted for mattress thickness. Dimensions are for a standard queen size mattress.

Drawing: Heather Lambert



Before the restoration, *this old Walker-Turner wasn't much more than a pile of scrap iron. Sixty-five hours and four hundred dollars later, the author has a new (again), better-than-from-the-factory, vintage bandsaw. The saw's quality casting, 12-in. resaw capacity and 16-in. throat depth were all factors that made it worth restoring.*

Restoring Vintage Machinery

Bandsaw's lessons can be applied throughout the shop

by Robert M. Vaughan

What a bargain—a 16-in. Walker-Turner bandsaw for $80. All it needed was new tires, guides, motor, electricals, guards, stand, complete disassembly, cleaning and rust removal, one casting weld, repainting, reassembly and, of course, realignment of all the parts during reassembly. The good news was that all of the crucial components were there and in good condition; the other stuff I could fix. This wasn't an $80 bandsaw, but an $80 bandsaw kit. It was up to me to turn it back into a bandsaw.

I had to weigh the value of the restored bandsaw against commercially available machines. A resaw capacity of 12 in., 400 lbs. of quality American cast iron and a 16-in. throat depth are all factors that made this moderate-sized machine worth restoring. If this had been one of Walker-Turner's 14-in. models, I would have passed. The work required to restore it would have been the same, but the result would have been little better than a new Powermatic or Delta 14-in. model.

If you're thinking of restoring an old machine, it's important to realize that it's a very rare old machine that's ready to run. Almost all are like this machine was—a lot of cast iron with potential. Bearings, belts, pulleys, switches, wires and motor almost always need replacement. One reason that bandsaws are so popular to restore is that the parts that wear out can almost always be obtained from sources other than the original manufacturer. The important question to ask before diving into a restoration is whether the restored machine will be worth your trouble.

In this article, I'll discuss the general procedures common to restoring any old woodworking machine, as well as the more specific procedures that were necessary to get this bandsaw back into top form. And while the general procedures are applicable to just about any machine restoration, even the bandsaw-specific procedures illustrate ways of addressing problems common to all woodworking equipment—ways, for example, of dealing with dust, alignment problems and beat-up or missing guards. The principles of machinery restoration are the same regardless of the machine.

Moving the machine

Moving any heavy machine from one shop to another is always a chore. There are no rules on how to accomplish it other than to be prepared. I have help on hand for lifting. I generally bring resealable plastic bags for nuts and bolts and a note pad to record the disassembly sequence and to label parts bags. I also bring wrenches and WD-40 for disassembly of any heavy or protruding parts that might impede handling. I often remove the table, and any guards or pulleys, and I always try to remove the motor and cord. I make sure there are a couple of floor floats (four casters on a piece of plywood) ready in my shop, so I can move the machine around during the restoration process.

***A fine-wire brush** mounted on the author's wood lathe quickly and efficiently cleans away dirt, dried grease and even light rust. The wheel also imparts a slight polish, so Vaughan runs all fastener heads under the wheel for a few seconds.*

***Masking all parts** ensures a clean, crisp, professional-looking paint job. A good way of masking holes is to wrap a piece of paper tightly around a dowel and then to release it inside the hole. The paper will expand to fit. To avoid a messy cleanup later, remove all the masking tape as soon as the paint is dry enough to touch.*

First inspection

Once in the shop, I break out the air hose to blow out the years of accumulated dust and grease. *Always* wear a face mask or safety glasses when using an air nozzle. A 100-lb. blast of air into any of those little nooks and crannies can unleash hostile projectiles at bullet-like speed. If you don't have a compressor, a stiff bristle brush will remove most of the crud.

After I've cleaned off the bulk of the dust, dirt and grease, I begin disassembly, examining each component for further mechanical problems—things I may have missed when I bought the machine. Organization at this stage really pays off. As I take apart the various subassemblies of a machine, I use plastic trays, bins or boxes for the larger parts and resealable plastic bags to hold the little stuff. I note the sequence of washers, springs and other things that I'd otherwise forget. I bag individually any shims I find, along with a note showing where they came from. This not only makes reassembly infinitely easier but also allows me to move the multitude of parts and store them out of the way, without losing track of what's what and what goes where—no little consideration in a space-starved shop.

Next I buy or collect all of the big items I'll need. This includes the motor, wiring, switch, pulleys and belts—all the big-ticket items crucial to completion of the machine. Even when other unexpected expenses crop up, I know that the project will get finished.

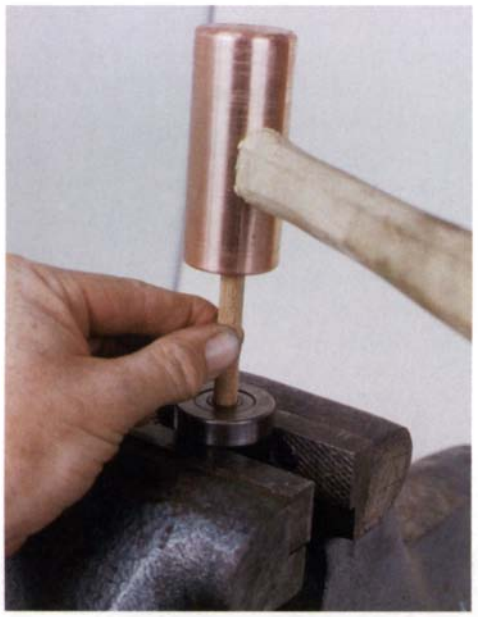
Cleaning

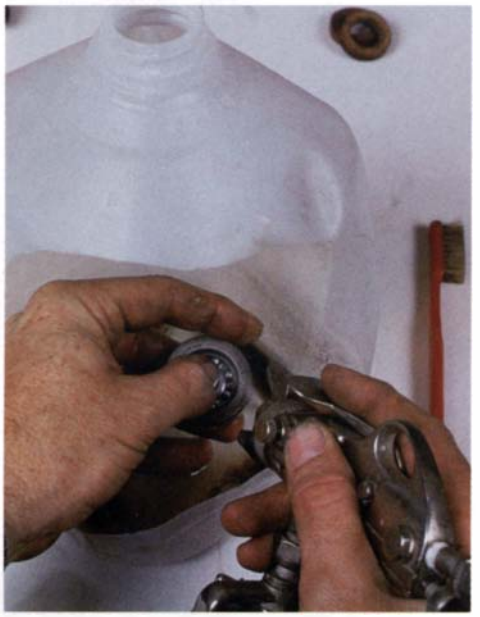
Proper parts cleaning is the most time-consuming aspect of the restoration process, but it's also the most important. The purpose of a thorough cleaning is not only to please the eye but to make things work as they should. I've been hired to repair a lot of equipment that needed nothing more mechanically challenging than a good cleaning. Forty years of dust, dirt and resins have a way of adversely affecting the performance of the finest machine.

After covering my lathe bed (to protect it from flying dirt and debris), I mount a fine wire wheel on my wood lathe and use it to brush away any dirt or grit in threaded parts, to remove minor coatings of rust and to clean up any dried, caked-on grease (see the photo above). The wire wheel also polishes a bit, so I put the heads of all the old screws, nuts and bolts under the wheel.

I clean holes, with or without threads, with a brass brush (the kind used to clean rifle barrels) chucked into my electric drill.

Photos: author





***Forty years of dust, dirt and resin** had taken their toll on the back blade guides, but they weren't damaged—just frozen. Vaughan removed the bearing from the shaft with two screwdrivers (above), popped the cap off the bearing with a hammer and dowel (left) and sprayed the bearing clean with lacquer thinner (right). The cleaned guide works like new.*

If the hole isn't very deep, I'll follow this with a blast of air and then wipe with a clean or solvent-dampened rag.

Grease is best removed with a solvent; I prefer lacquer thinner because it's the quickest solvent I normally have around the shop. I spray-clean small parts, using a compressor-powered spray gun and spraying into a cut-out plastic milk jug. The milk jug catches most of the spray, which I use later to dampen rags for wiping down larger areas; I wipe with a dry rag after cleaning with a solvent-dampened rag. I've also found the refillable, rechargeable spray cans—which are available at most auto parts' stores—useful for cleaning larger areas. I just spray lacquer thinner on, then wipe clean with a dry rag. These cans are particularly handy in close quarters or when you don't want to drag the air hose around.

Think safety whenever working with solvents. Work in a well-ventilated area, wear a respirator and *always* set the dirty rags outdoors—away from anything flammable—to dry after use.

Cleaning an old machine is messy work. Chances are that your workbench (and many other areas of your workshop) will become spotted with grease and grime. Make sure you clean up thoroughly after working on the machine before you begin working wood again. It's incredibly annoying to find greasy dirt smeared all over a just-completed project. Rebuilding a woodworking machine may not be as bad as rebuilding your car's transmission in your shop, but it's close.

Dirt or grease from a machine you're restoring can mess up your shop, but shop dust and dirt can mess up a restoration as well. To avoid this, make sure any surfaces you'll be working on are clean before you begin. Also try to finish the restoration without interruption. If you have to put your restoration on hold in midstream to work on a woodworking project, both can suffer unless you're extremely careful about cleanup and protection.

Renewing the table

To clean up the rust on the tabletop, I started with 220-grit sandpaper wrapped around a block of wood, then moved up to 320-grit. After finishing with the 320-grit, I dampened the table with naphtha and rubbed with a hard Arkansas stone until the high spots shone like little mirrors. This makes any metal very slick and does wonders for planer and jointer beds—even new ones. It only has to be done once, and the results are well worth it.

General machinery repairs

Some repairs are specific to individual machines; others are general and apply to most machinery. I'll discuss general repairs below and the specifics of bandsaw repair in the story on pp. 78-79.

All four wheel bearings in this saw were contaminated with dust and dried-out grease and needed to be replaced. The top bearings were standard sized, and available locally (check the Yellow Pages for a bearing distributor near you), but the bottom bearings had an odd-sized inside dimension. My usual local sources of power-transmission products couldn't locate replacement bearings. I knew that Walker-Turner had some of its bearings custom-made for them, so I began to worry. I called Accurate Bearing Co. (1244 Capital Dr., Unit 1, Addison, Ill. 60101; 800-323-6548) and asked the sales manager about my bearings. He replied, "Sure. I have them right here. What else do you need?" I liked that.

To restore the outside threads of beat-up fasteners that can't easily be replaced, I used a thread-restoring file. These square files come in two sizes with eight different threads-per-inch sizes on each file. I set the file's teeth into the matching grooves of the fastener and filed. These files are particularly handy when the end of a threaded piece is smashed and when trying to start a threading die would risk cross-threading. You can find these files in most large industrial-supply catalogs.

The pulleys on the saw were cheap aluminum ones that no longer ran true. I replaced them with cast-iron pulleys from a local power-transmission distributor. The belt was equally worn, so I replaced it with a Browning cogged, high-strength industrial belt (from the same distributor) that's designed to transmit high torque smoothly. Any machine is only as good as its weakest component, so these simple sub-

stitutions of power train components really make a big difference in the overall performance of the restored machine.

Any time something is held in place by a setscrew, there's a good chance that the point of the setscrew will cause a crater. The raised sides of these craters will cause all kinds of difficulties in disassembly, often requiring gear pullers, presses, punches or a big soft-faced hammer. I usually file down the crater edges with a super-fine file or honing stone before removing the part from the machine. This avoids galling the inside of a hole or housing as the part is withdrawn.

The parts on this saw that need to be removed or adjusted to change the blade were fastened with nuts, bolts and slotted-head screws. Every time I wanted to change blades, I'd have to hunt down the proper tools, have the tools and all loose hardware laying around during the blade change, and then put them all back when I finished. To make the machine more user-friendly, I replaced common nuts with wing nuts, bolts with threaded studs and slotted screws with socket-head (Allen) screws. I then mounted a holder for the Allen wrench on the machine. Now I can change the blade and adjust the guides without ever going on a tool hunt.

Painting

Repainting a restored machine may deter rust, but the real reason is that it looks nice and makes you feel better about your machine. Sawdust may come off *slightly* easier, but who are you kidding?

How far you want to take the paint job is up to you. I've stripped down to bare metal, done body work and built up the paint as though I was restoring an auto; other times, I've only needed to do touch-up work. Stripping may be necessary if the machine came from a school: often the color scheme will look as though it were designed by Stephen King and applied by King Kong. If you strip down old cast iron, you'll sometimes find that auto body filler was used to make a smooth surface.

On this particular machine, the existing paint had faded to olive-gray. I found original paint on an unexposed section of the machine and matched it with Krylon's #1608 Smoke Gray. It took five cans to do this bandsaw, including the stand. I didn't bother to strip because the paint film was in good condition. I simply cleaned the surfaces with soap and water and then wiped them down with lacquer thinner. I had to spend a little more time and use a bit more solvent in some of the greasy corners and crevices, but there were no real trouble spots.

I mask all surfaces that take working parts, like shaft holes and ways. An easy way I have of masking the inside of a hole is to cut a small piece of paper and wrap it around a dowel. I then insert this into the hole and unwrap the dowel until the paper springs out to fill the hole.

I remove all masking tape and paper as soon as the part is dry enough to handle, so I won't have to deal with any sticky residue later. I paint the parts individually while they're disassembled. Bright, unpainted fasteners, new aluminum guards and crisply contrasting parts, such as handwheels, all add up to create a quality impression. A wash-over paint job says something else altogether.

Electrical

This machine, like many older machines, had a simple toggle switch inconveniently located on the front of the frame. I replaced it with a new heavy-duty, push-button

How to build a good machinery stand

Constructing a well-made wooden stand is the single most important thing you can do to eliminate bandsaw vibration. A good wooden stand is superior even to a steel stand because the wood absorbs much of the vibration rather than transmitting and amplifying it as steel will. Another advantage of a wooden base is it's easily modified to accept hanging accessories, such as fences and miter gauges.

I build my stand first because I'd rather not be bending over for the whole restoration. Placement of the motor and electricals, provision for sawdust evacuation, ventilation and machine maintenance are all factors I take into consideration when designing a stand.

The keys to a good stand are good materials and good construction methods. I use strong, dry hardwood and good-quality birch-veneer plywood. My construction methods are neither esoteric nor showy. Glued butt joints work fine as long as you use enough glue, and the joints fit tightly to begin with.

I push a joint together with the nose of my pneumatic staple gun, just until the glue begins to ooze out, and then I pull the trigger, squirting a 2-in.-long, wide-crown staple into the wood. The staple isn't for strength but rather to hold the joint tight until the glue dries. Using staples or nails without glue results in joints that are guaranteed to vibrate loose. Bolts are forever having to be tightened because of machine vibration and seasonal wood movement. Glued joints are the only sure way I know of to make vibration-resistant wood joints. Biscuit joinery also works.

I glued the legs to the stand and then screwed large lag bolts through the leg, through the side of the plywood box and into a backing block (see the photo at right). The lag bolts compress the joint (providing clamping pressure) and add a comforting margin of safety against joint failure. I also glued in a panel to accept tracks for sliding motor mounts and drilled and installed T-nuts in the top of the stand to accept the bolts that would connect machine and stand.

Since no floor is really flat, I put in T-nuts and steel leveling feet. Distributing the machine's weight equally to each of the four feet is essential to reducing vibration. Why don't I put locking casters on the base? The bandsaw is tall, thin and has a high center of gravity, making it inherently subject to balance problems. Leaving a bandsaw permanently mounted on a wheeled base is trouble waiting to happen. —*R.V.*

***Glued joints are the key** to building a good machinery stand, but lag bolts are good insurance against failed joints where the legs meet the carcase. Elaborate joinery isn't necessary for a strong and sturdy stand.*

manual starter on the column (where it's easy to get to), but I had to cut a sheet-steel mounting plate for the switch first. After cutting and drilling the necessary holes in the mounting plate and mounting the starter, I drilled and tapped two holes in the bandsaw's cast-iron frame and attached the mounting plate assembly.

A rigidly mounted motor greatly reduces vibration. To mount the motor securely on this machine and still allow for tensioning of the belt, I cut a couple of short sections of folded steel U-channel (I used Unistrut from Grainger; 800-473-3473), drilled five holes in the bottom of each and screwed them to the base. Then I found a couple of pieces of steel that would slide in the channels and drilled and tapped them to accept the motor.

A good-quality new motor, switch, wire and plug will cost $200 to $300. It's money well spent. I've used a light switch, vinyl-covered cord and a cheap mail-order motor before. Performance was poor from the start. I ended up shelling out more money for the good stuff in no time.

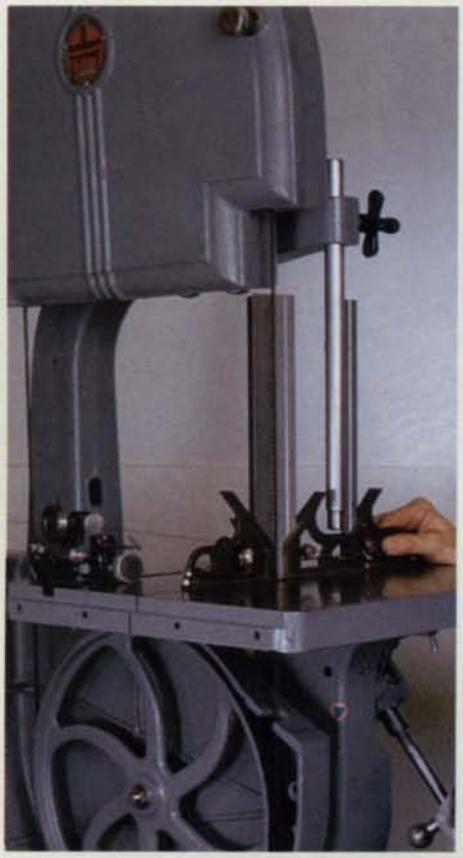
Bottom line

Total material costs were just under $400, bandsaw included. Costs were so low because I used a reconditioned motor and a manual starter (both good quality but without any bells or whistles) and because I already had just about all the peripheral materials (sheet steel and aluminum, clear plastic, fasteners) on hand.

I also spent about 65 hours on the restoration. At $25 an hour, labor costs would be about four times my materials' cost—not out of line for this kind of project. I've explained how I overhaul a machine and, for the most part, the reasons why. I hope this both inspires and instructs others to restore old machinery because the result, when done well, is most gratifying. The adage "they don't make them like they used to" is true, but there's a reason for it. The sad and brutal truth is that most buyers of new woodworking machinery don't demand quality so much as they do low-priced look-alikes. The downward spiral in the quality of woodworking machinery is the result. "They don't make discriminating buyers and users of woodworking machinery like they used to" is probably a more apt phrase. But who can criticize the guy who's perfectly satisfied with a five-dollar socket set? □

Robert Vaughan is a contributing editor to Fine Woodworking *and a woodworking machinery rehabilitation specialist in Roanoke, Va.*

The particulars of the bandsaw



***The saw table must be perpendicular** to both blade and upper blade-guide post (which must be parallel to each other) for the bandsaw to work perfectly. The author adjusts the table for perpendicular, using combination squares to check for gap between the rule and the blade and between the rule and the blade-guide post.*

***Miter gauge, disc sander** and a mitered push stick allowed Vaughan to grind the side blade guides with little effort. Other options, had the guides been irreparable, would have been to grind his own from steel bar stock, to replace them with new Delta guides or with guides made of graphite-impregnated phenolic resin (sold as Cool Blocks by Garrett Wade).*

Many of the steps in the restoration of this bandsaw are just as applicable to a vintage jointer or planer as they are to the bandsaw. A good stand, new electrical and drive systems and clean, well-lubricated bearings are things that any old machine can profit by. But the procedures below are bandsaw-specific, and although it's a Walker-Turner I happened to be working on, the steps taken—and the conditions that necessitated these steps—are common to most bandsaws.

Table, blade-guide post, blade

For a bandsaw to work properly, the blade, blade-guide post and table must all be in proper relation to one another. If they're not, every time you move the upper guide up or down, you'll have to readjust the guides. You can either live with this long-term hassle or go through the one-time tedium of correcting these misalignments. This alignment has been adjustable on every bandsaw I've ever worked on, but I've never worked on inexpensive do-it-yourself-type bandsaws, so regretfully, I have no experience in that realm.

On C-frame bandsaws, such as this Walker-Turner, the upper blade-guide post's line of travel is dictated by the position of a hole in the casting. To make the blade travel in a line parallel to that of the post, the position of the wheels needs to be adjusted properly. On this machine, the upper wheel can be moved from side to side. I was also able to make slight adjustments to the position of the whole upper wheel carriage by loosening and retightening its mounting bolts. The bottom wheel can be moved in and out by adjusting the setscrew-held bearing stops. It took quite a few adjust-tighten-test sequences before the blade's line of travel was right (parallel to the upper blade-guide post), but now I won't ever have to worry about it again.

The next step was to set the table perpendicular to the blade's line of travel. I first put some good squares against the sides of the blade, loosened the tilt lock and tilted the table until both blades were parallel with the sides of the blade. Next, I put the squares' blades against the front and back of the blade and loosened the underneath bolts that hold the table to the trunnions. I slipped thin sheet-metal shims between the table and the trunnions, experimenting with

different thickness shims until the table was perpendicular to the blade. If you can't get the table perpendicular, then all you can do is split the difference on either side of the blade. Once again, though, it's a one-time hassle with long-term benefits.

Restoring the old blade guides

Deep grooves were worn into the side guide blocks, and the back guide bearings were virtually frozen from sawdust contamination. Using a disc sander and miter gauge (see the bottom photo on the facing page), I reground the 45° angle on the steel side blade guides.

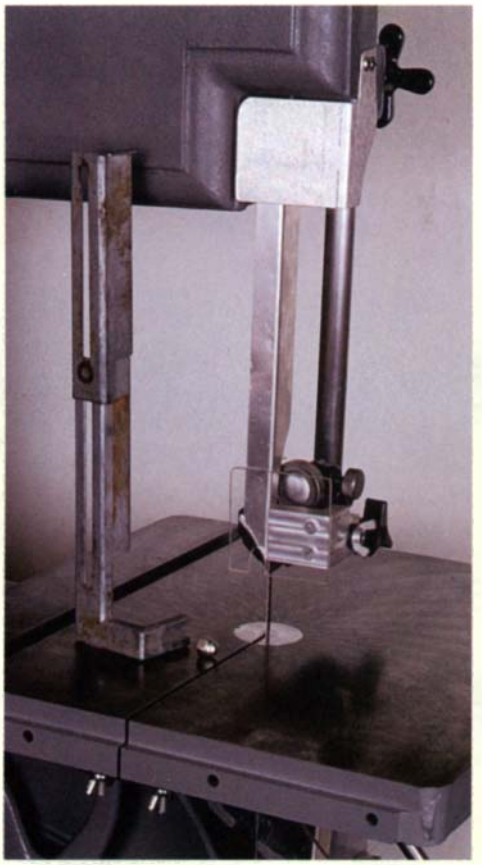
For both top and bottom back guides, I clamped the guide bearing's shaft in a vise and used two large opposing screwdrivers to pry off the bearing. I reversed the bearing and drove off the front dust cover with a wooden dowel, exposing the balls and cage. Then I flushed the bearings clean with lacquer thinner. Don't let the bearing spin freely under a blast of air because solvent will spew everywhere, and the bearing can be damaged at high speeds.

