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AMERICAN WOODWORKER

February 2000
#78

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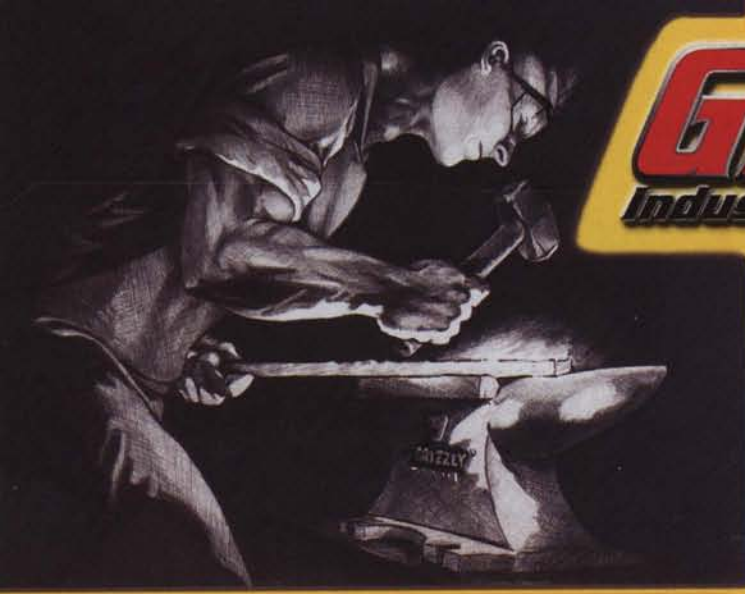
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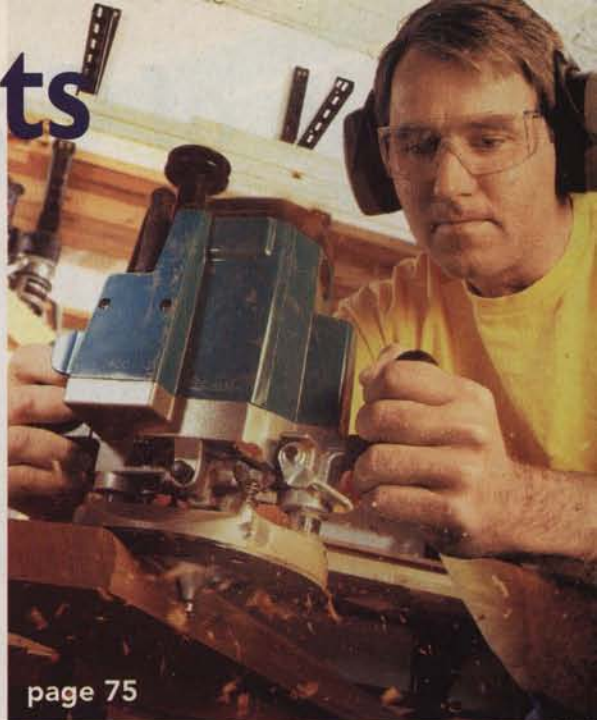
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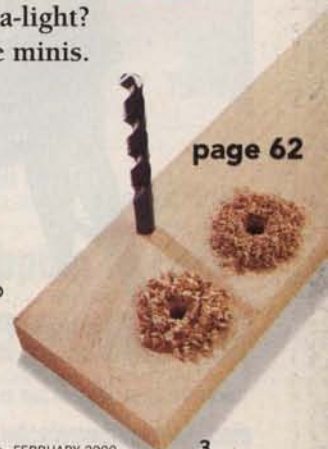
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PUBLISHED BY HOME SERVICE PUBLICATIONS, INC., a subsidiary of the Reader's Digest Association, Inc.

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Published by Home Service Publications, Inc., an affiliate of the Reader's Digest Association, Inc.

American Woodworker® (ISSN 1074-9152) is published seven times a year in February, April, June, August, October, November, and December by RD Publications, Inc., 260 Madison Ave. New York, NY 10016. Periodicals postage paid at New York, NY and additional mailing offices. Postmaster: Send change of address notice to American Woodworker®, P.O. Box 2134, Harlan, IA 51593-0323. Subscription rates: U.S. one-year, \$23.88; two-year, \$43. Single-copy, \$4.95. Canada one-year, \$31.88; two-year, \$58 (Canadian funds). GST #R122988611. Foreign surface one-year, \$35; two-year, \$65 (U.S. funds). Foreign air one-year, \$42; two-year, \$80 (U.S. funds). U.S. newsstand distribution by Hearst Distribution Group, New York, NY 10019. In Canada: Postage paid at Gateway, Mississauga, Ontario; CPM# 1447866. Send returns and address changes to American Woodworker®, P.O. Box 2134, Harlan, IA, USA 51593-0323. Printed in USA. © 2000 Home Service Publications, Inc. All rights reserved.

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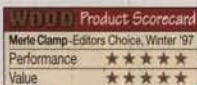
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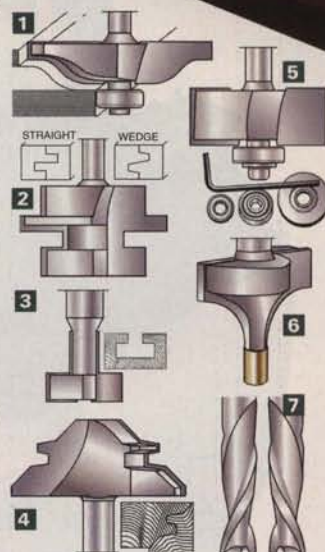
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OF THE WOODS

Question & Answer

Board too Wide for Jointer

Q. I've got some beautiful planks that are too wide for my jointer. I really don't want to rip them down to size and risk breaking up the grain pattern. What can I do?

Paul Schwartz
Warwick, R.I.

A. This is a common problem for which there are a number of solutions. You could use a hand plane to joint one face before sending it through the planer. Or, build a carriage to support the uneven board and hope nothing slips. Here's an easier way: use your jointer's rabbeting table, (you'll find it hiding under the guard), and a piece of plastic laminate to joint those boards in two passes.

First, unplug your machine and remove the guard. Don't worry, the board will completely cover the knives. Just be sure to use push blocks and turn the machine off between passes!

Set your fence to cut a little more than half the board's width.

Stick a piece of plastic laminate on the rabbeting table of your jointer with double-stick tape (available from Highland Hardware, 800-241-6748, #16.94.38; \$7). Then lay a straightedge across the plastic laminate shim so it overhangs the outfeed table. Adjust the infeed table until the shim and the outfeed table are flush (Photo 1).

Remove the shim, plug in your jointer and make your first cut (Photo 2).

Replace the shim, turn the board end for end and joint the other half of the same face. The previously jointed area should ride on the shim and prevent any tipping (Photo 3). Now you're ready for the planer.

BLADE GUARD REMOVED FOR THIS OPERATION. USE CAUTION.



1 SET THE DEPTH of cut equal to the thickness of the shim.



2 REMOVE THE SHIM and make the first cut.



3 REPLACE THE SHIM, turn the board end for end and make the second cut.

Custom Varnish Sheen

Q. The polyurethane varnish I like comes in gloss and semi-gloss. Is there any way to create a flatter, less glossy look than what comes straight out of the can?

Roger Smith
Davenport, Iowa

A. Yes there is, and it doesn't involve sanding or rubbing to alter the sheen. Varnish manufacturers create a semi-gloss or satin sheen by adding flattening agents like silica to their formulas.



You've probably noticed it as a layer of sludge that settles out when your varnish sits for a long time. To flatten the sheen you need to concentrate the flattening agents already in your semi-gloss. Here's how:

Let the varnish settle and pour off about half the clear varnish into a second container. Stir up the concentrated mix and try it on a sample board. Keep adding the gloss from the second container until you achieve the desired sheen.

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Sharpening Hollow Chisels

Q. My mortiser's hollow chisels have become quite dull. How can I restore their sharp edges before my right arm gets to be twice the size of my left?

Mike Kenfield
Roanoke, Va.

A. Mortising with a dull hollow chisel can be a strain on you and your equipment. But, there is hope for those aching arm muscles.

Clico Tooling Ltd. of Sheffield, England makes a hardened-steel sharpener for hollow chisels (Photo 1). The sharpener, which is actually a machinist's reamer, comes with interchangeable guide bushings for each chisel size; 1/4, 5/16, 3/8, and 1/2-in. Simply attach the right-size bushing to the sharpener and chuck it in a brace. Clamp the bit in a vice, insert the bushing and turn the sharpener using light downward pressure (Photo 2). The reamer shaves the

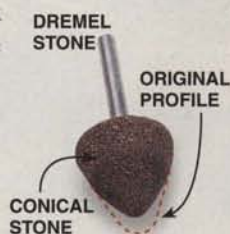
metal so it doesn't take many turns to complete the job. Take off just enough metal to create a tiny burr on the outside edges of the chisel. Lightly hone the outside of the bit to remove the burr. The Clico is a foolproof system and will do a great job of sharpening your hollow chisels. The only drawback is price; around \$90. Then again new chisels are around \$40 a pop so it almost pays for itself in two sharpenings.

A low-cost alternative is Dremel's conical grinding stone (\$3). Chuck the stone in a variable-speed drill to sharpen a chisel (Photo 3). Compared to the Clico, the stone is slow and requires a steady hand, making it harder to get a good edge on all four sides. We also had to flatten the tip of the stone to make it fit our 3/8-in Delta chisel. But this is easy to do. Simply take it to the grinder with the stone chucked in the drill. Turn the drill and the grinder on and hold the spinning stone against the face of the wheel. (Spinning the stone ensures even removal of material.) Rock the drill back and forth a bit as you grind to maintain the conical shape.

SOURCES

Clico Sharpeners: Woodcraft Supplies, (800) 225-1153, part # 06V90 (for Clico chisels); \$87. Part # 06V91; \$92 (for Delta/Taiwan chisels).

Conical Grinding Stones: Highland Hardware, (800) 241-6748, Part #00941; \$3.



Wood for Humidors

Q. Why is Spanish Cedar used to line humidors? Can other woods be substituted?

Patrick Helms
Bismarck, N.D.

A. Aging of premium cigars, like the aging of fine wines, requires a

controlled environment. Humidors are designed to keep cigars at 70 degrees F with a relative humidity of 70 percent—perfect for cigars, not so good for most woods. Actually a member of the mahogany family, Spanish cedar's name comes from its spicy, cedar-like odor. Surprisingly, this pungent scent does not impart any unpleasant taste to the cigars. Spanish cedar's ability to absorb and moderate moisture without excessive dimensional change makes it the wood of choice for lining humidors.

Honduran mahogany is an acceptable substitute for Spanish cedar with

one notable exception: The tobacco beetle, which uses tobacco as a host for its larvae, can't stand Spanish cedar but doesn't mind Honduran mahogany. Sometimes there's more to tradition than just tradition.

Tip: If you use Spanish cedar, look for *Cedrela mexicana* which doesn't have the pitch problems of the less expensive *Cedrela odorata*.

Spanish cedar and other humidur supplies are available from the Beall Tool Company (800) 331-4718 and from Custom Humidor (800) 486-4367.

another Revolution...

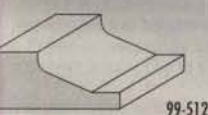


Freud has always been first in cutting tools technology. **First** with anti-kickback design. **First** with Teflon® coatings. **First** with Super micrograin carbide. Now, in their never ending quest for superior cutting tools, Freud engineers have designed another "**first for the industry**". A four-wing raised panel cutter that will revolutionize the way you make raised panel doors. Freud's patented 2+2 Raised Panel Router Bits produce glass-smooth cuts, even on cross grain! This new design has an ingenious configuration of both positive and negative sheer angles that eliminates the fuzz on the top edge of the profile. Available individually and in sets. Once you've tried Freud's 2+2's, you'll see all others are second class.

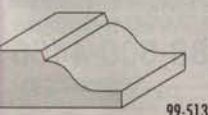
- **Anti-Kickback Design*** chip limiters restrict tooth bit reducing the effects of kickback.
- **Freud's Super Micrograin Carbide** for durable, long lasting cutters that really hold an edge.
- **DuPont Teflon® Coatings** reduce friction, heat and resin build-up and protects from corrosion.
- **Multi-Axis Grinding** provides consistent relief angles on the entire cutting edge for a flawless finish.
- **Shear Angle** Lets the bit slice through the wood, producing a superior finish on all materials.
- **Computer Balancing** eliminates vibration and chatter resulting in clean, smooth profiles.
- **Advanced Tri-Metal Brazing** creates a stronger, more impact resistant bond between the carbide and the bit.

Patented Design

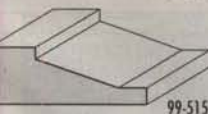
U.S. Patent No. 5,899,252



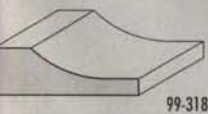
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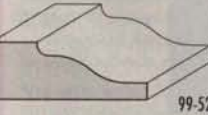
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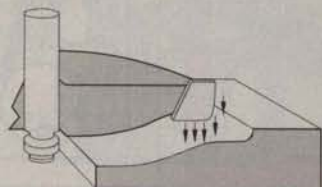


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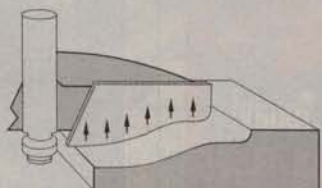


99-520

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Information courtesy of DuPont® Industrial Coatings
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Question & Answer

Make Your Own Baseball Bats

Q. I would like to turn a baseball bat for my grandson. Are there any regulations or guidelines for allowable dimensions?

Nancy Hernandez
Syracuse, N.Y.

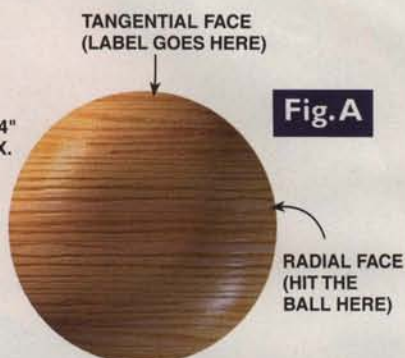
A. First, choose the right wood. Hickory and white

ash are common woods used to make baseball bats. Both are resilient (they won't be easily dented by baseballs) and can take a lot of bending stress before failure. Of the two, ash is preferred because of its lighter weight. Look for straight-grain wood that's free of defects. If you want the real thing, specially graded white ash bat billets are available from Paxton Lumber (800) 522-3305. The 3-in.

dia. blanks are 38-in. long and sell for \$16.

Hillerich and Bradsby, the folks who make Louisville Slugger bats, gave us the dimensions you are looking for (see photo). The handle-thickness regulation for Little League bats ensures a strong handle.

Finish your bat with shellac and be sure to add your own label on the tangential face of the bat (Fig A). Instruct your young batter to hold the bat so the label is facing up. This will result in balls being hit off the radial face of the bat where the porous early layers are on edge and less prone to being crushed when that killer home-run swing meets the ball.



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Finding True Horsepower

Q. I keep seeing the horsepower on power tools described as peak or developed horsepower. Is there any way for the consumer to find out what the real horsepower is?

Nils Sundsmo
Camden, N.J.

A. It is not unusual for manufacturers to state the peak or developed horsepower rather than the rated or continuous horsepower.

Peak horsepower is the maximum horsepower the

motor is capable of producing for very short periods of time. To better understand the concept, imagine a brake that can instantly stop the shaft of a running motor. If you had an ammeter hooked up to that motor when the brake was applied you would see a big spike in amps drawn. That is the amp rating used to determine "peak horsepower." But peak horsepower can only be maintained for a matter of seconds before the motor fries itself or kicks out its thermal protection. Not a very useful figure for real-world applications.

Rated horsepower is based on the motor's ability to deliver sustained or continuous horsepower. To determine rated horsepower, the National Electric Code (NEC) recommends using the full load

rating found on the motor nameplate (marked "A" for amps or "FLA" for full load amps). Plug that number into this formula: Volts x amps / 1000 watts = horsepower. This will give you a rated horsepower that takes into account the normal power losses from heat, bearing friction, cooling fans, etc. Here's an example: The nameplate on a motor says 120V and 15 amps; $120 \times 15 / 1000 = 1.8$ hp.

If you simply want to compare the relative power of one motor to another, regardless of actual horsepower, just look at the amp rating. As long as both motors use the same voltage, the more powerful motor will be the one that draws the most amps.

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Question & Answer

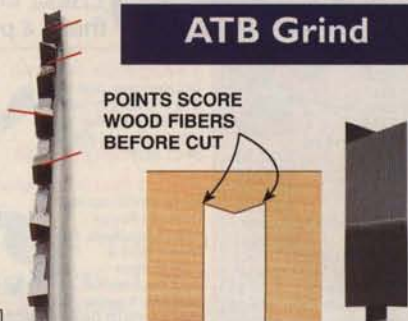
Saw Blade Teeth

Q. I'm looking to buy a 10-in. carbide blade for my contractor's saw. What do ATB, flat-top, ATB&R and triple-chip mean?

Curt Wulf
Columbia, S.C.

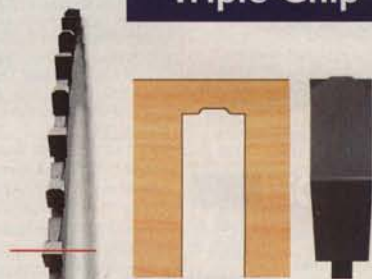
A. There are so many specialized blades on the market today, it can get quite confusing. The terms ATB, flat-top, ATB&R and triple-chip describe the grind or shape of the blade's carbide teeth on the blade.

ATB Grind



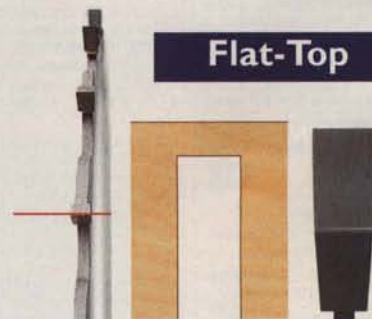
ATB stands for Alternate Top Bevel. As shown above, the top of each tooth is cut with a bevel to create a point. The points alternate from left to right and score the wood ahead of the cut. ATB blades cut with a slicing action and produce the cleanest crosscuts.

Triple-Chip



Triple-Chip grind has a chamfered tooth that removes the bulk of the material from the center of the kerf, followed by a raker tooth that cleans out the sides. This tooth design is best suited for man-made materials like particleboard, laminates, melamine and plastics with one exception; it does a poor job of crosscutting veneered plywood or particleboard.

Flat-Top



Flat-Top grinds are found on dedicated ripping blades. Flat-top grinds are aggressive and cut with a chisel-like action.



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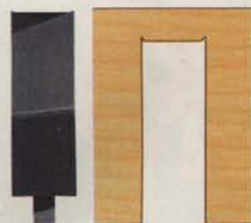
RAKER

ATB&R

ATB&R stands for Alternate-Top Bevel and Raker. The most common configuration for this grind has ten groups of five teeth around the blade. The first four teeth in a group are ATB followed by a flat-top raker tooth. The raker tooth helps to clean out chips and produces a flatter bottomed kerf. This grind is commonly used in combination blades meant for general purpose work.

TOP
BEVEL

RAKER



DEPARTMENT OF CORRECTIONS

PUNY TUNE MINIATURE FLUTES

The ocarina whistles featured in Issue #75 (p. 20) were originally designed by Bryan Mumford in Santa Barbara, California. Visit his Web site at www.bmumford.com to learn more about his wonderful line of Puny Tune Miniature Flutes.

CROSSCUT SLED MISSING LINK

In "The Best Crosscut Sled" in Issue #75. On page 42 between photos 8 and 9, the 4 1/4 in. throat-plate recess inexplicably appears. Here's how to put it in. After squaring and fastening the sled fence, lift the sled out of the miter gauge slots and rest the runners on top of the tablesaw table. Adjust the depth of the blade to cut just through the top layer of laminate and set the table-saw fence for cutting the right and left sides of the removable throat-plate slot. The piece can then be removed revealing the recess for the new throat plate.

WALNUT ENTERTAINMENT CENTER INSERT

Finally, a number of you have asked for dimensions for the Entertainment Center insert on p. 30 of Issue #75. If you would like a copy, send a SASE to: American Woodworker, Dept. E, 2915 Commers Drive, Eagan, MN 55121. Clarifications of the Entertainment Center Cutting List and dado positions are also included.

For the best-quality cuts, buy a flat-top blade for ripping and a 60-tooth combination ATB for cross-cutting. An ATB&R 50-tooth combination blade will do a good job of both ripping and crosscutting and you won't have to be changing blades so often.

Also, try a thin-kerf blade for your contractors saw. The thinner kerf requires less power which equals more performance from your saw. **AW**

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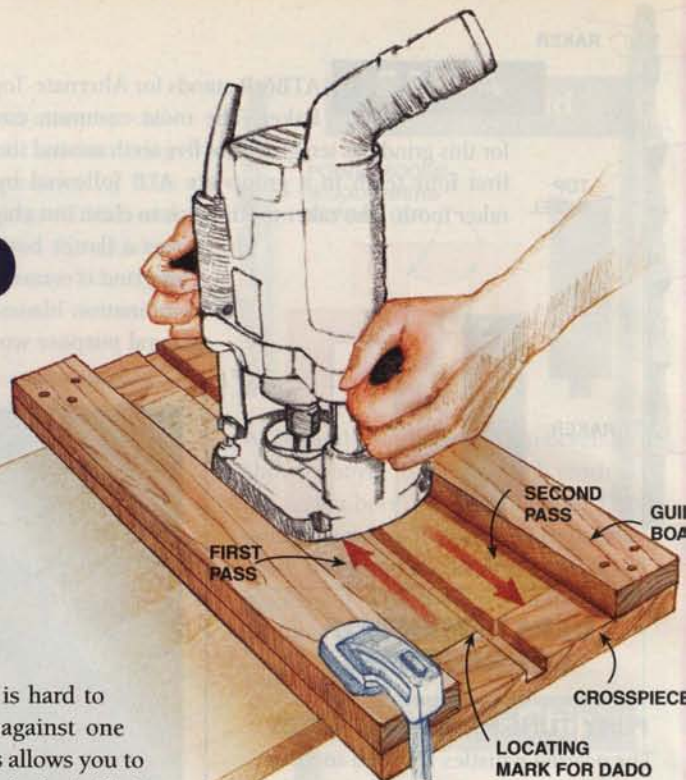
From Our Readers

WorkShop Tips

Jig for Router Dadoes

For fast and accurate dadoes, this jig is hard to beat. The trick is to run the router against one guide, then back against the other. This allows you to use a 1/2-in. bit, for example, to cut a dado that's 13/16-in. wide or less, to get a perfect fit with plywood. Because the dado is cut in the end of the jig, you can simply line up the jig with one mark. This makes it hard to goof up by having the dado on the wrong side of the mark. For greatest accuracy, make a dedicated jig to fit one router and one bit. Note: The jig will only cut one size dado.

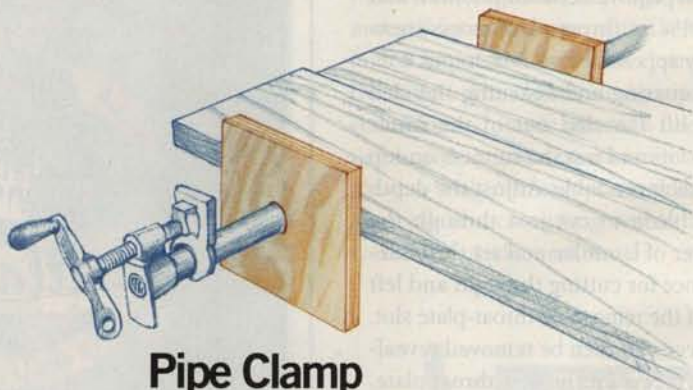
ELIOT EHRLICH
CHATHAM, N.J.



Tidy Stripping

When stripping a chair or table, place each leg in a coffee can. Any excess stripper drips right in, and when you take off the finish, you can simply push your scraper down the length of the leg. This also works when applying runny stains.

ARTHUR ELSON
LAKESIDE, N.J.



Pipe Clamp Pad-Stands

They don't come any simpler than this! Take squares of plywood, 6 in. on a side, and drill holes in them to make great clamp pads. They raise the clamps up off the surface so you can reach underneath to get glue squeeze-out, plus you don't bang your knuckles, even when putting clamps on top of the panel.

BILL DUFOUR
HELMER, TEX.

(continued on page 20)

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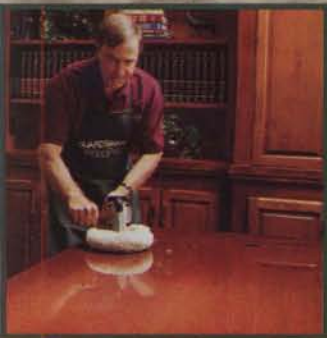
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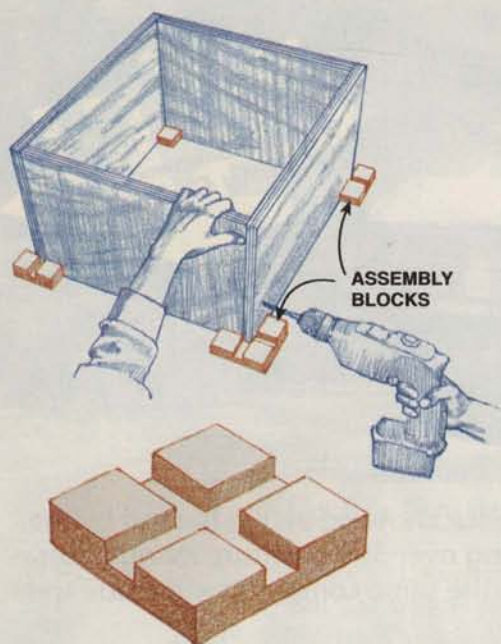
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Workshop Tips

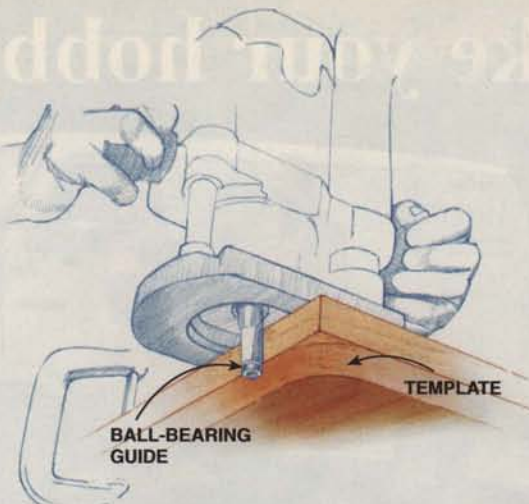


ASSEMBLY
BLOCKS

Drawer Helpers

These blocks are like a spare pair of hands for assembling drawers and many kinds of cabinets. Make them out of $\frac{3}{4}$ -in. plywood with dados the width of your stock.

BILL OSTROM
READS LANDING, TENN.



BALL-BEARING
GUIDE

TEMPLATE

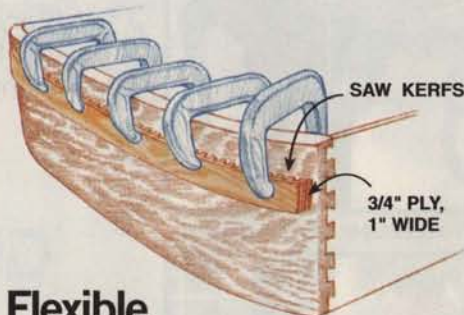
Template for Rounded Corners

This guide takes only a minute to make and helps you make perfect corners in four different diameters.

STEVE ROBERTSON
DURANGO, COLO.



HOLE
FOR
HANGING



SAW KERFS

$\frac{3}{4}$ " PLY,
1" WIDE

Flexible Clamping Pads

It's tricky to keep clamping pads positioned when gluing curved surfaces, so I came up with these flexible pads. To make them, cut multiple kerfs in a piece of plywood. Next rip the plywood into 1-in. strips. The deeper the kerfs, the more flexible the pads.

R.B. HIMES
VIENNA, OHIO

Vinyl Downspout for Dowels

An easy way to store dowels and other thin stuff like threaded rod is to get a length of vinyl downspout at your local home center. Six bucks buys an 8-ft. length. Cut a square piece of plywood to fit inside the pipe for the bottom, and attach with screws.

GUS MARKO
NEW PROVIDENCE, N.J.



VINYL
DOWNSPOUT



Good Glue Spreaders

To make excellent glue spreaders, take pieces of old plastic or heavy cardboard, from credit cards, bottles, or boxes and cut them with a pair of "pinking" shears. (Although it doesn't hurt the shears, I've learned the hard way to ask their owner first!)

BOB CALLISTER
SPERRYVILLE, VA.

(continued on page 22)

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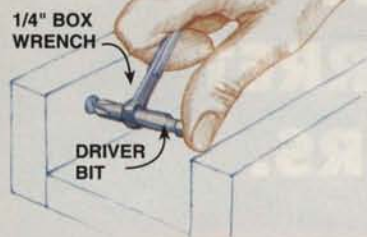


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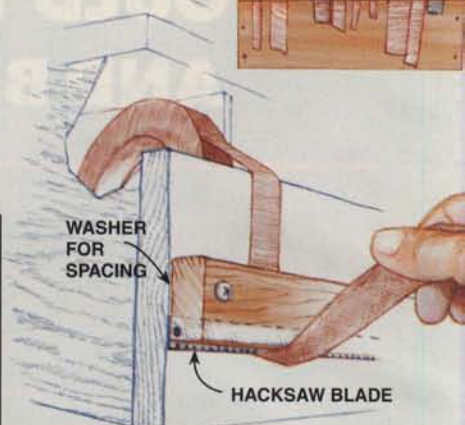
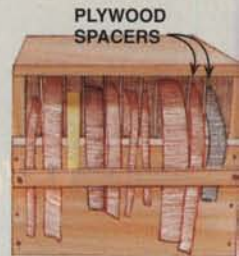
Workshop Tips



Tight-Spot Screwdriver

Here's a trick for driving screws in awkward places: Use a 1/4-in. box wrench to turn the driver bit and your thumb to apply the pressure.

HOWARD PARKER
ALBUQUERQUE, N.M.



Sandpaper Dispenser

For use at the lathe, I buy economical assortments of surplus "short" sandpaper rolls. These are the little bits left on a roll after most of the sandpaper's been made into belts. To make these rolls easier to use, I made this rack, which allows me to pull off a piece that's exactly the length I need.

KIP STRATTON
MORRIS, N.Y.

Ed. Note: To purchase rolls like these, call Klingspor at (800) 228-0000. A 20-lb. box costs around \$25.

Multipurpose Bamboo Skewers

Bamboo skewers (think shish kebobs) have endless uses in the shop. They're sold in bags of 100 for around \$5 in cooking supply stores. I use them for getting glue into mortises, dowel holes and biscuit slots. Wrap a bit of cloth around the tip and they're great for getting glue out of crevices. You can even use them as a fastener for delicate work, instead of a brad or small finish nail. After drilling an appropriately sized hole, I tap one end of the skewer in, cut it off flush and sand it smooth.

BARRY BARKER
RICHMOND, IND.



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years went by, the contents shifted more and more to woodworking and handyman projects. The advice is always direct and simple, using the tools available in a normal home shop, whether it is describing how to put an end loop on a coil spring or how to make a simple beam compass. The notes are profusely illustrated. The first volume has 385 illustrations and 200 pages but by the second year this becomes 555 illustrations on 228 pages and continues similarly in later years. The early years have excellent line drawings and engravings. Photographs start to creep in only after 1920. Each year has its charm but all issues share the attributes of being clear, concise, and widely informative. We intend to reprint at least the first 25 volumes at the rate of about one per month; these are our first 5 issues. 6 1/2" x 9 1/2".

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If you're hand sanding without a block, try this: Use quarter-sheets of sandpaper, but nest two together, as shown. It makes the paper stiffer and less likely to dig. It won't slip in your hand, either.

RICK FILIPKOWSKI

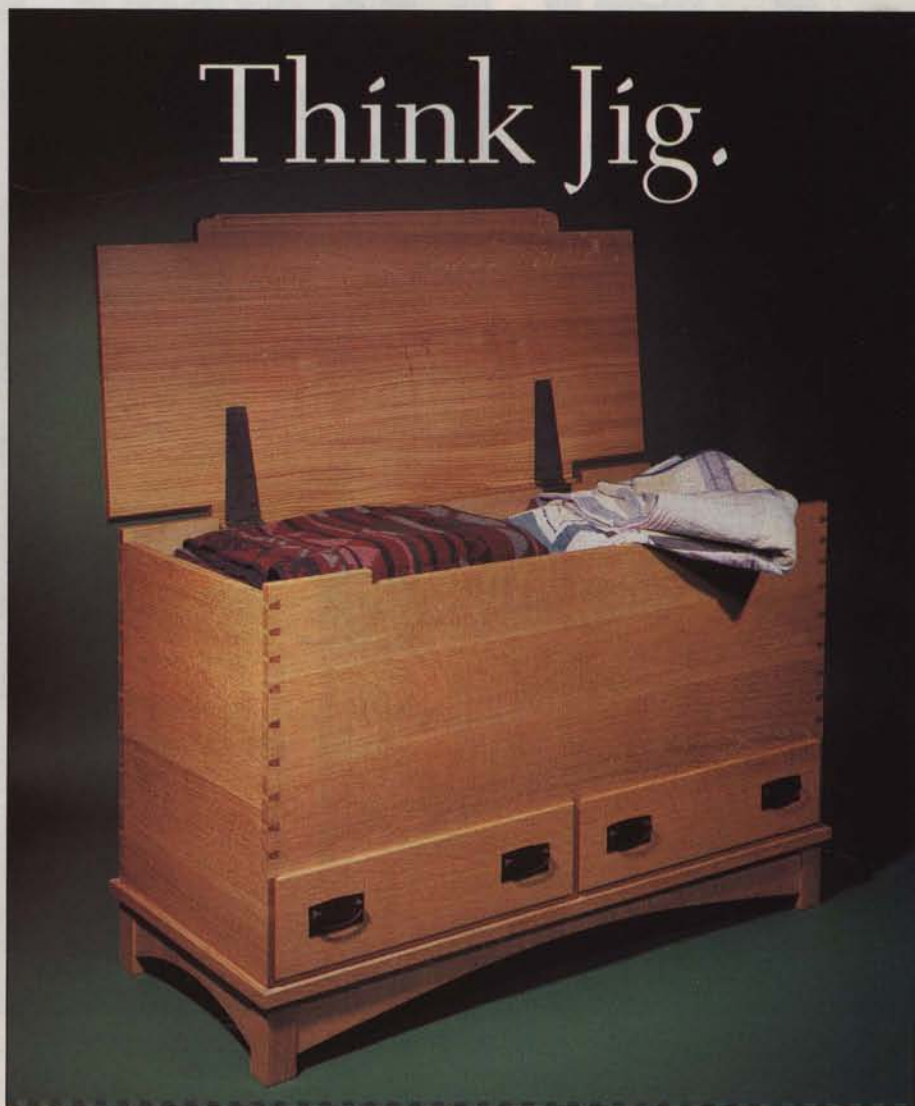
GARY, ILL. **AW**



Quick Utility Legs

For an instant table, make these legs out of a piece of 1x6 pine. Rip it as shown (a band-saw is the easiest way) and glue and screw the legs together so the wider piece overlaps the narrower one. Elapsed time: 3 minutes per leg.

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Greene & Greene Furniture

How teamwork between architects and woodworkers solved classic problems in furniture design.

Here's a recipe for creativity: Mix two gifted architects with two seasoned woodworkers, throw in a bunch of money and shake. The result can be a huge step forward in practical furniture design. That's exactly what happened in California just before World War I, when architects Charles and Henry Greene worked with cabinetmakers John and Peter Hall building houses and furnishings for wealthy Pasadena clients. As a team they solved problems of wood movement, weak short grain and efficiencies in production that had plagued woodworkers for generations.

The look of Greene and Greene furniture has captured the imagination of many of today's furniture makers. For me it's the guts that are really fascinating. What holds this furniture together? What's the story behind the innovative construction techniques?

Recent X-ray photographs published by Professor Edward S. Cooke, Jr. of Yale University have cleared up a lot of misconceptions about how this joinery actually works. In addition, interviews by scholars with descendants of the immigrants who worked in the Hall's shop reveal that many of the Greene's construction ideas actually came from Scandinavia.

