

WOODWORKER'S JOURNAL

December 2001
Volume 25
Number 6



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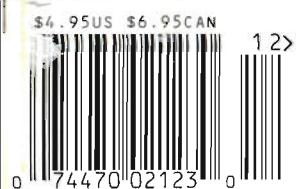
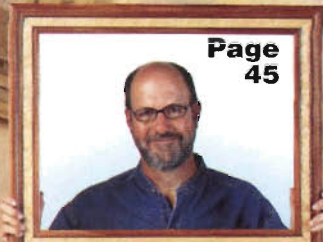
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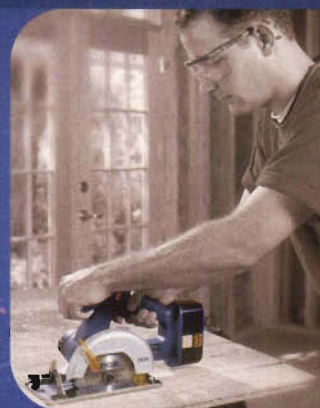
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By Joanna Werch Takes

American heritage — in furniture. We explore the "in" style from George Washington's day.

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By Ian Kirby

Regular contributor Ian Kirby walks you through the basics of our most common and useful joint.

38 Hollow, Spiral Turned Candlestand

By Rick Christopherson

The author "loves the idea of a project that someone picks up, stares at for a minute, and says 'how'd they do that?'"



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45 Picture Frame

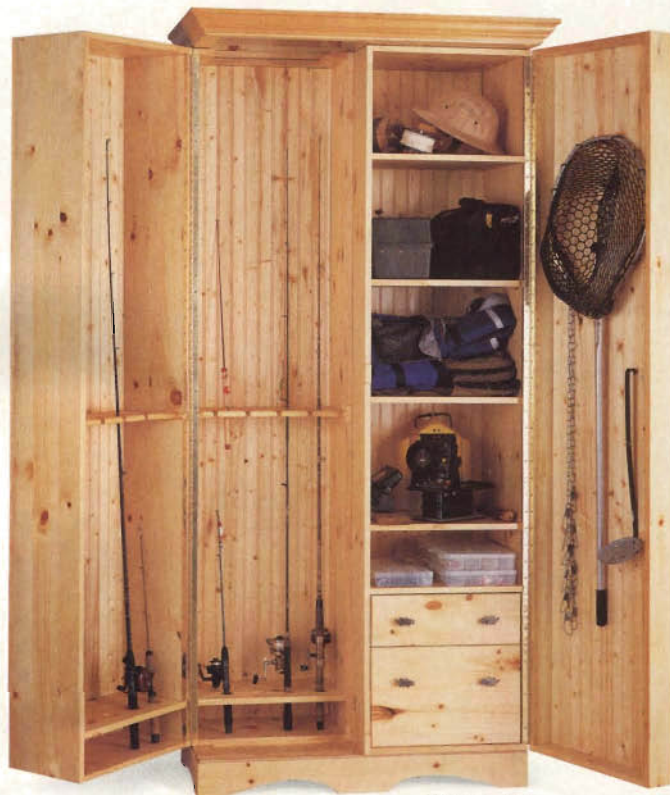
By Mike Stevesand

This issue's centerfold is a simple weekend project chock-full of woodworking techniques.

52 An Angler's Cabinet

By Rick White

Our regular project builder hit the shop with a different hobby in mind.



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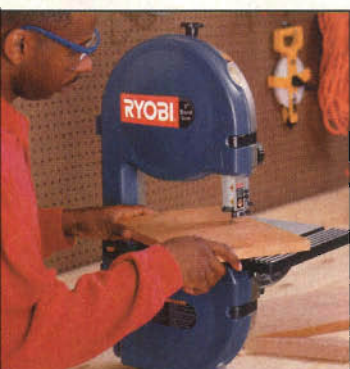
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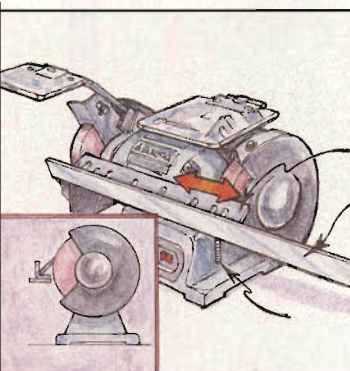
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Jigs & Fixtures: Shop Road Maps

A shop might look like an unorganized disaster to the uninitiated, but we woodworkers know that the road maps are hanging right on the walls. Find the tapering jig and you'll soon spot the table saw. Step up to the table saw and you'll likely uncover a fixture containing blades and a dado set nearby. In fact, I don't think I've ever had a tour of a woodworker's shop that didn't include stops to check out the various jigs, fixtures and templates. During one recent visit, I pointed to a router template hanging



on a wall and asked my host what it was for. "Oh, that's for a toy I made my nephew," he responded. "How old is your nephew?" I asked. "He's 21 now ... but he was six when I made it, and you never know when you might need that template again." I wasn't surprised. If there's one thing woodworkers have in common, it's an abiding love for shortcuts in the shop; i.e., jigs and fixtures. Who among you throws away even the simplest jig once the project is "done," or doesn't have at least a concept for the perfect shop fixture to support a new tool? And that, fellow woodworkers, is why I asked editor **Rob**

Johnstone to start up a brand-new department in our magazine covering jigs and fixtures. Look for the first offering, **Ralph Bagnall's** adjustable dado jig, on *page 70*.

Speaking of fixtures, contributing editor and project builder **Rick White** created a real doozy for this issue, only it's designed to manage the tools of his other hobby ... fishing. If you like to wet your line occasionally, check out the knotty pine angler's cabinet starting on *page 52*. We've also included **Rick Christopherson's** hollow, spiral turned candlestand (*page 38*) and an easy-to-make picture frame (*centerspread project*) from newcomer **Mike Stevesand**.

Associate editor **Joanna Werch Takes** has been hitting the furniture history books again, and the fruits of her labor can be found in this issue. Joanna's series on furniture styles started with an examination of the Arts and Crafts movement (*September/October '99*) and continued with her excellent piece on the Shakers last year (*September/October '00*). This issue she has uncovered some wonderful facts (and even better photos) about the Federal style. Her article starts on *page 26*.

Keep making sawdust and, please, send us a photo of your favorite jig!

Larry N. Storker

NOVEMBER/DECEMBER 2001

Volume 25, Number 6

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Readers love the idea of a laser to help align cuts on their chop saw, but have their own ideas on how this feature could be executed by manufacturers.

Laser Sharp Suggestions

Since my Porter-Cable LaserLoc saw is now out of production, I read your article about Craftsman's laser guided compound miter saw with keen interest (*What's In Store*, August 2001). No doubt about it, the laser indicator is a great feature. However, switching on the laser at 1,500 rpm requires the user to make final positioning of the workpiece while the blade is turning, and that is not so great. The PC 7700's laser stays on as long as the saw is plugged in and, while safer, still doesn't promote long laser life. A separate laser switch or, ideally, a two-position switch similar to that found on autofocus 35 mm SLR cameras would be better. A gentle squeeze of the trigger to activate the laser and position the workpiece (with the motor OFF) and a firmer squeeze to make the cut would make this a great system.

Mike Titus
Pikeville, Kentucky

Woodworking Calculations

Some Read; Some Don't

Loved your editorial on "No Time for Reading?" (*On the Level*, August 2001). I wish I had the answer to your question: why don't more people read?

I believe our school systems have made book reports and the entire reading process so unpleasant that, as adults, most people resist doing it ever again (fast-paced society and instant gratification do have something to do with it, too).

I have been a big fan of reading all my life. I find television mindless and a big thief of my time. I guess that I have found that there are two kinds of people—those who like to read and those who do not.

Duane Matson
Columbus, Nebraska

It seems that someone thinks it is easy to find a viable woodworking book to read ("Woodworking's Top 40," August 2001). I have been continually disappointed in the quality of books on woodworking.

Words, pictures and accurate drawings are necessary. Woodworking books lack some or all of these things.

I prefer to watch reruns of home improvement shows on television to obtain my information since I have been disappointed in books.

Kenneth Gilmer
Bartlett, Tennessee

New Math

I notice that Rob Johnstone did not really answer a question presented by Cliff Haas (*Questions & Answers*, August 2001). It seemed to me that Cliff's question was about making a 90 degree arc using a 3/4" pine board. Your answer of 11 cuts was not correct for 3/4" stock, but was correct for 1" stock. I happen to have a degree in mathematics, and I derived some calculations (below) using basic trigonometry, where you know the depth of cut and the blade width is 1/8".

Sam Bisignano
Issaquah, Washington

continues on page 12 ...

Stock	Depth of cut	Arc angle/cut	Number of cuts for 90 degrees
3/4"	5/8"	11.31°	8
3/4"	9/16"	12.53°	7
3/4"	1/2"	14.04°	7
1"	7/8"	8.13°	11
1"	13/16"	8.75°	10
1"	3/4"	9.46°	10
1 1/2"	1 1/8"	5.19°	17
1 1/2"	1 1/16"	5.44°	17
1 1/2"	1 1/4"	5.71°	16

Mail Call! Contact us by writing to "Letters", Woodworker's Journal, 4365 Willow Drive, Medina, Minnesota 55340, by fax at (763) 478-8396 or by e-mail: letters@woodworkersjournal.com

We ask that all letters, including e-mails, include a mailing address and phone number. We reserve the right to edit for length and clarity.

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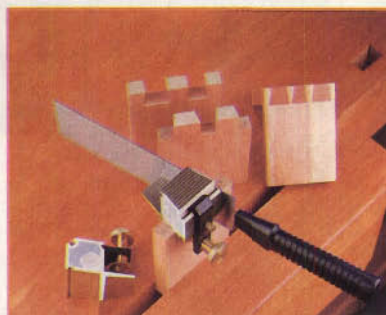
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SEARS

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Calling Lee Valley Tools

The contact number for Lee Valley Tools appeared incorrectly in the August 2001 issue of *Woodworker's Journal*. ("Dovetail Training Wheels," *What's In Store*). The correct number is 800-267-8767. We regret the error.

Eliminating Moldy Smells

In the August 2001 issue, there was a question on how to remove damp, moldy smells (*Questions & Answers*). Thought I would let you in on a secret: use Gillette Right Guard spray. We had a refrigerator which was left unconnected for three weeks, and you can imagine the smell when we returned. I sprayed it with Gillette Right Guard, closed the door and in the morning all traces of odor were gone! A friend of ours had an old wooden steamer trunk that was odiferous and he tried the same trick after we told him of our experience. The next morning his odor problem did not exist!

Karl Whisenand
Spring, Texas

Here are a couple of sure-fire treatments for musty or other bad smells which you might keep in mind as both are natural and noninjurious. A small saucer or bowl of vanilla set in a fridge or piece of furniture and changed every three or four days for a couple of weeks works wonders to eliminate many smells.

The one I like best, though, as I stumbled on it by accident, is to put some walnuts with the green hulls still in place in the item and let them stay there for a while. This completely

eliminated odors from a pickup my son gave me a few years ago. I had pulled the seats out and shampooed the entire interior and seats, but to no avail. The wife picked up some walnuts while we were out and about and put them behind the seat. Within a week the truck had absolutely no odor left. Previously, it smelled like a cross between a dead body and a weekend smokers' convention.

Jim Evans
Manchaca, Texas



Chest Champ

Your *Journal* has been a favorite with me for many years. Perhaps I am the apothecary chest champ. The enclosed is a picture of my 16th chest (a wedding gift for my grandson,) plus the July/August issue of 1987 which featured the chest on its cover. I started making the chests when I was a spry 66. Now, at a spry 81, I am still learning and continuing to produce more gifts. Number 17 is on the drawing board for this summer.

Hank Blake
Greensburg, Pennsylvania

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

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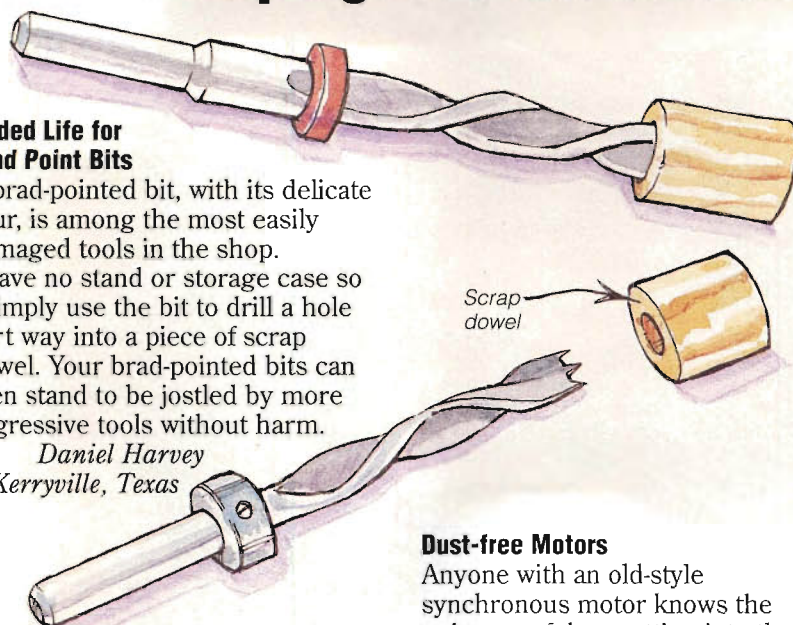
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Keeping Bits and Cutters Sharp

Added Life for Brad Point Bits

A brad-pointed bit, with its delicate spur, is among the most easily damaged tools in the shop. I have no stand or storage case so I simply use the bit to drill a hole part way into a piece of scrap dowel. Your brad-pointed bits can then stand to be jostled by more aggressive tools without harm.

*Daniel Harvey
Kerryville, Texas*



Removing Plugs

The simplest way I've found to remove a wood plug is to drill a pilot hole (about 1/8") through the plug until it hits the head of the screw beneath. Then I run a wood screw into the plug, and when it hits bottom the plug "walks" up the screw and out of the hole. Incidentally, you should never glue plugs in place: set them in paint, shellac or varnish.

*Alix K. Nadler
Swansea, Illinois*

Dust-free Motors

Anyone with an old-style synchronous motor knows the nuisance of dust getting into the centrifugal throw-out switch. It often means removing the motor housing and blowing it out with compressed air — if you have it.

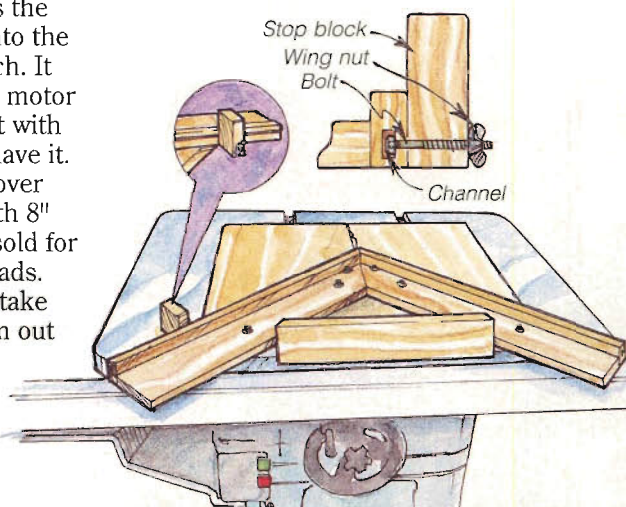
My solution is simple: cover both ends of the motor with 8" terry bonnets, which are sold for random orbit polishing heads. When necessary, you can take the bonnets off, rinse them out in warm, soapy water and replace them.

*Marc Broussard
White Lake, Michigan*

Super Accurate Miterers

I've been using the standard miter cutting jig (see sketch below) for some time, but have had trouble getting the two sides of a frame exactly the same length. So I routed a channel, using a slot-cutting router bit, along both legs of the jig. I then mounted stop blocks using a 1/4" hex-headed bolt, washer and wing nut. A penciled register enables me to set the block back at exactly the same position.

*Chuck Steger
Bossier City, Louisiana*



Grinding Your Own Planer and Jointer Knives

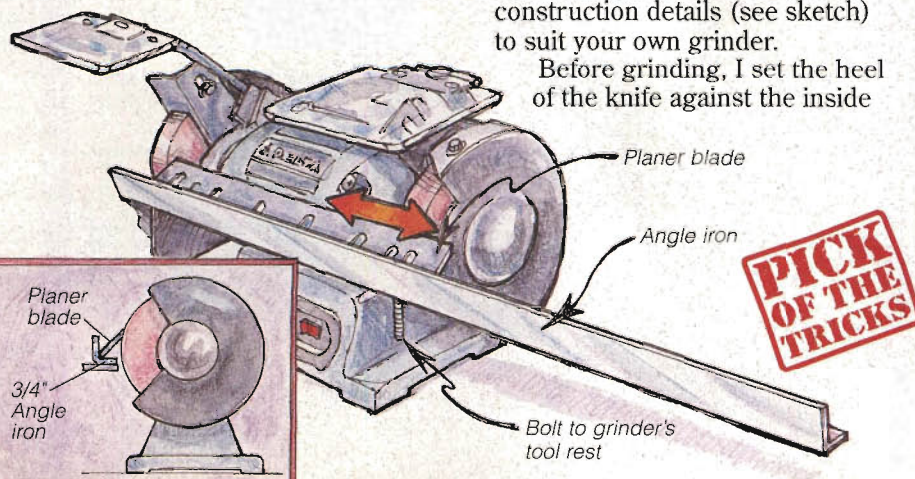
In these days of disposable cutters, it's getting harder to find machine shops able to grind planer and jointer knives at a reasonable cost.

With a bench grinder and this simple jig I now do the job myself without leaving the shop. You might need to modify the construction details (see sketch) to suit your own grinder.

Before grinding, I set the heel of the knife against the inside

corner of the iron and adjust the height until the angle exactly matches the knife's original bevel. Then I switch on the motor and slide the knife smoothly from left to right, maintaining a slight pressure against the wheel. I make only one pass at a time, so that the knife can cool, then do the next one. I continue until all nicks in the cutting edges are removed and then hone the knives with a fine, flat stone until the slight burr left by the grinding is gone. Don't try this with a carborundum wheel — you'll be sure to burn the steel: aluminum oxide is far better.

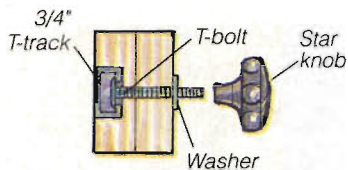
*Donald Hyson
Winnebago, Illinois*



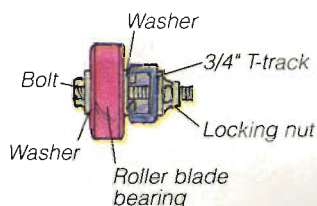
**PICK
OF THE
TRICKS**

T-track Assembly

Two pieces of 1/2" plywood laminated together



Bearing Assembly



Heavy-duty Turning Steady

I was having trouble working large vessels on the lathe so I built myself a "steady." The construction is simple, but you may have to modify the sliding foot details to suit your own lathe. The contact points are four inline roller blade bearings attached to sections of 3/4" aluminum T-track. Details are shown in the sketch. Total cost was about \$45.

David Kirkman
Lebanon, Oregon

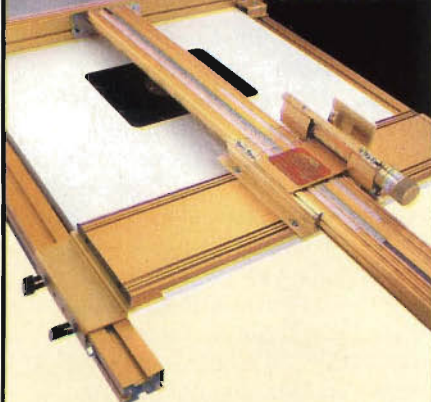


WINNER!

In addition to our standard payment (below) Donald Hyson of Winnebago, Illinois will also

receive a **Porter-Cable handheld oscillating spindle sander** for being selected as the "Pick of the Tricks" winner. We pay from \$100 to \$200 for all tricks used. To join in the fun, send us your original, unpublished trick. Please include a photo or drawing if necessary. Submit your Tricks of the Trade to Woodworker's Journal, Dept. T/T, P.O. Box 261, Medina, MN 55340. Or send us an e-mail: tricks@woodworkersjournal.com

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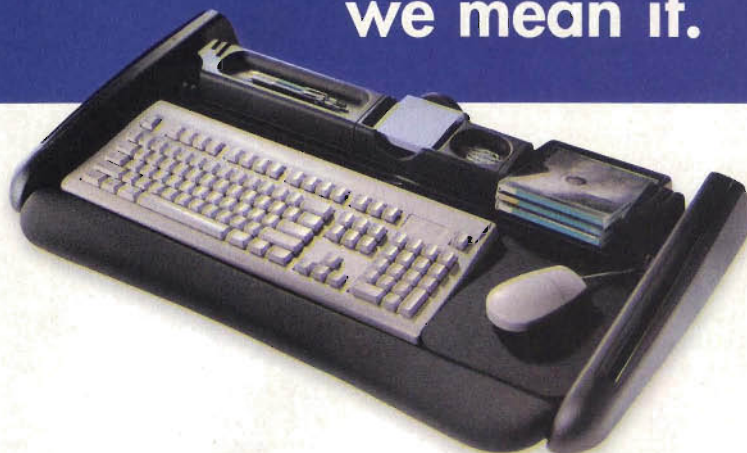


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A Woodworker With a Big Heart

Adaptive Woodworking Plans Help Disabled Kids

About 20 years ago, Lucian Brown answered an ad from Courage Center, a Minneapolis facility where people with disabilities can get therapy and get back into as normal a life as possible. The ad was looking for volunteers to help build adaptive equipment for disabled kids. Lucian set up shop (right) and started figuring it out.

With adaptive furniture, says Lucian, the limited movement of the end users has to be taken into account. It needs to be adjustable, but the adjustments must be designed so that someone with limited movement can manipulate them. Lucian's standing frame — which paraplegics or quadriplegics can use to stand up and keep circulation going in their legs — is an amazing collection of adjustable surfaces, knobs and clamps.

After he got Courage Center's program up and running, Lucian helped establish a center to help the local school district make its buildings accessible. Now, when a school's therapist needs a piece of equipment or furniture for a disabled student, they only need to contact the center.

All of Lucian's designs and furniture are made with Baltic birch plywood because, as he puts it, "it's the only plywood that will hold a screw driven into the edge of the board."

At 85, while he admits he is slowing down a tad, Lucian is still doing some great woodworking. He builds tables from rough edged planks with interesting grain patterns and has amassed a six-deep collection of jigs on his shop walls, sharing space with the planes he inherited from his grandfather.

Lucian's children and grandchildren have also taken up woodworking. Peter, Lucian's son,



Many of Lucian Brown's tools (above) are like the furniture he designs for disabled kids: they adapt to almost any task. Lucian didn't study engineering; he just figured out how to build things like the standing frame shown at right. Check out our eZine for his plans.



sent us some of the plans his father drew up for these adaptive contraptions — so others could build the projects and help out kids who had various physical impairments. *Woodworker's Journal* has published the plans on our eZine for anyone who is interested.

www.woodworkersjournal.com/eZine/lucian.cfm

— Bob Filipczak

"Cool" Tools —

From Space-age Technology

Cryogenics is, literally, a cool way to increase your tools' lifespan. Think of a freezer the size of your dining room table. Now think of putting your tools in there, and cooling them to several hundred degrees below zero. Done properly, says Lee Moore, vice president of Performance Cryogenics, it makes them more resistant to wear and breakage, without making them more brittle. "It's not smoke and mirrors and voodoo magic," he adds. "It actually does work."

Originally discovered through the space program, cryogenics is now an option for router bits, shaper heads, planer knives, saw blades, "essentially anything and everything anybody has in the shop that cuts," Lee said.

In the business Lee and his dad founded three years ago, the type of cryogenic processing they

Exposing your cutting tools
to a freezing substance increases
their lifespan, says Lee Moore
— if you do it the right way.



perform is a “dry” process. The easiest way to envision it, he said, is to think about the different ways you could warm up, for example, a rack of drill bits in your bathtub. Cryogenics, in which temperatures can reach 300 degrees below zero Fahrenheit, is “essentially a heat treating,” Lee said. “It’s just an absolute lack of heat.”

In the bathtub analogy, the equivalent of a “wet” cryogenics process — where the chamber with the tool in it is flooded with a cryogen, such as liquid nitrogen — would be putting the rack of bits in the tub, then filling it with hot water to cover them. In the “dry” process, you would put the rack on top of the tub, partially fill the tub with hot water, and let the heat and steam, not the water itself, change the bits’ temperature. In cryogenics, the liquid can evaporate in seconds.

The time that a particular tool is in the chamber varies. “It’s not a one-size-fits-all kind of process,” Lee said. Factors like size and alloys come into play. “Processing everything the same amount of time, whether it’s a 1/8” drill bit or a Chevy engine block, is not the way to achieve quality,” Lee said.

In woodworking tools, his shop processes a lot of Phillips square head drivers, Lee said, as well as Forstner bits and saw blades. Having a 10” to 12” inch saw blade cryogenically enhanced costs about \$25 per blade. “We look at it as, ‘spend a dime to save a dollar,’” Lee said. For example, one shop they work with was previously getting 900 board feet out of a particular saw blade before resharpenering it. Now, that’s up to 1,800 board feet.

Properly performed cryogenic enhancement, he explained, makes

the component more resistant to microcracks, and is effective throughout the component, for the life of the tool. The process does not have to be repeated each time the blade is sharpened. Still, Lee said, “It’s not a cure-all. The alloys in a \$15 rough cut saw blade are still going to be inferior to a tool steel blade.”

If you’d like to find out about freezing your blade or other cutting tool, visit www.percryo.com or call 877-219-3556.

Shop Talk continues on page 18 ...

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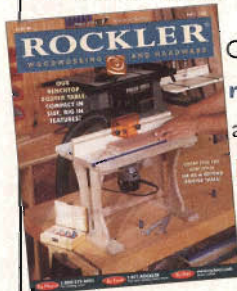
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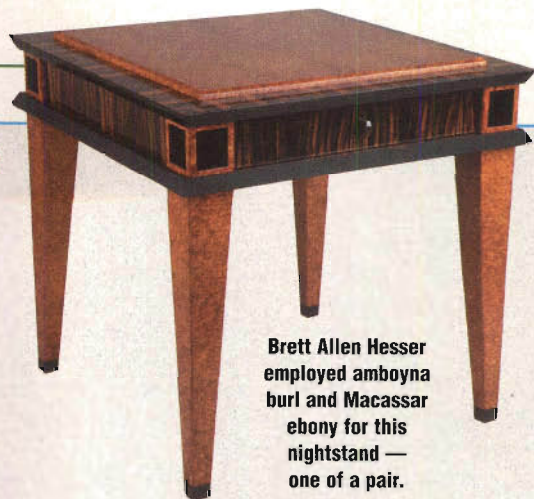
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SHOP TALK

California Dreamers

*San Diego's Latest
Woodworking Show*

The San Diego Fine Woodworkers Association marked the 20th year of their International Design in Wood show at last summer's Del Mar (California) Fair. *Woodworker's Journal* once again sponsored the honorable mention category, where the two works pictured on this page placed. For info on next year's show, call Bob Stevenson at 619-422-7338.



Brett Allen Hesser employed amboyna burl and Macassar ebony for this nightstand — one of a pair.



Sean Palmer's jewelry box is white oak veneer with walnut drawers. A variety of woods, including padauk, rosewood and purpleheart, went into the inlay.

Turners Gather Round St. Paul

*AAW's National
Symposium*

Demo's, a museum gallery show and community service were all part of the American Association of Woodturners' 15th Annual National Symposium in St. Paul, Minnesota, last summer. Administrator Mary Lacer said 830 attendees left with "excellent comments." For more info on next year's June 28 - 30 show in Providence, Rhode Island, call 651-484-9094 or visit the organization's web site www.woodturner.org.

**New Zealander
Soren Berger** demonstrated
tool handling at the American
Association of Woodturners'
Annual Symposium.

*photo by
Dick Burrows*



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Redwood for Furniture Making?

THIS ISSUE'S EXPERTS

Sandor Nagyszalanczy is a furniture designer/craftsman and author of seven woodworking books, including *Woodshop Dust Control* from Taunton Press.

Joanna Werch Takes is our associate editor and serves on the *Womeninwoodworking.com* advisory board.

Michael Dresdner is a nationally known finishing expert and author of *The New Wood Finishing Book* from Taunton Press.

Dr. Gene Wengert is a professor emeritus of wood processing at the University of Wisconsin-Madison and president of *The WoodDoctor's Rx*, a consulting and education company.

Mary Lacer is the administrator of the American Association of Woodturners.

Q Why isn't redwood used more often in furniture and cabinet construction?

*Glen Peysar
St. George, Utah*

A Redwood (*Sequoia Sempervirens*) has a rich color and a pleasant, aromatic smell when cut, shaped or sanded. The problem is, the dust is an irritant that can cause allergic reactions that range from mild sneezing to acute respiratory distress (in a small percentage of persons). Even people who aren't allergic to redwood can become sensitized to its dust, so always wear a mask.