If either the side or back guides had been irreparable, I would have had to replace the defective part. For replacement side guides, I could have used graphite-impregnated phenolic resin guides (Cool Blocks), cut and ground new guides, or searched for compatible guides from another manufacturer. If the back ball-bearing guide for this particular machine had needed to be replaced, I could have had a new shaft machined to fit a standard 6203 size bearing—no big deal for someone with a metal lathe.

Before replacing a lot of individual guide components, though, I would first consider upgrading to a set of Carter guides. They make three good styles that fit this saw. Cost ranges from $140 to $185 for a complete set of guides, mounting brackets and studs. Carter Products can be reached at 437 Spring St., N.E., Grand Rapids, Mich. 49503; (616) 451-2928.

A new blade guard

Blade guards on old bandsaws, if they're there at all, are rarely in good working order, and this machine was no exception. After studying the old blade guard, with its worn-out sliding pieces, I decided that I could make one that would work better and be easier to maintain. The only hitch was that I had to have an aluminum block machined to accept the bent sheet-aluminum guard. Knowing a tall, single piece guard fastened to the upper blade guide could not fully extend up into the castings enclosing the upper wheel, I had to make two separate guards. One short guard was fastened to the upper wheel guard casting. It came down about even with the bottom of the upper wheel guard castings and was wide enough to let the whole upper blade guide slide up behind it. A tall, skinny guard was fastened to the upper blade-guide area. At the blade guide's lowest position, the top of this guard did not come below the guard I put on the upper wheel casting. This way, I could raise the blade guide all the way up and prevent the tall guard on the blade guide from hitting things in the upper wheel guard castings. As an afterthought, I put a clear plastic panel on the front of the blade-guide mounted guard to provide extra protection on the feed side of the saw (see the photo at left). I made this panel even with the actual bottom of the blade guard so that any stock that would fit under the plastic panel would fit under the upper blade guide.



***A new guard of bent sheet-aluminum** seemed an easier and better solution than trying to get the rusted old steel guard (left) back into shape. Vaughan added the clear plastic to the front of the guard for more protection on the saw's infeed side.*

***Often the simplest solutions** are the best. The author had noticed that the bottom back blade guides are almost always inundated with dust and tend to lock up much more quickly than the top ones. By placing an angled piece of clear plastic between the saw table and guide, he was able to deflect almost all of the dust away from the guide.*

Custom dust deflectors

Bandsaws normally flood the bottom blade-guide assembly with sawdust, causing these guide's bearings to fail long before the top guide bearings. Also, since the bottom guides are hidden from convenient inspection, they're rarely cleaned. I was able to eliminate more than half of the normal sawdust deluge with a clear plastic deflector, which I mounted above the guide. I experimented with cardboard and tape until I had a good pattern, and then I cut out what I needed from some scrap clear plastic. I bent, drilled and tapped a strip of aluminum to hold the plastic deflector. I then drilled and tapped one hole in the bottom wheel guard and threaded a bolt through from the inside. I fastened the deflector assembly with a wing nut for easy removal and for when I needed to change blades or set the saw table at a particularly steep angle (see the photo at left).

Even with the plastic deflector, I noticed dust being broadcast from the joints of the clamshell castings of the lower wheel guard. This dust would blow out on the table and pile up on the floor behind the machine. I found I could direct most of this dust toward the front of the saw with two simple baffles. After experimenting with cardboard again to get the best pattern, I cut baffles from aluminum flashing and then mounted them to the guard by drilling and tapping a single hole for each baffle (see the top photo).

The net result of all of this activity is that most of the sawdust created by the saw winds up right in front of it, where it can be easily swept away. If I used a vacuum system, I'd have cut and mounted a piece of 2-in. tubing in place of the plastic deflector to suck up the dust right as it comes off of the blade. —*R. V.*

Fig. 1: Mirror and stand assembly

Construct the frame first. If needed, alter the stand to fit the frame. Position the pivot more than halfway up the frame. For more stability, use ¼-in. instead of ⅛-in.-thick mirror glass.

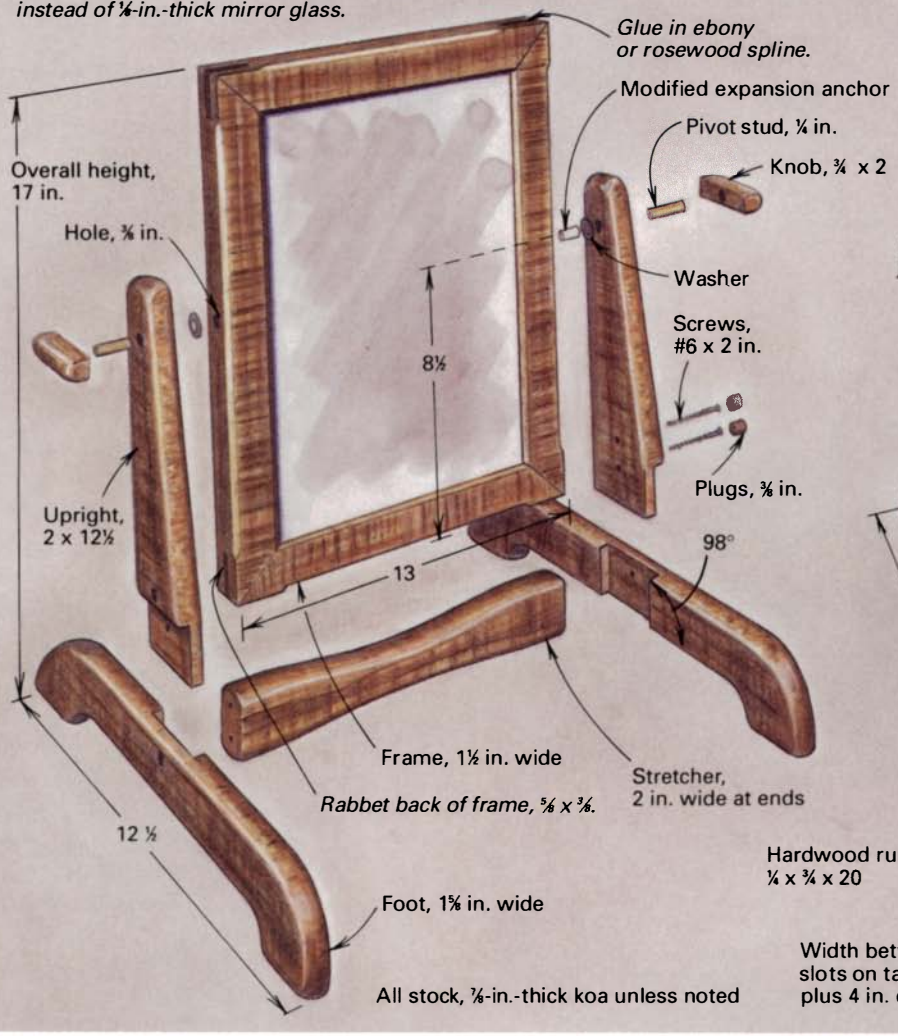
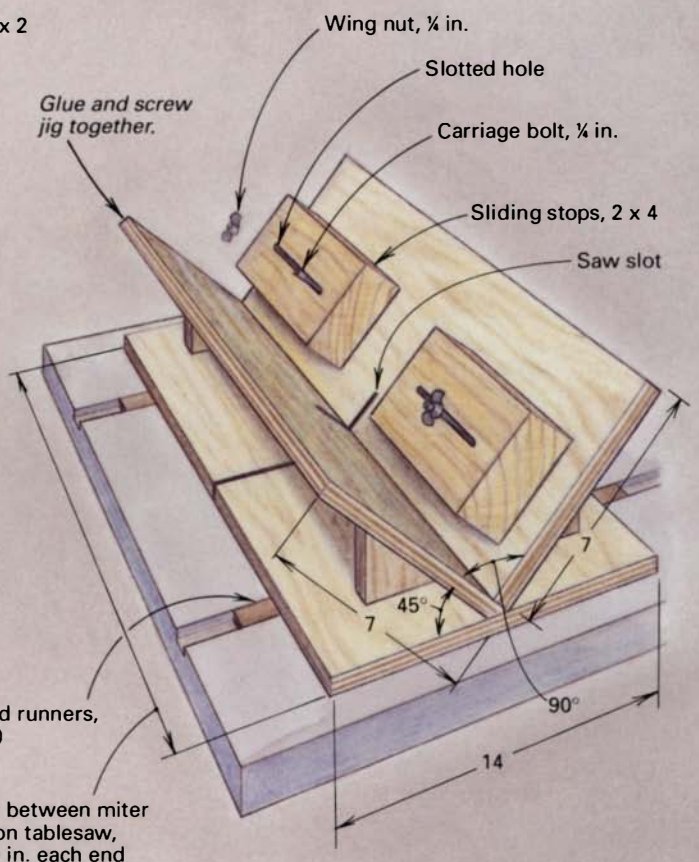


Fig. 2: Grooving jig for corner splines

Adjust stops to hold frame vertically and edge-centered with the tablesaw blade. All parts are ¾-in. plywood unless otherwise noted.



Splined Miters Join Mirror Frame

Tabletop project pivots for a better view

by Bob Gleason

As a luthier living in Hawaii, I have the opportunity to work with beautiful, exotic woods. With today's environmental concerns, I've learned to use these species efficiently. For example, with the small, narrow stock leftovers I accumulate, I do short production runs of special projects. One of these is a small version of a cheval mirror (see the top photo on the facing page), which is relatively quick to build and is an attractive addition to a tabletop or desktop.

The mirror pivots in a stand that consists of two sides (feet attached to uprights) connected by a stretcher, as shown in figure 1. A pair of knobs at the pivot point enable the mirror to be fixed at different angles. A mitered back frame retains two wooden panels in a recess at the back of the frame. The mirror frame itself is mitered and splined, and because these corner joints are exposed and tricky to cut cleanly, I built a jig that lets me quickly and consistently cut grooves for the splines. The jig (see figure 2) is made of plywood and has runners that slide in my tablesaw's miter slots.

Picking and preparing stock

I try to pick out matching wood for the mirror's frame and stand parts, preferably using 8/4 stock, so I can resaw it to book-match pieces. For the adjustment knobs, I cut out two ¾-in.-sq. by 2-in.-

long blanks. For the accent plugs and splines, I use ebony or rosewood (my fingerboard remnants). I thickness the frame and stand pieces to ⅞ in. Then I surface the two back panels and the back-frame pieces to ⅛ in. thick. Next, I rip the frame stock into 1½-in. strips. I leave the strips long rather than crosscutting them to length. Finally, I use a ⅜-in. roundover bit to ease the strip's edges except for what will be the frame's outside corners.

Cutting the frame's rabbet, miters and grooves

Because I often work with figured woods (see the photo at right) that chip out easily, I like to use my tablesaw when rabbeting the frame instead of using a shaper or router. The frame's rabbet receives both the ¼-in.-thick mirror glass and the back panels. Cut the rabbet ⅝ in. wide, so you won't see the cut edge of the glass when viewing the mirror from an angle. Next, miter the frame's corners accurately because the frame will be viewed often and from a close distance. After the glue is dry, smooth the joints flush. Then, using a tablesaw jig like the one shown in figure 2, cut slots for each of the corner splines.

Installing the mirror and back

The mating edges of the two back panels are beveled so that one or both of them can expand or contract. To hide the joint and to flush-up the panels, insert dark construction paper between the mirror and the panels (unless your mirror already has a dark backing). Next, roundover the edges of the back-frame pieces. To join the back-frame miters, lay out the frame flat and perfectly square on waxed paper. Then, with cyanoacrylate (super) glue, bond the corners together one at a time. So that the glass can be readily exchanged, drill slightly oversized holes in the back frame for ½-in.-long, 16d brass escutcheon pins (see the bottom photo). Drill slightly undersized holes in the mirror frame, install the panels and back frame, and then drive the pins home.

Assembling the stand

Appropriately, the two sides of the stand are mirror images. To cut the half-lap joints in each foot and upright, slant your miter gauge 8° to the left for the right leg and 8° to the right for the left leg. Once you've wasted exactly half the wood thickness between the layout lines using multiple saw passes, clean up the joint with a sharp chisel and a hard sanding block. Before you glue up the sides, bandsaw the tapered shape of the uprights and the curve of the feet. Then sand the edges that will be joined. When the glued-up sides are set, round over the edges with a router, and thoroughly sand both sides.

When you bandsaw the stretcher's profile, remember that its width must clear the pivoting mirror. The length of the stretcher is also critical. If it's too short, the problem is obvious. If it's too long, the tips of the uprights will tilt inward and touch the mirror frame when the knobs are tightened. In addition, the ends of the stretcher must be cut at exactly 90°, or the stand will be askew. Allow ¼ in. extra length for brass washers and for the adjustment knobs to work properly. Position the stretcher in the same plane as the slant of the uprights; one screw goes through the upright and the other goes through the foot. Butt join and cap the stretcher to each side using glue, screws (#6 by 2 in.) and ⅜-in.-dia. plugs.

Mounting the frame on pivot studs

I use ¼-in. threaded rod for the mirror's pivot studs. One stud attaches to the back of each knob. Drill a hole two-thirds of the way through the back center of each knob. The stud length equals the depth of the hole, the thickness of the upright, two washers and ⅜ in. to go into the frame. Cut the rod to this length, bevel one end so that it threads easily into a ¼-in. nut, and then epoxy the stud's other end perpendicular to the knob's back.

To screw the knob studs into the mirror frame, you could install threaded inserts, but I just use ¼-in. expansion anchors that are carried by most hardware stores. Punch out the spreader slug on the back of each anchor, remove the little ball and grind off the end until the anchor is ½ in. long. Next, mark the pivot points on the sides of the frame 8½ in. up from the bottom. After clamping a temporary stop across the back of the uprights, place a ⅛-in. shim on top of the stretcher, and set the mirror in place. Carefully transfer the frame's pivot marks to the uprights. After you've bored ⅜-in. holes through the center of the uprights, place the frame back on the shim on the stand. With a brad-point bit, re-mark the frame's pivot stud holes through the holes in the uprights. Finally, drill ⅜-in. holes in the frame edges and epoxy the modified anchors in them. After you've sealed all the wood (I use lacquer), mount the mirror to its stand with the screw knobs. □

***When making tilting** tabletop mirrors, the author uses exotic-wood leftovers from his guitar-making business. The mirror's design, a small version of a cheval mirror, relies on smooth forms for the components and contrasting woods for the exposed joinery.*

***Because this fiddleback koa** and ebony mirror will be touched often, Gleason finished the wood with lacquer, which is easy to clean. The mitered back frame, held with brass pins, retains the floating panels.*

Bob Gleason builds custom guitars and ukuleles in Hilo, Hawaii.

Photos: Karl Backus; drawings: Lee Hov

A New Twist for Turners

Pivoting headstocks simplify the ins and outs of bowls

by Dick Burrows

***Lathes with pivoting headstocks**, such as this Record Coronet, free turners from the usually restricting bed of the lathe. Because the headstock rotates 90°, bowls may be turned off the front of the lathe, permitting easy access to both the inside and outside of the blank.*

Most turners enjoy bowl turning but are often frustrated by the acrobatics needed to twist over the lathe's bed to hollow out the spinning blank. And the gap between the headstock and the bed generally limits the bowel's diameter to 12 in. or less on lathes not equipped with outboard spindles.

But, a new lathe design offers solutions to these problems. The design is based on pivoting headstocks, which can be rotated 90° to set the drive spindle at the front of the lathe. Hook up an articulated, three-piece tool-rest system, and you can work all parts of a bowl efficiently and comfortably from the front of the lathe. Because each tool rest is anchored to the lathe itself, you don't need the tippy freestanding tool rest often used with outboard turning. Another plus is that you can use the same faceplates for inboard and off-the-front turning, so you don't have to buy the special faceplates required for conventional outboard spindles.

In this article, I'll look at Delta, Jet and Record lathe systems priced under $1,200 (see the chart on p. 84). I've excluded the Myford Mystro (distributed in North America by Russ Zimmerman's House of Woodturning, RFD #3, Box 242, Putney, Vt. 05346; 802-387-4337) because the Myford tops out at more than $1,800.

I was impressed by how well the pivoting headstocks handled larger bowl blanks. Depending on the particular model, you can turn blanks from 16 in. to 30 in. dia., a real treat for turners once straitjacketed by the narrow swings of inboard drive spindles. Working bowls off the front of the lathe does take a little getting used to. It's easy to find yourself standing right over the bowl blank as it spins parallel to the front of the lathe. Once you are aware of the situation, though, you can quickly position yourself out of harm's way.

I used the three lathes for several weeks in my shop for turning spindles and bowls, both inboard and off the front of the lathe. Each of the lathes ran very smoothly at all speeds, and I didn't encounter problems with any spindle or bowl job. These lathes look like any other model except motors are attached to the headstock assembly, rather than housed in the tool base.

How headstocks rotate

Each of the lathes uses a slightly different approach for turning the headstock. Delta requires an additional tool; the others have everything built on. On most conventional lathes, the headstock assembly is securely attached to the lathe bed. In contrast, the headstock assemblies on these

lathes are attached to a yoke-like device that locks to the bed of the lathe. A center bolt joins the yoke and the headstock assembly and acts as a pivot. Loosen the bolt slightly, then rotate the headstock and retighten the pivot bolt. Because the motor is an integral part of the headstock, the drive belts stay aligned in all positions.

After years of being restricted by traditional two-piece tool rests, I found the three-piece assemblies for these lathes to be a real joy. The third section brings the tool support away from the base and provides a lot more maneuverability. In every situation, I could bring the tool rest right up to the work surface.

Delta model 46-700

The Delta variable-speed lathe runs very smoothly and is relatively vibration free, even though at 125 lbs. it is the lightest of the three lathes I tried. The company markets this model as a home-shop tool, but it's better than that term often indicates.

The Delta performs well for all turning jobs, although rotating the headstock is awkward. A large Allen wrench, which comes with the lathe, is needed to convert the lathe from inboard to off-the-front turning. Loosen a cap screw under the headstock assembly, lift the unit slightly (I never did get the hang of doing this smoothly), then rotate it before retightening the screw. The unit I used came with an optional stand that has an opening in the top, making it easier to manipulate the cap screw for rotating the headstock. Reversing the procedure switches the lathe back to inboard use and tightening the cap screw realigns the headstock for spindle work. I had to remove the tailstock assembly before I could slide the tool rest off and move it into position for off-the-front turning. The tool-rest extension is a heavy, stable, cast L-shaped plate that allows the tool rest to be used at the front or the back of the blank. The extension must be ordered as an accessory, but you can't hollow out a bowl on the front of the lathe without it.

The adjustment knobs of the speed control, tailstock and tool rest are large and easy to tighten. The handle on the tool-rest base is large and L-shaped for a comfortable grip and good leverage. Delta's variable speed feature is convenient. Push in the lever on the front of the headstock/motor assembly to engage it, and dial up the speed (500 RPM to 2,000 RPM).

My major complaint about the Delta is the location of the on/off toggle switch at the end of the motor. It's inconvenient for spindle turning and could be dangerous when turning bowls at the front of the lathe because you have to reach over or around the blank to the back of the motor.

***Spindle work** is still possible on pivot-head lathes by keeping the headstock in the normal position. The author was impressed with the quality of all the lathes but found he used the Jet the most for his own work, both spindles and bowls.*

***Billed as a home-shop tool,** the Delta pivot-head lathe is much more than that moniker might imply. The offset base extension for the tool rest shown above is a necessary optional accessory for off-the-front turning.*

Jet JWL-1236

The Jet lathe features an easy-to-use system for switching from inboard to off-the-front turning. Release one knob, pull out the locking pin and rotate the whole assembly. It is a very smooth operation, and I like not having to use a separate tool. Also, the locking pin provides a very definite stop for realigning the headstock for spindle work. This lathe comes equipped with everything you need for both inboard and outboard turning. The basic package includes a stand, tool rest, drive and a ball-bearing tailstock (a nice improvement over the cup centers common on many standard packages), a drift for removing the drive center and a face shield. Because of its stability, smooth operation and quick-change adjustments, I used this

Photos: Lorraine Burrows

lathe more and more for my own work.

A pair of large push-button on/off switches are mounted on the front of the left leg, and I have no trouble reaching them during either inboard or off-the-front operations. The locking knobs for headstock, tailstock and tool-rest assemblies are large and make it easy to secure each of the assemblies. The tailstock locking knob is about 5 in. long and mounted on the back side of the unit. This seemed awkward at first because I'm used to finding that lock at the front of the tailstock, but now I like how easily it securely tightens the tailstock to prevent creeping when I advance the ram.

The tool-rest assemby is versatile. The extension is a 9¼-in.-long cast-iron strip with a slight crook at its end. Even when extended out to its full length, the tool rest is sturdy and doesn't flex or vibrate. The Jet also has a gap in the bed right in front of the headstock assembly, making it easy to slide the tool-rest assembly off the main bed of the lathe and move it to the bed extension on the end of the machine.

The Jet speed control has seven distinct speed levels. The overall range is 550 RPM to 3,000 RPM. To change speeds, pull out a lever and move it to the desired detent. Of all the models tried, the Jet offers the highest maximum speed, which spindle turners might really like.

Record Coronet CL3/48M

The Record is the heavyweight of the bunch—precisely machined, smooth running and quiet, with 3-in.-dia. phosphor bronze taper bearings that can be adjusted to reduce spindle play. And it is capable of turning the largest bowl off the front, about 30 in. dia., if the headstock assembly is moved toward the center of the lathe. The motor cord is long enough to allow this, although I had to position the on/off switch in a couple of different locations along the bench before I found an arrangement that worked well. Once I got everything set, I enjoyed turning larger bowls on the Record.

The Record lathe is a benchtop model, so you will need to build a strong, heavy base to take full advantage of the turning capacity of the machine. The dual bed bars, which fit into cast-iron yokes, are finely machined from solid steel and chromed to resist corrosion.

Installing the auxiliary tool rest is a bit of a job, but I only had to do it once. The tool-rest support is massive, about 18 in. long, and connects to an intermediate section about 14 in. long. All the locking levers are large enough to exert considerable authority. Because of the size and heft of the pieces, the tool-rest assembly was stable and solid wherever I positioned it around the blank.

The headstock is heavy but easy to move. The locking lever is attached, so no additional tools are needed. Alignment marks on the front of the headstock help to realign it for spindle turning.

Speed levels are controlled by moving the drive belt to different sets of pulleys. This is relatively easy to do with a quick-release lever that lets the motor pivot up to slacken the belt. This model has a 48-in. spindle capacity and comes complete with a double tool-rest assembly and 10-in.- and 17-in.-long tool rests. □

Dick Burrows is a freelance writer and woodworker in Knoxville, Tenn. Too late to be included in this article: a new Hegner swivel head lathe, HDB 200S ($1495); Advanced Machinery Imports, P.O. Box 312, New Castle, Del. 19720; (302) 322-2226.