Let's take a closer look at some of the best-known furniture designed by Greene and Greene for lumber baron Robert Blacker in 1908. By this time the collaboration between this group of architects and woodworkers had fully



matured. The Greenes had taken on ambitious commissions to design houses and furnishings in a completely new style from top to bottom. The Halls had built a millwork production shop equipped with large line-shaft machinery where the techniques of making multiples efficiently and quickly were well known. Charles Greene, who specialized in furniture, set up a workbench for himself in the Hall's shop. He worked alongside seasoned cabinetmakers who had apprenticed in Scandinavia. Here are three examples of the design problems they tackled.

(continued on p. 26)

Fig. A
Writing Desk Designed by
Greene and Greene for the
Blacker House circa 1910
The work of two important Arts and Crafts designers was a marriage of artistry and production-shop woodworking.

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Crank Ergonomics We positioned the blade elevation crank with plenty of hand clearance to make blade-height adjustments quick and easy. Accurate blade-angle adjustments are also easy thanks to the large, adjustable bevel scale and the graduated bevel crank (each revolution equals a 2° adjustment).

Switch Ergonomics The large, easy-access on/off switch eliminates fumbling around when you're ready to start or stop cutting operations.

Powerful & Space Efficient The 1 3/4 hp TEFC induction motor provides the

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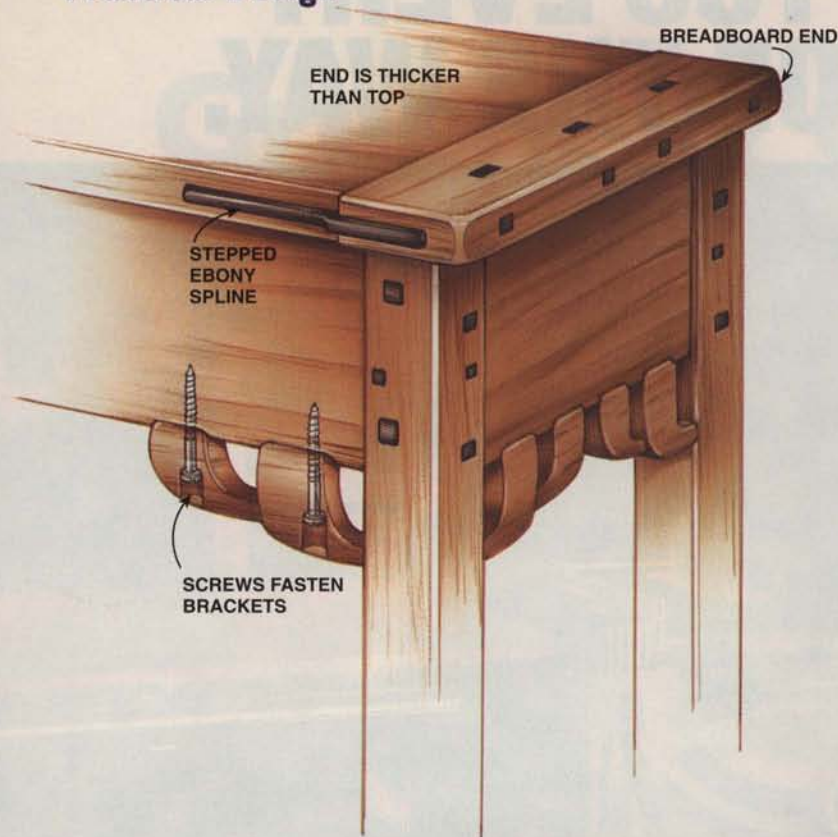
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Practical Design



(continued from p. 24)

Wood Movement and Breadboard Ends

Breadboard ends have stymied furniture makers for generations. They're meant to keep a top flat and cover up porous end grain. But they also invite disaster because the grain of the breadboard end, or cleat, runs opposite to the grain of the top. A top should be able to freely expand and contract, but a mortised and glued cleat will restrain it. Something has to give and inevitably the top cracks.

A second tricky situation involves flush joints, a favorite of meticulous artisans. A breadboard end originally made flush with a top won't remain even as the top moves. Usually the cleat ends up sticking out, marring the original clean lines of the table.

(continued on p. 28)

Fig. B

Bench for the Blacker House

The grain of the top and breadboard end run in opposite directions. Greene and Hall joinery allows the top to move freely, so it won't crack.

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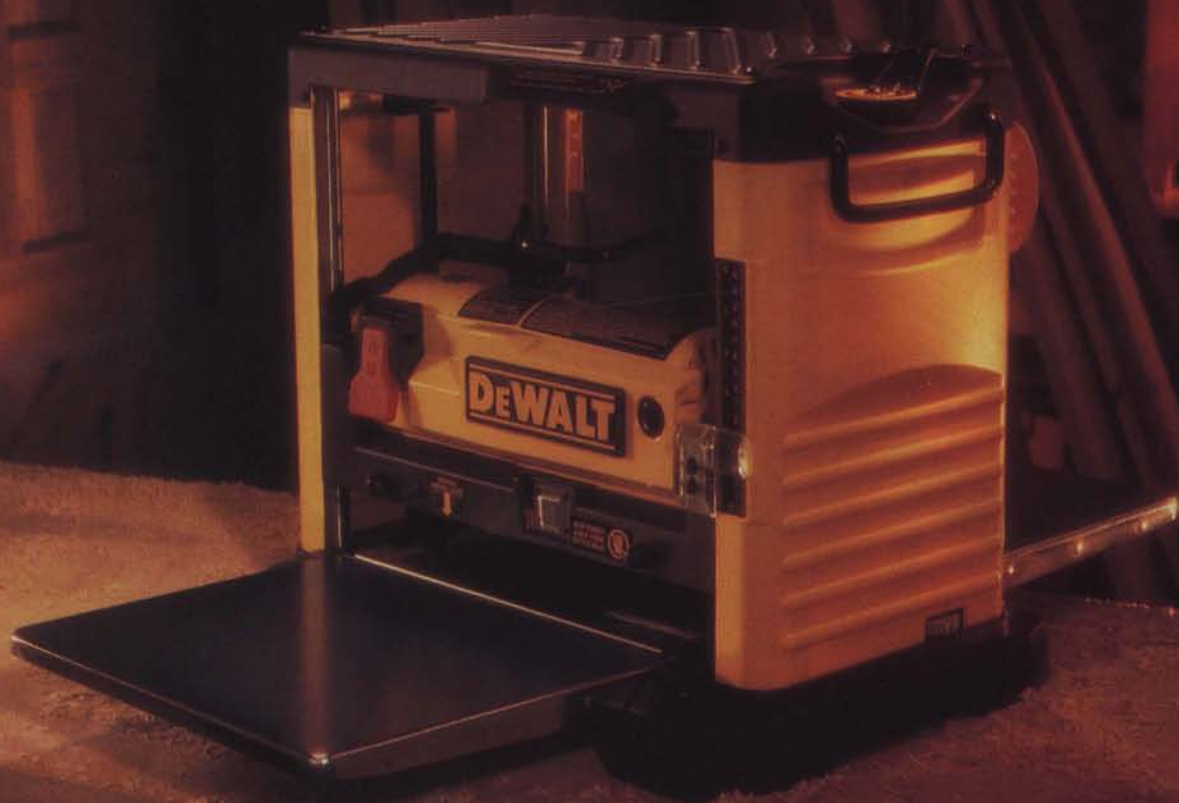
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Practical Design

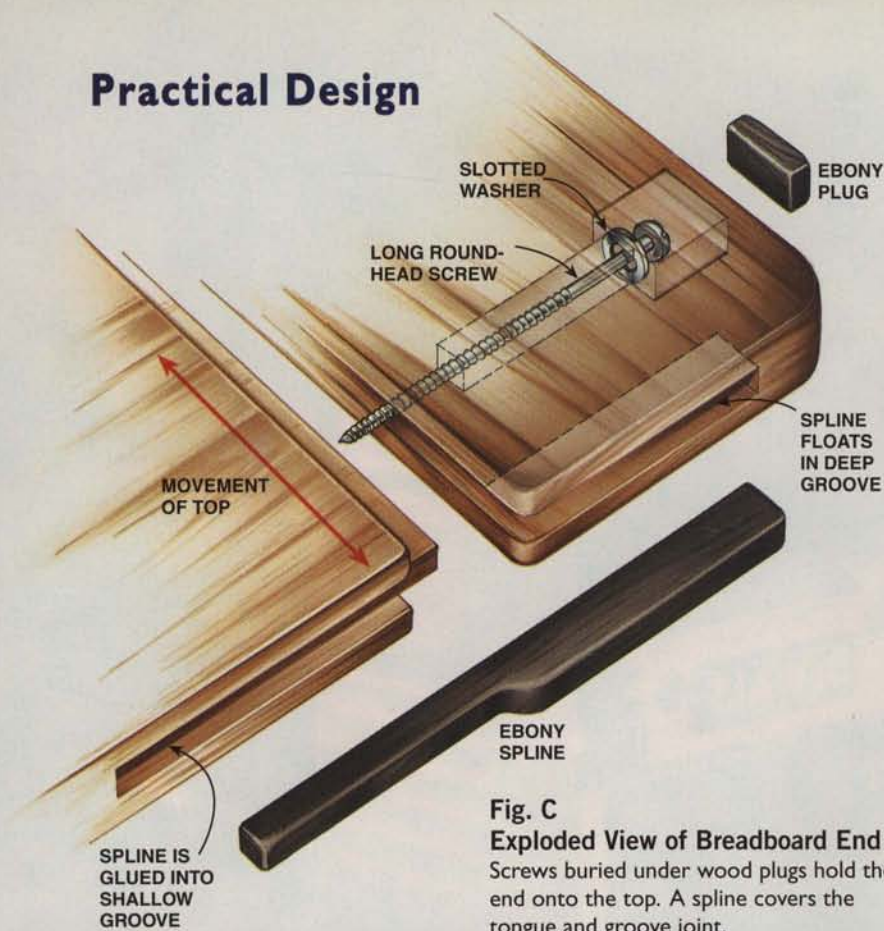


Fig. C
Exploded View of Breadboard End
Screws buried under wood plugs hold the end onto the top. A spline covers the tongue and groove joint.

(continued from p. 26)

The Greenes and Halls worked out solutions to both problems.

Their breadboard ends don't restrain the top. They're joined to the top with a tongue and groove joint that isn't glued and screws that pass through slotted washers. As the top expands and contracts the screws move back and forth through the washers. An ebony spline at the end of the cleat both strengthens and covers the joint.

A Greene and Greene breadboard end is never flush with the side of the top. That's their solution to the clean line problem. They substituted stepped surfaces for flush ones. You'll hardly find any flush joints in Greene and Greene furniture. Every surface lies on different levels. That's both a design statement and a concession to making furniture easy to build. They were early masters at what we now call a "reveal."

(continued on p. 30)

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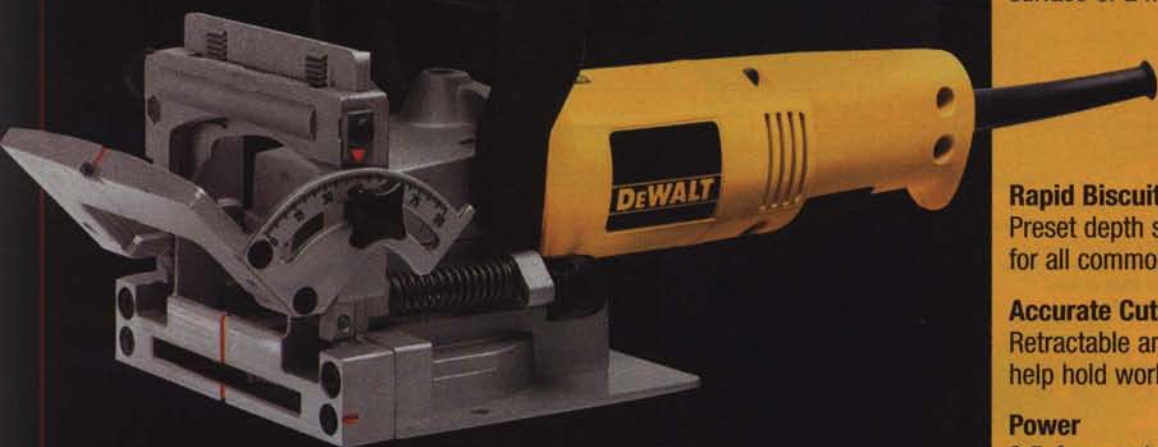
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these features ensure accurate joints every time. The DeWALT Plate Joiner is also easy to use and control, thanks in part to the ergonomically designed barrel grip and the extra-wide paddle switch. Because it's so versatile, it can be positioned on the inside or the outside face of a mitered joint. For precision that can't be beat, choose DeWALT. It's built into every one of our plate joiners. Guaranteed Tough.™

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Practical Design

(continued from p. 28)

Short Grain and Splined Joints

Chair arms get a lot of hard use. Every time you push yourself out of a chair you put enormous strain on fairly thin members. It's not unusual for an arm to break near the joint. The short grain in a continuous arm is particularly weak, so Charles Greene strengthened the joint with ebony splines.

From the outside the splines appear to be one large piece of wood reinforced with square pegs. The joint between arm and post looks like one very large bridle joint. But it's not. X-ray photographs reveal that the joint is actually standard mortise and tenon work (Fig. E). The spline is composed of narrow strips of ebony sitting in shallow grooves. Furthermore, the plugs are only decorative. There are no screws or dowels behind them. They merely add the appearance of strength by simulating the rivets of steel girders.

(continued on p. 32)

Fig. D

Armchair for the Blacker House

A continuous arm is easy to break, but this one is reinforced with ebony splines.

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Standard C-2 Carbide (left) and FORREST still sharp Oxidation and Corrosion Resistant Sub-Micron C-4 Carbide (right). Each shown after cutting 3,500 feet of MDF. Similar results obtained cutting particleboard, melamine and plywood.

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Faster feed rates & absolute splitter control. Sharp splintering on OAK, BIRCH, PLY, VENEERS & MELAMINE. "Our Best Plywood Blade."	Size	Price	10% Off Price	20% Off Price
8", 7-1/4" & others available	10" x 40T (10" x 32 3/32")	\$94	\$143	\$127
	12" x 40T (12" x 1" hole, 18")	\$94	183	145
	14" x 40T (14" hole)	\$94	177	158
	16" x 40T (16" hole)	\$94	263	181
	18" x 40T (18" hole)	\$94	279	194

CARBIDE IS THE HARDEST OF THE C-4 GRADES AND 40% STRONGER, NOT WEAKER!
FOR 50% TO 300% LONGER LIFE

NOW AVAILABLE FOR DEWALT CORDLESS

FORREST'S BUY ONE & SAVE - BUY MORE & SAVE MORE SALE

Buy any sawblade or dado in this ad and save 10% off the sale price! Buy additional sawblade(s) or dado(s) and save even more! 15%-20% thru December 31, 1999. Call Forrest now for details - (800) 733-7111 or (973) 473-5236

Editors' Choice and Top Rating Over 18 Competing Combo Saw Blades
The 10" x 40T earned the Editors' Choice Award for the best performance regardless of price. See American Woodworker April 1998 pp 64-65

WOODWORKER II
With this one ALL PURPOSE blade you can RIP & CROSSCUT 1"-2" ROCKHARDS and SOFTWOODS resulting in a SMOOTH-AS-SANDED surface. PLY-VENEERS of OAK and BIRCH will crosscut with NO BOTTOM SPLINTER at moderate feed rates.
• DOUBLE HAND and 40% STRONGER C-4 CARBIDE
• Ends blade changing
• Ends scratchy saw cuts
• Ends second-sharp finishing
• Ends cutting 1/16" over-size to allow for RESURFACING
• BUY AND SHARPEN 1 BLADE INSTEAD OF 3
5/8" holes, boring thru 1-1/4" add \$7.50. Larger at time basis - Shipping \$6.00.

	List	SALE	10%	20%
14" x 40T x 1"	\$215	\$149	\$134	\$119
14" x 30T x 1"	195	139	125	111
12" x 40T x 1" x 5/8"	183	129	116	103
12" x 30T x 1"	162	119	107	95
10" x 40T x 1/8" or 3/32"	156	119	107	95
30T x 1/8" or 3/32"	135	99	89	79
9" x 40T	146	109	98	87
30T	125	99	89	79
*8-1/4" x 40T 3/32"	136	99	89	79
8" x 40T 3/32"	136	99	89	79
30T 3/32"	115	89	80	71
7-1/4" x 30T 3/32"	112	69	62	55
**New 6" x 40T 3/32"	136	89	80	71

*NEW for Sears & Makita Table Saws **For Saw Boss

BLADE DAMPENERS-STIFFENERS
FOR BETTER CUTS on all brands of blades, use our large 1/8" DAMPENERS-STIFFENERS against one side.
• Parallel and flat to .001 • Stop vibration, flutter, cutting noise and blade ring • Triable and returnable for full cash refund
4" ... \$21
5" ... 24
6" ... 25
FULL RANGE OF OTHER INDUSTRIAL SIZES
REDUCES NOISE 50%-75%
7" AND LARGER AVAILABLE

CHOPMASTER FOR SLIDING COMPOUNDS & MITER SAWS

New sizes, 5" Nip, Pic. & flat, runs out less than .002 for perfect, light, smooth, splinter-free joints.	Extra 10%-20% Off
NEW SIZES AVAILABLE	
Delta Sidekick 6-1/2" x 40T x 5/8"	\$149 \$99
Sears 8-1/4" x Delta 8-1/4" x 40T x 5/8"	170 109
Hilachi 8-1/2" x 40T x 5/8"	179 119
DeWalt 8-1/2" x Ryobi 8-1/2" x 40T x 5/8"	179 119
Delta 9" x 40T x 5/8"	204 129
Ryobi-Makita & all 10" x 40T x 5/8"	207 139
DeWalt, Makita, B&D, Hitachi 12" x 40T x 1"	229 149
Ryobi-Makita 14" x 100T x 1"	256 189
Hilachi 15" x 100T x 1"	277 199

For good gen. purpose cuts use Woodworker II 30T & 40T for Woodworker I. Use small stiffener where possible.

WOODWORKER I - For Table & RADIAL SAW

This fine and crosscut ALL PURPOSE blade gives scratch-free polished cuts on all materials RIP or CROSSCUT UP TO 7".				
• ALL MET AND 3/32" THIN KEF 30" ATD and 5" face hook on 10" diameter and under. 12" and 14" are 20" ATD 1/8".				
• DOUBLE HANDER and 40% STRONGER carbide.				
• THIN KEF. Saves 1/3 wood loss on each cut, radial or table. Feeds easy when used for moderate rip and crosscut on table saw. Reduces "JUMP" W" greatly for better "FULL CONTROL." Practically eliminates bottom splinter on RADIAL CROSSCUT.				
• Totally stops ALL bottom and top splinter on ply veneers in push-cut made on RADIAL.				
• Our STIFFENER STRONGLY RECOMMENDED AGAINST outside blade only for best cuts. Made and serviced in U.S.A. for your benefit.				
	List	SALE	10%	20%
14" x 40T x 1" x 1/8"	\$224	\$159		
12" x 40T x 1" or 5/8" 1/8" x 1/8"	186	139		
10" x 40T x 1/8" 3/32" x 1"	162	129		
10" x 40T x 1/8" 3/32" x 1"	156	119		
8" x 40T x 1/8" 3/32" x 1"	150	109		
NEW 8-1/4" x 40T x 1/8" 3/32" x 1"	150	109		
7-1/4" x 40T x 1/8" 3/32" x 1"	150	109		

FREE SHIPPING on orders over \$200 - thru 12/31/99

For INFO OR ORDER CALL 1-800-733-7111 (973) 473-5236 Fax (973) 471-3333

Blade sale good through February 28, 2000.

Must mention American Woodworker to receive coupons & extra bonus.

SPECIAL FREE OFFER

Select one of these items FREE when placing an order for any saw blade or dado purchased from this ad in American Woodworker. (16 oz. can Peels Plus® Blade Cleaner)



Hurry! This special offer is limited while supplies last on orders placed by 12-31-99.

YOURS FREE up to \$29.95 Value

NEW DELUXE DADO-KING! AS LOW AS \$184 NET AFTER USING SHARPENING COUPONS

Free \$21 Value, 10" Blade Hammer Carrying Case with 6", 8" or 10" Blade Sets.

C-4 Carbide Type - 4 on each chipper with special negative face hooks.	LIST	SALE	10%	20%
6" D. 5/8" Bore NEW	\$299	\$269	\$242	\$229
8" D. 5/8" Bore	\$321	\$289	\$260	\$245
10" D. 5/8" & 1" Bore	\$389	\$349	\$314	\$297
12" D. 1" Bore	\$499	\$449	\$404	\$382

(Bore up to 1-1/4" Add \$25 - Plus \$8.00 S&H)

NEW "EASY-FEED" STANDARD DADO
For solid hard and soft woods only! (No plys, no melamine!) 8" D. with positive hook 24-tooth blades & 2-tooth chippers, and shims. Cuts 1/8" to 1 1/2" wide.

	LIST	SALE	10%	15%
8" D.	\$249	\$218	\$196	\$185

Since 1946, American saw making and sharpening.

FORREST MANUFACTURING COMPANY, INC. ■ 457 River Road ■ Clifton, NJ 07014 ■ 1 (800) 733-7111

Write in 100 for Reader Service

Dealer Inquiries Welcome

FREE \$45 IN SHARPENING COUPONS

SUPPLIED WITH EACH BLADE OR DADO SET.

GOOD ON ALL FORREST OR OTHER MAKES

OF CARBIDE BLADES OR DADO SETS.

1 Coupon Per Blade or Dado

ORDER BY MAIL

TO ORDER BY MAIL... clip ad, circle choices and enclose payment. For bonus specify Dept. AW when ordering.

PHONE TOLL FREE! 1 (800) 733-7111

To inquire or order in NJ: (973) 473-5236

NJ, FL, NY residents please add sales tax.

SATISFACTION GUARANTEED OR FULL CASH REFUND.

BUS. OPEN ACCOUNT

THE FASTEST FINEST FINISH.



DW411

Heavy-Duty 1/4 Sheet
Palm Grip Sander



DW423

Heavy-Duty 5" Random Orbit Sander
With Electronic Variable Speed



DW431

Heavy-Duty 3" X 21" Electronic
Variable Speed Belt Sander



DW421

Heavy-Duty 5" Random Orbit Sander

DW421

Finest Finish

Patented, Controlled Finishing System maintains pad speed on or off the material

3/32 orbit diameter provides tight orbital patterns

Reduce Vibration

Dual-plane counterbalance for more comfortable use

Fastest Finish 2.0 Amp

2.0-Amp motor with 12,000 orbits per minute

95% Dust-Collection

Built-in, dust-extraction adapter attaches to standard shop vacuums

Durability

Dust sealed switch and 100% sealed ball bearing construction prevents dust contamination

The DeWALT Heavy-Duty Sanders were designed to produce the fastest, finest finishes possible on all kinds of materials. Take the DW421 Heavy-Duty 5" Random Orbit Sander, which features the patented DeWALT Controlled Finishing System to maintain pad speed and virtually eliminate gouging. Its 2.0-Amp motor provides maximum sanding speed while being extremely comfortable to use. And, features like the dust-sealed switch contribute to longer tool life. If greater control is

needed, there's the DW423 Electronic Variable Speed sander (7,000 to 12,000 opm). The electronic variable speed keeps the sander running at a constant speed under load. For fine finishes, the DW411 palm grip sander has a 2.0-Amp motor with 13,500 opm. And for faster removal, the DW431 Belt Sander provides a compact and lightweight unit for sanding vertical surfaces or tight spaces. So choose the best sander for the job. Choose DeWALT. Guaranteed Tough.™

For more information, call 1-800-4 DEWALT
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DEWALT

High Performance Industrial Tools

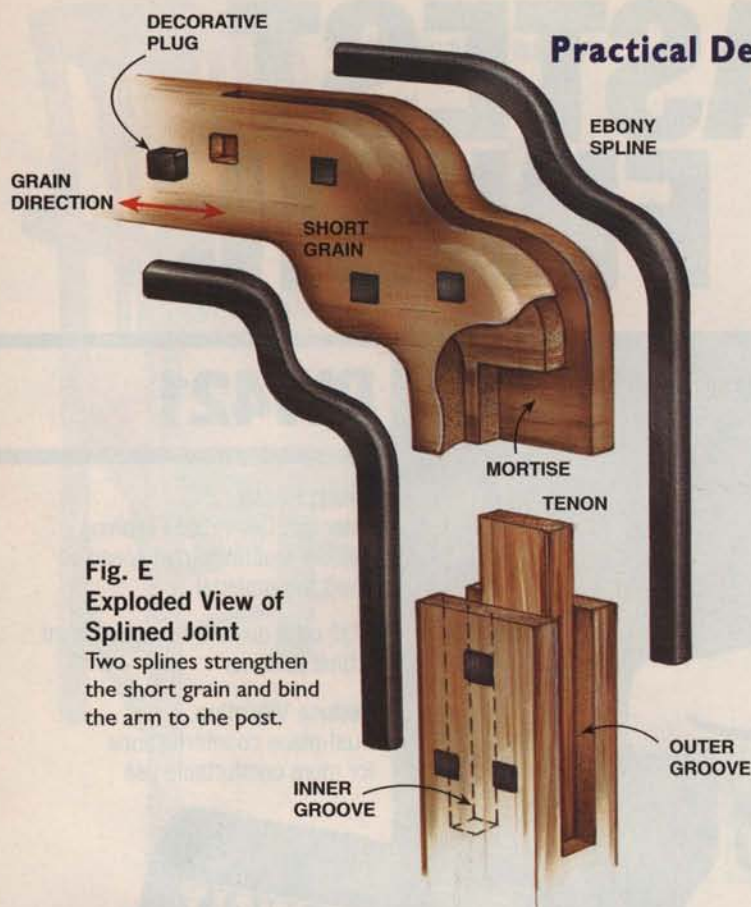


Fig. E
Exploded View of Splined Joint
Two splines strengthen the short grain and bind the arm to the post.

Practical Design

(continued from p. 32)

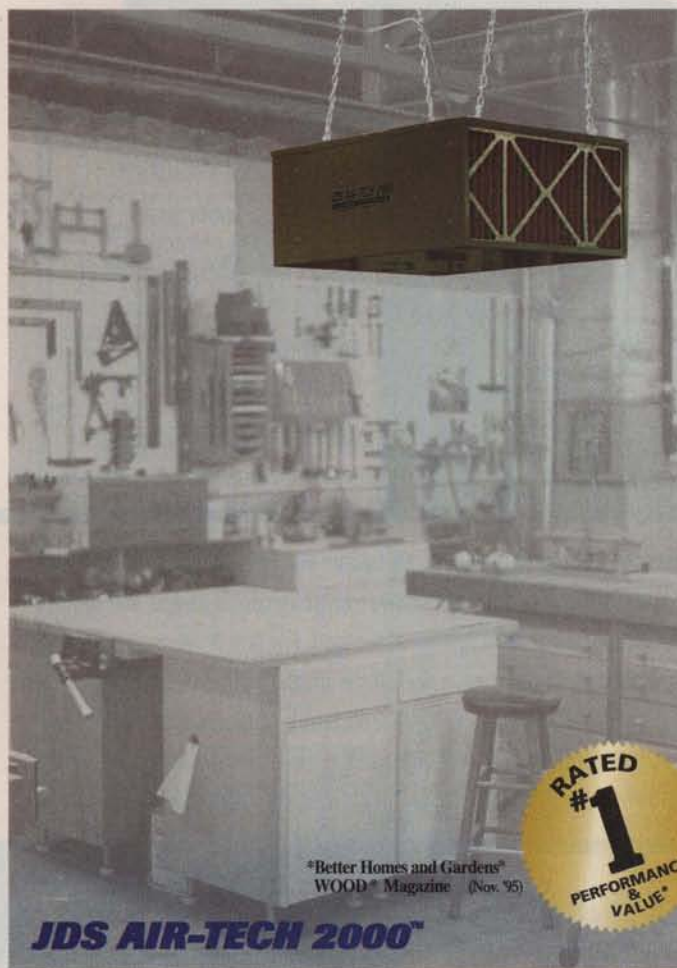
Production Work and Drawer Joinery

You won't find dovetails in Greene and Greene furniture made by the Halls. They used machined joints that didn't require laborious handwork. They valued efficiency of production more than virtuoso cabinet making. But they were able to take humble joints and transform them into works of art.

In this composite of two different drawers, you'll find joints that were made on the tablesaw (Fig. F). Neither joint was commonly used at the time on high-end furniture. The half-blind tongue and rabbit probably was an innovation introduced by the Hall's Scandinavian-trained furniture makers, according to Professor Cooke.

Many Greene and Greene drawers were center-guided with a track running underneath the middle of the drawer bottom. It's a production shop method that may well have been a Scandinavian innovation, too. Center-guided drawers have three advantages over conventional drawers. First, they are easier to fit into a case. The sides are set back from the front, so they don't have to be planed down. Only the thin ends of the drawer front must be fitted. Second, once a batch of center guides is

(continued on p. 34)



Let's Clear the Air...

Introducing The New Model 750

Simply The Best!

- **Variable Speed Control** (200 CFM to 750 CFM Filtered Air)
- **Two Speed On/Off Pull Chain**
- **Ultra Quiet**
- **95% ASHRAE Tested Main Filter**
- **Lifetime Warranty**
- **30 Day Money Back Guaranty**

The National Institute for Occupational Safety and Health (NIOSH) recommends limiting wood dust exposures. The JDS Air-Tech 2000 will dramatically improve the quality of the air you breathe. Our new model 750 variable speed allows you to dial in your desired air flow, from a whisper quiet 200 cfm to an ultra performance 750 cfm. This will clean the air in a 30'x30'x8' shop ten times per hour. For larger areas our models 8-12 and 10-16 are available. The JDS systems will remove 99% of particles as small as five microns and 80% of particles as small as one micron. For the removal of odors, fumes and smoke, our optional charcoal filter is available. To place an order or for the dealer nearest you call us toll-free.

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Model 750

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Manufactured in the U.S.A.

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DEWALT HEAVY-DUTY ROUTERS

DW621

95% Dust Collection

Exclusive, built-in, dust-extraction column attaches to standard shop vacuum

Quality Finish

Electronic Variable Speed (8,000 - 24,000 rpm) for constant speed under load

Fast and Accurate Depth Setting

Rack-and-Pinion, microfine depth adjustment starting at 1/256"

Versatility

Converts from fixed base to plunge with the lock-down knob

Control

Rubber-coated knobs have built-in plunge lock and on/off switch

Durability

100% Ball Bearing Construction

Power

2 Horsepower Motor

Capacity

Accepts 1/4" and 1/2" collets



DW625

Heavy-Duty 3 HP
VS Electronic Plunge Router

DW610

Heavy-Duty 1-1/2 HP Router

DW621

Heavy-Duty 2 HP
Electronic Plunge Router

The DeWALT Heavy Duty Routers deliver accuracy, durability, power and the most innovative features available. For example, the DW621 includes the industry's first built-in dust-collection system. It can also convert from a fixed base to a plunge router with the twist of the left knob. The DeWALT line includes the DW625, which boasts 15 Amps and a 3 horsepower motor.

Additionally, it contains phosphorous bronze guide bushings for a smooth and even plunge. Our fixed-base router, the DW610, won the 1998 Wood Magazine® Editors' Choice Award and our Plunge Router, the DW621 won the American Woodworker's Editors' Choice Award for 1998. So get the best of all worlds, and get a DeWALT heavy-duty router. Guaranteed Tough.™

**For more information, call 1-800-4 DEWALT
or visit our web site at www.dewalt.com.**

DEWALT
High Performance Industrial Tools

Practical Design

(continued from p. 32)

machined and installed, each drawer will run smoothly right off the bat. Conventional drawers, on the other hand, require a great deal of individual attention. Third, a drawer guided in the center is easy to pull out with one hand because it doesn't rack. **AW**

SIDE IS SET BACK FROM FRONT

HALF-BLIND TONGUE AND RABBET

CENTER GUIDE TRACK IS FASTENED TO DRAWER

BOX JOINTS

EBONY PLUGS COVER SCREWS

Sources

Our thanks to Dr. Edward S. Cooke, Jr. for his research, which was published as 'Scandinavian Modern Furniture in The Arts and Crafts Period: The Collaboration of the Greenes and Halls' in the book "American Furniture, 1993," University Press of New England (out of print).

For more information on the furniture, see "Greene and Greene, Furniture and Related Objects," by Randell Makinson, 1983, \$24.

For a closer look at details, see "Images of the Gamble House," by Jeanette Thomas, 1995, \$20.

Both books are available at www.amazon.com

Fig. F

Two Styles of Drawer Joints

Production shop joints, not dovetails, hold these center-guided drawers together.

POWERMATIC
CORPORATION

MODEL 66 10" TILTING ARBOR SAW

Includes these features:

ONE-PIECE,
HEAVY DUTY
TRUNNION

Exclusive ACCU-FENCE

LEFT-TILT BLADE

Exclusive 3 V X BELT DRIVE

Exclusive BACKLASH ADJUSTMENT

Engineered to perform.

Built to endure.

Make your shop more versatile
with the optional mobile base...

... or try the optional Excalibur
sliding table with 50" capacity!

(with room to grow.)

