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Build your own home theater—complete with pocket doors and more.

PHOTO BY JOHN HAMEL, MODEL DENISE REPKO/MODEL MANAGEMENT, STYLIST PAM SIMPSON



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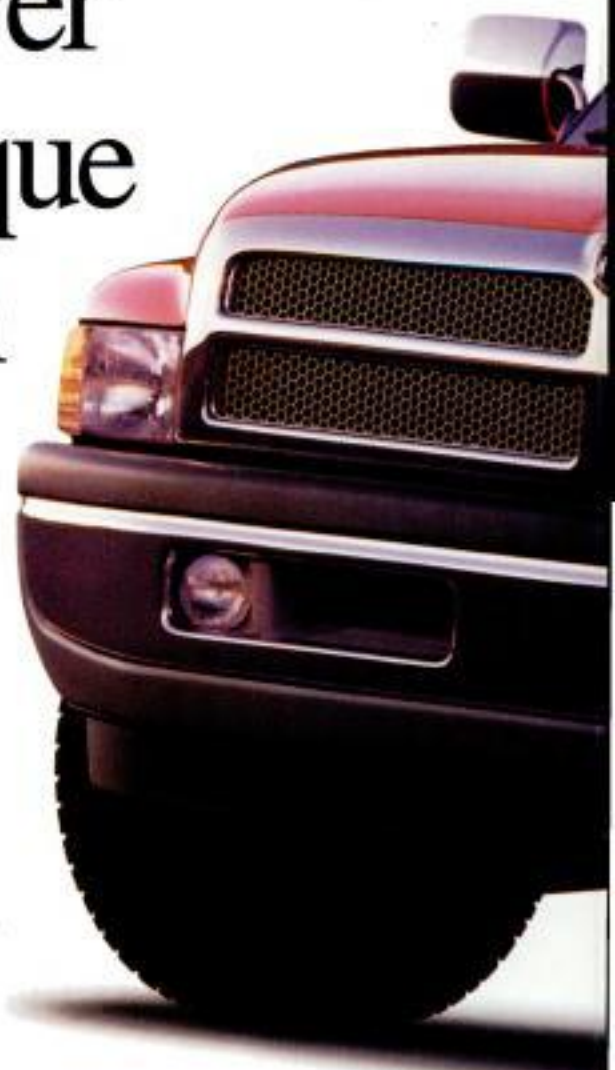
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¹We calculated resale using avg. trade-in values for '94-'95 full-size models vs. MSRPs, published in Jan. '95-Sept. '96 N.A.D.A. Official Used Car Guide® monthly editions. Use of these values does not constitute NADA's endorsement. ²Won Strategic Vision's 1995 and 1996 Total Quality Award™ in its class. Based on Strategic Vision's 1995 and 1996 Vehicle Experience Studies™ of 31,440 ('95) and 35,652 ('96) Oct.-Nov. new vehicle buyers of 170+ ('95) and 200+ ('96) models after the first 90 days of ownership. ³J.D. Power and Associates 1995 & 1996 Automotive Performance, Execution, and Layout Studies™, based on 27,859 ('95) and 25,492 ('96) consumer responses.

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This One





Networking

Sharing skills and tools is a win-win situation

Did you know there are more than 500 woodworking guilds and clubs in the U.S.? "Why so many?" you ask. Well, besides the fact that woodworkers are such sociable creatures, I believe the answer can be summed up in one word: *networking*.

Networking is a fancy word for one of the oldest, most fundamentally human endeavors—communicating with others. Our cave-dwelling ancestors held tribal gatherings to swap spearheads and demonstrate mammoth-hunting techniques. Guild meetings are a lot like that. And, though stone axes have given way to steel tools, networking remains

one of the most effective ways to share information and resources.

Sharing makes sense. I've never met a woodworker who owns every tool he or she will ever need. Even seasoned professionals swap tools and services rather than spend a lot of money for things they'll only use a couple of times. It can be gratifying to "make do" with what you have, but there's even more to be said for working smart. Instead of hand-planing 100 feet of rough lumber, wouldn't you rather take it to a friend who owns a big jointer and planer?

You can also learn a lot by networking. Most guilds and clubs sponsor guest

speakers and educational programs that will inspire and enlighten you. And when you've got a specific question or concern, help from a more experienced club member is never more than a phone call or two away.

If you haven't checked into your local woodworking organizations yet, it's never too late. AMERICAN WOODWORKER is glad to help. Call (610) 967-8315 for the names and phone numbers of the guilds nearest you. If you have a computer and a modem, you can search the AW Online guild database. See page 24 for details.

Ellis Valentine
Executive editor

PLAY IT SAFE

Woodworking can be dangerous. Safety equipment can greatly reduce your risk of injury; so can common sense and caution. Remember, if a procedure feels dangerous to *you*, don't try it—find a safe alternative. Your safety is your responsibility.

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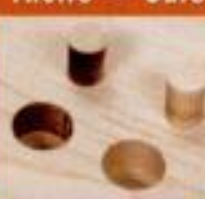
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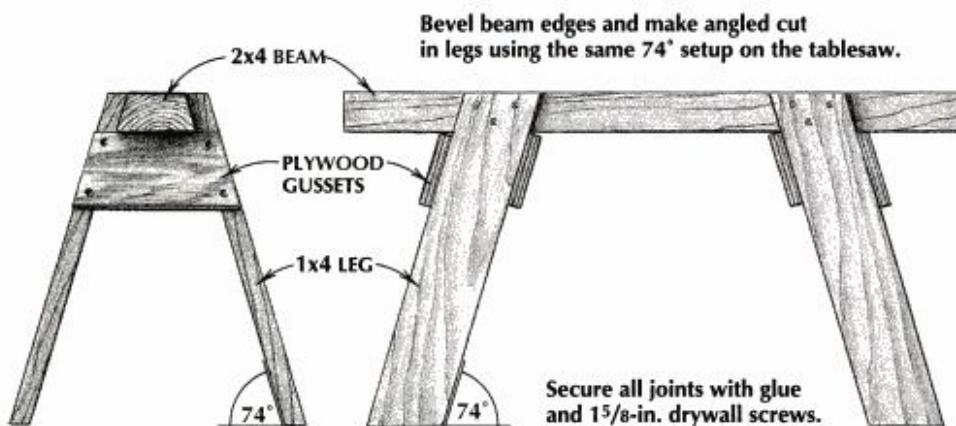
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A Simpler Sawhorse

Sawhorses have interested me for many years, so I was glad to see Paul Anthony's article in issue #52. The Japanese-style horses are intriguing, and they give the woodworker an opportunity to show off his or her skill. But this approach isn't consistent with my priorities when building sawhorses. My design is closer to Anthony's "advanced A-frame," but his design is more complex and time-consuming to build than it needs to be. Here's what I consider important when building sawhorses:

- Ease of construction.** Anthony's A-frame calls for mortises, which are time-consuming to cut. In my design, the two long edges of the 2x4 beam are simply bevel-cut on the tablesaw to match the leg angle. (See drawing.)
- Sturdiness.** In my experience, you get the strongest stance with legs that splay in both directions. But the legs shouldn't extend beyond the ends of the beam, or you'll be tripping over them.

NIEMANN'S SIMPLIFIED SAWHORSE



•**Stackability.** Sawhorses that stack on top of each other save valuable workshop space.