Another problem with redwood is that it's quite a soft material that dings with alarming ease. Just picking up a board wrong can leave fingernail gouges. Further, cutting tools that aren't surgically sharp tend

to burn redwood, and dull chisels or turning tools leave fuzzy or torn surfaces that can be difficult to sand cleanly.

Finally, "cabinet grade" redwood can be difficult to source. Even here in redwood-rich central California, the redwood you find in an average lumberyard is "second growth" material cut from young, fast growing trees. It's more suited to decks and planters than dressers or desks.

Highly prized, first-growth redwood is from ancient, slow-growing trees. This wood ranges in color from deep red to tobacco brown and has a fine grain. Since most of California's first-growth redwoods were clear-cut around the turn of the last century (or are now protected), first-growth stock is hard to find.

— Sandor Nagyszalanczy



Forstner bits have been useful ever since a veteran of the Oregon Trail invented them.

Q I'd like to get some information on Forstner bits — a little history, some uses, etc.

*Jordan Reed
New York, New York*

A The Forstner bit was invented and patented in Aurora, Oregon by Benjamin Forstner in the mid 1800s. They're used to drill clean, flat-bottomed holes without running into problems with knots or odd grain. A circular rim and two cutters grab and start the hole without pushing the tip through the board.

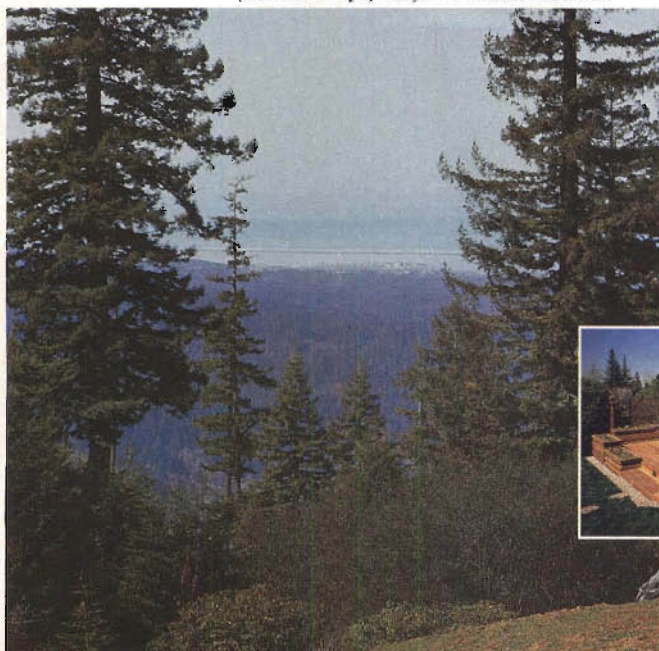
— Joanna Werch Takes

Q How can I calculate the amount of finish that I'll need to complete my next project?

*Omar Grant
via e-mail*

A The rule of thumb is to figure out the amount of surface area you will want to cover, multiply that by the number of coats you are going to apply, and divide by

photos courtesy of California Redwood Association



Old growth redwood is now protected and can be hard to find as lumber. Recycled planks from old barns are often the best source.



continues on page 22 ...

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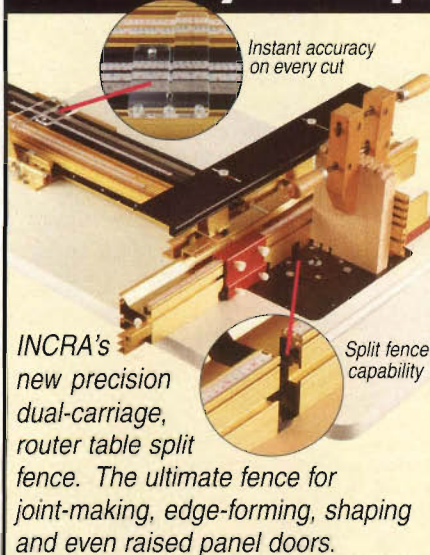


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Your lumber will dry in weeks, instead of months, if you dry it at the preferred 130° Fahrenheit. The high temp, available with a kiln, also kills insects or fungi in the lumber.

will not provide the needed protection; I recommend using a product designed specifically for protecting lumber ends. The US Forest Products Lab has recently issued *Drying Hardwood Lumber*. The book can be downloaded for free at werc-hdw.com/publications.htm, or you can call 304-487-1510.

— Gene Wengert



WINNER! For simply sending in his question on preserving burls, Donald Thomas of Haddonfield, New Jersey wins a **Bosch 1278 VSK compact sander.**

Each issue, we toss the questions we use into a hat and draw a winner. Contact us by writing to "Q&A", *Woodworker's Journal*, 4365 Willow Drive, Medina, MN 55340, or send us an e-mail:

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the coverage rating of the material. Most finishing materials cover about 400 square feet per gallon if applied by brush. For safety's sake, I would allow at least 10 percent extra for cleanup and miscalculation if I were using a brush or rag. For spraying, you need to double or triple the amounts (depending on the type of gun you use), since it is a much more wasteful way of applying finish.

— Michael Dresdner

you would be lucky to arrive at the required low moisture content within nine months — and remember, you need the core down to that low level, not just the shell.

You would be much better off putting the lumber in a drier, warmer location. Then drying time would be weeks. Contact your state forestry people to see if they can suggest someone locally that has a kiln drying service.

I suggest that log ends be coated, if possible, and certainly fresh ends of lumber. The coating must adhere well to wet wood and also provide a moisture vapor barrier. Most paints

Q I just acquired about 400 board feet of band sawn cherry 1 X's. I have it stacked and stickered in a dry, cement-floored building at a temp of 65° to 70°. How long before I can start using some of it, and should I paint the ends while it's drying?

L.D. Jeffries
Russell, New York

A You need to dry the lumber to six or seven percent moisture content. This means that the relative humidity (RH) in your building must be no higher than 30 percent. Even with 20 to 25 percent RH, I think

Q I have just found a few nice burls and would like to know the best way to preserve them. Also, how much of the burl will have to be treated? Will I just have to treat the cut surface, or the entire burl?

Donald F. Thomas,
Haddonfield, New Jersey

A You will need to treat the cut surface. The rest of the burl (the part that's covered with bark) should dry more evenly. You have a few options for treatments you can brush onto the cut area. They include PEG (polyethylene glycol), wax, a petroleum sealer or a water-based paint.

— Mary Lacer

Treating the cut surface of a burl with one of several different options will preserve the wood until you're ready to turn it.



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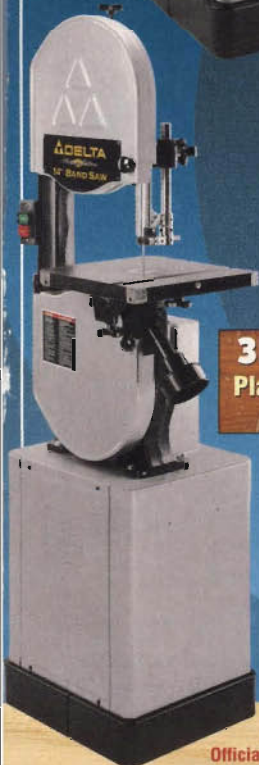
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- Tool weight: 4-1/2 lbs.

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~~\$149~~ **\$95**

ITEM 41168-5KCA

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SIZE	TEETH	STYLE	ARBOR	ITEM	PRICE
10"	60	ATB	5/8"	38543-3KCA	\$13 \$13
10"	80	ATB	5/8"	38544-1KCA	\$17 \$17

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- 2-1/2 lbs. tool weight

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M2 molybdenum tips; 5/8" arbor
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LENGTH	ITEM	PRICE
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- Wheel diameter: 12"
- Shipping wt.: 92 lbs.

~~\$89~~ **\$89**
ITEM 37297-3KCA

12" SANDING DISCS

GRIT	ITEM	(PK. OF 2) PRICE
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120	37959-3KCA	\$5 \$9

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ITEM 37145-1KCA **\$29**

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- Includes battery and charger

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- C2 tungsten carbide tips
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- UL approved

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(Circle No. 43 on PRODUCT INFORMATION form)

America's Founding Furniture

By Joanna Werch Takes

I have always been fascinated by the 18th century. Merely hearing the names Washington or Jefferson can evoke the era of our country's beginnings, when certain ideals swept government, religion ... and furniture. "Federal" is the name of the furniture style that marked this era.



Pieces like this lady's cabinet and writing table reflected the Federal era's new emphasis on learning for women. The panels on this mahogany piece with satinwood inlay use Baltimore's "verre eglomisé" painted glass.



A truly American piece of furniture: the "Martha Washington chair" is a style of high-backed armchair named after the nation's first First Lady.

All photos courtesy of Winterthur Museum

America's first statesmen — Washington, Adams and Hamilton — sought to form a new republic based on classical ideals descended from ancient Greece and Rome. Furniture makers of the day, caught up in the groundswell of change, were of a like mind. In fact, "Federal," the name ultimately used to identify their style, was borrowed from the Federalist party of the day, embodying the 18th century connection between politics and furniture.

The beading, fluting, reeding and classical designs like urns, drapery and cornucopias that appeared on Federal furniture paid homage to a classical heritage, while American patriotic symbols such as Liberty, sheaves of wheat and the American eagle expressed the new country's hope for its future. George Washington himself frequently appeared on Federal furniture, in the form of portraits either created by or surrounded by inlay — a popular Federal adornment.

The first appearance of Federal furniture was in a year with particular significance for the young United States: 1776, when Benjamin Randolph of Philadelphia created a mahogany lap desk with satinwood banding for Thomas Jefferson. On that desk, Jefferson wrote the Declaration of Independence, the summary of the ideals that 18th century society strove to express. For approximately the next 40 years, until around 1820, the delicate

Reeded and inlaid panels of figured birch on this bed's footposts are typical Federal elements. While the floral textiles likely came from the East India Company, the English also manufactured some bed hangings with American patriotic motifs, like George Washington standing by a pyramid.



lines and fine ornamentation of Federal furniture were a visual manifestation of these ideals. As President James Madison furnished the White House in 1808, architect Benjamin Latrobe even designed furniture for the president's mansion in the "new Greek style."

England and "The Antique"

Ironically, one source of both the Founders' philosophies and their decorative influences was England, the country from which the United States had just wrested its independence. British law, with its own Roman influence, helped form the basis of U.S. government, and European interest in the classical era influenced the fashionable taste of the day.

Current events, in turn, had an influence on the fashion. Early 18th century excavations at Pompeii and Herculaneum, for example, had sparked a reinterpretation of classical design principles. In response, Scotsman Robert Adam developed a "neoclassical" style which relied heavily on ovals, rectangles and circles with delicate ornamentation in naturalistic or classical themes — things like bellflowers, urns and draperies. The Adam style was the height of fashion in 1770s England — but the Americans weren't paying much attention at the time. They had other things on their minds, like fighting the Revolutionary War and rejecting British goods.

When the war was over, however, Americans once again looked to England to set fashionable standards. Many of

them had grown up thinking of themselves as British citizens, looking to London for governance of both law and taste. Even as a newly independent country, they continued this relationship. Neoclassical's popularity spread on both sides of the Atlantic, although the American Federal interpretation was simpler, more clean-cut and delicate than the Adam style in England. By the time the U.S. Federal Constitution was ratified in 1788, the classically inspired style was firmly entrenched on both sides of the Atlantic. Writing in 1790, Archibald Allison commented, "The taste which now reigns is that

of the Antique. Everything we now use, is made in imitation of those models which have been lately discovered in Italy."

One method by which furniture designs traveled from one country to the other was through the dissemination of popular pattern books, including George Hepplewhite's *Cabinetmaker's and Upholsterer's Guide*, published in 1788; Thomas Sheraton's *The Cabinetmaker & Upholsterer's Drawing Book*, published in several parts between 1791 and 1794; and Thomas Shearer's *Cabinet-Makers' London Book of Price and Designs of Cabinet Work*, first printed in 1788.

These books had such a strong influence that the Federal furniture era has sometimes been called "Sheraton and Hepplewhite." Customers and cabinetmakers alike used the books as inspiration for reproducing certain designs, or for mixing



The "father of the country" — and a popular decorative element on Federal furniture — George Washington was a member of the Federalist party that gave the style its name.



Eagles in both an inlay and a finial on this desk and bookcase emphasize the patriotic elements of Federal furniture. Early Americans would have followed Sheraton's advice to tack colored (usually green) silk behind the glass doors to conceal the contents.

and matching different elements. Although the names "Sheraton" and "Hepplewhite" have each come to be associated with a particular style of chair, both of these designers showed several stylistic options in their books — including the ones that now bear each other's names. Their influence came not so much from these specific designs as from the general inspiration their furniture drawings provided for the cabinetmakers of the day.

Sheraton, in particular, also offered other suggestions. For instance, he told the wealthy that

the more elegant their parlor, the more it showed respect for visitors — which led to demands for rooms filled with fine furniture, and an abundance of orders placed with woodworkers. He also said that colored silk — usually green — should hang behind glass doors to conceal the contents of bookcases, which explains the tack holes found in many of these pieces.

Regional Influences

Although such British influences left their mark on Federal furniture, Americans' new spirit of independence led to slight regional variations of the new national style. Where a woodworker lived, and what materials were available, impacted the furniture he built. Those working in coastal towns, with access to the shipping lanes, for instance, tended to use mahogany as their primary wood, while woodworkers with inland locations were somewhat more likely to choose walnut. Cherry was also popular as a primary wood, particularly in the Connecticut River Valley and western Massachusetts.

Northern New Englanders sometimes used species like birch or maple.

White pine was prevalent everywhere as a secondary wood, and other choices included chestnut and tulip in

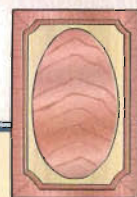
Connecticut and Rhode Island and holly and satinwood further south. Frequently, the lighter-colored woods were applied as veneer or inlay to contrast with the dark mahogany or cherry.

Boston's most famous Federal cabinetmakers, John and Thomas Seymour, were fond of such contrasts. The father and son also employed techniques like painting the interior of their case pieces light blue to highlight the contrasts. Stringing, or banding, in which lines of light and dark wood were applied in geometric patterns, was popular in the Boston of their day.

The Seymours were associated with tambour desks — desks with sliding tambour doors, which, in the Seymours' case, were frequently inlaid with bellflowers. Another popular desk form of the day was the secretary, which employed the clever new invention of a drawer that pulled out and folded down its front to form a writing surface. These were particularly popular in Salem, Massachusetts. Sheraton had commented that secretaries were useful "for a gentleman to write at, to keep his own accounts, and serve as a library."

Other common elements in Massachusetts Federal furniture were figured birch panels, chevron stringing and ebony spade feet.

Baltimore woodworkers developed a style that was the closest to England's interpretation of neoclassical furniture of any in the United States. It was



"Ye cabinetmakers!
Brave workers in
wood, as you work
for the ladies, your
work must be good."

*Federal Society
of Cabinetmakers*



The names Sheraton and Hepplewhite have each come to be associated with a particular chair style (round, reeded, tapered legs and square backs for Sheraton — above right; and square, tapering legs and oval or shield-shaped backs for Hepplewhite — above left); each designer actually published both styles.



"Work tables" were a new form of furniture in the Federal era. Some incorporated a fabric pouch to hold a lady's sewing, while others featured a locking drawer.

often painted, and sometimes incorporated *verre églomisé*: glass panels with Biblical or mythological scenes painted on the reverse side.

New York had already become the nation's cultural and fashion center by the early 1800s. Its most prominent woodworker was Duncan Phyfe, a Scottish immigrant whose early work for John Jacob Astor cemented his place in the fashionable world. The furniture Phyfe and other New York woodworkers produced tended to be made of solid wood — usually carved or reeded mahogany — rather than the light and dark contrasts other areas achieved with inlay. Chairs with back splats created as urns, fans or feathers were associated with New York — and with Phyfe — as were pedestal base dining tables with curved legs and brass claw feet.

New York shared with Philadelphia a preference for the design element of inlaid, astragal-ended satinwood rectangles with dark elliptical

centers. Philadelphians also had a predilection for chairs with heart- or fan-shaped backs (a John Aitken advertised them in 1790 as a pattern "entirely new, never before seen in this city"); square back chairs with three or four turned columns; and ladderback chairs with pierced and carved slats, molded and tapered legs, and rounded shoulders.

An American Identity

As the United States increasingly gained a national identity, the country's woodworkers moved further away from their English roots. Convex looking glasses with round or oval frames went out of style in England but continued to

be popular in America, where the frames were ornamented with Federal motifs like eagles or delicate urns. Sheraton had called such pieces "mirrors," and the word became more common than "looking glass" in the U.S. By 1792, "bureau" in America had also come to mean "a four-drawer chest" instead of a desk, as in England.



Hepplewhite called chairs with stuffed backs "cabriole chairs" and said the high arms had been used successfully in a chair for English royalty. This American Federal version from Philadelphia likely came from a drawing room, where furniture tended to be fancier.



Almost all the furniture at left is attributed to Duncan Phyfe, New York's most prominent woodworker. A Scottish immigrant, Phyfe's early work for John Jacob Astor cemented his place in the world of the fashionable elite.



The development of the "Grecian" or "klismos" chair, with a scrolled back with cross bars and saber-like legs, occurred around 1805 in the New York area.

Perhaps the most symbolic furniture development of the Federal era was the "Martha Washington chair." The design for this tall armchair does not appear anywhere in Hepplewhite, Sheraton or Shearer, but was instead an American adaptation of a similar, outdated style illustrated in Thomas Chippendale's *Director*. With its high back and tapered or, occasionally, turned and reeded legs, and its name derived from the young country's first First Lady, the Martha Washington chair was a truly American idea.

Winds of Change

Woodworkers of the Federal era were experiencing other historical changes as well — like the beginnings of the Industrial Revolution. Already, they were more likely to be specialists than generalists.

Carvers, turners, gilders, inlay makers, cabinetmakers, chairmakers and upholsterers sometimes

had individual shops and purchased elements from each other. In this system, an inlay maker might produce several copies of a design for sale to chair- or cabinetmakers. He'd make the copies of his design by pricking through his original drawing onto other sheets of paper and pasting those papers to one thin slice of wood, with other species pinned to the workpiece. After clamping his layers into a vise and sawing out his design, the inlay maker discarded the unnecessary pieces from each layer. The cabinetmaker who purchased this inlay would place it onto an area of dried glue and clamp it with a heated wooden caul to remelt the glue.



Although this Baltimore card table has four legs, those from New York were generally five-legged, with at least one rear leg designed to "fly" or "swing."



In contrast to the bold lines of the preceding Chippendale era, Federal sofas had a softer outline, frequently with delicate carvings. Samuel McIntire, a well-known architect and carver from Salem, Massachusetts, may have done the carvings on this sofa.

With transactions like this going on among and within shops, attributing a piece to a specific name of the Federal era is often similar to assigning a brand name. An 1812 Boston newspaper ad, for instance, cited, "Useful and Ornamental Cabinet Furniture all made by, or under the immediate inspection of Thomas Seymour."

In the 1790s, price books began appearing which documented the prevailing rates for different elements of furniture making. Perhaps one of the first was a 1786 compilation by Benjamin Lehman of Philadelphia, a lumber dealer and livery stable keeper. In addition to listing current prices, these documents also contained demands for better payment for the woodworkers and other craftsmen. When the New York cabinetmakers' society issued their plea for better wages, they modeled it on the Declaration of Independence.



Pier tables were intended to be placed along a wall between two windows. They were often more elaborate than other pieces of furniture. This table may have been built by John or Thomas Seymour of Boston.

By 1792, the word "bureau" in the U.S. had come to mean a four-drawer chest — a sign of America's increasingly separate identity from Britain. This example incorporates matched mahogany veneers, stamped brass pulls and ivory escutcheons.



Constitutional ratification, the Windsor Chair Makers' group carried a banner which depicted several ships going to different ports and read, "Free Trade. The Federal States in union bound, O'er all the world our chairs are found."

The United States continued to develop a separate identity from its former colonizer — and fought another war with the British in the War of 1812 — and the fashionable ideal gradually shifted to French culture. Heavier, bolder pieces of furniture with marble tabletops and columnar supports started replacing delicate Federal furniture, as it gave way to the French Empire style.

Still, Federal furniture was the style that was developed and appreciated by the first citizens of

the United States, making it significant from both a woodworking and a historical point of view. As if the Martha Washington chairs, George Washington images and American eagles weren't enough evidence of Federal furniture's patriotic pride, the Philadelphia group of woodworkers called themselves "The Federal Society of Cabinetmakers." They sang a verse in their city's Federal Procession that was attributed to Benjamin Franklin.

The words: "Ye cabinetmakers! Brave workers in wood, as you work for the ladies, your work must be good."



Tools of the Day

If you're intrigued by the woodworkers of the Federal era, you can find out more about their tools and techniques in a new exhibit at Winterthur Museum in Delaware.

"In Wood," displays the drawing instruments of an early 1800s Boston cabinetmaker, as well as nearly 500 tools belonging to 19th century craftsman Alexander Forbes. The toolbox Forbes made for storage is also on display. Design patterns, an "in progress" table and chair, and a collection of 18 unfinished woods popular in the era, ranging from ebony and mahogany to cherry and maple, are all part of the exhibit.

You'll also see 29 chairs from the 18th and 19th century, displayed with commentary about regional characteristics, back and leg shapes, carvings and original prices. Winterthur's curators and conservators will be conducting research on six tables as part of the exhibit, providing regular updates on their findings to visitors.

For more information, contact Winterthur at 800-448-3883 or visit www.winterthur.org.

Mortise and Tenon: A Primer

Joining long grain to end grain with mortise and tenon — the king of rail joints

By Ian Kirby

A mortise and tenon joint is nothing more than a square peg in a square hole. The joint is either stopped or through. The through joint is usually wedged, which makes it effectively a dovetail joint. Chances are there isn't a house in the U.S.A. that doesn't have examples of the joint somewhere in its furniture or built-in cabinets.

In this article I'll describe the three main ways the joint is used. Since the geometry of any design follows a certain set of conditions, it's vital to understand that aspect of the joint. I'll also explain how to design for strength.

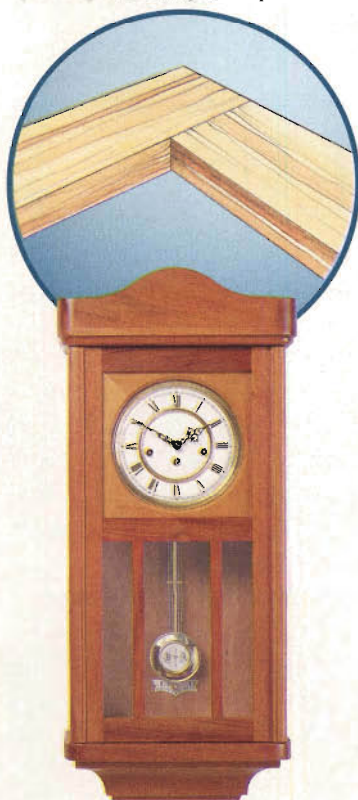
In a subsequent article I'll put theory into practice by looking at ways the joint can be cut and describe, through the making of a simple table, what you must do before and after cutting the joint.

Although the basic joint is simple, its design details vary in complexity and sophistication according to the following circumstances: Do the two or three pieces being joined form the corner of a two-dimensional frame, as in a door, or a three-dimensional frame, as in a table? Or, do they form a T-shape, as in a center rail? And finally, is the joint through or stopped?

Over the years the mortise and tenon assumed a variety of design forms for a variety of reasons. I've illustrated some of them along with brief comments. Regardless of their design peculiarities, to work correctly each must follow the general design characteristics of the more common forms.

In many joinery situations where a mortise and tenon would have been the traditional solution, two recent alternatives have proved their worth and may be appropriate. They are plate joints and pocket screws inserted with the aid of oriented holes.

Two-dimensional frames
(doors, mirrors, wall panels)



Three-dimensional frames
(tables, chairs, beds)



Carcasses
(bookshelves, etc.)



Although these pieces of furniture were built by three different craftsmen and represent vastly differing styles, they share the mortise and tenon as their foundational joint.

Anatomy of Parts

A key step to understanding mortise and tenon joinery is knowing the parts, many of which are derived from human anatomy.

The specific name of the mortise/tenon piece depends upon its function and orientation. The mortise piece is usually the upright member, such as a stile, leg, or post. The tenon piece is usually horizontal, such as a rail, an apron, a stretcher, or a shelf.

Dimensions of Parts

$A = \text{Tenon length} = \text{Mortise depth}$

On a stopped joint leave a gap between the end of the tenon and the bottom of the mortise. The two parts don't need to meet since the end grain of the tenon isn't a gluing surface, and it's easier to make if you leave a gap of about 1/16".

$B = \text{Tenon width} = \text{Mortise length}$

Make the tenon width to exact fit. If it's too narrow, the tenon may float and position the rail in the wrong place. For the same reason, don't crush the the edges of the tenon during assembly thinking you are making the joint tight. More likely you are causing misalignment. The end walls of the mortise are end grain and therefore not suitable gluing surfaces.

$C = \text{Tenon thickness} = \text{Mortise width}$

Make the tenon width to exact fit. If it's too thin, it will likely float and position the rail in the wrong place.

You should be able to "push fit" the parts together. A "clamp fit" with squeaky resistance is too tight. Applying glue will swell an easy-fit joint much tighter. A too-tight joint might split when glue is added.

Geometry of Parts

Accurate joinery, whether cut by hand or machine, is defined by accurate geometry.

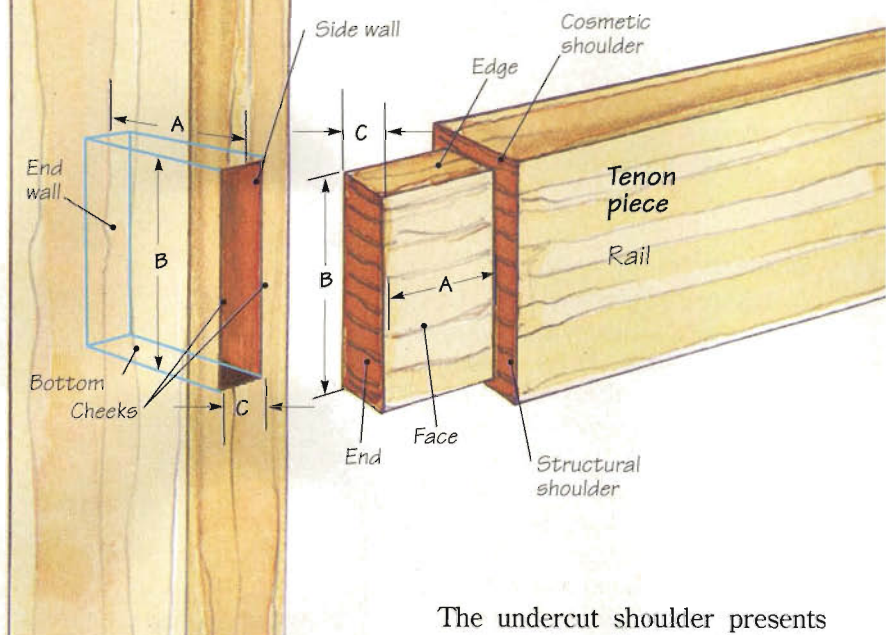
Some authors recommend undercutting the shoulder to ensure a tight-fitting joint. My view is — don't. First, what is undercut? 85°? 70°? Second, how do you measure it? Third, if you can undercut consistently, its stands to reason you can also cut square.

Defining the parts

$A = \text{Tenon length} = \text{Mortise depth}$

$B = \text{Tenon width} = \text{Mortise length}$

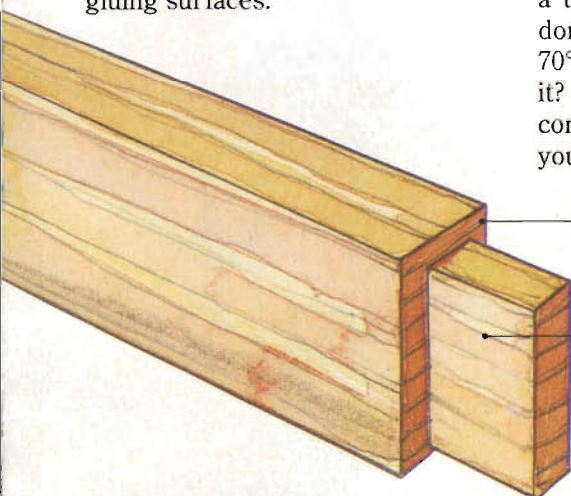
$C = \text{Tenon thickness} = \text{Mortise width}$



The undercut shoulder presents an edge to the stile instead of a flat face. Clamp pressure easily pushes the edge into the stile, distorts the wood, and changes the between-the-shoulders distance. Most important, you also lose the mechanical efficiency of a dead stop.

Mortise and tenon joinery is subjected to two types of stress. One type arises from use, as when we lean back in a chair or push a table to a new location. The other type arises from wood movement. Wood shrinks and expands across the grain in response to changing humidity but not along its length.

To cope with both types of stress, we design the joint to be as strong as possible. Since the configuration and section of the parts being joined are usually unique, we must design for the job at hand and that design is based on experience about what has worked before.