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Website: www.powermatic.com

Model	Description	List	Sale
31-750	NEW Bench Random Orbit Sander		
		Sale	199
28-150	NEW 9" Bench Band Saw	Sale	155
50-860	850 CFM Air Cleaner	Sale	239
31-695	6" Belt/9" Disc Sander	441	299
23-710	Sharpening Center	217	155
31-460	4" Belt/Disc Sander	198	119
40-560	16" 2 speed Scroll Saw	230	129
40-540	16" var/spd Scroll Saw	249	159
11-990	12" Bench Drill Press	255	184
11-090	32" Radial Bench Drill Press	405	279
43-505	1/2" Bench Router/Shaper	398	299
22-540	12" Bench Top Planer	Sale	259
22-560	12-1/2" Planer w/ extra knives	329	
36-865	Versa Feeder Stock Feeder	249	
36-220	10" Compound Miter Saw	294	199
37-070	6" var/spd Bench Jointer	351	265
14-650	Hollow Chisel Mortiser with chisels and bits	380	249
17-900	16-1/2" Floor Drill Press	490	329
17-924	Mortise Chisel Kit	Sale	65
36-285	8-1/4" Builders Saw w/ stand	275	
34-555	Sliding Table	487	315
36-250	10" Slide Compound Saw	825	455
31-780	Occulting Spindle Sander	253	194
46-700	12" Wood Lathe	575	479
40-650	Q3 18" Scroll Saw	Sale	389
36-905	30" Unifence	346	259
36-906	50" Unifence	444	319
36-444	10" Contractors Table Saw	Sale	589
33-830	10" Radial Arm Saw	851	729
37-285	NEW 6" Jointer w/ stand	424	345
37-380	NEW 8" Professional Jointer	1500	1095

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

36-475	10" Platinum Edition Contractors Table Saw w/ 30" unifence, cast iron wing, table board & carbide blade	Sale	849
22-675	DC380 15" Planer	Sale	1175
28-275	14" Band Saw 3/4 HP	Sale	595
28-280	14" Band Saw 1 HP motor with enclosed stand	Sale	739
28-255	14" Platinum Edition Band Saw - 1 HP w/ mobile base, 18" rip fence, & 3/8" blade	Sale	849
31-280	Sanding Center w/ stand	Sale	789
37-190	8" Deluxe Jointer	603	445
37-195	6" Professional Jointer	625	539

Model	Description	List	Sale
6527-6	Sawzall with case	343	169
6537-226527	w/quick lok blade change	224	179
0407-2212V	Drill w/keys chuck&2 batt	380	179
0224-1	Drill 4.5 amp magnum	236	136
0234-6	1/2" Drill 4.5A mag 0-850 rpm	255	134
0235-6	1/2" Drill w/keyless chuck	255	139
0244-1	1/2" Drill 4.5A mag 0-600 rpm	255	139
0222-1	3/8" Drill 3.5 amp 0-1000 rpm	213	128
0228-6	3/8" Drill 3.5 amp 0-1000 rpm	207	124
0375-6	3/8" close quarter Drill	255	148
0379-1	3/8" close quarter Drill	288	168
6546-6	Screwdriver 200 & 400 rpm	150	89
6547-6	6546-6 w/bits, 1/4" chuck & cs185	112	
5399	1/2" D-handle Hammer Drill Kit	356	225
5397-6	3/8" v/ spd Hammer Drill Kit	275	145
5371-6	1/2" v/ spd Hammer Drill Kit	360	194
6145	4-1/2" Grinder 10,000 rpm	179	105
6494-6	10" Compound Miter Saw	585	279
6266-6	Top Handle Jig Saw	315	159

Item	Description	Teeth	List	Sale
LUT2M010	Gen Pur. A.T.B. 10" 40	69	42	
LUT8M010	Cut-off 10"	60	93	32
LUT8M011	Comb 10"	50	78	45
LUT8R010	Super Cut-off 10"	80	114	68
LUT7M010	Ripping 10"	24	69	39
LUT7M010	Cut off 10"	60	84	49
LUT8R010	Thin Kerf 10"	24	72	48
LUT8R010	Thin Kerf 10"	60	88	55
LUT8R010	Ultimate 10"	80	128	78
LUT9M010	Compound Miter 10"	60	88	54
F410	Quiet Blade 10"	40	95	54
SD308	8" Dado - Carbide	230	119	
SD508	8" carbide w/case & shims	344	172	
FB100	16 piece Forstner Bit Set	338	194	
94-100	5 pc. Router Bit Door System	320	169	
FT2000E	Plunge Router	Sale	185	

Model	Description	List	Sale
C8FB2	8-1/2" Slide Compound Saw	1169	449
C10FS	10" Slide Compound Saw	1627	579
C15FB	15" Miter Saw	1346	645
C10FCD	NEW 10" dual bevel Compound Miter Saw	550	265
NV45AB	Coil Roofing Nailer	935	379
NT50AE	Pinner 3/4" - 2"	Sale	119

Model	Description	List	Sale
5090DW	3-3/8" Saw Kit 9.6 volt	280	139
DA391D	3/8" angle Drill 9.6V	166	95
DA391DW	3/8" angle Drill Kit 9.6V	341	139
6095DWE9	6 volt Drill Kit w/2 batt	Sale	125
6095DWLE2	6095DWE w/flashlight	Sale	139
632007-4	9.6 volt Battery	47	30
632002-4	7.2 volt Battery	39	28

Model	Description	List	Sale
6343DWE	1/2" Drill Kit	Sale	255
5620DWA	6-1/2" Circular Saw Kit	Sale	255
DK1016	1/2" Drill & 6-1/2" Saw combo kit	Sale	389

Model	Description	List	Sale
9900B	3"x21" Belt Sander w/bag	347	165
9924DB	3"x24" Belt Sander w/bag	360	169
N1900B	3-1/4" Planer with case	263	142
1912B	4-3/8" Planer	352	205
DA3000R3/8"	4" Disc Grinder 4.6 amp	118	65
6405	3/8" Drill Rev. 0-2100 rpm	115	65
6013BR	1/2" Drill Rev. 5 amp	270	149
9401	4" x 24" Belt Sander w/bag	458	219
5907NBK7-1/4"	Circ Saw w/ case	250	125
LS1011	10" Slide Compound Saw	995	429
LS1212	12" Slide Compound Saw	1620	695
3901	Plate Joiner Kit	376	159
3612C	3 HP Plunge Router	492	265
LS1040	10" Compound Miter Saw	460	259
LS1013	10" Dual Compound Slide Miter Saw	1086	599
BO5010	5" Random Orbit Sander	142	69
LS1220	12" Compound Miter Saw	379	
9227C	7/9" Polisher	350	195
SJ401	16" Bench Scroll Saw	300	175
2702	8-1/4" Table Saw	Sale	299
2703	10" Table Saw	Sale	309

Model	Description	List	Sale
8N0S-1	Stick Nailer	Sale	299
RN45	Coil Roof Nailer 3/4" - 1-3/4" B&S	399	
N60FN-2K	Finishing Nailer w/ case	557	269
BT35-2K	Brad Tacker 5/8" - 1-3/8" w/ case, oil, & brads	279	125
MIJFS	Flooring Stapler 15 gauge	902	539
S32SX-1K	Finishing Stapler 1/2" - 1-3/8" w/ case & oil	269	135

Item#	Jaw Opening	Length	Capacity	List	Sale	Box of 6
#0	8"	4-1/2"	20.35	10.50	69.95	
#1	10"	6"	23.30	13.95	78.95	
#2	12"	8-1/2"	26.75	15.75	88.95	
#3	14"	10"	33.85	19.95	114.95	

YE6431FKQW	NEW 1/2" 15.6V drill kit with two amp-hr Ni-Cd batteries, 30 minute charger, & case.....	339	189
YE6407NOKW	NEW 1/2" 12V drill kit with two 3 amp-hr Ni-Mh batteries, 45 minute charger, & case.....	339	189
YE6406FKQW	NEW 3/8" 12V drill kit with two 2 amp-hr Ni-Cd batteries, 30 minute charger, & case.....	305	169
YE3503FQWKK	5-3/8" 12V Wood Cutting Circular Saw Kit.....	500	259
BIESEMEYER FENCES			
B-50	50' Comm'r. Saw.....	443	325
T-SQUARE 52	52" Homeshop.....	360	275
T-SQUARE 40	40" Homeshop.....	335	255
T-SQUARE 28	28" Homeshop.....	325	245

AIRY AIR NAILERS			
	Model	Description.....	List Sale
0241SK	Brad Nailer	3/8" - 1-9/16"...	180 98
0626SK	1/4" Crown Stapler	3/8" - 1*194	89
Above nailers come w/case, fasteners, oil & wrenches			
STABILA LEVELS			
25010	10" die cast Torpedo Level		Sale21.95
24640	24" Level w/ hand holes		Sale47.95
24670	48" Level w/ hand holes		Sale 59
24632	NEW "Jambor Set" designed for setting door jams. Includes 78" level and		

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PRICES SUBJECT TO CHANGE WITHOUT NOTICE

Model	Description	List	Sale
DW124K	1/2" right angle Drill	590	329
DW321K	Top Handle Jigsaw Kit	300	164
DW364	7-1/4" Circ. Saw w/broke	294	155
DW610	1-1/2 HP 2 handle Router	266	149
DW411K1/4	sheet Palm Sander w/ case	58	
DW682KB	Biscuit Joiner with case	448	169
DW705	12" Compound Miter Saw	734	339
DW621	2 HP Plunge Router	400	199
DW677K	3-1/4" Planer with case	268	155
DW431	3 x 21" v/spd Belt Sander	338	188
DW421	5" Palm Ran. Orb Sander	144	75
DW423	Palmgrip Random Orbit Sander - variable speed	170	92
DW272	Drywall Gun, 0-4000, 6.3 amp	160	95
DW276	Drywall Gun, 0-2500, 6.5 amp	160	99

Model	Description	List	Sale
DW972K-2	3/8" variable speed w/ two 12V XR batteries	362	184
DW991K-2	3/8" variable speed w/ two 14.4V XR batteries	415	209
DW911	Jobsite Radio & Charger	Sale	149

Model	Description	List	Sale
DW933K	Jigsaw Kit	468	275
DW938K	Recipro Saw Kit	520	269
DW959K-2	1/2" Drill Kit w/ 2 batt.	Sale	259
DW959K-2	1/2" Drill/Hammer Drill Kit	454	249
DW936K	5-3/8" Saw Kit	458	249
DW995KS-2	DW995K Drill, DW936 Saw and case	Sale	399
DW995KC-2	DW995K 18V drill kit, DW938 18V reciprocating saw, & case	Sale	399

Model	Description	List	Sale
DW006K	1/2" Drill/Hammer Drill Kit	560	299
DW007K	6-1/2" Circular Saw	560	299
DW008K	Reciprocating Saw	560	299

Model	Description	List	Sale
DW708	12" Slide Miter Saw	Sale	649
DW788	20" Scroll Saw	Sale	499
DW733	12" Planer w/ extra blades	Sale	399
DW744	10" Portable Table Saw	Sale	499

Model	Description	List	Sale
LP6-20A	Sight Level package-20x	329	239
LP6-20XLA	LP6-20A with 9056 tripod and 7620 rod	409	279
LT8-300	Level Transit - 26x	739	539
LT8-300P	above Level with optical plumb	869	629
ALT6-900	Automatic Level - Transit - 18x	666	479
ALTP6-900	above Level with tripod & rod	799	549
ALB-22S	Automatic Level - 22x	583	289
ALP8-22	Automatic Level with tripod & rod	Sale	349
ALB-26S	Automatic Level - 26x	854	325
ALP8-26	Automatic Level with tripod & rod	Sale	389

Model	Description	List	Sale
1587AVSC	1587VS Saw Kit with case and New Progressor blades	Sale	155
1584VS	Barrel"CLIC"Jig Saw	288	155
Bosch Metal Case	for above Jig Saws	24	
Bosch 30 blade assortment	for Jig Saws	29.99	

Model	Description	List	Sale
1295DH	5" Random Orb Palm Sndr	145	89
1274DVS	3"x21" v/spd Belt Sander	301	175
1278VSK1-1/2"x12"	Belt Sander	218	129
1275DVS	3"x24" v/s Belt Sndr	379	219
1276DVS	4"x24" v/s Belt Sndr	408	229
1194VSRK	1/2" v/ spd Drill w/ case	303	159
1613EVS	2HP v/ spd Plunge Router	369	199
1634VSK	Recip Saw 10.5 amp	335	185
3615K	12V Thandle Drill Kit	345	159
3615K	14.4V Drill Kit	354	174
3107DVS	5" Random Orbit Sander	165	98
3107DVS	3107DVS with case	195	145
3125DVS	5" Random Orbit Sander	256	145
3127DVS	6" Random Orbit Sander	266	149
3915	10" Slide Compound Saw	1050	499
3912	NEW 12" Cmpnd Miter Saw	638	329
11224VSR	7/8" SDS Rotary Drill	404	229
1703AEVS	5" Grinder - 8.5 amp	245	145
1347AK	4-1/2" Grinder with case	159	92
1638K	Drywall Cut-out Unit	165	105
1617	1-3/4 HP Router - 2 handle	Sale	159
1617EVS2	HP Router w/ variable speed - 2 handle	Sale	189
1618	1-3/4 HP Router - "D" handle	Sale	179
1618EVS	1618 Router w/ var/speed	360	215
1640VS	NEW Power Tenon Saw	200	129
1640VSK	NEW Power Tenon Saw Kit	209	129
3850K	18V cordless Drill Kit	Sale	255

Model	Description	List	Sale
12"x24"x28"	1/4 hp 200 CFM - 750 CFM	Sale	249
8-12	20"x24"x44" 1/3 hp 800 & 1200 CFM	Sale	479

Model	Description	List	Sale
JJ60S	6" Jointer - open stand	Sale	429
JJ6CSXW	6" Jointer - closed stand and extra knives	Sale	499
JJ8CS	8" Jointer - closed stand	Sale	1189

Model	Description	List	Sale
JWBS140S	14" Band Saw 3/4 HP - open stand	Sale	495
JWBS14CSW	14" Band Saw 1 HP - closed stand with rip fence and mitre gauge	Sale	579

Model	Description	List	Sale
JWTS10CW2JF	10" Contractor Table Saw with 30" Jet fence and cast iron bases	Sale	649
JWTS10CW2PF	10" Contractor Table Saw with 30" Exacta fence 1-1/2 HP & cast iron bases	Sale	769
JTAS10X501	10" Tilling Arbor 3 HP Table Saw with 50" Exacta fence, table, and legs	Sale	1399

JDP17MFW	16-1/2" Drill Press 3/4 HP - 16 speed with bits and mortise attachment	Sale	419
DC-650	Dust Collector, 1 HP, 650 CFM	Sale	319 199

Model	Description	List	Sale
9444VS	Var/spd Profile Sander Kit	207	119
690	1-1/2 HP Router 8 amp	278	149
6931	Plunge Router Base	139	85
693PK	690 and 6931 plus case	Sale	199
9690	690 Router with case	Sale	159
691	1-1/2 HP Router D-handle	303	16



Frame & Panel HOPE CHEST

Mortise and tenon joinery the easy way.

I used to struggle with mortise and tenon joinery. I tried every new system that came along, but they all seemed way too complicated. One day a friend of a friend walked into my shop, said “Throw away those fancy jigs!” and showed me an elegant way to make these classic joints. This blanket chest is the ideal project to showcase this technique.

One of the ways I used to get into trouble with joinery was to constantly measure everything. No more. Whenever possible, I use “the thing itself” to guide my cuts, especially in mortise and tenon work. That is, I use an object, not a ruler, to measure directly from one thing to another. Settle on the most important sizes first, make the pieces and then everything else falls into place.

You'll see how fool-proof the system is in building this blanket chest. The design utilizes a form of frame and panel construction that goes back hundreds of years. This joinery has proved to be durable and reliable, so if you're thinking of making an heirloom project, here's one that will last many generations.

THE TENONS

of this chest line up exactly with the grooves that hold the panels. This simplifies laying out the joints. Cut the grooves first and the rest naturally follows.

HAUNCH

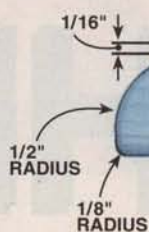
GROOVE
FOR PANEL

By Tom Caspar

Frame & Panel HOPE CHEST

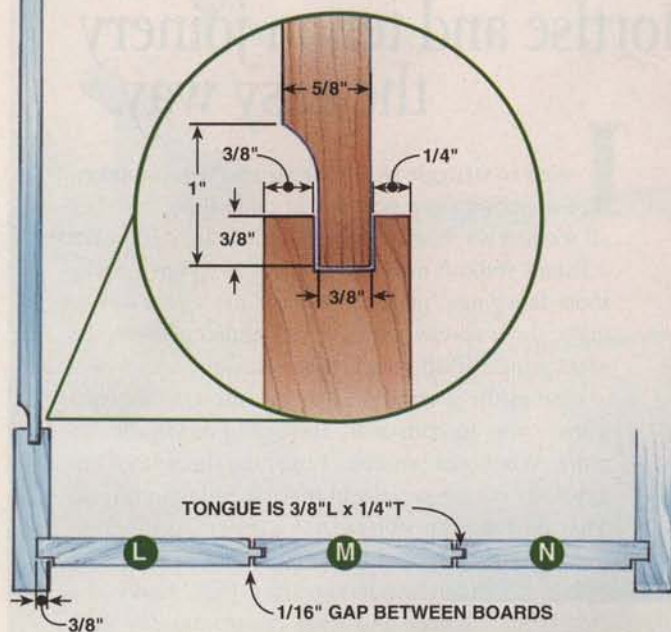
Detail 1

Elevation of top



Detail 2

Cross section of front and bottom



CUTTING LIST

BLANKET CHEST 26 1/2" H 48 1/2" L 18 3/4" D

Cherry and Pine

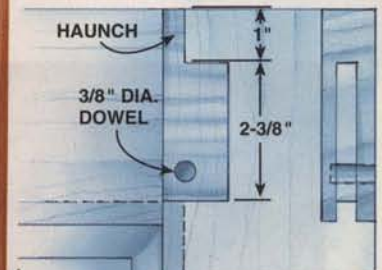
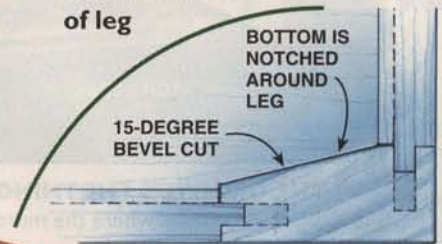
Part	Qty.	Name	Material	Dimensions	Comments
A	1	TOP	4/4 Cherry	13/16 x 19 x 48	
B	4	LEGS	8/4 Cherry	13/4 x 33/4 x 253/4	
C	2	TOP LONG RAILS	5/4 Cherry	1 x 33/4 x 407/8	Tenon Length 1 1/8" Between Shoulder 38 5/8"
D	2	BOTTOM LONG RAILS	5/4 Cherry	1 x 4 1/2 x 407/8	Tenon Length 1 1/8" Between Shoulder 38 5/8"
E	2	TOP SHORT RAILS	5/4 Cherry	1 x 33/4 x 163/4	Tenon Length 1 1/8" Between Shoulder 14 1/2"
F	2	BOTTOM SHORT RAILS	5/4 Cherry	1 x 4 1/2 x 163/4	Tenon Length 1 1/8" Between Shoulder 14 1/2"
G	4	STILES	5/4 Cherry	1 x 33/4 x 14 1/2	Tenon Length 3/4" Between Shoulder 13"
H	3	FRONT PANELS	4/4 Cherry	5/8 x 11 1/16 x 13 1/16	OPENING IS 10 3/8" W 13" L
J	3	BACK PANELS	4/4 Pine	5/8 x 11 1/16 x 13 1/16	
K	2	SIDE PANELS	4/4 Cherry	5/8 x 15 3/16 x 13 1/16	OPENING IS 14 1/2" W, 13" L
L	1	BOTTOM	4/4 Pine	3/4 x 6 x 44 13/16	OVERALL WIDTH OF BOTTOM IS 16 1/16" W, TONGUE AND GROOVE IS 3/8" DEEP
M	1	BOTTOM	4/4 Pine	3/4 x 5 1/16 x 44 13/16	
N	1	BOTTOM	4/4 Pine	3/4 x 5 5/8 x 44 13/16	
HARDWARE					
	2	HINGES	BRASS	2" H x 1 1/2" OPEN WIDTH	
	1	DOWEL ROD	CHERRY	3/8" DIA. 24" L	
	2	LID SUPPORTS			

FIG. A EXPLODED VIEW OF BLANKET CHEST

26½" H 48½" L 18¾" D

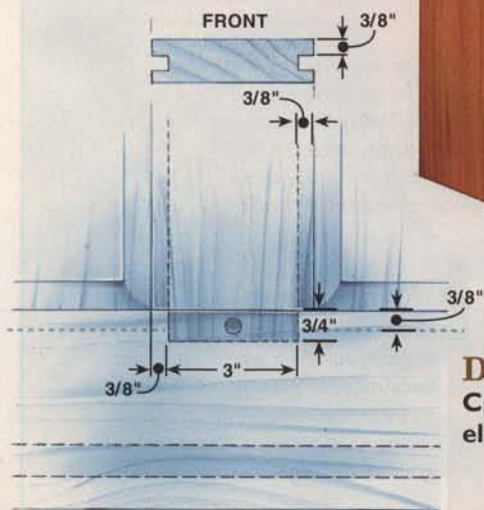
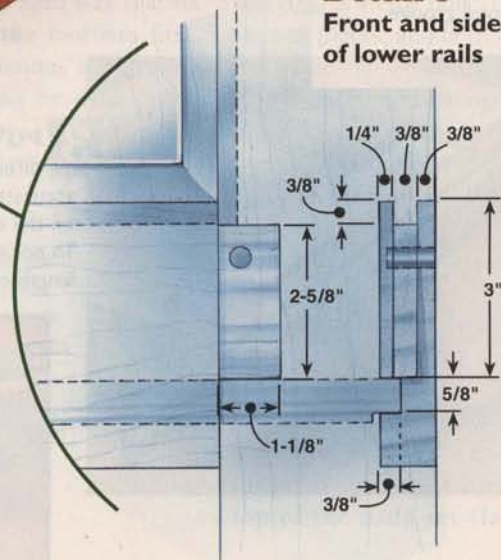


Detail 3
Cross section
of leg

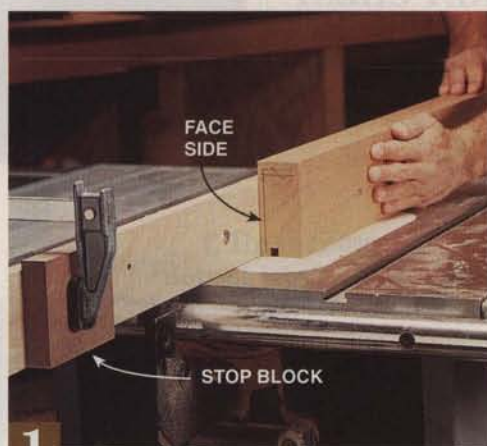


Detail 4
Front and side
elevation of
top rails

Detail 5
Front and side elevation
of lower rails



Detail 6
Cross section and
elevation of stiles



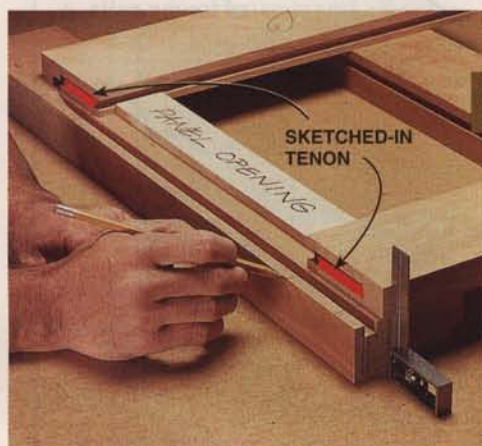
1

THE GROOVE'S THE THING. Its size and location determine where the mortises will go, so here's the place to start.



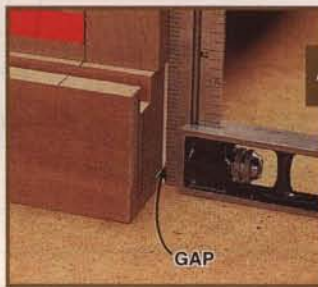
2

SAW ONE STOPPED GROOVE in each leg with a dado set. The end of the leg is marked with lines identifying the two face sides. Put the face side against the fence. Re-set the fence to the other side of the saw blade to cut the second groove.



3

PUT AWAY YOUR RULER and lay out the mortises directly from the rails. This is much easier and more accurate than using a bunch of numbers. Sketch in the tenon on the end of the rail and extend lines down onto the leg. To position the bottom rail, make a spacer that's the exact length of the panel opening and place it between the rails.

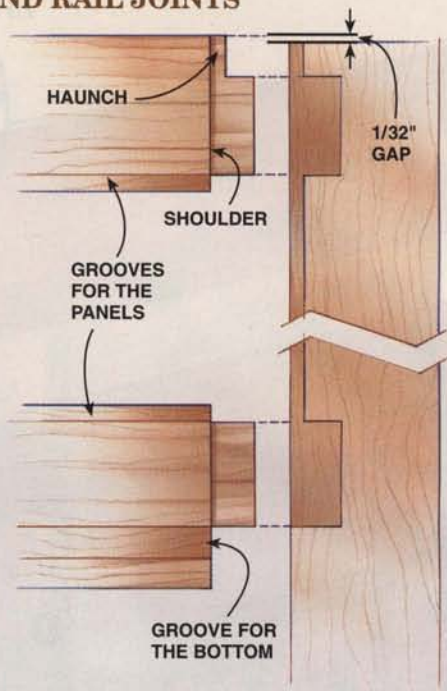


4

THE TOP RAIL should extend about $\frac{1}{32}$ -in. above the leg. This makes your life a whole lot easier because after glue-up you are able to plane the rail to meet the leg, rather than trying to plane the end grain of the leg.

FIG. B LEG AND RAIL JOINTS

These grooves define the width of both the tenon and the mortise. The haunch is the part of a tenon that fills in the groove.



Tools and Materials

You should have some experience milling rough lumber straight and square before tackling this project. You'll need a jointer and a planer to prepare the wood, a carbide-tipped stack dado set to cut grooves and tenons and a miter gauge you can trust to make square cuts. I prefer a mortising machine for its speed and accuracy, but you can use a plunge router or a drill press to cut mortises.

You'll need three different thicknesses of rough hardwood. I used

Pennsylvania cherry, which is easy to work and available in both rift and plain sawn boards (see Sources, p. 45). The legs are made of $8/4$ stock and require about 10 board feet of lumber. The rails and stiles come from $5/4$ stock and you'll need about 30 board feet. I used the straight grain of rift-sawn wood in the legs, rails and stiles to offset the plain-sawn top and panels, which required about 20 board feet of $4/4$ wood. I used about 12 board feet of white pine for the bottom boards and back panels



5

MORTISE THE LEGS. A mortising machine with a tuned-up bit and chisel (see p. 10) makes short work of these deep mortises. The groove locks in the chisel, producing a mortise with perfectly straight walls.



6

SET THE DADO BLADE HEIGHT for cutting the tenons. It should be even with the groove in a leg. Fine-tune the setting by trial and error. It's best to start out low and work your way up.



7

CUT A CHEEK on the face side of a test piece. Set the saw's fence to the length of the tenon. Take two passes across the tenon's face to remove all of the waste. Make sure the end of the rail is tight against the fence during the second pass.

5 WAYS TO SOUP UP YOUR MORTISER:

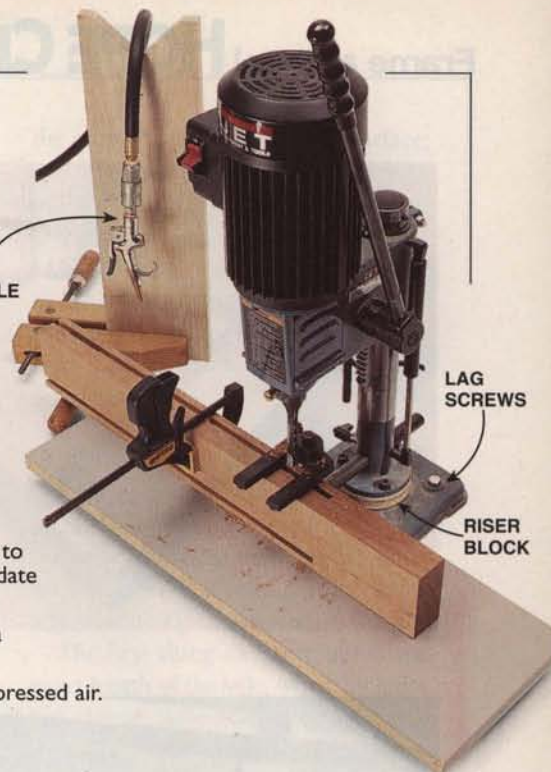
These machines can cut accurate mortises incredibly fast. Here are some tips to make a good machine even better for any project:

- Install a wider and longer support table.
- Fasten the machine to your workbench.
- Add a homemade riser block to the machine to accommodate wide legs and rails.
- Lock the work in place with a quick-action clamp.
- Blow out the chips with compressed air.

AIR NOZZLE

LAG SCREWS

RISER BLOCK



partially for economy, but mainly because I like the smell. Using rift-sawn wood, the total lumber cost is about \$400.

Begin by milling all the legs and rails to thickness, width and length (see Cutting List, p. 38). *Be sure to cut the rails to their overall length, which includes both tenons.* Mill the stiles to thickness and width, too, but leave them a bit long for now. Make a few extra short rails to use as test pieces down the road.

The Grooves

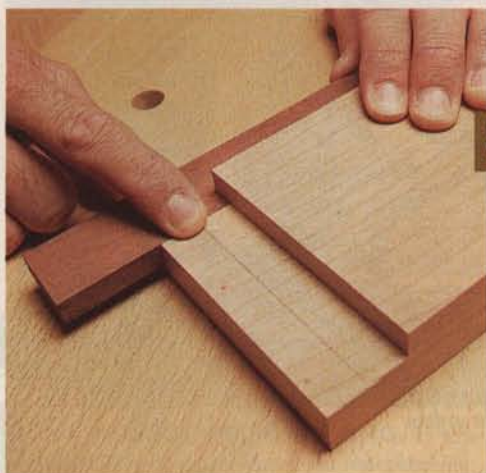
I've learned the hard way that it's best to make the mortises first, then size the tenons to fit them. Begin mortising by making the grooves, because they define the sides of the mortises. In addition,

the depth of the grooves defines one end of the mortises (see Fig. B). Notice how the bottom of the groove becomes the edge of a tenon (see inset photo, p. 37). In this project, the groove is "the thing itself" that'll guide your cuts.

Make the grooves on the table-saw with a dado set. It's a simple set-up: the groove is $\frac{3}{8}$ -in. wide, $\frac{3}{8}$ -in. deep and $\frac{3}{8}$ -in. from the fence (Fig. A, Detail 2). Mark the face side of each piece before you begin to cut. The face side always goes up against the fence. Groove one edge of all the rails, including the test pieces, and both edges of the stiles.

Cut one stopped groove in each leg (Photo 1). You'll have to limit the length of the groove because it stops at the bottom edge of the lower mortise (Fig. A). Clamp a stop block to a long auxiliary fence board.

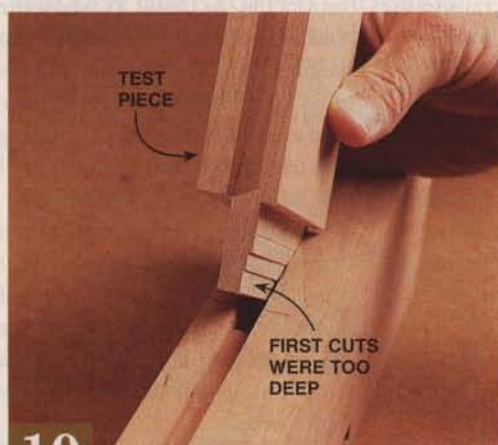
Reset the fence to the left side of the saw blade to cut the other groove in each leg. Use one of the legs as a measuring tool to position the fence. Unplug the saw, nestle the grooved edge of a leg right on top of the dado set (face side



8 CHECK THE ACCURACY of your cut by holding a tight-fitting stick of wood in the groove. Run your finger across the tenon and stick. They should be perfectly even.



9 SAVE THIS SETTING! You'll need it for cutting tenons on the stiles. Mark the position of your hand wheel to record the height of the dado set. Then lower the dado set and cut the back side of each tenon.



10 SIZE THE TENON by inserting the test piece into the mortise. If it takes a mallet to get the tenon into the mortise, the fit is too tight. If the tenon drops into the mortise with ease, it's too loose. The correct fit is somewhere in between. Adjust the height of the dado blade to find that fit, then cut the back side of all the tenons.

pointing to the left) and snug up the fence. Run the other face of each leg up against the fence when you cut the groove (Photo 2).

Next, cut the wider groove that holds the bottom in place (Fig. A, Detail 5). It will become the lower edge of a tenon. Use the top of the rail as your reference edge. The tenons on these lower rails fit exactly between the two kinds of grooves you've made (Fig. B).

The Mortises

Deepening parts of the grooves creates the mortises. Where exactly do the mortises go? Pick up any rail and you've got the information right in your hand.

Lay the top rail on a leg and you'll be using "the thing itself" (Photo 3). Place the rail so it barely hangs over the leg (Photo 4). Just follow the lines down from the grooves (Fig. B). Cut a piece of wood the length of the panel opening (Cutting List, p. 38) to precisely position the lower rail.

Once you've marked one leg, clamp all the legs together and transfer the mortise marks from the first leg to the others. Make the mortises $\frac{1}{8}$ -in. deeper than the length of the tenons (Photo 5).

The Tenons

Having made the mortises, cut the tenons to fit them. You won't have to measure. Simply use the parts you've got so far. To get started,

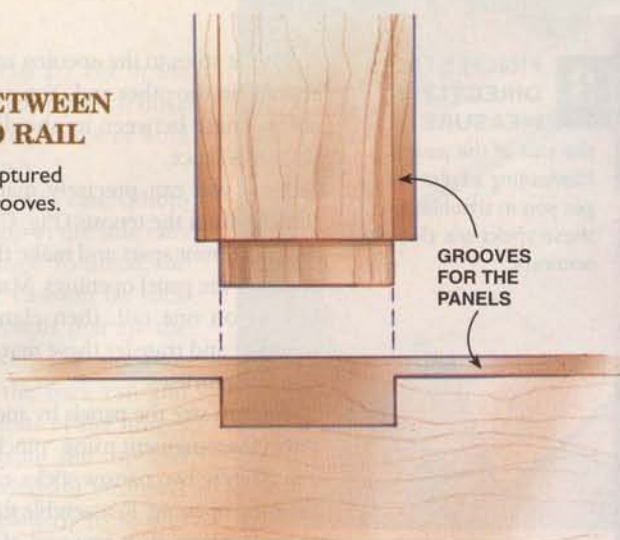


11 BANDSAW THE NOTCH that forms the haunch. A fence helps keep the cut straight, but you can also cut freehand, following a pencil line. Clamp a board onto the fence and raise it above the bandsaw's table. When the waste piece falls out of the notch, it will slide underneath the board and won't get trapped between the blade and the fence.

FIG. C

JOINTS BETWEEN STILE AND RAIL

This tenon is captured between two grooves.



the groove; adds more gluing surface; and widens the tenon to fight racking of the case. It's great. I use a haunched joint in table legs, too.

Finish the legs by beveling the inside corners (Fig. A, Detail 3). Tilt the blade away from the fence at a 15-degree angle. Clean up the saw marks on the jointer.

The Stiles and Panels

There's one more fussy operation to do, and that's fitting the stiles between the rails. You might think this is asking for trouble, but it only takes a minor adjustment of your fence to get it right.

The first thing to figure out is the exact length of the stile, which includes two tenons. Assemble the front of the chest, without glue, by clamping together two long rails and two legs. Measure the opening and add the length of the two tenons (Fig. A, Detail 6). You can do this without a ruler by marking directly on a stile.

Cut all the stiles to length. Then cut a complete tenon on *one end* of each stile. Because you recorded the two heights of the dado set to make a tenon, this should be easy. If you use all the dado chippers, add a wooden face to your fence.

Oops!

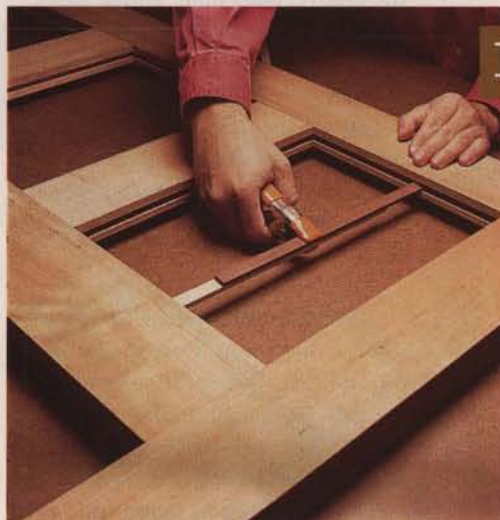


We accidentally cut off the haunch on one tenon. Here's an easy fix: You can insert a new one! Cut a dado right in line with the tenon and glue in another haunch.



12

LAY OUT THE MORTISES in the long rail directly from the stiles. Cut spacers that are the width of the panel opening and place them between the stiles. Then draw a pencil line along the side of each tenon.



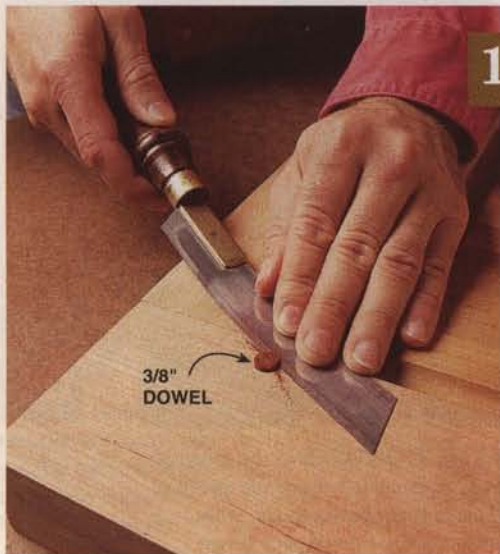
13 PINCH STICKS DIRECTLY MEASURE

the size of the panels. Misreading a ruler can get you in trouble, but these sticks are always accurate.



14 PLANE THE TOP RAIL

flush with the leg after you glue up the chest's front and the back. This beats planing down the end of a leg to meet a rail!



15 CUT OFF THE DOWEL PINS

that lock the joints with a Japanese-style flush-cutting saw (see Sources, at right). Its teeth have no set, so they won't cut into the wood around the pins. Glue the pins in the front and back assemblies and saw them flush before you glue up the entire case.

Fit the stiles to the opening when you cut the tenons on the other end. You can fine-tune the stile's length between its shoulders by moving the saw's fence.

Now you can precisely mark the mortises directly from the tenons (Fig. C and Photo 12). Take the front apart and make three spacers the width of the panel openings. Mark alongside the tenons on one rail, then clamp all the rails together and transfer these marks across them. Cut the mortises.

You can size the panels by another method of direct measurement using "pinch sticks" (Photo 13). They're two narrow sticks, each a bit shorter than the opening. Reassemble the front with the stiles in place. Butt one end of each stick into opposite grooves and pinch them together with a small spring clamp. Wiggle the pinch sticks out of the opening and you've got another "thing itself."

Cut the panels $\frac{1}{16}$ -in. smaller in width and height than the length of the pinch sticks. Shape the panels with a $\frac{3}{4}$ -in.-dia. round-nose bit on a router table equipped with a tall fence (Fig. A, Detail 2. Also see AW #73, p. 39 for more information on raising panels and Sources, at right for the bit). Sand and apply a finish to the outside of the panels before you glue up the case.