•**Low cost.** My horses are made with 2x4s, 1x4s and scraps of 5/8-in. or 3/4-in. plywood.

•**Consistent dimensions.** This contributes to ease of construction. To make all the bevel and angle cuts in

beams and legs, I set the angle of my saw blade and my tablesaw's miter gauge to around 74°. This setup gives you perfect fits and plenty of strength with no chisel work. If there's a simpler, stronger sawhorse design out there, I'd certainly like to see it.

Alvin H. Niemann
Ocean Shores, WA

Feedback on the Buyer's Guide



I recently bought AW's 1997 Tool Buyer's Guide and was disappointed to find no rankings or ratings for tools in each category. I seem to remember that the Buyer's Guide issue in previous years had Editors' Choice and Best Buy selections noted in different tool categories. What gives?

Steve Spodaryk

The Buyer's Guide is a special issue that poses a dilemma for us editors. We don't have the resources to test and rate every tool in the Buyer's Guide—it's simply too big a task for our staff and our budget. Last year (in the 1996 Buyer's Guide) we included most of the Editors' Choice and Best Buy winners that we have picked over

the last several years. The problem with this approach, and the reason we didn't do that this year, is that some of those Editors' Choice and Best Buy winners are two or more years old. In other words, it's two or more years since we tested that specific tool category. In the meantime, lots of new models have been introduced in some categories (like cordless drills, for example) that might be better than our old Editors' Choice winners. We just haven't tested them yet, that's all.

So, for us to steer readers to an old Editors' Choice winner is really a disservice if there are new models available that weren't considered when we tested the tool category. Instead, in each category, we've indicated when that tool was last tested and where to find the article for more information.

It's not a perfect solution but we've given it a LOT of thought and debate. I hope this explains our thinking. If you have a better suggestion, we're listening.

David Sloan
Editor & publisher

I just read your 1997 Tool Buyer's Guide issue and noticed an unsafe procedure illustrated in the Table of Contents and on page 102. In these photos you show the woodworker holding a pneumatic nailer in his right hand and positioning the work with his left hand. The position of his left hand is very unsafe, as the fastener could deflect through the side of the work and into his finger.

When I first bought my pneumatic nailer I was cautioned by a contractor

STAY IN TOUCH! If you have comments, corrections or news to share, we want to hear from you.

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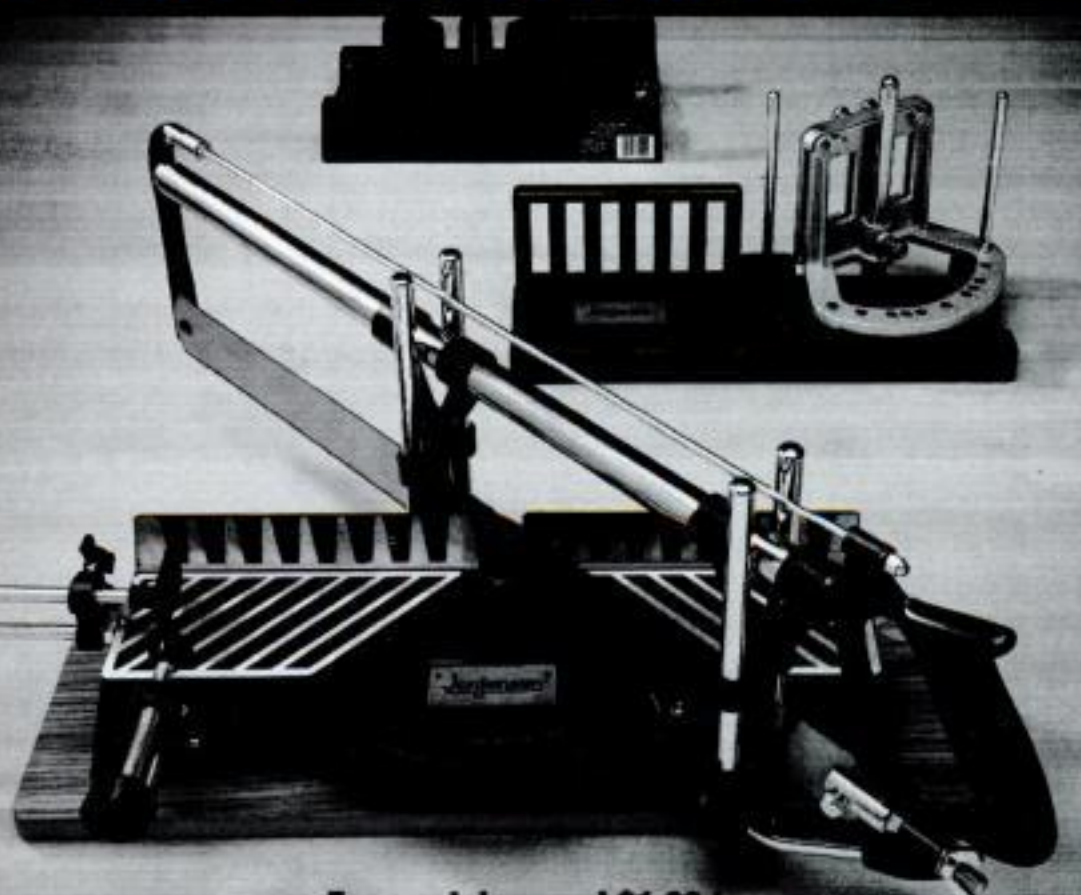


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LETTERS

against using this procedure. He has seen first-hand that this can and does happen. Please caution your readers to keep the free hand completely clear of any possible path of deflection that the fastener could take—and save themselves a trip to the emergency room.

Jim Gott
San Jose, CA

Good catch, Jim. We agree that it's good practice to keep your free hand clear of any possible path of fastener deflection when using pneumatic nailers.—Eds.

More Kudos for Carvers

Just when I was giving up on AW for the scant attention you pay to carvers, my faith is renewed. I really enjoyed Wayne Barton's article on chip carving. (See AW #56.) The chip-carved box he did for the article really says it all: The most basic project can be transformed by carving, and all it takes are a couple of knives. In the same issue, I was also heartened to see carving recognized in

your Excellence in Craftsmanship awards. The carved lectern done by Randy Rosenthal is truly amazing. Thanks for the coverage.

Edward Almgren
Bridgeport, CT

An Award-Winning Desk



I wanted to let you know that I entered my version of Kiera's desk (AW #44) in the Latah County (Idaho) Fair's "Arts" division and walked away with the Grand Champion Award for woodworking. Thanks for the inspiration and instruction. The next project I take on from the pages of AW will be the humidor featured in issue #53.

Michael Baron

Low-Tech Tenons Are OK

I like Joe Wajszczuk's simple approach to cutting tenons. (See AW #54.) I think a fair number of readers aren't interested in constructing elaborate jigs for every cutting operation. The "five-

board" tenoning jig (shown on page 57) is a simple, refreshing alternative—and it gets the job done just like a more complex version.

Chris Marshall
Minnetonka, MN

Correction

The toll-free telephone number listed for Shopsmith in our shop test of floor-model scrollsaws (AW #54) is incorrect. The correct number is (800) 543-7586.