Shoulders square to face side and other faces

Faces aligned with stock, with no twist

End walls square to the face side and face edge

Side walls parallel to each other and to face side

Designing for strength

Tenon is too thin for typical use



$\frac{1}{3}$ | $\frac{1}{3}$ | $\frac{1}{3}$

Preferred machining of the joint



$\frac{3}{16}$ | $\frac{3}{8}$ | $\frac{3}{16}$

MORTISE & TENON RULES

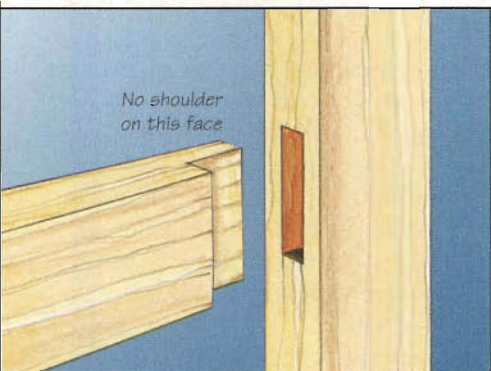
1. Hidden mortises should penetrate about halfway into a stile.
2. Create Balanced joints.
3. Structural shoulders resist stress.
4. Cosmetic shoulders hide the joint.
5. At the end of a stile, leave a horn. (to resist splitting)
6. Don't undercut.

When joining two pieces of the same thickness, balancing the joint for strength amounts to making the thickness of the two cheeks added together equal the thickness of the tenon.

Shoulders

All tenons require shoulders. There are two types. Structural shoulders resist bending stress. Cosmetic shoulders hide the joint if the rail shrinks and they hide the gap presented by a damaged mortise end or a mortise made slightly long. Cosmetic shoulders need be only $\frac{1}{8}$ " to be effective.

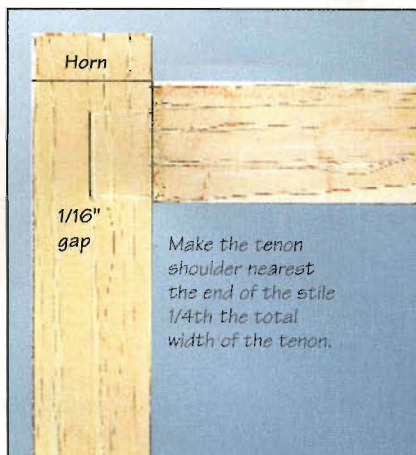
A tenon without a shoulder on one side is called a barefaced mortise and tenon. To keep it aligned at the glue-and-clamp stage requires purpose-made clamping blocks. I don't recommend this configuration. If at all possible, reduce the thickness of the tenon to get a shoulder on each side.



A tenon without a shoulder on one face of the stock, called a barefaced mortise and tenon, is not recommended. Try reducing the tenon thickness to get a shoulder on the bare side.

Tenon Length, Mortise Depth

If the tenon is too long, the joint is under greater stress due to wood movement. Too short, and it may fail due to too little glue surface. My compromise is to mortise about halfway into the stile. In narrow stock, go a bit more than halfway.



When a mortise is placed near the end of a stile, an extra inch or so of material is left to extend past the joint. This horn will be cut off later.

Tenon Width, Mortise Length

If a mortise extends too near to the end of the stile of a corner joint (often, exactly the spot where you simply need a joint to go), the stile may split. Therefore, make the tenon shoulder nearest the end of the stile one-quarter the total width of the tenon. To keep from splitting the mortise, an extra inch or so (called the horn) is left on the stile. Once the glue is cured and the job is out of clamps, the horn is sawn off.

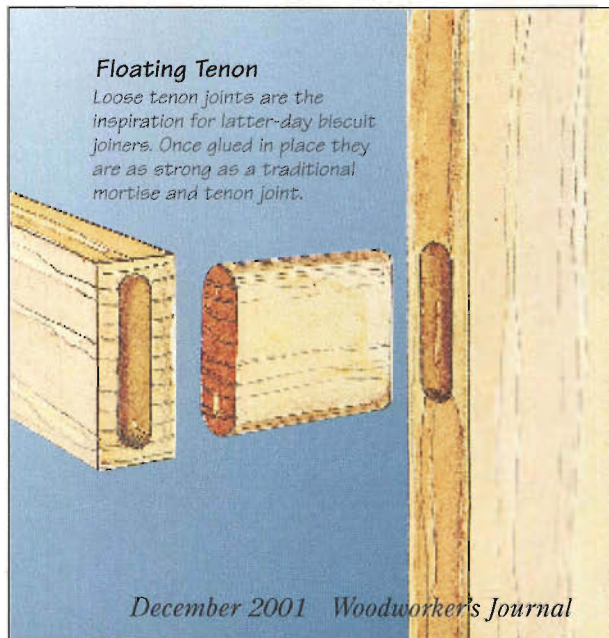
When the mortise is not at the end of the stile, make the tenon the full width of the rail, less $\frac{1}{8}$ " at each edge for the cosmetic shoulder.

Tenon Thickness, Mortise Width

When joining two pieces of wood of the same thickness, divide the thickness roughly in half to create a balanced joint. For example, if the wood is $\frac{3}{4}$ " thick, make the tenon $\frac{3}{8}$ " thick and each mortise cheek $\frac{3}{16}$ " thick. Since each piece has an equal amount of tissue, each is equally able to resist stress and the joint is balanced.

Loose-tenon Joint

A slot mortiser is a machine that cuts a mortise into both rail and stile. The two parts are connected with a third piece made to fit the slot, much like a biscuit joiner. This joint is called a loose mortise and tenon. You can make the joint using a plunge router and a single bit, although you will normally need different jigs to manage the two parts. Once glued, the joint is just as strong as a conventional mortise and tenon.



Two-dimensional frames



$\frac{1}{4}$
A stile turned 90° to the rail provides the greatest resistance to stress. Typically the through tenon in that situation will be 1/4th the width of the rail.

MORTISE & TENON RULES

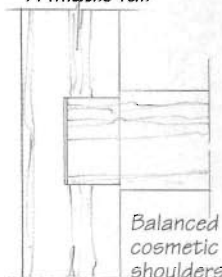
7. The completed joint should slide together with moderate hand pressure.
8. Accurate geometry is the key to effective joinery.
9. With stopped tenons, always cut them 1/16" short of the end wall.
10. Use a sufficient amount of glue on the joints (but avoid over gluing.)

By slightly offsetting the through tenon, you can reduce your chances of splitting the stile and add stability to the joint.

Frame and Panel

Two-dimensional frames with a solid panel trapped in a groove make a classic frame and panel. This ingenious construction is not only the foundation of furniture making, it remains the only method we have for making a dimensionally stable frame from dimensionally unstable solid wood. The traditional example is, of course, the frame and panel door. Although with modern material this door is no longer the most efficient design available, tradition and a sense of history continue to drive the popularity of this beautiful cabinet staple. Used in multiples, we can make larger frames, which, joined at the corners, make storage chests and cabinets.

A middle rail



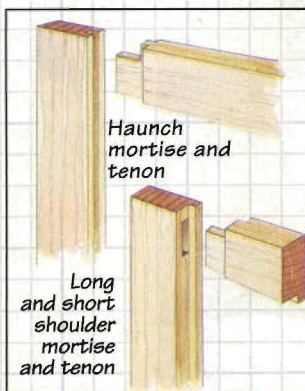
A top rail



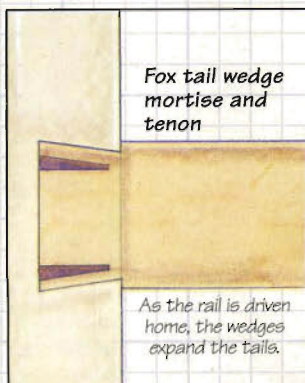
Mortise and tenons and the flat panels easily created by them have long been the building blocks of solid wood construction. Adjust the position of the tenon at the end of the rail to logically suit the location of the rail in the panel.

Mortise & Tenon Variations

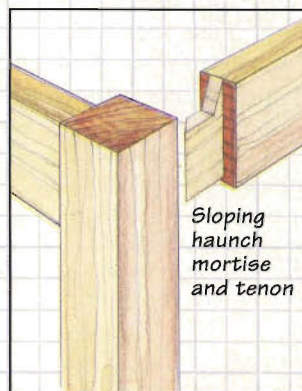
Nearly as soon as there were woodworkers, the mortise and tenon joint was created — an efficient and elegant way to join solid wood. Variety being the spice of life and the essence of creativity, many kinds of mortise and tenon joints became common. Due to advances in machinery, adhesives, and techniques, the mortise and tenon variations illustrated here are seldom used today.



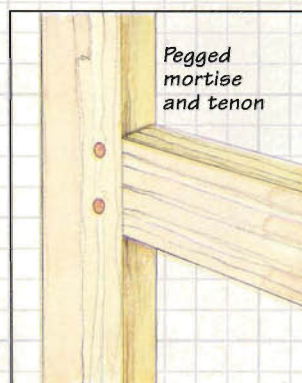
In the days of hand tool woodworking, grooves were made using a plow plane. Because you can't make a stopped groove with a plow plane, the haunch was left on the tenon to fill the groove. If the frame was to be fitted with a glass panel sitting in a rabbet, then the long and short joint was used.



The author has made many fox tail joints but never used one in furniture! You only get one shot at glue-up. It's a clever concept, but there's no place in furniture where it's really necessary.

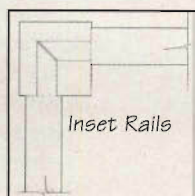


On a three-dimensional frame, there is no need for a groove. The notion of a haunch, however, remained. A sloping haunch satisfies the psychological need for a haunch and the visual need for a flush shoulder line at the top edge.

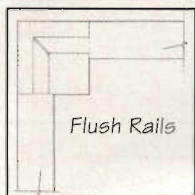


Draw pegging is a technique derived from timber frame construction. It's unnecessary with modern glues and correctly made joints, but if you like the look, add the pegs after the joint is made.

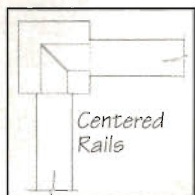
Three-dimensional frames



Inset Rails



Flush Rails



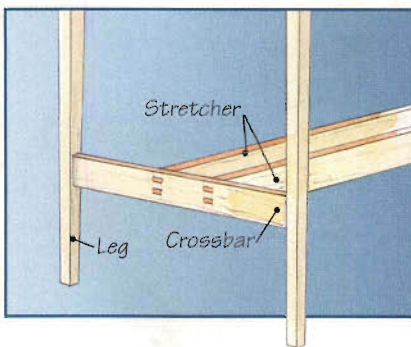
Centered Rails

With three dimensional frame construction, design considerations become almost infinitely variable. Regardless of how the joint is employed to create a pleasing appearance, the rules of mortise and tenon joinery must be observed.

Tables, chairs and other pieces of furniture are created from mortise and tenon joints constructed in three dimensions.

Three-dimensional frames are used to make table bases, chairs, and the skeletons of large cases. Three members generally connect, for example, a table leg and two rails or aprons. In most situations the vertical leg is more or less square in section, while the incoming rails are flat. Factors affecting the design of the joint include the width and thickness of the rails, the exact location of the rails on the faces of the leg, and complications caused by drawers or doors.

Underframes impart stability to a piece of furniture. On this one the design not only includes twin tenons, but wedged tenons as well.



Note that the thickness of the tenon is increased as it is inset while the gluing area decreases. In each case the tenon is mitered in the middle of the joint. Provided the tenons don't touch, you can make the gap as small as you like. The 1/8" inside shoulder on the flush and inset rail is enough to do the job.

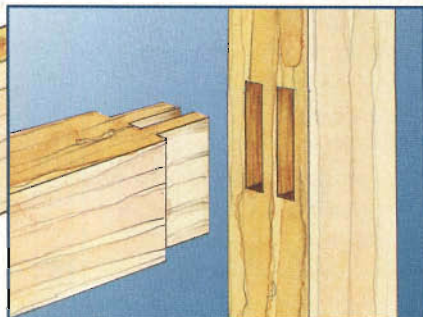
Underframes

Underframes impart stability to a piece of furniture by bracing the structure. They often do double duty as supports for shelves.

Where two underframe members meet at a T-shaped junction, you can increase the gluing area by using twin tenons. If the joint is made through and wedged, it offers an attractive design detail.

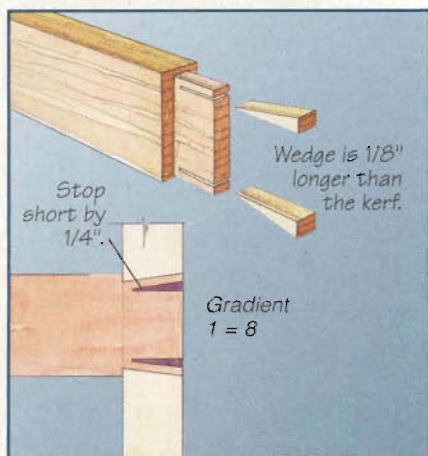
Twin Tenons

When the rail is thicker than 1", you can increase the gluing area by making twin tenons side by side. The total thickness of the two tenons is about the same as for a single tenon, but the doubled gluing area makes for a potentially stronger joint. The figure below shows typical proportions: the minimum thickness of each tenon is about 3/16", and the space between should be about equal the tenon thickness. Twin tenons are often used this way in chair making where a back rail joins a legs.



Thicker stock offers the possibility of creating twin tenons. The key advantage to this modification is you nearly double the glue area.

Short twin tenons also occur in carcass sides, where a partition ties the case together and also acts as a shelf. Make the housing (also known as a dado) about 1/8" deep between the mortises. A housing between tenons not only makes the shelf able to bear a heavy load, but it also flattens any cup in the two boards. Because the tenons would otherwise be very short, they are usually made through and wedged. Because of the 1/8" deep housing, a 1/2" thick tenon is plenty big.

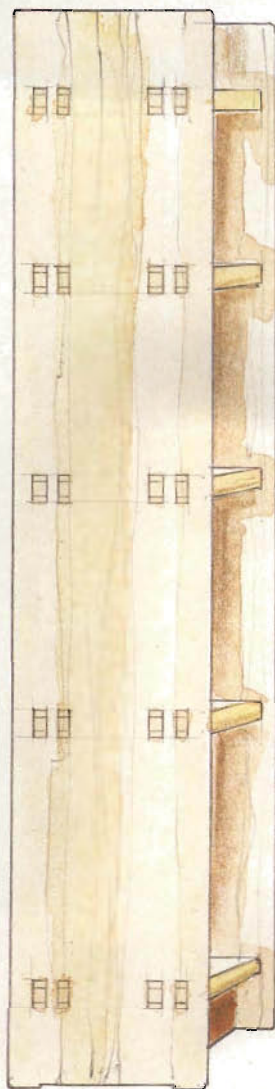


A through-wedged mortise and tenon demands precision joinery. The wedge must thrust the stock against the end grain of the mortise. Place it the other way and you'll split the wood.

Gluing and Clamping

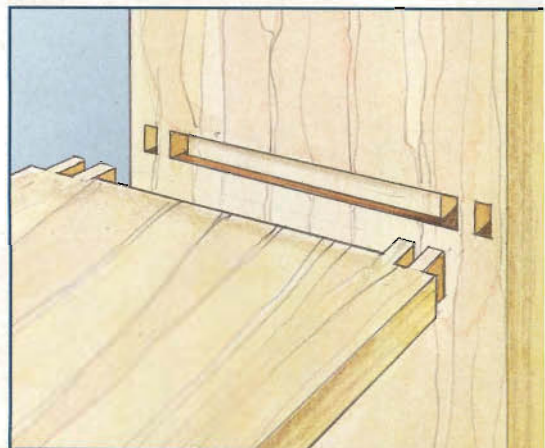
A simple yet elegant idea like the mortise and tenon joint can go wrong at the last moment. In a later article, I'll go through the basics of gluing and clamping. But for now I must simply say that incorrectly applied clamps and their critically important clamping blocks, or cauls, will ruin the best crafted joints in short order. So do not give short shrift to this last step in making a joint.

With these few concepts in mind, it's time to go to your shop and join some wood. Good cutting!



Carcasses

One place where through mortise and tenons, and particularly twin tenons, occur regularly is in projects such as a bookcase. The through tenons are both structurally integral and visually beautiful. An additional joinery technique that the author regularly employs is a conjoined housing (or a dado here in America). The 1/8" deep dado shown between the mortises increases the weight-bearing capabilities of the shelf and flattens any cupping in the shelf and upright pieces. It also presents a clean and subtle joint line.



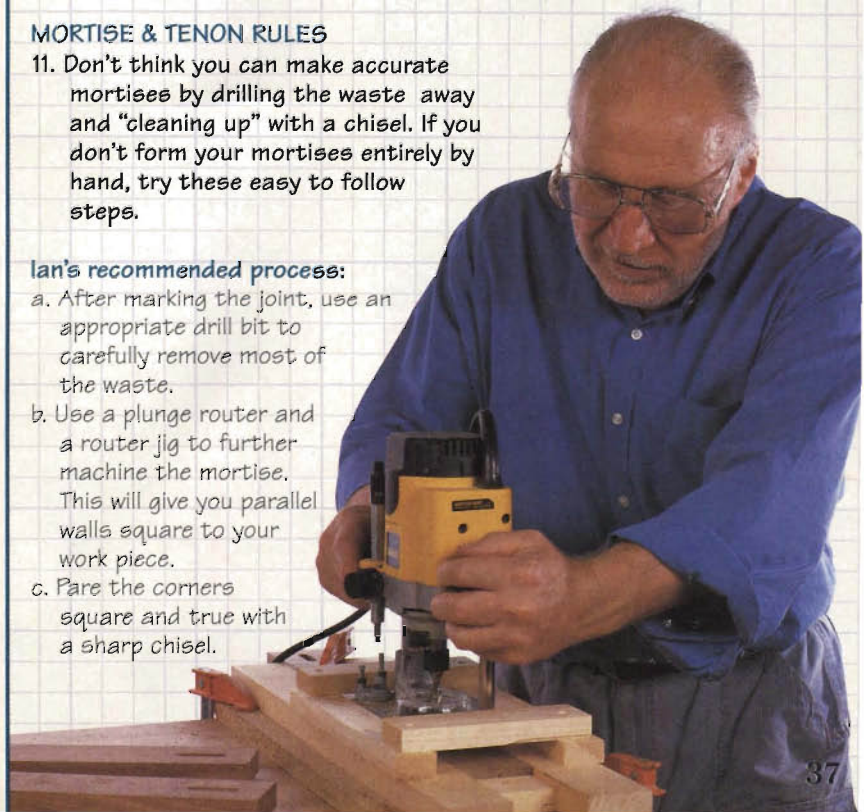
In this example, the author recommends a shallow dado stretching between the through mortises.

MORTISE & TENON RULES

11. Don't think you can make accurate mortises by drilling the waste away and "cleaning up" with a chisel. If you don't form your mortises entirely by hand, try these easy to follow steps.

Ian's recommended process:

- a. After marking the joint, use an appropriate drill bit to carefully remove most of the waste.
- b. Use a plunge router and a router jig to further machine the mortise. This will give you parallel walls square to your work piece.
- c. Pare the corners square and true with a sharp chisel.





Hollow Spiral Candleholder

By Rick Christopherson

 I love the idea of a woodworking project that someone picks up, stares at for a minute or two and then says "how'd they do that?" To get yourself quickly to the interesting part of this project, turn a 3" x 3" x 8" billet of mahogany round. After shaping the top and bottom flanges to your liking, reduce the diameter of the mid-section slightly and scoop out the top flange with a parting tool, creating a cradle for the candle. Finish up with a little sanding to make it easier to draw your layout lines on the stock.

An exercise in precision woodworking demonstrates what's possible when you concentrate on layout and mark up.

Laying Out the Spiral Lines

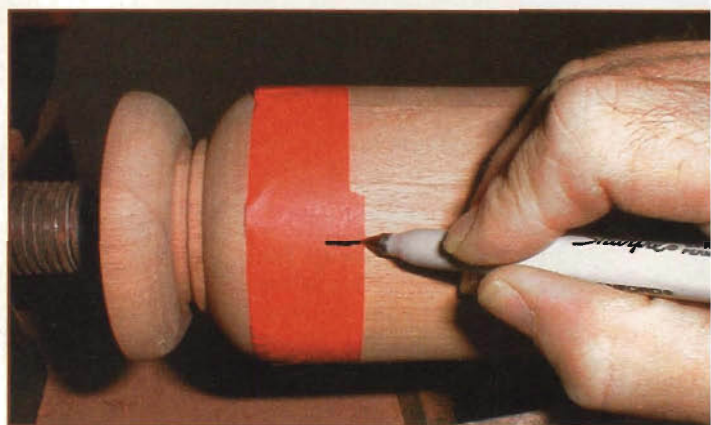
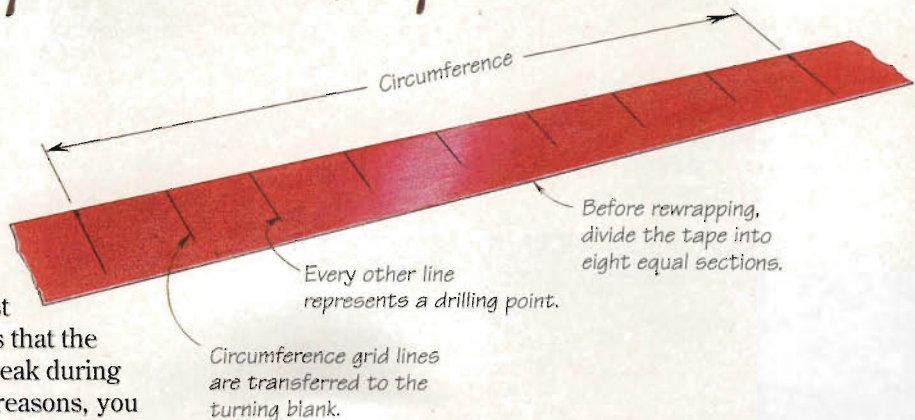
Now the fun begins. With your spindle blank in hand, you are ready to lay out the spirals. The most important thing to keep in mind here is that the flutes should not be so thin that they break during machining. Additionally, for aesthetic reasons, you don't want the flutes wider than the gaps between them.

Three basic factors control how thick or thin the flutes will be — the number of flutes, the size of the Forstner bit used to rough out the gaps and the number of revolutions around the spindle each flute makes. For candleholders of this size, I found that a four-flute design, cut with a $5/8$ " Forstner bit, and a pitch of $7/8$ ths of a revolution was both appealing and thick enough to stand up to machining and sanding.

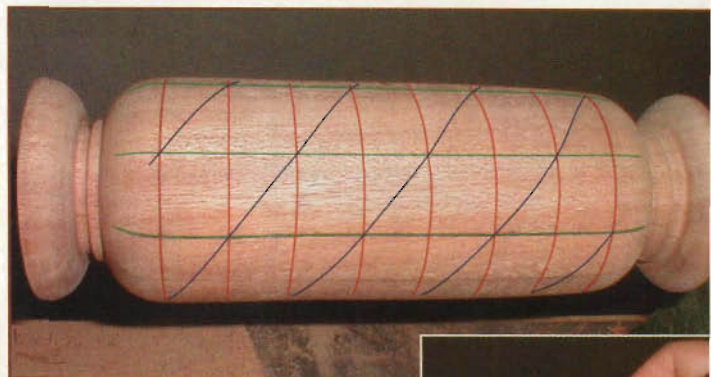
To make drawing the spirals easier, draw a grid pattern first, and then draw the spiral layout lines at the intersections of the grid — a process somewhat like "connecting the dots." The ratio between lengthwise grid divisions and circular grid divisions will determine how many revolutions the spirals make.

The number of divisions around the spindle needs to be a multiple of the number of flutes. If four flutes are used, the circumference of the spindle needs to be divided by four, eight, twelve, etc. divisions. To achieve the $7/8$ ths ratio, the circumference is divided into eight segments and the length is divided into seven segments. (The photo at right shows my final grid and spiral.)

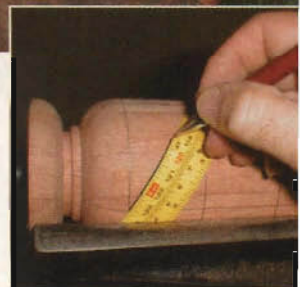
Begin by dividing the circumference of the spindle by eight. To do this, wrap a piece of masking tape around the spindle (see photo, above right) and draw a line across the overlapping pieces. When the tape is laid out on the workbench, the distance between the resulting two lines will be equal to the circumference of the spindle. Divide the tape into eight equal segments. Now wrap the tape back around the spindle and transfer the marks to the wood. Use the lathe's tool rest as a straightedge and extend the lines across the length of the spindle. To divide the length of the spindle, determine where you want the flutes to begin and end, and divide the space between into seven equal sections. These sections are the spaces between the red lines.

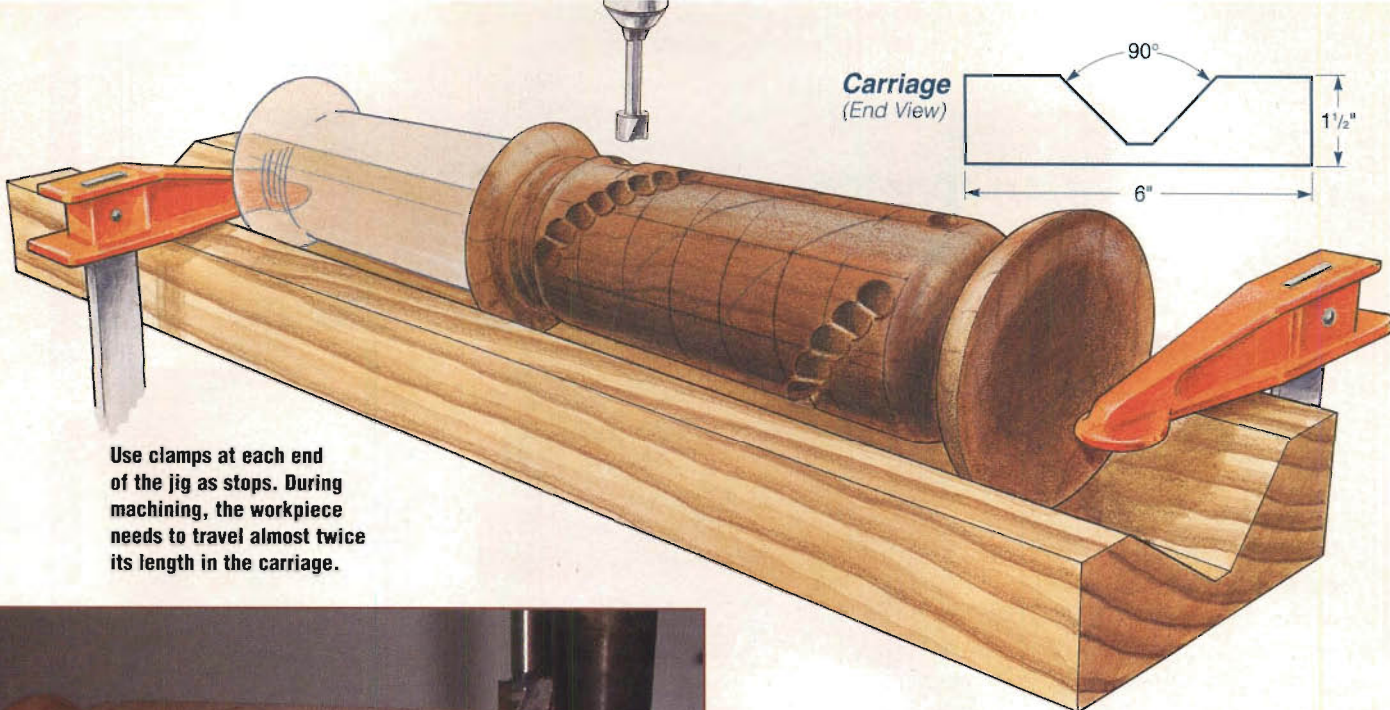


To perfectly divide the circumference of the spindle, the author wrapped a piece of tape around it and drew a line at the overlap. He then removed the tape, laid it out on his bench and marked out eight equal segments.

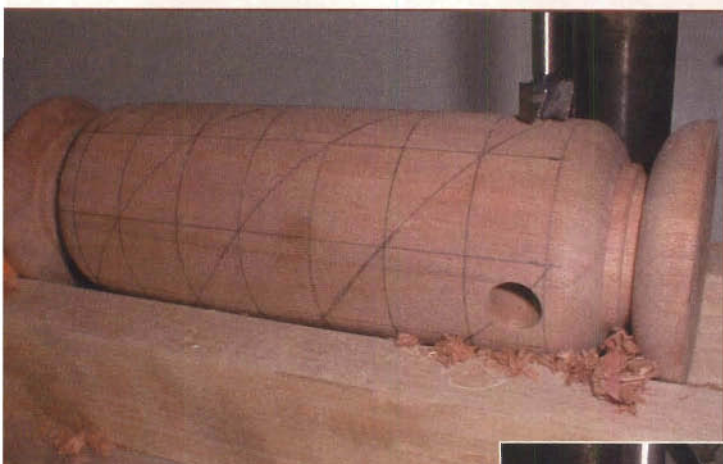


With the grid lines established, the author adds the spiral layout lines (black) across every other grid intersection, as shown in the inset at right. The circumference divisions are shown in green while the longitudinal divisions are shown in red.