The Top and Bottom

The bottom is notched around the legs. Don't mess around with measuring angles to make the notches. Here's a direct method:

Put the whole chest together without glue to figure out exactly how big the bottom needs to be. Measure from the bottom of one groove to the opposite groove as you did for the panels. Make the bottom from three loose boards connected by tongue and groove joints (Fig. A, Detail 2). Cut the bottom boards to length and width, put them together on a flat surface and place the chest on top of them. Scribe around the legs onto the bottom, remove the bottom from under the chest and cut out a notch in each corner on the bandsaw (Fig. A).

Glue up the top and cut it to fit the chest. Rout a molding on the front edge and ends, but not the back (Fig. A, Detail 1).

Assembly

Glue up the front and back. Plane down the top rails so they're even with the legs (Photo 14). Cut the double-deep mortises for the hinges on

the back rail (Fig. D). Set in the dowel pins and cut them off flush (Photo 15). Plane, scrape or sand all the joints flush.

Glue up the entire case (Photo 16). Plane the top of the side rails even with the legs. To install the hinges, lay the case on its back supported by boards that are the same thickness as the top. Butt the top up to the back rail and mark the positions of the hinges (Photo 17). Install the top and add spring-loaded lid supports (see Sources, below right) to prevent the top from squashing a kid's fingers as it closes.

Cherry naturally darkens with age, especially under a thin finish. Patience, rather than stain, will yield the best results. If you oil your chest it will turn a beautiful deep color in a year or two. You can leave the interior of your chest unfinished, or use shellac or wax to avoid unpleasant odors. **AW**



16 SLIP IN THE BOTTOM

BOARDS during the final glue up. They fit in a groove that goes all the way around the inside of the chest. Tongue and groove joints hold the boards together so you don't have to glue them to each other.

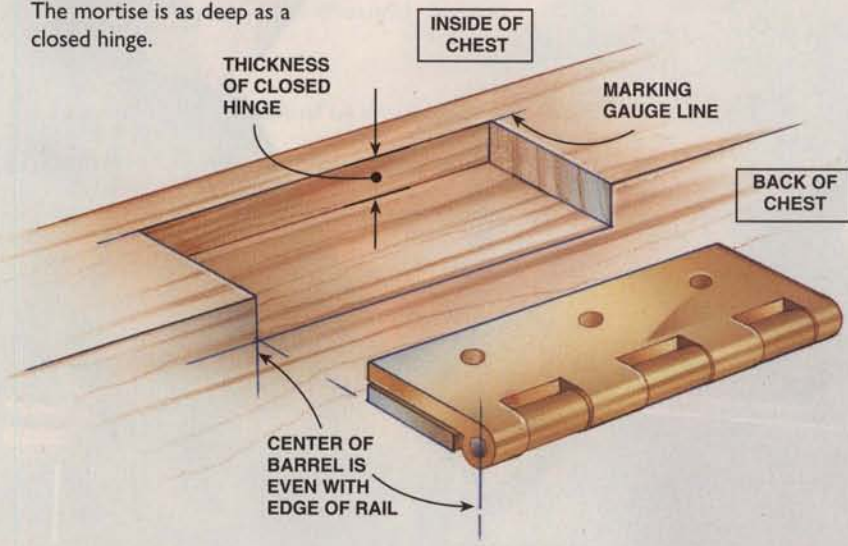


17 POSITION THE HINGES

on the top and mark the screw holes with an awl. Each hinge sits snugly in a mortise that's as deep as the thickness of a doubled-over hinge, so there's no need to mortise the top.

FIG. D DETAIL OF HINGE MORTISE

The mortise is as deep as a closed hinge.



Sources

LUMBER:

Pennsylvania cherry: Groff and Groff Lumber, (717) 284-0001

Cherry dowel rod, #50B02; \$1.50: Woodcraft Supply, (800) 225-1153

Router bits, 1/2-in. shank size: 3/4-in. dia. Round-nose, #747; \$17 Round-over, #655; \$17

Tongue and groove, #7844; \$40: MLCS, (800) 533-9298

HARDWARE:

Hinges: 01B01.07; \$22/pr.

Lid Support: 03K20.06; \$4:

Lee Valley, (800) 871-8158

(Be sure to ask for installation instructions.)

TOOLS:

Flush-cutting saw, #126296; \$16:

Woodcraft Supply, (800) 225-1153

IS YOUR Shop Too

ART DIRECTION: IDEL SPIES • PHOTOGRAPHY: BILL ZUEHLKE • ILLUSTRATION: DAN WESTERBERG



Small?

Tips for making king-size projects in a pint-size shop.

In a recent poll of woodworkers, the most common complaint, by far, was that their shops were too small. Even one guy with 5,000 square feet thought he was cramped!

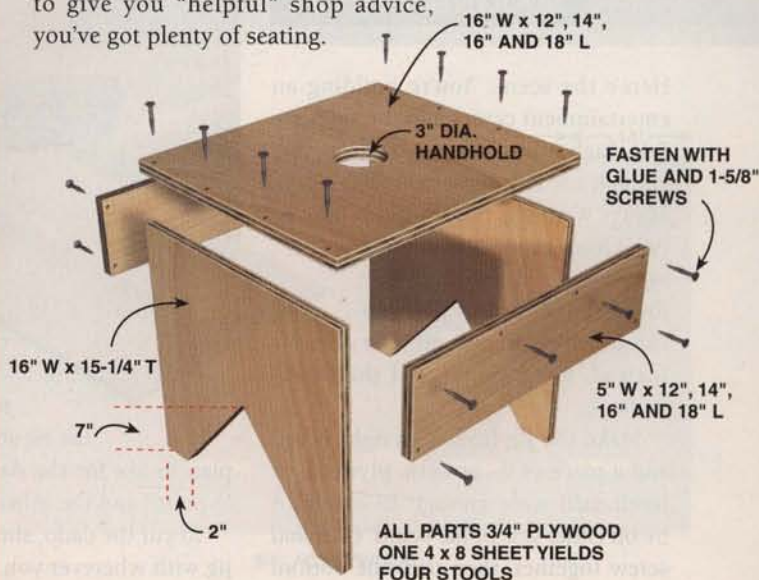
In spite of that, most of us would like to be able to turn out dining room tables, kitchen cabinets and other big projects. Well, if your shop and tools are small, but your dreams are gigantic, here are some ideas that will help.

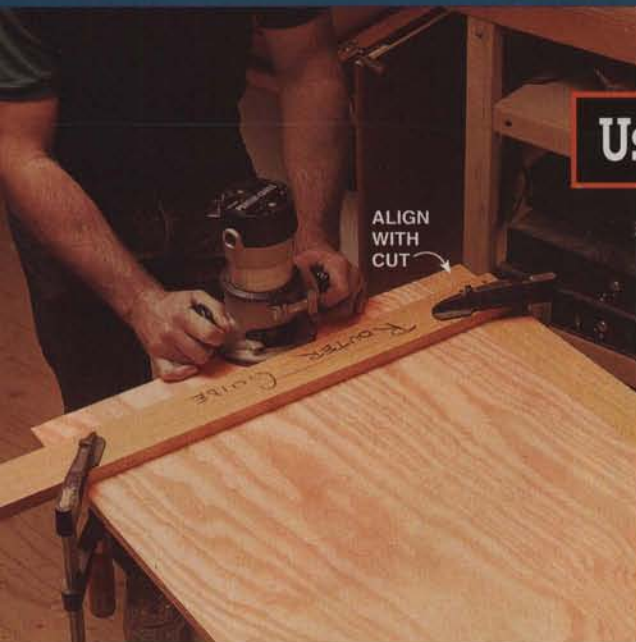
by George Vondriska



A Nest Of Crickets

Call them low boys, stools or crickets—whatever you call them, these stands are amazingly useful. And because they nest, they're perfect for a cramped shop. You can make four of them out of one sheet of $\frac{3}{4}$ -in. plywood. The 16-in. height is just right for large work that might not fit on normal sawhorses. For working around the house, that extra height makes it easy to reach the ceiling. If that's not reason enough, when your buddies come over to give you "helpful" shop advice, you've got plenty of seating.



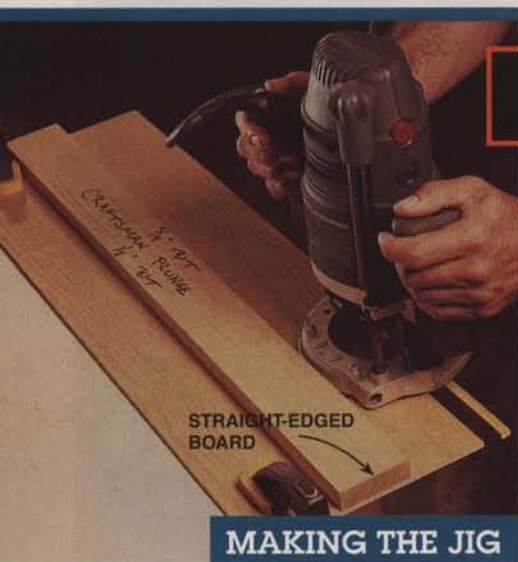


Use a Router for Crosscuts

Ever tried to trim the ends on an 8-ft. dining table in a shop that's only 9-ft. wide? The trick is to use a router instead of your table-saw. Rough-cut the top with a circular saw or jig saw first, using a fine blade to avoid splintering. Then use a simple T-square jig and a router with a straight bit to trim the work to length.

Note that one leg of the T-square has already been trimmed by the router, so you can simply line up that end with

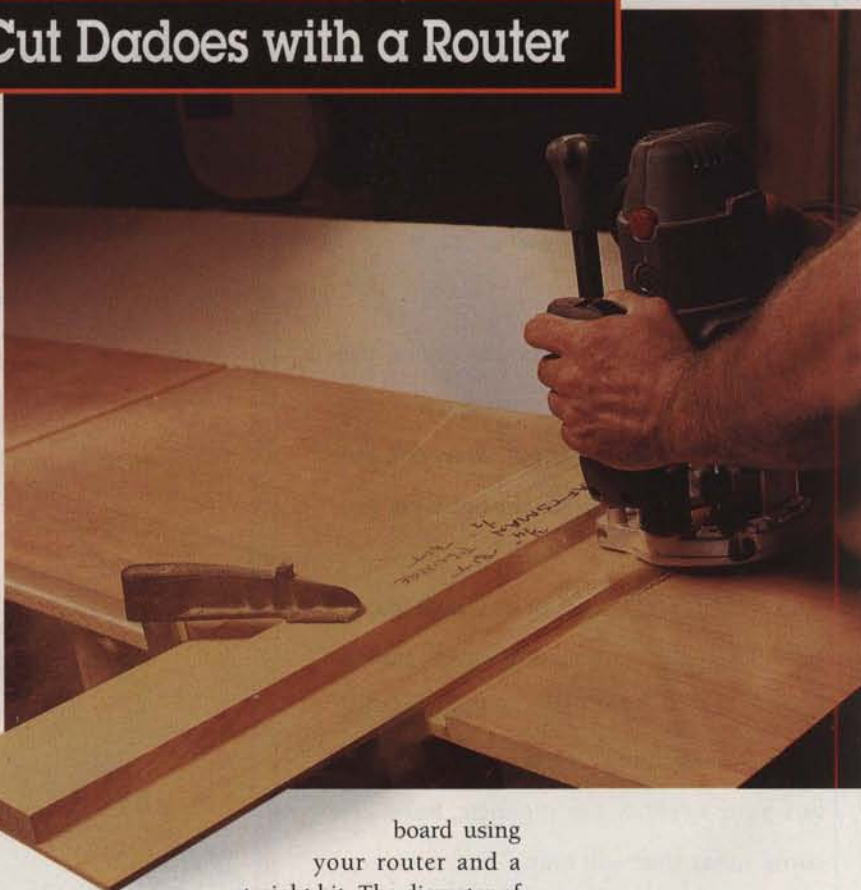
your cutting line. Hang on to the jig and use it only with that router and bit. I once made a bunch of cabinets without using a tablesaw at all. I simply rough-cut the pieces with a circular saw (see p. 50), then trimmed them to final size with a router.



Cut Dadoes with a Router

Here's the scene: You're building an entertainment center and the sides are 7-ft. high and almost 3-ft. deep (big enough for that big-screen TV you've always wanted). But the sides have to be dadoed for shelves. Forget trying to use a dado head on the tablesaw, unless you happen to have 8-ft. rails on your saw! Instead, use a router and this easily made jig:

Make the jig from a straight board and a piece of $\frac{1}{8}$ - or $\frac{1}{4}$ -in. plywood or hardboard wide enough to extend 4 in. on either side of the board. Glue and screw together, then trim the bottom



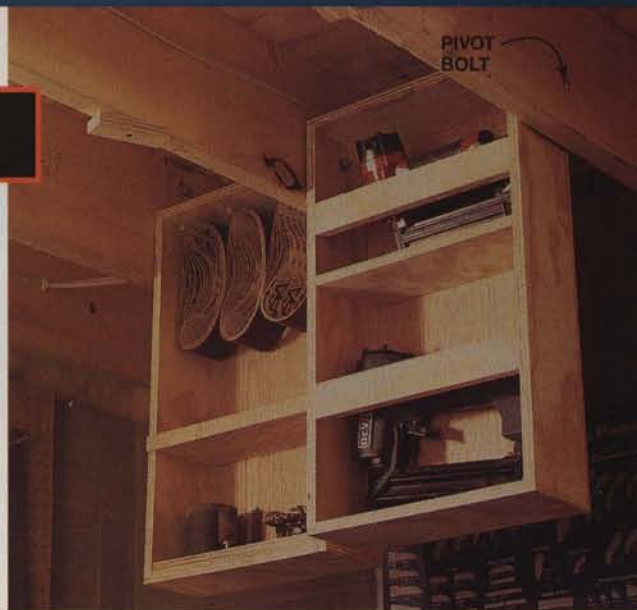
board using your router and a straight bit. The diameter of the bit should be whatever size you plan to use for the dado. I trim one side with a $\frac{1}{2}$ -in. bit and the other side with a $\frac{3}{4}$ -in. bit.

To cut the dado, simply line up the edge of the jig with wherever you want the dado.



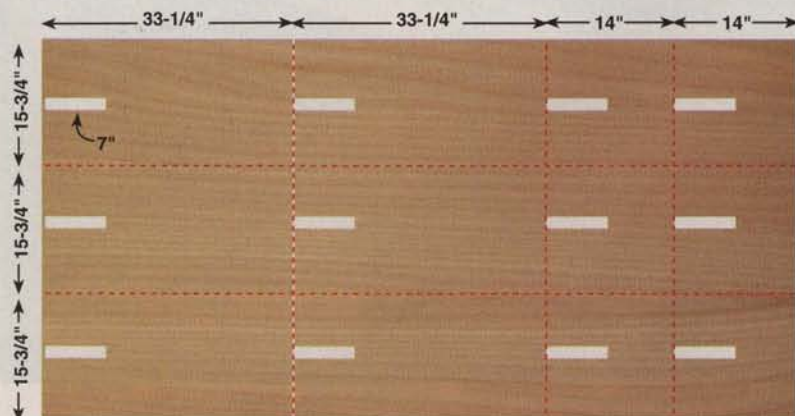
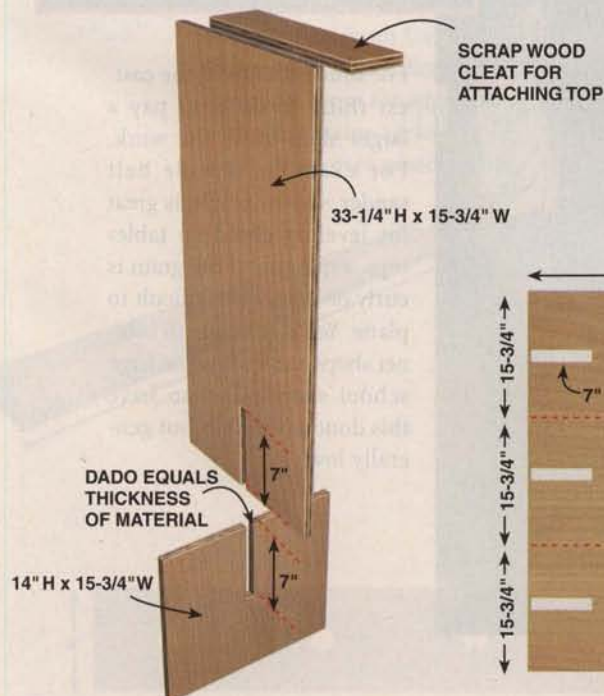
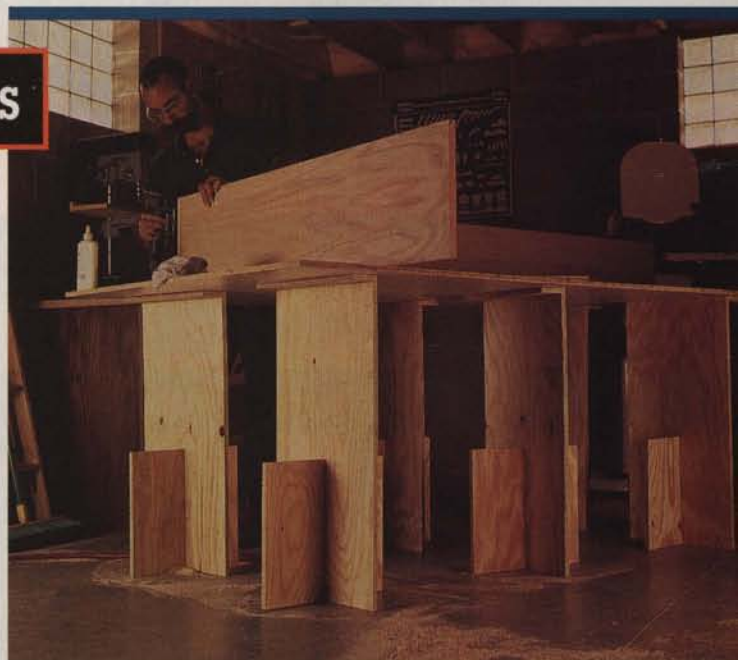
Ceiling Drawers

To eke out every cubic inch of storage in a basement shop, try these boxes that hang between your ceiling joists. When a drawer is down, you have easy access to its contents. A lag screw or bolt works well for a pivot and a pair of pivoting cleats holds each drawer in place. They're perfect for tools and supplies you don't need to get at all the time.

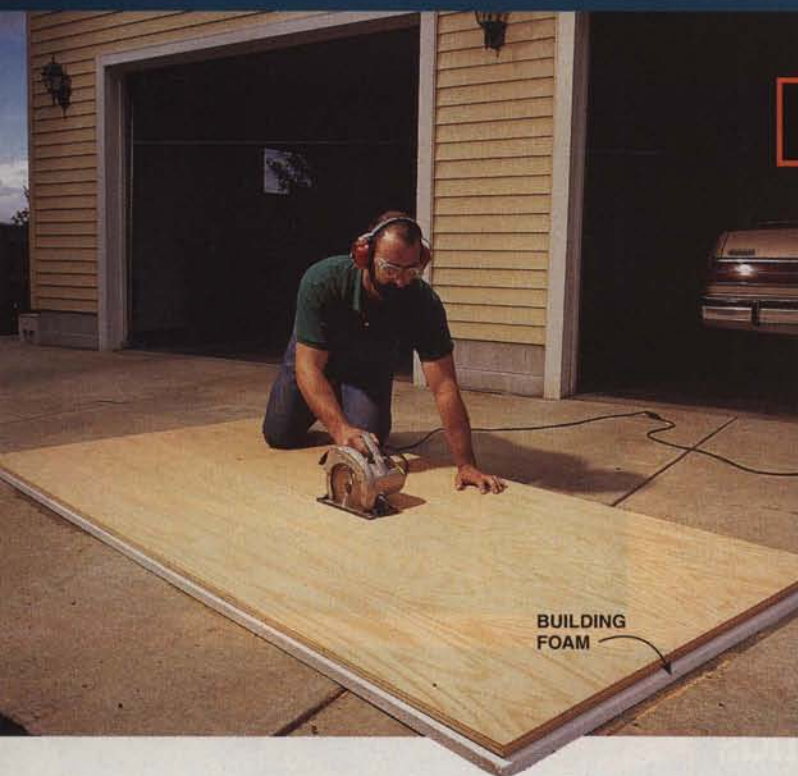


Collapsible Work Stands

In a small shop, the more things that can be folded up and moved out of the way, the better. These work stands are easy to build, easy to store and cheap. They're especially good for finishing and gluing up panels. One sheet of $\frac{3}{4}$ -in. AC plywood will yield six stands. If you make them the same height as your tablesaw they will double as infeed and outfeed supports.



$\frac{3}{4}$ " AC PLYWOOD



Rough-Cut Plywood

It's awkward to manhandle plywood in a small shop and sometimes your cuts aren't accurate just because the sheets are so unwieldy. One solution is to rough-cut the pieces with a circular saw and then make final cuts on your tablesaw. Lay the plywood on top of a piece of building foam, use a fine-tooth blade in your saw and set the saw so it cuts just $\frac{1}{8}$ -in. deeper than the plywood. Then simply kneel on top to cut. It's much easier than sawhorses.

Make sure that you leave a factory edge on each piece that you cut. Although you may have to trim it off later, it's essential as a reference for your first cut on the tablesaw.

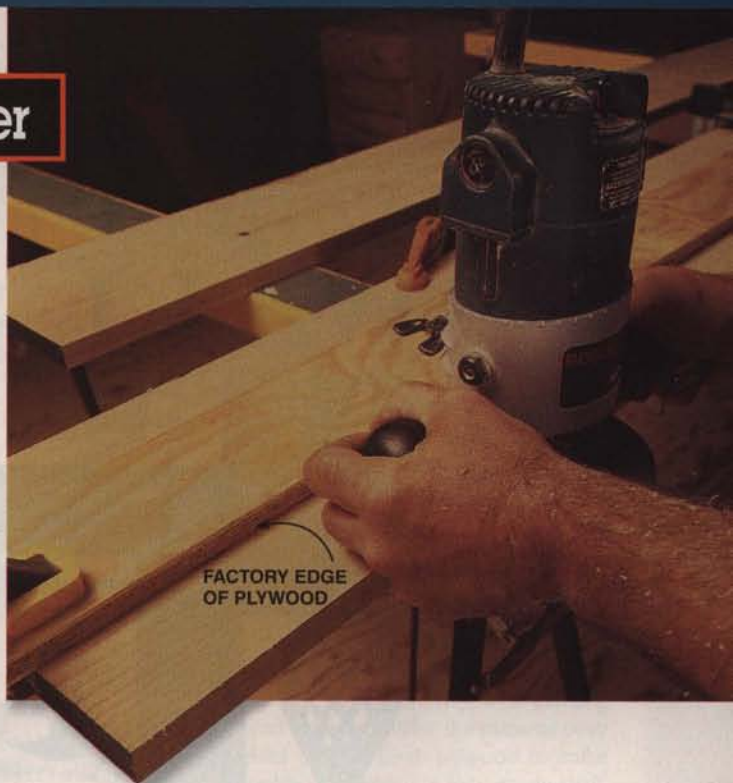


Pay for Service

For some situations, the easiest thing to do is to pay a larger shop to do the work. For example, a wide belt sander, shown at left, is great for leveling glued-up table-tops, especially if the grain is curly or otherwise difficult to plane. You'll find one in cabinet shops and even some large school shops. Cost to have this done is variable, but generally low.

Joint Edges with a Router

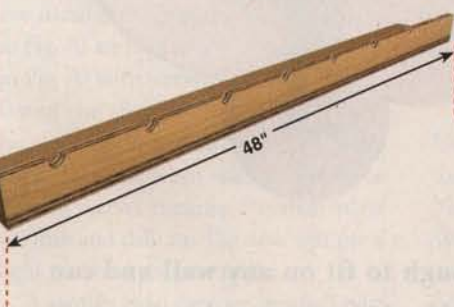
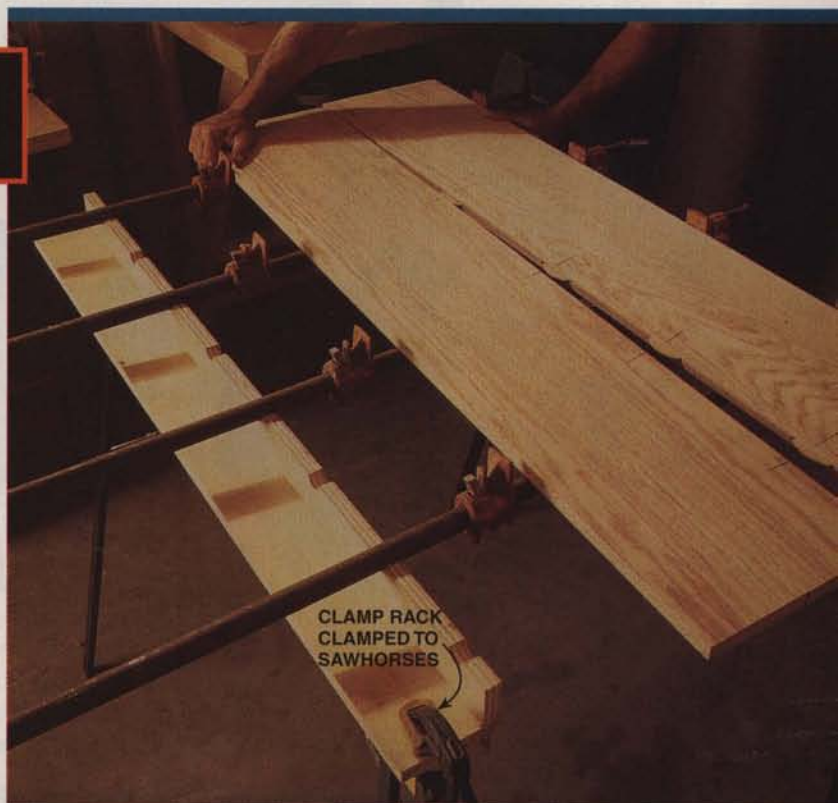
Trying to joint the edges of 8-ft. long by 1½-in.-thick hard-maple boards on a small jointer can end in disaster. Use a router, guided by a long straightedge, instead. The factory edge on a piece of hardwood plywood is sufficiently straight. Clamp the straightedge to the board so you're removing about ⅛ in. Use a straight ½-in. or ¾-in. bit with a guide bearing above the bit (available from mail-order sources like Jesada Tools, 800-531-5559; around \$30).



Easy-to-Store Clamp Racks

In a small shop, there's no room for a dedicated glue-up table, and often no room for much of an assembly table either. But you can make room for edge gluing with these clamp racks that fasten to sawhorses when needed.

AW



1. DRILL HOLES SAME DIA. AS PIPE CLAMPS
2. RIP IN HALF
3. FASTEN TO CLEAT

SWEDISH WALL SHELF

By DAVE MUNKITTRICK



Here's a charming shelf that's small enough to fit on any wall and can be built in an afternoon. It makes a great gift and it's easy to make a bunch all at once. While the design is based on a 19th-century Swedish-American clock shelf, its use today is limited only by your imagination. Kitchen spice shelf, photo display shelf, knickknack shelf—it's great for just about anything, except maybe encyclopedias!

GETTING STARTED

You'll need a scroll saw to cut out the parts for this project. In a pinch a band-saw could do the job, but you'll have a lot more sanding to do on the edges. Because the parts for this shelf are small enough to fit around knots and defects, you can save some money by ordering a lower grade of wood called #1 or #2 common. We used #1 common butternut for our shelf and paid \$1.98 a board foot versus \$3.24 for select grade. Plan on three board feet per shelf.

Photocopy the templates in Fig. B, then transfer the pattern to your blanks with a hot iron (Photo 1).

MAKING THE PARTS

Lay out the shelf pieces on your wood (Photo 2). If you're thinking of making several shelves at once, stack up to three of your blanks using 1/2-in. square pieces of double-stick tape (see Sources, p. 54). Be careful when taking the stacked pieces apart after sawing because the double-stick tape is strong enough to take some wood with it. To avoid any problem, dribble some mineral spirits between the layers to dissolve the adhesive before separating them.

Cut out the shelf parts on a scroll saw (Photo 3). Finish-sand all your pieces before assembly. It's a lot easier to sand flat pieces now rather than trying to get into a bunch of small corners later. Begin with 120-grit paper and work your way up to 320-grit.

PUTTING IT ALL TOGETHER

For maximum strength, the brackets (C in Fig. A) are held onto the wall panel (B in Fig. A) with screws. Nails are used to fasten the shelf (A in Fig. A) to the brackets because their holes are easily filled. Take care when nailing, drilling or driving screws because the shelf parts are thin and delicate. Go slow and use a light touch to prevent splits.

Assembly is an exercise in small-part management. Trying to do without clamps may seem quicker, but you'd have to be built like an octopus to pull it off. The entire assembly can be done with the wall panel lying flat on your

bench and using a simple 2x4 as a clamping aid. Here's how:

1. Square up the edges of a 2x4 and cut to 7 7/8-in., then clamp the brackets to the ends of the 2x4 (Photo 4).
2. Use a tape measure to center the brackets on the *back* of the wall panel, then mark their location (Photo 4).
3. Turn the wall panel over and center the bracket assembly on the *face* of the back panel. Place the shelf on your bench so that one bracket overhangs the edge (Photo 5).
4. Drill two 3/32-in. pilot holes and fasten with two #6 x 1-in. screws (Photo 5). To avoid stripping out the holes, drive the screws by hand.
5. Turn the piece around and repeat step 4 for the other bracket.
6. Slide the wall panel assembly back onto your bench. Center the shelf, top-side down, on the brackets. Then, trace the bracket's outline onto the shelf.
7. Turn the shelf right-side up and re-center the brackets. Then, use a clamp to secure the shelf to the 2x4 block (Photo 6).
8. Use the bracket outlines as a guide and drill two 1/16-in. pilot holes through the shelf into each bracket. Be sure to place the holes where the brackets are wide enough to accept the screw. Drill three holes along the back edge of the shelf for nailing to the wall panel.
9. Run a small bead of glue along the top edge of the back panel and nail the top to the brackets and wall panel (Photo 6).
10. Attach the valance (Photo 7).

FINISHING TOUCHES

Use 320-grit sandpaper to do a little touch-up sanding and ease the edges. Now you're ready to finish. We used Watco medium walnut oil for the finish and Behlen Fil-Sticks to fill the nail holes (see Sources, p. 54).

Now, attach a couple wall hangers to the back and you're ready to hang your shelf! You just need to find the perfect spot, "...a little to your left...a little lower...try more to the right...."

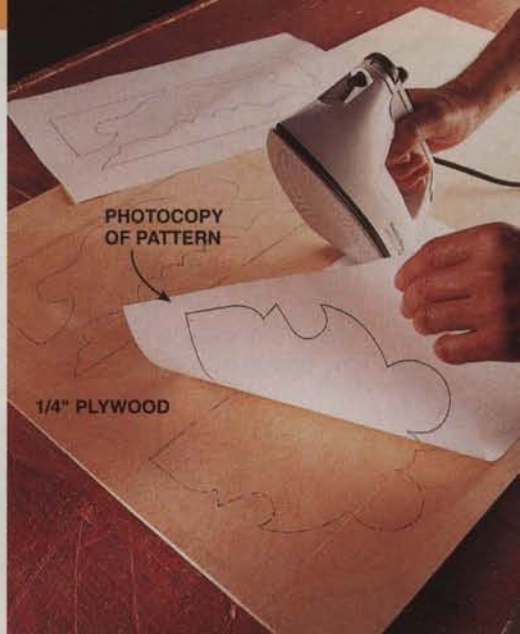


PHOTO 1

IRON ON A PHOTOCOPY of the patterns using a household iron set on high with no steam. If you're building several shelves at once, transfer the patterns onto a piece of 1/4-in. birch plywood to make reusable templates. Or, for a single shelf, spray some low-tack mounting adhesive (#SL66; \$6.45; Constantine's, (800) 223-8087) on the back of each paper pattern and stick it right onto the wood.

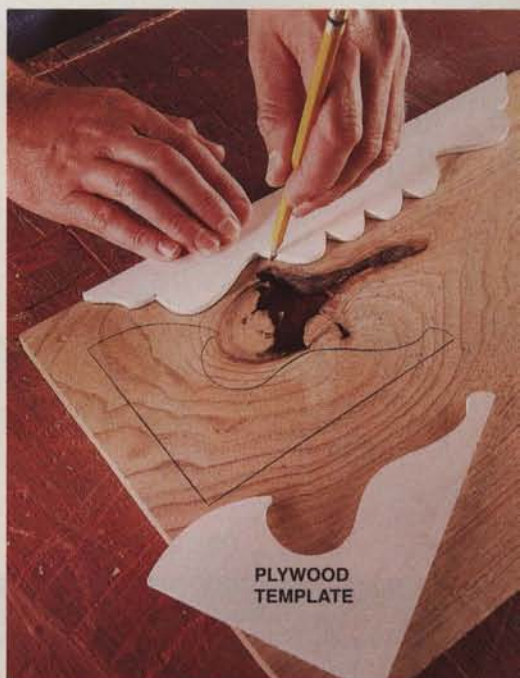


PHOTO 2

TRACE THE OUTLINE of your template onto the wood. Take advantage of grain patterns around knots that follow the shape of your piece.

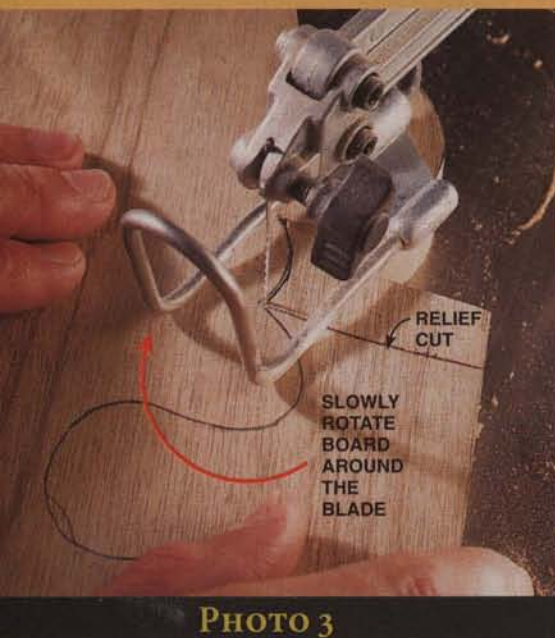


PHOTO 3

CUT OUT THE PIECES on the scroll saw. For tight inside corners like this use what's called a "zero-radius" turn. Here's how to do it: Cut all the way into the corner, then rotate the piece around the blade by letting the teeth slowly nibble away as you complete the turn. If you've never done a zero-radius turn before you can always make relief cuts into the corners to give your blade more room.