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CIRCLE NO. 29 ON PRODUCT INFORMATION FORM

Lee Valley & Veritas®

Innovation in tools®



Lee Valley Tools and its manufacturing arm, Veritas® Tools, bring you the newest products from their research and development activities.

The following 3 pages are a sample of what you can expect in the full-color, 236-page Lee Valley catalog.

A. Veritas® Bar Gauge Heads

Simple bar gauges are among the most useful tools in a shop. Like cabinet scrapers,



after using them, you wonder how you got along without them. They have two primary purposes, comparing measurements (such as ensuring equal diagonals in drawers or carcasses to guarantee squareness) and transferring

measurements. Any time you can transfer a dimension directly,

without converting it into numbers, you avoid a primary source of error. Bar gauges not only shine in basic measurement transfer, but are unequalled for inside measurements such as for sizing shelves, or interior trim in windows. They can also be used as "story sticks" for complex built-ins where nothing is square. Gauge head openings are $\frac{1}{2}'' \times \frac{3}{4}''$; you just rip $\frac{1}{4}''$ slices off standard $\frac{3}{4}''$ lumber to make bars of the length you want (wood is not included). Made of brass and ABS plastic.

AW06 Bar Gauge Heads \$9.95



Ideal for inside measurements.

B. A Tape for Cabinetmakers

A customer recently wrote to say, in essence, "Why can't you sell a decent 10-foot tape that I can slip in my apron pocket without it weighing me down? Everything you sell is long, wide, and heavy. I want something slim, light, and handy." Here it is and, better yet, we offer it in right-to-left reading version (which we call a "right-hander's" tape) as well as the usual left-to-right reading version (a "left-hander's" tape). The vast majority of tape measures

made today read from left to right, which is OK for just measuring, but becomes a major problem when a right-hander needs to measure and mark something; you end up either having to hold the pencil in your left hand or switching the tape to your left hand and then having to read tape markings that are upside down. The solution is a tape that reads right-to-left. Then you can hold the tape in your left hand and mark with your right hand.

This new tape is perfect for keeping on the bench or in an apron and, at just over 2½ oz, you hardly notice it in your apron pocket. So that left-handers can enjoy it also, we made it in a left-to-right reading version as well.

AW13 RH Cab. $\frac{1}{2}'' \times 10'$ Tape (right-to-left) \$3.95

AW14 LH Cab. $\frac{1}{2}'' \times 10'$ Tape (left-to-right) \$3.95

C. The Lee Valley Hammer

The world has needed a good small hammer for several decades; we have designed one, 10" in overall length. The 5 oz head is ground in the classic octagonal shape and the hickory handle is scaled to match the smaller head. It is far better for fine work than the standard 16 oz hammer. It not only fills a need in the shop, but it is an ideal hammer to keep in a kitchen drawer. It is also the only hammer that children can use with confidence.

AW07 Lee Valley Hammer \$8.95

A Catalog Of Solutions

Our 236-page, full-color catalog has the widest selection of woodworking hand tools in the market. The copy in this ad is taken directly from the catalog to show you the detailed information you can expect to find about each tool.

To Order: 1-800-871-8158

or fax: 1-800-513-7885



Our catalog is \$5 (refundable with first purchase) or free with any purchase from this three-page ad.

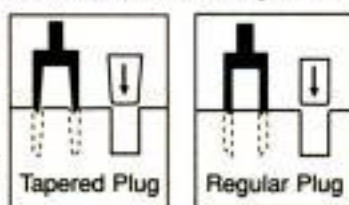
N.Y. residents, add sales tax.

Outside U.S.A., call: 1-613-596-0350 or fax: 1-613-596-6030



A. Veritas® Tapered Snug Plug® Cutters

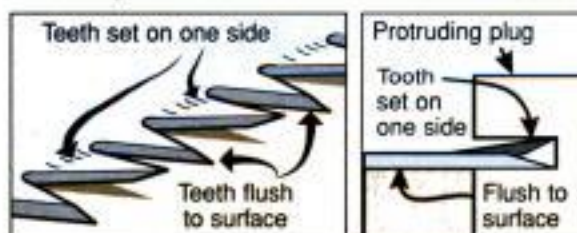
It is always difficult to fit plugs perfectly; any slight runout in your drill press quill can make the holes oversize. Unfortunately, this runout will also make plugs undersize. The combination leads to ill-fitting plugs that are very noticeable in your finished work. Snug Plug cutters are designed to cut slightly tapered plugs; the first 1/8" of the plug is the stated size (1/4", 5/16", etc.) and then flares out at a 3° included angle. Unlike regular plug cutters, they also shave the plug sides as they cut, producing very smooth plugs. You just tap a plug into a hole until you meet resistance, then cut off the excess. You will then have a plug that fits perfectly, with a nearly invisible line between the plug and the workpiece. These plug cutters are carefully reamed after hardening to ensure perfect concentricity. It is difficult to believe how nice a plugging job you can do until you actually use one. 3/8" shanks. Patented.



AWS01 Snug Plug® - 1/4"*	\$11.95
AWS04 Snug Plug® - 5/16"	\$12.50
AWS02 Snug Plug® - 3/8"*	\$12.95
AWS05 Snug Plug® - 7/16"	\$13.50
AWS03 Snug Plug® - 1/2"*	\$13.95
AWS06 Set of 3 Imperial Cutters*	\$29.95
AWS07 Set of 5 Imperial Cutters	\$52.95

Veritas® Flush-Cutting Saw

Traditionally used for the rapid trimming of plugs and dowels flush with a surface, our flush-cutting saws can be used anywhere that you want to cut off a projection without damaging the surrounding or adjoining face. This is possible because the teeth are set one way only. The 22 tpi Japanese-style tooth pattern cuts aggressively (on the pull stroke), but does not mark the surface that it is cutting next to. The .016" thick blade is



flexible and can be pressed flush to any surface. The saw is available with teeth cut on only one edge or in a double-edged style that cuts in either direction. Each is about 11 1/2" long with 4 3/4" of blade. These work like a charm. Patented.

B. AW01 Flush-Cut Saw, Single Edge	\$14.95
C. AW02 Flush-Cut Saw, Double Edge	\$17.95

Veritas® Snug Plug® Cutters & Saw Offer

We are offering our set of 3 Snug Plug® Cutters (1/4", 3/8", 1/2") with either our single-edge or double-edge Flush-Cutting Saw at a special discount. This combination will quickly become indispensable in the shop.

AW03 Single Flush-Cut & Cutters	\$39.95
AW04 Double Flush-Cut & Cutters	\$42.50

D. Carpenter's Beech Mallets

A good mallet is one of the first tools that any woodworker should purchase. It is useful daily in the shop for dozens of tasks, but is particularly handy for striking chisels and gouges. These are classic mallets made from steamed European beech, lacquered and polished. The faces are slightly raked to ensure a square strike; the face size lets you watch what you are doing rather than how you are striking the tool. The chamfered edges prevent splintering in use. The 4 1/2" size is standard (16 oz), and the 6" is for heavy mortising (24 oz).

AW17 Beech Mallet - 4 1/2"	\$14.50
AW18 Beech Mallet - 6"	\$16.95

E. Polished Firmer Gouges

These are sturdy firmer gouges with double-hooped hardwood handles, in the classic European style, suitable for use with a mallet. The blades are forged from chrome-vanadium steel and are fully polished. Tempered to Rc57-59, they need only final honing before use. Overall gouge lengths are 10" to 11". Available in 1/4", 3/8", 1/2", 3/4", and 1" sizes, or as a set of all five. Excellent value.