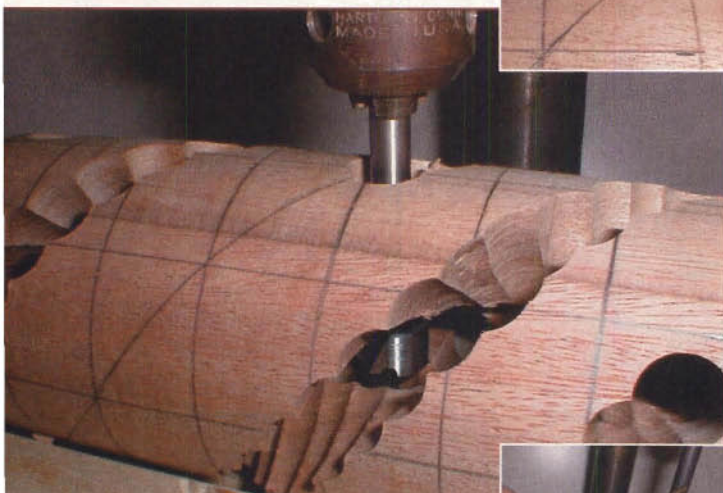




Use clamps at each end of the jig as stops. During machining, the workpiece needs to travel almost twice its length in the carriage.



Bore the beginning and ending holes first. The clamp (see illustration above) serves as a stop block to keep the holes aligned. The pilot tip of the Forstner bit should pierce the piece (inset) right on the layout line.



Bore overlapping holes down the length of the spiral lines by rotating the spindle in the carriage. The top of the bit creates a hollow area in the center. Later, an ordinary twist bit (inset) works best for shaving the edges smooth. Be sure to work in a clockwise direction to avoid kickback, holding tightly with both hands.



Right-handed Versus Left-handed Spirals

Before you draw the spiral layout lines, decide which direction they should rotate. Like the threads of a screw, the spiral can be right-handed (as with the stand in the lead photo) or left-handed (as with the stand being drilled at left). A left-handed spiral is much easier to make than a right-handed spiral because you'll be cutting across the grain during machining. With a right-handed spiral, the machining is into the edge of the grain, which results in a rougher surface, more tearout, and a tendency for your tools to "grab" the work. If you are only making one candleholder, I recommend the left-handed spiral. If you're making them in pairs, I suggest one of each, but be warned, it's tough to get a perfect match.

With the grid drawn, use a flexible straightedge to draw the spiral lines. Remember to skip every other grid or you'll end up with eight flutes instead of four.

Making the Drill Press Carriage

The secret to the success of this project is drilling precisely through the center of the turning. To ensure that this happens, a drill press carriage is critical. It's made from a piece of scrap wood at least twice the length of the candleholder, with a 90° V-notch cut down its length. The carriage is clamped to the drill press table and centered under the tip of the bit.

Roughing Out the Spiral

A Forstner bit in the drill press will machine out clean and straight bores through the candleholder. Each hole passes through the center axis of the spindle, and by rotating the spindle slightly between holes, you are able to slowly form the spiral. I found that boring the holes at the ends of the spirals first worked best. I also positioned the clamp holding the V-carriage to the drill press so it served as a stop block, as shown in the

drawing at left (top). The outside edge of the bit should line up with the first and last layout lines, and the centerpoint of the bit should be directly over the spiral layout line, as shown in the top inset photo.

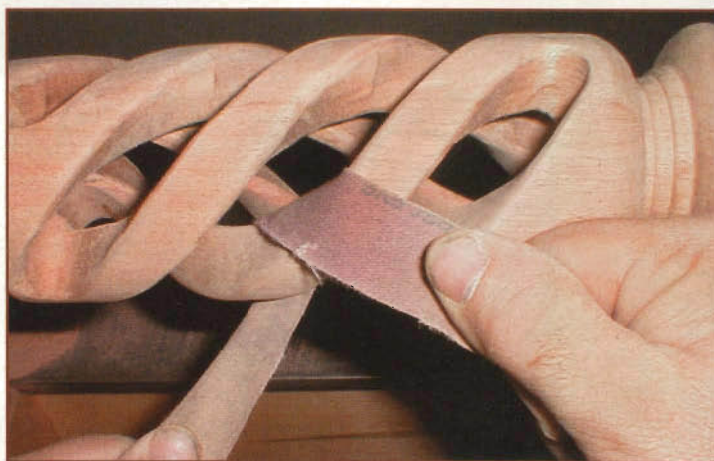
With the spindle resting in the V-carriage, align the center of the bit perfectly over the layout line. Plunge into the wood to a depth just slightly past halfway. I don't recommend drilling all the way through, just in case your layout lines are not perfectly aligned with one another (see photo, bottom left). Follow the spiral layout line down the length of the spindle until you reach the opposite end. Do the same for each of the spirals.

Cleaning Up the Rough Spirals

After the spirals are roughed out with the Forstner bit, you need to clean up the edges with the side of a twist drill bit. (I've tried doing this with both straight and spiral fluted router bits, but they cut too aggressively, which makes it difficult to control the stock's feed rate.) Increase the speed of your drill press — high enough to reduce chatter, but not so high as to overheat the bit.

The drill bit should have aggressive margins (that's the cutting edge along the length of the bit). Even the most aggressive drill bit will be less aggressive than a router bit, and the web (the flat portion just behind the margin) acts as a kickback limiter.

To clean up the edges, slowly rotate the workpiece past the drill bit while keeping it centered in the



With the candleholder remounted in the lathe, the author sands the flutes with strips of cloth-backed sandpaper. (The lathe is NOT on.)

V-carriage. You may find it easier to smooth down the sharp crowns first and gradually smooth the whole edge afterward. Make sure you hold the workpiece firmly, and always work in a clockwise direction, as shown in the inset photo at bottom left.

Shaping the Flutes to Final Form

Get out your sandpaper and grease up your elbows, because the fun is about to begin — that is, if you love sanding. The final step before finishing is shaping the flutes so they are smooth and have rounded edges. All of this can be done with sandpaper, but for a quicker solution, check out the sidebar below. The first step is to knock down the inside edges and smooth the side walls of the flutes. Strips of cloth-backed sandpaper are ideal for this task. I remounted the spindle back into the lathe so I didn't have to hold it, and pulled the sandpaper back and forth across the flutes, as shown in the photo above. Finish up by rounding over the outside corners of the flutes.



Use a router bit to cheat the corners



If the V-carriage is too far to the right of center, the router bit will not cut deeply enough.



If the V-carriage is just slightly to the left of center, the bit follows the spiral, producing a clean, rounded edge.



If the V-carriage is too far to the left of center, the router bit will cut too deeply.

If you're like me, you'll do whatever it takes to avoid tedious sanding — like chucking a router bit in the drill press to round over the flute corners. My first attempts at this failed because I didn't realize that the difference in diameter between the drill bit, router bit, and Forstner bit would affect the alignment of the bits with the sidewalls of the flutes. The cutting edges of the router bit would either "lead" or "lag" the bearing of the bit as it followed the spiral and the bit would cut too much, or not at all. To use bits of different diameters, shift the V-carriage off-center to the right or left. For smaller bits, move the carriage closer to the sidewall that is being machined. With the V-carriage shifted to the left, machine all four of the left-hand sidewalls of the spiral. Then move the V-carriage to the right, and machine the right-hand sidewalls. You'll have to sand the flutes a bit, but the edges of the spirals will be consistent in shape and size.

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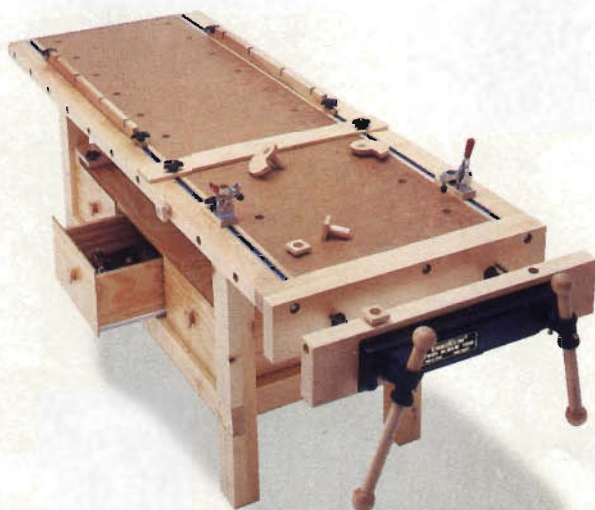
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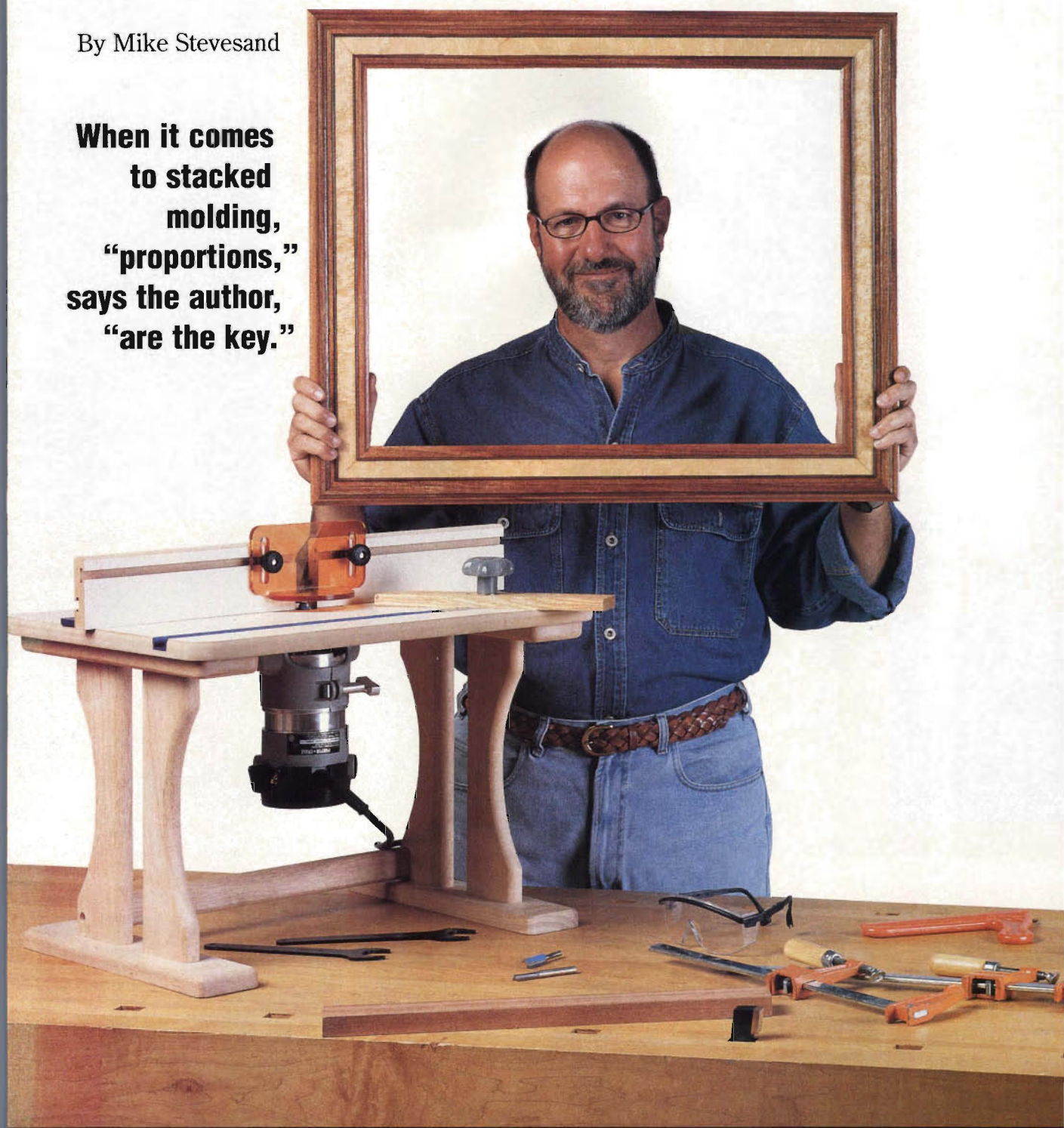
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Stacked Molding Frames

By Mike Stevesand

When it comes to stacked molding, "proportions," says the author, "are the key."



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Build this handmade picture frame in a weekend. You'll get an introduction to decorative veneering and learn the author's clever techniques for stack molding and goof-proof mitering.

As with most woodworking projects, the first few attempts at making this frame found their way into my scrap bin. I tried varying the width of the frame's bird's-eye maple field, I experimented with different edging profiles and I tested a variety of species combinations. One "almost there" mockup, with a maple field deemed just a bit too wide, is shown at right. After a few more mockups, I had my final dimensions and species (quartersawn mahogany, bird's-eye maple and walnut trim) established. The frame was sized just right for the picture it was made to hold, the species complemented each other and my design still looked good after laying it aside for a week — always an important test.

Machining Options

With the layout established, I was ready to begin machining, and to consider a whole new set of woodworking options. With a project like this, the first inclination is to set up for production, creating one long piece that can later be milled into however many frames you need. In this case, two challenges worked against that approach. First, finding long, usable pieces of highly figured veneer is just about impossible, and second, cutting long lengths of thin molding invites the kinds of irregularities that tend to lay low until your frame is complete. I decided to cut each frame side separately, relying on "test cuts" to ensure accuracy.

Once again, as I started machining, I found myself making regular donations to the scrap bin. As a result of this process, I decided to capture the outer molding in a shallow

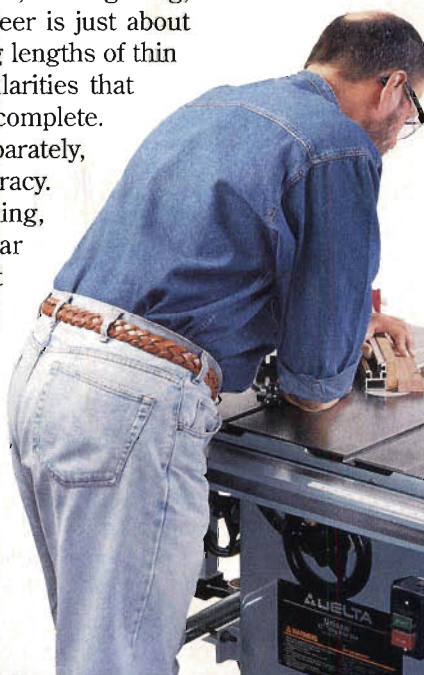
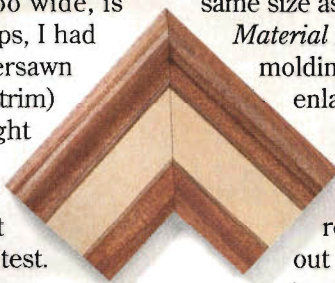
groove in the base frame stock and use this as a point of reference. All subsequent setups and measurements were indexed off of this groove.

Precision Indexing

I don't imagine that your frame will be exactly the same size as mine, so I didn't include "lengths" in my *Material List*. If your frame is smaller or larger, the moldings and veneer fields should shrink or be enlarged proportionately.

Once I had machined my base frames (pieces 1) to exact thickness and width (I left all the pieces a little long), I was ready to move to the router table. I started out by forming the 1/2" grooves for the outer moldings (pieces 2). Next I switched to a 1/4" cove bit and machined the two coves on the edges of the front face. A 3/8" cove bit is used next, to shape the cove on the outside edge of the back face. The last bit change is to a 3/4" straight bit, which I used to form the groove for the veneer fields (pieces 3) and the rabbets for the glass and art. When forming the veneer fields, I was very careful to leave exactly 1/4" between the inner cove and veneer field and exactly 1/4" between the groove for the outer molding and veneer field. The

Super-accurate miter gauges are terrific, but you still have to ensure that your table is square to your gauge. The author cuts miters and makes micro-adjustments until two successive miters (flip the first over) line up perfectly, as shown below.



s woodworking tools for the home shop, workshop,

Anyone who has tried to sand a complex built-up molding can appreciate the author's approach of sanding individual pieces prior to assembly. Be sure to keep the machining lines sharp and crisp.

exact size of the field was less important to me than making sure the two surfaces on each side were exactly the same, as shown in the *Full-size Drawing* at right. Remember, each new machining operation takes place on test pieces first.

Veneer Fields

Now you are ready to cut your veneer to size. I decided to give myself a little margin of error here and cut my pieces the full width of the groove, even though the two field borders (pieces 4) end up within these grooves. Turn to your scrap bin now and mill a gluing caul from some 3/4" hardwood scrap. The caul should fit perfectly in the grooves for the veneer. Gluing the veneer in place is a sandwiching affair, with one base frame on the bottom, followed by veneer, gluing caul, veneer and matching base frame on top. Make sure the glue reaches right to the edge of the groove (to prevent tearout later) and clamp the sandwiches together (one for the sides, one for the top and bottom).

Once the glue has dried, chuck a 1/8" straight bit in your router and, using your test pieces first, mill the deeper grooves for the field border pieces, cutting right through the edges of the veneer. This approach guarantees nice crisp lines and cleans up any inconsistencies on the veneer's edges.

Making the Molding

With your base frame machined and veneered, you're ready to add the three strips of molding to each piece. I returned to my router table to form a cove on the top and bottom edge of four 1/2" thick sticks and then used the table saw to safely trim off my molding (see *Full-size Drawing* at right). The 1/8" field border molding was made in much the same way, but with a slightly exposed roundover bit.

With the moldings and base frame ready for assembly, I turned to sanding my individual pieces. Sanding at this point keeps you out of trouble in mitered corners — just be sure you don't soften the grooves for the molding and keep a sharp line on the edges of all your cove cuts. Work your way down to 220 grit paper, and be careful not to sand through the



veneer. When everything looks ready, apply glue sparingly to the grooves (squeeze-out, particularly on your veneer fields, would be no fun at all), and clamp your molding in place.

Ready to Miter

I tried an Incra miter gauge in place of my regular miter gauge for this project, to ensure perfect "gap-free" corners. And even though Incra claims you'll get perfect miters "without trial-and-error setup," I still turned to my trusty test pieces to make sure my miter slot was dead on square to my blade. As far as I'm concerned, whenever you use a new miter gauge

MATERIAL LIST

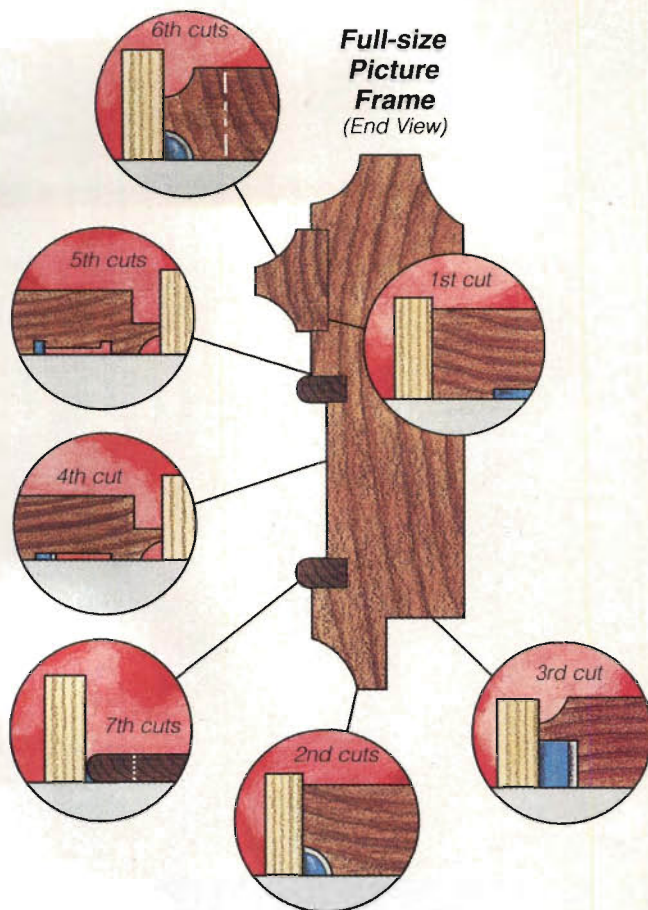
	T x W x L
1 Base Frame (4)	3/4" x 2 3/4"
2 Outer Moulding (4)	1/2" x 1/2"
3 Veneer Field (4)	1/28" x 1"
4 Field Borders (8)	1/8" x 1/4"
5 Biscuits	#10

*NOTE: Lengths can vary. Dimensions of frame shown are 23 1/2" x 28"

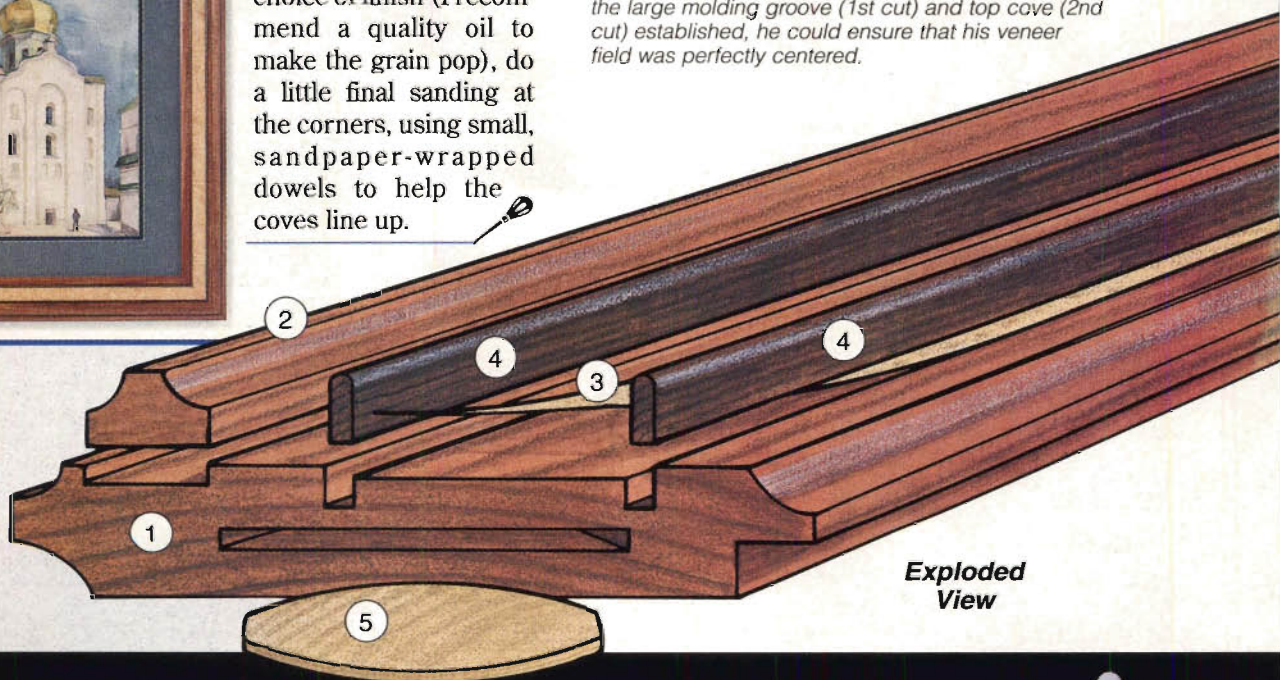
and professional shop. So the next time you're sh

on your table saw, you should micro-adjust it until you can flip one miter over and lay it against the preceding miter and see no air through the gap (see *inset photo* at left). At that point you can be pretty confident that 45° and 135° will deliver the exact same angle. With the gauge set perfectly, proceed to miter one end of each piece. Now readjust your gauge, use your scrap wood to test for accuracy (again!) and sneak up to the second miter on the first piece. Employ a stop block to make sure that your second piece is exactly the same length as your first piece. Repeat the process for the second set of pieces and you're about ready to assemble the frame. I used #10 biscuits (pieces 5) to provide extra gluing surface at the corners and to keep the pieces lined up. Once again, I recommend restraint when it comes to glue coverage. The biscuits will give you plenty of hidden glue surface, and staying away from the edges just makes good sense. Use a web clamp

to bring the pieces together, checking for square as you go. Before applying your choice of finish (I recommend a quality oil to make the grain pop), do a little final sanding at the corners, using small, sandpaper-wrapped dowels to help the coves line up.



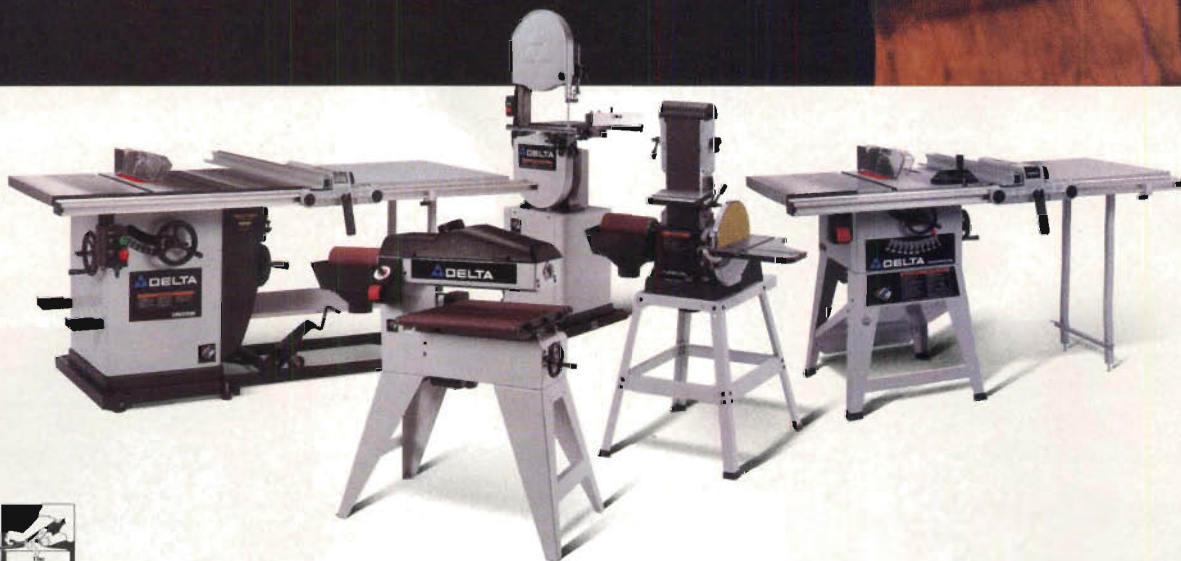
Your machining sequence can make a difference: The author wasn't overly concerned with the exact size of his veneer field (4th cut), but he did want the areas on each side of it to be exactly the same. With the large molding groove (1st cut) and top cove (2nd cut) established, he could ensure that his veneer field was perfectly centered.