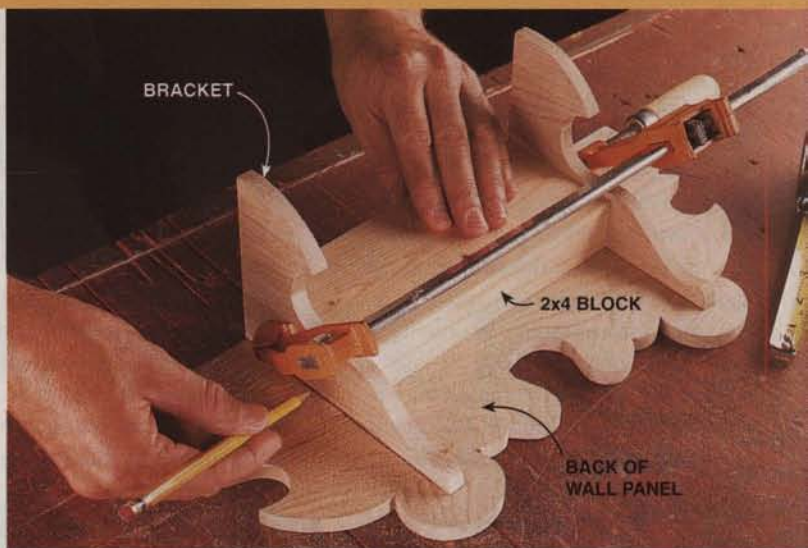
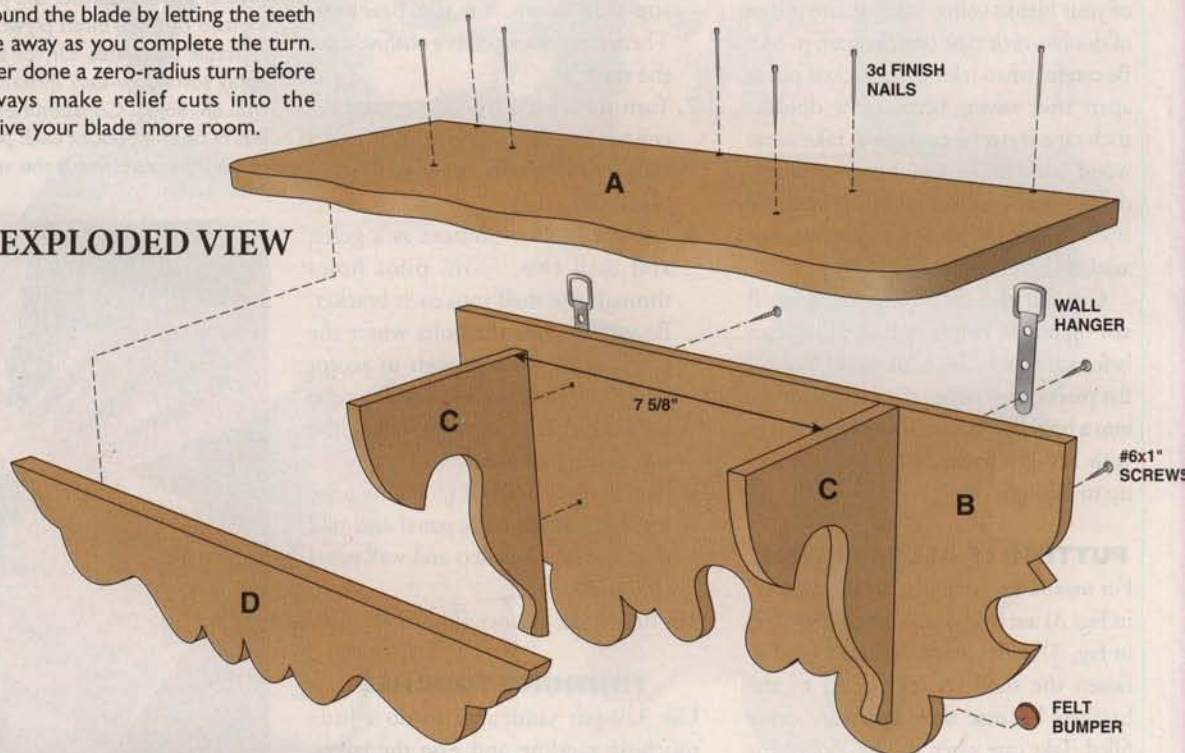


PHOTO 4

OUTLINE THE SHELF BRACKETS onto the **back** of the wall panel. This will show you exactly where to drill the pilot holes for the screws.

FIG. A EXPLODED VIEW



CUTTING LIST

OVERALL DIMENSIONS: 7 1/16" H x 16" W x 6" D

Part	Name	Qty.	Dimensions
A	Shelf	1	7 1/16" x 6" x 16"
B	Wall Panel	1	7 1/16" x 7" x 15"
C	Brackets	2	7 1/16" x 4 1/4" x 6 1/4"
D	Valance	1	7 1/16" x 2 1/8" x 12 3/4"

Materials: 3 board feet #1 butternut, approx. \$6.

SOURCES

Double-Stick Turning Tape, 15D25; \$14.99; Wall Hangers, 27K03; \$2.75; Woodcraft Supply, (800) 225-1153. Watco Danish Oil, 19.31.49; \$7.99; Highland Hardware, (800) 241-6748. Behlen Fil-Sticks, FLS25; \$2.45; Constantine's, (800) 223-8087.

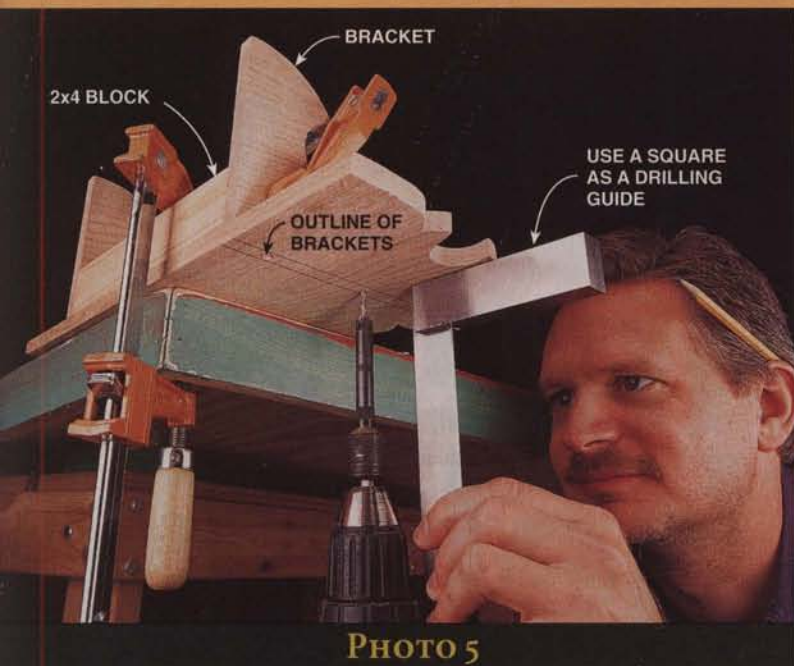


PHOTO 5

DRILL AND COUNTERSINK pilot holes through the back panel and into the shelf brackets. Use a second clamp to hold the assembly onto your workbench. Use a square to help guide your drill and place the holes where the brackets are widest (see Fig. A).

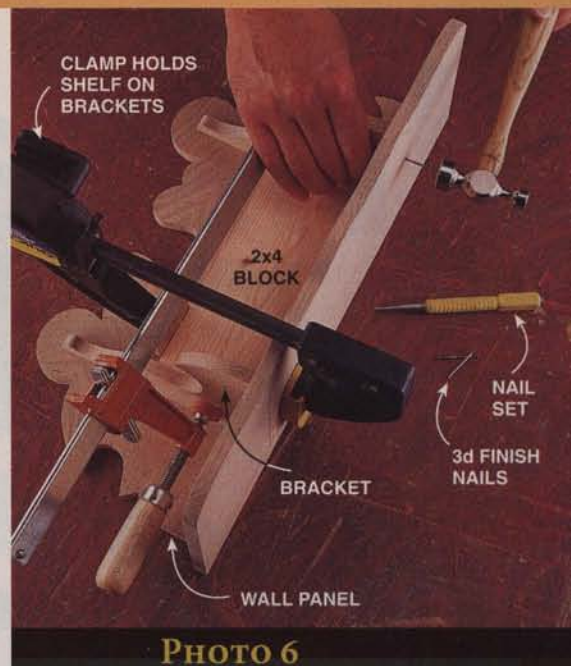


PHOTO 6

NAIL THE TOP to the brackets with 3d finish nails. Use a small hammer and tap (don't drive) the nail into the bracket. Use a nail set to countersink the nail heads.

FIG. B TEMPLATES

MAKE A PHOTOCOPY of these templates at 200 percent enlargement (you'll need a copier that handles 11 x 17-in. paper). Then, take the enlargement and cover one of the images with a piece of white paper and photocopy again at 200 percent (400 percent total enlargement). Remove the paper, cover the other image and photocopy. Set the tone scale as dark as it can go without causing gray shadows on the white background. This will ensure a heavy coat of toner for transferring onto your template stock.

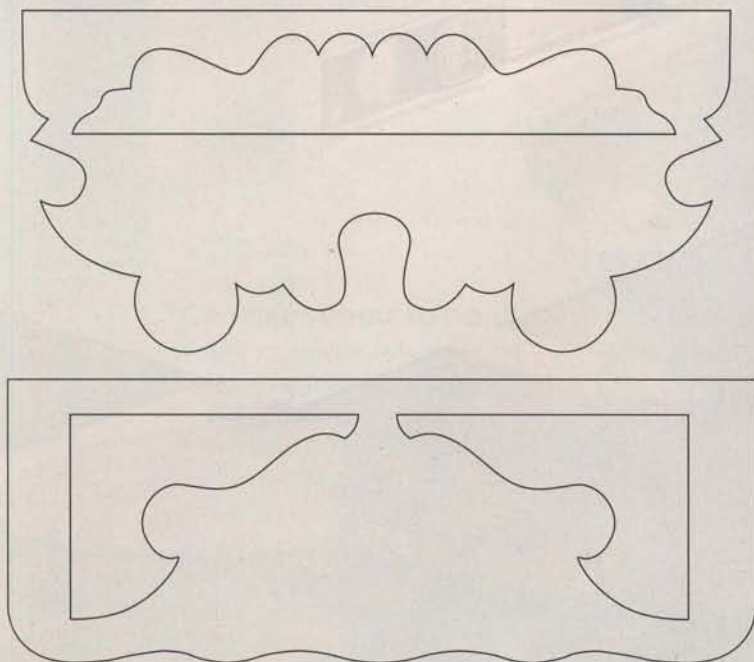


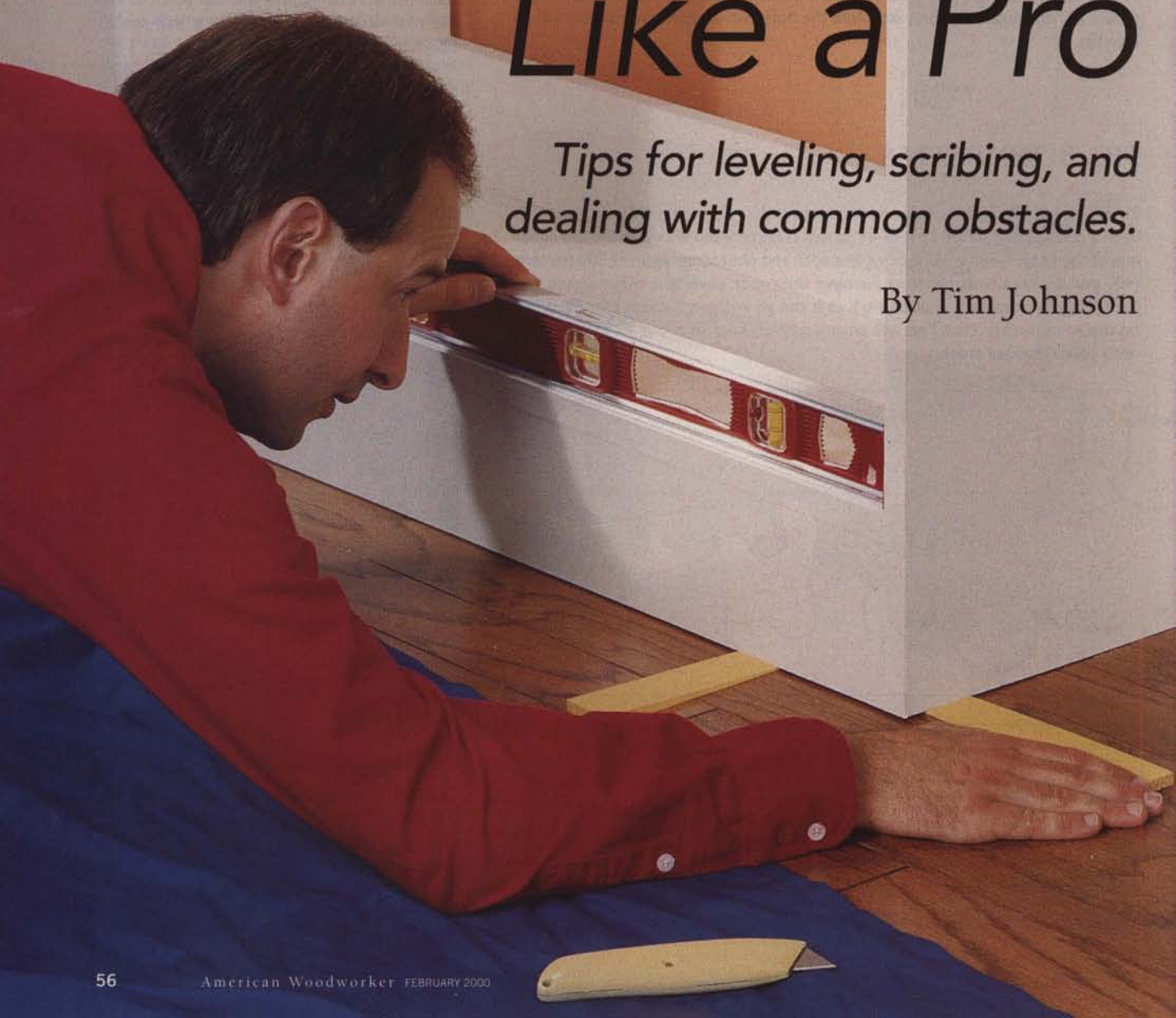
PHOTO 7

CLAMP THE VALANCE onto the underside of the top with spring clamps. Use a thin bead of glue to minimize squeeze out. A damp cloth can be used to wipe away any excess glue before it sets. **AW**

Install Cabinetry and Shelving *Like a Pro*

*Tips for leveling, scribing, and
dealing with common obstacles.*

By Tim Johnson



Does the thought of installing a built-in cabinet make you queasy? You're not alone. Many woodworkers skilled at building free-standing pieces balk when it comes to built-ins. In the workshop, keeping things square assures a good fit and a satisfying result. But in the world of built-ins, square things may have to fit into round holes.

Level, Then Scribe

In the old days, cabinets were literally built in place. Today, built-ins are usually brought to the site partly or completely assembled. They're designed with extra material, called "scribe," added wherever there is a visible joint between the cabinet and the wall, floor or ceiling. This means the stiles, cabinet sides and toe kicks are made extra wide and tops oversized so they can be trimmed. When it's necessary, one or all of

these parts are left off the cabinet until it is installed.

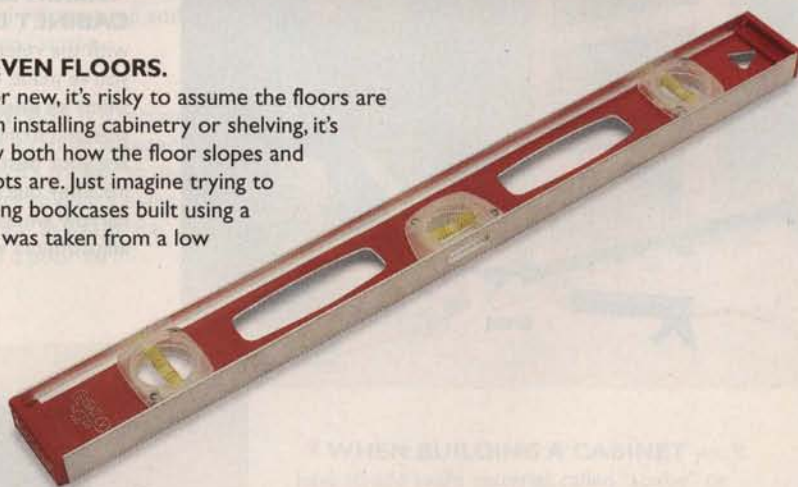
Knowing where to add scribe material and deciding which pieces to leave loose are two critical design elements that are determined in the planning stage. Learning two techniques, how to level a cabinet and how to scribe pieces to fit, will prepare you for most installations.

First map out the location, checking for plumb, level and square. Make a sketch with exact measurements. On it, indicate corners that are out of square and walls that aren't plumb. Then design the project to fit inside this space, bearing in mind that the cabinet box(es) will be installed first, leveled, scribed and anchored. Pieces purposefully left off, like the top, are then scribed to fit and added, resulting in a neat, built-in appearance.

FIRST GET THINGS LEVEL

MAP OUT UNEVEN FLOORS.

In any house, old or new, it's risky to assume the floors are level and flat. When installing cabinetry or shelving, it's important to know both how the floor slopes and where the high spots are. Just imagine trying to install floor-to-ceiling bookcases built using a measurement that was taken from a low spot in the floor!

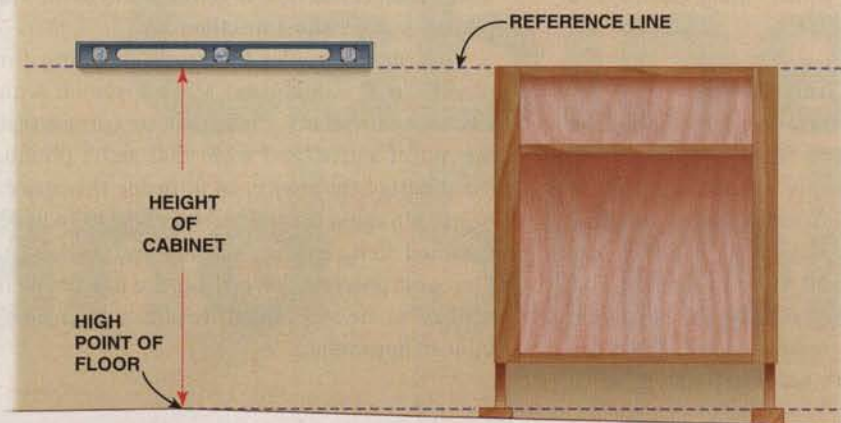


► **HERE'S WHAT TO DO:** Use level and straight 2x4s to find the highest spot on the area of floor that will be underneath your built-in. Level one 2x4 at the cabinet's back and a second one parallel to it at the cabinet's front. Find the highest point by leveling across these 2x4s front to back. Transfer this point to the wall and use it as a reference for further measurements.



Install Cabinetry and Shelving

FIG. A Installing Cabinets on a Sloping Floor

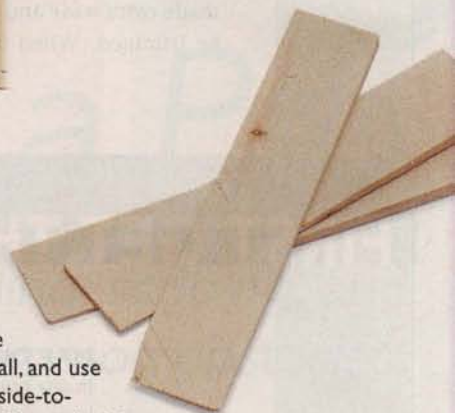


◀ **LEVEL A ROW OF MODULAR CABINETS** using a reference line. On a sloping or uneven floor, trying to keep modular cabinets aligned as you level is frustrating and difficult without one. Mark the height of the cabinet on the wall, measuring up from the high point of the floor. Then draw a level line extending the length of the cabinet run.



◀ **ALIGN EACH CABINET BACK**

with the reference line you've made on the wall, and use shims to bring it level side-to-side and front-to-back. Shims (right) are your best friends when installing built-ins. They quickly stabilize a cabinet and their narrow wedge shape allows for minute adjustments when leveling.



INSTEAD OF LEVELING many individual modular cabinets, another option is to make a separate base that spans the entire run. That way you only have to level one unit. Fasten it to the floor after leveling side-to-side and front-to-back, then attach cabinet boxes on top. It doesn't matter what you use to make the base—after leveling, everything gets hidden behind a toe-kick made from 1/4-in. plywood. You can scribe this piece to the floor or use a quarter-round molding to cover any gaps.



THEN SCRIBE TO FIT

POTENTIAL TROUBLE LURKS at any visible joint between a cabinet and a wall. Walls are rarely plumb or flat, so gaps between them and the cabinet are likely. Eliminate these gaps by transferring the contours of the wall onto the cabinet so you can cut it to fit. This is called scribing. For a precise fit, it's important the cabinet is exactly positioned and leveled before you scribe it. After scribing, cut, plane or sand to the line.

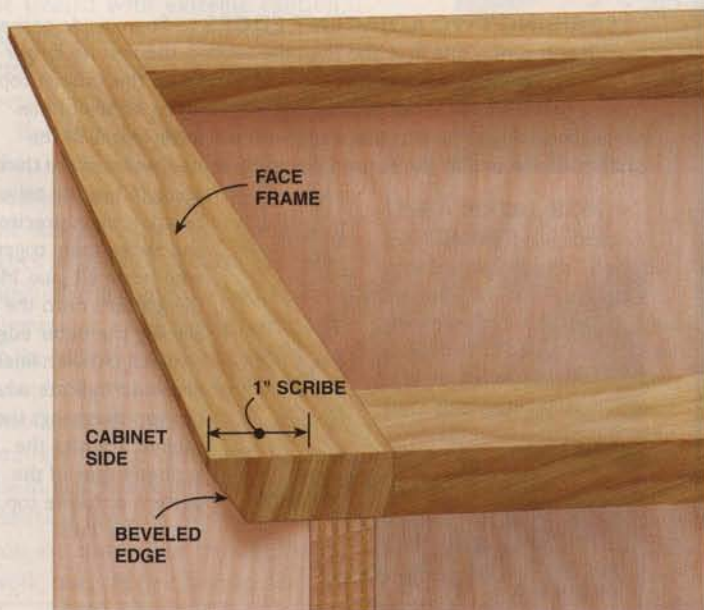


▲ **WHEN THE GAPS ARE SMALL**, it's easy to transfer the wall's contour with a carpenter's pencil. Its rectangular shape allows you to make a narrow scribe (left) or a wide scribe (right), depending on which edge you hold against the wall.



◀ **FOR WIDER GAPS**, use a spacer block taped to a pencil. Make the block slightly wider than the largest gap and hold it against the wall as you scribe.

▶ **A COMPASS** is a versatile scribing tool because it can be adjusted for any size gap, although it's trickier to use than a pencil. It's important to hold a compass locked at the same angle as you scribe. Any variance can result in a poor fit.



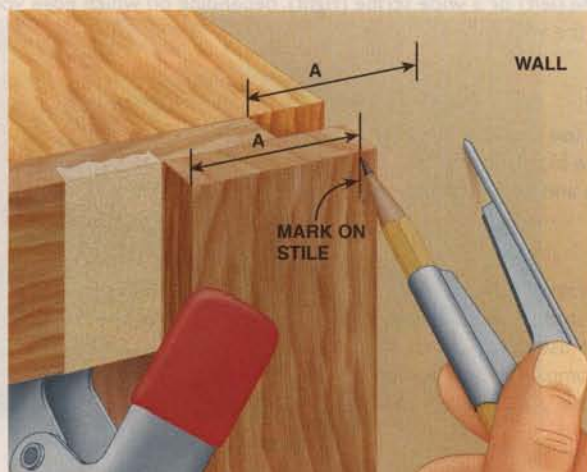
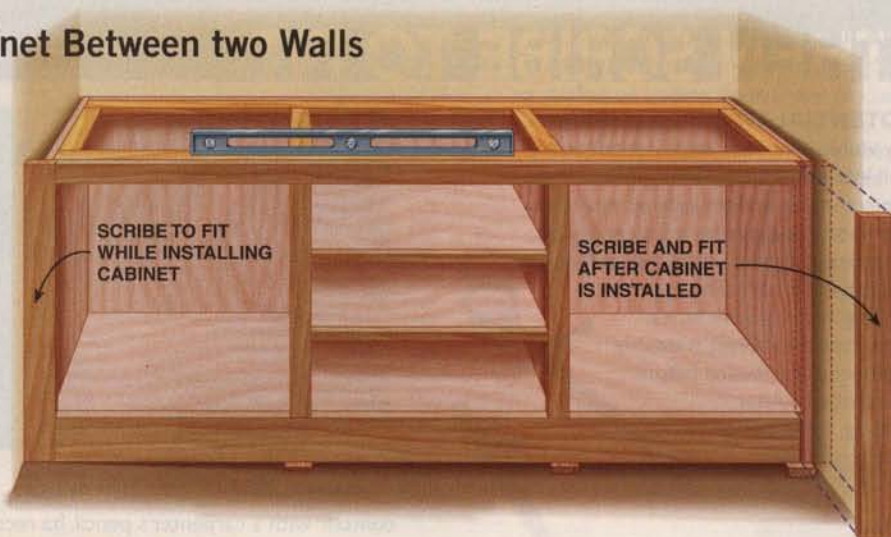
◀ **WHEN BUILDING A CABINET** you'll have to add extra material, called "scribe" or "scribing allowance" anywhere the cabinet will meet a wall. On face-frame stiles the scribe is the part that extends beyond the cabinet side.

Most of this material gets cut away when the cabinet is fitted. Scribes usually have a beveled or rabbeted edge so there's less material to remove. Generally, designing one inch scribes into a project is a good idea. It gives you adequate flexibility when fitting and you can always cut it off, which is much easier than adding on!

Install Cabinetry and Shelving

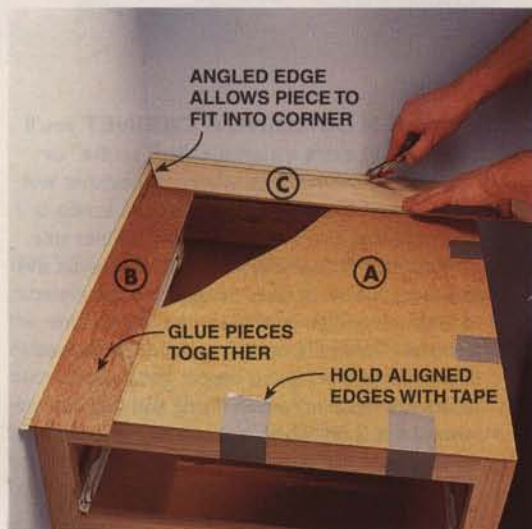
FIG. B Fitting a Cabinet Between two Walls

A LOOSE STILE is the secret to an exact fit when a cabinet must be installed tightly between two walls. Leave one of the outer stiles unattached and fit it last, after the cabinets have been positioned, leveled, scribed and anchored in place.



◀ HOW TO SCRIBE A LOOSE STILE:

Measure the greatest distance (A) between the rail and the wall. It could be anywhere along the side of the cabinet. Mark the same distance on the loose stile, measuring from its inner edge. Clamp the stile onto the cabinet, using tape on both rails to position it squarely. Set the compass to span the distance between the wall and the mark on the stile, and scribe the line.



◀ SCRIBING TWO ADJACENT EDGES to fit an inside corner is hard. If you scribe one first and then the second, the first no longer fits.

Here's a way to fit both edges at once, as shown on this cabinet top: Make a pattern from three overlapping pieces, using scraps of thin sheet stock. Align the first piece (A) with the outer edges of the cabinet. Scribe and fit the second piece (B) to one wall and the third piece (C) to the other. Position them precisely and fasten them together with hot-melt glue. Move this pattern onto the top, aligning the outer edges of piece (A) with lines drawn to indicate where the top overhangs the cabinet. Transfer the scribed edges of the pattern onto the top and cut to the lines.



USE MOLDINGS



DENTIL MOLDING

◀ **HIDE THE GAP** at the top of a floor-to-ceiling cabinet with a two-piece molding. Install the first piece level with the cabinet. Then butt the second piece to the ceiling. The vertical orientation of dentil molding disguises the transition if the top of the cabinet and the ceiling aren't parallel.



CROWN MOLDING

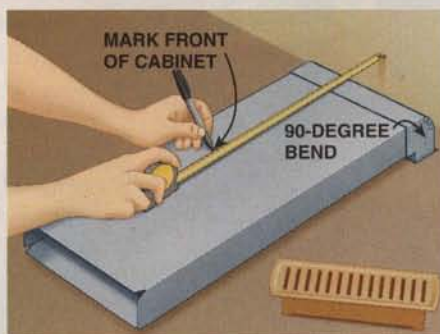


◀ **SOMETIMES SCRIBING IS TOUGH.** Fitting a piece around two outside corners that pinch inward, like this one does, is almost impossible. It's easier to roughly scribe to fit, then cover the gaps with a decorative molding.

SAFELY DEALING WITH OUTLETS AND VENTS

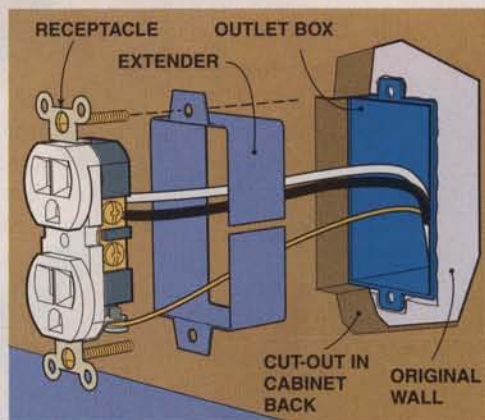
Most walls have electrical outlets or heating ducts in them. It's easy to safely extend a floor vent (right). Just wear gloves so you don't cut yourself. But electrical outlets must be treated with extreme caution. Always shut off the power at the fuse box or breaker panel before beginning work.

If an outlet is unnecessary and you plan to build over it, it has to be safely disabled first. You can't just remove the receptacle and bury the spliced wires in the wall. To keep an outlet functional and give it a neat, built-in appearance, you'll need to cut a hole in the back of the cabinet, mount the receptacle to its face and install a metal box extender. The extender protects the exposed area, up to a 1¼-in. gap, between the wall-mounted electrical box and the receptacle. If you are unfamiliar with electrical work, hire a licensed electrician. **AW**



◀ **EXTEND A FORCED-AIR DUCT** to the front of the cabinet with a 90-degree bend and a short length of prefabricated duct, cut to length with snips.

USE A METAL BOX ▶ EXTENDER to protect combustible material, like wood or plywood when there's a gap between the receptacle and the box. Code requires it. The extender houses the receptacle and extends back inside the electrical box, protecting the exposed cut-out area of the cabinet. After it's wired, two wraps of electrical tape (not shown) around the receptacle will insulate the terminal screws from the metal wall of the extender.



Sharpening



ART DIRECTOR: DAVID FARR • PHOTOGRAPHY: KRIVIT
PHOTOGRAPHY • ILLUSTRATIONS: BRUCE NIEFFER

Drill Bits

You'll love the precision cuts you'll get after using these four simple jigs!

I'm a reformed drill bit abuser.

While a rack kept my saw blades separate, and my chisels were positively babied, my drill bits were left loose to bang against each other in a drawer.

Now I take pains to keep my bits separate and organized in indexes or divided boxes. I make sure they are clean, rust-free and sharp. The pay-off comes with bits that are a joy to use. Crisp, clean, accurate cuts that produce real shavings with less effort (see photo, above right). Maybe it's time to start paying closer attention to your bits. Like the day you first discovered the joys of sharp chisels and planes, you'll wonder how you ever put up with dull bits for so long. In this article we'll show you how to keep a keen edge on four types of drill bits; twist, brad point, spade and Forstner.

The Basics

Less is certainly more when it comes to guaranteeing successful results. All of these bits have two cutting lips—be sure to treat each one equally. Take as little metal as possible and don't take more from one lip than the other. If you do, the result will be an unbalanced bit that won't cut well. Avoid sharpening the center points and never touch the outside surfaces of the bit or you risk altering its geometry.

When you're done sharpening your bits remember that an "ounce of prevention is worth a pound of cure." Here are a few more tips for keeping your bits in top form:

- Keep each bit separate by storing them in an index of some kind. Even a length of 2x4 with holes will do the job.
- Avoid overheating your bits by keeping the rpm down and the feed rate up while drilling.
- Don't neglect the flutes of the bit. Although they do no cutting, clean, smooth flutes are essential for efficient chip removal. Keep pitch out of the flutes with oven cleaner and remove any rust with steel wool. An occasional dose of WD-40 will help keep these bits free of rust and pitch.
- It's not practical to sharpen bits under $\frac{3}{16}$ -in. Treat yourself to a new bit instead.

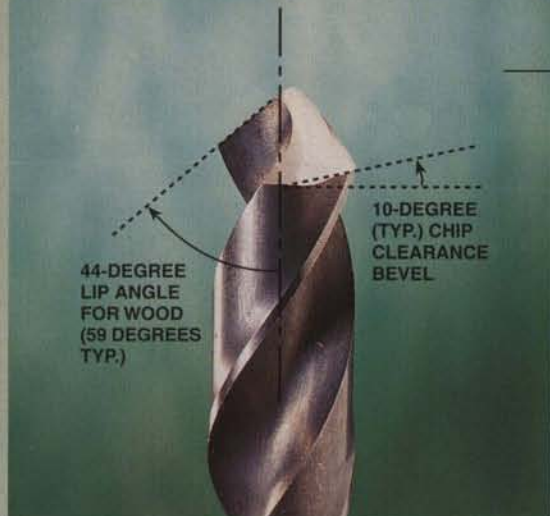


A GOOD SHARPENING JOB produces a hole that just fits the shank with no gaps. In this photo, a fresh sharpening is tested by sticking the shank end of the bit into the hole it just drilled.

by **DAVE MUNKITTRICK**

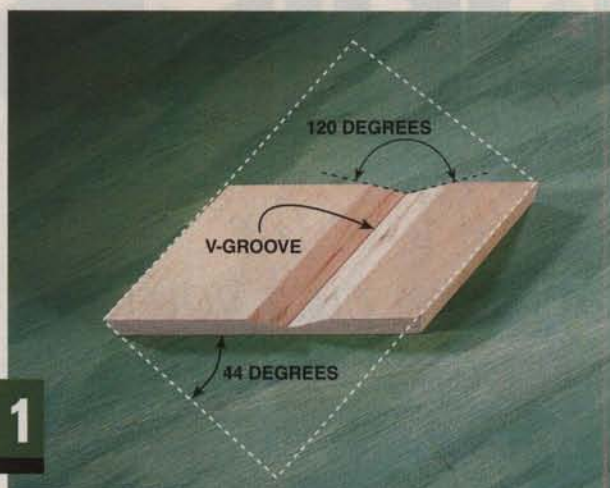
TWIST BITS

SHARPENING DRILL BITS

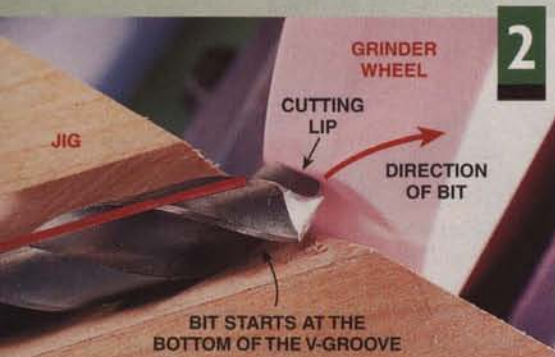


Twist bits are designed to give adequate performance in both wood and metal. The cutting lips are ground at 59 degrees and chip clearance at 10 degrees. While not the first choice for woodworking, twist bits do excel at end-grain drilling. A more pointed 45-degree angle is better for woodworking.

Twist bits require a grinder for sharpening. A 1,750-rpm grinder with a white or pink aluminum-oxide wheel (60-80 grit) is best. (# 129945, \$220 at Woodcraft Supply, (800) 225-1153.)



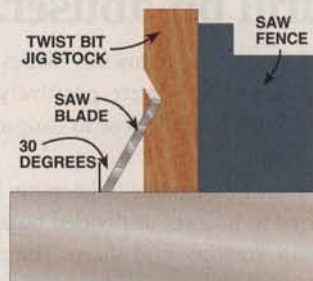
THIS SIMPLE JIG takes all the mystery out of twist bit sharpening. Use double-stick tape to hold the jig onto the grinder's tool rest. The jig guides the bit at the grinder. All those angles in the photo (above, left) are built into its construction.



2

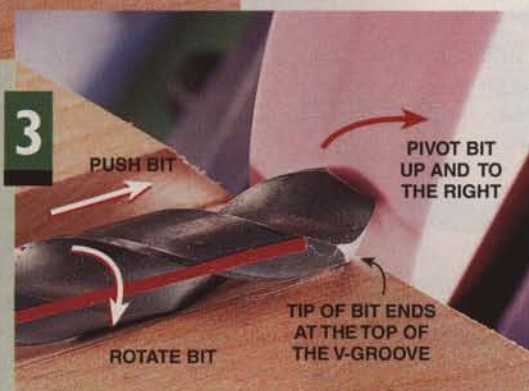
START THE GRIND by placing the bit in the trough of the jig so the cutting lip is just shy of the wheel. Turn on the grinder and gently push the bit into the wheel.

FIG. A START WITH SOME 3/4-IN. STOCK ripped to about a 3 in. width and long enough for safe handling on the table saw (12 to 16 in.). Cut the center groove on the table saw with the blade set at 30 degrees. Cross-cut the ends at the desired lip angle for your bit (45 degrees for wood; 59 degrees for general purpose).



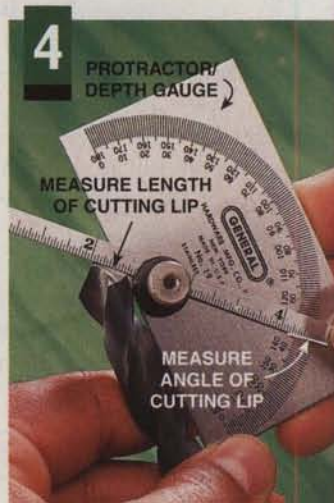
COMPLETE THE GRIND by moving the tip of the bit up and to the right while simultaneously rotating the shank clockwise one-eighth turn. Here's how to do it:

As soon as the bit makes contact with the wheel, use the back edge of the jig as a pivot point. Slide the shank of the bit up along the V-groove at the front of the jig as you complete the one-eighth turn. The procedure sounds harder than it really is and a little practice will yield surprisingly good results. Remember, the key is to remove as little metal as possible, so use a light touch.