Pivot Head Lathes

Manufacturer	Swing over bed ▲	Swing over tool rest ▲	Distance between centers ▲	Front-of-lathe turning ▲	Speeds (RPM)	Spindles ◗	Ram travel (in.)	Motor	Weight (lbs.)	List Price✸
Delta 46-700, Delta Int'l. Machinery Corp. 246 Alpha Drive, Pittsburgh, PA 15238 (800) 438-2486	12	8¼	36	16 in. dia.by 4 in. thick	Variable (500 - 2,000)	Headstock 1 in. dia. by 8 tpi Headstock & tailstock #2 Morse taper	2	¾ HP 120v	125	$548➤
Jet JWL-1236, Jet Equipment and Tools Inc., PO Box 1477, 1901 Jefferson Ave., Tacoma, WA 98401 (206) 572-5000	12	8¾	36	16½ in. dia. by 5 in. thick	Variable (550 - 3,000)	Headstock 1 in. dia. by 8 tpi Headstock & tailstock #2 Morse taper	2¼	¾ HP 115v	183	$689
Record Coronet CL3/48M, Record Tools, Inc., 915 Clements Road #1, Pickering, Ont., Canada L1W 3V4 (416) 428-1077	12	8	48✢	30 in. dia. by 15 in. thick	510 750 1,110 1,632 2,400	Headstock ¾ in. dia. by 16 tpi #1 Morse taper Fits only Record Coronet accessories	3	¾ HP 115v	200	$1,209
Myford Mystro, Myford Ltd., Beeston, Notts, England NG9 1ER 011-44-602-254222	11	9	40	20½ in dia. by 10 in. thick	420 ■ 680 1,100 1,780	Headstock 1⅛ in. dia. by 12 tpi Headstock & tailstock #2 Morse taper	2⅞	¾ HP	210❖ 115v	$1,870❖

▲ Capacity (in.)
✸ May be discounted by some dealers.
◗ All lathes have holes through both headstock and tailstock.
✢ A 36-in. model is available also.
■ A lathe with optional variable speed AC motor is available for $2,200.
❖ With optional bowl turning setup.
➤ Optional stand is available for $125, offset base extension for $21.25.

A Table for Breakfast or Banquets

Drop down legs support expansion mechanism

by Steven M. Lash

***Extra legs add support** and rigidity to tables that expand beyond the usual additional 2 ft. or 3 ft. Drop-down legs hidden in the expansion mechanism enable this Queen Anne dining table to expand to more than 14 ft. long.*
***With the center legs retracted** into channels in the beams of the expansion mechanism, the ends can be pushed together to shrink the table from 14 ft. long to just 60 in. long.*

As a reproduction cabinetmaker, I am constantly looking for examples of 18th-century American furniture that can inspire new projects. My unsuccessful search for an expandable Queen Anne dining table led me to design and build a table with an unusual extension slide mechanism: It incorporates hidden legs that can be dropped down to provide extra support as the table is expanded. The legs remain concealed inside the beams of the slide mechanism when they're not needed.

The convenience of drop-down legs was a crucial factor in my overall table design. I wanted my table to have a pair of fluted, pillar-and-claw pedestals (rather than four legs) as its principal supports. I also wanted significant expansion capacity—from 5 ft. long in the closed position to over 14 ft. long with all the leaves in place (see the photos above). In this article, I'll describe a smaller version of the extension slide mechanism that I used in my table.

How the extension slide works

Like many table extension mechanisms, mine extends and retracts in telescope fashion. Fixed to one end of the table is a central beam—the narrowest part of the telescope. The remaining beams in the mechanism function in pairs, sliding against the edges of adjacent beams as the table is extended. The outermost pair of beams is fixed to the opposite end of the table (see figure 1 on the following page).

Although I knew that drop-down legs would help to stabilize my table in stretched-out form, I still wanted to minimize sag when the mechanism was fully extended. A good way to do this is to maximize beam overlap when the mechanism is fully extended. I divided the 48-in.-long beam into thirds, allowing for an overlap of two-thirds and an extension of one-third, or 16 in. (The beam length is determined by the size of the tabletop, allowing space for overhang and apron thickness.) Once you know the maximum beam extension, you can calculate how many beam pairs will be required to achieve the full extension of your table.

The only major limitations in designing a table around my extension mechanism are the width and thickness of the mechanism. It can't exceed the space you have available beneath the table and between the table aprons (see figure 1). The extension-assembly

Photos: Dirk Bakker; drawing: Bob La Pointe

beams are paired around a larger central beam (see figure 2 on the facing page). The wide central beam is mortised to receive a tenon that extends from the top of one pedestal.

As in any expanding table design, it's very important for the extension mechanism to be solidly anchored to the table ends. In a pedestal-type table like mine, table-end construction must include solid connection details for the pedestals as well as for the extension mechanism. With this in mind, I designed a drawer-like compartment, or sleeve, formed by the tabletop, two side aprons and a bottom support board in each table end. A pair of steel angles and a ¼-in.-thick steel plate reinforce each sleeve.

The extension mechanism and the pedestals are secured to the bottom support, not to the tabletop. The tabletop, fastened to the aprons with machine screws and threaded inserts, is easily removed for access to the entire extension mechanism.

One pedestal has a tenon that extends through the bottom support board, through the steel plate and through a mortise cut in the central beam. Wedges and screws add rigidity at this critical connection. The other pedestal is screwed to a 3-in.-dia. pipe flange that is, in turn, screwed to the steel plate.

Wood dovetails and brass guides

In a well-functioning extension mechanism, the beams are coupled together and glide smoothly against one another. In my initial design, I planned to couple the beams with sliding dovetails—beam-long dovetail pins that would slide in dovetail slots milled along beam edges. To test the design, I built a mock-up mechanism out of 2x4s.

The mock-up was a good idea. I learned that the overall weight of my test mechanism caused the dovetails to bind. This prevented the beams from sliding smoothly against each other. If weight was a problem with fir 2x4s, it would only get worse with the maple I planned to use for the finished version.

To solve the binding problem, I added some guides made from brass angle stock. The guides have a leg that rides in a slot milled along the edge of the adjoining beam (see figure 2). There are more guides on top of the beams than on the bottom because the hollow section in the bottom of each leg-carrying beam doesn't leave enough wood for guide slots or mortises.

To make the sliding surfaces more slippery, I let in a pair of plastic strips on either side of each beam's dovetail slot. The central beam has dovetail slots and strips on both sides. I cut the plastic from a sheet of high-density polyethylene (HDPE), available from Laird Plastics, Inc., 1400 Centrepark Blvd., Suite 510, West Palm Beach, Fla. 33401; (407) 689-2200. Similar to teflon, but less expensive, HDPE is easy to cut on the tablesaw.

I made some staple-like stops from brass rod (which is available at most hobby shops) and drove them into the upper guide grooves to prevent each beam from sliding beyond its maximum extension of 16 in. Also, I screwed a small stop into the dovetail slots to prevent each beam from sliding beyond the closed position. To close against this stop, the adjacent beam's dovetail pin needs to be trimmed. By removing the end stops, and a few central brass guides, it is possible to completely disassemble the mechanism.

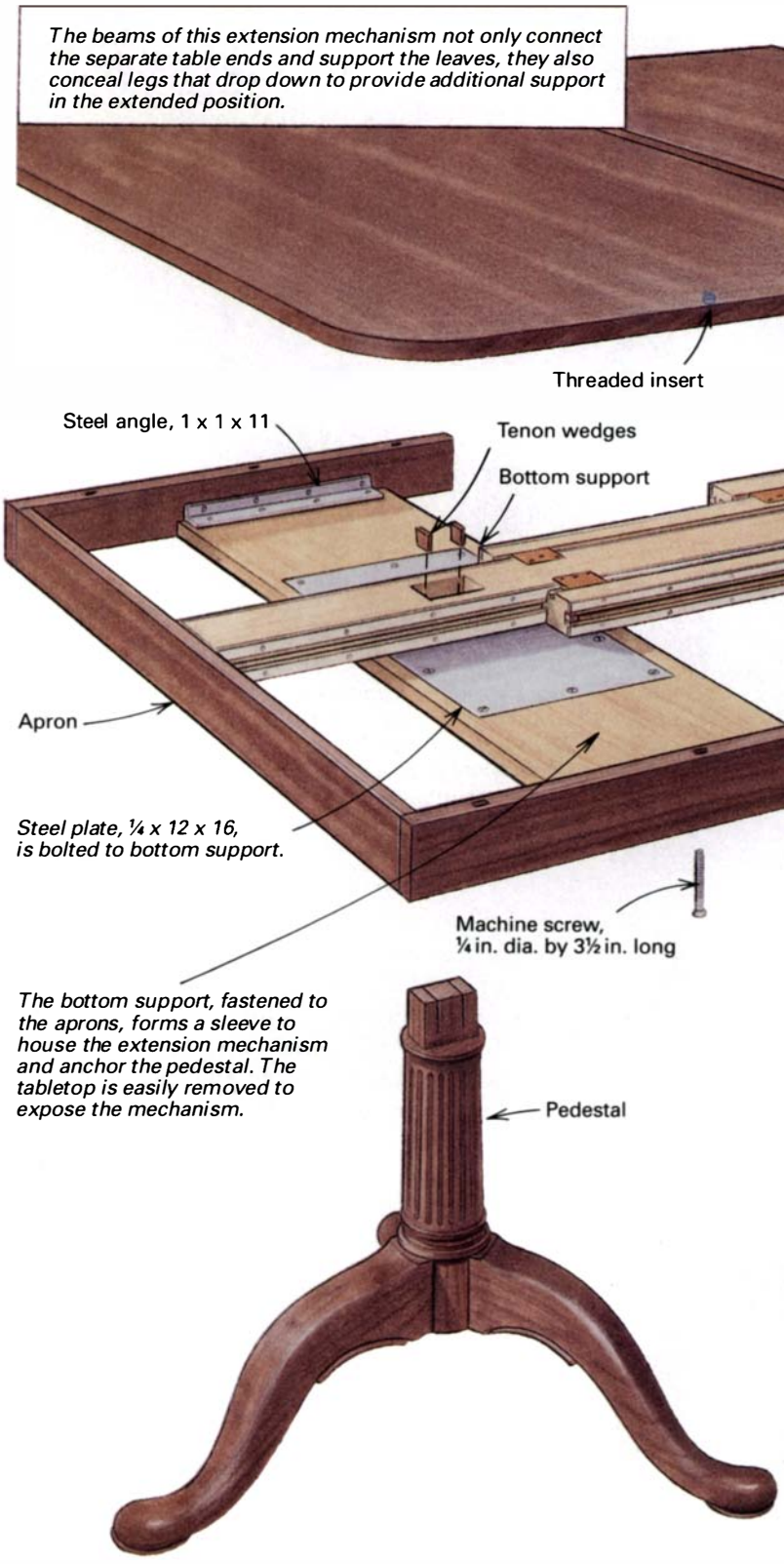
Making the beams was fairly straightforward. I milled the dovetail slots on my shaper, using a ½-in.-dia. dovetail bit. The rest of the work was done on the tablesaw: cutting out the dovetail pins, rabbeting beam edges to receive plastic strips and cutting guide slots. Making multiple passes with the dado cutter, I cut the channel for each drop-down leg. This channel needn't extend the full length of the beam. Instead, it can be stopped a couple of inches from where the base of the leg will fit.

The drop-down legs

I carved the drop-down legs in Queen Anne style, tapering from the square top section to just above the carved pad foot. The top edges of each leg are radiused so that the leg can swing freely without binding against its channel.

Removable, brass pins hinge the drop-down legs to their respective beams. I made the pins from brass rod, threading one end of each pin and cutting a straight screwdriver slot in the other. Then I held the leg in its correct position in the beam and drilled a pilot hole through the beam and leg. Next, I enlarged the pilot hole in the leg to accept a length of brass tubing. The tubing prevents the

Fig. 1: Table expansion mechanism houses drop-down legs



pin from enlarging the hole with use. After installing a threaded insert in the beam to receive the threaded end of the pin, I installed the leg by inserting the pin through one installation hole and through the leg and screwing the pin into the threaded insert.

A brass ball catch holds each leg in place in the beam channel until the leg is pulled free. I used a Brusso ball catch (available from The Woodworkers' Store, 21801 Industrial Blvd., Rogers, Minn. 55374; 612-428-3200). For more holding leverage, install the catch as far down the square section of the leg as possible.

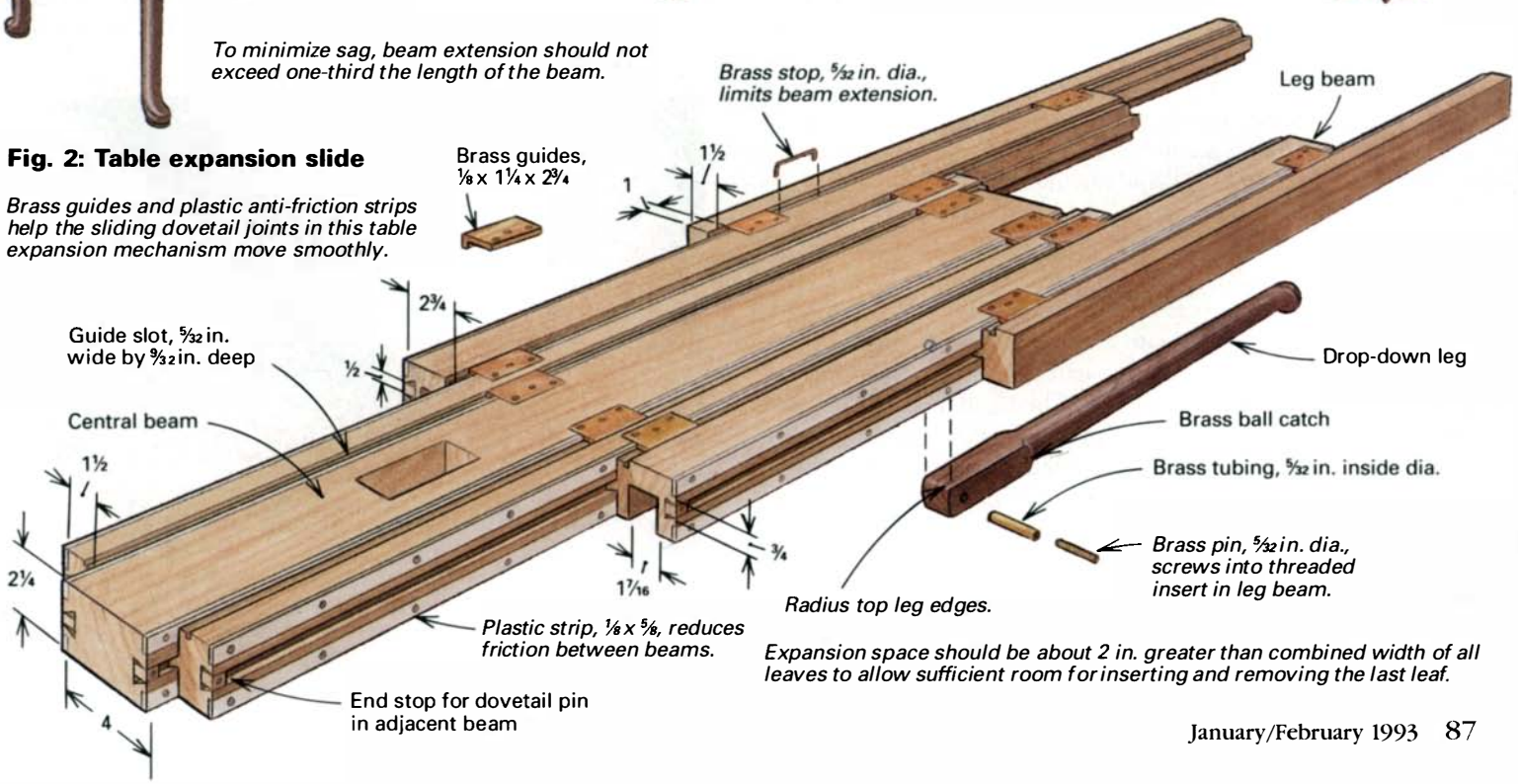
Adjustable floor glides are an important feature on my drop-down legs. The threaded insert that fits in the bottom of the foot enables me to fine-tune the leg length to accommodate floor irregularities.

I glued some felt in the channels where the drop-down legs fit. The felt is most useful near the base of the leg to protect the carved foot from scraping against the beam as a leg is returned to its concealed position. In addition to its protective function, the felt is a fine finishing touch for a mechanism that you're bound to be showing off. □

Steven Lash builds furniture as an avocation in Bloomfield Hills, Mich.

Fig. 2: Table expansion slide

Brass guides and plastic anti-friction strips help the sliding dovetail joints in this table expansion mechanism move smoothly.



***Behold the language** of auctioneer Richard Crane. Most auctioneers initially start the bidding low; later, they'll open items high.*

How to Buy Used Hand Tools

You can find high-quality tools at flea markets and auctions

by Robert Hubert Jr.

I was excited. I had finally saved up a little extra cash to put toward new hand tools for my shop. I gathered up all my dog-eared woodworking catalogs to pick out planes, chisels and other tools. The shock came when I hit "total" on my calculator; my modest savings would buy only a fraction of the tools I wanted. But thanks to a neighbor who told me about an old plane he had seen at a local flea market, my tool-buying strategy changed.

The next Sunday I bought that plane, a usable Stanley #5, for just $15. Three years later, my collection of vintage hand tools has cost me less than half the price of new tools. And here's the best part: By carefully purchasing and reselling a few extra tools for a profit, my tool buying has begun to pay for the rest of my shop.

Preparing for a tool hunt

Whether you call them antique tools, vintage tools or just plain old tools, hunting for used tools requires preparation. The better equipped you are, the better your chances of acquiring high-quality tools at reasonable prices. Here's the systematic approach I use.

Make a tool "want list" for the woodworking you do. Use catalogs to jog your memory of your shop needs. Be specific. Don't just list "bench plane," put down "Stanley #3," and list whether you want a wood plane or an all-metal one. Being specific will keep you focused and help you avoid buying tools you don't need.

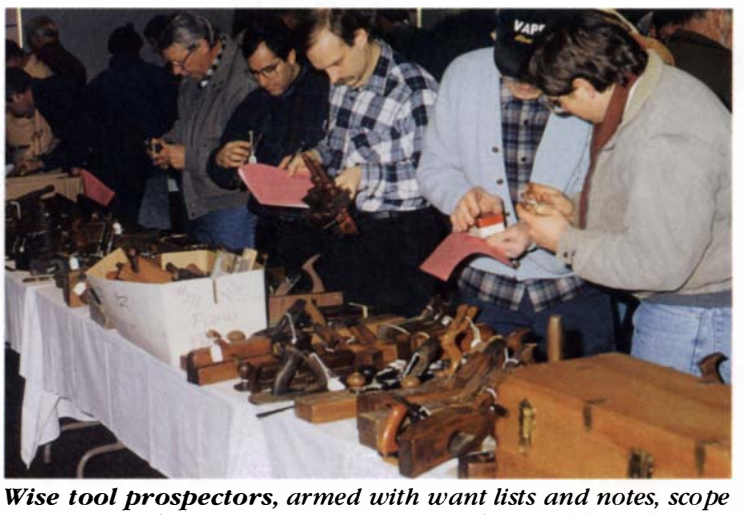
Study the tools you'll be buying. Start by becoming familiar with tool classes and makers. Certain tools, like drawknives, have changed little over the years. Others, like planes, have changed dramatically. One place to learn about hand tools is in original or reprinted owner's manuals and catalogs. Product literature can help you identify a tool as well. In addition, there are books and associations (see the sources of supply on the facing page) that offer a tour of secondhand tools and sellers, as well as supply information about repairing and using old tools. As a beginner, you can go a long way by studying up on Stanley tools alone.

Learn about fair prices and value of used tools. Although you shouldn't completely rely on price guides, current guides can give you ball-park figures for tools. If you're buying for speculation, the guides can tell you how valuable a tool is. Collectors typically look for limited-production tools or tools from unusual makers. Stay away from these tools if you want a bargain tool for woodworking. Always jot down a fair price range for each of the tools on your want list. An entry in my notebook looks something like this: "Jack Plane—prefer Stanley #5 w/corrugated sole—$15-$25."

Four basic rules for buying vintage tools

As I head into an uncharted used-tool market with my want list in hand and my head full of knowledge, I follow four basic rules.

Rule #1: Thoroughly inspect the tools you're buying. If a tool has many parts, take it apart and examine the pieces. I carry a simple tool-disassembly kit that consists of two screwdrivers, an Allen wrench set and a pair of pliers. A hidden crack (see the photo on p. 91) can make an old tool useless. Therefore, after you take a tool apart, wipe away grime with a rag. Then, check the tool's stress points. On a plane, the blade area and mouth are susceptible to stress and so is the rear tote (for more on this, see the story



***Wise tool prospectors,** armed with want lists and notes, scope out a table of handplanes and box lots of tool parts during the auction preview. A few of the bidders will snatch up bargains at the end of the auction just by outlasting their competitors.*

on p. 90). On chisels, check for mallet-caused damage and for splits where the tang meets the handle.

Check for missing or substitute parts. Here again, a manual makes it easy to compare a parts list against the actual tool. At the least, a catalog will show a drawing or photo of what the tool should look like. In addition, the tools themselves can reveal where parts are absent. A threaded hole with nothing attached may indicate a missing fence, for example.

Rule #2: Look at what tool collectors don't. One of my best bargains came about because a collector shunned a tool. The owner of a panel-raising plane had restored his tool by refinishing it. The tool looked beautiful to me, but not to a collector. Without its original finish, the plane sold for one-tenth of its value.

Rule #3: Buy parts and pieces. Occasionally, it's a good idea to buy a box lot or two of tool parts because you'll often find a tool with something missing. The tool may be offered cheaply and be in good shape otherwise. To complete the tool, you can simply connect the right part from your stock. My best hand tools have come this way (see the bottom photo at right).

Rule #4: Take it easy. There will always be another tool like the one you want. Don't feel forced into buying a marginal tool or one that costs more than it's worth. It took me nearly three years to put together my assortment of hand tools, and I'm still refining it.

Where to acquire old hand tools

Vintage tool hunters basically have three avenues where they can buy tools: flea markets, auctions and dealers. Depending on where you live, the used-tool scene can be quite disorganized and the prices arbitrary. Always remember, it's "buyer beware."

Flea markets offer the best bargains, but they'll cost you energy and time (pleasant work for me). At many flea markets, you may only find one tool. But, it's likely you'll be able to buy it cheap. My favorite buy was a mint-condition Millers Falls bit brace—just $3. You can cover a flea market quickly once you learn to spot tool tables from a distance. When you find a tool, don't be afraid to barter. Rarely have I had to pay the marked or asking price.

Auctions provide the best selection of tools, but be wary of auction fever. There'll be lots of tools for sale, so wait for a good

There are other places to look for secondhand tools *besides auctions and flea markets. Here, Hubert asks about a pair of calipers being offered by a tailgate dealer, who temporarily has set up shop in the parking lot outside the Cabin Fever Auction. This old-tool auction is held every February in Nashua, N.H.*

Put together for less than one-fourth the price *of a complete plane, this Stanley combination plane is the author's pride and joy. Assembled from parts acquired from flea markets, auctions and tool dealers, this non-original plane makes a perfectly good woodworking tool, even though it's unacceptable to a collector.*

Sources of supply

For a more complete list of tool groups, dealers, auctions and publications, send $1 to Bob Vogel, New England Tool Collectors Assoc., 164 Chestnut St., N. Easton, MA 02356-2611.