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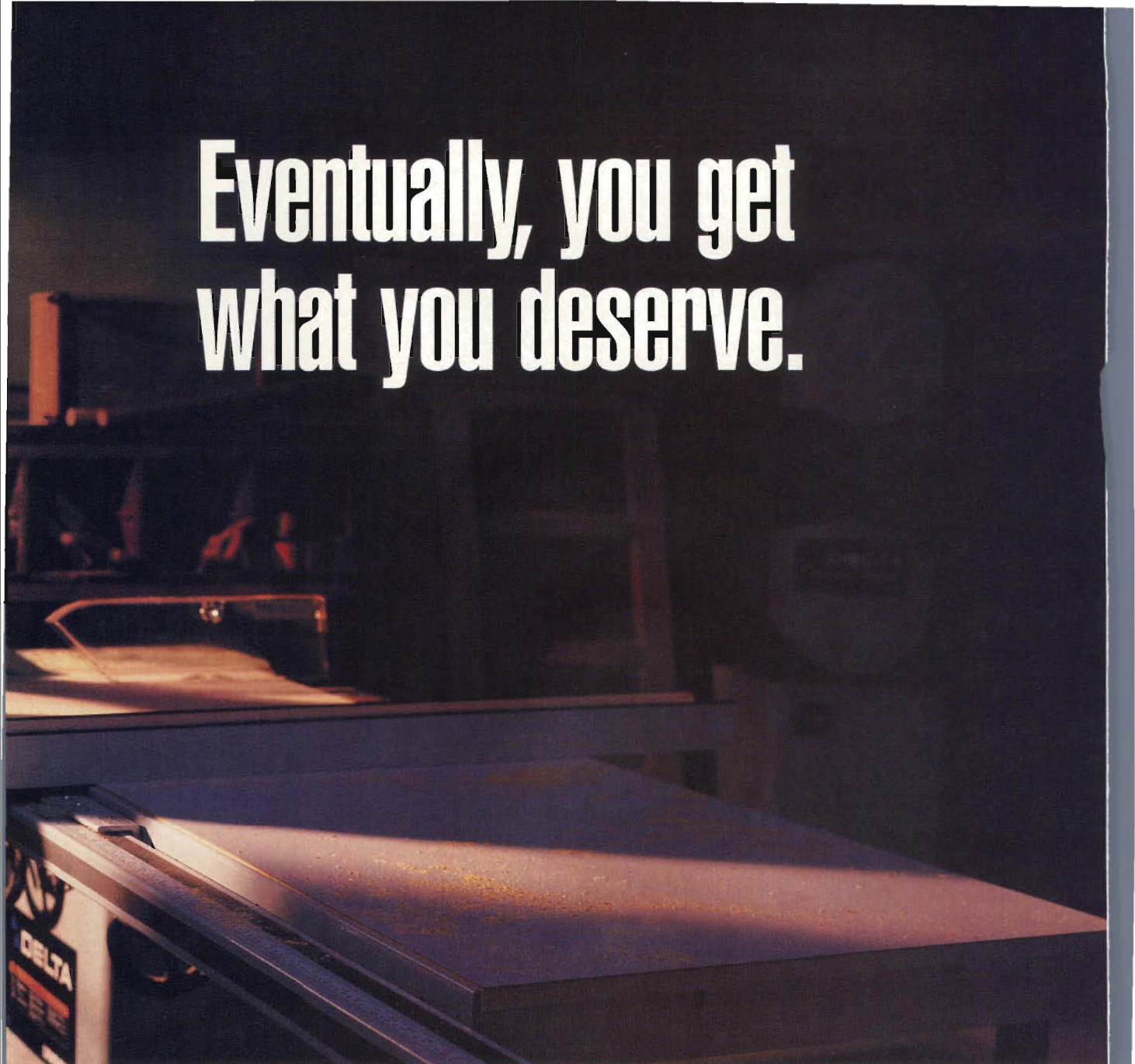
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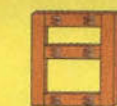
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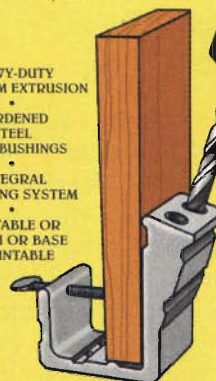
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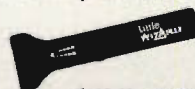
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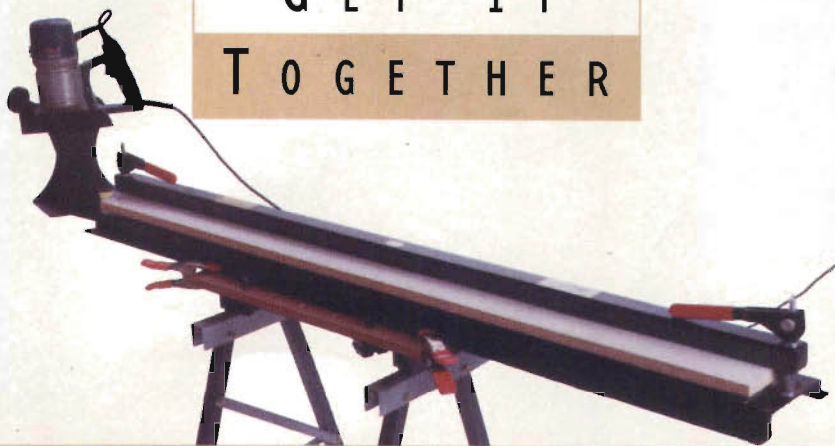
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An Angler's Cabinet

By Rick White



Like Rick White, our readers tell us that they like fishing next best to making sawdust. It was in the spirit of this sense of community that we asked Rick to share some of his favorite fishing hot spots. And he said "... No." Apparently, this is where fishing and woodworking branch off on different paths, because he was more than happy to share the design of his new angler's cabinet.

Fishing is more than a hobby with me. When free time rolls around, you can generally find me in one of two places: my shop or my boat. One common denominator between fishing and woodworking is the absolute necessity of having the proper "tool" for the proper job. When I need a mortising machine or maybe a Fenwick fishing rod ... I believe it's just common sense to go out and buy one. (My wife, Susie, has questioned this philosophy from time to time.) Where to store all these important tools can be a challenge, both in the shop and in my den. Hence this storage cabinet, specifically designed to hide ... umm — I mean store my ever growing mess of fishing tackle. I chose knotty pine lumber and plywood for this project to reflect my Northwoods heritage, and even lined the interior of the cabinet with 1/4" tongue and groove pine paneling to add visual interest.



Big Box Construction

I sliced up my sheet stock first, cutting the four sides and their tops and bottoms (pieces 1 and 2) from knotty pine plywood (see *Cutting Diagram* on page 55). I chose to make one large box for each compartment of the cabinet. After I assembled each box, I sliced the door sections off the front of each box, ensuring perfectly matched doors and cabinet sections. Before you start assembly, look to the *Elevation Drawings* on page 56 for the locations of the dadoes and rabbets you'll need to plow for the shelves and back, and the tops and bottoms.

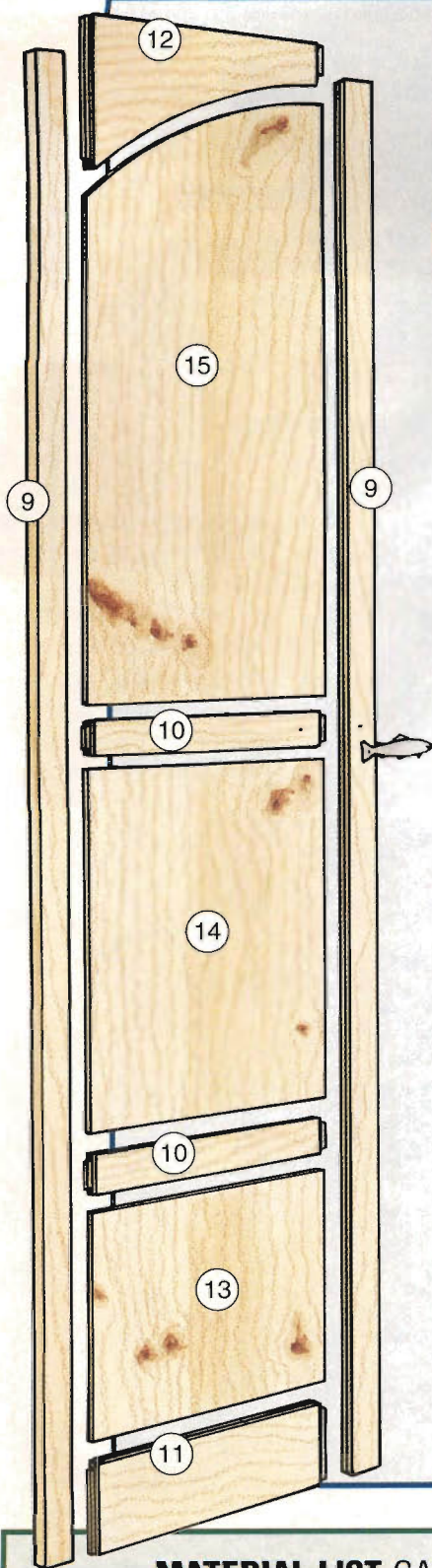
Storage is the Key

By making use of every inch of interior space, I was able to store a ton of stuff in this cabinet and retain a relatively small footprint. Each door is a swinging cabinet of its own, holding rods, reels, nets, stringers and other gear. The trade-off is that this unit is very tall — just a few inches short of an 8' ceiling. (Check your ceiling's height before you build; you may need to adjust the height.) The shelves are adjustable and I included a couple of full extension drawers for monofilament line (to keep it out of the light ... it can break down from ultraviolet rays) and other smaller items like special reels and tools. (I even bought a new drawer joining router bit to build the drawers ... I just loved this project!)

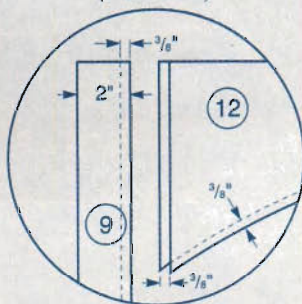
My casework design is basically two big boxes that share a base and decorative top. Heavy-duty wraparound piano hinges support the doors and some fancy, fish-shaped pulls dress the unit up a bit. If you have a well outfitted shop and a measure of determination, you might be able to polish off this piece in a long weekend.

Fishing poles, gear and other essentials are out of sight but not out of mind in this project designed to blend two wonderful hobbies.

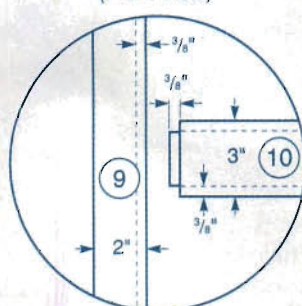




Top Door Rail
(Front View)

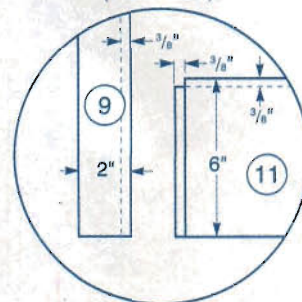


Middle Door Rail
(Front View)

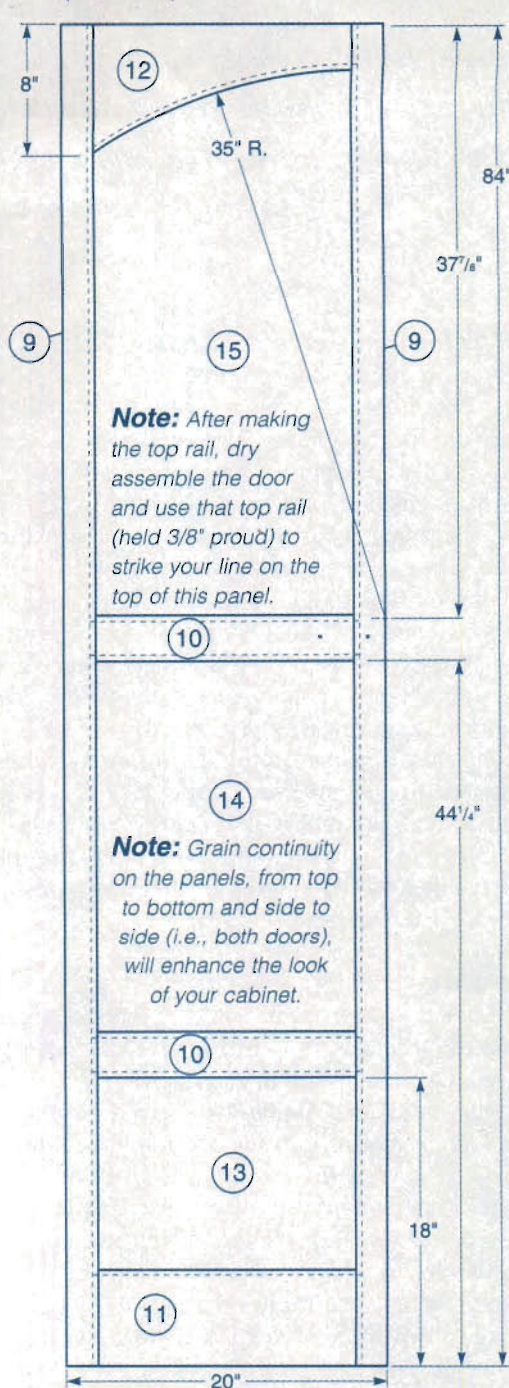


Note: All door grooves are 3/8" deep by 1/4" wide.

Bottom Door Rail
(Front View)



Door Frame and Panel
(Front View)



Note: After making the top rail, dry assemble the door and use that top rail (held 3/8" proud) to strike your line on the top of this panel.

Note: Grain continuity on the panels, from top to bottom and side to side (i.e., both doors), will enhance the look of your cabinet.

MATERIAL LIST CARCASS AND DOORS

	T x W x L		T x W x L
1 Carcass Sides (4)	3/4" x 21 3/16" x 84"	9 Door Stiles (4)	3/4" x 2" x 84"
2 Carcass Tops and Bottoms (4)	3/4" x 21 3/16" x 19"	10 Middle Rails (4)	3/4" x 3" x 16 3/4"
3 Fixed Shelves (2)	3/4" x 18" x 19"	11 Bottom Rails (2)	3/4" x 6" x 16 3/4"
4 Divider Shelves (6)	3/4" x 17" x 19"	12 Top Rails (2)	3/4" x 8" x 16 3/4"
5 Rod Base Shelves (2)	3/4" x 10 5/8" x 19"	13 Bottom Panels (2)	1/4" x 17" x 12 3/4"
6 Rod Divider Shelves (2)	3/4" x 10 5/8" x 19"	14 Middle Panels (2)	1/4" x 17" x 24"
7 Carcass Backs (2)	1/4" x 19" x 83 1/4"	15 Top Panels (2)	1/4" x 17" x 34 3/4"
8 Pine Edging (1)	1/8" x 3/4" x 75'		

Be sure to check the actual thickness of your lumber and plywood before you start the various machining operations — even manufactured stock can vary in thickness. (Try Ralph Bagnall's dado jig, featured on page 70 in this issue.) Once you've completed your machining, join the sides and tops and bottoms with glue and screws set into counterbored holes. (Plug the holes later with flat topped pine plugs.) Now make the fixed shelves and divider shelves (pieces 3 and 4) that go into the gear storage side of the cabinet. On the rod-holding side you will need to make matching pairs of rod divider and rod base shelves (pieces 5 and 6). The *Scaled Drawings* on page 57 show the shapes and machining details for these solid lumber pieces. Lastly, mount the plywood backs (pieces 7) into each compartment, making sure the units are square before the glue cures.



Fish illustrations by Joseph R. Tomelleri

Making Making the Doors

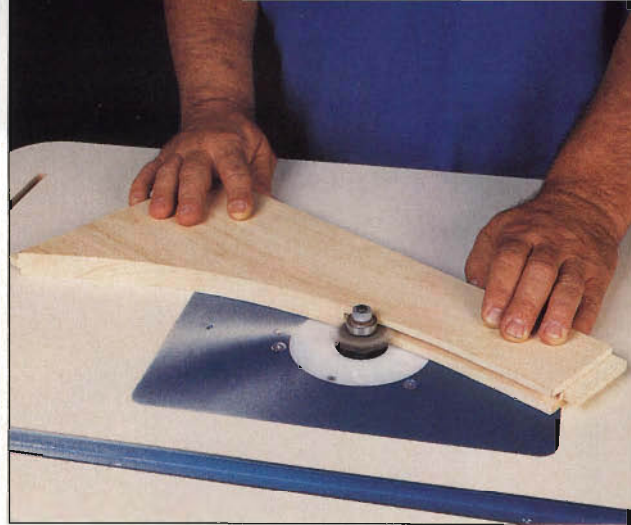
When it came time to cut the door sections off of the large boxes, I asked a friend to lend a hand (see photo, next page). It was safer and

easier than doing it myself. Making the doors this way not only ensured a perfect fit to the carcass, but kept the grain pattern intact on the side panels. After the door sections were removed, I glued the fixed shelves and the rod holders in place. Then I applied 1/8" thick pine edging (piece 8) to hide the exposed edges of the plywood.

The front of each of the door sections was closed up with a classic frame and panel assembly, accented with symmetrically arched top rails. I made the flat door panels with 1/4" knotty pine plywood.

Select straight pine lumber to make the stiles and rails (pieces 9 through 12) and cut these pieces to size. Tight knots are acceptable, as they add to the overall look of the cabinet. Start the machining by plowing a 1/4" wide by 3/8" deep groove down the length of the stiles' inside edges, using a 1/4" dado head. Do the same to the

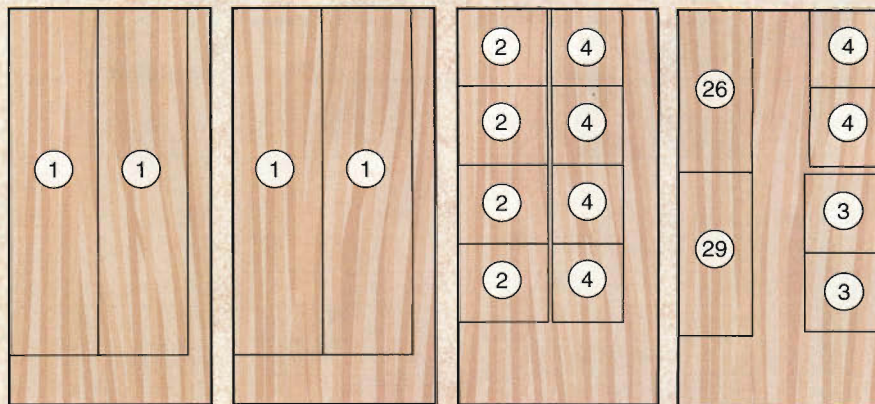
Use a 1/4" slot cutter in your router table to help make the symmetrically curved top door rails. The rails provide a nice bit of visual interest to this tall slender cabinet.



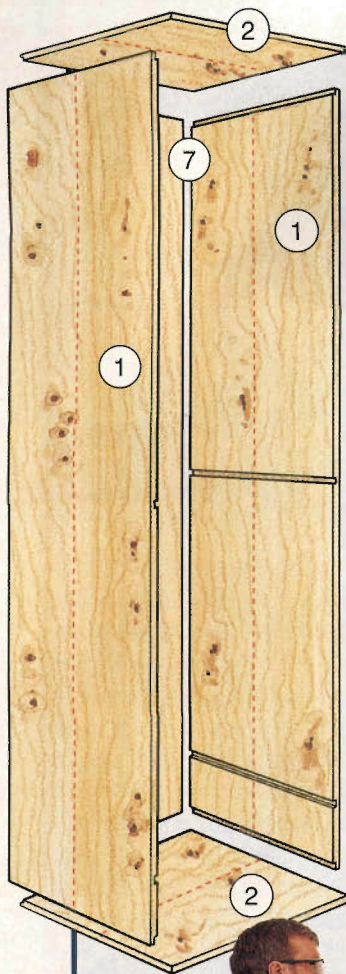
appropriate edges of the middle and bottom rails. Now set up your miter gauge and employ the same dado head to form the full width tenons at the ends of all the rails. (The top rails remain rectangular for the moment.) On a large, flat work surface, temporarily clamp the stiles and rails together as they will appear on the front of the cabinet. (You don't need the panels during this test assembly.) Make sure the clampup is square and true. At the center seam, measure down 37 7/8" and strike a 35" radius across the top rails to create their gentle curve. Disassemble the clampup and take the top rails over to your band saw. Cut the arcs and then sand the rough saw marks smooth while holding the rails together as a pair. Chuck a 1/4" bearing guided slot cutter in your router table and plow a groove centered along the curved edge of each rail, as shown in the photo above.

Cutting diagram for 3/4" knotty pine plywood

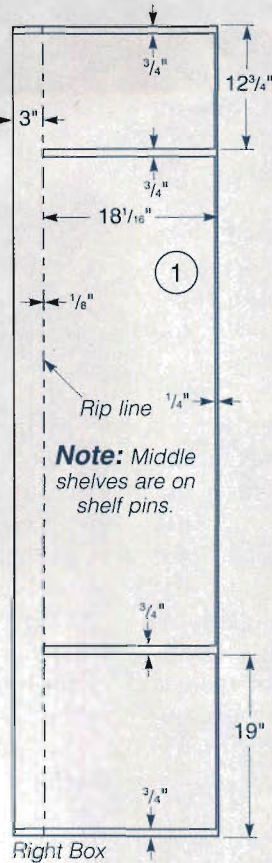
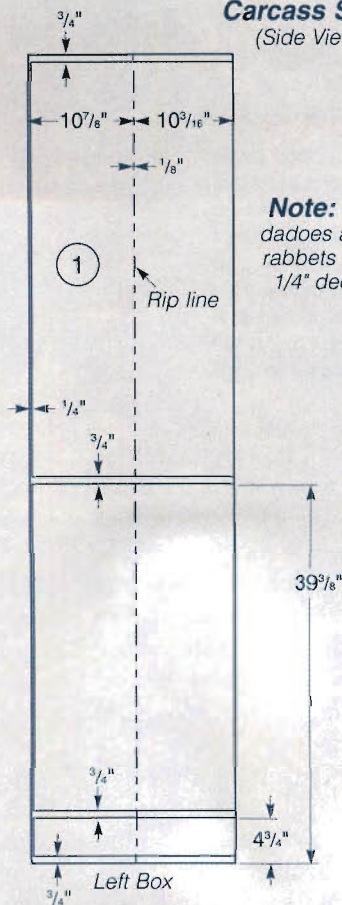
Knotty pine plywood is a good choice for this cabinet because it has the stability of regular plywood combined with the beauty of knotty pine lumber. You will need to purchase this plywood at a full service lumberyard — one that commonly deals with cabinet grade hardwood plywood. (While you're there, pick up the crown molding.) Use the cutting diagrams at right for each sheet of plywood.



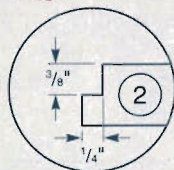
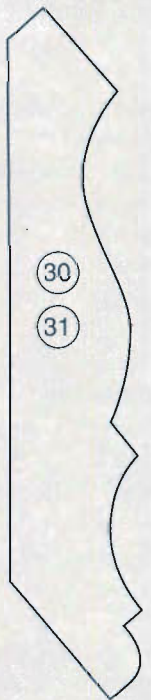
Left Box Exploded View



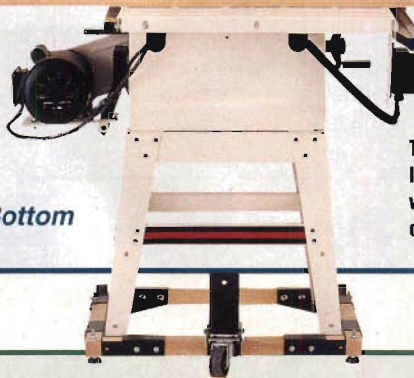
Carcass Sides (Side Views)



Crown Molding
(Full-size: The author purchased these pieces at the lumberyard.)



Carcass Top and Bottom
(Back Edge)



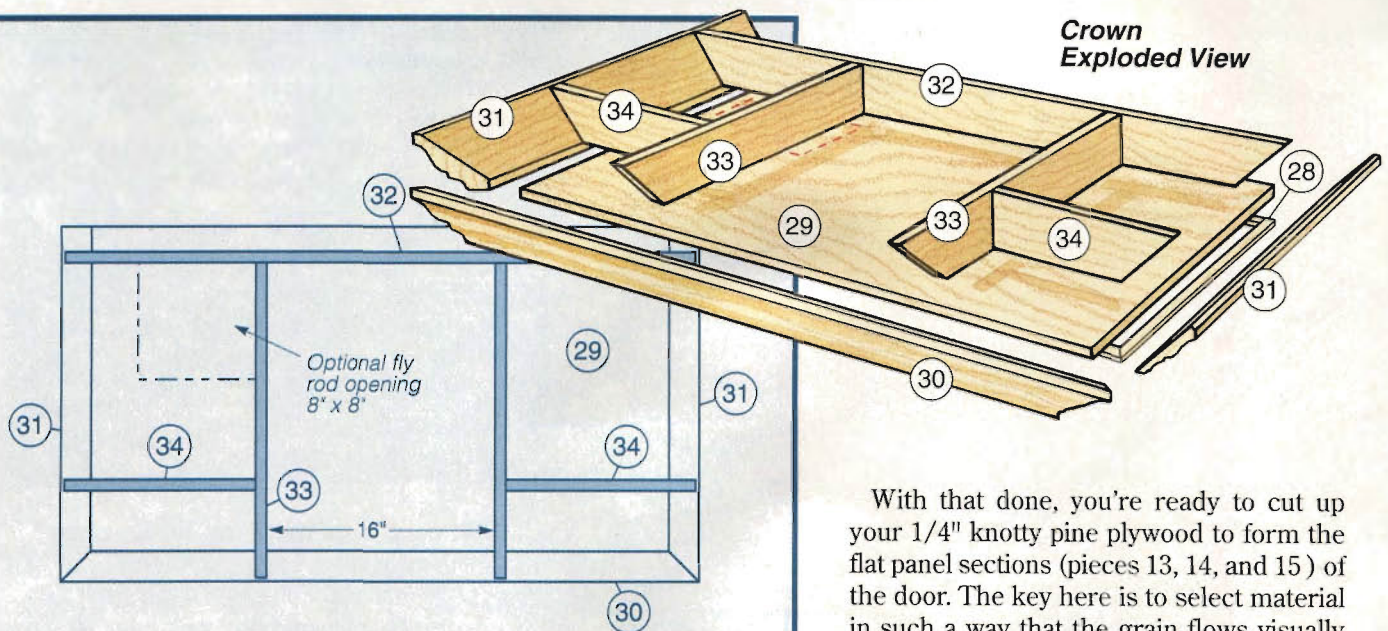
The author recommends looking for a helping hand when it's time to rip the carcass assembly in two.



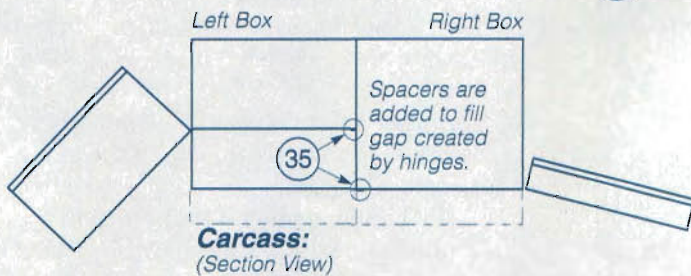
MATERIAL LIST DRAWERS, PEDESTAL AND CROWN

	T x W x L
16 Small Drawer Face (1)	1/2" x 6" x 18 1/4"
17 Large Drawer Face (1)	1/2" x 12" x 18 1/4"
18 Sm. Drawer Front and Back (2)	1/2" x 6" x 17 1/4"
19 Sm. Drawer Sides (2)	1/2" x 6" x 17"
20 Lg. Drawer Front and Back (2)	1/2" x 12" x 17 1/4"
21 Lg. Drawer Sides (2)	1/2" x 12" x 17"
22 Drawer Bottoms (2)	1/4" x 16 1/2" x 17"

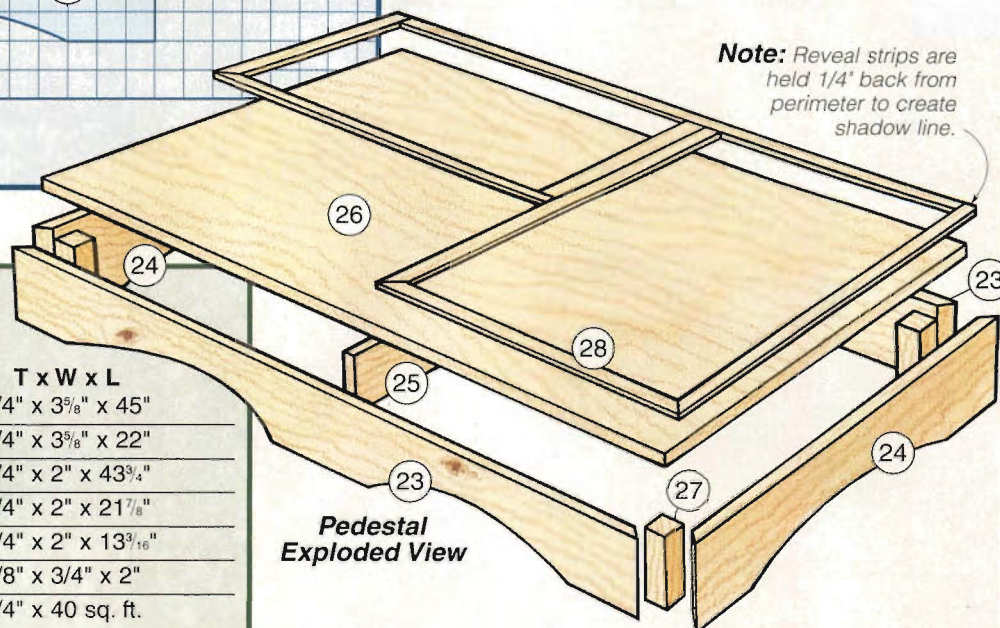
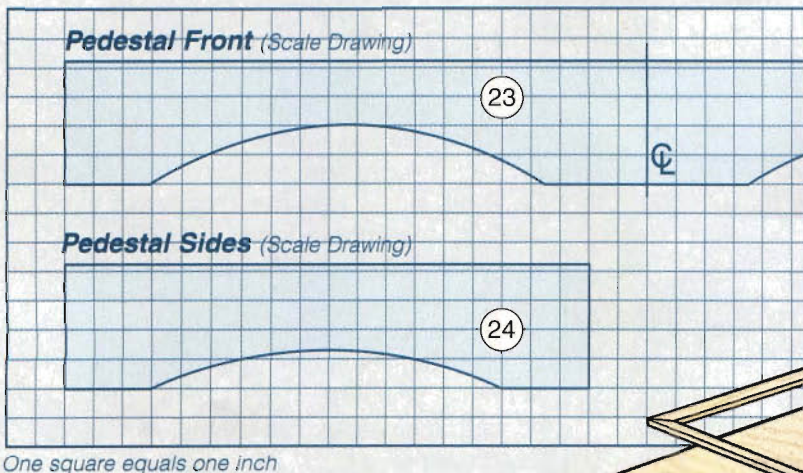
	T x W x L
23 Pedestal Front and Back (2)	3/4" x 4 1/4" x 40"
24 Pedestal Sides (2)	3/4" x 4 1/4" x 18"
25 Pedestal Support Beam (1)	3/4" x 3 1/2" x 16 1/2"
26 Pedestal Top (2)	3/4" x 16 1/2" x 38 1/2"
27 Support Cleats (4)	3/4" x 3/4" x 3 1/2"
28 Reveal Strip (1)	1/4" x 3/4" x 250"
29 Crown Cap (1)	3/4" x 21 11/16" x 39 1/2"



**Crown
Exploded View**



With that done, you're ready to cut up your 1/4" knotty pine plywood to form the flat panel sections (pieces 13, 14, and 15) of the door. The key here is to select material in such a way that the grain flows visually across the front of both doors and through the rails. Test fit the door assemblies together, leaving off the curved top rails. Lay the curved rails on top of the assemblies (but hold them 3/8" proud of the top of the door stiles), and use the curved bottom edge to strike a pencil line onto the upper door panel. Take the top panels to the band saw and cut the curve right on the pencil line. You may want to scribe the line with a shop knife to prevent grain tear-out. Do one final test fit before you glue and clamp the door subassemblies together. When the glue has cured, secure the door fronts to the cut-off door assemblies with glue and finish nails. Scrape away the glue squeeze-out and sand the doors smooth, and you're ready to move on to making the drawers.