AW24 Polished Firmer Gouge - 1/4"	\$ 7.50
AW25 Polished Firmer Gouge - 3/8"	\$ 7.75
AW26 Polished Firmer Gouge - 1/2"	\$ 7.95
AW27 Polished Firmer Gouge - 3/4"	\$ 8.95
AW28 Polished Firmer Gouge - 1"	\$ 9.95
AW29 Set (5) Firmer Gouges	\$38.00

Lee Valley & veritas®

Veritas® Tools Inc. is the manufacturing arm of Lee Valley Tools Ltd. The intense research and development activities of the retail firm, Lee Valley, naturally led to the creation of Veritas® Tools Inc., the manufacturer.

Lee Valley Tools Ltd., 12 East River Street, Ogdensburg, N.Y. 13669

Guarantee - We pledge to you the best service we can provide with personal attention and the best value on every order. If you are not satisfied for any reason, just return your purchase within 3 months by insured parcel post to our Ogdensburg, N.Y., address. You can choose to either exchange the product, or receive a complete refund (including our regular shipping charges); we will also refund your return insured parcel post costs.



F. Forstner/Saw Tooth Bits

Made exactly to our specifications, these bits took over a year to develop and refine. Bits up to 1" diameter are forstner pattern and have 3/8" round shanks. Above 1", bits are saw tooth pattern and have hex shanks — a key feature for anyone who has tried to keep large-diameter bits from slipping in a chuck.

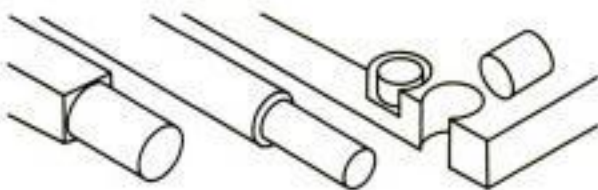
The rim on the forstners is proud of the chippers by only .005", reducing rim heat. The saw tooth styles are true saw teeth, not forstner bits with rim notches. The teeth have a skewed shear-cut design to prevent fiber pull and to give clean holes. Both styles have slightly sloped chipping bevels so that bits ride a cone of wood to keep them boring straight. Center brads can then be shorter, increasing bit versatility in thin material. Finally, bits have been finished with extra-fine grinding wheels to reduce friction.

Overall length is 3 1/2" for bits up to 1", 5" for bits from 1 1/8" to 2", and 6 1/2" for bits over 2". These are the best value we have in bits.

AW100	Box of 7 Forstners†	\$ 25.95
AW197	Box of 13 — 1/4" to 1"	\$ 44.75
AW198	Box of 16 — 1 1/8" to 3"	\$145.00
AW199	Box of 29 — all bits	\$179.00

G. Dowel, Plug and Tenon Cutters

For straight plugging operations, nothing works better in the 1/4" to 1/2" sizes than our Snug Plug® cutters. But for larger plugs or for cutting dowels and tenons, these are the best you can get. Not only are they made to very tight tolerances and will therefore cut accurate tenons and plugs, but we spent nearly two years in a design and test process to get the cleanest possible finish and the least heat build-up while cutting.



Although they run cooler than any other rim hold cutter, you still have to be careful. Cutting softwoods is okay, but care has to be taken in hardwoods to avoid overheating. Regardless, the convenience of being able to cut tenons and plugs up to 3" diameter makes it all worthwhile.

Plugs 1" long or less automatically side eject. Total available depth of cut is 2". Cutters up to 1" dia. have 1/2" round shanks, above 1", 1/2" hex. For use only in a drill press.

AW155	Set of 4 Cutters*	\$29.95
AW156	Boxed Set of 6 — 3/8" to 1"	\$49.95

Individual Bit Prices

Size	Forstner Bits		Dowel/Tenon
1/4"	AW161	\$ 3.10 †	
5/16"	AW162	\$ 3.40	
3/8"	AW163	\$ 3.50 †	AW130 \$ 7.25 *
7/16"	AW164	\$ 3.70	
1/2"	AW165	\$ 3.75 †	AW131 \$ 7.75 *
9/16"	AW166	\$ 4.00	
5/8"	AW167	\$ 4.25 †	AW132 \$ 9.25
11/16"	AW168	\$ 4.30	
3/4"	AW169	\$ 4.40 †	AW133 \$ 9.75 *
13/16"	AW170	\$ 4.60	
7/8"	AW171	\$ 4.80 †	AW134 \$10.50
15/16"	AW172	\$ 5.00	
1"	AW173	\$ 5.20 †	AW135 \$11.50 *
Size	Saw Tooth Bits		
1 1/8"	AW180	\$ 5.70	AW136 \$12.25
1 1/4"	AW181	\$ 5.90	AW137 \$12.75
1 3/8"	AW182	\$ 6.10	AW138 \$13.50
1 1/2"	AW183	\$ 6.70	AW139 \$14.25
1 5/8"	AW184	\$ 7.20	AW140 \$14.75
1 3/4"	AW185	\$ 7.70	AW141 \$15.25
1 7/8"	AW186	\$ 8.00	AW142 \$15.75
2"	AW187	\$ 8.40	AW143 \$16.75
2 1/8"	AW188	\$ 9.70	AW144 \$17.75
2 1/4"	AW189	\$11.75	AW145 \$18.25
2 3/8"	AW190	\$13.00	AW146 \$18.75
2 1/2"	AW191	\$14.50	AW147 \$19.25
2 5/8"	AW192	\$15.50	AW148 \$19.75
2 3/4"	AW193	\$16.75	AW149 \$20.25
2 7/8"	AW194	\$17.75	AW150 \$21.00
3"	AW195	\$19.25	AW151 \$21.50

A Catalog Of Solutions

Our 236-page, full-color catalog is filled with detailed information (like above), plus many technical tips. Smaller seasonal catalogs contain extensive technical bulletins.

To Order: 1-800-871-8158

or fax: 1-800-513-7885



Our catalog is \$5 (refundable with first purchase) or free with any purchase from this three-page ad.

N.Y. residents, add sales tax.
Outside U.S.A., call: 1-613-596-0350 or fax: 1-613-596-6030

Grinding Custom Router Bits

Q I need to duplicate a tabletop molding, and a standard router bit won't do it. I can't afford to have a bit custom-made just for one molding. Can I grind one myself?

Jonathan Hauze
St. Paul, MN

A Yes—and it's surprisingly easy and inexpensive. Here's how I do it: I use my standard 6-in. bench grinder, a couple of narrow (1/4-in. and 1/2-in.) grinding wheels, and an abrasive cutoff wheel for very tight areas. I round the corners of the wheels with a diamond dressing stick (available from MSC Industrial Supply, 800-645-7270) so I can grind fluid curves.

For small profiles, I use high-speed-steel (HSS) two-wing rabbeting bits, available at hardware stores and home centers. For large profiles, I use HSS, 1/2-in.-shank industrial bit blanks from DML Industrial Products (for a dealer near you, call 704-322-4266). These have 1 1/2-in.-long flutes, and diameters from 3/4 in. to 3 in. *Caution: With the largest of these, you'll need to use a variable-speed router mounted in a table.*

I usually follow the blank's original bevel—usually 70°—when I grind. (See drawing.) This leaves a clearance angle of 20°, which is necessary to keep the heel of the bevel from rubbing the workpiece.