Associations, auction houses and workshops:

Early American Industries Association, PO Box 2128, ESP Albany, NY 12220-0128

Society of Workers in Early Arts and Trades, 606 Lake Lena Blvd., Auburndale, FL 33823

Tool Group of Canada, 112 Holmcrest Trail, Scarborough, Ont., Canada NT M1C 1V5

The Tool and Trades Historical Society, 60 Swanley Lane, Swanley, Kent, U.K. BR8 7JG

Your Country Auctioneer Inc., 63 Poor Farm Road, Hillsboro, NH 03244

National Antique Tool Auction, 4729 Kutztown Road, Temple, PA 19560

David Stanley Auctions, Stordon Grange, Osgathorpe, Leicester, U.K. LE12 9SR

Warwick Country Workshops (plane clinics), 1 E. Ridge Road, Warwick, NY 10990

Antique and used-tool dealers:

Tom Witte's Antiques, PO Box 399, Mattawan, MI 49071

Bob Kaune Antique and Used Tools, 511 W. 11th St., Port Angeles, WA 98362

Two Chislers, 1864 Glen Moor Drive, Lakewood, CO 80215

Iron Horse Antiques, PO Box 4001, Pittsford, VT 05763

Roger K. Smith, PO Box 177, Athol, MA 01331

Martin Donnelly Antique Tools, 31 Rumsey St., PO Box 281, Bath, NY 14810

Books and publishers:

Dictionary of Woodworking Tools, R.A. Salaman, revised by Phillip Walker, 1990, The Taunton Press Inc., PO Box 5506, Newtown, CT 06470

The Antique Tool Collector's Guide to Value, Ronald S. Barlow, 1985, Windmill Publishing Co., 2147 Windmill View Road, El Cajon, CA 92020

Restoring, Tuning and Using Classic Woodworking Tools, Michael Dunbar, 1989, Sterling Publishing Co., 387 Park Ave. S., New York, NY 10016

Astragal Press, PO Box 338, Mendham, NJ 07945

Photos except where noted: Alec Waters

tool at the right price. To minimize overbidding, first get the auction preview list, even if you have to buy it, and then use preview time wisely (see the bottom photo on p. 88). Some auctions have previewing the day before; and some require an admittance fee. After I check off items from my want list, I allow five minutes for inspecting each tool. This gives me enough time, even when there's a crowd. If there's no preview list, try to arrive when previewing begins. Do a once over to spot-check all the tools. Then go back and fully inspect items that interest you.

Second, mark down the maximum price you're willing to pay for a tool. I often write the figure on the back of my bidding card along with the lot number (this prevents me from bidding on a tool that looks identical to the one I want). Once you've arrived at a figure, don't exceed that limit. You'll be strongly tempted to bid another five dollars in hopes of winning a tool, but this rarely works. One exception is when you're bidding against a dealer—they're usually conservative, disciplined bidders. Once they reach their cutoff, you can often buy an item at just a slightly higher bid. On the other end of the spectrum are the collectors. Avoid getting in a bidding war with a collector—they often bid quite aggressively when pursuing a tool for their collection.

Third, to save yourself grief, don't bid on something you haven't inspected. I've wound up with lemon tools because I didn't inspect them first. If you can't attend an auction, you may still be able to place a sight-unseen absentee bid, but it is risky. If you're determined to take a risk at an auction, buy a cheap box lot.

Fourth, check out the tailgate tool market, where dealers peddle their wares in event parking lots (see the top photo on p. 89).

Dealers have hard-to-find tools, but their prices are frequently higher than those at flea markets and auctions. Many tool dealers sell via mail order and issue some kind of catalog. The catalogs usually list prices and describe tools and their condition. Before you order from a dealer, verify that he has a flexible return policy. Most dealers also have a listing service in which they'll locate something from your want list. Finally, keep an eye open for antique dealers who double as tool dealers. □

Bob Hubert Jr. works for an architectural firm. He likes to build period and modern furniture for his Harvard, Mass., home.

Stalking a secondhand plane

by Maurice Fraser

Acquiring a new handplane can mean spending good time tuning it or else spending dearly for a ready-to-use deluxe model (see the photo below). Another option is to hunt for a usable old classic. So you won't have to hunt in the dark, I'll describe what to watch for when pursuing a used plane, and I'll explore their inner workings.

Basic plane anatomy

A plane is, essentially, a chisel locked in a guiding body. Standard bench planes are of three types—each for a special job. The jack plane (14 in. to 15 in. long) zaps wood to dimension, the jointer plane (18 in. to 24 in.) straightens curves, and the smooth plane (8 in. to 9½ in.) polishes surfaces. Except for size, the three types are built alike.

British and American traditions

The best metal planes are either the wooden-core British models, exemplified by the classic Norris, or the open-shell cast-iron planes, perfected by the Stanley planemakers of Connecticut.

Norris and Stanley-type metal planes boast parallel-thicknessed irons, which ensure that the mouth-to-blade fit is constant. In addition, both Norris and Stanley blades have a cap iron bolted to them called, collectively, the "double iron." Both planes lock the double iron to the throat opening with a pivoting lever cap.

Norris-type lever caps are on an axle and tighten to the blade by the turn of a bolt. Stanley-type lever caps are captured under a bolt head and snap tight with a clever cam action: The lever cap consistently forces the blade onto the back of the throat (cutter seat). However, the ideal, integral seat isn't feasible in a cast body, so Stanley-types have a screw-on cutter seat or frog, which allows adjustment. But, often more a liability than an asset, the frog permits chatter on heavy cuts, and its blade-positioning range can be narrow. Furthermore, Stanley-type frogs wander during adjustment, and realignment is by tedious trial and error. By contrast, the Norris-type cutter seat is simple. It is cut into the solid wood interior and is not adjustable.

Adjusters: Stanley vs. Norris

Both Stanley and later Norris metal planes rely on mechanisms to control both depth of cut and side-to-side evenness. Stanley planes separate the two modes of adjustment. For depth, a brass wheel's rotation pushes a forked lever downward, carrying the blade with it. Sideways movement is via a pivoting upright lever, whose end is captive in a blade slot. Norris planes combine the two motions in a single ingenious, but awkward, mechanism (see the inset photo on p. 91).

Stanley's two-part adjustment system is re-

Inspiring smoothers: *The mint-condition used planes in the background (an A-6 Norris, left, and a Stanley #4½, right) are hard to find. But, a few new planes borrow features from these originals, as shown in the foreground: Bristol Design's P-40 (left center), J. Warshafsky's 04 Reed (left front) and Record's Calvert-Stevens CS-88 (right front).*

Photo this page: Beryl Goldberg

Checking used plane parts: What to avoid

A Stanley "Bailey" #4 smooth plane assembled

Disassembly reveals problems and virtues: *The parts on the left show what to be wary of when buying an old plane. The assembled plane (top right) is fully restored. The Norris-type adjuster (bottom right) is taken from a new Record plane (carried by Garrett Wade).*

liable and responsive. Even over-used Stanleys adjust with finesse. But a well-preserved Norris adjusts less finely, and it's easy to over-tighten the lever cap.

What to look for

Since Norrises are rare and ultra expensive, start by looking for the upper-end Stanley models: Bailey, Bed Rock and Gage. Liberty Bell and Defiance are Stanley's lesser models and may not tune up as well. Most generic "Stanleys" (unsigned) are cheapies and no bargain. Leave exotic brands to the collectors, and as a rule, avoid (or haggle for) planes with mixed parts.

If you're patient and observant, you can avoid buying a plane that will need major work. The photo above shows a few features that can make or break a deal.

Body: Normal rust and pitting won't affect a plane's function, but cracks (common around the mouth) are risky and can worsen. Check the sole against a straightedge or a sole of known flatness. If light shows through, the sole will need flattening.

Handles: Avoid planes without totes. In addition, broken or badly mended totes are like ill-fitting running shoes—no bargain is worth the misery. Note that the totes of long and short planes are not interchangeable. Broken or missing front knobs are replaceable. You can remedy a loose knob or tote by screwing in the retaining bolt or shortening it.

Blades: Preferably, a blade should be the same make as the plane. A blade ground down to ¾ in. or less from its long slot has little life left (and may have only unhardened steel left in it). Rust pitting on a blade's bevel face is acceptable, but *not* on the cutting face. The blade's back should be flat and unscored or else proper cap-iron fit will be impossible. Avoid bent blades.

Cap iron and lever cap: When screwed tight, no light should show at the cap iron's junction with the blade's edge (chips will clog here). If the cap iron is a substitute, its adjuster slot may not align with the depth lever. This limits blade extension, so check out the blade-depth range. A chipped lever cap corner won't affect planing, but the leading contact edge should be straight.

Adjuster and threaded parts: If the brass wheel is rust-frozen, applying WD-40 or oil may or may not free the motion. The yoke should be astride the wheel and freely move with it without rattling. Reject a broken yoke. The lateral adjustment lever can be bent and still function perfectly. Screws should all turn and have reasonably crisp slots and rust-free threads. The lever-cap capture bolt *must* turn to allow tension adjustment, but rusted frog bolts may never require further use if the frog is set right. If you can, try the tool then and there. □

Maurice Fraser teaches woodworking at the YWCA's Craft Students' League in New York City.

Photos this page: Susan Kahn

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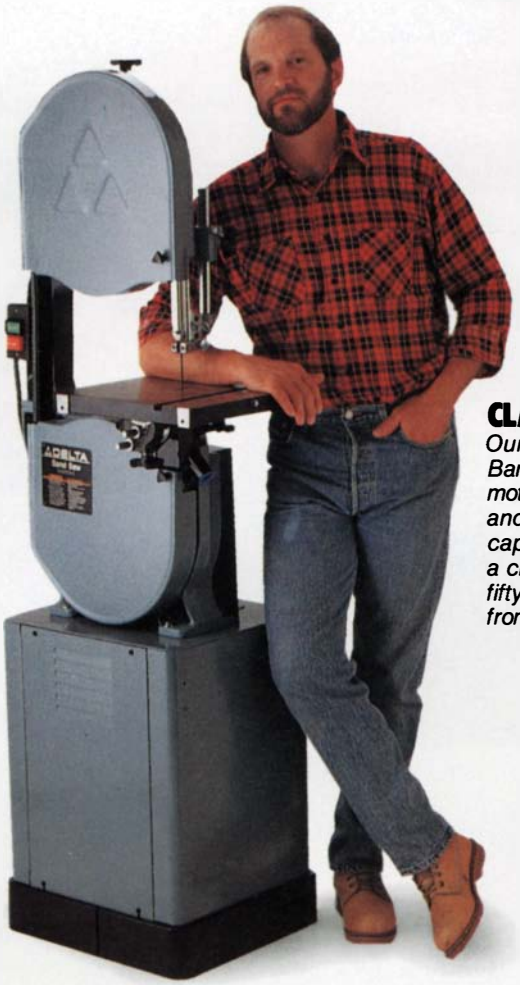

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Fine WoodWorking®

Index to issues 92 through 97

This alphabetical index covers all the issues of Fine Woodworking *magazine published during 1992, that is,* FWW *#92 through #97. Starting in 1988,* Fine Woodworking *has published annual indexes as follows: 1988 is in* FWW *#74 (#66 through #73), 1989 is in* FWW *#80 (#74 through #79), 1990 is in* FWW *#86 (#80 through #85), 1991 is in* FWW *#92 (#86 through #91). The Taunton Press also sells a cumulative index covering 1975 through 1984 (issues #1 through #50) for $3.95. A supplement covering issues #51 through #65 is, regrettably, out of print. The format of each index reference is issue number:page numbers. A hyphen between page numbers means the discussion is continuous; commas between page numbers indicate an intermittent discussion. This index, like all previous indexes to* Fine Woodworking, *was prepared by Harriet Hodges, chairmaker, of New Castle, Va.*

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WOODWORKING IN ESTONIA, by A. Viires. Reprint. Springfield, VA. U.S. Dept. of Commerce, 1969. Offers to: Ray Geerinckx, 25 Ave. De la Tendraie, B-1421 Ophain, Belgium.

The Connoisseurship of Chinese Furniture by Wang Shixiang. *Art Media Resources, Ltd., 21 W. Illinois St., Chicago, Ill. 60610; 1990. $150, two-volume hardback; 416 pp.*

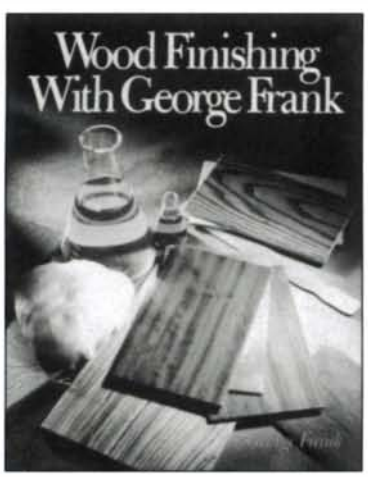
Wang Shixiang has spent a lifetime studying the history of Chinese furniture. No easy task in a China racked by invasion, civil war, social turmoil and cultural revolution. He trekked across the furniture-producing regions of China on foot and by bicycle, photographing and sketching, talking to woodworkers, canvasing door to door, searching for the craftsmen and the antiques that could clarify the evolution of the furniture tradition.

The Connoisseurship of Chinese Furniture, recently published in English, is the summary of his research. The books (a two-volume set) are structured much like the classic works on Chinese furniture by Gustav Ecke and George N. Kates and consider many of the same topics, but Wang expands each topic, adding a wealth of specific and detailed information. Joinery is given the most thorough treatment yet, and the description of Chinese cabinet woods is augmented with color photos of each. Wang has also linked his examples, where possible, to ancestral types found in tomb furniture and scroll painting.

Those who already possess other volumes on Chinese furniture will appreciate the photos of 350 pieces of furniture. Wang's photos are drawn overwhelmingly from collections inside China in contrast to the other books that rely mostly on Western collections. Regrettably, these are all black-and-white photos. These books attempt to be an encyclopedia cataloging every permutation of design that Wang could document.

The books' principle fault is that Wang assumes an objective, scholarly tone, so he reveals little of his magnetic personality or sense of humor. Apart from this, *The Connoisseurship of Chinese Furniture* is sure to stand as the authoritative work on Chinese furniture for decades to come and a data bank for future scholarship in the field. This status is especially appropriate because these books are the first major work on the subject in modern times written by a Chinese. *—John Kriegshauser*

Wood Finishing With George Frank by George Frank, *Sterling Publishing Co., 387 Park Ave. S., New York, N.Y. 10016-8810; 1988. $14.95, paperback; 144 pp.*

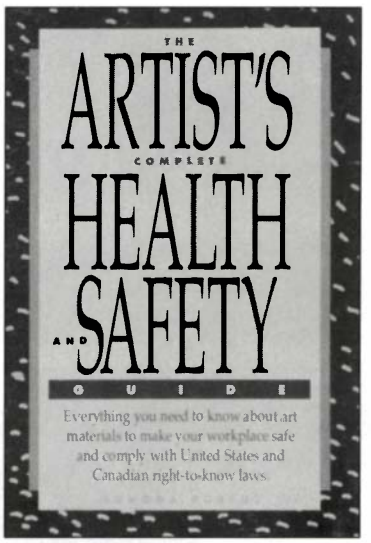


Throughout this rich treasury of wood-coloring and wood-finishing lore, the author, George Frank, teaches in the Old World way. Frank teases, cajoles, and warmly draws the reader in with stories of his experiences. Sometimes he scolds. Always he holds out the rare information for us to take. Beautiful color plates show results we can hope to achieve.

Nearly two-thirds of the tome is dedicated to treatments for coloring wood. Both modern chemical dyes and stains are covered as well as the more traditional vegetable stuffs. Tucked in carefully, sometimes between the lines or maybe one or two paragraphs beyond where you expected it, are the keys to successful usage of these sometimes temperamental materials.

Almost all woodworkers have experienced the frustration of unexpected results in finishing pieces we have long labored over. To use today's vernacular, Frank will not tolerate reactive finishing: simply hoping for the best, but resignedly taking what one gets. He teaches proactive methods, which allow us to create the effects we want. This is not another finishing manual that simply lists recipe after recipe. It does not bother with the mundane most of us already know. Rather, *Wood Finishing With George Frank* tells us how to predetermine the coloring and finishing results we want to achieve. *—Tim. B. Inman*

The Artist's Complete Health and Safety Guide by Monona Rossol. *Allworth Press, 10 E. 23rd St., New York, N.Y. 10010; 1990. $16.95, paperback; 328 pp.*



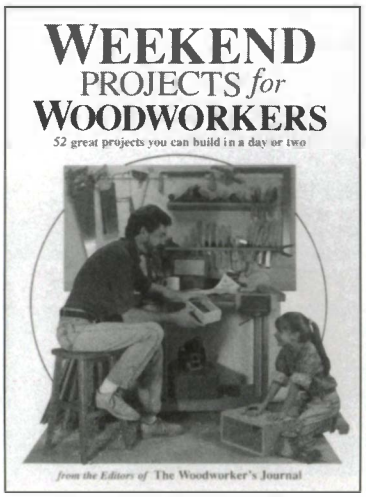
We all have a natural tendency to do what is familiar and easy (and all too often, risky) rather than doing what we really should in order to protect ourselves. This characteristic of human behavior is not likely to change any time soon, but laudably, there is an increasing focus in arts and crafts literature on safety. This comprehensive text adds considerably to this focus. It is both timely and forceful. You cannot read it without feeling somewhat guilty about your current work practices.

At first glance, it does not appear that there is much of interest to woodworkers here. There is only one chapter, of 10 pages, titled "Woodworking." This is misleading because excellent chapters on hazardous materials, their affects on the body, chemical and physical (e.g. noise and vibration) hazards, ventilation and respiratory protection are all relevant. The information is well-organized and concisely presented. For example, in the chapter on chemical hazards and their controls, the author distinguishes among gases, vapors, mists, fumes, dusts and smoke— seemingly an academic exercise until you try to avoid inhaling them. Prevention, not treatment is emphasized throughout the text.

For a general reference book on hazards in the arts and crafts, *The Artist's Complete Health and Safety Guide* is unsurpassed. If you use minerals, plastics, ceramics, metals, animal products, pigments, dyes or glass in addition to wood, this volume is indispensable. Art and craft school teachers should read it from cover to cover.

Deficiencies in such an ambitious undertaking are inevitable. In the woodworking glues and adhesives section, white glue is touted for its safety. However, white glue has been supplanted by modified polyvinyl acetate (PVA) glues—yellow glues—which are not mentioned. Great emphasis is placed on personal protection, but you will not find terms such as *gloves* or *goggles* indexed. Though a good chart is provided for various goggles, there is no such quick reference guide for gloves. All too often one is advised to "consult the manufacturer" for proper glove selection. A text such as this must make changing bad habits as easy as possible if it is to succeed. *—Theodore Fink*

Weekend Projects for Woodworkers by the editors of *The Woodworker's Journal. Madrigal Publishing Co., 517 Litchfield Road, New Milford, Conn. 06776; 1991. $14.95, paperback; 121 pp.*



I'm not normally impressed by project books. They usually contain pieces that either answer questions I'm not asking, or they appear to have been churned out solely for the sake of filling the pages.

But the editors from *The Woodworker's Journal* have developed some wonderful, exquisite designs that can be completed in a weekend. Each project shows evidence of careful attention not only to construction but also to the design details that mark the dividing line between the merely functional and the elegantly useful.

For example, the Shaker-style step stool combines the usefulness and construction of the original Shaker stools with the slightly softened appearance derived by giving the aprons and stretchers a gentle radius, a la James Krenov. The resulting stool looks like it belongs in the library at the Rockefeller's mansion—but works perfectly as an easily stored step stool for your pantry. As another example, the clamdigger's basket (useful as a magazine rack or for displaying floral arrangements) has a handle that runs diagonally. This provides better balance and the visual spark of excitement that separates good design from the merely functional.

This book contains a wide variety of projects: several categories of toys, furniture, furnishings and jewelry chests. There's not a clinker in the bunch. For those of us not fortunate enough to be able to attend design school, simply observing these designs with a thoughtful eye can offer many good design lessons.

Each project is accompanied by a high-quality black and white photograph and two-color line drawings that help make the spatial relationship extremely clear. All the information you need to complete each project is clearly presented—even to the inclusion of several sources of supplies. *—Richard Griffin*

Country Classics: 25 Early American Projects by Gloria Saberin. *TAB Books, Blue Ridge Summit, Pa. 17294-0850; 1991. $12.95, paperback; 166 pp.*

Each of Gloria Saberin's projects is a reproduction of a genuine 18th- or 19th-century country antique; each would typically be found in almost every home of the period. Saberin includes a broad range of projects in four categories: "Small Household Accessories," "Furniture," "Toys" and "Doll Furniture."

Saberin does not fall into the trap of using the same thickness of wood for each element of her projects but rather carefully balances aesthetic and structural requirements. Construction instructions are clear and adequate. Each piece is illustrated both by line drawings and by black and white photographs, and there are color plates of 12 of the 25 projects. Saberin has even included black and white photos of the original pieces (those

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110-600	10x60	F	E	G	E	G	G	E	G
110-800	10x80	F	E	F	E	E	E	E	E
185-048	8.5x48	F	E	G	E	G	G	E	G

Key: E= Excellent, G= Good, F= Fair, P= Poor, NR= Not Recommended

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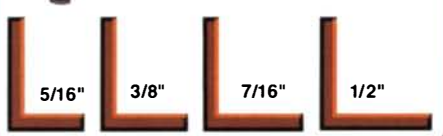

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If your taste in country furniture runs toward the more refined, you'll probably wish to pass on this book. But if the best of Early American country design appeals to you, Saberin's book will help you build some true classics. *—Richard Griffin*

Restoring, Tuning and Using Classic Woodworking Tools by Michael Dunbar. *Sterling Publishing Co., Inc., 387 Park Ave. S., New York, N.Y. 10016; 1988. $14.95, paperback; 169 pp.*

Restoring, Tuning and Using Classic Woodworking Tools is written for craftspeople who appreciate and use fine, old woodworking tools. Dunbar focuses on cutting tools sold during the golden age of hand tools. From about 1900 to 1940, good grades of tools that actually fit your hand were produced. They were solidly made, worked well, held an edge and looked wonderful when made with materials like rosewood, brass and steel.

The author's advice, which can hardly be repeated often enough, is to buy only complete tools in good condition. Many of these tools were sold, and in most parts of the country, they are not uncommon on the secondhand market. With a little shopping, you can often obtain twice the tool at half the price of a new one.

The coverage and organization of the book make it very useful. The major headings include tool-buying guidelines; tuning, cleaning and reconditioning tools; bench planes; specialized planes and miscellaneous—including chisels, gouges, bits, braces and saws. Photographs and illustrations are of good quality and do an excellent job of complementing the text.