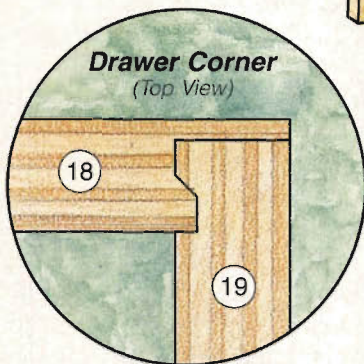
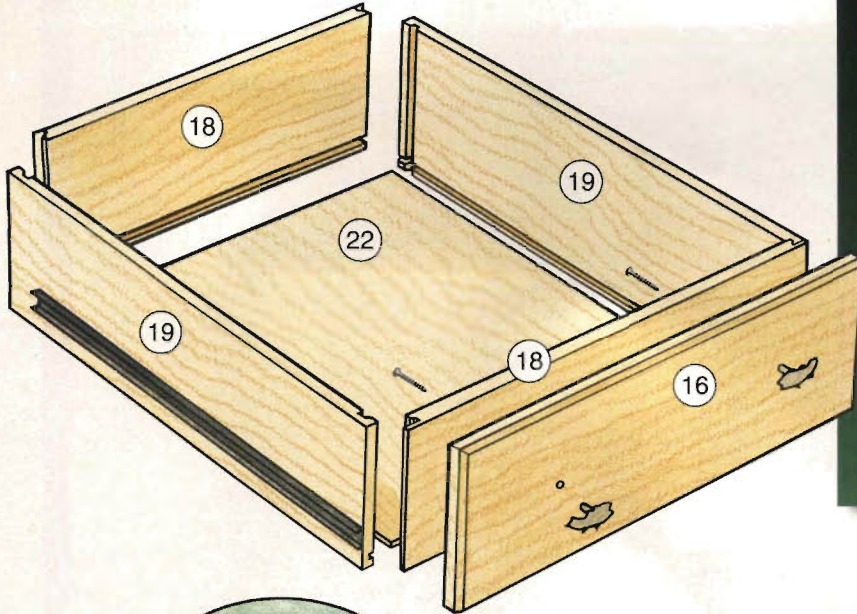


Note: Reveal strips are held 1/4" back from perimeter to create shadow line.

	T x W x L
30 Crown Front Molding* (1)	3/4" x 3 5/8" x 45"
31 Crown Side Molding* (2)	3/4" x 3 5/8" x 22"
32 Crown Long Brace* (1)	3/4" x 2" x 43 3/4"
33 Crown Medium Braces* (2)	3/4" x 2" x 21 7/8"
34 Crown Short Braces* (2)	3/4" x 2" x 13 3/16"
35 Door Spacers (6)	1/8" x 3/4" x 2"
36 Pine Paneling (1)	1/4" x 40 sq. ft.

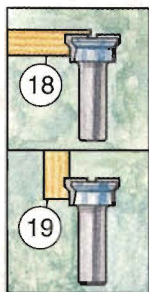
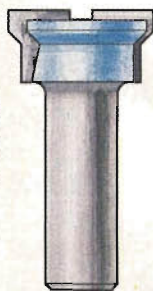
*Miter to fit.

**Pedestal
Exploded View**



Drawer Corner
(Top View)

The author used a new **Corner Locking Bit** (above) to form the corner joinery on his drawers. The bit cuts both the sides and front/back with one setup in your router table. Be sure to lightly mark the orientation of your stock before machining.



Simply change the orientation of your stock and the fence position for the opposing cuts.

Hard-to-Find Hardware

The following hard-to-find supplies are available from **Woodworker's Journal**.
Wraparound Piano Hinges* #19431...\$20.99
16" Drawer Slides** #89682.....\$15.69
Shelf Pins (bag)*** #22955.....\$2.29
Bass Pull: left-facing**** #39514.....\$13.99
Bass Pull: right-facing**** #39523.....\$13.99
Left-Facing Long Trout Pull #39531.....\$18.99
Right-Facing Long Trout Pull #39540.....\$18.99
Drawer Corner Locking Bit #22637.....\$31.99
 *Four 48" hinges required. **Two slide sets required.
 Two bags required. *Two drawer pulls required.

To order your supplies, call 800-610-0883 and mention code W2122.

Drawers, Index Holes and Top Opening

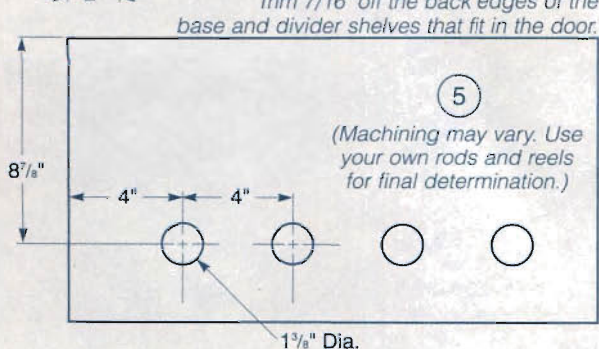
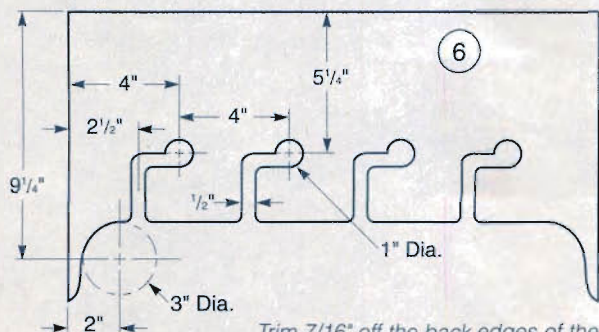
The two drawers are made mostly of 1/2" material (pieces 16 through 21) with 1/4" plywood bottoms (pieces 22). As I mentioned earlier, I purchased a new router bit (see *Supply Box* above and *Drawings* at left) to form the drawers' corner joints. It couldn't have worked any slicker. I just cut the sides, fronts and backs to size, plowed my 1/4" bottom dados (1/4" up from the bottoms), and used my new bit to rout the corner joints on my router table. A little test fitting on some scrap lumber was all the setup required.

Once the drawer boxes were glued up, I mounted them in the cabinet on full extension drawer slides and used double-sided tape to fit the faces to the front of each drawer. Nice and easy. With the drawers ready to go, I moved on to drilling the index holes for the shelf support pegs.

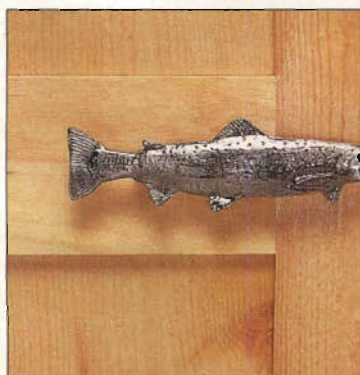
One last detail you may want to include is the opening at the top of the rod holder side of the cabinet. I went with it so my fly rods could extend out through the top of the cabinet. You may not need this detail, as the interior height is sufficient for most fishing rods. Make this opening with a hand-held jig saw and cover the exposed plywood with your 1/8" pine edging.

Rod Base and Divider Shelves

(Top Views)



A little hardware splurge adds a touch of class and identity to the author's cabinet.





The Crowning Touches

This cabinet sits on a separate pedestal and is capped off with crown molding (purchased), held in place with some bracing.

The pedestal is framed up with a front and back and two side pieces as well as a center support beam (pieces 23 - 25). See the *Exploded View Drawing* on page 57 for construction details. Band saw the exposed front and side members of the pedestal with the decorative curves shown in the *Scaled Drawings* on page 57. Glue and screw the base together and drop the base top (piece 26) in place to square up the subassembly. I glued cleats (pieces 27) in each corner to provide a little extra support. Now trim out the pedestal with 1/4" thick reveal strips (piece 28) mitered around the top edge, holding them back 1/4". These strips separate the carcass from the base (and, later, the crown molding), and create a pleasing shadow line. They also allow the large doors to swing freely.

Next, create the crown molding subassembly. I wrapped the crown molding around a 3/4" plywood cap (pieces 29, 30 and 31). On the underside of the cap I secured more of the reveal strip with glue and small brads. Next, with my hand-held jig saw, I cut an opening to match the fly rod hole in the top of the rod holder side of the cabinet. (If you didn't include this detail, ignore this step.) Finally, I added bracing (pieces 32 through 34) to add support to the top's crown molding (see *Drawings*).

I would like to bring up an important point with these four sub-assemblies. Because the cabinet is so tall, it's a good idea to install the base and top as you place the cabinet in your room. This will make it a lot easier to set the cabinet upright in a typical house with 8 foot ceilings.

Hardware and Finishing Details

With most of the work done, I temporarily mounted the pedestal and base to the cabinet. Then I hung the doors, using wrap-around piano hinges for strength and durability (see *Supplies Box* above). You will have to notch the wrapping aspect of the hinges to fit around the fixed shelves. To accommodate the thickness of the hinges I glued several small spacers (pieces 35) in place.

I went with specialty fish shaped pulls on the doors and drawers, even though they cost me a couple of extra bucks (See *Supplies Box* above). Then I mounted magnetic catches to hold the doors shut. Finally, to add to the Northwoods theme, I cut and fit 1/4" pine tongue and groove



Tongue and groove pine paneling is a final detail in this Northwoods fishing cabinet. Finished with amber shellac, this project will look great in your den or at your cabin or vacation home.

paneling (piece 36) inside the cabinet and doors. I glued it in place (see photo above) and used a few small brads for insurance. After that came the sanding (always a pain!) and several coats of orange shellac (sanding between each coat). For my money, you just can't beat orange shellac as a finish on pine lumber. It brings out the beauty of the grain and the knots and adds a real warmth to the wood.

Now all I had to do was figure out a way to quietly get all my fishing gear into the cabinet ... without anyone noticing how much stuff I actually own!

Contributing editor Rick White is as happy catching trophy fish as he is working with wood. This Canadian walleye weighed in at 11 lbs., 14oz. and, yes ... it's on his wall.



An Inspired Amateur's Portfolio

By Joanna Werch Takes

I've never sold a piece. I'm strictly an amateur," says John McAlister. While woodworking may be his hobby and not his profession, one look at John's pieces reminds you that the "amateur" designation has nothing to do with skill.

John's specialty is reproductions of 18th century furniture — including a Newport secretary he modeled after examples in East Coast museums. Since he started woodworking in the mid 1960s, he estimates, he's made close to 60 pieces. "I don't count ballpoint pens and junk like that," he said. Which is ironic, when you consider that John's big plan when he set up a shop in his basement was to make birdhouses. Basically, he was bored.

"I needed a diversion," he said. "We were living in a small town in southwest Virginia, and there were no golf courses or tennis courts nearby." Drawing on junior high shop experience, he gathered a table saw, a jointer and a few hand tools.



John McAlister's fascination with 18th century reproductions has led to many pieces like this Philadelphia lowboy with fluted quarter columns and acanthus leaves carved on the knees.



A mahogany tea table exhibits the flowing curved apron and ball and claw feet typical of John's 18th century heroes: the Townsends and Goddards of Rhode Island.

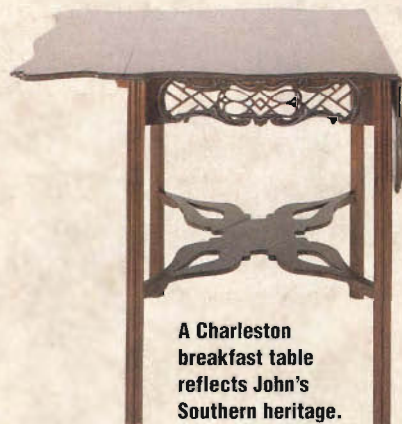
photos by Pat Shanklin

Soon after he acquired a lathe, he saw pictures of a William and Mary dressing table in a magazine. "I made it, and I thought it was the prettiest thing I'd ever seen," John said. His comment now, as he looks back: "It was terrible." Still, John said, "That's when I fell in love with 18th century furniture." With the projections and the typical cyma curve (a projected molding with a double curve), he said, "I just thought it was gorgeous."

A turning point in John's search to learn more came when his oldest daughter started college at William and Mary. While visiting, John ended up at a store selling reproductions of the furniture found at Colonial Williamsburg. The staff allowed him several visits with a camera and sketch pad and, John said,

"I fell in love with 18th century furniture. I just thought it was gorgeous."

John McAlister



A Charleston breakfast table reflects John's Southern heritage.

"I guess the first good pieces I built were copies of some in the Williamsburg catalog."

Later, when he found examples of a Newport secretary at both the Museum of Fine Arts in Boston and the Rhode Island School of Design, the staff let him take photos and measurements so he could draw his own plans. No others were available. "They would not let me touch the piece," he explained. "They sent an intern in to pull out drawers and open doors."

"When I draw up plans," John continued, "I want to estimate every single dimension before I cut anything." The Newport secretary, finished in 1991, is a piece he identifies as one of his favorites. In general, John said, he has a fascination with the entire Newport style.



The piecrust edge of this tilt-top table was a common 18th century feature.



When he's reproducing 18th century works, John said, "I try to follow pretty faithfully what joints they would've used," but he's not a purist. When he's making joints, for example, "I'll use whatever power tools are available" — although he does do all his carving by hand.



Turned legs on a William and Mary dressing table, left, mark an early 18th century style, while the cabriole legs, broken pediment and classically inspired finials on the Philadelphia highboy, at right, became popular later in the century.



This six-shell Newport secretary is one of John's favorite pieces.

His next piece, a Newport chest on chest, will join John's other work in his own North Carolina home or in the home of his family. "My woodworking means an awful lot to me," John said. "I'm strictly an amateur, but I have thoroughly enjoyed it."



DeWalt Revs Up Their Cordless Drills

By Rob Johnstone

"Shh — don't tell anybody about these new drills ... not until we say it's OK." That was the message given to me at the Home Builders Show in Atlanta this past February, when DeWalt rolled out these new drill/drivers — and I've been dying to tell you about them ever since. (Few folks are as miserable as an editor with a secret he can't spill.)

To their credit, DeWalt wanted us to wait until the three new XRP™ drill/drivers were available to the public, a reasonable request, and therefore all the more aggravating. But the wait is now over.

A Total Redesign

DeWalt did more than throw a new switch or battery pack onto their existing models and crank up the marketing department. This is a significant redesign — the yellow and black colors are the same, but that's about it. The guts of each of

A secret since February, these new offerings from DeWalt are now on the market and ready for consumers. Three new drills offering three speed settings — DeWalt cubed!

these new drills (including 12 volt, 14.4 volt and 18 volt models), is an all metal, newly designed transmission. I held their old transmission and a new one in my hands and, while I'm no engineer, I can vouch that the new models are quite a bit more substantial.

The three unique speed settings on DeWalt's new drills are a valuable feature ... not just a bit of window dressing. Research with construction workers told DeWalt that that the increased speed and torque improved productivity.

Tool Preview continues on page 64 ...



**DeWalt DW987
18 Volt XRP™**



**DeWalt DW983
14.4 Volt XRP™**



**DeWalt DW980
12 Volt XRP™**

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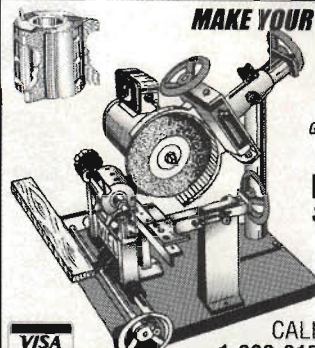
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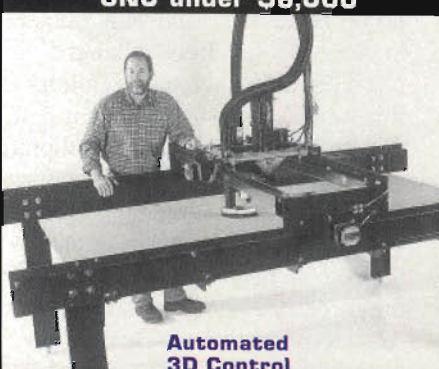
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The 18 volt version of DeWalt's new XRP drill/driver, shown with a battery charger, extra battery and auxiliary handle. A complete redesign, these three new offerings add power and torque to DeWalt's line.

DeWalt told me they needed to create the new trannies because they were delivering a lot more power with these new units. The other reason they reworked the transmission was to create a three-speed drive. Conversations with end users who drive screws day in and day out convinced them that increased speed was a critical consideration. (If you drive screws in 30% faster, you cut a third of the time off the job.) But speed was not the only consideration; power, or torque, must be delivered as well — and these new drill/drivers provide both. You can pick your desired range of rpm, controlled by an easy to operate three-speed switch on the top of the barrel. (I'd probably just leave it on the top speed and adjust to suit with the variable speed trigger ... but that's just me.)

Keyless Chuck and Adjustable Clutch

The redesign does not stop with the power train. Outfitted with 1/2" keyless Jacobs chucks that are paired with an adjustable clutch, this new DeWalt threesome is indeed user-friendly. The ratcheting chucks are designed to prevent their sleeves from working loose when in use, and DeWalt contends that they'll grab onto bits with twice the force of conventional chucks. As you might expect, DeWalt has brought improved technology to the batteries that power their new generation of cordless drills, too. Their extended run-time performance (XRP™) offers users more operations per charge and the company is claiming that the batteries do not have decreasing memory charging problems. Each drill is a bit larger than its counterpart in the existing line, but all are easy to handle and comfortable to use.

Into the Fray

Available in a carrying case that includes a battery charger and an extra battery, these drill/drivers are a competitive entry into a crowded tool category. While their price is nowhere near the bottom of the group, it is easy to justify the cost through unique features and DeWalt's reputation for quality. The key claim for these new drills is more speed delivered with higher torque. It would seem a winning combination.

Tool Preview continues on page 66 ...

Tools by the Numbers

DeWalt DW980

12V XRP™

Voltage	12V
Keyless Chuck (with an adjustable clutch)	1/2"
Maximum Torque	380 inch-lbs
No-load RPM (at each speed setting)	0 - 450, 0 - 1400, 0 - 1800
Drilling Capacity in Wood	1 1/2" Dia.
Drilling Capacity in Steel	1/2" Dia.
Weight	4.9 lbs
Street Price	\$169

DeWalt DW983

14.4V XRP™

Voltage	14.4V
Keyless Chuck (with an adjustable clutch)	1/2"
Maximum Torque	400 inch-lbs
No-load RPM (at each speed setting)	0 - 450, 0 - 1400, 0 - 1800
Drilling Capacity in Wood	1 3/4" Dia.
Drilling Capacity in Steel	1/2" Dia.
Weight	5.2 lbs
Street Price	\$199

DeWalt DW987

18V XRP™

Voltage	18V
Keyless Chuck (with an adjustable clutch)	1/2"
Maximum Torque	450 inch-lbs
No-load RPM (at each speed setting)	0 - 450, 0 - 1450, 0 - 2000
Drilling Capacity in Wood	2" Dia.
Drilling Capacity in Steel	1/2" Dia.
Weight	5.9 lbs
Street Price	\$269

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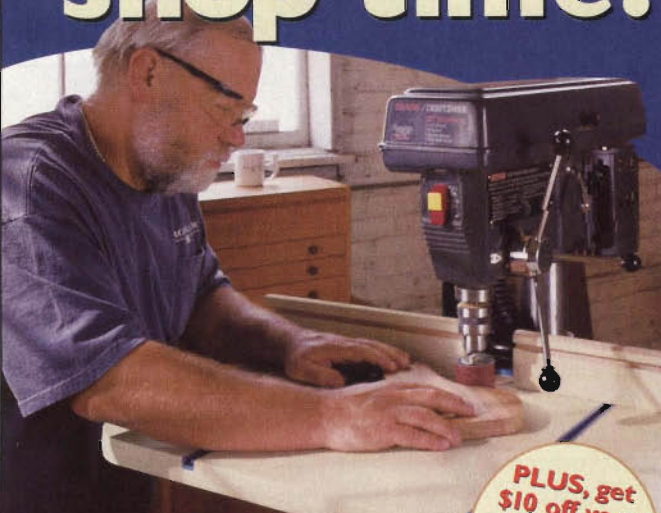
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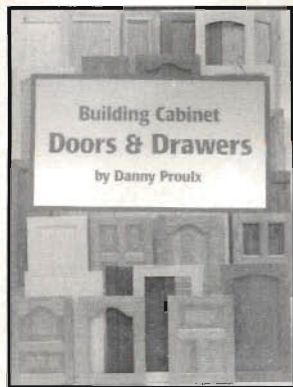
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TOOL PREVIEW

Rockler's Benchtop Router Table

By Joanna Werch Takes

This tool is aimed at anyone who has ever said, "When I get a bigger shop, I'm getting a router table." At 14 1/2" high, 16" deep and 21" wide, the Benchtop Router Table from Rockler® Woodworking and Hardware fits into even the dinkiest of shop spaces, and at 20 pounds, moving it around won't break your back.

Constructed of MDF with a melamine laminate, the tabletop sits on a set of hardwood legs which clamp to your workbench — it comes ready for assembly, with all the screws and T-bolts you'll need.

The heart of the benchtop table, like the full-size one in Rockler's line, is a 20 3/4" fence. The 1/4" anodized aluminum angle is machined straight to within .010 inches, in order to create an accurate 90° angle.

The table also promises to minimize the gap around bits with two 10 3/8" laminated MDF fence faces that slide in a T-slot. Like the larger Rockler table, the benchtop uses an accessory kit that includes both fence and table featherboards,



The 20 3/4" anodized aluminum fence and its two laminated MDF faces are at the heart of the router table.

a stop block and a dust port. According to Steve Krohmer, who oversaw development of the table for Rockler, the plate leveling system on the unit is a real innovation. "Turning threaded inserts allows you to raise and lower the insert plate in order to align it with the tabletop," he explained. "Then, when you're ready, you secure the plate with screws that fit into the same threaded inserts."

An aluminum miter gauge track, 1/4" MDF insert with 1 1/2" center hole, and safety bit guard round out the features of the router table. It's pre-drilled for the Porter-Cable 690 Series routers, with custom adapter plates available for the DeWalt DW621, Bosch 1617 and 1618, and Sears Craftsman 1 1/2 HP or less routers. You can also purchase blank plates and drill to fit other routers.

Whatever router you put in it, this Benchtop unit is a good first fit for the small shop — and an affordable second table for larger shops.

Tools by the Numbers

Tabletop.....3/4" x 21" x 16"

Fence.....20 3/4"

Weight.....20 lbs

Retail Price.....\$119.99

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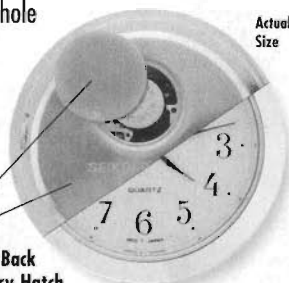
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Woodworking's Foot Soldier: The Unisaw

By Charles Self

As woodworkers advance in skill and their projects increase in size and complexity, the desire for heavier-duty and more accurate equipment begins to grow. Cabinet saws are a logical first step. Often imitated and always a category leader, the Delta Unisaw has a blue-blood pedigree with a blue-collar work ethic. Regular tool tester Charles Self has been putting a Delta Unisaw through the paces for over a year, and was more than comfortable recommending it as one of the Journal's "Tools That Endure."

For the last 15 months, I have been making extensive use of a basic Unisaw left tilting arbor table saw, with a 52" Unifence. My experience with Unisaws in general, however, goes back over 15 years.

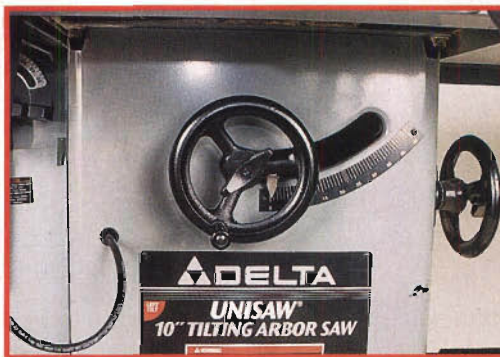
The 3 HP, single phase 220 volts saw was selected for my test, as this is the basic Unisaw package. The tool is also available with a 5 HP single phase or a 5 HP three phase set-up. Both of these packages are designed to be hardwired in, while the 3 HP unit comes wired for 220 volts, with plug, and is rated at 12 amperes.

Recent Refinements

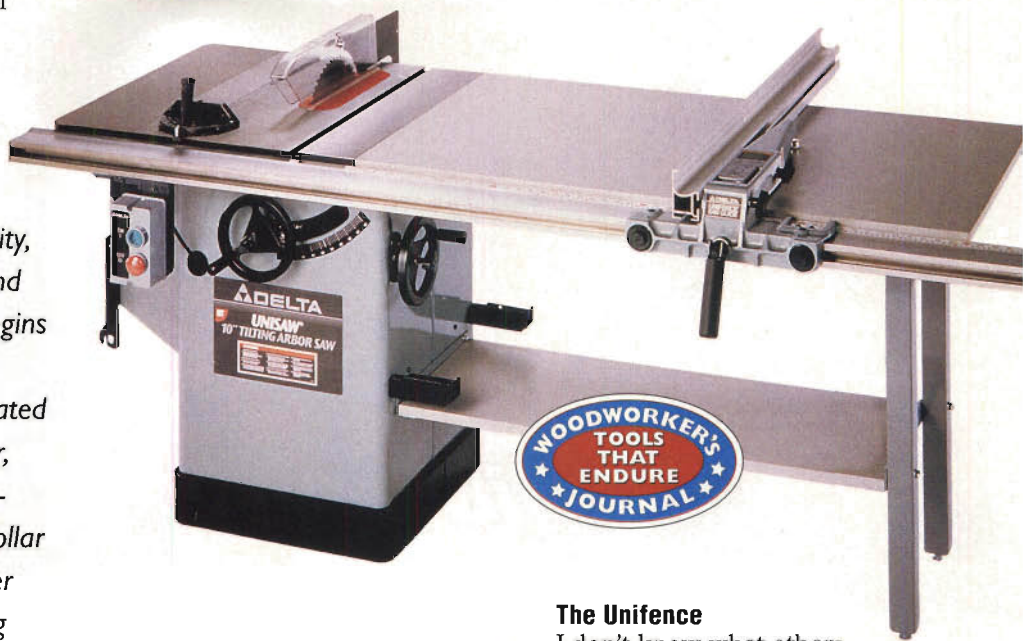
More than a dozen years ago, my old right tilt (this one is a left tilt) Unisaw came with no internal chute to the dust collector area, but it did have a lift-out latching door in its front. Today, the door

is gone — but the chute (really a sturdy sheet-metal plate welded to the inside of the cabinet) at least partly makes up for the loss and makes attaching an adapter and dust collector much easier. It also stiffens the cabinet.

Other refinements are an included motor cover with a good latch, a set of hangers for the fence, a hanger for the miter gauge and another for the blade wrenches. The blade is removed, and installed, using two wrenches instead of the more common "jam a stick in the teeth" method.



Large and smoothly operating control wheels have been a standard feature on all the versions of the Delta Unisaw.

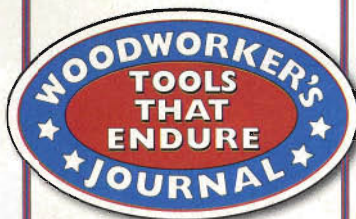


The Unifence

I don't know what others might expect of the Unifence, but it quickly became a workhorse for me. The aluminum construction looks a bit fragile at first, but unless you drop an electric motor on it (don't ask), it does its job and even more than that. The extruded segment of the fence easily slides backward and forward to provide its own cut-off setup. It can also be reversed, with the flat side on the table, to cut laminates. The scale on the cast lock-down part of the fence is easy to read. There is a shorter fence that goes on as a permanent stop

— or for use in the European style that does not appreciate the longer fences we use on this side of the Atlantic.

One knock against the Unifence seems to be the difficulty some people have attaching jigs and sacrificial fences. I just don't get it. Keep clamps to the top area of the Unifence, or drill holes — the aluminum is very easy to drill — and go on about your business. I've not had any difficulty at all.