On very deep parts of a profile (see drawing) I need to increase the clearance

angle because the cutting radius is smaller. I usually then grind a slightly convex, or "radial," bevel on those areas to avoid a weak, shallow cutting edge. I never grind the bit smaller than the shank diameter—instead, I buy a larger-radius bit.

I coat each wing with layout dye (also available from MSC), let it dry, and use an awl to scratch the desired profile on each wing. Holding the blank at 70° to the wheel, I slowly grind away the deepest sections first. To avoid overheating, I dip the bit in water regularly.

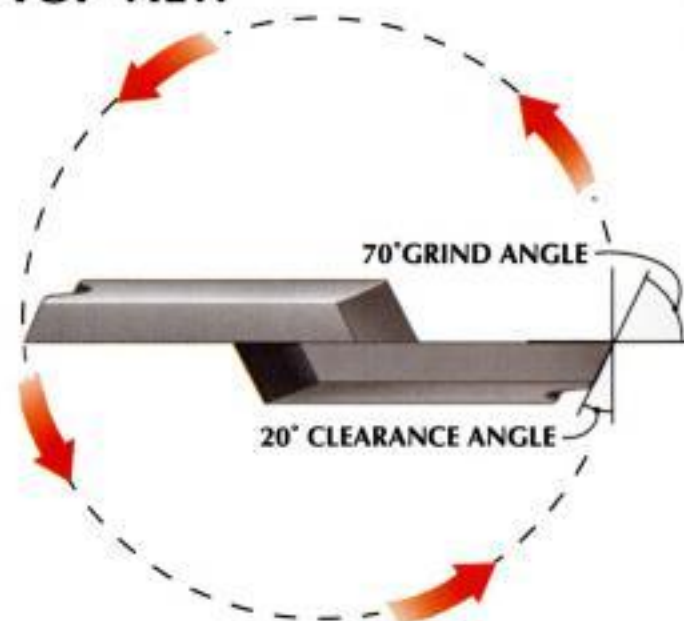
Once I've reached the profile on one wing, I trace it onto paper and use it as a reference for the second wing—it's more accurate than grinding to the layout lines alone. On very complex designs, I use a cardboard template or a sample of the molding as a reference for both wings.

I hone the finished edges with a small slipstone. Then I'm ready for a light test cut. I chuck the bit, set my router to 15,000 rpm or less—depending on the bit diameter—and take it for a spin.

Lonnie Bird
Woodworking instructor &
AW contributing editor
Rio Grande, OH

ROUTER BIT GEOMETRY

TOP VIEW



FRONT VIEW



Grind radial bevel in deep parts of profile.

Bandsaw Blades for Resawing Veneer

Q I need to resaw some 5 1/2-in.-wide walnut into veneer. I have a 14-in. Delta bandsaw. What kind of blade should I use? And do you have any tips for resawing?

Jeremy Taylor
Swarthmore, PA

A I'd recommend a 3/4-in. blade, with 3 or 4 tpi (teeth per in.). But here's the catch: While you can use a standard 3/4-in. blade on your saw, it will be difficult to tension properly because, at 0.032 in., it's a little too thick for a 14-in. saw.

A good alternative is a 1/2-in., 3-tpi

hook-tooth blade. Thin (0.022-in.) models are available from Highland Hardware (800-241-6748). Hook-tooth blades are aggressive and can leave tooth marks, but you could sand or plane those out later.

If you want to avoid both tensioning problems and tooth marks, you could use a 3/4-in., 3-tpi regular-tooth blade that's only 0.025 in. thick. These blades aren't widely available, but you can purchase them by mail from Suffolk Machinery (800-234-7297).

For best results, technique is as important as the blade you use. Here are some tips: First, always use a fence. You can buy an aftermarket fence or make your own from hardwood and

attach it with C-clamps. For stable cutting in 5 1/2-in. stock, the fence should be 3 in. to 4 in. high.

Second, feed the stock at the right rate. Around 6 ft. per minute is fine for moderately hard wood in your width range. The thicker or harder your stock, the slower your feed rate should be. You can "eyeball" the correct feed rate: If you're feeding too fast, the blade will wander; if you're feeding too slowly, you'll get burn marks.

With the right blade, a good fence, a smooth-running machine and the right feed speed, you'll make great veneer.

Art Gschwind
President, CEO & Founder
Suffolk Machinery, Patchogue, NY

Your best projects



Photo courtesy of Beaufort Furniture



Deserve the best cuts

When your work requires absolute precision and quality cuts, there is no substitute for the Freud LU85 -- at any price.

The LU85 produces a flawless cut that requires no sanding. It eliminates chipping and will improve the fit and beauty of your most demanding projects.

Only the award winning LU85 can give you this kind of performance, because no other blade is manufactured with the same care, strict tolerances and fine materials.

The exclusive long-life, titanium-bonded micro-grain carbide tips are ground with special angles, and the laser-cut extra stiff plate is bonded with a thick layer of Teflon® using a special process. This allows the blade to glide through the wood and eliminates pitch build-up.

The LU85 is a precision cut-off saw, ideal for your mitre saw or table saw, for the cutting of natural woods, low pressure laminates and mouldings.

SIZE	TEETH	BORE
8"	64	5/8"
9"	72	5/8"
10"	80	5/8"
12"	96	1"
14"	108	1"
15"	108	1"

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Precisely what you need.

218 Feld Ave. • High Point, NC 27264

CIRCLE NO. 3 ON PRODUCT INFORMATION FORM

Materiale protetto da copyright

Restoring a Tambour Desk

Q I'm restoring an old rolltop desk. The rolling top is in two pieces and needs a new backing. What kind of fabric should I back it with? Any tips for attaching the tambour slats?

Jeff Bacon
Union, MO

A It depends on the value of the piece. If your desk is a valuable or historically important piece, your goal is to remove as little of the original material as possible. For more information on stabilizing and preserving the old canvas, you can call the American Institute of Conservation for help (202-452-9545). For a household piece, there's an easier way:

First, determine how much of the canvas must be removed. Often only partial replacement is necessary. In this case, you can cut and glue a patch to fit. If the canvas is badly deteriorated, you'll have to remove it all.

Before you remove the canvas, num-

ber the slats on the back at the edge that isn't covered by canvas. You'll apply them to the new canvas in the same order. Then pull off any loose canvas. Hide glue was usually used on tambour doors of this sort, and a steam iron will loosen up anything that's stuck. On stubborn canvas, you can run a razor between the slats. Just leave the hide glue residue on the slats—the new hide glue will dissolve it. Once all the slats are loose, you can repair their finish if necessary.

Now prepare the new canvas (available from Van Dyke's Restorers, 800-843-3320). Lay it on a flat surface that is wider than the length of the slats, and tack it down around the edges. Next make a reference grid, to help keep your slats straight. Take a framing square and mark a large rectangle to frame all the slats. Mark horizontal lines inside the rectangle, about 1½ in. apart. Make sure they're parallel to each other and perpendicular to the ends of the rectangle.