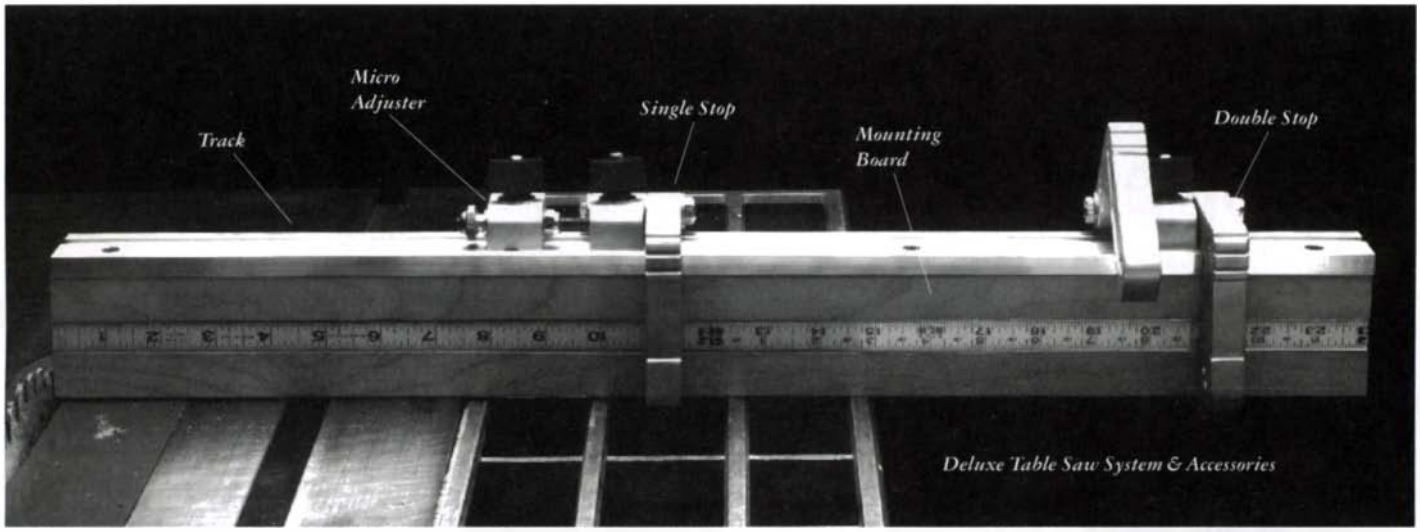
The array of hand tools covered by Dunbar is excellent. The book covers a wide variety of cutting tools, especially planes (wood, transition and metal) and plane-related tools (spokeshaves, drawknives and scrapers). This is a good book for beginners, but it also contains a lot of valuable and interesting information for the seasoned classic-tool user.

Although I found chapters on selecting and reconditioning tools to contain good information and tips, I was hoping for more. For example, Dunbar's recommendations for removing rust are usually limited to steel wool or 440-grit sandpaper. Safe, but slow and tedious. Since rehabilitating and tuning up a tool is not my primary objective, I'm constantly looking for faster ways to remove rust without damaging the tool.

While this book will not replace other good reference books on the subject, it will make a good addition to your library.

—Bernard A. Smith

John Kriegshauser is a furniture designer/craftsman and shop director in the College of Architecture at the Illinois Institute of Technology in Chicago. Tim B. Inman restores furniture in Lake Mills, Wis. Theodore Fink is an internist in Shelburne, Vt., and an amateur woodworker. Richard Griffin is an amateur woodworker in Oak Park, Ill. Bernard A. Smith is a woodworker in Bend, Ore.



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Although the mitre guide is the most important positioning fixture on any woodworking machine, virtually every machine sold comes with a guide that just doesn't measure up.

The FastTrack System was designed and developed by professionals to work in *real world, real shop* situations – as an inexpensive and simple solution to many table saw and other machine jigging problems. It really works.

The system is like an Erector Set, because you can assemble its various elements to meet your own special needs. Made of precisely cut and finished aluminum extrusions and solid Brass fittings, each system and accessory comes with the necessary screws, knobs, and instructions.

FastTrack For Table Saws

The Basic Table Saw System includes a 24″ Track, and a Single Stop. You make a mounting board to attach the track to your mitre guide. The Deluxe System includes the above plus a 24″ Mounting Board, with a fully adjustable, right-to-left reading 24″ Rule set into it.

67K04.01	Basic Table Saw System	$35.95
67K04.02	Deluxe Table Saw System	$71.00

FastTrack For Radial Arm Saws & Chop Boxes

This system, comprised of a 48″ Track and Single Stop, makes a superb cut-off jig.

67K07.01	Radial/Chop Saw System	$46.35

The FastTrack Track

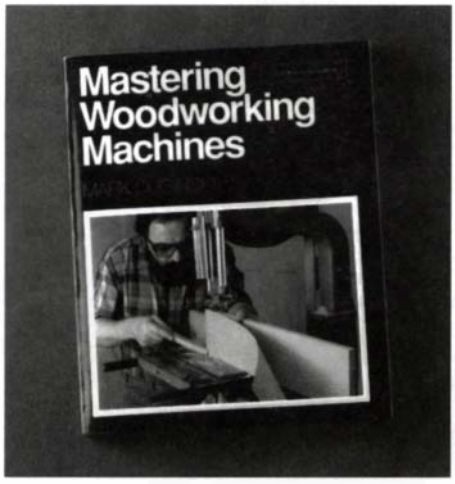
The foundation of the system is the Track, a ⅜″ thick by 1½″ wide precision extrusion with a T-slot that fits the head of a ¼″ hex-head bolt. These bolts hold all of the accessories and fittings to the Track, which is attached to a mounting board. Any length of Track can be cut to fit, or butted end-to-end.

67K08.01	6″ Track	$ 7.75
67K08.02	12″ Track	$10.30
67K08.03	18″ Track	$13.15
67K08.04	24″ Track	$15.45
67K08.05	36″ Track	$20.60
67K08.06	48″ Track	$25.75

Single & Double Flip Stops

In the down position, the pivoting Flip Stop acts as a positioning guide, fixing the distance between the end of a board and the saw blade. It flips easily out of the way when not needed. The Double Stop provides two settings 2″ apart.

67K09.01	Single Stop	$20.60
67K09.02	Double Stop	$25.75



Other Accessories

The Micro Adjuster screws into the side of a Single or Double Flip Stop or Microbase, allowing precise adjustment in .004″ increments. It is recommended for use with either Stop.

The Mitre Mount (includes a 12″ section of Track and a short piece of die board) lets you slide the Mounting Board freely left or right on the mitre guide. We recommend installing one with every FastTrack Table Saw setup.

The right-to-left reading 48″ Rule is marked in 1/16″. It fits into a dovetail-shaped flat extrusion which is set into a 14° dovetail dado you cut in your mounting board. The Deluxe Table Saw System already has the Rule set into it.

Suggested accessories for the Table Saw System are the Micro Adjuster, additional Track, Double and extra Single Stops, a 48″ Rule, and Mitre Mount. For the Radial Arm Saw, you can use a second 48″ Track, a Micro Adjuster, a Double or an additional Single Stop, and the 48″ Rule.

67K10.03	Micro Adjuster	$12.35
67K10.04	Mitre Mount	$19.30
67K10.05	48″ Rule	$19.25

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91L01.08	Machinery Book	$24.95

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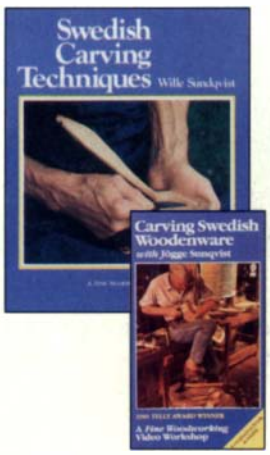

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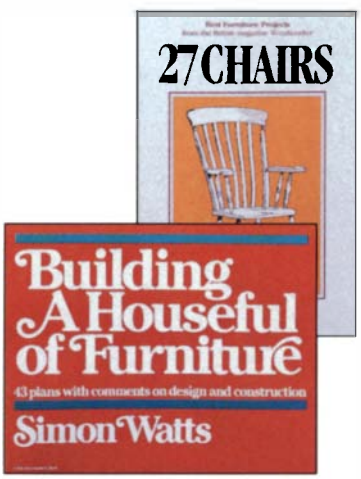

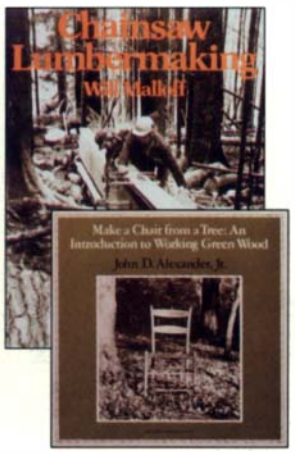

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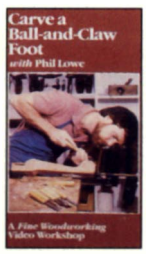
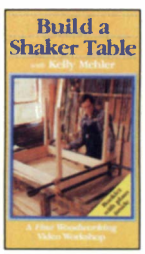


Carve a Ball-and-Claw Foot
with Phil Lowe

The ball-and-claw foot, combined with the cabriole leg, is a hallmark of 18th-century furniture. In this video workshop Phil Lowe shows you how to design and carve the version made popular in Colonial Philadelphia. 115 MINUTES, #060005, ~~$39.95~~, $20.00

Award winner

Build A Shaker Table
with Kelly Mehler



Want to build your own Shaker-style dining table? You can — once you've watched how furniture maker Kelly Mehler handles the task in this video. You'll be able to apply Mehler's systematic approach to any furniture project you want to tackle. 60 MINUTES, #060041, ~~$29.95~~, $15.00

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TAUNTON BOOKS & VIDEOS ...by fellow enthusiasts

What's new (and exciting) in tools? Some offerings from IWF '92

***Excalibur's sliding table** is available in two sizes, which list for $599 and $745 respectively. More information is available from Excalibur Machine & Tool Co., 29 Passmore Ave., Unit 6, Scarborough, Ont., Canada M1V 3H5; (800) 387-9789.*

***Porter-Cable's Model 7700** 10-in. miter saw features a LaserLOC indicator and lists for $634. For more information, Porter-Cable Corp., P.O. Box 2468, Jackson, Tenn. 38302-2468; (901) 668-8600.*

***Porter-Cable's Model 550 Pocket Cutter** makes quick, strong face frames. It lists for $330. For more information, contact Porter-Cable Corp.*

Every two years, woodworking tool manufacturers—heavyweights and flyweights alike—scramble to get the first production model of their latest gizmo off the line or out of the shop in time for the International Woodworking Machinery & Supply Fair (IWF) in Atlanta, Ga.

It's no wonder. IWF is the world's second largest woodworking show, occupying 15 acres of exhibit space and surpassed in number of exhibitors only by Germany's Ligna show. Attendance records are broken with each show: over 23,000 buyers in 1992. A well-received new product at IWF has catapulted many a part-time, garage-based business into the big time, sending its owner scurrying back to his local bank's loan office just to fulfill orders taken at the show.

Still, until recently, the show has been almost exclusively for the industry giants. And this year, as in the past, there were plenty of gargantuan, multi-million dollar machines on display, designed to convert raw materials into finished products with little or no human interference. But that's only part of the story. The truth is that IWF is also the best woodworking show for the small-scale furnituremaker.

I walked the halls and concourses of the Georgia World Congress Center (site of IWF '92), looking specifically for tools, accessories and materials that might be of interest to the skilled amateur or small-scale professional woodworker. What follows is an overview of the highlights.

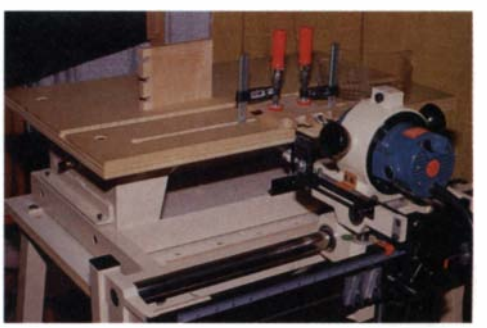
Saws and accessories

Although it was introduced over two years ago at IWF '90, **Excalibur's sliding table** was new to me, and the folks at the Excalibur booth told me their sliding table hadn't seen much press since it was introduced. That's surprising because it's the best aftermarket sliding table I've seen to date. It mounts to the saw with the stock bolts used to attach the left-hand extension wing (which you remove), and comes in two sizes, the larger of which will crosscut over 60 in. The crosscut bar can be mounted at either the front or the rear of the sliding table, and can be pivoted up to 45° from either position. A quick-action lever allows the sliding table to be locked for ripping. A flip stop comes with the crosscut bar, and toggle clamps that mount in the top of the crosscut bar are also available. Best of all was how smoothly the table slid and how little play there was in the whole setup. The overall quality of construction seemed exceptional.

One miter saw got a lot of attention at

***DeWalt's DW682K plate joiner** is one of the best available. It lists for $408. For more information, DeWalt Industrial Tool Co., P.O. Box 158, 626 Hanover Pike, Hampstead, Md. 21074; 800-433-9258.*

***Face Maker is a well-built fixture** for making face frames. It costs $295. For more information, contact Face Maker, 605 Oro Dam Blvd., Oroville, Calif. 95965; (800) 533-5000.*



***The Stanfield JS-1010 Joiner/Shaper** makes many traditional joints and can do some minor shaping too. It costs $1,150. For more information, Stanfield Manufacturing, Inc., 2730 San Pedro N.E., Albuquerque, N.M. 87110; (505) 889-0022.*

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PORTER-CABLE

9852 3/8" 12v Magnequench Cordless Drill **159.**

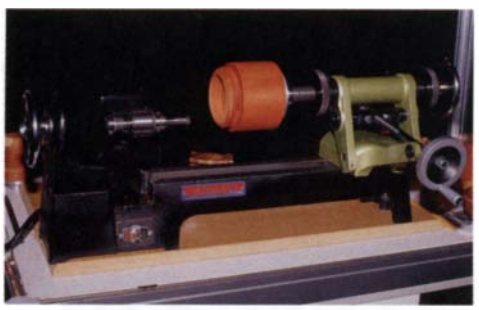
9853	12v Magnequench w/Keyless Chuck	**159.**
9854	1/2" Magnequench Cordless Drill	**165.**
666	3/8" VSR T-Handle Drill	**125.**
7511	3/8" VSR H.D. Drill	**114.**
7514	1/2" VSR H.D. Drill	**119.**
7515	1/2" VSR H.D. Drill w/ Keyless Chuck	**124.**
320	Abrasive Plane	**119.**
9367	3-1/4" Plane Kit	**159.**
9118	Porta-Plane Kit	**205.**
9652	Versa-Plane Kit	**299.**
555	Plate Joiner Kit	**165.**
100	7/8 HP Router	**105**
690	1-1/2 HP Router	**134.**
691	1-1/2 HP D-Handle Router	**144.**
693	1-1/2 HP Plunge Base Router	**169.**
7310	Laminate Trimmer	**89.**
7312	Offset Base Laminate Trimmer	**122.**
7319	Tilt Base Laminate Trimmer	**105.**
7399	Drywall Cut-Out Tool	**79.**
7518	3-1/4 HP 5-spd Router	**269.**
7519	3-1/4 HP Router	**225.**
7536	2-1/2 HP Router	**204.**
7537	2-1/2 HP D-Handle Router	**215.**
7538	3-1/4 HP Plunge Router	**229.**
7539	3-1/4 HP VS Plunge Router	**269.**
97310	Laminate Trimmer Kit	**189.**
330	Speed-Bloc Finishing Sander	**58.**
352	3"x21" Dustless Belt Sander	**142.**
360	3"x24" Dustless Belt Sander	**182.**
362	4"x24" Dustless Belt Sander	**189.**
504	3"x24" Wormdrive Belt Sander	**329.**
505	1/2 Sheet Finishing Sander	**118.**
7334	5" Random Orbit Sander	**119.**
7335	5" VS Random Orbit Sander	**129.**
7336	6" VS Random Orbit Sander	**135.**
314	4-1/2" Trim Saw	**138.**
315-1	7-1/4" Top Handle Circular Saw	**118.**
345	6" Saw Boss Circular Saw	**104.**
7549	VS, Var-Orbit D-Handle Jigsaw	**145.**
9345	Saw Boss Kit	**124.**
9637	VS Tigersaw Kit	**139.**
9647	Tiger Cub Reciprocating Saw	**118.**

ERRORS SUBJECT TO CORRECTION

822 Anthony St., Berkeley, CA 94710
Items marked with asterisk, *, are FOB Berkeley

READER SERVICE NO. 159

Vega's Jointmaker 1000 can make many traditional joints. It lists for $450. For more information, contact Vega, Route #3, Box 193, Decatur, Ill. 62526; (217) 963-2232.



Carba-tec's Threadmaster fits most lathes and threads lidded boxes. It retails for about $250. For more information, contact Carba-tec, 44-48 Cambridge St., Coorparook, Qld., Australia 4151.

Super Squares are accurate to .003 per foot and are available in standard lengths of 24 in., 36 in. and 60 in. For more information, contact Hudson Valley Metalworks, Inc., P.O. Box 2775, Newburgh, N.Y. 12550; (914) 565-3525.

IWF. **Porter-Cable's Model 7700** 10-in. miter saw features a laser that shines a line of light on the workpiece indicating the line of cut. Though only somewhat useful for 90° cuts, this feature could be a real asset if you have to cut interior trim for an old house, or for architectural work in general—wherever true 45° and 90° angles are scarce. The saw has a long list of features, not the least of which is a soft-stop electric/dynamic safety brake.

Joinery

The **Porter-Cable Model 550 Pocket Cutter** was also introduced at IWF. Seeing it in action made me wonder why it took as long as it did to be invented. The tool uses a router motor to power a 7⁄64-in. bit that swings down into the workpiece and cuts the pocket holes. An adjustable work hold-down and guides help ensure accurately positioned holes, and a drill bushing on the rear of the unit makes sure the pilot holes for the screws are dead center at the end of the pocket cuts. For anyone who does a lot of cabinet work, or face-frame work of any kind, this tool will pay for itself in no time.

Another solution to building quick, strong face frames is the **Face Maker**. The unit consists of a main body with jaws on either side and a T-bar out front. The jaws and T-bar, which adjust via clamp screws, hold intersecting workpieces in place. Bushings in each jaw ensure accurately positioned pocket holes, and there's an optional Quick-Attach kit so that you can put face frames together even faster. The Face Maker is a well-designed, solidly built tool, and like Porter-Cable's Pocket Cutter, it's a real time-saver.

DeWalt's DW682K plate joiner (also sold as the Elu 3379K and the Black & Decker 3382K) is another solution for quick, solid joinery. The engineers who designed this tool thought of everything: it's a heavy-duty tool with finesse. The fence sits flat against the face of the joiner when it's not in use, preventing any damage to the fence. The fence adjusts with a rack-and-pinion gear system, tilts from 0° to 90°and features a permanent, acid-etched scale. Retractable anti-slip pins on the lower face of the joiner keep it from slipping when the blade contacts wood. The unit invites comparison with Lamello's Top 10 (which one you prefer probably has more to do with taste than quality), and the DeWalt costs about half what the Lamello does.

The **Stanfield JS-1010 Joiner/Shaper** is also primarily a joint-making tool, but it makes more traditional joints than the above three tools. Following various templates and using a pair of 1-in. steel rods for horizontal travel, ¾-in. rods for vertical travel and a 4½-in. plunge mechanism, the Joiner/Shaper can not only cut through dovetails, box joints and round and square tenons but also can perform some limited shaping (cutting fancy aprons or raised panels, for example). I'd seen literature on it before IWF, but was unimpressed. Seeing it there changed my mind. The ingenuity with which this tool was designed and the ease with which it cuts joints sold me. After returning from the show, I asked Albuquerque, N.M., furnituremaker Sven Hanson to take it through its paces. He concluded that it lives up to its not insignificant price of $1,150—high praise indeed. If getting the job done has ever been more of a consideration than the pleasure of cutting dovetails by hand, get the literature on this tool.

A day after seeing the Stanfield Joiner/Shaper, I stumbled across **Vega's Jointmaker 1000**. Like the Joiner/Shaper, the Jointmaker moves in three planes to cut joints. The Jointmaker costs less than half as much ($450), doesn't use templates and doesn't cut dovetails. The Jointmaker relies on high-density plastic blocks running on ¾-in. steel ways for movement; it seems like a good, reliable system. The Jointmaker's range isn't nearly as great as the Stanfield Joiner/Shaper (8¼-in. horizontal travel vs. 24 in.), but whether that's an important issue is an individual matter.

Miscellany

Interesting new products abound at these shows, and magazine space to discuss them is limited, so I'll just briefly mention a few more .

Ryobi's DS1000 Detail Sander, an oscillating, triangular finish sander, is small, light and cheap, and with the array of optional pads and angles, probably quite useful. The promotional copy touts it as being able to remove paint, varnish, putty, adhesive and rust as well as sand into corners—and that's not all. Check it out at a local tool dealer.

At least one major tool company's president thought that the show-stopper was **Carba-tec's Threadmaster**. It's a threading accessory that works almost exactly the same as the homemade version featured in *FWW* #95 ("Threaded Lid Boxes" by Steven Gray) but with the advantage of a much better bit that slices rather than plows. This allows the Threadmaster to be used on almost any woodworking lathe at speeds as slow as 200 RPM.

For anyone who's ever wanted an accurate perpendicular line longer than a carpenter's square could provide, Hudson Valley Metal Works has come up with **Super Squares**. They come in standard lengths of 24 in., 36 in. and 60 in., have engraved 1⁄16-in. graduations and are accurate to within .003 per foot.

—Vincent Laurence

STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION
(Required by 39 U.S.C. 3685)

1a. Title: Fine Woodworking. **1b.** Publication no. 03613453 **2.** Date of filing: September 30, 1992. **3.** Frequency of issue: Bimonthly. **3a.** No. of issues published annually: 6. **3b.** Annual subscription price: $29.00. **4.** Location of office of publication: 63 So. Main Street, PO Box 5506, Newtown, CT 06470-5506. **5.** Location of the headquarters of the publishers: 63 So. Main Street, PO Box 5506, Newtown, CT 06470-5506. **6.** Publisher: John Lively, 63 So. Main Street, PO Box 5506, Newtown, CT 06470-5506; Editorial director: John Kelsey, 63 So. Main Street, PO Box 5506, Newtown, CT 06470-5506. **7.** Owner: The Taunton Press, Inc., 63 So. Main Street, PO Box 5506, Newtown, CT 06470-5506. Stockholders owning or holding 1 percent or more of the total amount of stock: Paul Roman, 63 So. Main Street, PO Box 5506, Newtown, CT 06470-5506; Janice Roman, 63 So. Main Street, PO Box 5506, Newtown, CT 06470-5506; David Roman, Melinda Roman, Andrea Roman, Suzanne Roman, Sarah Roman, P.F.R. CRA Trust, 63 So. Main Street, PO Box 5506, Newtown, CT 06470-5506. **8.** Known bondholders, mortgagees and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages or other securities: None. **9.** Not applicable. **10.** Extent and nature of circulation:

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1. Sales through dealers and carriers, street vendors and counter sales	66,491	62,811
2. Mail subscription	217,233	220,012
C. Total paid and/or requested circulation	283,724	282,823
D. Free distribution by mail, carrier or other means, samples, complimentary, and other free copies	7,474	5,789
E. Total distribution	291,198	288,612
F. Copies not distributed		
1. Office use, left over, unaccounted, spoiled after printing	11,315	18,532
2. Return from news agents	37,094	41,874
G. Total (sum of E, F1 and 2)	339,606	349,018

11. I certify that the statements made by me above are correct and complete. Signature: John Lively, Publisher

Listings of gallery shows, major craft fairs, lectures, workshops and exhibitions are free, but restricted to happenings of direct interest to woodworkers. We list events (including entry deadlines for future juried shows) that are current with the time period indicated on the cover of the magazine, with overlap when space permits. We go to press three months before the issue date of the magazine and must be notified well in advance. For example, the deadline for events to be held in March or April is January 1; for July and August, it's May 1, and so on.