3

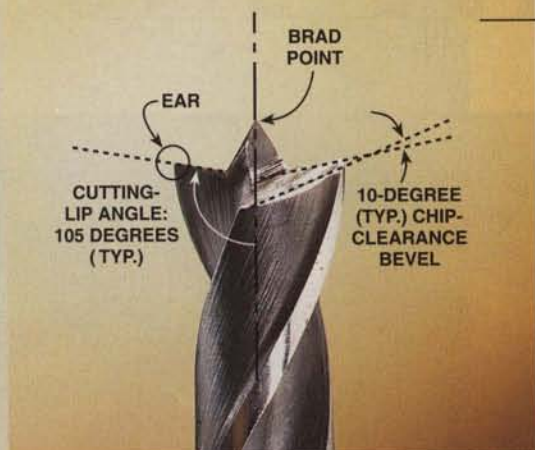
MEASURE THE LENGTH AND ANGLE OF THE CUTTING LIPS with a protractor/depth gauge (available from Rutland Tool & Supply, 800-289-4787; \$15). Equal cutting lip lengths and angles guarantee a centered point and a bit that cuts a precise hole with less "walking." If one lip is shorter, mark the bevel with a felt-tip pen and take another light pass on the grinder. If the measurements are good, take your newly sharpened bit for a test drive and see how well it fits into its own hole (see photo, p. 63). A tight fit with no wobble means you've done a good job.



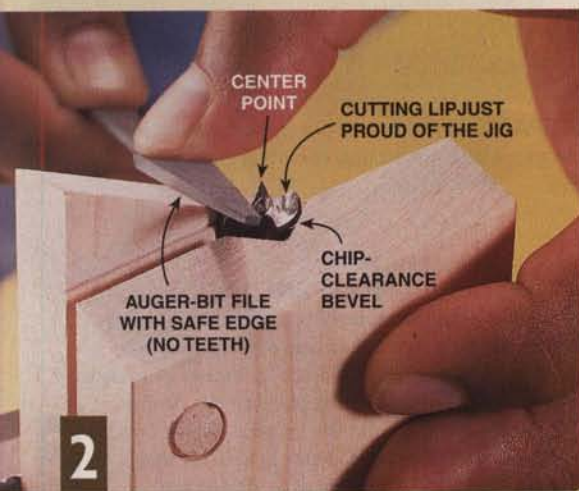
4

BRAD POINTS

SHARPENING DRILL BITS



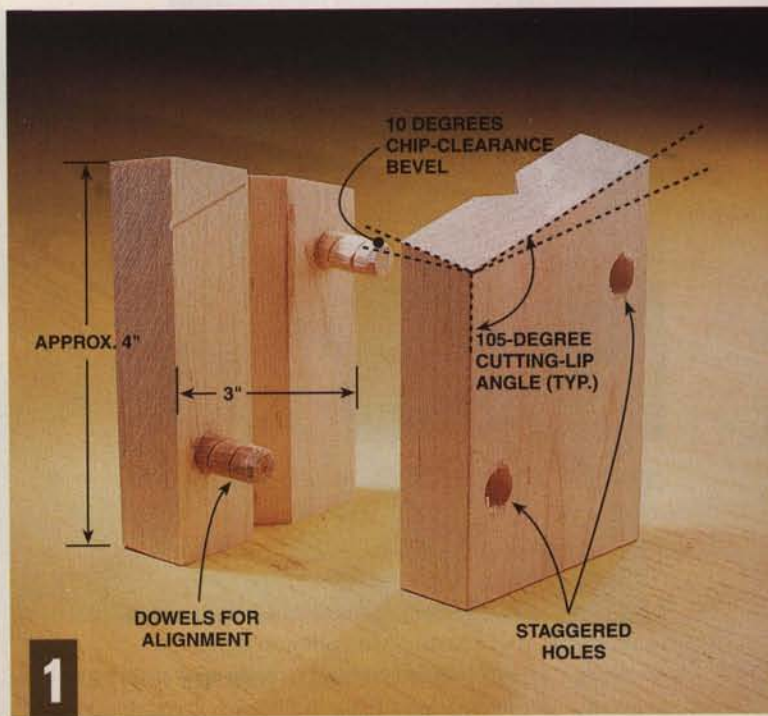
Brad points are the bit of choice for most woodworkers. They cut clean holes and the center point eliminates "walking." In contrast to twist bits, brad points feature cutting lips ground at 105 to 110 degrees. Each cutting edge has a 10-degree bevel for chip clearance. Usually made of carbon steel, these bits are easily sharpened with an auger-bit file. Highland Hardware, (800) 241-6748, auger-bit file #02.44.14.; \$8.50.



2

USING AN AUGER-BIT FILE, take an equal number of strokes on each chip-clearance bevel. A properly sharpened bit will leave the cutting lips in the same horizontal plane. (To test your sharpened brad point see Spade Bits, Photo 3.) The auger-bit file is tapered, allowing it to be used with different-sized bits. Also, one end has safe edges while the other has safe faces. This allows the file to ride right up against the center point without damaging it.

Normally, it's best to leave the brad point alone. If your bit should make an unexpected free-fall onto a concrete floor, then restoring the point is a must. A blunted center point can be fixed by taking an equal number of strokes on each facet with an auger-bit file until the point is restored.

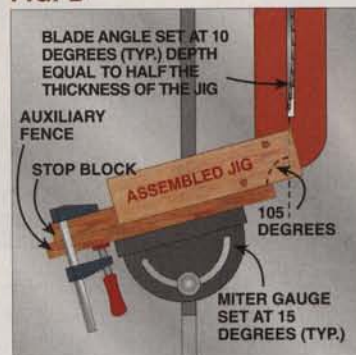


1

BUILD THIS EASY-TO-USE JIG from $\frac{3}{4}$ -in. x $2\frac{1}{2}$ -in. wide hardwood stock that's long enough to be handled safely on the tablesaw (12 to 16 in.). A V-groove holds the bit steady while the compound angles at the top of the jig serve as guides for the file.

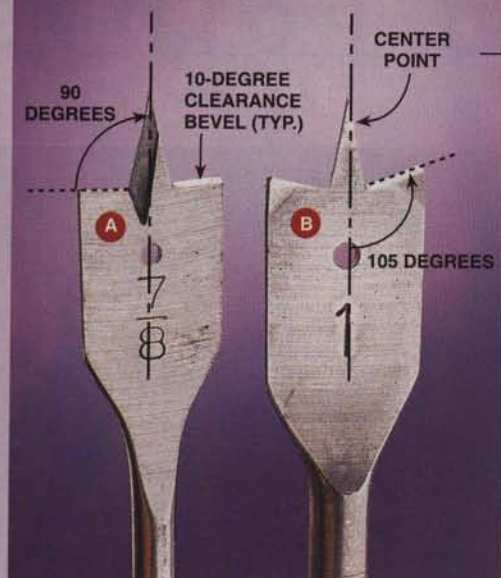
- Cut the $\frac{1}{4}$ -in.-deep groove with the blade set at 45 degrees and the fence set at $1\frac{3}{8}$ -in. Make one pass, then turn the piece end for end and make a second cut to complete the groove.
- Cut the piece in half.
- Clamp the two halves together, groove to groove, so all the edges are perfectly aligned. Mark the length of the jig 4-in. from the end and drill two $\frac{3}{8}$ -in. holes staggered top to bottom about $\frac{1}{2}$ -in. in from the outside edges.
- Glue a couple of $\frac{3}{8}$ -in. dowels into one half and shave the exposed dowel ends for an easy fit into the other half.
- Use a protractor to determine the chip-bevel and cutting-lip angle.
- **FIG. B:** Set the saw blade angle equal to the chip bevel (10 degrees typ.) and depth of cut equal to one of the jig halves.
- Set the angle on the miter gauge equal to the cutting lip angle on the bit (15 degrees typ.).
- Attach a stop block on the miter gauge so that both bevels are cut to the same length.
- Lay the assembled jig on the miter gauge, cut the bevel on one half, then roll the jig over and cut the bevel on the second half.

FIG. B

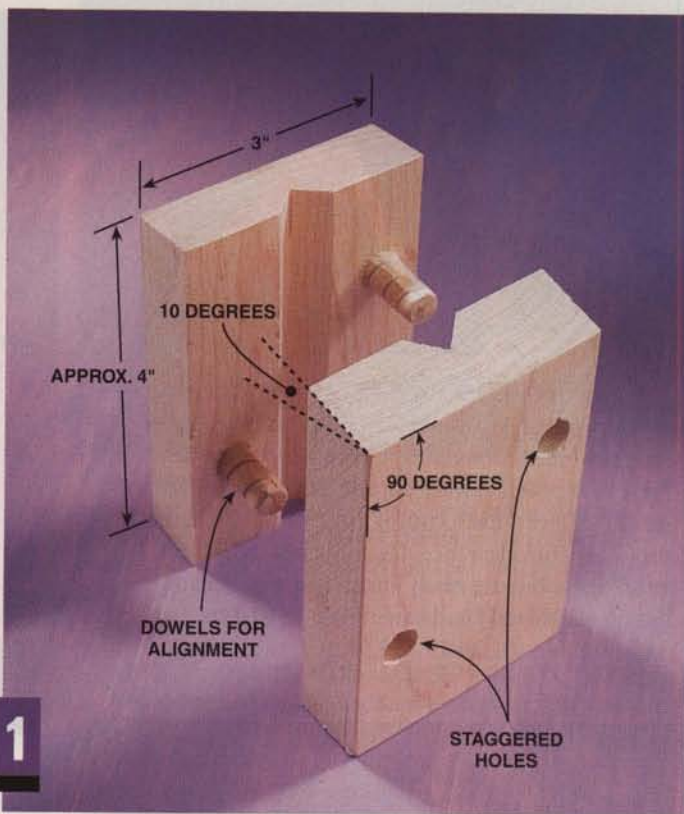


SPADE BITS

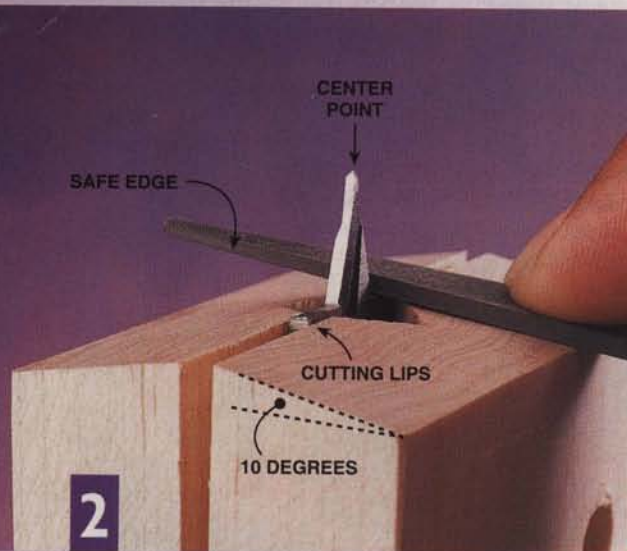
SHARPENING DRILL BITS



Spade bits are designed for quick, rough cuts with long center points that permit angled drilling. Because they're inexpensive, they may be the most abused bits in your toolbox, but they're also the easiest of all to sharpen. So, no excuses! Two common types are shown here. We'll show you how to keep a keen edge on Bit A using the jig in Photo 1. Bit B features lips ground to 105 degrees like a utility brad point. Use the brad-point jig to sharpen it.



THE JIG FOR SPADE BIT A is built like the brad-point jig except the miter gauge is left at 90 degrees when cutting the bevels on the top.



SET THE BIT so the cutting lips are just above the ramp on the jig. Use the ramp as a guide for your file. Make light cuts and take the same number of strokes on each side. If you must, you can lightly hone the center point with a slip stone (available from Highland Hardware, 800-241-6748, #02.64.51; \$3.50) taking great care to remove an equal amount of metal from both sides.

TEST YOUR NEWLY SHARPENED BIT in the drill press by drilling a shallow hole. Next, unplug the machine and use your hand to turn the chuck while putting downward pressure on the quill. Each lip should be making curls of equal size. If not, mark the bevel of the deeper cutting lip. Re-mount the bit in the jig, take one or two strokes on the marked bevel and test again. This test works well for brad-point and Forstner bits as well.



FORSTNER BITS

SHARPENING DRILL BITS



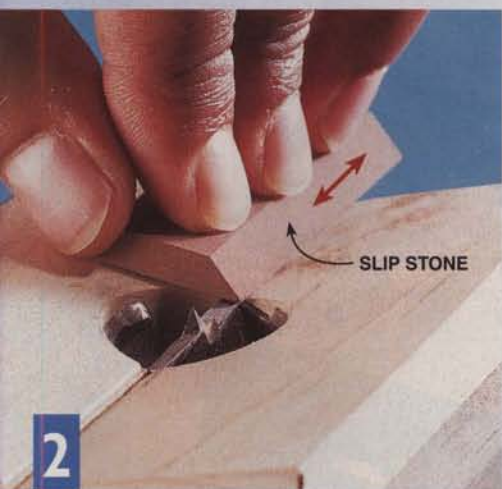
Forstner bits are the cleanest cutting of all woodworking bits because the outer rim scores the fibers ahead of the cutters. The outer rim also acts as a guide allowing for overlapped holes (handy for hogging out mortises), angled holes and drilling on curved surfaces.



1

EACH FORSTNER BIT REQUIRES ITS OWN JIG so make a batch on your table saw.

- Take a 1 1/4-in. x 3-in. x 32-in. piece of hardwood and make a mark every 4-in. for each jig.
- Drill a hole in the center of each jig using a different-size bit for each hole.
- Rip the jig exactly in half.
- Measure the chip-clearance bevels (10 degrees typ.) and cut that same bevel on the face of each half.
- Add a spline to the joint to make the jig self aligning.
- Clamp the two halves together.
- Crosscut each jig from the blank.



2

MOUNT THE BIT IN THE JIG so the chip-clearance bevels are just above the bevels on the jig. Use a slip stone to hone each lip.

SHARPEN THE CUTTING RIM by mounting the bit in a drill press with a slip stone held at the appropriate angle in a hand screw. With the machine unplugged, turn the chuck back and forth to hone each half of the rim. A properly sharpened Forstner-bit rim will extend about 1/4-in. beyond the cutting lips. Make a test cut on the drill press by just touching the bit to the surface of the wood. The center point and the outer rim should make their mark before the cutters engage. If the rim checks out, test the cutting lips as in Spade Bits, Photo 3. **AW**



3

TOOL TEST



ART DIRECTION: PATRICK HELL AND BARBARA PEDERSON • PHOTOGRAPHY: BILL ZUEHLKE • CONSULTANT: ALAN LAGER

Portable and affordable,
these lathes can go where you go!

Mini-Lathes

By Dave Munkittrick

Are you a veteran turner looking for a portable lathe? Do you lack the space or money to devote to a full-size lathe? Or, are you a beginner looking for a user-friendly starter machine? A mini-lathe may be just the ticket. They're small and light enough to travel with you, and



TURNINGS BY MARY LACER

some are capable of turning a 10-in.-diameter bowl. Their low profile allows them to be used when seated, making woodturning accessible to people in wheelchairs or those who are unable to stand for prolonged periods of time.

WHAT IS A MINI-LATHE?

All the lathes we tested weigh less than 100 pounds. Within this group are two distinct types: the heavyweights (over 40 lbs.) and the lightweights (under 40 lbs.). Because many of these lathes come without motors, their advertised weight can be misleading. The weights in our chart include a motor and base.

No single lathe can be the best at everything. Just remember, the tiniest turnings can be executed on the largest lathes, but the reverse is not true.

HEAVYWEIGHTS

With the exception of the Ryobi, the heavyweight

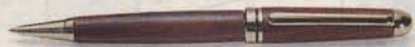
mini-lathes look like scaled-down full-size lathes. They feature cast iron construction with a traditional cam-lock tool rest banjo (see photo below). Some even use the same #2 Morse taper and 1 in. by 8 spindle thread as the big boys. Greater size and weight translates into a larger turning capacity for the heavyweights. If you plan on turning 10-in. bowls as well as 10 mm goblets, this is the type of lathe for you.

LIGHTWEIGHTS

Originally designed as metalworking lathes for producing small metal parts, these mini-lathes shine when it comes to portability. They also feature higher spindle speeds for turning small diameter objects like pens. Their primary limitation is the size of blank they're capable of turning. If you don't mind being limited to very small-scale work, choose a lightweight mini-lathe.

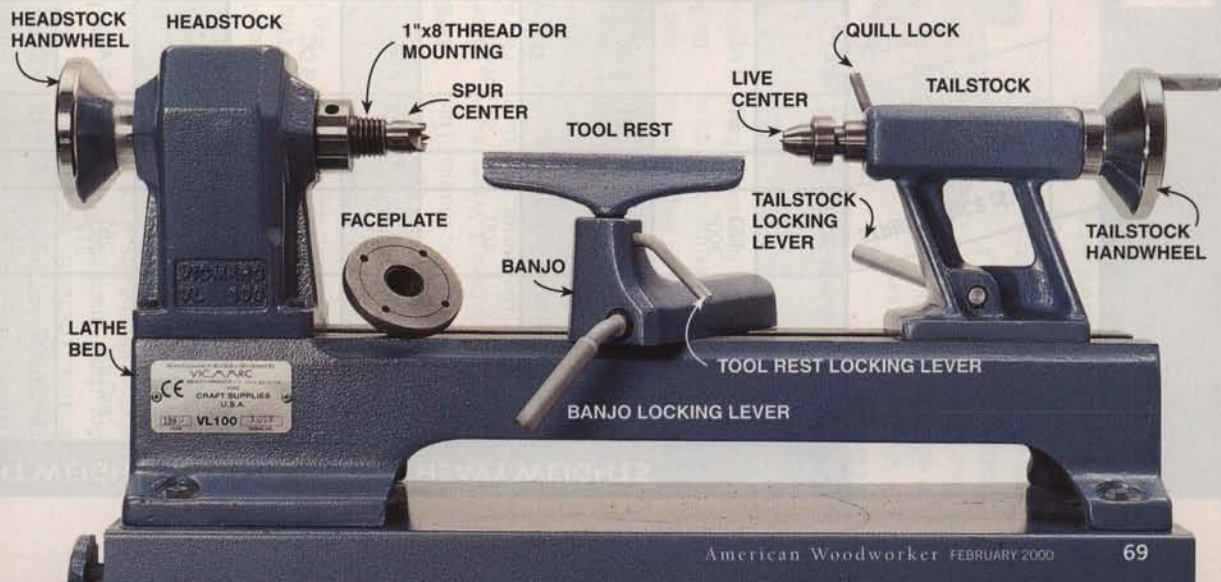
PEN TURNING LATHES

Within the lightweight lathe category are the specialized pen-making machines like the WoodWrite and the Sherline. They each have a cutter head mounted to a semi- or fully automatic horizontal feed mechanism for cutting pen blanks. Accessories are available to use these machines for hand turning, but their strength is pen making.



TURNING BY ALAN LACER

BASIC LATHE PARTS



TOOL

NUTS & BOLTS

SPINDLE (Threads/in.)

and TAPER

BETWEEN CENTERS

SWING OVER BED

SPEED (RPM)

MOTOR HP

WEIGHT (LBS.)

WARRANTY (YRS.)

STREET PRICE (\$)

LATHE

PROS

CONS

CHART NOTES: * Price without motor; / ST=Special Taper / MT=Morse Taper / OB=Outboard Capacity /
† Price varies according to package / ** Semi-Automatic Version

JET	320	2	72	1/2 AC	500-3,975	1"x8 #2 MT	14"	10"	No setup required; good manual; smooth, stable; good power; clean castings; tail, banjo and tool rest handles convenient and secure; easy belt change with rpm chart; comes with 5" tool rest and knock out bar	Could use a handhold under the tailstock end of the base for carrying; too high a profile for use in a seated position
VICMARC	420 300*	1	87	1/2 AC	500-3,600	1"x8 #2 MT	12"	9"	Indexed spindle with lock; smooth, stable; good power; clean castings; tail, banjo and tool rest handles convenient and secure; low profile can be used while seated; comes with 3" and 6" tool rests, 2 3/4" faceplate, 3/8" motor pulley and knock out bar	Motor, belt, switch and mounting board not included; a little heavy for portability
NOVA COMET	465 370*	2	81	1/2 AC	450-3,600	1"x8 #2 MT	14"	10"	Indexed spindle with lock; smooth, stable; good power; extensions available for bed; available without motor, comes with 4" tool rest, 3" faceplate, motor mounting plate, motor pulley, and drive belt	Spindle lock slips; tailstock lock lever design makes adjustments and removal of tailstock difficult; no head stock hand wheel; access to belts cumbersome; pinch points at tool rest height adjustment; at tailstock quill thread and hand wheel power switch on cord is inconvenient and possibly unsafe; cannot get tool rest in close for bowl interiors; motor must be mounted before use
RECORD	400	1	94	1/3 AC	540-2,440	3/4"x16 #1 MT	12"	8 1/2" 14" OB	Smooth, stable; good power; largest outboard capacity; includes 5" tool rest	Requires wrenches to adjust belt, banjo and tailstock; difficult to remove tailstock; only three speeds; no outboard hand wheel; no indexing; large openings in motor could fill with shavings and dust; requires mounting motor and switch; heavy
CARBA TECH	275 200*	3	45	1/2 DC	400-4,500	3/4"x16 #1 MT	12 1/2"	6"	Light weight; tail, banjo and tool rest handles convenient and secure; available with AC motor (recommended); includes 3" tool rest, 2" faceplate, knockout bar, switch and motor pulley	No manual; breaker on DC motor kicks out too easily; belt change cumbersome; rough castings; pinch point on hand wheel and head stock; plastic handles
RYOBI	214	2	41	1/2 DC	500-2,500	3/4"x16 #1 MT	18"	6" 10" OB	Inexpensive; light weight; ready to go out of the box	Vibration with large stock; breaker on DC motor kicks out too easily; tool rest is too light for bowl turning; can't reach back of blank during outboard turning; tool rest lock interferes with tool movement; cumbersome to change from inboard to outboard; face plate had significant wobble; locking and adjusting handles made of plastic
KLEIN	429 349*	1	27	1/2 AC	500-5,200	3/4"x16 ST	10"	5"	Smooth, stable; high spindle speed; tail, banjo and tool rest handles convenient and secure; hardened steel tool rest; lever-action tailstock; easy belt changes; great accessories including threading jig, indexing, and predrilled mounting board with switch	Requires motor, mounting board and switch; switch needs to be wired to motor; Allen wrench required to remove tailstock
TAIG	281 212*	1	27	1/2 AC	525-5,200	3/4"x16 ST	9 1/4"	4 1/2"	Least expensive of micro-lathes; smooth; lightweight; lever-action tailstock; great accessories including conversion for metal working; high spindle speed; includes 2" face plate, 2 1/2" tool rest	Need to use three small knurled knobs to adjust position of tool rest; hard to tighten knobs; Allen wrench required to lock tailstock and quill; tool rest small and light weight; power switch on cord
SHERLINE	409 550†	1	26	1/2 DC	70-3,000	3/4"x16 #1 MT	6 1/2"	3 1/2" 10" OB	Excellent DC motor with great power; most versatile of all the lathes from semi-automated pen making to bowl turning; ease of speed adjustment; many accessories and kits available	Two knobs and a wrench required to adjust outboard tool rest; belt pulley adj. awkward; vibration with large stock; Allen wrench required to move tailstock; lacks the high spindle speed found on the other lightweight lathes
WOODWRITE Model 160	945 695**	1	38	1/2 AC	500-6,000	3/4"x16 ST	16 1/2"	5 1/2"	Only lathe with dust collection; fully automated for pen-making; highest spindle speed of all the lathes; ready to go out of the box	Vibration with large stock; small tool rest; handle on tool rest banjo interfered with hand tools; tool rest banjo adjustments cumbersome; tool rest is \$22.50 extra

HEAVY WEIGHTS

LIGHT WEIGHTS

Our testing panel consisted of seven seasoned turners. They turned a blank of maximum diameter followed by a between-center turning of 2-in. by 2-in. spindle stock. The testers were asked to consider three main features: power and stability; adjustability of the tool rest and tailstock; and ease of speed changes.

POWER AND STABILITY

In general the heavy lathes have the weight and power to handle the large blanks. The Jet, Vicmarc, Record and Nova Comet were up to the task, but the Ryobi and the Carba-Tech couldn't take a modest cut without tripping the circuit breaker in their DC motors. This is a potential safety hazard. When resetting the breaker the motor will turn back on if the operator fails to turn off the power switch first!

In the lightweight category, only the Sherline could turn a large blank without causing the belt to slip. With a \$150 upgrade the Sherline can turn a 10-in. blank outboard, but not without noticeable vibration.

TOOL RESTS AND TAILSTOCKS

A tool rest that's easy to adjust is the difference between a lathe that's a joy to use and one that's a chore. Tool rests on full-size woodworking lathes are manipulated using two levers. The banjo has a locking lever that allows it to

be moved around on the bed of the lathe. The tool rest has a locking lever that allows it to be moved up and down and rotated. All of the heavyweight mini-lathes use this system, although the Record requires a separate wrench to adjust the banjo.

In the lightweight category, only the Klein featured this preferred set up. The others used Allen wrenches or knobs that were hard to fasten securely. This was especially evident when turning large stock.

A well-designed tailstock is easy to lock, adjust and remove.

SPEED CHANGES

Speed changes are another fact of life for woodturners. You want the change to be quick and easy. With AC motors, speed changes are accomplished by moving a belt on stepped pulleys. Belt changes on the Jet, Vicmarc, Klein, Taig and WoodWrite were a breeze. Access to the belt and pulleys on the Nova-Comet proved difficult and the Record required an Allen wrench.

With DC motors, speed is changed by adjusting a knob. This is a great convenience. The Sherline, Carba-Tech and Ryobi come with DC motors. However, only the Sherline had the power to turn large stock (see "Power and Stability" above). **AW**



TURNING BY
HAL MALMLOV



JET



Best all-around mini lathe. Easily handled all aspects of our test. Good choice for anyone.



VICMARC



One of only two lathes with indexing. Good choice for people who need a low profile for sitting at the lathe.



KLEIN



Designed with the woodturner in mind. Good choice for anyone wanting to do small-scale turning on a truly portable lathe.



TAIG



Good choice for small-scale turners on a budget.

SOURCES

Carba Tech
Penn State Industries
(800) 377-7297

Jet
Tool Crib of the North
(800) 884-9132

Klein
Klein Industries
(206) 226-5937

Nova Comet
Woodcraft Supply
(800) 225-1153

Record
William Alden
(800) 249-8665

Ryobi
most home centers or
Tool on Sale
(800) 328-0457

Sherline
HLT Products
(800) 547-5461

The Cutting Edge
(800) 790-7980

Taig
Lee Valley and Veritas
(800) 871-8158

Vicmarc
The Woodturner's Catalog
(800) 551-8876

WoodWrite
WoodWrite Ltd.
(888) 966-3974

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PROFILE CUT

STILE

COPED CUT

RAIL

REVERSIBLE CUTTERS have removable profile- and slot-cutting wings along with shims and a guide bearing mounted on a single shaft. Changing from profile to cope cutting (see photo above) means disassembling the cutter, rearranging the wings and reassembling—a two-minute process. Depending on its orientation, the profile cutter either makes the profile or its coped negative. Make sure the flat sides of the carbide cutters face into the cut. Shims are included to adjust the fit if it's too loose.



**STILE-CUTTING
SETUP**



**RAIL-CUTTING
SETUP**

A reversible stile and rail cutter makes perfect-fitting frames for doors and cabinets without dowels, mortises or biscuits.

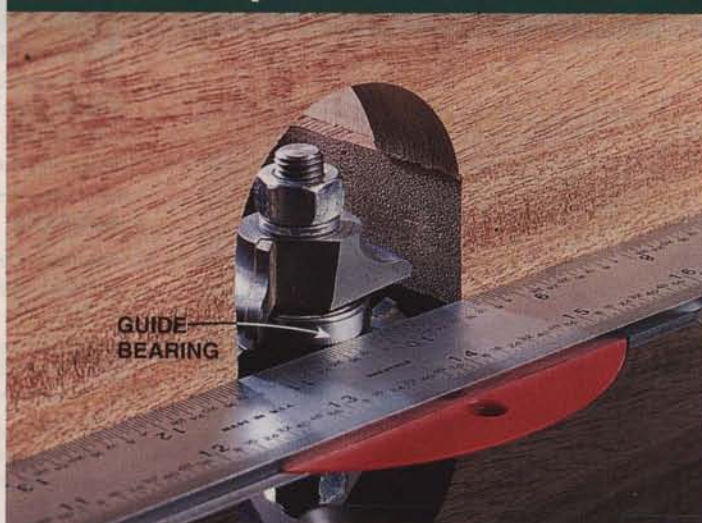
by Tim Johnson

One of the best buys you can make for your table-mounted router is a set of stile and rail cutters. These cutters allow you to join frame pieces together at right angles by making a decorative version of the tongue and groove joint. It's sometimes called a "cope and stick" joint because the rail is coped to fit around the profile that's "stuck" onto the stile. When assembled, two stiles and two rails form a frame with a groove around its inside edge, perfect for holding a panel.

Stile and rail cutters come in a variety of profiles (Fig. A) and are great for making kitchen cabinet doors and other frame and panel structures. Most manufacturers offer them either as dedicated two-bit sets or as a single "reversible" bit. With the two-bit set you get one bit to make a "profile" cut on long grain (the stile cutter) and another to make a matching "coped" cut on the end-grain (the rail cutter). With the single, reversible-bit sets you get removable parts that can be configured to make both cuts (photos at left).

Dedicated sets are best in production shops, but reversible sets are a good choice for anyone working with a budget because they're cheaper to buy (\$40 to \$85, usually at least 25-percent less than dedicated sets) and still offer great performance. Using the reversible set is a piece of cake (Photos 1 - 6), as long as you remember to make the cope cuts face-side up and profile cuts face-side down. Making the changeover from profile to cope cutting (or back) takes only a few minutes. You'll be impressed with the quality of the fit and the speed with which you can make a quantity of doors or frames.

PHASE 1: Make Coped End-Grain Cuts



1 SET THE FENCE flush with the bearing on the rail cutter, using a straightedge to assure a smooth pass.



FIG. A

Stile and rail cutters come in a variety of decorative profiles.



2 MAKE TEST END-GRAIN CUTS. You'll need a sled to hold the rail safely and ensure a square cut. Simply glue a block of wood with one squarely cut end onto a larger piece of 1/4-in. plywood, aligned on one edge. Then attach a toggle clamp. Clamp the rails in the sled **face-side up** for all end-grain cuts.



3 SET THE HEIGHT of the cutter by making cuts so the rabbet on the bottom of the rail is at least 3/16-in. deep. Otherwise the corresponding bottom shoulder on the stile will be too thin and may break. Once you've got the height set, use the sled and make all of the coped end-grain cuts in the rails.

PHASE 2: Cut Profiles on Long Grain



4 DISASSEMBLE THE CUTTER to rearrange the pieces for making profile cuts. Leave it mounted in the router when loosening the locking nut—it's a handy way to hold onto the shaft. After rearranging, don't over-tighten the nut or you'll damage the shims.



5 SET THE HEIGHT of the stile cutter by aligning its slot-cutting wing with the tongue on one of the rails. These cuts don't require a sled. Use scrap stock to make a test cut, check its fit with the rails and make adjustments, if necessary.



6 MAKE PROFILE CUTS on the stiles and inside edges of the rails with the stile cutter. (Yes, use the stile cutter for this profile cut on the rails!) Orient the pieces **face-side down** and mark the edge to be routed. Use push blocks to hold the stile against the fence and the table when you guide it past the bit. **AW**

SOURCES

Reversible Cutters (\$37 to \$85) and Toggle Clamps (\$8 to \$14).

Eagle America
(800) 872-2511
www.eagle-america.com

Highland Hardware
(800) 241-6748
www.highland-hardware.com

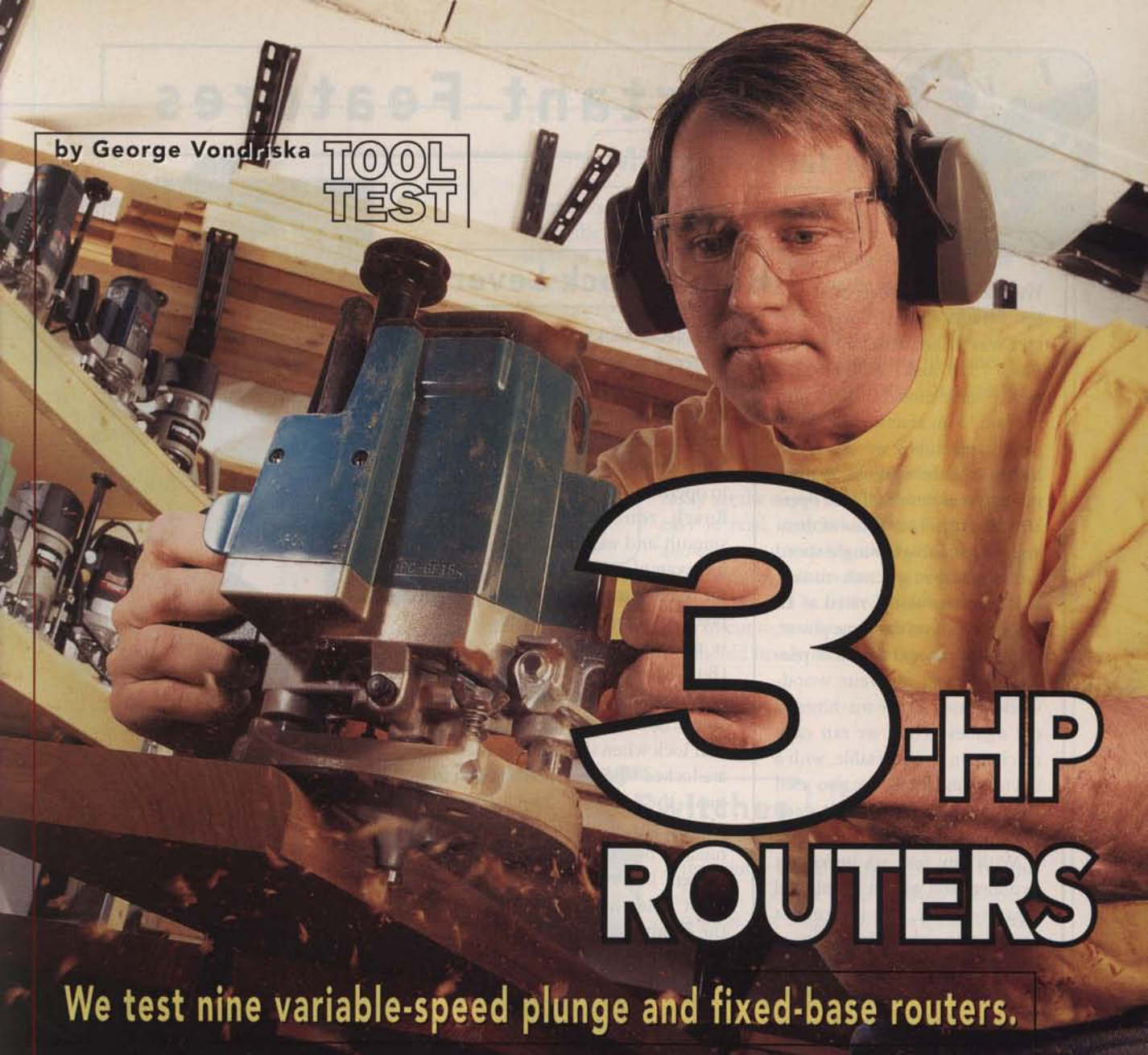
MLCS
(800) 533-9298
www.mlcswoodworking.com

Sears
(800) 377-7414
www.sears.com/craftsman

Sommerfeld's
(888) 228-9268
www.sommerfeldtools.com

Woodcraft Supply
(800) 225-1153
www.woodcraft.com

The Woodworker's Choice
(800) 892-4866
www.1-800-twc-4tools.com



by George Vondriska

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I'm sure Tim Taylor loves these tools. They're BIG. They're POWERFUL. If you're in the market for a tool that'll safely make heavy cuts and last for years, these routers are for you.