Mix some fresh hide glue (available from Frog Tool, 800-648-1270) and heat it to between 140° and 150°. For flexibility, I add 5% glycerine by weight.

WHERE TO FIND IT

Hygrometers and thermometers for monitoring shop humidity and temperature are available from Chem-Lab Supplies, 1060-C Ortega Way, Placentia, CA 92670, (714) 630-7902.

Dollhouse doors, windows, shakes, flooring and other parts are available from Lee Valley Tools, Inc., 12 E. River St., Ogdensburg, NY 13669, (800) 871-8158.

Custom brass and bronze hardware cast from your originals is available from Winston W. Harness, Metalsmith, 501 North Sixth St., DeSoto, MO 63020-1550, (314) 337-5693.

Simply the Best...

Performax® owners agree – no other competitor model can compare.

Only Performax offers eleven different models. Only Performax offers patented features and exclusive technology. And only Performax offers the opportunity to see a Performax demonstrated at 200+ dealers worldwide.

We are the sanding specialists. Whether your sanding needs are a few hours on the weekend or all day, everyday, Performax has the model to fit your budget and your needs.

Call us today, let's talk abrasive planing, dimensioning and fine finish sanding in your shop.
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CIRCLE NO. 46 ON PRODUCT INFORMATION FORM

Pen Turning Lathe Special from HUT Products



Our SHERLINE is **American made**, with a range of 70 to 3000 RPM. It uses a versatile #1 MT. No awkward collets.



FREE PEN Turning catalog & details
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or Fax 1-573-875-0472

FREE \$50 worth of quality HUT merchandise when you buy either package. Offer good for a limited time.

Package ONE: \$455.
Sherline Lathe, Live Center, Carbide Cutting Tool, Rocker Tool Post, Shipping and our PEN TURNING MANUAL.

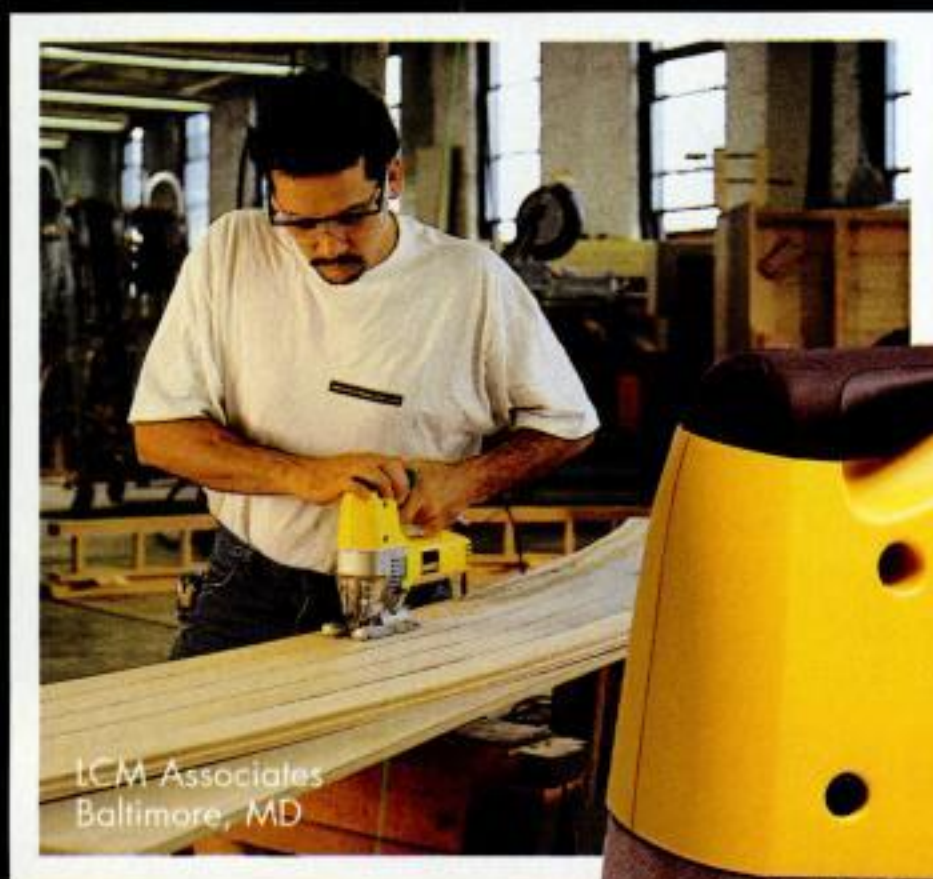
Package TWO: \$540.
Besides the Sherline Lathe, tools and accessories included in package ONE, this package includes both a Jacobs Drill Chuck and a 3-Jawed Chuck.

HUT Products for Wood
Pens from start to HUT PPP finish

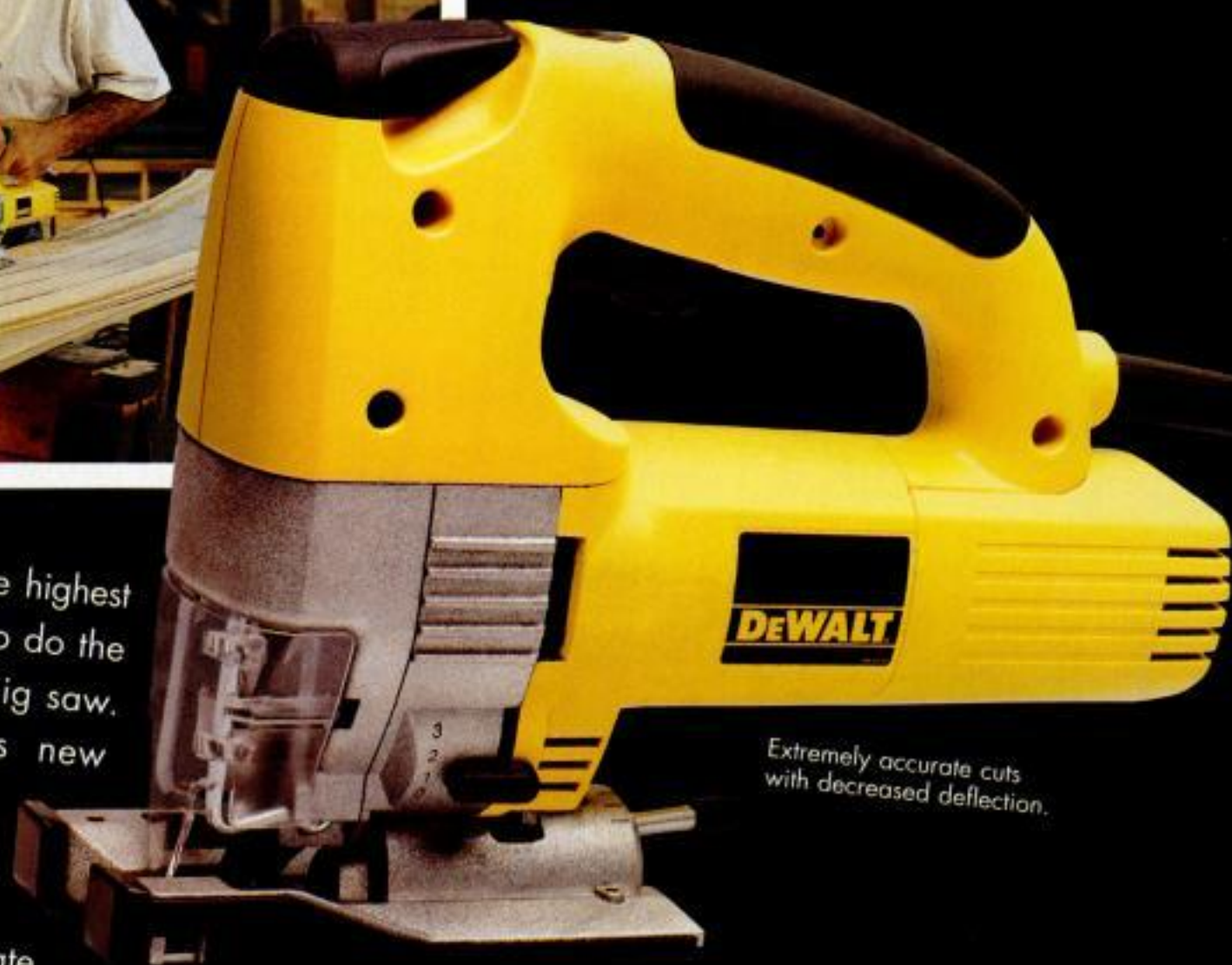
CIRCLE NO. 44 ON PRODUCT INFORMATION FORM