NATIONAL & INTERNATIONAL: **Conference**-World Turning Conference, April 21-25. Wilmington, Delaware. Contact Albert LeCoff, Wood Turning Center, PO Box 25706, Philadelphia, PA 19144. (215) 844-2188.
Fair-Ligna Hannover '93 World Fair for Machinery and Equipment for the Wood and Forest Industries, May 19-25. Hannover Fairgrounds, Hannover, Germany. For further information, contact Hannover Fairs USA, Inc., 103 Carnegie Center, Princeton, NJ 08540. (609) 987-1202.
Exhibition-Decorative Arts Today, Jan. 25 thru Feb. 17. Bonhams, Montpelier Street, Knightsbridge, London SW7 1HH. For further information and photographs, contact Nina Drummond, Knightsbridge Press Office 070-584 961.
Meeting-Wood West, Oregon 1993. International Wood Collectors Society's annual meeting Aug. 15-19. Springfield/Eugene. Fore more information, contact Don Roberts, 1810 S. Fairmount Ave., Salem, OR 97302.

ALASKA: **Workshops**-Alaska Creative Woodworkers Association, thru April. For info, contact the association at PO Box 201796, Anchorage 99520-1796. (907) 345-8135.

ARIZONA: **Juried show**-Redefining the Lathe-Turned Object, thru Jan 31. Arizona State University Art Museum, Nelson Fine Arts Center, Tempe, 85287-2911. (602) 965-2787.
Show-Fourth annual Grand Canyon State Woodcarvers Desert Festival Award Show & Sale, March 12-14. Phoenix Civic Plaza, Phoenix. National competition in woodcarving open to all woodcarvers. For more information, contact George Hendrix, 10926 E. Regal Drive, Sun Lakes 85248. (602) 895-7036.
Seminars-Advanced carving seminars with John Burke, Feb. 8-10; Carve an Indian Head in Butternut, Feb. 11-13; Carve a Cowboy-Style Head. Woodcarvers Supply, 2530 N. 80th Place, Scottsdale, 85257. (602) 994-1233.

ARKANSAS: **Meetings**-Woodworker's Association of Arkansas meets the first Monday evening of each month at 7:00 at Woodworkers Supply Center, 6110 Carnegie, Sherwood 72117. For more information, call (501) 835-7339.

CALIFORNIA: **Workshops**-Woodworking for women. Furnituremaking with hand tools using traditional joinery, weekends. San Francisco. Call for schedule: Debey Zito, (415) 648-6861.
Workshops-Various workshops including Japanese woodworking, joinery and sharpening. For further information, contact Hida Tool Co., 1333 San Pablo, Berkeley, 94702. (415) 524-3700.
Convention-Woodwork Institute of California 42nd Annual Convention, Apr. 18-20. Yosemite National Park. For more information call (209) 233-9035.
Exhibition-The Year of Craft, College of the Redwoods Fine Wood working Program student show, Jan. 8 thru Feb. 26. Daly's Fort Bragg Center for the Arts, 303 N. Main St., Fort Bragg. (707) 964-0807.

COLORADO: **Exhibition**-Eighth annual American Craftsmen Woodworking, Jan. 16-30. Vail Public Library, Vail. For more info, call (303) 328-7253
Classes-Woodworking and related classes, year-round. Red Rocks Community College, 13300 W. 6th Ave., Lakewood, 80401. (303) 988-6160.
Seminars-Woodworking seminars, Sept. thru April. For more information, contact Schlosser Tool and Manufacturing Co., 301 Bryant St., Denver, 80219. (303) 922-8244.

CONNECTICUT: **Call for entries**-Juried Exhibition of Lathe Turned Objects in conjunction with the A.A.W.'s national symposium in June 1993. Slide deadline: January 30th. For more information, contact New Horizons Gallery, 42 West Putnam Avenue, Greenwich, 06830.
Workshops and classes-Woodworking Techniques with Greg McAvoy; Furniture Restoration with Tom McCaffrey; Woodworking with Hand Tools with Larry Hendricks, starting Jan. 12. Veneers for Woodworking with Robert March, Jan. 16-17; Inlaid Woodturning with Michael Mode, Jan. 23-24; Beginners Bowl Turning with Bill Gundling, Jan. 30-31; Hardwood Furnituremaking with Josh Markel, Feb. 6-7; Advanced Bowl Turning with Bill Gundling, Feb. 20-21; Making Bandsawn Boxes with Bill Gundling, Mar. 20-21. For more information, Brookfield Craft Center, PO Box 122, Brookfield. (203) 775-4526.

DISTRICT OF COLUMBIA: **Show**-Ninth annual Woodworking World Washington, DC show, Feb. 12-14. Hyatt Regency Crystal City, Jefferson Davis Hwy., Arlington. For more information, call (800) 521-7623.
Show-11th annual Washington Craft Show, April 15-18. Smithsonian Institution, Arts & Industries Bldg., Room 1465. For further information, contact Hortense Green, American Craft Council, 72 Spring St., New York, NY 10012.

FLORIDA: **Exhibition**-41st Florida Craftsmen Statewide Exhibition, Jan. 15-March 14. For info, contact DeLand Museum of Art, 600 N. Woodland Blvd., DeLand, 32720-3447.
Meetings-Central Florida Woodworkers Guild, second Thursday of every month, Winter Park. For information, contact Ed Harte (407) 862-3338.
Meetings-Sarasota Woodworking Club. Second Thursday of every month. For info, contact Tom Clark, 3544 Oak Grove Drive, Sarasota, 34243. (813) 351-9059.
Festival-30th annual Coconut Grove Arts Festival, Feb. 13-15. For info, contact Coconut Grove Arts Festival, PO Box 330757, Miami, 33233-0757. (305) 447-0401.
Show-Florida State Fair Fine Handcrafted Furniture show and exhibit. For info, contact Barry S. Caskey, 5637 Peach Ave., Seffner 33584. (813) 684-6564.
Show-Woodworking World Orlando Show. Mar. 26-28. Orlando Centroplex Civic Center, Livingston St., Orlando. For more information, call (800) 521-7623.

GEORGIA: **Workshops**-Japanese woodworking by Toshihiro Sahara. One Saturday each month, year-round. For further information, contact Sahara Japanese Architectural Woodworks, 1716 Defoor Place N.W., Atlanta, 30018. (404) 355-1976.
Courses-Various woodworking courses, Feb. thru May. For info, contact Chris Bagby, Highland Hardware, 1045 N. Highland Ave., N.E., Atlanta, 30306. (404) 872-4466.
Demonstration and lecture-Woodworkers Guild of Georgia, Jan 12. Shaving Horse with Tim Goodson, DeKalb College Central Campus, Building H, 555 North Indian Creek Drive, Clarkston. For more info, contact John McCormick (404) 623-9145.
Classes-Woodworking classes, throughout the year. Woodworkers Guild of Georgia, PO Box 8006, Atlanta. For info, contact John Gorrell (404) 460-1224.

ILLINOIS: **Show**-Second annual Woodworking World Springfield show, Feb. 26-28. Illinois State Fairgrounds, Eighth St., & Sangamon Ave., Springfield. For more information, call (800) 521-7623.
Exhibits-The Art of Intarsia featuring Bob Hlavacek, Jan. 16-17; Hand-Carved Feathers and Birds featuring Walt Mayer, Feb. 6. Tom's Woodshop Inc., 777 N. York Road, Hinsdale. (708) 920-1635.
Tour-Woodworker's tour of England & Germany, May 17-27. For info, contact B.L. Mooberry, Peoria Wood Club, 2514 E. Muller Road, E. Peoria, 61611. (309) 266-6575.

INDIANA: **Classes**-Various woodworking classes and workshops including general woodworking, lathe and router seminars. Woodworking Unlimited, 6038 E. 82nd St., Indianapolis, 46250. (317) 849-0193.
Show-Second annual Woodworking World, Mar. 19-21. Allen County Memorial Colliseum, 4000 Parnell Ave., For Wayne 46805. For more information, call (800) 521-7623.

KENTUCKY: **Workshops**-Woodturning and joinery instruction. One-day to one-week courses. For info, contact Jim Hall, Adventure in Woods, 415 Center St., Berea, 40403. (606) 986-8083.
Meetings-Kyana Woodcrafters Inc., first Thursday of each month. Bethel United Church of Christ, 4004 Shelbyville Road, Louisville, 40207. (502) 426-2991.
Workshops-Traditional Windsor chairmaking instruction. One-week courses. Contact David Wright, 503 Prospect, Berea, 40403. (606) 986-7962.
Exhibition-Contemporary craft, Jan. 22-24, Kentucky Craft Market, Kentucky Fair and Exposition Center, Louisville.

LOUISIANA: **Juried show**-Lafayette Art Association annual art competition, March 9 thru April 8. For info, contact J.K. Sommer, Lafayette Art Gallery, 700 Lee Ave., Lafayette, 70501.

MARYLAND: **Show**-Second annual Woodworking World Baltimore show, Apr. 2-4. Pikesville Armory, Pikesville. For more information, call (800) 521-7623.

MASSACHUSETTS: **Classes**-Woodworking classes, throughout most of the year. Boston Center for Adult Education, 5 Commonwealth Ave., Boston, 02116. (617) 267-4430.
Workshop-Wood Identification with Dr. R. Bruce Hoadley, Jan. 19-22. For more information, contact Alice Szlosek or Trudie Goodchild, Div. of Continuing Education, Univ. of Mass., Amherst. (413) 545-2484.
Show-Northeast Wood Products Expo '93, March 11-13. Contact Pat Lee, Exposition Manager, Drysdale Lee & Associates, 6 Abbott Road, Wellesley Hills, 02181. (617) 237-0587.
Juried show-Danforth Museum Craft show, June 19-21. Justin McCarthy Campus Center, Framingham State College, Framingham. Deadline: Feb. 1. For application form, write Danforth Museum Craft show, Danforth Museum of Art, 123 Union Ave., Framingham 01701. (508) 620-0050.
Juried show-Handcrafted Furniture '93, Mar. 20 thru Apr. 25. Deadline: Jan. 15. For prospectus, write Danco Design Center, 10 West St., West Hafield, 01088. (413) 247-5681.
Exhibition-New Traditions/1993, featuring Gary Knox Bennet, Jan. 22-Feb. 27. Worcester Center for Crafts, 25 Sagamore Road, Worcester. (508) 753-8183.
Call for entries-The Domestic Object, Apr. 3 thru June 13. Berkshire Museum; July 10 thru Aug. 21, Worcester Center for Crafts. Northeast regional competition. Deadline: Jan. 25. For prospectus, send SASE to Domestic, Worcester Center for Crafts, 25 Sagamore Road, Worcester 01605. (508) 753-8183.
Show-Tenth annual Woodworking World Boston show, April 16-18. The Host Inn/Sheraton, Boxboro. For further information, call (800) 521-7623.

MICHIGAN: **Show**-Fourth annual Woodworking World Grand Rapids show, Feb. 5-7. Grand Rapids Jr. College Fieldhouse, 111 Lyon NE, Grand Rapids. For more information, call (800) 521-7623.

MINNESOTA: **Classes**-Woodcarving classes year-round. Also, seminars on woodturning, chair caning and whittling. For info, contact the Wood Carving School, 3056 Excelsior Blvd., Minneapolis, 55416. (612) 927-7491.
Show-Third annual Woodworking World Twin Cities show, Jan. 29-31. Minneapolis Convention Center, 1301 South Second Ave., Minneapolis 55403. For more information, call (800) 521-7623.
Symposium-American Association of Woodturners seventh annual symposium . June 25-27, including the Edward Jacobson collection of turned wooden bowls. State University of New York, Purchase. For more information, contact American Association of Woodturners, Mary Redig, Administrator, 667 Harriet Ave., Shoreview 55126. (612) 484-9094.

MISSISSIPPI: **Classes**-Various classes. Allison Wells School of Arts & Crafts, Inc., PO Box 950, Canton. (800) 489-2787 or (601) 859-5826.

NEW HAMPSHIRE: **Classes**-Fine arts and studio arts. Manchester Institute of Arts and Sciences, 114 Concord St., Manchester, 03104.
Classes-Various woodworking classes, year-round. Including antique repairs, carving canes & walking sticks, small boxes, kitchen utensils, lathe-turning, hand-carving, more. Contact The Hand & I, PO Box 264, Route 25, Moultonboro, 03254. (603) 476-5121.
Auctions-Antique and craftsman's tool auctions, year-round. For more information, contact Richard A. Crane, Your Country Auctioneer, 63 Poor Farm Road, Hillsboro, 03244. (603) 478-5723.
Conference-1993 North Country Studio Conference, March 18-22. Shaker Inn & Conference Center, Enfield, 03748. For further information, contact Ellwyn F. Hayslip, Conference Coordinator, 205 N. Main St., Concord, 03301. (603) 224-3375.

NEW JERSEY: **Exhibition**-Carvings of Gary Giberson, thru Jan. 3. Noyes Museum, Lily Lake Road, Oceanville. (609) 652-8848.
Juried festival-Waterloo Arts & Crafts Festival, May 1-2. Deadline: Jan. 15. Waterloo Concert Field, Waterloo Road, Stanhope. For application, call (201) 384-0010.
Show-Ninth annual Woodworking World Cherry Hill show, April 23-25. National Guard Armory, Grove St. & Park Blvd., Cherry Hill. For more information, call (800) 521-7623.

NEW MEXICO: **Classes**-Woodworking classes. Northern New Mexico Community College, El Rito, 87520. For info, call (505) 581-4501.
Classes-Fine woodworking classes, Santa Fe Community College, Santa Fe 87502. (505) 438-1361.

NEW YORK: **Classes**-Various beginning and advanced woodworking classes. Constantine's, 2050 Eastchester Road, Bronx, 10461. (718) 792-1600.
Meetings and classes-New York Woodturners Association, first Tuesday of each month. Woodturning techniques, exhibits, more. Traditional woodworking, Maurice Fraser; bowl and spindle turning, Bill Gundling; finishing, Susan Perry, beginning Feb. 1. The Craft Student League, YWCA, 610 Lexington Ave. (53rd. St.) New York City. (212) 735-9732.
Show-Third annual Woodworking World Long Island show, Jan. 8-10. Hofstra Univ., 100 Fulton Ave., Uniondale. For more information, call (800) 521-7623.
Fair-International Gift Fair, Feb. 21-25. Jacob K. Javits Convention Center, New York. For more info, contact George Little Management, Inc., 2 Park Ave., Suite 1100, New York, 10016-5748. (212) 686-6070.
Juried show-Woodstock-New Paltz Arts & Crafts Fair spring show, May 29-31. Fall show, Sept 4-6. Ulster County Fairgrounds, New Paltz. Application deadline: Feb. 1. For more info, contact Scott & Neil Rubinstein, Quail Hollow Events, PO Box 825, Woodstock, 12498. (914) 679-8087 or (914) 246-3414.
Juried festival-17th annual American Crafts Festival at Lincoln Center for the Performing Arts, July 3-4 and July 10-11. Application deadline: Jan. 5. For more info, contact Maureen Mullin, American Concern for Artistry & Craftsmanship, PO Box 650, Montclair, NJ 07042. (201) 746-0091.
Demonstrations and workshops-Handtooled dovetails, Maurice Fraser; lathe turning, Bill Gundling, Jan 19-20. Hand planes I and II, tablesaw techniques; routers, Bill Gundling. Feb. and March. Craft Students League, YWCA, 610 Lexington Ave. (53rd. St.) New York City. (212) 735-9732.
Exhibition-Czech Cubisim: Architecture and Design, 1910-1925. Cooper-Hewitt Museum, 2 East 91st St., New York, N.Y. 10128-9990. For more information, contact Gwen Loeffler (212) 860-6894.
Classes-Building a Shaker blanket chest and advanced Shaker furniture design with Eric Eklum, beginning mid-Jan. Adult Division of Jamestown Public Schools, Jamestown. For more info, call the director of Adult Education (716) 483-4384.
Show-Crafts at West Point, Jan 23-24. Hotel Thayer, West point. Juried by 5 slides. SASE. For more information, contact Scott & Neil Rubenstein, Quail Hollow Events, PO Box 825, Woodstock 12498. (914) 679-8087, 246-3414.

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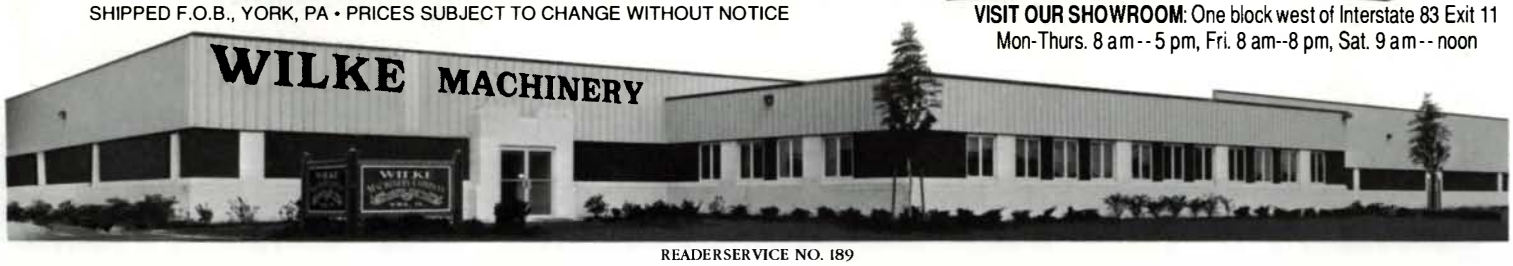


READERSERVICE NO. 189

NORTH CAROLINA: **Meetings**-North Carolina Woodturners, second Saturday of every month. Also, woodturning workshops for all levels. For further information, contact Eric Hughes, Route 3, PO Box 300, Conover, 28613. (704) 464-5611.
Classes-Woodworking, design business marketing, associates degree program. Haywood Community College, Freedlander Drive, Clyde, 28721. For more info, contact Wayne Raab (704) 627-2821.
Classes-Basic Woodworking with Jim Rittman and Wood Carving with Tom Wolfe, Jan. 3-9; Woodturning by Roger Jacobs, Jan. 24-30; Woodcarving with Helen Gibson, Jan. 31 thru Feb. 13. For more information, contact John C. Campbell Folk School, Route 1, Box 14A, Dept. FW, Brasstown, 28902. (800) 562-2440.
Video course-Wood Technology, Six-lesson correspondence course on the wood industry. For more info, contact Ms. Vann Moore, Dept. of Wood & Paper Science, North Carolina State University, PO Box 8005, Raleigh, 27695-8005. (919) 737-3181.
Tutorials-Country Workshops. Ladderback chairmaking, Jan. 11-15; Windsor chairmaking, Jan. 25-29; Swiss cooperage, Feb. 8-12; Ladderback chairmaking, Feb. 22-27; Windsor chairmaking, Mar. 8-12 ; Advanced Windsor chairmaking, Mar. 22-27; Swedish Woodenware, Apr. 5-9. Contact Drew Langsner, 90 Mill Creek Rd., Marshall 28753. (704) 656-2280.
Juried shows-Winterfest Art & Craft Show, Feb. 11-14; Highland Heritage Art & Craft Show, June 17-20, Asheville Mall; Heritage Art & Craft Show, July 1-4, Old Thresher's Reunion, Denton. Juried by slides/ photographs. For more information, contact Gail Gomez, High Country Crafters, 46 Haywood St., Asheville 28801. (704) 254-7547.

NORTH DAKOTA: **Show**-Second annual Woodworking World North Dakota show, Jan. 15-17. Bismark Civic Center, 601 East Sweet Ave., Bismark. For more information, call (800) 521-7623.

OHIO: **Meetings**-Cincinnati Woodworking Club meets at 9:00 the second Saturday of January, March and May at the Reading High School. Those interested in attending should contact Cincinnati Woodworking Club, PO Box 428525, Cincinnati, 45242 for more information.
Show-Eighth annual Woodworking World Columbus show, Jan. 22-24. Veteran's Memorial Hall, 300 West Broad St., Columbus. For more information, call (800) 521-7623.

OREGON: **Meetings**-Guild of Oregon Woodworkers, third Friday of every month. For more information and location, contact the Guild of Oregon Woodworkers, PO Box 1866, Portland, 97207. (503) 293-5711.
Meetings-Cascade Woodturner's Association, third Thursday of each month. For info, contact Cascade Woodturners, PO Box 91486, Portland 97291.

PENNSYLVANIA: **Classes**-Windsor chairmaking, all levels, weekly and weekends. For more info, contact Jim Rendi, Philadelphia Windsor Chair Shop, PO Box 67, Earlville, 19519. (215) 689-4717.
Show-Philadelphia Buyers Market, Feb. 19-22. Philadelphia Civic Center, Philadelphia. For more information, contact Melissa B. Goldman, Buyers Markets of American Crafts, Suite 300 Mill Centre, 3000 Chestnut Ave., Baltimore, MD 21221. (410) 889-2933.
Competition-International Lathe-Turned Objects: Challenge V, objects produced from 1991 through June 1993. Exhibition scheduled for January 28 to April 1994. Entry fee $20 for up to three pieces. Entry deadline: July 10, 1993. For prospectus/application, send a #10 SASE to Albert LeCoff, Wood Turning Center, PO Box 25706, Philadelphia, 19144. (215) 844-2188.
Competition-17th annual mid-Atlantic woodcarving, Apr. 3-4. Pennsylvania Delaware Valley Wood Carvers Association. Penn State Abington campus gymnasium, Woodland Road, Abington. For more information, contact Al Ritter, publicity chairman, (215) 757-2152.
Classes-Woodturning with David Ellsworth. Three-day weekend workshops in private studio. Limited to four students. Jan. 8-10, Jan. 15-17, Feb. 5-7, Feb. 19-21, March 5-7, March 19-21. For further information, contact David Ellsworth, Fox Creek, 1378 Cobbler Road, Quakertown, 18951. (215) 536-5298.

RHODE ISLAND: **Call for entries**-Woodworking exhibition at the Museum of Art at Rhode Island School of Design (Providence). Entry deadline: April 1. For further information, send SASE with two 29-cent stamps to: Seth Stem, Box 4-14, Rhode Island School of Design, 2 College St., Providence 02903-2784.