Woodworker's Journal's

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Very smooth movement, a secure lock-down and remarkable versatility are combined in the Unifence. It is also simple to remove and install.

The Unifence installed easily, with one person doing the work. The fence rail has a backer rail, though unlike the ones used in the Biesemeyer and clones, and the holes are accurately drilled. That last feature is the one that makes installation easy on any fence.

I've also heard some complaints about the Unifence being difficult to remove and replace. It is difficult to believe that someone in a skill based hobby like woodworking couldn't provide the right hand twist necessary to get the fence loose, and the left hand twist needed to re-install it. (The directions are clear and printed right on top of the fence itself.)

Control Wheels

The generous 7" diameter control wheels are great: Action is silky-smooth even after months of moderately heavy use. Just a few turns raises, or lowers, the blade. Tilt is smooth and easy, again with a relatively small number of turns of the wheel. Both wheels have easy-to-use locks on them so the settings you crank in are the ones you'll still have 200 linear feet of cutting later.

On the left tilt Unisaw, controls are mounted in front and to the right of the cabinet. On right-tilt saws, reverse the order of the tilt control, and you've got it.

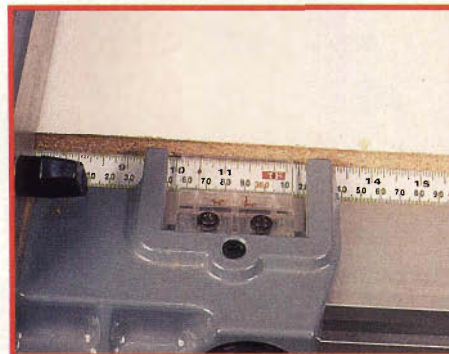
Fit and Finish

The Unisaw matches any saw in its class for fit and finish, even though the medium gray paint is not as showy as other colors ... color does not cut wood.

The tabletop glistens with fine machining. The cabinet is well-made and securely fastened to the top. And, as with all cabinet saws, this one is easily adjusted: A cap head bolt at each corner of the cabinet holds the trunnions, making for easier adjustments should they ever be necessary. It will be an unusual hobbyist who uses any of these saws to the extent that adjustments are needed, but some strange things can happen in shipping, so having the possibility is always a good idea.

A Legacy of Durability

In one form or another, but basically much the same, the often imitated Unisaw has been around since 1938, and has set standards for other manufacturers to meet or beat. The individual saw durability is almost legendary — one recreational woodworking newsgroup reader has a 1939 model, in use today (though it was stored badly for many years, and needed lots of restoration). Unisaws



Once the Unifence is set up, (note the adjustable nature of the cut indicator) accuracy is virtually assured by the easy-to-read measuring scale.

are now the middle price range of the cabinet saw group, making them an excellent value.

Can You Afford One?

If you want, or need, a cabinet saw badly enough, even the price will probably not be a huge deterrent. The price range for the Unisaw runs from \$1,470 to about \$1,800, but the saw can often be found with \$50 to \$100 rebates. Most hobby woodworkers do very well with contractor's saws, which can give accuracy and repeatability almost on par with cabinet saws. When you want to discard the "almost" the cabinet saw class comes into the picture. When your woodworking demands extreme repeatability, ease of setup, ease of tune-up of the saw and abundant power in every situation, then the cabinet saw is the only choice.

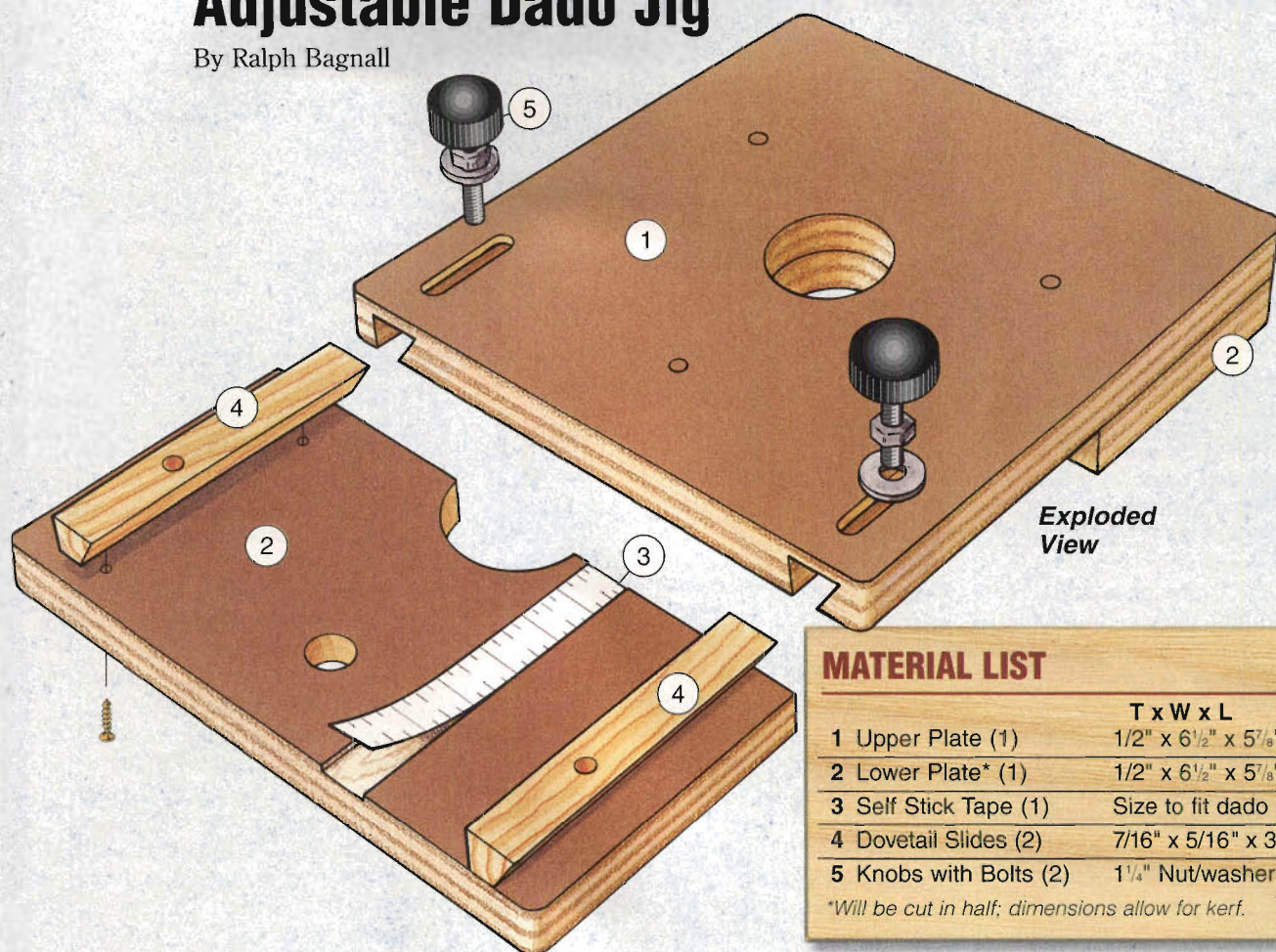
And the Delta Unisaw, after more than 62 years of availability, is both an obvious and realistic solution for a long-term keeper that does what it is advertised to do — day after day and year after year.

For all of the features and reasons listed above, *Woodworker's Journal* is pleased to name the Delta Unisaw as a *Tool That Endures*.

Charles Self is an award-winning author and tool tester for the Woodworker's Journal.

Adjustable Dado Jig

By Ralph Bagnall



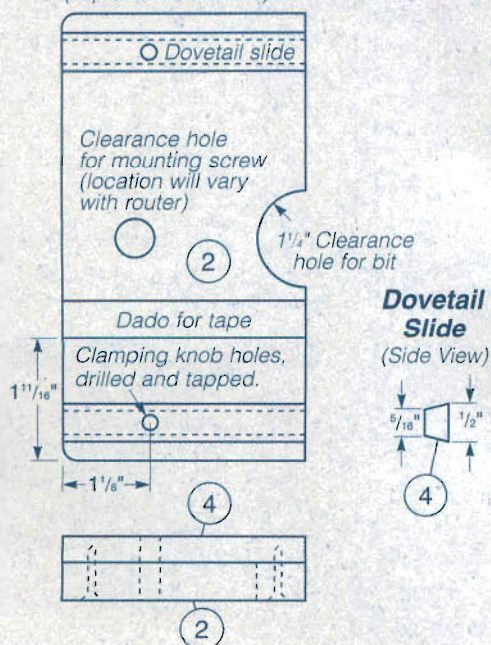
MATERIAL LIST

	T x W x L
1 Upper Plate (1)	1/2" x 6 1/2" x 5 7/8"
2 Lower Plate* (1)	1/2" x 6 1/2" x 5 7/8"
3 Self Stick Tape (1)	Size to fit dado
4 Dovetail Slides (2)	7/16" x 5/16" x 3 1/8"
5 Knobs with Bolts (2)	1 1/4" Nut/washer

*Will be cut in half; dimensions allow for kerf.

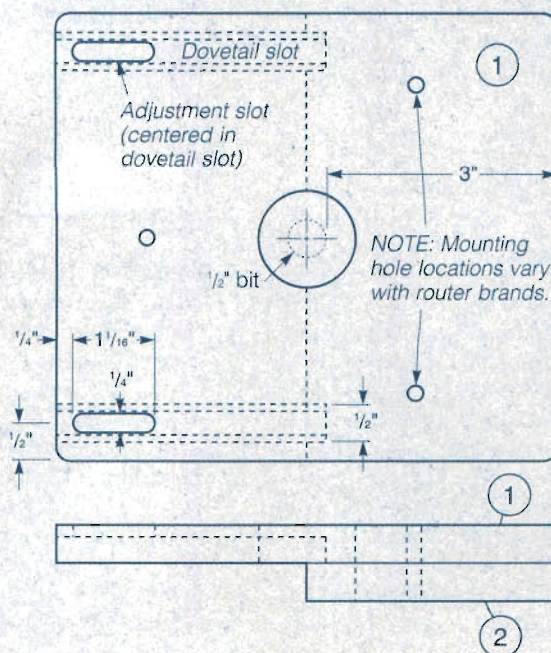
Movable Half Bottom Plate

(Top and Side Views)



Top Plate and Fixed Half of Bottom Plate

(Top and Side Views)



How do you rout dados to match plywood that is a hair under 3/4" or lumber that is 1/32" too thick? What you need is an adjustable auxiliary router base that will form one edge of a dado at a time. Two passes equals perfect dimension, every time!

Every woodworker knows that 3/4" is not really 3/4 of an inch, and virtually no two boards are exactly the same thickness. This makes milling snug-fitting dados difficult indeed, and was the impetus for my adjustable dado jig.

While there are a number of tried and true methods for cutting perfectly sized dados, I wanted to be able to set a single straightedge and mill most any size dado I need — in just two passes. My solution: running two of the auxiliary base's edges along the straightedge. One edge is a fixed distance from the cutting edge of the bit, while the second can easily move in and out to adjust the final dado width.

Milling the Base Pieces

Begin by cutting 1/2" material to form the two plates (pieces 1 and 2) of the auxiliary base. It is important that the next step is exactly matched top to bottom, so double-face tape the two parts together. Lay out the mounting hole locations for your router on the face of the top plate so that the cutting edge of your 1/2" straight bit will be exactly 3" from the fixed edge of the jig (see *Elevation Drawings* at left). Drill the mounting holes and the clearance hole for the bit through both layers. Separate the two parts and turn the top plate over to countersink the mounting holes and mill the dovetail slots, as shown at left. Next, mill the 1/4" adjustment slots through the top plate, along the centerlines of the dovetail slots.

The lower plate is now cut in half, and the mounting holes are bored out to 1/2" to provide clearance for the mounting screws. The front half is glued to the top plate to create the fixed edge of the jig. A shallow 1/2" wide dado is milled in the movable base for

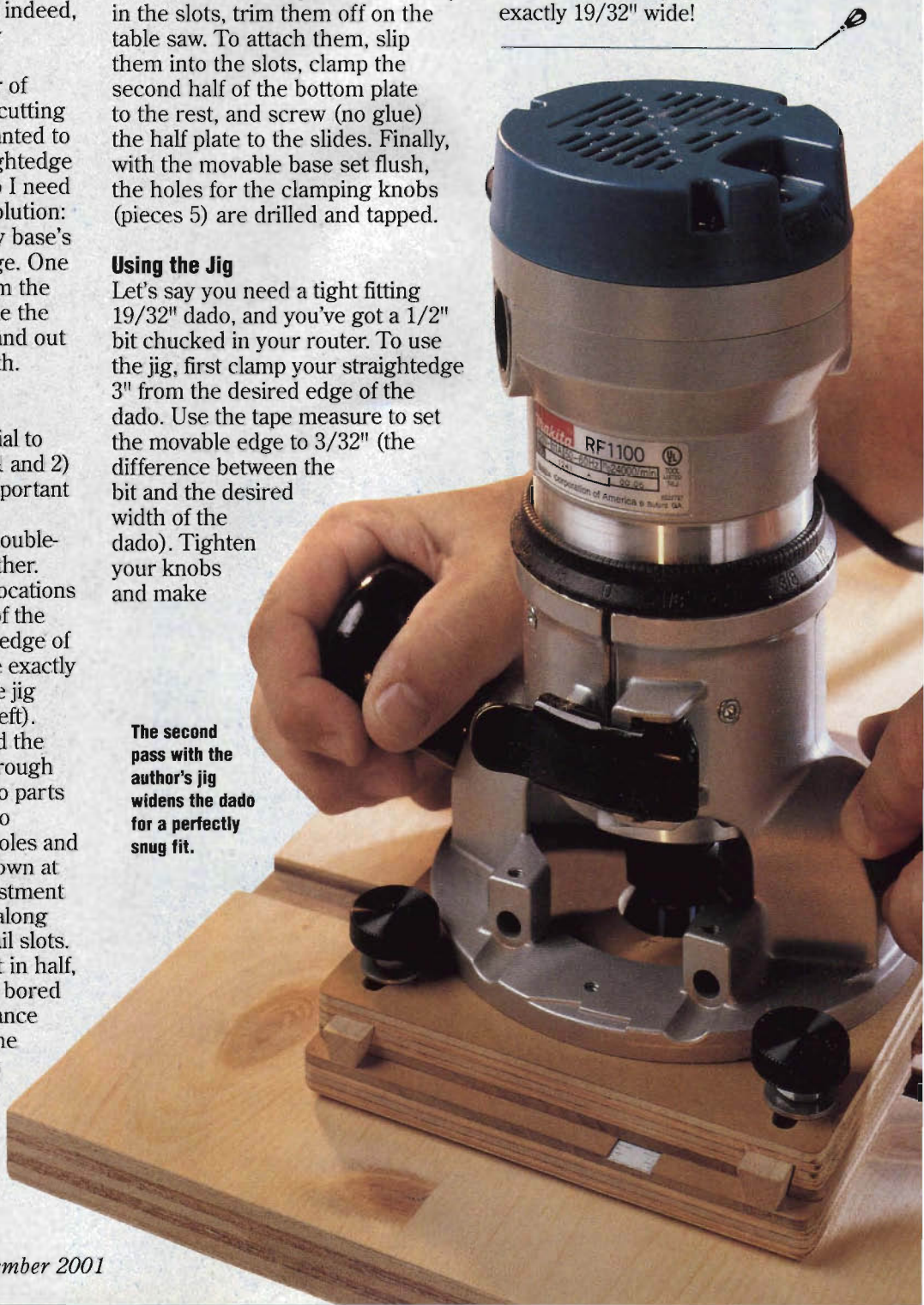
a stick-on ruler (piece 3). For safety, the hardwood dovetail slides (pieces 4) are milled along one edge of a wider 1/2" board to fit the slots. Once they slide smoothly in the slots, trim them off on the table saw. To attach them, slip them into the slots, clamp the second half of the bottom plate to the rest, and screw (no glue) the half plate to the slides. Finally, with the movable base set flush, the holes for the clamping knobs (pieces 5) are drilled and tapped.

Using the Jig

Let's say you need a tight fitting 19/32" dado, and you've got a 1/2" bit chucked in your router. To use the jig, first clamp your straightedge 3" from the desired edge of the dado. Use the tape measure to set the movable edge to 3/32" (the difference between the bit and the desired width of the dado). Tighten your knobs and make

the first pass with the movable edge riding along the straightedge. Spin the router around so the fixed edge is along the straightedge, and form the other wall of your dado — exactly 19/32" wide!

The second pass with the author's jig widens the dado for a perfectly snug fit.



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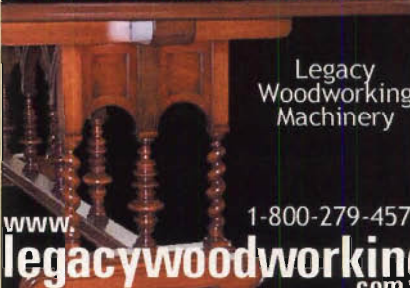


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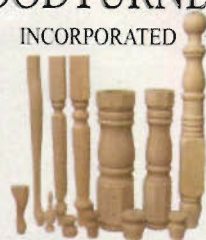
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Benchtop Mortisers

By Charles Self

It may be happenstance, but the popularity of the Arts & Crafts style may well be responsible for the upswing in the numbers of benchtop mortisers being sold in recent years. Our author tested seven 1/2 horse units, ranging in price from \$199 to \$289.

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Shop Fox W1671

I tested one of Shop Fox's "older" models, as that was all that was available. This unit featured a 1,760 rpm, 6 amp motor and dual round steel columns, with serrations on the right one. It uses a hydraulic piston to control head movement and was the heaviest of all the benchtop mortisers I tested, at about 82 lbs. It is also among the most powerful, with a massive, finned motor housing and a 17" long handle for good leverage. Doors covering the chuck are easy to open and access is very

good. The depth stop bar is similar to others I tested, but locks with a spring-loaded L handle, a nice touch.

Fit and finish are very good, and machine parts are meaty enough to

handle the extra stress brought by the extra depth capacity. The table is 16" x 6", and the base 14" x 3" (it's 11" wide in front but tapers to 3" at the back). The handle operates smoothly, and the head moves up and down smoothly. The hold-down is similar to most of the others, and Shop Fox uses a paddle switch, which is very easy to swat off in emergencies.

Shop Fox's depth capacities are almost astonishing. The hydraulic piston can be placed in any of three positions, allowing a greater range of motion; there are three clamp posts for thicker workpieces. You can mortise a board as thick as 7 3/4".

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Grizzly G3183

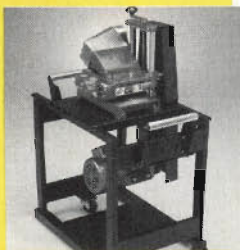
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Grizzly G3183

Grizzly has a reputation for turning out tools that are a great value for the price, but sometimes need a bit more set-up work. In this case, the opposite was true. The fence was square to the table, and assembly went very smoothly. Once I had it assembled, the chisel was parallel to the fence. This is a traditional unit, foregoing some of the innovations of the Fisch, but it is powerful — six amps — and uses its 3,400 rpm motor to good advantage. The manual is solid, containing more adjustment information than most of the others. The machine is solid, but not fat, at 45 pounds, and results in cherry and oak were fine, with both 1/4" and 3/8" chisel sets.

The Grizzly G3183 has a 13 1/2" wide by 5 7/8" deep table, on a 12" deep by 7" wide base. The chuck is 3/8". The switch works well, has a removable key for safety, and is easy to smack off with the left hand.

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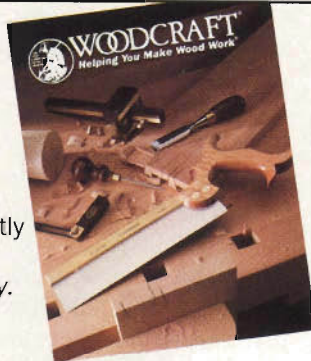
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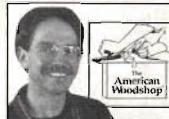
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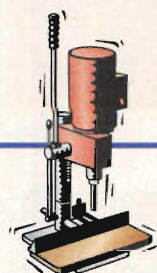
The 15 1/4" long handle provides plenty of leverage. This was the first of the high speed mortisers in my evaluation, and as such I checked in particular for problem possibilities that don't exist with lower speed units. Only one came up, and it was an issue that all the fast rpm machines share: if great care isn't used with small chisel and bit sets, the bits are quickly ruined.

Getting a grip, as with the lower speed mortisers, and using a more delicate touch on the handle reduced problems and sped up completion. Grizzly uses a single

round steel upright, with a way screwed onto its face. There is a method to adjust perpendicularity, another for sliding fit, both very simple. The depth stop is easy to set and uses an Allen wrench for a set screw. The hold-down is the familiar forked type. The fence is standard, sliding on its rod through the center of the down-rod which holds the power head.

The 3/8" chuck is easily

reached through an L shaped cover that removes with two plastic capped screws. A hydraulic piston helps control the head, and spindle travel is a generous 4 3/4". Currently, the Grizzly G3183 is selling for \$225 plus shipping, making it a real bargain.



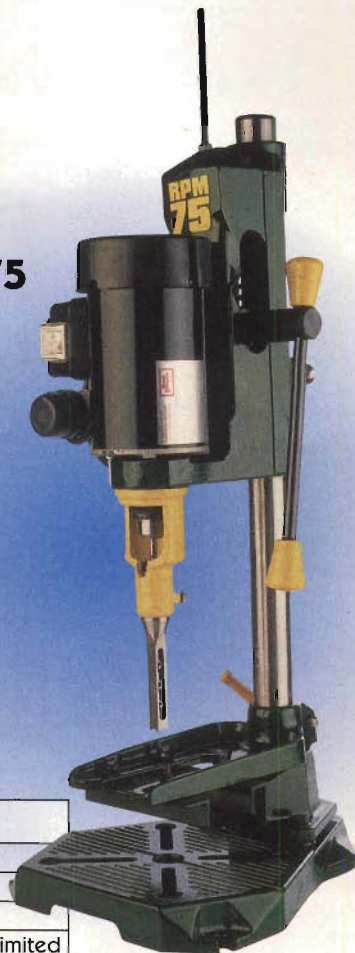
Benchtop mortisers replace two tools, the drill bit (preferably a Forstner or a brad point) and a chisel.

Record RPM75

Record RPM75

Record is noted for power tools, such as lathes: they now have an interesting entry in the benchtop mortiser field. The RPM75 is very different from most of the units I tested, but retains the basics. The 4.7 ampere motor rotates at 3,400 rpm. From there, things get different. The switch, for instance, is covered with plastic, pushes both on and off and does not have a key. The unit I received was the first one to arrive in the U.S., and was assembled already, in England. It is the only non-Asian offering in the bunch.

Fit and finish were really super, featuring dark green glossy paint. The single column allows easy changes of vertical head position, needed because of the short spindle travel — I measured 3". At 55 pounds, the RPM75 is among the heaviest. The base has basic dimensions of 10" (across the center) by 13 1/2" deep. There is no table, as such. If one is desired, you simply mount it on the base — a real aid to usefulness. The hold-down has a platform, with two L-shaped clamps. The clamps are located under the hold-down platform, and also serve as a fence. The workpiece is placed on the platform, the clamps are aligned, and the mounted chisel and bit set is lowered to make the necessary cuts. The side-to-side movement needed to cut most mortises is easily carried out here, a shade more



Record RPM75

Street price: \$289
Amps: 4.7
Weight: 55 lbs.
Max. wood thickness: unlimited
Fence to center of chuck: 4 3/16"
Phone: 800-866-5740
www.recordtool.com

easily than with traditional fences and hold-downs.

The head comes down against a spring, instead of a hydraulic piston, with tightening at the end of the compression range. Still, the short handle (8" of effective length) seemed to be plenty, and the yellow rubber caps on both ends of the handle provide a bit of comfort. The depth gauge is unusual, too, a threaded rod extending above the head of the mortiser. It is screwed in as needed, and then a locking nut is run down. It takes a little longer to set than do the slip and slide rods in the other mortisers. With an introductory price of \$289 I would suggest that this machine is different enough that you should locate one to try out before buying. The RPM75 works, and works well, but isn't everyone's cup of tea. For some set-ups it is quicker and easier than other benchtop mortisers.

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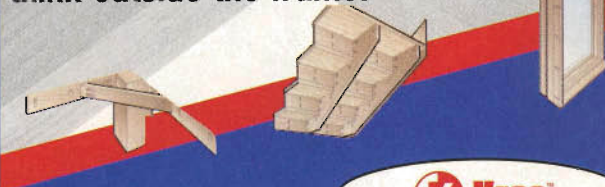


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Craftsman 21906

Craftsman 21906

The Craftsman mortiser was the lowest cost unit I tested (\$199.99) and, no coincidence, the lowest powered. Fit and finish were good and set-up was quick and easy: The tables attach with two screws, the fence is slipped into its slot and various locking screws are installed.

The Craftsman four amp motor rotates at 1,725 rpm, easing burn on small drills — but it is very easy to burn a 1/4" bit and chisel set in oak or cherry. The permanently mounted handle changes to six positions to move the bit down precisely. The base is 11" deep and 10" wide at the front, tapering to 7 1/2" at the rear, giving the unit a good, stable footprint. The table is 13 1/2" by 5 7/8", an adequate size for most work. The motor mounts to the top of a cast iron column, or post, on dovetailed ways, with nuts that allow you to adjust for wear. The switch has a removable key and is easily hit to stop the mortiser.

The handle is a rugged steel bar, with a soft, shaped handle, extending about 14 1/2" when screwed in place. That, and a hydraulic piston, keep the head under control when you use the mortiser.

You have easy access to the chuck through small plastic doors on either side, which fasten with knob-handled screws.

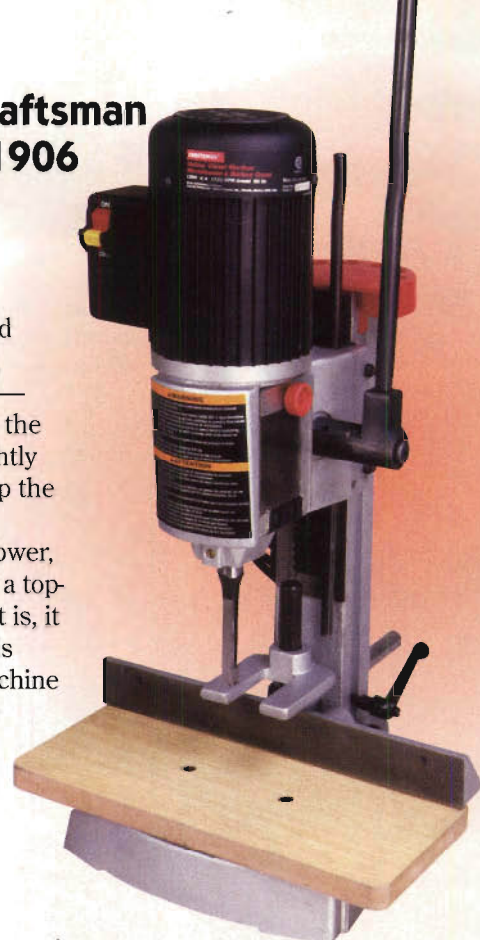
This unit has smooth action, and cuts clean mortises at a relatively slow speed. Handle angle changes are easy, for continuous pressure. The low speed of the motor, and its four ampere power (50% less than the more powerful mortisers in this test) do limit your cutting speed.

All mortisers work better and more smoothly when a steady, consistent pressure is applied — just strong enough to advance the chisel and hold the motor slightly before stall. It's easy to develop the touch with a few mortises.

With another amp or so of power, the Craftsman 21906 would be a top-rated bench top mortiser. As it is, it does good work, but the pace is slower than with any other machine in this test. As noted, the price is the lowest of all, and Sears is known for sales that offer another 10% or more off.

JET JBM-5

At first glance, JET's offering looked similar to others I tested, but important differences soon revealed themselves. The JBM-5 uses a single round upright, like the Grizzly, but differs in access to



Craftsman 21906

Street price: \$200
Amps: 4
Weight: 53 lbs.
Maximum wood thickness: 4 3/4"
Fence to center of chuck: 2 7/16"
Phone: 800-MY-SEARS
www.sears.com

JET JBM-5



JET JBM-5

Street price: \$240
Amps: 6
Weight: 44 lbs.
Maximum wood thickness: 3 3/8"
Fence to center of chuck: 2 1/16"
Phone: 800-274-6848
www.jettools.com

the chuck, using two hinged steel doors, with pressed-in steel latches and internal closure springs. The half horse motor draws six amperes, and is finned, compared to Grizzly's flat surface. The big motor in this machine runs at 1,725 rpm. The spindle travels a maximum of 4 3/4". The table is 13 1/2" by 5 7/8", sitting on a base that's 7 5/8" wide and 12 3/16" deep, providing a stable unit — with the mortiser bolted to a sturdy bench. The depth lock is a steel rod, with a spring-loaded L-shaped locking handle. JET's hold-down fork is the familiar two tine type, locked in place with a neat little wing handle on its set screw. The table was square to the fence on assembly, and was also parallel to the chisel.