THE NEW DEWALT DW321 HEAVY DUTY JIG SAW

People Strive For The Perfect House,
The Perfect Car And The Perfect Job.
All That Matters To You Is The Perfect Cut.



LCM Associates
Baltimore, MD



Extremely accurate cuts
with decreased deflection.

Your work demands the highest degree of accuracy. So do the designers of our new jig saw. Introducing DEWALT's new 5.8 amp, 500-3,100 SPM variable speed jig saw. It's designed to provide extremely accurate cuts with decreased deflection and increased perpendicularity. And when coupled with DEWALT's new cobalt steel blade with patented tooth design, it offers the fastest cutting performance in the industry. Plus, you'll find a unique tool-free blade change system for both "T" and universal shank blades, a non-marring tool-free shoe which bevels 45° in each direction and a counterbalance system to reduce vibration. If you're looking for comfort, precision and performance, your saw is ready. For the distributor nearest you, call 1-800-4-DEWALT.



Dedicated To Perfection.

CIRCLE NO. 2 ON PRODUCT INFORMATION FORM

Materiale protetto da copyright

(available at pharmacies). Brush or roll enough glue onto the canvas for four to six slats. Then coat the back of the first slat and carefully place it on the grid. Press it down firmly along its length. As the glue cools, it will tack and set.

Position the next slat parallel to the first and as close to it as possible. Don't panic if the glue dries too soon; just heat it with a hair dryer and position it again. Do this for each slat until you've covered the glue-coated area, then brush on glue for the next few slats, and repeat.

After all the slats have set, flip the canvas over and check the bond. If any areas are loose, you can warm the canvas with an iron or hair dryer and repress them.

Once the glue is completely dry, clean any dust or debris out of the tambour grooves, wax the ends to avoid binding in the grooves, and reattach the door.

Robert Klein
Robert's Antiques and Restoration
Pensacola, FL

Burnt-Out Burn-In Sticks

Q I find that, after six or seven months, my lacquer sticks don't flow on my electric knife as they once did. Instead, they're rubbery and pull back out of the voids I'm trying to fill. What's going on?

Vic Abraham
Gautier, MS

A Burn-in sticks have a definite shelf life related to temperature. If you live in an area with very hot summers, your sticks are not likely to survive even one summer. Once a stick has "turned," its normally shiny surface will develop fine hairline cracks.

You can substantially extend the life of your burn-in sticks by keeping them in the refrigerator—but you might want to post a note to the family that they are not candy.

Michael Dresdner
Finishing consultant &
AW contributing editor
Tacoma, WA

Simple Drawer Lining

Q I built the jewelry chest in AW #54, and I'm looking for a quick way to line the drawers. Any ideas?

Connie Jaarsma
Pella, IA

A Here's a simple method. All you need are a few scraps of mat board and some imitation suede (available at most fabric stores). Cut the mat board 1/16 in. shy of the drawers' inside dimensions, apply spray adhesive, then wrap it in suede. If you're lucky the liner will be a press-fit; if not, use a dab of glue to hold it in place.

Michael Sage
Furniture maker
Redwood City, CA

WOODWORKING QUESTIONS?

Send them to: "Q&A," AMERICAN WOODWORKER, 33 E. Minor St., Emmaus, PA 18098. Or e-mail them to: AWQA@aol.com

RATED TOP VALUE BY WOOD® MAGAZINE - NOV. '96. PG. 79




PRECISION PLANING, EASY PORTABILITY

CT-340 12½" Benchtop Planer

- 12-1/2" x 6" Capacity
- Four Post Support
- Powerful 2HP 15 Amp Motor
- 2 Blade Cutterhead
- Adjustable fold-up bed extensions
- Stock rollers on top for consecutive cutting operations
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EVENTUALLY, OUR 15" WIDE BELT SANDER COULD MAKE THE DRUM SANDER OBSOLETE.

SDM-15 15" Wide Belt Sander

- Change belts in 30 seconds! vs. 2 hours on a drum sander
- Belts last up to 20 times longer
- Efficient dust extracting system
- With continuous oscillation and pneumatic tracking, Sheng Shing wide belt sanders deliver superior quality sanding at affordable prices.

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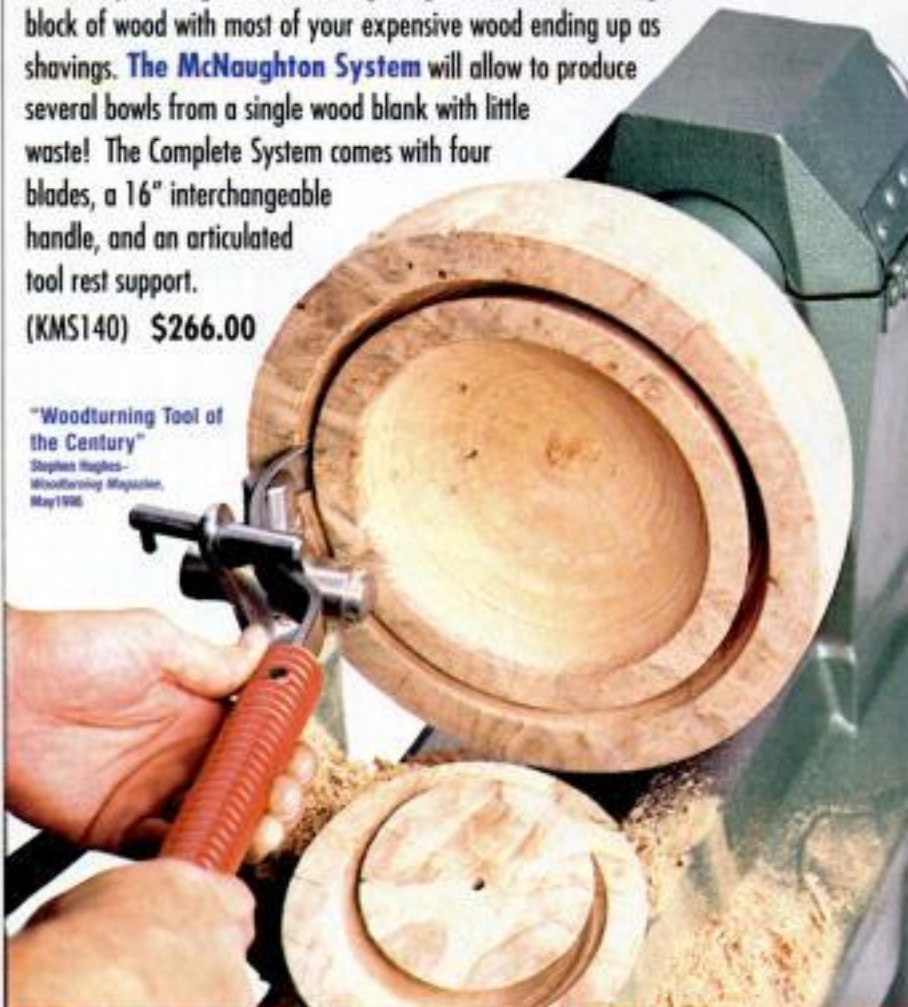
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COMPLETE LINE OF QUALITY WOODWORKING MACHINERY - ALL BACKED BY OUR FULL ONE YEAR WARRANTY