SOUTH CAROLINA: **Show**-Second annual Woodworking World South Carolina show, Feb. 19-21. Exchange Park, Highway 78, Ladson, 29456. For more information, call (800) 521-7623.

TENNESSEE: **Juried show**-Pattern: New Form, New Function, Feb. 26 thru May 15. For info, contact Arrowmont School, PO Box 567, Gatlingburg, 37738. (615) 436-5860.

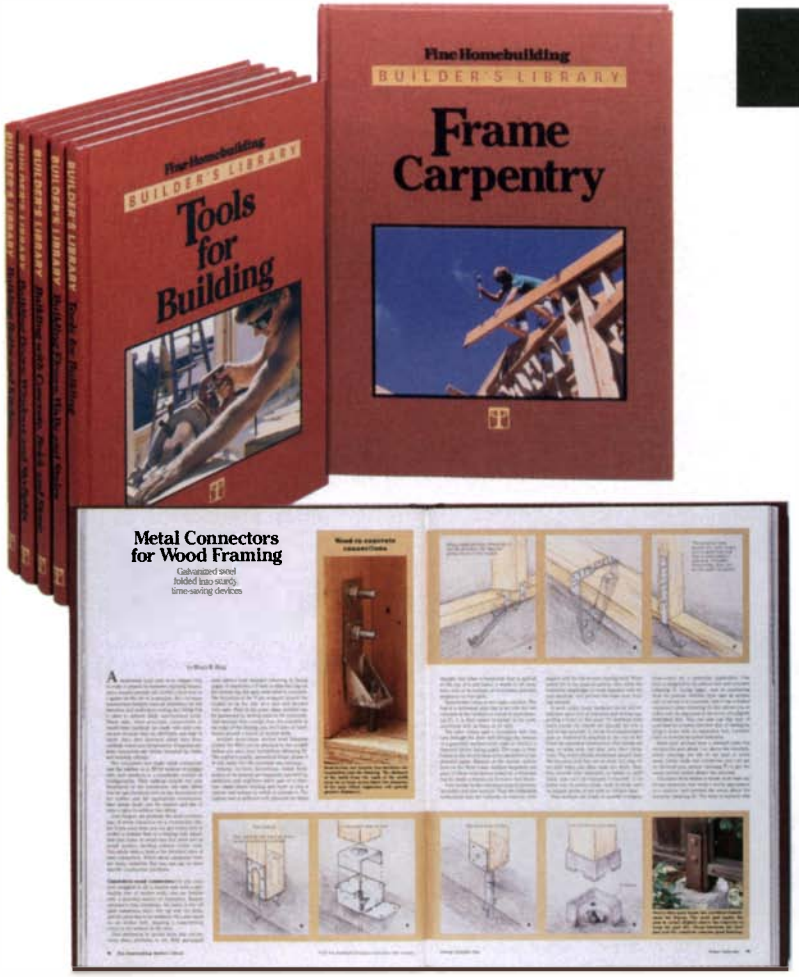
TEXAS: **Show**-Seventh annual Rio Grande Valley Woodcarvers, Inc., Jan. 13-24. For further information, contact Dorothy Chapapa, Route 2, Box 150, McAllen, 78504. (512) 581-2448.
Show-Woodworking World Dallas show, Mar. 5-7. Fairpark-Tower Bldg., 1300 Robert B. Cullum Blvd. at Grand Ave., Dallas . For more information, call (800) 521-7623.
Show-Seventh annual Woodworking World Houston show, Mar. 12-14. Adams Mark Hotel, 2900 Briarpark at Westheimer, Houston. For more information, call (800) 521-7623.

VIRGINIA: **Show**-Herndon Antiques show and sale, March 27-28. Herndon Community Center, 813 Ferdale Ave., Herndon (703) 435-6879.
Show-Ninth annual Woodworking World show, Feb. 12-14. Hyatt Regency Crystal City, Jefferson Davis Hwy., Arlington. For more information, call (800) 521-7623.

WASHINGTON: **Meetings**-Northwest Woodworkers Guild, last Wednesday of each month. For more information, contact John Gruenewald, 622 Ninth Ave., Kirkland, 98033. (206) 827-8012.
Workshops-Boatbuilding workshops and seminars yearround. For more information, contact Northwest School of Wooden Boatbuilding, 251 Otto St., Port Townsend, 98368. (206) 385-4948.
Workshops-Various workshops. For more information, contact The Center for Wooden Boats, 1010 Valley St., Seattle, 98109. (206) 382-BOAT.

CANADA: **Classes**-Furnituremaking, carving, lathe turning, router and more. For more information, contact Tools 'n Space Woodworking, 338 Catherine St., Victoria, B.C., V9A 3S8. (604) 383-9600.
Meetings-West Island Woodturners Club meetings, second Tuesday of each month. Also, woodturning courses. Contact Eric Webb, 61 Devon Road, Beaconsfield, Que., H9W 4K7. (514) 630-3629.
Meetings-Northern Alberta Woodcrafters Guild meetings, third Thursday, Sept. thru June. For more information, contact Douglas Lobb, 121 Healy Road, Edmonton, Alberta, T6R 1W3. (403) 430-7391.
Show-Ottawa Wood show, Mar. 19-21. Landsdowne Park, Bank St., Ottawa. For more information, contact Cryderman Productions Inc. (519) 351-8344.

ENGLAND: **Classes**-Woodworking classes. Smith's Gallery, 56 Earlham St., WC2. Contact Laetitia Powell, Parnham, Beaminster, Dorset, DT8 3NA. (0308) 862204.



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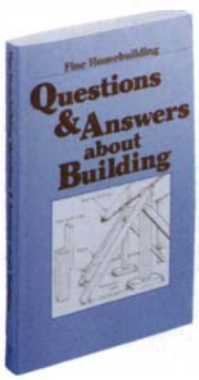

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Model	Description	List	Sale
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23-680	6" Bench Grinder 1/4 HP	86	75
23-880	8" Bench Grinder 1/2 HP	151	115
11-950	8" Drill Press	199	144
28-160	10" Hobby Band Saw	210	145
31-050	1" Belt Sander 2.0 amp	104	78
31-460	4" Belt/6" Disc Sander	198	135
31-340	1" Belt/8" Disc Sander	268	188
31-080	1" Belt/5" Disc Sander	134	94
40-560	16" 2 speed Scroll Saw	266	179
11-990	12" Bench Drill Press	276	209
11-090	32" Radial Bench Drill Press	399	285
43-355	3/4" Shaper 1-1/2 HP	964	709
43-505	1/2" Bench Router/Shaper	399	279
22-540	12" Bench Top Planer	595	389
36-220	10" Compound Mitre Saw	350	239
14-600	Hollow Chisel Mortiser	668	445
46-700	12" Wood Lathe	548	419

NEW TOOLS BY DELTA

33-060	NEW "Side kick" Miter saw	499	379
14-070	NEW 14" Floor Drill Press	450	325
28-180	NEW Bench Band Saw	232	167
40-640	NEW 20" Bench Scroll Saw	466	319
23-675	NEW 6" Grinder / 3 x 24 Belt Sander	141	105
50-075	NEW Dust Collector/Sweeper 3/4 HP	360	245

DELTA STATIONARY

34-444	Table Saw complete with/1-1/2 HP motor & stand	812	615
22-662	13" Planer with 2 HP motor & stand	1436	1169
28-245	14" Band Saw w/open stand 1/2 HP	698	549
17-900	16-1/2" Floor Drill Press	441	395
40-601	18" Scroll Saw with stand and blades	942	719
34-080	10" Mitre Box	Xtra Special	198
34-761	10" Unisaw 1-1/2 HP w/S100 rebate	1715	1275
33-990	10" Radial Arm Saw	818	589
37-280	6" Motorized Jointer	488	395
50-179	3/4 HP 2 stage Dust Collector	483	335
50-181	2 HP Dust Collector	885	615
70-200	20" Floor Drill Press	1049	815
33-055	8-1/4" Sawbuck comp with legs	865	579
34-330	8-1/4" Table Saw 13 amp	343	228
36-510	10" Table saw	210	159
34-670	10" Motorized Table Saw	511	395
32-100	Station Plate Jointer	645	265
36-040	8-1/4" Compound Mitre Saw	224	165
34-915	30" Unifence	385	239
34-897	50" Delta Unifence	525	285
36-755	10" Tilt Arbor Saw	1264	935
36-380	10" Table Saw	550	425
33-890	12" Radial Arm Saw	1720	1359
14-040	14" Bench Drill Press	360	325
28-560	16" Three Wheel Band Saw	456	399

The following Delta tools have a $50.00 rebate! Price shown is before rebate.

28-283	14" Band Saw with enclosed stand	910	725
34-445	34-444 Saw with 30" unifence	1200	759
37-154	DJ15 6" Jointer with 3/4 HP motor	1420	1079

NEW DEWALT TOOLS

DW944K	3/8" 9.6 volt cordless drill kit with 2 batteries	264	149
DW945K	3/8" 12 volt cordless drill kit with 2 batteries	284	169
DW364	7-1/4" Circ. Saw w/brake, 13 amp	245	148
DW947K	13.2 volt cdls 3/8" drill kit	377	209
DW306K	8.0 amp Recip Saw w/case var. spd	254	159
DW610	1-1/2 HP 2 handle Router	250	138
DW411	1/4 sheet Palm Sander, 1.7 amp	87	54
DW705	12" Compound Mitre Saw	555	339
DW704	12" Mitre Saw	480	289
DW100	3/8" Drill, 4 amp, 0-2500 rpm, rev	110	65
DW250	4.5 amp Drywall Gun, 0-4000 rpm, rev	146	89
DW254	4.5 amp Drywall Gun, 0-2500 rpm, rev	146	89
DW124K	1/2" joist & stud Drill with case, rev	504	295
DW102	3/8" Drill, 4.5 amp, 0-1200 rpm, rev	154	92
DW103	3/8" Drill, 5.0 amp, 0-1200 rpm, rev	189	115
DW402	4-1/2" Grinder 6 amp	143	85
1707	8-1/2" Slide Compound Mitre Saw	815	439

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3810	10" Mitre Saw	263	205
3810K	3810 with 60 tooth carbide blade		229
77	7-1/4" Worm Drive Saw	230	144
5825	6-1/2" Worm Drive Saw	255	159
2735-04	12 volt cordless Drill Kit	210	132
2735-04X	2735-04 with keyless chuck	235	132
1605-02	NEW Biscuit Jointer with case	200	125
7484	NEW 5" Random Orbit Sander	160	104
5510	5-1/2" Circular Saw	165	114
5660	NEW 8-1/4" 60° Circular Saw	225	138
5860	NEW 8-1/4" 60° Worm Saw	275	168
5625	6-1/2" Circular Saw	210	139
4560-02	Top Hdle Jig Saw with case	134	97
5790	10-1/4" Circ. Saw 15 amp	459	289
5657	NEW 7-1/4" Circ Saw - pivot foot	205	118
5525	NEW 6-1/2" Circ Saw - big capacity	195	105

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3380	8" Drill Press	200	135
3370	4" Belt/6" Disc Sander	200	135

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3572	72"	38.47	24.95	142.00

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J-08	8"	9.48	6.19	35.45
J-10	10"	11.09	8.95	50.99
J-12	12"	13.74	10.55	59.39
J-14	14"	16.50	10.99	62.00
J-16	16"	17.96	11.69	65.00

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Item#	Jaw Length	Opening Capacity	List	Sale	Box of 6
#5/0	4"	2"	13.80	8.35	48.59
#4/0	5"	2-1/2"	14.80	8.95	51.99
#3/0	6"	3"	15.90	9.59	55.75
#2/0	7"	3-1/2"	17.10	10.35	58.95
#0	8"	4-1/2"	19.00	11.89	61.00
#1	10"	6"	21.76	12.89	70.65
#2	12"	8-1/2"	24.95	14.95	80.95
#3	14"	10"	31.61	18.95	104.95
#4	16"	12"	42.30	24.95	143.95

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3706	6"	9.86	6.25	34.75
3712	12"	10.92	6.75	37.75
3718	18"	12.05	7.25	40.75
3724	24"	13.16	8.19	43.75
3730	30"	14.70	9.10	49.75
3736	36"	16.05	10.19	55.75

JORGENSEN STYLE 45 5" Throat 1-3/8" x 5/16"

Item	Jaw Length	List	Sale	Lots of 6
4512	12"	30.07	19.39	109.99
4518	18"	31.73	20.45	116.99
4524	24"	33.55	21.75	123.99

PONY CLAMP FIXTURES

Model	Description	List	Sale	Lots of 12
50	3/4" Black Pipe Clamps	13.61	7.89	84.99
52	1/2" Black Pipe Clamps	11.37	6.50	69.50
53	Double 3/4" Pipe Clamps	38.50	24.45	274.00

JORGENSEN STEEL "I" BAR CLAMPS

Model	Size	List	Sale	Lots of 6
7224	24"	31.46	18.45	107.00
7236	36"	33.77	20.19	115.45
7248	48"	37.12	22.19	126.95
7272	72"	42.71	26.79	149.95

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3338	2-1/4 HP var. speed Plunge Router	427	255
3304	1 HP variable speed Plunge Router	292	164
3375	3-1/8" Univ. Planer 7.2 amp	313	155
3380	Biscuit Jointer with case	542	248
4024	3 x 21 vanable speed Belt Sander	322	184

BLACK & DECKER

1166	3/8" Drill 0-2500 rpm 4 amp	100	65
1180	3/8" Drill 0-1200 rpm 5 amp	188	104
2600	3/8" Drill 0-1200 rpm 4.5 amp	142	89
1703-1	10" Mitre Saw with 73-770 blade	313	179
4011	1/4 sheet Palm Sander	82	59
79-034	Workmate 400	175	105
1349-09	1/2" Timberwolf Drill 2 speed	489	279
1180	3/8" Drill rev. 0-1200 rpm 5 amp	182	104
2037	Drywall Gun 0-4000 5.0 amp	175	97
2038	Drywall Gun 0-2500 rpm 5 amp	175	99
3157	Orbital var spd Jig Saw 4.5 amp	220	145
2665K	NEW 3/8" cdls 12V Cyclone Drill	280	165
5045K	MACHO Rotary Hammer Drill	742	409
5071	3/8" Hammer Drill with case	239	144
5073	1/2" Hammer Drill with case	282	163
2054	TekGun 0-2500 5.0 amp	269	152
2660	Drywall Gun 0-4000 4.5 amp	142	77
2700	7-1/4" Worm drive Saw 13 amp	250	142
1321	1/2" Spade hdle Drill 450 rpm 7 amp	292	165
2750	4-1/2" Grinder 10.000 rpm 6 amp	149	83
2694	7-1/4" Super Sawcat Circular Saw	248	137
2695	8-1/4" Super Sawcat Circular Saw	271	153

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Model #	Diameter	# Teeth	List	Sale
73-715	5-1/2	16	13.70	7.99
73-716	6-1/2	18	13.70	7.55
73-756	6-1/2	36	28.10	16.85
73-717	7-1/4	18	13.90	7.99
73-737	7-1/4	24	17.20	9.29
73-707	7-1/4	35	26.45	15.85
73-757	7-1/4	40	31.30	16.89
73-718	8	22	19.95	10.95
73-758	8	40	40.45	24.25
73-759	8-1/4	40	44.65	24.99
73-719	8-1/4	22	19.65	11.95
73-739	9	30	29.85	17.50
73-710	9	45	59.90	35.95
73-769	9	60	72.75	39.89
73-704	7-1/4	18	21.00	11.59
73-740	10	32	32.98	17.95
73-770	10	60	67.02	33.95
73-711	10	50	65.08	33.95

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Model	Size	Weight(lbs)	Sale
W394	4'	21#	44.00
W395	5'	26#	53.00
W396	6'	32#	60.00

WOODEN STEP - TYPE 1- 250# RATING

W384	4'	20#	36.00
W385	5'	24#	42.00
W386	6'	29#	48.00

ALUMINUM STEP - TYPE 1A- 300# RATING

404	4'	16#	64.00
405	5'	20#	73.00
406	6'	24#	85.00

ALUMINUM DOUBLE STEP -TYPE 1A-300# RATING

T404	4'	21#	90.00
T405	5'	25#	105.00
T406	6'	30#	120.00

FIBERGLASS STEP - TYPE 1- 250# RATING

6004	4'	13#	50.00
6005	5'	16#	60.00
6006	6'	18#	65.00

FIBERGLASS STEP - TYPE 1- 250# RATING

6004-S w/pail shelf	4'	15#	55.00
6005-S w/pail shelf	5'	18#	65.00
6006-S w/pail shelf	6'	20#	70.00

FIBERGLASS STEP - TYPE 1A- 300# RATING

6204	4'	14#	65.00
6205	5'	18#	75.00
6206	6'	20#	80.00

ALUMINUM FLAT STEP TYPE 11- 225# RATED EXTEN.

Model	Size	Working Length	Weight(lbs)	Sale
D1216-2	16'	13'	22#	115.00
D1220-2	20'	17'	27#	130.00
D1224-2	24'	21'	33#	145.00
D1228-2	28'	25'	42#	175.00
D1232-2	32'	29'	53#	200.00
D1236-2	36'	32'	62#	239.00
D1240-2	40'	35'	73#	265.00

ALUMINUM FLAT STEP TYPE 1- 250# RATED EXTEN.

D1316-2	16'	13'	26#	125.00
D1320-2	20'	17'	32#	145.00
D1324-2	24'	21'	39#	165.00
D1328-2	28'	25'	50#	195.00
D1332-2	32'	29'	62#	235.00
D1336-2	36'	32'	77#	270.00
D1340-2	40'	35'	85#	295.00

ALUMINUM FLAT STEP TYPE 1A- 300# RATED EXTEN.

D1516-2	16'	13'	31#	139.00
D1520-2	20'	17'	37#	159.00
D1524-2	24'	21'	45#	179.00
D1528-2	28'	25'	56#	215.00
D1532-2	32'	29'	66#	239.00
D1536-2	36'	32'(250# rating)	79#	279.00
D1540-2	40'	35'(250# rating)	89#	309.00

ALUMINUM FLAT STEP TYPE 1A+ 300# RATING

D520-2	20'	17'	42#	199.00
D524-2	24'	21'	49#	230.00
D528-2	28'	25'	66#	265.00
D532-2	32'	29'	74#	305.00
D536-2	36'	32'	89#	350.00
D540-2	40'	35'	99#	389.00

FIBERGLASS FLAT STEP TYPE 1A- 300# RATING

D6116-2	16'	13'	34#	175.00
D6120-2	20'	17'	40#	195.00
D6124-2	24'	21'	53#	225.00
D6128-2	28'	25'	60#	259.00
D6132-2	32'	29'	74#	298.00

FIBERGLASS FLAT STEP TYPE 1A- 300# XTRA HEAVY

D7116-2	16'	13'	37#	198.00
D7120-2	20'	17'	43#	229.00
D7124-2	24'	21'	58#	269.00
D7128-2	28'	25'	66#	298.00
D7132-2	32'	29'	79#	359.00

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Model	Description	List	Sale
VSRE500KNEW	v spd 5" Random Sndr w cs	279	149
VSRE600KNEW	v spd 6" Random Sndr w cs	284	155
HBSE75S	3 x 21 vanable speed Belt Sander	299	168
ABSE15S1	2" cdls 12 volt Drill complete w cs	389	235
FSPE100	Barrell Grip v spd Jig Saw	265	149
BSPE100K	Top Hdle v spd Jig Saw w/case	275	159
EZ560	3/8" cordless 7.2 volt Drill 2 speed	205	139
OFS50	1HP Plunge Router	299	175
TXE150	New 6" v arspd Rand Orb Sander	220	145

HITACHI TOOLS

Model	Description	List	Sale
C7SB	7-1/4" Circular Saw	214	109
DTC10	3/8" 7.2 volt cordless Drill	138	78
C7BD	7-1/4" Circular Saw with brake	230	127
M12V	NEW 3 HP variable speed Router	447	225
TR12	Plunge Router 3 HP	354	167
F1000A	12" Planer 6" Jointer	2835	1535
P12R	12-9/32" Planer	1361	699
P12RA	Planer/Joiner	1797	875
C10FA	10" Deluxe Mitre Saw	538	274
C12FA	NEW 12" Mitre Saw	632	305
C8FB	8-1/2" Slide Compound Saw	899	445
FREUD	LU91M0088-1/2" carb blade 48 tooth	68	43
C15FB	15" Mitre Saw	745	379
FREUD	LU85M015 15" carb blade 108 tooth.	180	105
F20A	3-1/4" Planer 3 4 amp	172	99
G12SA	4-1/2" Grinder 6 9 amp	147	79
DS10DVAK	NEW 12 volt Cordless Drill Kit with 2 batteries	385	199

Hitachi Air Tools

NR83A	Framing Nailer 2 - 3-1/2 Full Head	680	398
NR83AA	Framing Nailer 2 - 3-1/2 Clip Head	740	419
NT65A	16 ga. Brad Nailer 1 - 2-1/2	590	318
NT45A	18 ga. Brad Nailer 13/16 - 1-3/4	484	275
NV45ABC	Coil Roofing Nailer 7/8 - 1-3/4	740	425
NV83A	Coil Nailer 2 - 3-1/4	740	419
NV50A1	Coil Nailer 1-1/4 - 2"	534	305
N5008AA	7/16" Stapler - 16 ga. 1 - 2 lgth	578	315
N3824A	1" Stapler 16 ga. 1/2 - 1-1/2"	626	329
N3804A	1/4" Stapler 18 ga. - 1/2 - 1-1/2"	520	299

DREMEL TOOLS

Model	Description	List	Sale
3950	Moto Tool Kit with bits & case	129	79
3952	Super Moto Tool Kit with bits, case, & accessories	145	95
1671	16" Scroll Saw - 2 speed "Best buy"	278	169
1571	15" Scroll Saw	139	79
290	Electric Engraver with point	2415.50	
8508	Cordless Moto Tool Kit with case	104	68
1731	5" Disc\1" x 30" Belt Sander	178	114

DAVID WHITE INSTRUMENTS

Model	Description	List	Sale
LP6-20	Sight Level package - 20x	310	198
L6-20	Meridian Level - 20x	290	189
LT8-300	Level Transit - 26x	650	445
LT8-300P	above Level with optical plum	769	525
LT6-900	Level Transit - 20x	389	245
ALT6-900	Automatic Level - Transit - 18x	549	385
ALTP6-900	above Level with tripod & rod	600	438
AL6-18	Automatic Level - 18x	439	319
ALP6-18HD	above Level with tripod and rod	550	372

ELECTRICAL CONDUCTOR EXTENSION CORDS

Model	Wire	Type	Length	Wire 125 volt rating	List	Sale
01617	12/3	SJEOW-A	25'	15A	22	12.85
01618	12/3	SJEOW-A	50'	15A	38	22.49
01619	12/3	SJEOW-A	100'	15A	70	40.95

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PASLODE IMPULSE GUNS

Model	Description	List	Sale
IM250	Tripulse Finish Nailer Kit complete drives 3/4" - 2-1/2" brads	849	615
IM325	Impulse Framing Nailer Kit complete drives 2" - 3-1/4" nails	849	615
402500	Extra battery	Sale	42.95
402502	No-Mar Work contact element	Sale	19.25