Pros and Cons of Big Routers

For many woodworkers, these routers are the *second* router they purchase. They're an excellent complement to a smaller fixed-base router, especially if the smaller router only takes 1/4-in. bits. The plunge action allows you to make stopped dados and flutes with ease, and is an excellent way to cut

mortises. It also allows you to work faster because you can take several cuts of increasing depths without spending much time readjusting the depth. These big routers have the guts to do heavy cutting like big roundovers, template shaping of 8/4 material and raised-panel work. They're a favorite for router tables, where they can perform like a small shaper at much less cost.

On the down side, these big routers are heavy and awkward. They're not ideal for normal edge-routing. Most woodworkers prefer a 1- to 2-hp machine for their day-to-day use. If

you're looking at one of these big routers for hand-held use, be sure to test drive the one you intend to purchase to make sure you're comfortable with it. Also, the plunge action on these big machines makes it hard to set the depth of cut in a router table, where you have to work against the plunge springs. A common solution is to use a micro-adjust knob, which is included on some machines and available as an accessory (about \$25) for the others. This knob is so convenient it's almost a necessity for router table operation with a plunge router.



Important Features

We tested nine models of 3-hp. variable-speed routers. One was a fixed-base, the Porter Cable 7518, and the other eight were plunge models. All accommodate 1/2-in. shank router bits. All the machines we examined had variable speeds, which makes them much safer to operate with larger bits. Some of them are also available in single-speed configurations. Each router motor in this test is rated at 15 amperes and has the same power.

AW editors and a team of professional and amateur woodworkers used all the machines to cut dados. Then we ran each machine in a router table, with a micro-adjust knob. We also used each machine to hog out deep mortises.

With any test, it's important to understand what it reveals and what it doesn't. Our test cannot say anything about longevity or durability. Only long-term testing on a large sample of machines would give useful results.

In our test, all of these routers performed well at all the types of cutting we asked of them, including the heaviest of cuts we considered safe. In other words, within their capacities, all of these routers cut wood the same. But the test did reveal subjective differences in comfort and convenience—the overall “feel.” We also noted significant difference in capacity. Here are the features that vary on each machine:

Height Lock Lever

This lever locks a plunge router at a given depth of cut. Though the levers on all machines worked fine, there were differences in how comfortable they were to operate. The lever on the Bosch router is large, smooth and easy to grasp, for example. The lever on the Ryobi machine is a small piece of stamped metal and is more awkward to use. (Both shown at right.)

There are two styles of locking levers. Some of the routers have levers that lock when they're pushed. Others are locked when released and you must push the lever to unlock them and plunge the router. The routers that must be pushed to unlock are less convenient in a router table because you must hold the lever down to adjust the depth of cut.



push to lock



push to unlock

Maximum Bit Diameter

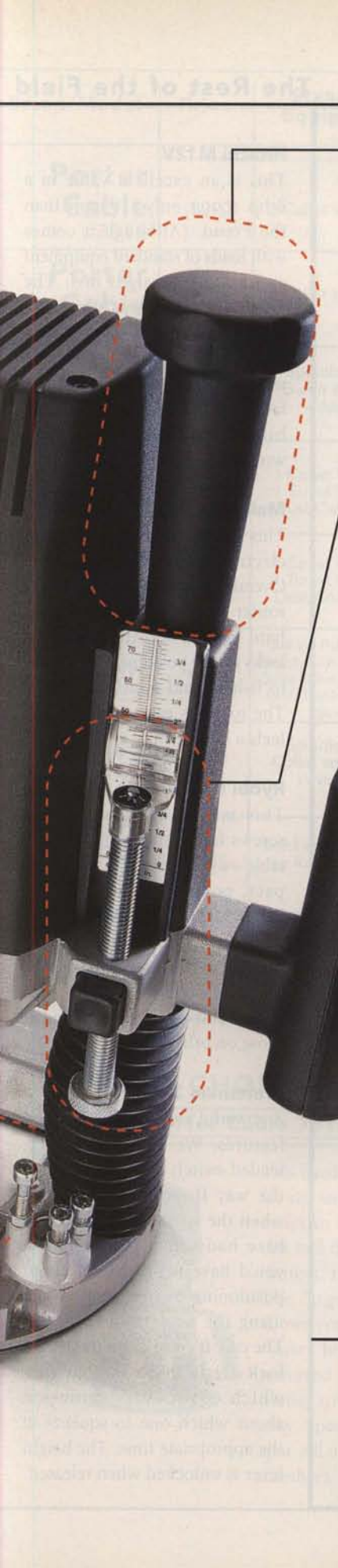
If you're planning to use one of these machines to raise panels, look closely at its base. Most do not have a big enough opening to handle 3-in. or larger horizontal panel bits. It's not the plastic base that's limiting, but the metal base of the router itself. You can still raise panels, however, using a vertical bit instead of a horizontal. See “Raising Panels on the Router Table,” AW # 73, p. 39.



larger opening



smaller opening



Micro-Adjust Knob

A micro-adjust knob makes it easy to fine tune the depth of cut of the router. It's especially important to have one if you want to use a plunge router in a router table. Unfortunately, a micro-adjust knob poking out the top of the router means you can't do bit changes with the router upside down; you have to get used to laying the tool on its side. The knob is included on some machines, which we like, and is a manufacturer-supplied accessory on others. The generic after-market knobs don't always fit well.

Depth of Cut and Turret

A good depth of cut gauge allows you to easily set the depth of the router bit and it's easy to read. A quick-release fitting that allows you to quickly change depth settings without tedious turning of wheels, is a plus. The turret is the gizmo that can be rotated to different positions, allowing the depth of cut to be changed without moving the stop rod. The turret should firmly lock in every position.



Switches

There are two styles on each of these machines: the switch on the body of

the router and the trigger switch on the handle. Both are separate from the speed control. The trigger switch is spring loaded, and requires a second button to lock in the on position. We prefer this type for hand-held use, whether for plunging or not, because you do not need to remove your hands from the router to switch it off, and because it's less likely to be accidentally in the on position when you plug in the machine. The switch on the motor, however, is easier to operate in a router table. Most people, however, wire up a separate switch on the front of their table for even easier operation.

simple
switch on
motor

trigger
switch

Spindle Lock

A spindle lock makes for one-wrench bit changing and is a handy feature especially for plunge routers. It's found on all routers except the Porter Cable machines which require two wrenches.



The Results

The Rest of the Field

7518. For both router table and hand-held use, we like the plunge-base Porter Cable, the DeWalt and the Bosch. Each had strong features and each had a few weaknesses, too.

The Porter Cable is large, heavy and solid. It will take significantly larger bits than the others. The DeWalt and Bosch are lighter and less bulky, and differ mainly in that the Bosch has a trigger switch and push-to-unlock height lever, whereas the DeWalt has

a switch on the motor, and a push-to-lock height lever. Take your pick.

The remaining routers are all solid and capable machines. They cut dadoes and mortises and worked in router tables without significant problems. The main differences that emerged were in comfort and convenience. One surprising thing was that many of the plunge routers had lots of play between the guide posts and the motor. We thought this would produce sloppy mortises, but after cutting dozens of deep mortises with all the machines, we found them all to be the same. When the machines are actually plunging, the play is reduced.



Porter Cable 7539 General Use



Shown with optional micro-adjust knob

This machine is similar to the 7518 but in a plunge base. It has a trigger switch on the handle, which we prefer, and like its fixed-base cousin, this router can accommodate even the largest diameter bits. The height lock lever is large and easy to use. It locks when released.

Unfortunately, if you add a micro-adjust knob to this router, it replaces the turret system. That means that when you take the router out of the router table, and want to use the turret to control depth of cut, you must take off the micro-adjust knob and put the turrets back on—a pain. We also missed a shaft lock for bit changing—the two-wrench system is a nasty knuckle banger.

Bosch 1615 EV5 General Use



Great balance in hand-held operations and a good spindle lock help make this a user-friendly router. The depth of cut gauge is easy to read and use. A trigger switch on the handle makes controlling the router easy. The height lock lever is easy to reach and use.

The largest diameter bit you can run in this router is 2 5/8 in. The turret was a little sloppy, but worked fine.

DeWalt DW625 General Use



Shown with optional micro-adjust knob

Another tool with good balance, a spindle lock and a great feel. This router felt like it had a lower center of gravity than the others, making it feel less top-heavy when hand held. The depth of cut gauge is easy to read and use, and includes a magnifier to make reading the scale even easier. The height lever is normally unlocked when released.

The router's base limits you to bits 2 1/2-in. diameter and smaller. The micro-adjust knob had a tendency to vibrate up and down the threaded rod when the router was running.

Hitachi M12V

This is an excellent value in a 3-hp. router, only \$10 more than the Freud. (Although it comes with loads of standard equipment and a 1/2-in. straight bit). The depth of cut rod was a bit awkward to use, and the stamped steel height lock wasn't as comfortable as some others. With only two facets on the collet nut, getting bits in and out takes more wrestling.

Makita 3612C

This is the only machine with an electric brake; a great feature. Overall, an effective and powerful router. The depth of cut scale is hard to read and the shaft only locks in one position, so you have to fish around a little to find it. The turret is easy to get at, but feels a bit sloppy.

Ryobi RE 600

This machine includes extra screws for mounting to a router table—a good idea. This is a compact, powerful machine. The height lock is stamped metal and fairly small; it could be more comfortable to the hand. The spindle lock and depth of cut rod seem not as robust or well machined as those on other routers.

Craftsman 315.27511

A powerful router with some good features. We liked the spring-loaded switch on the handle and the way the motor is disabled when the spindle is locked. The base had some high spots, so you'd have to be careful about positioning it consistently when using the base against a fence. The on/off switch and the height lock are both on the handles, which could cause confusion about which one to squeeze at the appropriate time. The height lever is unlocked when released.

Brand/Model	Price	Standard Equipment	Max. Bit Diameter	Micro-Adjust Knob	Weight (lbs.)	Switch	Height Lock	Contact
Porter Cable 7518	\$290	2 Collet Wrenches	4	N/A	14	On Motor	N/A	888-848-5175
Porter Cable 7539	\$290	2 Collet Wrenches	3-3/8	No	19	Trigger	Push to Unlock	888-848-5175
Bosch 1615EV5	\$295	Spindle Lock, Guide Bushing Adaptor	2-5/8	Yes	14	Trigger	Push to Unlock	877-267-2499
DeWalt DW625	\$235	1 Collet Wrench, 1 Turret Wrench, Dust Col. Shield	2-1/2	No	14	On Motor	Push to Lock	800-4-DEWALT
Freud FT200SE	\$180	1 Collet Wrench, 1 Turret Wrench, Dust Col. Shield	2-3/8	Yes	12	On Motor	Push to Lock	800-334-4107
Hitachi M12V	\$190	Dust Vac Pick Up, Collet Wrench, 1/2-in. Straight Bit, Guide Bushing Adapter, 1 Guide Bushing, Straight Guide	2-3/8	Yes	13	On Motor	Push to Lock	800-546-1666
Makita 3612C	\$260	Spindle Lock, Collet and Turret Wrenches,	2-3/8	Yes	14	On Motor	Push to Lock	800-462-5482
Ryobi RE 600	\$235	Bolts for Mounting to Router Table,	2-3/8	Yes	14	On Motor	Push to Lock	800-525-2579
Craftsman 315.27511	\$240	Straight and Curved Edge Guides, Collet Wrench, 1 Guide Bushing	2-1/2	Yes	13	Trigger	Push to Unlock	Sears Retailers

EDITORS' CHOICE ROUTER TABLE

Porter Cable 7518 Router Table



This fixed-base router is our choice for use in a router table. It's much easier to adjust the bit height on this tool than on any of the plunge routers, regardless of the brand. The large opening in the base allows you to run even the largest router bits. The motor can be removed from the base (unlike plunge routers) so bit changes are easy. Speed control gives actual rpm. All other brands use letters or numbers.

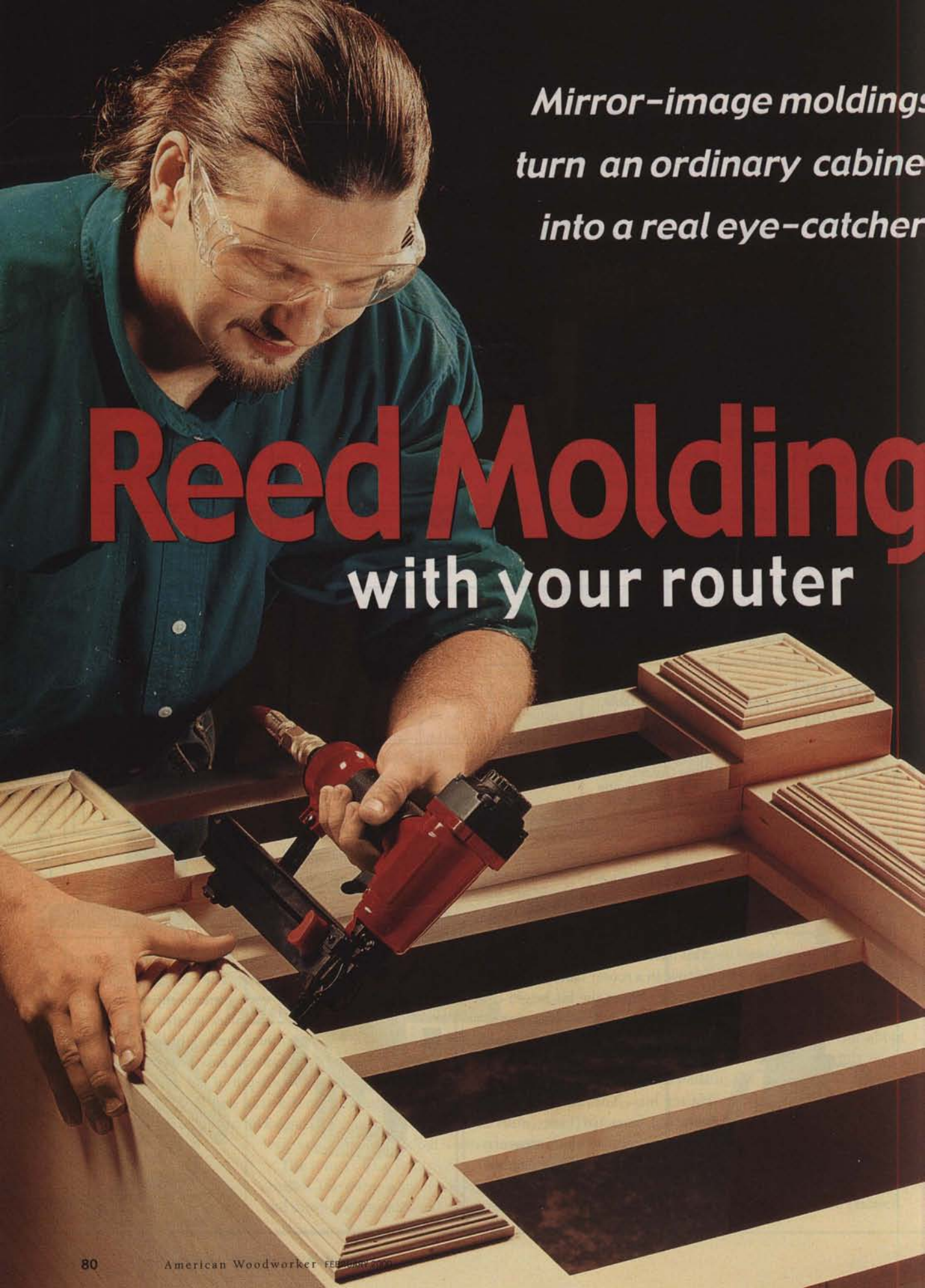
BEST BUY GENERAL USE

Freud FT200E General Use



Lots of good features, at a great price. The Freud router comes with a micro-adjust knob (so the price is effectively lower) and the height lock is a well-made, easy-to-reach lever. The depth of cut gauge is easy to read and has a quick release. The turret works great.

AW



*Mirror-image moldings
turn an ordinary cabinet
into a real eye-catcher*

Reed Molding

with your router

WANT TO DRESS UP A PLAIN-LOOKING CABINET? Add reeded moldings. The ones shown here are unusual because the reeding is diagonal, creating the look of turned spirals. All you need to make them is a point-cutting round-over bit for your router (see Sources, p. 82) and a jig to hold the stock while you rout it. The jig (Fig. A), which was designed by Rick Christopherson, holds pieces up to 6-in. wide for cutting moldings with either left- or right-hand diagonals. Aluminum rails fixed at 45 degrees to the workpiece guide the router as it cuts the profile. You can make this jig in an afternoon and spend the evening reeding.

Make the Jig

Draw a line on the base (A) from corner to corner. On this line, mark and drill the two holes for fastening the backstop (B) and attach tee-nuts from the bottom. Glue and screw the fence block (C) to the front corner and the fence rails (D) to the sides of the base. Be sure to align the edges. Then cut the two slots in the backstop and fasten it loosely to the base so it slides in and out.

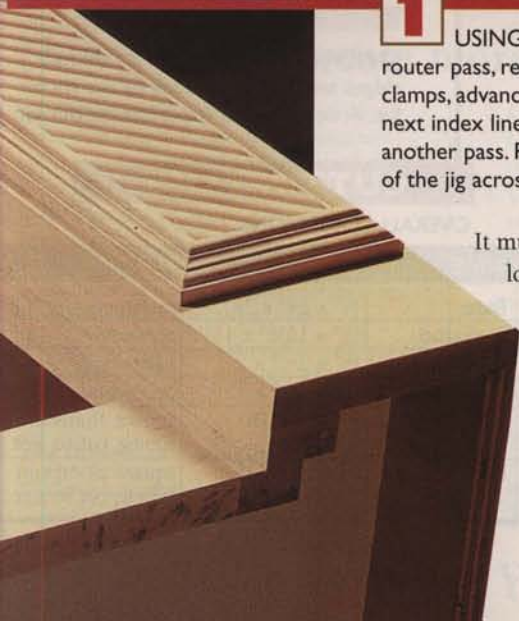
The alignment and spacing of the two diagonally fastened guides is important for making smooth router passes. Square aluminum tubing (see Sources, p. 82) is rigid, durable and dimensionally stable, making it a good choice for repeated use. Mark points on each fence rail 10 1/4-in. from the front corner. Clamp the front guide (E) to the base assembly at these two points and drill holes for screws through both the guide and base. Mark the guide with a felt-tip pen where it overhangs the base and miter it to fit before fastening. Washers raise the guides slightly so the workpiece can slide easily underneath. Fit and attach the back guide (F) the same way.



1 **USING THE JIG.** After each router pass, release the toggle clamps, advance the workpiece to the next index line, reclamp and make another pass. Rout from the outside of the jig across the workpiece.

It must be parallel to the front guide. Use an 18-in.-long scrap cut the same width as your router base plate to ensure proper spacing. Draw an index line on each side fence rail between the guides

2 **THIS POINT-CUTTING ROUND-OVER BIT** makes the half-round reeds. It takes two passes with the router to make each one.



and slightly offset from center so it's out of the path of the router cut.

Prepare the Workpiece

Make blanks from $\frac{3}{8}$ -in. stock, allowing an extra 6 in. in length and an extra $\frac{1}{2}$ in. in width for cleanup after routing. Mark index lines along the length of each blank. Use these lines to position the piece for each cut (Photo 3 and Fig. B).

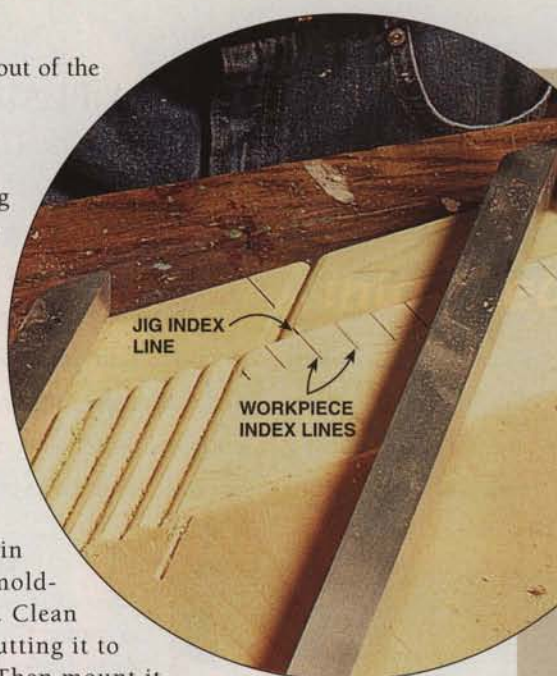
Make and Install the Molding

Slide the blank in the jig, align the index marks and snug the backstop up to it. Lock the blank in place with the clamps. Make the molding with repetitive cuts (Photo 1). Clean up the molding after routing by cutting it to final size and sanding (Photo 4). Then mount it, either recessed into the cabinet or on the surface, with trim molding (opening photo). **AW**

SOURCES

Point-cutting round-over bits, #6431-6434, \$13 - \$22; toggle clamps, #9476, \$7
MLCS (800) 533-9298
www.mlcswoodworking.com

1-in. Square aluminum tubing, #32000952, 6-ft. length; \$11;
Toggle clamps: # 76988625; \$10 each
MSC Industrial Supply Company, (800) 645-7270
www.mscdirect.com



3

THE RADIUS of the router bit you use determines the distance between the index lines on the workpiece (see Fig. B). The bigger the radius, the larger the bead, and the farther apart the index lines. I used a $\frac{1}{4}$ -in.-radius bit (for a $\frac{1}{2}$ -in.-wide bead) so my index lines are $\frac{1}{16}$ in. apart.

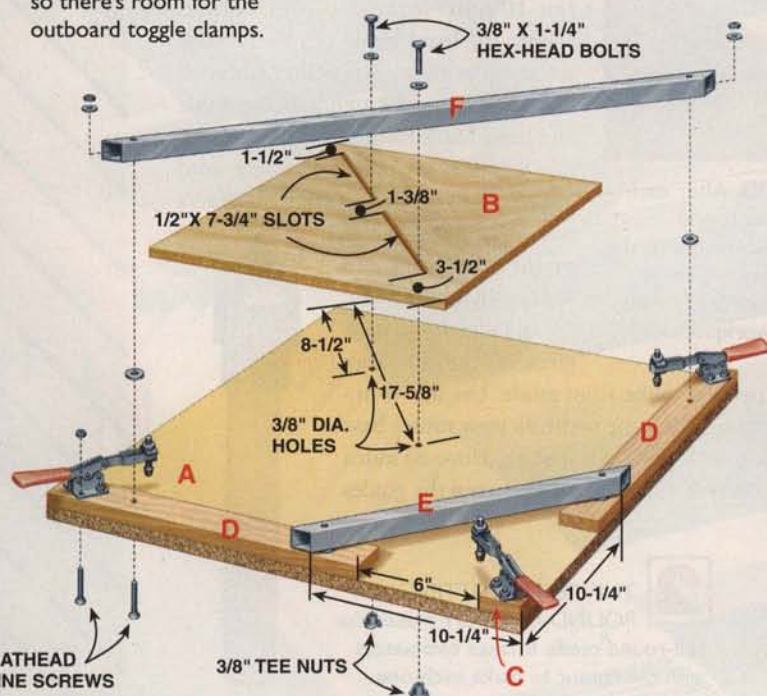
FIG. B

Space between index lines on workpiece

BIT RADIUS	INDEX LINES
$\frac{1}{8}$ "	$\frac{3}{8}$ "
$\frac{1}{4}$ "	$\frac{1}{16}$ "
$\frac{3}{8}$ "	$\frac{1}{16}$ "
$\frac{1}{2}$ "	$\frac{1}{8}$ "

FIG. A JIG FOR DIAGONAL ROUTING

This jig can accommodate routers with base plates up to 6-in. dia. For larger routers, use a slightly larger piece for the base (A) so there's room for the outboard toggle clamps.

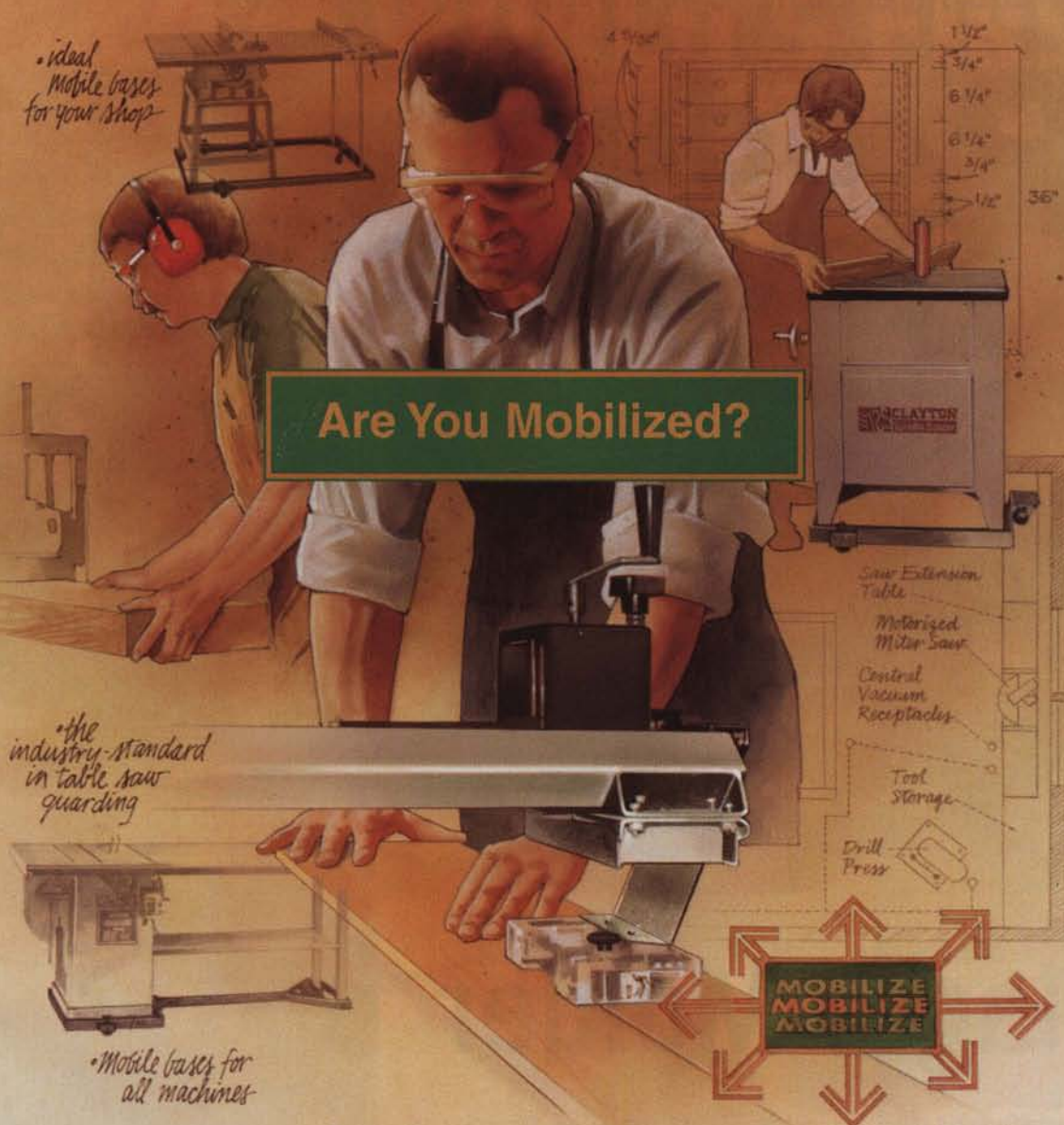


SANDING IS NECESSARY to smooth ridges and rough grain left by the router bit. A detail sander is perfect for this job.

CUTTING LIST

OVERALL DIMENSIONS: $3\frac{1}{2}$ " X 24" X 24"

PART	NAME	DIMENSIONS	MATERIAL
A	Base	$\frac{3}{4}$ " x 24" x 24"	melamine or MDF
B	Backstop	$\frac{1}{2}$ " x $15\frac{1}{2}$ " x $15\frac{1}{2}$ "	plywood
C	Fence Block	$\frac{5}{8}$ " x $2\frac{1}{2}$ " x $2\frac{1}{2}$ "	hardwood
D	Fence Rails (2)	$\frac{5}{8}$ " x $2\frac{1}{2}$ " x $15\frac{1}{2}$ "	hardwood
E	Front Guide	1" x 1" x 18"	square aluminum tubing, cut to size
F	Back Guide	1" x 1" x 32"	square aluminum tubing, cut to size



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Product Reviews



Magic Molder

If you don't own a shaper, a molding head is just the ticket for making all kinds of moldings using your table-saw. LRH Enterprises' new bright purple Magic Molder looks futuristic, but is designed with safety first and ease-of-use in mind. This colorful tool has several advantages over more conventional molding heads.

One is the distinctive way the cutters are installed. Each cutter consists of a solid-carbide knife welded to a 1 $\frac{3}{4}$ -in. steel disc with an L-shaped groove milled into its circumference. Pick the profile you want, then simply slip each disc into a cutout in the head and locate the groove over an indexing pin. Tightening a single Allen screw aligns the cutter and you're in business. It takes

about 30 seconds to remove a set of cutters and install a new one. You can do this right on the saw—a real time saver when making complex moldings using two or more profiles. To fully support the workpiece, you'll need to make a throat plate large enough for the cutters.

Safety is another advantage. The cutters' chip-limiting design means you can't take too big a bite, reducing the risk of sniping or kickback. And unlike the high-pitch whine of a router, the Magic Molder emits a low, quiet hum.

The Magic Molder itself consists of a precision-balanced, solid aluminum head that mounts on your table-saw's arbor. Two cutters lock into the head. LRH stocks 70 cutter profiles, and you



MOLDINGS GALORE. An impressive array of moldings are possible with the Magic Molder and with the optional fence you can make half-cuts. Changing cutters right on the saw is a snap.

can have custom profiles ground to your specs for \$150 per set. Each cutter is 1-in. wide—the maximum profile you can cut without repositioning the fence or the workpiece. You can use different profiles in various combinations to make virtually any type of molding including raised panels. LRH sells an

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ULTIMATE 18V CORDLESS

Product Reviews



SAFE AND SECURE. The molder's unique pin and groove design and circular cutout means cutters won't loosen during use.

auxiliary fence for \$155 that attaches to your rip fence, allowing you to make half-cuts by burying the cutters under the fence. It easily attaches to Biesmeyer-style fences, but won't work with Delta's Unifence.

Cuts with the Magic Molder were

smooth in all types of materials, including pine, maple, cherry, mahogany, oak and MDF, with little or no sanding required. The mirror-like polish on the carbide knives was impressive, and results in super-sharp cutting edges. The head ran smoothly and free of vibration—the result, says the manufacturer, of high-tech balancing.

If you're new to making moldings on your tablesaw, you'll appreciate the training video that comes with the molder. While the low-budget film shows how to make a variety of moldings, more instructions on setup and safety tips would improve it. Still, the video was informative and will inspire you with the impressive range of profiles possible on the tablesaw

Andy Rae

Available from LRH Enterprises,
(800) 423-2544
www.lrhent.com

Pros

- 70 profiles for making virtually unlimited molding styles
- Change cutters right on the tablesaw
- Safer and quieter than conventional molding heads

Cons

- Expensive
- Limited instructions for beginners
- Expensive auxiliary fence

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Cutter profiles: \$95 per pair

Molding head and one pair of cutters: \$200

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Add-on Strip Sander

The "Multitool" replaces one wheel of your 6-in. or 8-in. grinder and converts it to a 2-in. strip sander. The 2-in.-wide belt makes sharpening big stuff easy, especially when you use the sharpening jig accessory. The jig allows you to slide tools across the belt, so you can sharpen tools wider than the belt, at a consistent angle. Unlike a grinder, the belt allows you to get the flat or convex grinds preferred for knives, hatchets and axes. It's also handy for sanding small wood parts.

The Multitool uses 2 in. by 36 in. belts. Replacing and tracking the belts is easy; much like on a portable belt sander. You can run the belts horizontally or vertically.

If a tool only needs polishing, use the Multitool with a ScotchBrite belt. It's a great way to remove a light coating of rust or corrosion.

Call H and B Distributors (800) 660-0880. Multitool 362 grinder attachment and table, \$170. Sharpening jig accessory, \$5.



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3X24	.93
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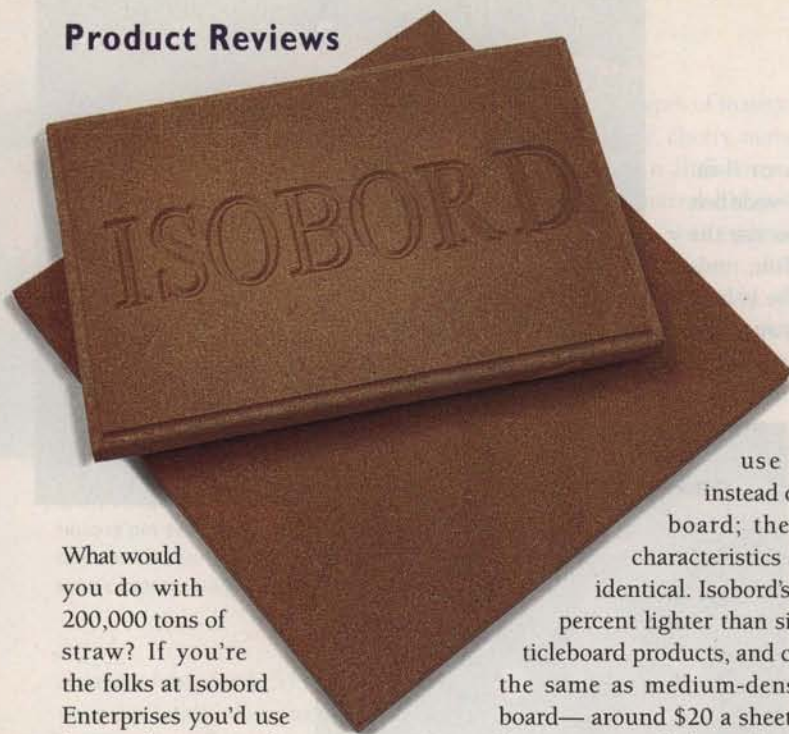
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Product Reviews



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You can use Isobord instead of particleboard; the working characteristics are almost identical. Isobord's about 20-percent lighter than similar particleboard products, and costs about the same as medium-density fiberboard—around \$20 a sheet. If you've been concerned about formaldehyde in your building materials, you'll really like Isobord. It's completely formaldehyde free. It's currently available raw or with a melamine coating. Plans are in

Particleboard From Straw

the hopper for veneered sheets.

I've used this stuff, and like it a lot. It machines and holds fasteners just like particleboard, plus I found the smell when cutting a lot more pleasant than particleboard products. And for anyone who's handled full sheets of particleboard, you'll really appreciate the lighter weight of Isobord.

Find a local distributor by calling Isobord at (503) 242-7345. You can also check their Web site at www.isobord.com.

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Bigger Cordless Drills

In the ongoing "voltage wars," Bosch has raised the stakes. They've introduced a \$490 combo kit that includes the first 24-volt drill/driver along with a circular saw and flashlight.

The drill has replaceable brushes, and is said to deliver 500 inch-pounds of torque. Two speed ranges deliver 0-500 rpm, and 0-1,650 rpm. An electric brake stops the drill on a dime and a 16-position clutch gives you just the right control for any job. As a testimony to the drill's power, it even comes with a side handle to help you hold onto it. The handle fits on either side of the drill.

The circular saw also has replaceable brushes and an electric brake and runs

at 3,600 rpm. The saw has a 6½-in. blade, an aluminum foot that angles up to 50 degrees, on-board wrench storage, a spindle lock and even a dust port that accepts a vacuum hose.

The kit includes two 24-volt batteries and a one hour Smart Charger that will charge any Bosch battery, regardless of voltage. (According to Bosch, 24-volt batteries last about 30-percent longer than 18 volt.)