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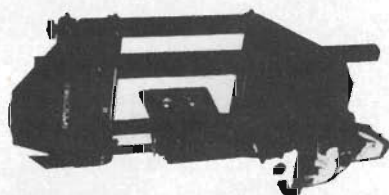
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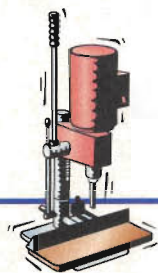
www.woodpeck.com

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The JET JBM-5 has a 14 $\frac{3}{4}$ " long handle, allowing plenty of pressure when working in oak, or cherry. Handle action is smooth and easy, and changing the handle range of swing is also easy, requiring the same motion — pull out and swing to the position you want, let the pieces mesh, and go on. Head control is maintained with a hydraulic piston, too.

There is a tiny gap between the fence and the table when set-up is complete, but it's not enough to do any real chip clearing. Fit and finish on all the machines was very good, but the JET was a step up from the pack. The JET is a moderate weight machine, at 44 pounds, with a standard keyed switch that is easy to whap off.

There were several little touches that said "JET," as I looked over the JBM-5: the swiveling handle on the hold-down set screw and the L handle on the lock screw for the depth gauge are two of the most important. Neither is a make or break addition, but they're nice touches that either save a second or two per use, or make use easier. The JBM-5 sells for about \$240.



I used oak to test the power of the units and cherry to test the ability of the mortisers to make cuts without burning stock.

Fisch BTM99-44252

Fisch BTM99-44252

Fisch is fairly new to the power tool market in this country, and has brought in a mortiser that offers many different features, plus plenty of familiar ones. The depth stop, for instance, is a collar on the right machined steel post. Tightening is done using a handle on the collar, with the set screw hitting a machined flat on the round steel column. There's also a second stop for upward movement.

Fisch uses no hydraulic piston. There is a heavy spring on the left hand column (partially enclosed). The head moves smoothly, with good precision, and the pressure is equal until the spring comes close to full compression. When that happens, increased pressure is needed on the 16 $\frac{1}{2}$ " long handle. The Fisch is a low speed machine, at 1,725 rpm, with a five ampere half horse motor. With 4 $\frac{5}{16}$ " of spindle travel, the mortiser can go deep or shallow with ease. Fisch's hold-down is similar to the other cast iron hold-downs I tested. Apply pressure with your left hand to keep the workpiece from rotating as the bit comes out.

Access to the chuck is through pinch latch plastic doors. The switch has a key and is easy to shut off with the left hand.

Fisch BTM99-44252

Street price: \$250

Amps: 5

Weight: 58 lbs.

Maximum wood thickness: 3 $\frac{1}{4}$ "

Fence to center of chuck: 2 $\frac{3}{8}$ "

Phone: 724-663-9072

www.fisch-woodworking.com



The Fisch table is 13 $\frac{1}{2}$ " wide by 5 $\frac{3}{4}$ "

deep, with a fence that sits tight to the table. The fence is also micro-adjustable. Fit and finish are right up there with the best in this group.

The fence was mildly out of square with the base when I set the unit up, but came back in quite easily with brass shim stock. I just held it parallel with the backside of a chisel and popped it right back in.

The Fisch does an excellent job in both cherry and oak. In my tests, I used oak to test the power of the unit and cherry to test the ability of the mortiser to make cuts without burning a species that is easy to burn with power tools. Scorching of bits was minimal, even with the 1/4" sets that heat up fast and easy. Price of this model is \$250.

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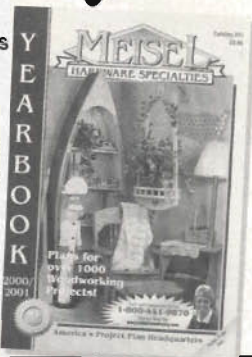
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Delta 14-650

Delta's entry is another 1,725 rpm machine. The five ampere motor speeds mortise completions. Like the Craftsman, it has a cast iron post, with a machined steel way on which the head moves up and down. The flap on the chuck access doors has a plastic latch, and the handle is 16¹/₈" long from the collar. The fence stands up off the 5³/₄" x 13¹/₂" table by about 1/4", for easy chip clearance. Delta is the only manufacturer that really leaves enough space to allow for dispersion of the type of chips a mortiser makes. The fence was not quite square to the table, but it shimmed in easily.

Head movement was smooth, and any change of handle angle needed can be made quickly so pressure can be maintained. The 4¹/₈" spindle travel gives good depth, while the 11¹/₄" deep by 7¹/₂" wide base provides good footing — with the mortiser screwed or bolted to a solid bench.

The machined steel way on the Delta has a couple of over-sized-head Phillips screws that release pressure and allow adjustment, while cap screws make any needed adjustment easy. The depth stop rod is easy to use, and locks in place with an Allen screw. The clamp hold-down fork works well, too, with tines a little wider than usual, though not quite as wide as the Craftsman. Both have the problem of the set-screw backing out with use.

The head movement is controlled by a hydraulic piston. The safety switch is standard, with a key to keep children from playing with the mortiser. The off portion of the switch is easy to swat if you get into trouble.



Delta 14-650

Delta 14-650

Street price: \$240

Amps: 5

Weight: 47 lbs.

Maximum wood thickness: 3³/₄"

Fence to center of chuck: 2⁷/₁₆"

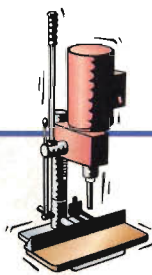
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Choices, Choices, Choices

I didn't find much to growl about with the units I tested, except for hold-down security. Most loosen too easily. If you have problems in that area, try adding Loctite™ to the threads of the set screws; (just be sure to let it dry thoroughly before

re-installing the set screw). All of these mortisers will do the work — some just require more patience than others. The line-up for consideration goes like this: for those who are going to be chomping away in thick or wide wood, the Shop Fox W1671, (either the current unit or the upcoming high speed tool) is all there is. For top of the line general use at low cost, the Delta 14-650, the JET JBM-5 and the Fisch BTM99-44252 all make excellent choices, with only a 10 buck spread in prices. For a well-made, no-frills machine, Grizzly's G3183 is a superb choice. As noted, the Craftsman is a bit low on power, but it offers good construction and should prove durable. If you're patient and don't cut enough mortises to have that as a key issue, you might well prefer this machine at the low, low \$200 price (and if you catch one of Sears' frequent 10 or 15% off sales, think of the patience you could then buy). For those who love innovation added to efficiency and all around utility, the Record RPM75 will serve you well.



I didn't find much to growl about ... except for hold-down security. Most loosen too easily. Try adding a little Loctite™ to the set screws.

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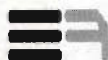
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Simple Cures for Your Furniture's Finish

By Michael Dresdner

Now that the summer guests have gone, it's time to help your furniture recover from all those little nicks, scratches, and water rings left behind — before the onslaught of holiday visitors begins. While severe damage may require refinishing, many problems can be removed, or at least hidden, with some simple techniques and a few easy-to-find repair tools.

Tools of the Trade

Take a walk through your favorite home improvement store and, in the aisle that houses finishing supplies, you'll find some items you may not have noticed before. Tucked in with the stains and cans of polyurethane are materials specifically for repairing damage on already finished wood.

• **Touch-Up Pens and Crayons:** They look like felt tip markers or crayons, but these "pens" are offered in common furniture colors. The felt tip markers add color to scratches, dry quickly, and can be sealed with clear finish. Crayons and china pencil type sticks will fill nicks and add color at the same time.

• **Colored Putty:** Like any repair putty, these clear jars or tubes of colored putty also come in typical furniture tones. Many of the putty compounds designed for raw wood would damage a finish if you were to put it on top, but these latex or oil based ones are made to go over a finish without harming it.

• **Scratch Cover or Restorer:** This thin liquid is for more global repairs, and may be found under a variety of brand names. Typically, the can or bottle will boast that it will not dissolve an existing finish, will blend out scratches, restore color, and possibly even remove water marks.

• **Cleaning and Polishing Gear:** Maybe the only thing your furniture needs is a good cleaning and polishing. For that, arm yourself with some VM&P naphtha, ultra fine 0000 steel wool and, for gloss finishes, a tin of polishing compound (you'll have to venture into the automotive section for that last item, so go ahead and pick up some of those shop towels that look deceptively like paper towels, but are vastly softer and more absorbent. If you have white water rings to deal with, add

a small container of denatured alcohol to the list. Round out the shopping trip by tossing a bag of disposable latex or vinyl gloves into your cart.

A Gallery of Repairs

From light surface scratches and smudges to serious eyesores, here are some cures for the damage. I'll start with the easiest to repair, and move on to more challenging tasks.

• **Surface Smudges:** You'd be surprised how many problems go away with just a good cleaning. Accumulations of airborne grease, furniture polish and dirt can make a surface look dull and hazy. Mild soap and water may do for regular cleaning, but for heavy-duty jobs, haul out the VM&P naphtha. Dip your 0000 steel wool pad liberally and gently scrub off the wax and dirt, or use cloth for easier jobs. Naphtha won't harm any common finish, but it will remove wax and grease. Rub with the grain but be gentle — let the solvent do the work. Wipe up the wet residue with those thick "paper towels" until no more dirt comes off on them.

• **Fine Surface Scratches:** Sight across your dining room tabletop and you're likely to see a myriad of very fine surface scratches — nowhere near deep enough to go through the stain color, but deep enough to affect the sheen. Eliminate them by sanding very lightly with 600 grit paper (or P1200 grit). Don't cut through the finish — just eliminate the fine scratches. If the surface is a satin sheen, follow the sanding by rubbing

continues on page 88 ...



A trip to the local building supply center will set you up to deal with most of the scratches and dings your furniture accumulated over the summer.

Photos by Dan Cary

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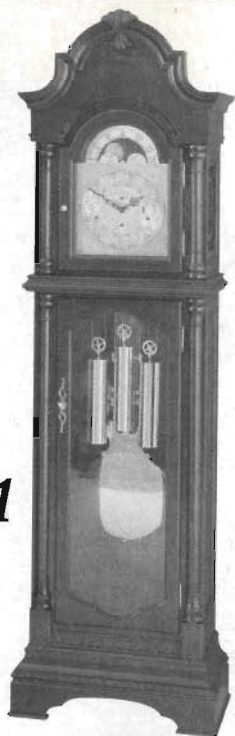
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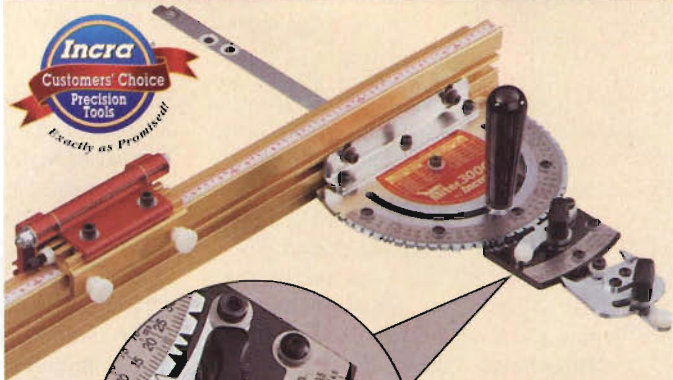


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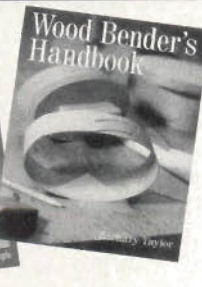
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FINISHING THOUGHTS

in straight lines with the grain, using a 0000 steel wool pad dipped into paste wax. Wipe off the wax vigorously as soon as you are done rubbing. For gloss finishes, use a damp cloth dipped into polishing compound. Rub a small area at a time, and buff off the dried polishing compound residue with a soft cloth or towel.

• **Water Rings:** You may find that water rings, some of which are in the wax layer, come out when you are cleaning. Others will come out with rubbing. For those that don't, don a pair of disposable gloves and wipe the ring

with a soft rag dampened with denatured alcohol. Wipe once, wait a few seconds, and if that doesn't do it, wipe a second time. Make sure the cloth is only damp, not wet — too much alcohol can etch or dissolve some finishes.

• **Through-the-color Scratches:** For those scratches that remove color and leave a light line, merely re-applying the color may hide them well enough to pass muster. Here's where those felt tip markers come in. Find a color that matches closely and simply color in the scratch. If you can't find just the



Hide nicks and scratches with careful use of a colored touch-up pen and follow with a quality paste wax. You'll be happy with the results.

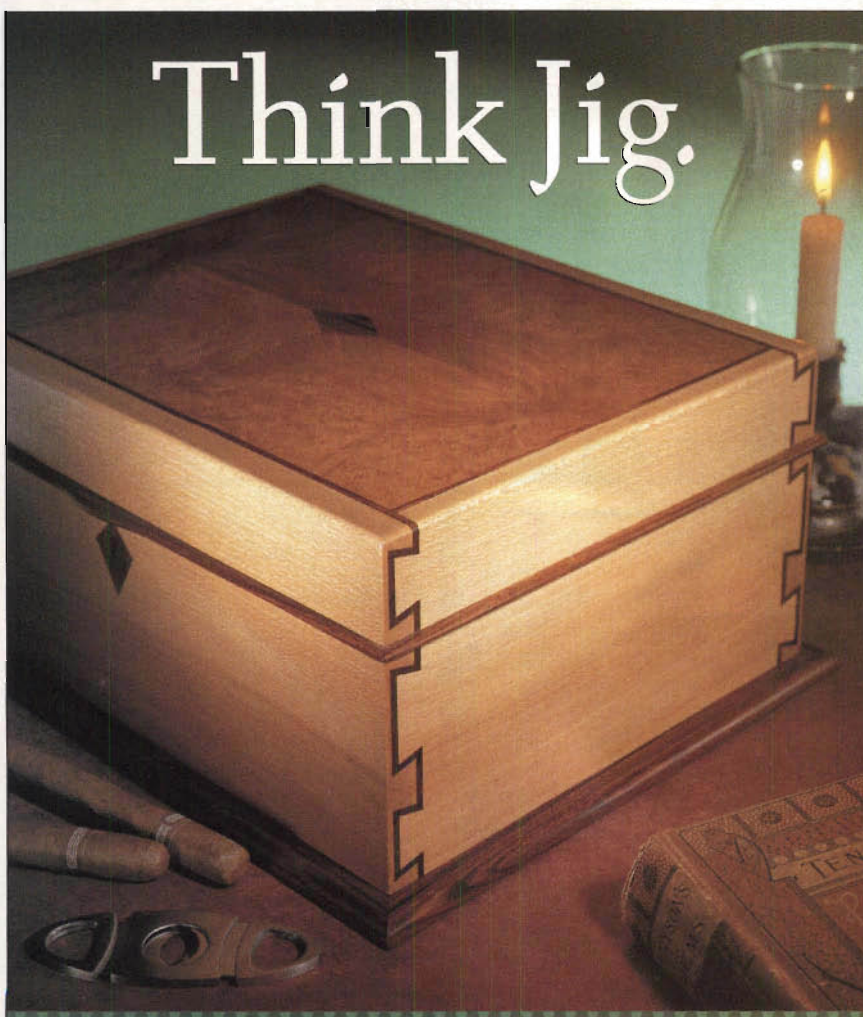
right one, start with a lighter tone, then modify it with a second color.

• **Small Nicks and Gouges:** There are two ways to fill nicks and gouges. For vertical surfaces, or those that are not that obvious, simply fill the nick by rubbing across it with a touch-up crayon or china marker type repair stick, or even a regular crayon, if you can find the right color in your kid's toy chest. The void will fill with the colored wax. You'll always see your own repairs, but if you choose a color that matches well, they won't be apparent to the casual observer. Remove any excess wax by scraping it with a credit card, or burnishing it with some brown bag paper.

• **Chips in Thick Finish:** When you have chips in thick finish that are on surface tops or are very visible, go with a two-step process. First, color the scratch to match with a felt tip marker. Then fill the void by carefully placing drops of clear nail polish into the chip. Try to keep the polish in the hole. If you have to, use a toothpick to place the drops. If the polish shrinks when it dries, apply another drop or two. When the polish is dry (overnight), sand any raised areas flush with 600 grit paper wrapped around a small sanding block. Polish the area with polishing compound or steel wool to match the surrounding sheen.

• **Global Repairs:** If you've got a piece that shows its wear with a myriad of small scratches too numerous to touch up one by one, scratch cover may be the answer. Several brands are on the market, and they are all fairly similar. Sold in colors like cherry, maple, tan, or walnut to match furniture tones, they consist of a cleaning solvent with stain blended in. In one step, they remove old wax and dirt while recoloring most scratches. Simply pour some on a soft cloth or shop towel, wipe it on, then wipe it off. On a very worn surface, it will usually get about 90% of the small scratches.

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Power and Purpose

Benchtop Band Saw, Benchtop Drill Press

Ryobi's new 9" band saw, the BS901, and 10" drill press, the DP101, are two benchtop tools with serious features. The two-wheel band saw has independently adjustable upper and lower Tracklock™ blade guides, rack and pinion height adjustment and a tracking sight window. A built-in brush cleans the drive wheel, to improve tracking and wheel life. The BS901 also has a 1/3 HP induction motor that operates at 2,900 surface feet per minute. Cutting thickness capacity is 3 1/4", and the saw table tilts to 45 degrees. It comes with an adjustable miter gauge, 1/4" blade, and rear dust port exhaust. The BS901 weighs in at 30 pounds, priced at \$99.



The DP101 drill press weighs in at 68 pounds, and has a 1/4 HP induction motor, 1/2" chuck and five speeds (570 - 3,050 rpm) for use with a variety of bits and materials. It can bore holes to the center of 10" wide stock with a 2 1/4" stroke. Other features are rack and pinion adjustable table height, adjustable depth lock, and acceptance of mortise attachments. The DP101 is also priced at \$99. *For more information on either tool, call 800-525-2579 or visit www.ryobitools.com.*



Dreams Fulfilled

Wouldn't it be great if someone invented a truly universal sealer, so you'd only have to buy one product, no matter what finish you were using? Well, it's here. SealCoat™ Universal Sanding Sealer from Wm. Zinsser & Co. rolled out in April. I've been beta testing the material for almost a year, and I absolutely love it.

If you're a die-hard shellac aficionado, you'll recognize it as dewaxed shellac, which up to now we had to buy as flakes and mix ourselves. SealCoat comes ready to use and is thinned just right to work as both a sealer and a top coat. The quick-drying formula can be easily sanded or recoated in a little over half an hour and, since SealCoat contains no wax or stearates, you can top it with any finish: oil-base or acrylic polyurethanes, varnishes, lacquers and more. It also works on any wood, makes the figure stand out, and is food safe and nontoxic.

As a result of their new formula (patent applied for), SealCoat shellac has a shelf life of up to five years — three is the minimum guarantee — not the scant six months that our home brew had. Available in quart, gallon and five-gallon sizes, SealCoat is VOC compliant everywhere and costs approximately \$18 to \$20 per gallon. You can find out more at 732-469-8100 or www.zinsser.com. If you try it, I'm betting you'll say just what I've been saying this past year: "Thanks, Zinsser!"

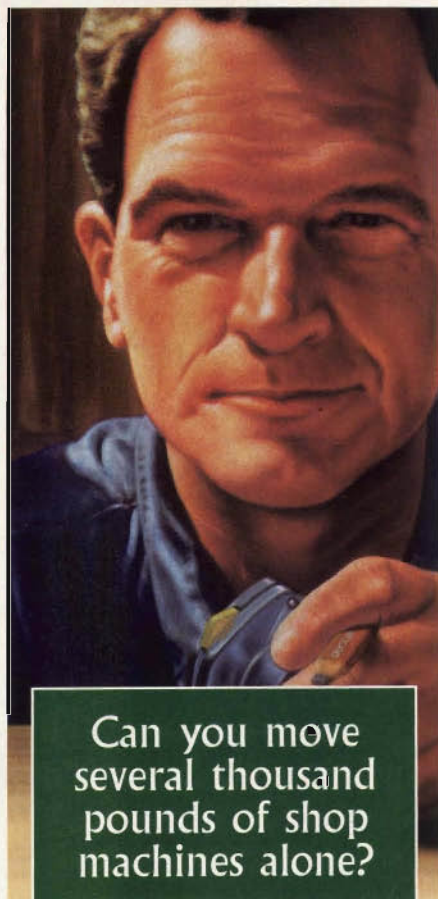


— Michael Dresdner, Finishing Expert



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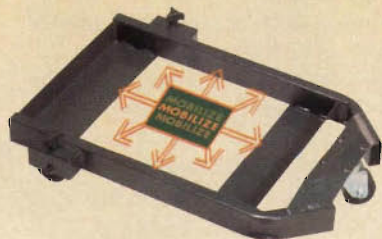
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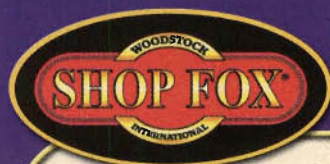
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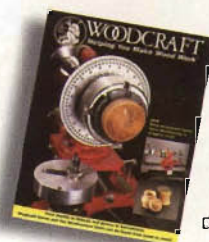


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A Slice of Mystery

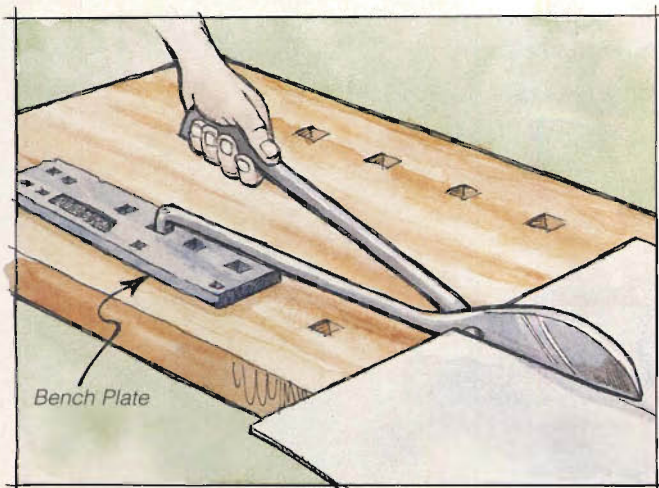
By Joanna Werch Takes

For this issue's Stumpers column, I'm ignoring some really good advice and running with scissors. Big scissors, small scissors, this time it's all scissors — special kinds, of course. Further on in this column there's plenty of discussion about the big ones — Paul Bunyan-sized, I called them earlier — but first, let's start a little smaller.

Our new mystery tool (pictured at right) is a submission from **Dan Kautt** of Minnetrista, Minnesota. Dan's scissors are seven inches long, and the upper blade has a flat attachment extending at a right angle from its cutting surface. As you move the scissors, the attachment descends into the box-like attachment to the lower blade you can see in the picture. So, can anyone cut to the chase and solve the mystery of what these scissors are for?

You've already solved a far "bigger" mystery by identifying the tool from **Brian Bailey** of Killingworth, Connecticut that appeared in our June issue. "The bench shears," said **Francis Caron** of Saint Helena, California, "are no stumper for a sheet metal man." **Jack Snyder** of Albuquerque, New Mexico, elaborated: "kind of like a giant tin snips."

Paul A. Engebretson of Hudson, Wisconsin informed us that the shears were generally "placed on a bench with the handle leg having the hole in it stuck through a hole in the bench top. The hole in the leg of the bottom handle permits it to be locked to the bench top with a clip or pin so it won't come out of its hole when the top handle is lifted for a cut." "The short extension on the other handle," said **Dennis Fullerton** of Converse, Texas, "keeps the operator from pinching his hand between handles."



Robert G. Hutchings of Gasport, New York, sent us some illustrations from sheet metal workers' manuals of the bench shears, which were used in an earlier day to cut strips for items like gutters.



The purpose of these scissors is a sheer mystery. Do we have any readers with some sharp insight?

Mounting the shears to a bench — or an anvil — held the slitter upright and also enabled one man to handle the tool," according to **Howard Klopfenstein** of Salem, Oregon.

As **Jim Fitzgerald** of Marshfield, Massachusetts, pointed

out, though, "It is easier to use if one person does the cutting and another holds the stock to be cut."

Arthur L. Clark of Roseburg, Oregon, mounted the tool to the floor (or deck) of a 1950s naval sheet metal shop. "We used to cut larger sheets of 20, 18, 16 gauge sheet metal to smaller, workable pieces," he said.

In his reminiscences, **Francis Caron** noted, "The sheet metal trade, as the woodworkers' trade, has many hand tools lying about that are no longer used, and as such the identity of many are lost to the workers coming up today." For now, though, "There are a few of us old fellers about who can remember using these tools."



WINNER! For taking the time to respond to Stumpers, **Martin W. Gaberman** of Chelmsford, Massachusetts wins a collection of

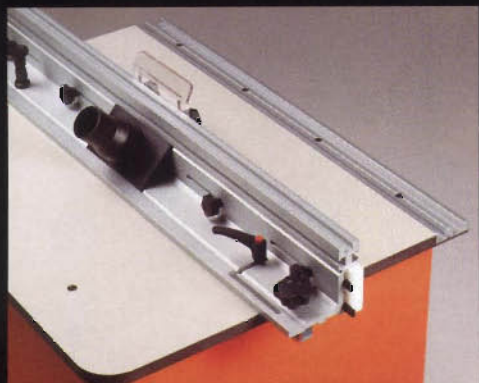
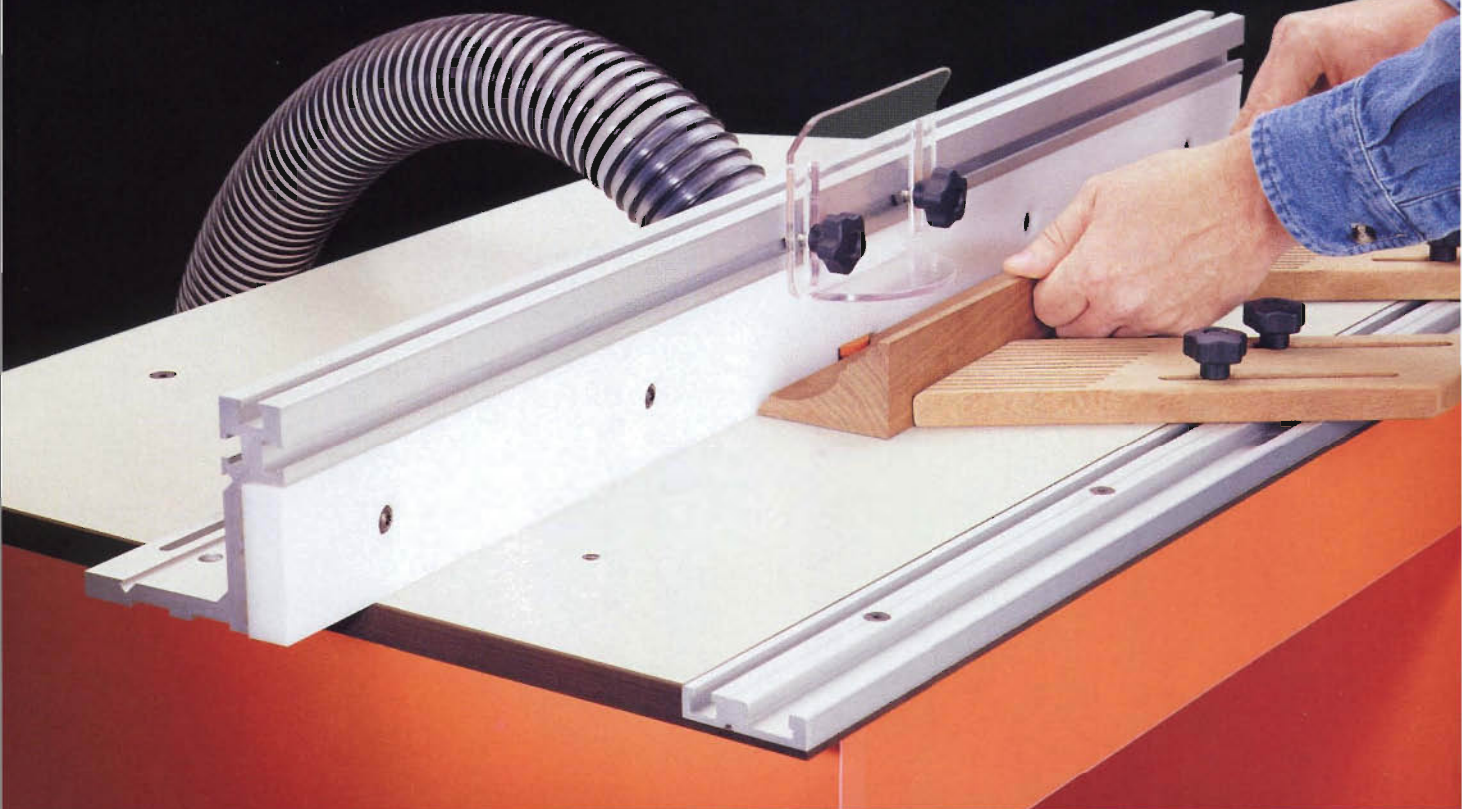


American Tool's Quick Grip clamps.

We toss all the Stumpers letters into a hat to select a winner. If you have a question or answer, send it to Stumpers Dept., *Woodworker's Journal*, P.O. Box 261, Medina, Minnesota 55340. Or e-mail us: jtakes@woodworkersjournal.com

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