Paslode Nailers not available in MN. WI. IA

SENCO AIR NAILERS

SFN1	Finishing Nailer 1" - 2"	377	275
SFN2	Finish. Nailer 1-1/2" - 2-1/2"	571	395
SN325	Nailer 1-7/8" - 3-1/4"	665	455
SN4	General purpose 2" - 3-1/2"	685	468
SLP20	NEW Pinner w/case 5/8" - 1-5/8"	399	285
SKS	Stapler 5/8" - 1-1/2"	351	255
SPS	Stapler 1" wide - 3/4" - 1-1/2" length.	460	335
PW	Stapler 1" wide - 1/2" - 1-1/4" length.	505	345
M2	Stapler 1/16" wide - 1-3/8" - 2" length	490	345

Not available in all states

EXCALIBUR Fences & Tables

Model	Description	List	Sale
TT45R24L9	24" Fence	369	299
TT45R50L12	50" Fence	399	329
EXSLT30	Sliding Table	599	475
EXSLT60	Sliding Table	745	585

RECORD WOODWORKING VISES

Model	Jaw Width\Opening		List	Sale
53E	10-1/2"\15"	Quick release	189	105
53P	10-1/2"\15"	Plain Screw	174	100
52D	7"-8"	Quick release w/dog	137	84
52-1/2D	9"-13"	Quick release w/dog	175	99

REMINGTON POWER FASTENING TOOLS

Model	Description	List	Sale
75707	476 Power Hammer with case	35	28
77550	480 Power Driver with case	169	109
78480	482 Multi Driver with case	369	235

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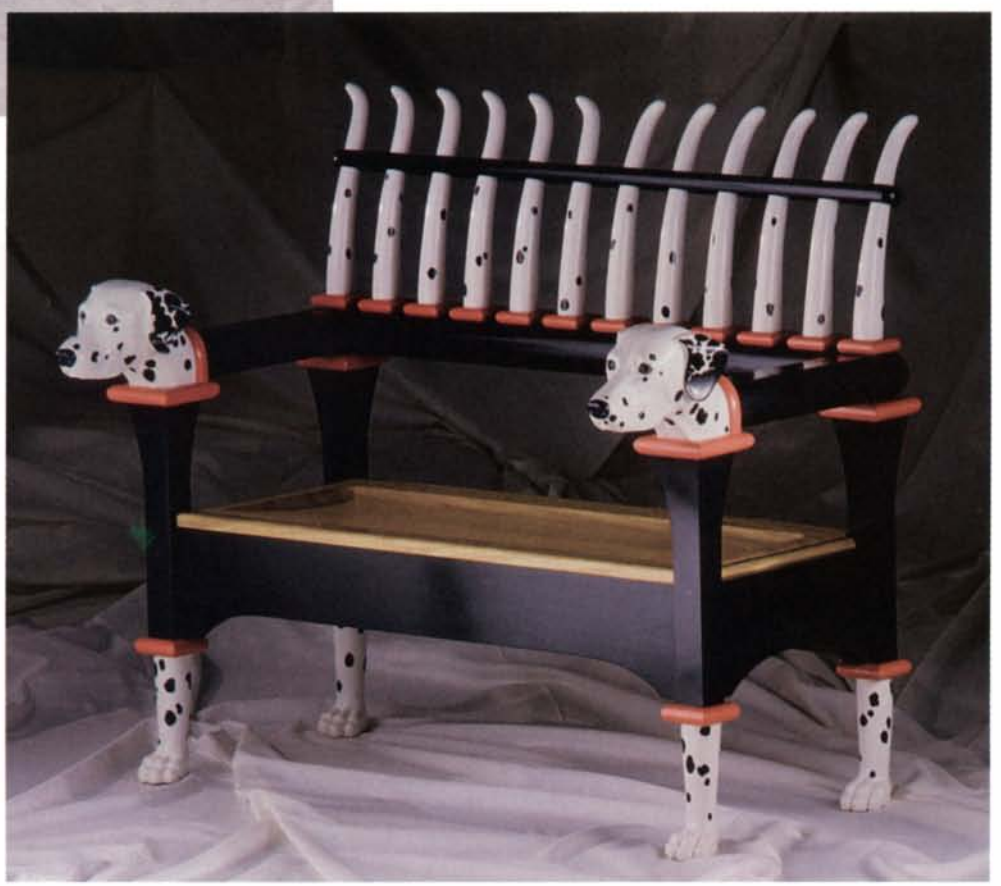
READER SERVICE NO. 90

***The undulating lines** of Jamie Robertson's* Water Bench *capture the ripples on the wind-swept surface of a pond.*

***David Cramers' bench,* Wag,** *although not as popular as Disney's* 101 Dalmatians, *did win a $1,000 award of excellence.*

***The running mouse** is a dead giveaway to the title* (The Clock Struck One) *of Jon Alley's creative interpretation of an old nursery rhyme.*



Art furniture for the '90s

Whether it's furniture as art or art as furniture, these handcrafted, one-of-a-kind or limited-edition pieces are gaining greater public acceptance. *Artiture*, as it is sometimes referred to, is more frequently seen in museum exhibitions and is the focus of increasing media attention. And now there is an organization dedicated to advancing the field of art furniture. Organized in 1989 by Houston furniture artist Adam St. John, the American Society of Furniture Artists (ASOFA) is a non-profit organization that sponsors open competitions and special exhibitions.

ASOFA recently ended its second annual Furniture of the '90s exhibition, which ran in Houston, Texas, and New York City. The exhibition featured a broad selection in a variety of media. Three $1,000 awards of excellence were presented to David Cramer of Connecticut (see the center photo), Amy Hamilton of Colorado, and New York City's Henner Kuckuck. Repeat winners from last year's exhibition were

Photos: Bill Pogue

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READER SERVICE NO. 43

Jamie Robertson (see the top photo on p. 122), Peter Thibeault and Barry Weiss. Among the other winners were pieces by Jon Alley, as shown in the bottom photo on p. 122, and Ira Keer

The judges, Lorry Parks Dudley, director of Peter Joseph Gallery (New York City), Keith Kutch, furniture design program director, Parsons School of Design (New York City), and Adam St. John, ASOFA president and national director, culled the 20 winners from more than 500 entries.

ASOFA is planning to participate in the Year of American Craft, 1993 by hosting an International Furniture of the '90s competition open to all artists in South, Central and North America. For more information, contact ASOFA at P.O. Box 270188, Houston, Texas 77277-0188; (713) 660-8855.

—Charley Robinson

IWF student show attracts record entries

Design Emphasis '92, sponsored by the International Woodworking Fair (IWF), is a furniture design competition for woodworking students. It's held every other August in Atlanta, along with the IWF. Industry sponsorship makes this show different from other furniture shows because the winning designs might be picked up for mass production You'd never have guessed it last August: hand-cut dovetails, flowing curves and solid-wood designs were everywhere. It felt like another (excellent) custom furniture gallery.

The criteria on which entries were evaluated included marketability, design originality, manufacturing adaptability, creative use of materials, engineering and functionality. In addition to the open competition, there were four subsidiary categories: case goods, seating, ready to assemble and design creativity. Judges selected 13 winners from the largest field ever (78 students from 29 schools) with the bulk of the prizes going to students from Rochester Institute of Technology (RIT), Rochester, N.Y. (five prizes) and Kansas State University, Manhattan, Kan. (three prizes).

The best of show award, however, went to Fielding Robert Lane III, one of Ian Kirby's students at Palomar College in San Marcos, Calif. Lane's entry, an ebony and rosewood-veneered writing desk also won in the case goods category. Winners in the other categories were Joe Dasta, RIT (seating), for his maple garden seat; Rhett Hastings, Kansas State (ready to assemble), for his oak and glass cocktail table; Bryan Cahoone, Kansas State (design creativity), for his glass and PVC pipe combination dining table and coffee table.

Other noteworthy projects in wood included Daniel Miller's chest of drawers, which took honorable mention in the case goods' category (see the top photo), and Brad McDougal's upholstered chair in cherry, which took a merit award (see the photo at right). Both Miller and McDougal are RIT students.

Schools and/or individuals interested in Design Emphasis '94 should contact Julie Johnson at (301) 948-5730.

—Vincent Laurence

Clean lines and simple construction methods are hallmarks of Daniel Miller's walnut chest of drawers. Miller's honorable mention in the case goods' category was one of five prizes won by RIT students in the competition.

***Comfortable and curvaceous,** Brad McDougal's upholstered cherry side chair took a merit award in seating.*

Rules for rosewood same as for ivory

Rosewood lumber is now under the same international trade restrictions as ivory, tortoiseshell and other materials that come from species in danger of extinction.

In March of this year, the Convention on International Trade in Endangered Species (CITES), gave rosewood an Appendix I classification. Meeting in Kyoto, Japan, the delegates from 115 nations voted to ban international trade in rosewood lumber cut after June 11, 1992 and to regulate trade in lumber cut before that date.

The intent of the treaty is to reduce destruction of endangered species by banning international trade for commercial use. Does this mean that woodworkers and musicians who cross a border risk confiscation of a rosewood-handled pocket knife or a guitar with a rosewood fretboard? How do you tell the difference between rosewood harvested ten years ago, and some cut and smuggled out of Brazil last week?

If you attempt to ship any quantity of rosewood lumber across the borders of treaty nations, you most probably will need documents verifying that this wood was cut before June 11, 1992. Though technically possible, such verification will not be required by most countries for items like musical instruments and knife handles, according to Don Thompson, a 14-year veteran with the U.S. Department of Agriculture (USDA) Office of Plant Protection and Quarantine.

But what about the gray area between knife handles and shipments of lumber? "There are no certainties, only probabilities," said Thompson. There is a general, unwritten agreement among treaty nations not to regulate or restrict items like musical instruments and knife handles. Each country makes its own laws, though, and enforcement will vary. Reportedly, authorities in Japan have recently confiscated a shipment of guitars that allegedly did not comply with regulations.

The only way to protect yourself in questionable circumstances (such as shipping new furniture that contains any rosewood) is to determine whether authorities in each involved country will require verification that the wood in question is pre-convention. If so, you must then comply with the involved country's laws.

Exporting rosewood from the United States requires two documents: a general permit from the USDA for the export of endangered species, and a pre-convention certificate specifically for your rosewood from U.S. Fish and Wildlife (Department of the Interior). To import, you will need a general permit, and all shipments containing questionable goods

Photos: Vincent Laurence

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should have pre-convention certificates issued by the country from which the shipment is made.

The general permit from the USDA is good for two years and allows you to import or export the stipulated item from most ports. You can get an application within two weeks by contacting USDA, Plant Protection and Quarantine Permit Unit, 6505 Bellcrest Road, Room 632, Federal Building, Hyattsville, Md. 20782. You'll get your permit about two weeks after the USDA receives your application and the required $70 fee.

Pre-convention certificates are issued by U.S. Fish and Wildlife Service, Office of Management Authority, 4401 N. Fairfax Drive, Room 432, Arlington, Va. 22203. Plan ahead because it can take up to 60 days for them to send out an application. You will need to include with the application some means of verifying that your rosewood is pre-convention—an invoice, some record of its importation or simply a statement declaring the rosewood is indeed pre-convention lumber. Send in the application with the $25 fee, and the certificate will be sent in a week. Rosewood with pre-convention certificates can be shipped only from certain ports, so contact the USDA for the port closest to you.

When your shipment gets to the dock for export, USDA officials will inspect it and, at their discretion, validate or invalidate your pre-convention certificate. If validated, the rosewood will be allowed to be shipped. Once it gets to its destination, the rosewood is in the hands of foreign officials. This is why you must investigate the laws and policies of the receiving country before you ship.

When importing rosewood, USDA officials will inspect your shipment to confirm that the appropriate pre-convention certificate has been issued by the country of origin if they believe it is required. Your pre-convention certificate can be invalidated by the USDA at the dock if they think the shipment is questionable, though this is not likely. What happens ultimately hinges on the discretion and judgment of government officials. Further action by CITES may help, but the basic problem will remain: how do you distinguish pre- from post-convention rosewood?

—Jeff Greef, Soquel, Calif.

The doctor is in

When I decided to start getting paid for my woodworking, about fifteen years ago, I had the same dream as every other guy with a saw and a warm place to work. I planned to start with heavy, primitive designs (I had just bought a truckload of century-old 2x10 pine planks) and as my woodworking career advanced, recapitulate the history of American furniture.

But my community had other plans for me. It started with a friend of mine. Some chairs were broken while discussing matrimonial problems with her husband. She wondered if the chairs could be fixed rather than discarded along with the husband. I turned some replacement spindles, and before you knew it, the chairs were as good as new.

News that someone in a community can fix chairs spreads faster than the flu. Trucks and station wagons began showing up at my doorstep stuffed with four-legged patients of all descriptions. There were brittle walnut East Lake chairs with cracked seat fronts, rocking chairs with broken rockers and, the kitchen delight of the 1970s, captain's chairs with loose and usually broken back spindles, often in sets of four or six. Whoever made these captain's chairs was as ignorant of moisture's effect on wood movement as Nixon claimed to be about Watergate. The '70s also marked the advent of the hot-melt glue gun—the bane of all furniture medics. Try cleaning a mortise after Henry Homeowner has given it a good dose of that impervious slime.

From chairs, I soon found I was doing repairs on anything and everything made of wood, such as a living room set altered by a teenage party, stair spindles damaged in a fight and parts for antique cars.

All the while, the new furniture I was building improved as I learned how to make pieces that would last by avoiding the mistakes I saw in the furniture I was repairing. I learned how to carve, patch veneer and apply finishes. I learned to dry my chair spindles in the oven, to avoid cross-grain gluing and to avoid wide boards. I learned how much wood bends before it breaks, what's hopeless and how to talk to customers. I studied the repairs, good and bad, made by my predecessors and felt some kinship as I added my name by theirs on a chair bottom. And as I got better, I cached vintage wood so my repairs blended in with the original work. I still get a kick out of hearing my customers ask, "Which leg did you replace?"

Don't get me wrong, building custom furniture is a great pleasure. A young couple recently asked me to do all their furniture, one piece each year. We favor cherry, and it will be wonderful, 10 years from now, to walk through their home and be surrounded by its fine glow. But it's equally fulfilling to nurse back to health an ailing chair that's been passed on from generation to generation. As a furniture doctor, I help wooden objects on their journey through life. The careful repairer is an extension of the original builder.

—John Sillick, Lyndonville, N.Y.

Photo: Kathleen Sillick

***Repairing furniture** can help the beginning woodworker stay financially afloat, and as John Sillick found out, it also can provide valuable lessons in how to and how not to build furniture.*

Notes and Comment

Got an idea you'd like to get off your chest? Know about any woodworking shows, events or craftsmen of note? Just finished a great project? If so, we'd like to hear about them. How about writing to us? And, if possible, send photos (preferably with negatives) to Notes and Comment, Fine Woodworking, *PO Box 5506, Newtown, Conn. 06470-5506.*

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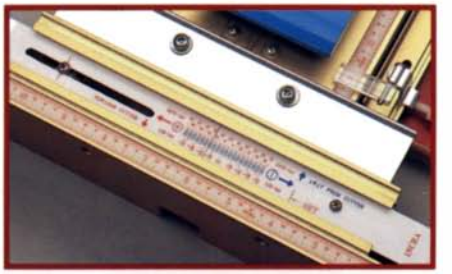

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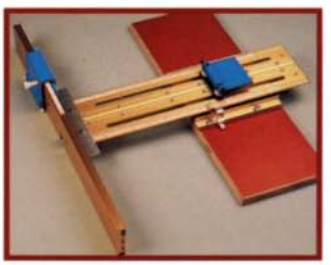
Precision crafted of solid aluminum, the INCRA JIG PRO delivers the same phenomenal accuracy as the Original INCRA JIG over a full 16 3/8" range. But it's the new user-friendly features that make this tool such a pleasure to use. A quick action cam clamp locks the jig securely in place. No secondary lock-down knob needed! Release the clamp and the racks automatically spring apart. An adjustable top mounted scale and the FLIPSIGHT™ hairline cursor make it easy to view every setting. And there's no need to buy a complete new setup. INCRA JIG PRO works with ALL genuine INCRA JIG Accessories.

Best of all, it's surprisingly affordable. Our top of the line 16 3/8" INCRA JIG PRO sells for **$60.00 LESS** than our nearest competitor's bottom of the line 10 1/2" machine. Why? Because our superior, state of the art rack positioning technology simply works better and costs less to produce.

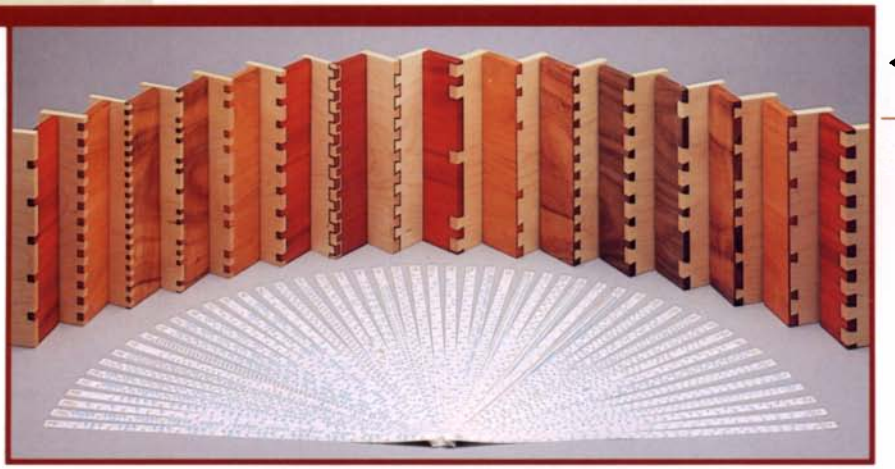


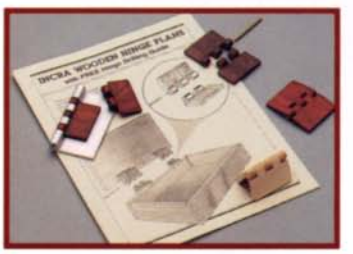
▲ INCRA JIG PRO

The INCRA JIG PRO, shown here with the 28" INCRA PRO Fence System , makes a truly superb fence for the table saw or router table. (INCRA JIG PRO and INCRA PRO Fence System sold separately.)

The Original INCRA JIG

When INCRA JIG was first introduced several years ago, it quickly became the favorite tool in workshops across the country. With good reason. For the first time ever, a woodworker was able to position his work with true machine shop precision and better than machine shop repeatability. **All from a tool that costs less than $40.00!**





▲ NEW! INCRA Wooden Hinge Plans

These beautiful wooden hinges will provide the perfect accent for your next project. Complete, fully illustrated plans include a FREE aluminum hinge drilling guide.

▲ NEW! INCRA Miter Slider

This 18" long aluminum runner adjusts for perfect sliding action in any standard table saw miter slot. Also locks in place for stationary jigs. Includes illustrated plans for building a wide variety of table saw jigs.

NEW for Fall '92!

◂ INCRA Master Template Library

50 genuine 16" long INCRA templates for use with INCRA JIG or INCRA JIG PRO. Includes templates to make all of the joints shown here and much more, plus a complete range of fixed increment templates. Comes with full sized plans for each joint. A great supplement for the INCRA JIG Handbook and Video.

The INCRA System

- **NEW! INCRA JIG PRO**
- **NEW! 28" INCRA PRO Fence System**
- **NEW! INCRA MIKE**
- **NEW! INCRA Master Template Library**
- **NEW! INCRA MITER SLIDER**
- **NEW! INCRA Wooden Hinge Plans**
- **The Original INCRA JIG**
- **18" INCRA Fence System**
- **INCRA Right Angle Fixture**
- **The Official INCRA JIG Handbook & Templates**
- **The Complete INCRA JIG Video**
- **INCRA GAUGE**

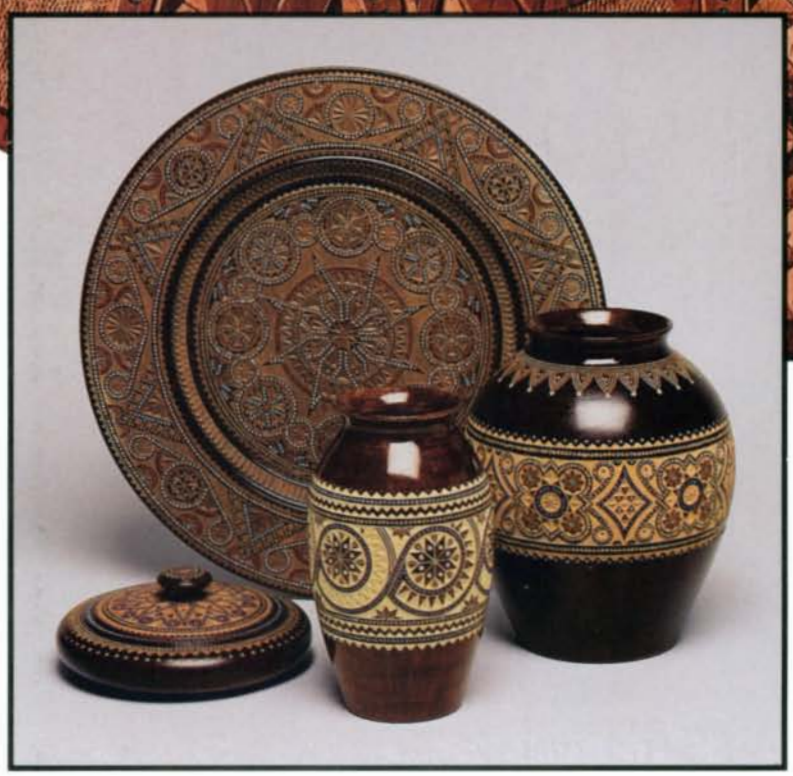
Coming Soon!
INCRA PROJECT BOOK

Written by our own "INCRA Pro", Perry McDaniel, this beautifully illustrated book contains a wide variety of complete projects, like the jewelry box shown here, that you can build with your INCRA JIG.

For a FREE INCRA Brochure & your nearest dealer, write:
Taylor Design Group, Inc. P.O. Box 810262 Dallas, TX 75381
Or send $8.00 for our new VIDEO BROCHURE (VHS)

READER SERVICE NO. 79

Returning to the Ukraine



Little did Michael Korhun realize, when he began trading carved figures for food in a World War II German labor camp, where his talent would take him. Korhun now lives in Troy, N.Y., and last year was invited to tour his native Ukraine where, with traditional folk crafts in decline, he is recognized as a master woodcarver. Korhun didn't turn to chip carving until 1965, 13 years after he immigrated to the United States. Since then, he has developed the skill to render astoundingly complex pieces without the aid of a sketch or layout. Unlike other chip-carved work, Ukrainian carving begins with a stained and finished turning, whose glossy surface will show every stray cut. These carvings also include inlaid beads or stones. Today, Korhun's work is displayed internationally, and he has been nominated for a National Heritage Arts Award. *–Ellen McHale*