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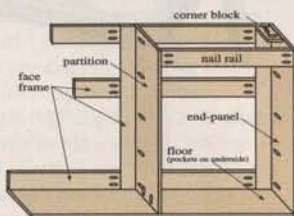
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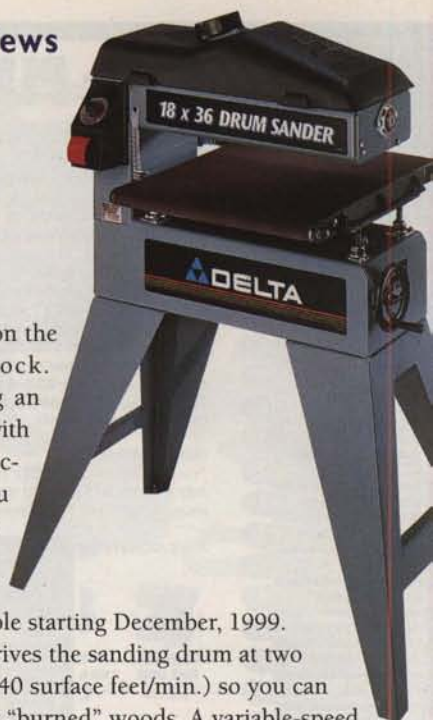
Product Reviews

Delta Drum Sander

Delta's the new kid on the drum sander block. They're introducing an 18-in. drum sander with cantilevered construction that allows you to run parts as wide as 36 in. Delta representatives say that it will be available starting December, 1999.

A 1½-hp motor drives the sanding drum at two speeds (2,350 or 3,340 surface feet/min.) so you can slow down for easily "burned" woods. A variable-speed conveyor feeds material under the drum at a rate of 1 to 12 feet/min. As a bonus feature, you can use the outboard shaft on the drum to drive available pneumatic drum accessories.

Expect to pay around \$900, including the stand. Find it wherever Delta tools are sold.



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Ratchet Clamp

If you like spring clamps but wish you had better control of the clamping force, try the new Craftsman Ratchet Clamp. The jaws open up to 2½ in. and clamp pressure is controlled by how hard you squeeze the handles. The metal ratchet mechanism lets go when you press the clamp's release button. The jaw pads won't mar surfaces and are V-grooved so you can grab round stock.

One drawback—it takes a big hand to hold both handles when the jaws are wide open. But at least your hand isn't fighting spring pressure on these clamps like it does on conventional spring clamps.

Buy them at Sears for \$10

continued on page 94



JESADA TOOLS®

PRODUCT SCORECARD

Jesada Tools router bits

Performance	★ ★ ★ ★ ★
Price	Comparable to other premium brands
Value	★ ★ ★ ★ ★

Set your work apart from the crowd!

Jesada Doormaker's Sets

Raised Panel Bit: Choose your favorite profile from the four styles below. These bits mill a beautiful shape on your door panels, plus they provide a great decorative touch on drawer fronts. You'll also enjoy the safety of Jesada's anti-kickback design, a critical feature you should demand on large-diameter bits.



Rail & Stile Set: Each set includes a pair of perfectly matched bits. They mill rock-solid joints, plus a nice decorative profile along the edge of the stiles and rails. Jesada equips all of its rail and stile bits with a three-wing slot cutter - a unique feature that provides smoother, cleaner cutting action. Complete instructions included.

Raised panel doors set your cabinets apart from the humdrum uniformity of mass-produced furniture. Each of these sets include all of the bits you need to build beautiful doors. All three bits are 1/2" shank and feature micrograin carbide and Jesada's unique white PTFE coating. Choose from four great sets! *Profiles are shown 3/4 actual size.*

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Product Reviews



Touch Switch for Cabinets



Power at your fingertips. That's what you get with a touch dimmer/switch system. They're incredibly goof-proof and simply plugs together—no wiring!

This dimmer/switch module works with either halogen or incandescent lights. (Halogens require their own transformer.) The dimmer module has a metal touch pad. You either fasten the touch pad directly to your project, or remove it from the system and attach its wire lead to any metal part on your project—like a hinge. When you touch that metal part, you control the lights.

The lights are purchased separate from the dimmer/switch. Check the maximum wattage on the dimmer, and make sure your light system doesn't exceed it. The cords are long, but even so it's a good idea to buy the lights while your work is in the planning stages to make any necessary allowances for cord lengths.

The rope lighting pictured here can be used indoors or out and comes in a variety of colors.

These items are available at many home centers or call Woodworker's Hardware (800) 383-0130.

Three halogen lights and a transformer, \$40

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Build a Whittled Peg Rack

George Vondriska
Fri., 9:00-11:00 am; Sat., 9:00-11:00 am
Sun., 11:30-1:30 pm
This butternut wall-hung coat rack appeared in AW issue, #73. Make one at the show and use it to hang your favorite fedora. Capacity: 12. Cost including all materials: \$75.

Make a Hinge Mortising Jig

Carol Reed
Fri., 9:00-11:00 am; Sun., 11:30-1:30
Make and keep a great jig for routing hinge mortises in your boxes and cabinets. You will also get a set of hinges and learn to install them using the jig. Capacity: 20. Cost including all materials: \$60.

Construct a Pair of Cam Clamps

Fred Mallack
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Sun., 2:00-4:00 pm
Handmade from wood and aluminum, it will last forever. Take the pair home to use on your next project. Capacity: 20. Cost including all materials: \$60.

Make a Mahogany Jewelry Box

Frank Klausz
Fri. & Sun., 2:00-4:00 pm
Learn to layout and cut dovetails by hand. Use tools sharpened by Frank, and then complete the jewelry box at home. Capacity: 12. Cost including all materials: \$75.

Make the Jig that Makes Jigs

Carol Reed
Sat., 2:00-4:00 pm
Customize a plastic marking gauge to suit your router. Then, take the gauge home and use it in your shop to make other new, very accurate woodworking jigs. Capacity: 20. Cost including all materials: \$65.

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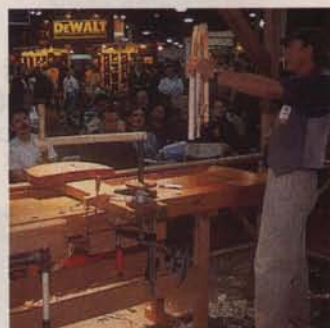
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George Vondriska
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Sharpening
Paul Anthony
Sun., 11:30-1:30 pm
Learn how to put a truly keen edge on your chisels and plane irons. Bring a couple of your favorite tools for a serious tune-up. Take home a sharpening aid. Capacity: 12. Cost including all materials: \$60.

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Woodworking Fundamentals
Frank Klausz
Fri., 11:30 am-1:00 pm; Sat., 1:30-3:00 pm
Learn how to select and understand tools, machines and materials. Choose projects and joinery you can handle. Allow for wood movement. Use the proper glue.

Tablesaw Basics, Fred Matlack
Fri., 11:30-1:00 pm; Sat. 3:30-5:00 pm
Learn how to use it safely and efficiently for ripping, crosscutting, dadoing, and other essential woodworking operations.

Making and Fitting Cabinet Doors
Paul Anthony
Fri. & Sat., 1:30-3:00 pm
There's nothing more important to the look of a cabinet than its doors. This design tour of cabinet door styles will include a demonstration of construction and installation techniques.

Getting Started with your Router
Carol Reed
Fri., 1:30-3 pm; Sat. 11:30-1:00 pm
For anyone new to routing. Learn how to rout safely and successfully. Discover which routers, bits, and aftermarket jigs and fixtures will work best for you.

Finishing Secrets
Michael Dresdner
Fri., 3:30-5:00 pm; Sat., 3:30-5:00 pm
Learn how to select the best finish for the job. Understand wood stains and use them correctly. From surface preparation to final polish, you'll know what it takes to get a professional finish.

Tablesaw Tips and Tricks
Andy Rae
Fri., 3:30-5:00 pm; Sat., 11:30am-1:00 pm
Tired of wobbly cuts and wasted wood? Want to know the safe way to saw? Learn 4 savvy steps, from simple tune-up procedures and safe sawing methods, to jigs that improve your skills and accessories the pros use.

Turning Plates

Got an offcut from a beautifully figured board? Turn it into a plate! Standard $\frac{3}{4}$ -in. wood and a shop-made chuck are all you need.

The trick is to figure out how to hold such a thin piece of wood on the lathe. It's so thin, there's hardly anything to grab onto. Here's a safe and simple system for turning a plate from thin wood.

All you'll need is a small face plate, a medium-sized bowl gouge ($\frac{3}{8}$ -in. to $\frac{1}{2}$ -in.), a round-nose scraper, some masking tape and a large, thick chunk of wood for the chuck.

A plate blank that's 9- to 10-in. wide works best. It can be glued-up or cut from a wide board, just as long as one side is flat and smooth. You'll need that flat surface in order to glue the plate blank onto a mounting block.

To make the blank, cut off a square piece from the wide board and cut it into a rough circle with a bandsaw. Draw a 3-in. circle in the center of the blank's smooth side. Then make a 3-in.-dia. mounting block from a piece of 1-in.-thick wood that's been surfaced on both sides. Screw the mounting block onto a small face plate. Now follow the photo sequence and create your own stunning plate.



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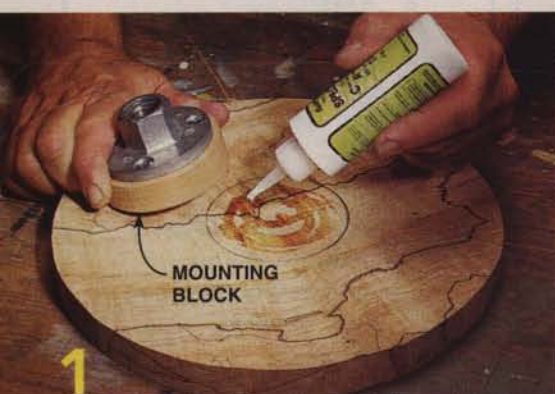
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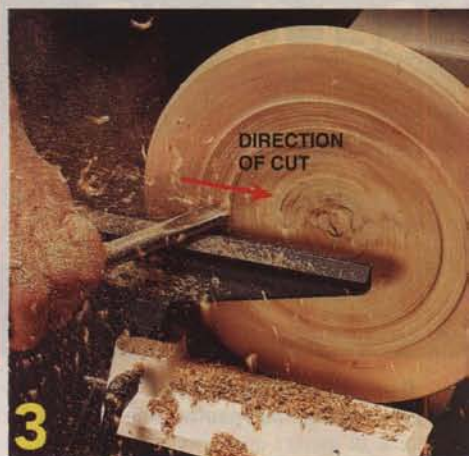


▲ **Glue the mounting block** onto the plate blank. Use medium- to thick-viscosity cyanoacrylate (CA) glue. It dries quickly, so you'll be ready to turn in two to three minutes.

Adjust your lathe to run at its lowest speed. Then mount the face plate on the lathe and true up the face and edge of the blank with a bowl gouge.



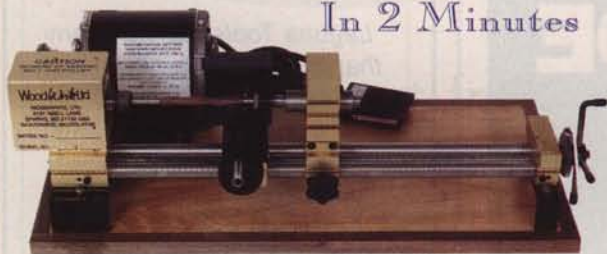
▲ **Round the plate's rim** with the bowl gouge turned on its side. This prevents the gouge from catching and is called a "closed cut." Move in the direction of the arrow and swing the handle of the gouge around the corner. Ride the bevel of the gouge on the plate, keeping the cut very light.



▲ **Flatten the face** of the plate. Work from the outside to the center. Keep the bevel of the gouge rubbing against the plate to make this shearing cut.

Because you are working with thin material, use light shearing cuts, especially around the rim. You can place your hand behind the rim to reduce vibration.

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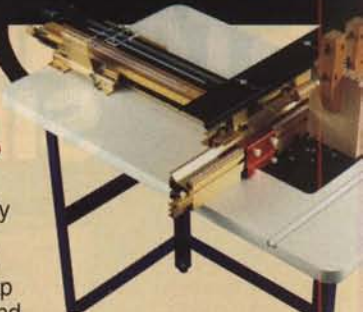
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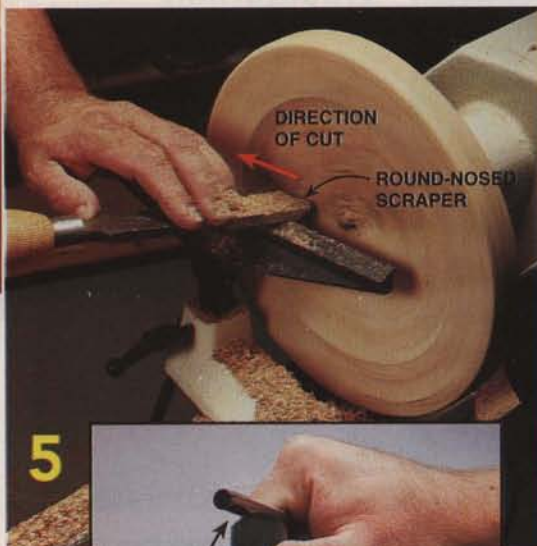
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4 ▲ Cut a cove to define the rim. Drop the handle of the gouge below the level of the tool rest so the gouge won't catch. Keep the bevel riding on the plate.

Next dish out the center of the plate with shearing cuts. Measure the depth of the plate before you cut too deep.

If you're careful you should be able to make a very smooth surface across the entire face of the plate with the gouge. You can move right on to sanding. But if you've had some trouble and there are tool marks you can't get out, reach for a scraper.



5



Woodturning

◀ **Scrape the face** of the plate with light cuts for a smooth surface. Move from the center out to the edge. Raise the handle of a round-nose scraper above the level of the tool rest so its cutting edge won't grab.

◀ **Burnish a scraper's edge** at a 90-degree angle. Grind the scraper first at 60 degrees, then remove the wire edge with a sharpening stone. Burnish with a single pass, using hard pressure (see Sources, p. 104).

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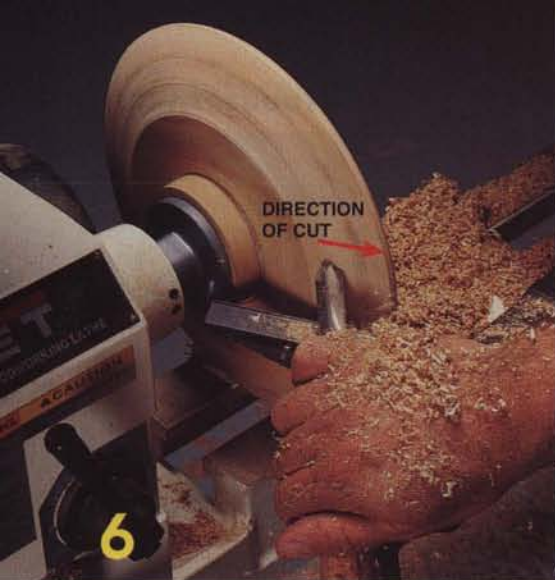
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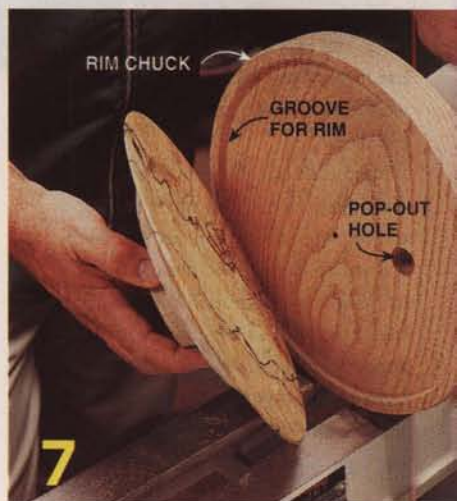
◀ **Remove most of the waste** from the back side of the plate. Move the bowl gouge from the center out to the edge. Take the rim down to its final thickness. Again, you can support the rim with your hand to reduce vibration.

Sand the face of the plate and apply a finish as it spins on the lathe. Sand and finish the outer edge of the back side as well. Then remove the face plate from the lathe.

▶ **Make a rim chuck** to hold the face side of the plate. Make the chuck from a wide piece of hardwood. The wood should be at least 1 1/2-in. thick or make the chuck from two 3/4-in.-thick pieces of marine plywood that are glued together. (Marine plywood is free of annoying voids.)

Turn a recess into the face of the chuck. The plate should fit snugly within it, but you can insert paper shims if it's a little loose. (You can re-use the chuck for smaller plates by turning another recess.) Drill a hole through the chuck so you can pop out the plate with finger pressure.

Once the plate is mounted, snug up the tailstock to the mounting block to hold the plate securely in the chuck.



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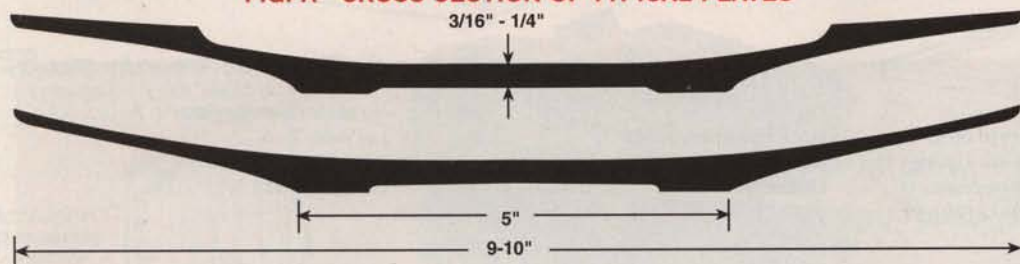
▲ **Reduce the mounting block** to a 1/2-in.-dia. stub tenon with the bowl gouge. Then shape the plate's base and complete the underside of the rim. Sand and finish the back while it's still supported by the tailstock.



◀ **Tape the plate** into the rim chuck. Use plenty of wide masking tape. Adjust the lathe to run at its lowest speed. Then back off the tailstock and cut off the stub tenon with the bowl gouge.

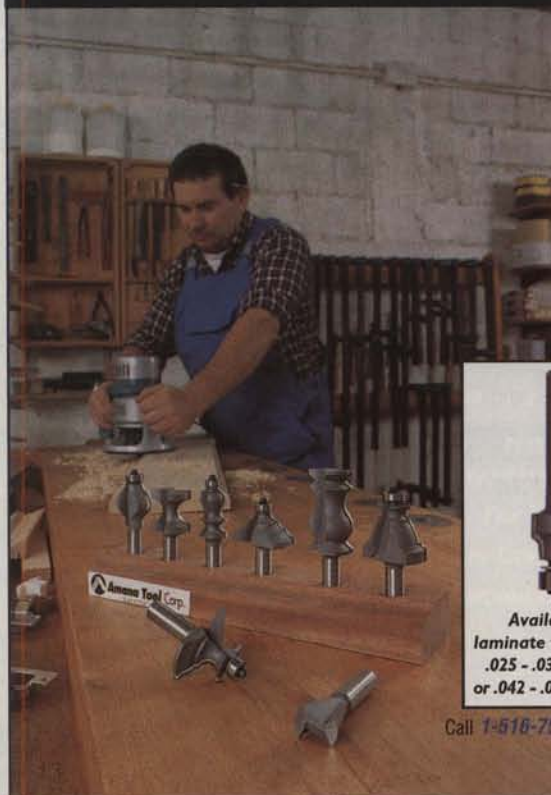
Use light cuts so you don't dislodge the plate. Sand and apply finish to the rest of the plate's bottom. Remove the tape as soon as possible so it doesn't leave any marks.

FIG. A CROSS SECTION OF TYPICAL PLATES



◀ Try these classic shapes for starters or copy any piece of china that you like. The thickness of your wood plate shouldn't be less than 3/16 in.

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Woodturning

◀ If making a wooden rim chuck for every plate you turn seems like too much work, try a commercial adjustable rim chuck. A turn of the wrench simultaneously moves four aluminum jaws in and out to firmly anchor your plate. Eight rubber buttons screwed into tapped holes in the jaws hold the edge of the plate.

Pictured at left is a set of Jumbo Jaws mounted on a Oneway Stronghold Chuck. They can hold a plate from 2 3/4- to 11-in. diameter. Order from: Packard Woodworks, (800) 683-8876, Stronghold Chuck 112610; \$260, Jumbo Jaws 112614; \$80.

A similar set of plates and buttons is available for a Super Nova-gear chuck. Called a Cole Jaw Set, it can hold plates from 3- to 10-in. diameter. Order from Woodcraft Supply, (800) 225-1153, Super Nova Chuck 127141; \$180, Cole Jaw Set 15M83; \$85. **AW**

Sources

Plate Finish

If your plate will have food served on it, use Behlen's Salad Bowl Finish. It's a quick-drying food-safe varnish. Packard Woodworks, (800) 683-8876, 125701 (1 Pint); \$9.

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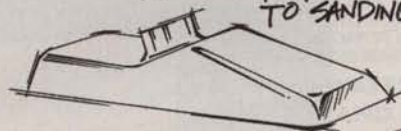
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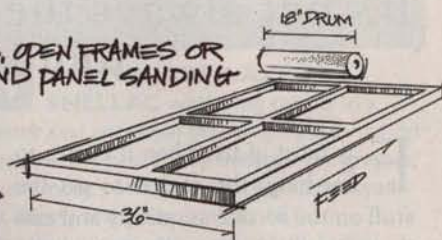
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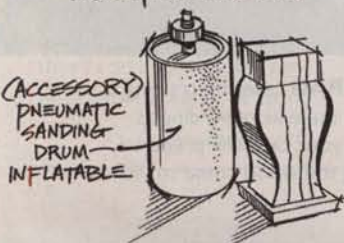
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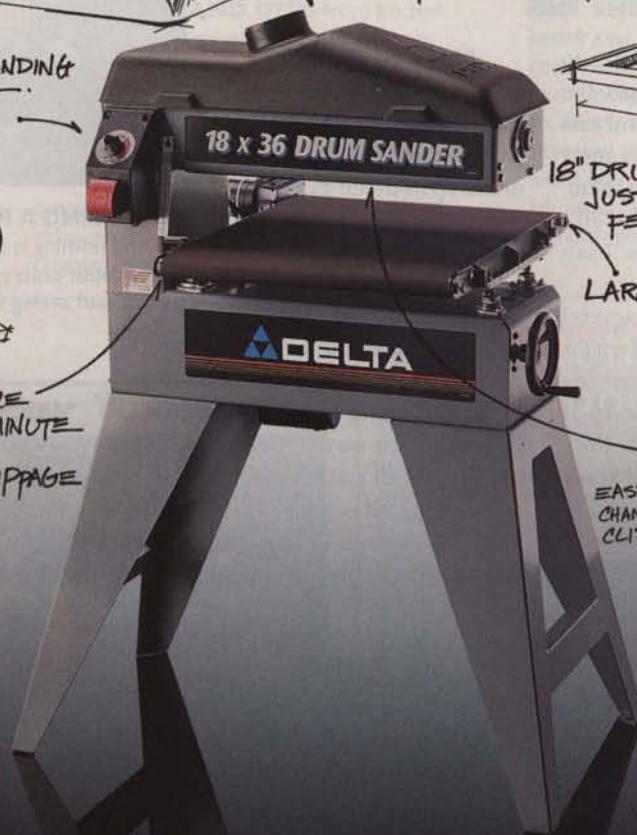
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It's not always the best tool for the job.

For most of us, when it comes to finishing, the goal is to get the stuff on the surface as quickly and easily as possible. Traditionalists may argue that once you learn how to use them, brushes are the most versatile and efficient tools for applying finishes. I say, brushing is not always best.

Flooding and wiping offers several advantages over brushing. Each coat is of uniform thickness, so it'll dry quickly and evenly. Dust can't settle in it because the layer of finish is so thin. And even though you'll have to apply more coats, you don't have to sand in between, there's no technique to learn and no brush to clean.

Oil stains and Danish oil finishes are designed to be flooded on and wiped (Photo 1). I've found this is a great approach for lots of other finishing chores, including raising the grain before finishing (Photo 2) and applying water-soluble dyes and stains (Photo 3). I always apply my seal coat of dewaxed shellac with a rag (Photo 4). Some oil varnishes are formulated at the factory for wiping, but most brush-on types can also be applied this way, if you thin them first with boiled linseed oil (one cup to a quart of varnish).

How to Flood the Surface

The idea is to flood the wood with finish, let it drink up as much as it can, then wipe off the excess. Immersing the entire piece in a bath of finish is usually not practical, and pouring stain directly on the surface can result in unsightly dark spots. Used with a rag, a spray bottle (\$2) is a great way to cover a surface quickly, but all you really need is a rag. A good rag allows you to get finish onto the surface cleanly and recoat porous areas easily.



1 **USING A RAG** takes no training at all. And nothing is quite as rewarding as wiping finish onto your carefully prepared surface and seeing the wood come to life.

What Makes a Good Rag?

Absorbency and a tight weave. Whether transferring material from the can to the surface or soaking up the excess while evening out the coat, a rag that can hold a lot of liquid works the best.



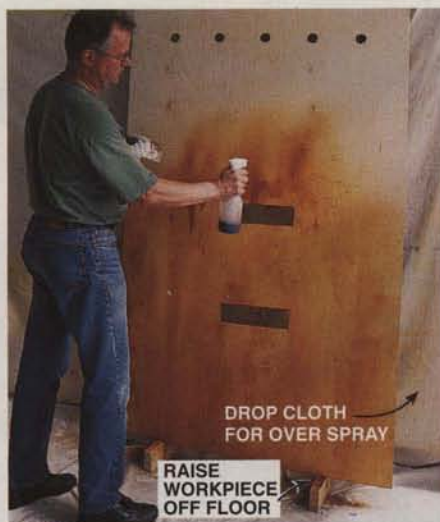
2 RAISE THE GRAIN

before you apply any waterborne finish by liberally wetting the sanded wood with a sponge. After wetting, squeeze out the sponge and soak up any excess water immediately, leaving the surface damp. This quick wetting won't effect glue joints or loosen veneer. After overnight drying, sand lightly before applying the finish.

Loosely woven rags shed tiny threads of fabric (lint) that contaminate surfaces. For applying oils, shellac and varnishes, the best rags come from all-cotton fabrics—old towels, diapers, tee shirts—the softer the better. You can also buy cotton rags from finishing suppliers. Paper towels may be a convenient substitute, but cheap ones leave lint and disintegrate quickly. I prefer “shop wipes,” a thicker, more durable and absorbent type of paper towel. They’re available at home centers, are virtually lint-free and only cost about five cents apiece.

Sponges are another useful alternative because they’re so absorbent. They hold lots of water or thin,

Continued on p. 110.



3 SPRAY WATER-SOLUBLE STAINS AND DYES from bottles.

It's a quick and easy way to cover large or vertical surfaces and keep them from drying out. Wet the entire surface with water first. Then spray on the color, working from the bottom up. After you've got the surface flooded, wipe it down evenly with a rag. You can put oil-based stains on this way too, although they don't atomize as well and cleaning the spray bottle afterward is a chore.

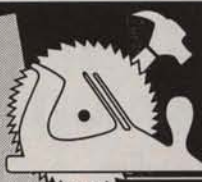


4 APPLYING DEWAXED SHELLAC with a rag results in a

better seal coat than brushing. A brushed-on coat doesn't seal evenly because end grain is much more porous than face grain. Instead, let thirsty end grain drink its fill from repeated passes with a saturated rag. You won't leave lap marks or a thicker coat on adjoining face grain, so the next coat of stain or finish goes on evenly.

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Just Finishing

Continued from p. 107.

runny stains without dripping, so you can flood and wipe a large surface quickly and cleanly.

Dispose of Oily Rags Safely

After use, rags, wipes and sponges saturated with oils from finishing products are a serious fire hazard. These oils—boiled linseed and tung oil are most common—dry to a film when exposed to air. This drying process can generate enough heat to cause a pile of wet, oil-soaked rags to spontaneously catch on fire within a few hours. Dry these rags safely (Photo 5) before throwing them out and keep them out of the reach of children and pets. **AW**



5 **FOR SAFETY, SPREAD OUT OIL-SOAKED RAGS,** one layer thick, so air can circulate around them. This allows the heat generated by the oils as they dry to dissipate so the rags won't spontaneously catch on fire. Once dry, they'll be hard and crusty, and can be safely tossed into the household trash.

Dust Collection

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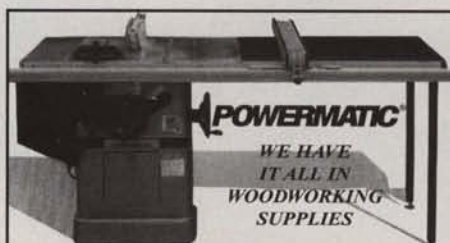
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If the world was flat, just about any antenna would do!

Xium's new 83-channel technology combines an all-in-one solution for receiving maximum high-energy TV reception.

by Chris Murdock

If you think you need a big antenna to get great TV reception, think again. The reason most antennas have such a large surface area is that they are trying to pick up TV signals from a variety of sources.

Unfortunately, most antennas miss the point. The area of the antenna is not as important as the angle at which the signal is received. The new Xium Multi-Spilateral Antenna Energy Core provides excellent reception of UHF and VHF channels in most viewing locations.

The antenna's patent pending technology is comprised of a newly advanced spilateral design. This enables it to provide superior reception in areas where broadcast signals are received from many different locations. It features a multiple spiral-lateral design, which gives it multiple side-by-side positions for receiving audio and video signals. This design gives it the ultimate in multi-directional performance, so that it can use multiple angles to detect almost any TV signal from almost any direction, without the need for "manual tuning."

Fully automatic 360-degree tuning. The core of the antenna has multiple, 90-degree angled plates. This spilateral design creates an all-directional antenna that receives almost any analog or digital signal from any radio frequency broadcast tower. It creates an electromagnetic energy field, that strengthens an incoming signal, regardless of the direction. It also includes multiple, back-to-back interceptors allowing electromagnetic energy to be generated between each set of interceptor patterns. This means that it can receive signals from multiple directions without having to be rotated. Once the signal is received, the antenna reprocesses it at the antenna's highest passive energy/center point. The result of this exclusive design is automatic multi-waveguide tuning that creates optimum levels of radio frequency energy fields.

You can mount it almost anywhere. The multiple spilateral design provides you with a wide range of placement options. You can mount your Xium Antenna in an attic, closet or other out-of-the-way indoor location. You can mount it on a horizontal mast, closet rod or suspended from a roof

Looks like no other antenna...inside or out

- Works on any TV. Quality laboratory tested performance
- Signal-grabbing Spilateral Technology
- Fully automatic tuning
- Full multi-directional design
- Easy to install
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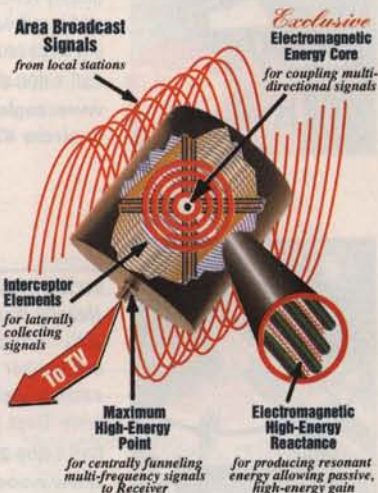
support by one of the included base mount brackets. If you choose to mount the Xium Antenna outside, you can use the mounting brackets to install it with the connector up or down, giving you customized mounting options depending on the type of home you are in. For optimum results, you should mount the antenna in as high an elevation as possible, to allow the best spilateral performance for collecting all of the signals available in your area.

Quality construction. The Xium Antenna features compact, modern styling that will blend in with almost any decor. The UV-protected housing is made of impact-resistant copolymer, making the exterior resistant to weathering and color

Spilateral Design

This unique design features a multiple spiral-lateral design, which gives it hundreds of positions, all in one, for receiving audio and video signals. This design gives it the ultimate in multi-directional performance, so that it can use multiple angles to detect almost any TV signal from almost any direction, without the need for "manual tuning."

You can install it with the connector up or down, giving you customized mounting options depending on the type of home you are in.



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Conventional Antennas

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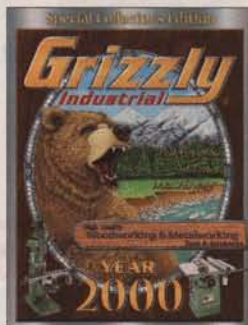


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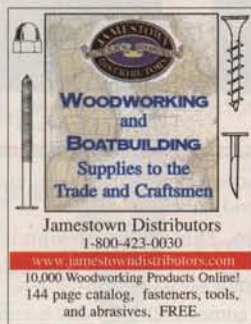
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DeWalt DW744

ITEM 37645-2EEA

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ITEM
03813-4EEA

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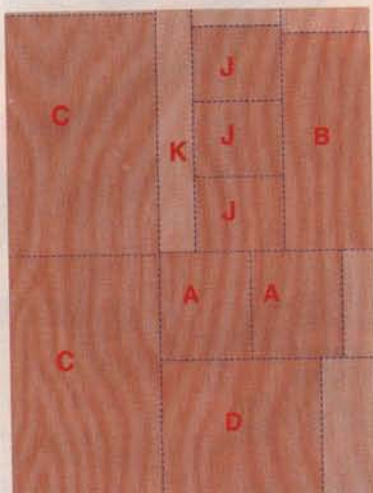
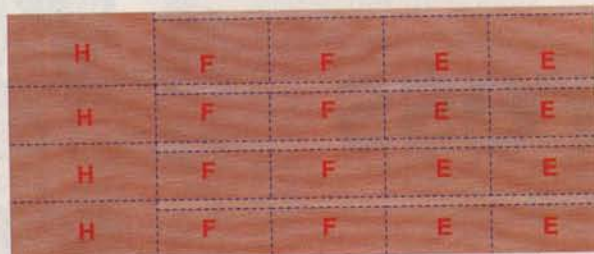
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B Back	1	1/4" x 11 1/2" x 28 1/4"
C Side	2	1/4" x 20" x 31 1/4"
D Top	1	1/4" x 17 1/2" x 21"
E Drawer side	8	1/2" x (7, 5, 5, 5)"* x 11"
F Drawer end	8	1/2" x (7, 5, 5, 5)"* x 12"
G Drawer bottom	4	1/4" x 11" x 13"
H Drawer front	4	1/2" x (8, 6, 6, 6)"* x 15 1/2"
J Bit rack	4	1/4" x 11 1/2" x 9 1/4"
K Toe-kick	1	3/4" x 15 1/4"

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- American Woodworker
- Publication Number : 738-710
- Filing Date: September 24, 1999
- Bimonthly except monthly in November and December
- No. of issues published annually: 7
- Annual subscription price: \$23.88
- Known office of publication: 2915 Commers Drive, Suite 700, Eagan, MN 55121.
- Complete mailing address of headquarters or general business office: 2915 Commers Drive, Suite 700, Eagan, MN 55121.
- The names and addresses of publisher, editor and editor-in-chief: Publisher: Michael P. Reilly, 260 Madison Ave., New York, NY 10016; Editor: Ken Collier, 2915 Commers Drive, Suite 700, Eagan, MN 55121; Editor-in-Chief: Gary Havens, 2915 Commers Drive, Suite 700, Eagan, MN 55121.
- The owner is Home Service Publications, Inc., 2915 Commers Drive, Suite 700, Eagan, MN 55121. RD Publications (sole shareholder of Retirement Living Publishing Company, Inc.) 260 Madison Ave., New York, NY 10016.
- There are no known bondholders, mortgages, or other security holders owning or holding 1% or more of the total amount of bonds, mortgages or other securities.
- N/A
- American Woodworker
- Issue date for circulation data: September/October 1999
- Extent and nature of circulation:
 - Average no. of copies each issue during preceding 12 months
 - Actual no. of copies of single issue published nearest to filing date

	(i)	(ii)
(a) Total no. of copies	453,713	448,474
(b) Paid/requested circulation - Sales through dealers and carriers, Street vendors, counter sales - Paid/requested mail subscriptions	57,067 300,141	60,005 295,080
(c) Total paid/requested circ. (sum of 15b(1) and 15b(2))	357,208	355,085
(d) Free distribution by mail (samples, complimentary, and other free copies)	2,494	2,511
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I based the design on the "Roll-Around Shop Cabinet" that appeared in AW #72, p. 79. An important feature of this cabinet is the drawers that have extra-long slides to give you full-extension. I sized my cabinet to fit my Delta 17-in. drill press, model 17-900 and made it all from birch plywood. The total cost was \$75.

To build the cabinet, cut all parts, including the top cutout. Then screw and glue parts A and B. Screw on the sides, then attach slides and top. Nail and glue together the drawer boxes, then nail on the bottoms to square them up. Now attach the slides and install them in the cabinet. Using double-stick tape, attach the drawer fronts so there is a uniform gap all around. Screw on the fronts, attach pulls and bingo, you've got storage space. **AW**

Submitted by Jean Bartholome, Dundas, South Dakota.

For information on how to order past issues and copies of past articles, see p. 4.



Plan and Cutting List continued on p. 119.

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