SAVE TIME AND MONEY BY PRODUCING SEVERAL BOWLS FROM A SINGLE BLOCK OF WOOD!

Ordinarily, turning a bowl meant getting one bowl from a single block of wood with most of your expensive wood ending up as shavings. **The McNaughton System** will allow to produce several bowls from a single wood blank with little waste! The Complete System comes with four blades, a 16" interchangeable handle, and an articulated tool rest support.

(KMS140) \$266.00



"Woodturning Tool of the Century"
Stephen Hughes - Woodturning Magazine, May 1996

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FOR DOLL HOUSE MOULDINGS



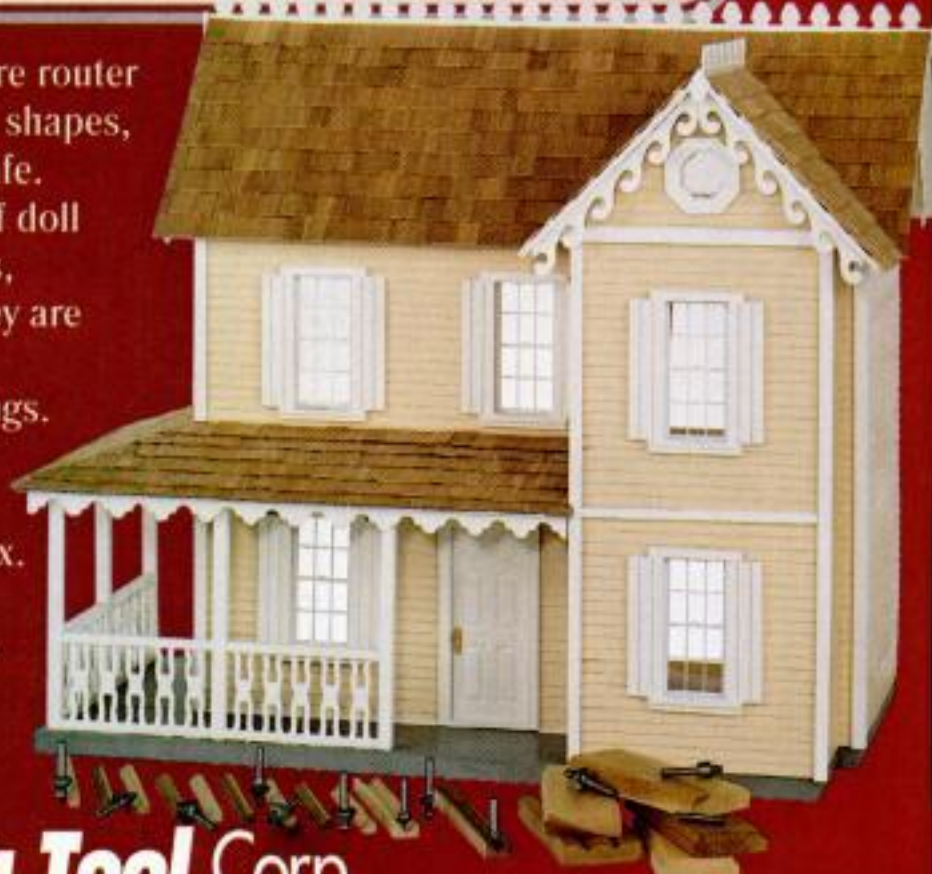
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CIRCLE NO. 35 ON PRODUCT INFORMATION FORM

offcuts

Bits and pieces of woodworking news

The AMERICAN WOODWORKER Show™ rides again!



Nearly 18,000 woodworkers from across the globe attended the AMERICAN WOODWORKER Show™, held last fall in Chicago and Fort Washington, PA. Each three-day event brought the pages of the magazine to life, with educational demos and seminars, inspirational exhibits and fantastic deals on woodworking tools and equipment.

The AW show will hit the road again next year. Dates and times will appear in an upcoming issue of the mag. Don't miss the next one!



Expert demos. Carver David Calvo was one of more than 20 demonstrators and seminar-givers at the show.



Incredible deals. Hundreds of exhibitors, including major manufacturers, offered everything a woodworker could want—hot new power tools, jigs and fixtures, hand tools, specialty lumber and books—most at special show discounts.

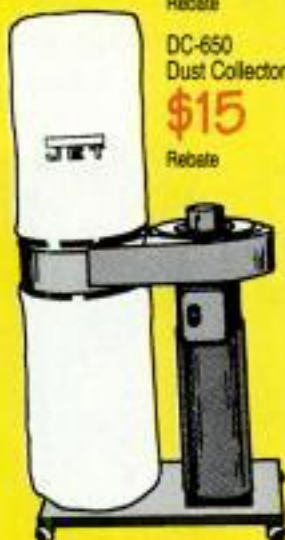
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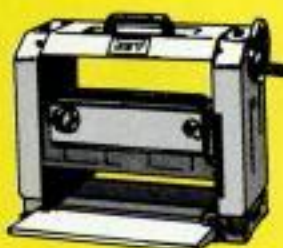
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Guilds Root for the Future



Branching out. A California guild passes on their love of wood by helping local schoolchildren plant trees.

PHOTO BY PAUL ANTHONY

Many woodworkers leave behind a legacy of work for future generations; some also leave trees to replace the ones they use. In northern California, the Sonoma County Woodworkers' Association (SCWA) gathers annually to plant the next generation of trees with the current generation of kids.

The five-year-old program is a real community project. The group works with a different school each year to grace the grounds with native trees. The guild buys some; others come from a PTA "tree fund." Nurseries and hardware stores give discounts and

donations, and a nursery person helps select suitable trees.

On planting day, woodworkers and kids gather trees and supplies. After a brief discussion and demo, adults and kids break into workgroups. In an afternoon, a dozen adults and a few dozen kids can easily plant 20 trees.

The Albuquerque (NM) Woodworkers Association helped Cub Scouts plant over 150 native trees last year through a similar program. So, along with a small forest of trees planted by woodworkers, grows a spirit of responsibility and trust in the future. —Paul Anthony

TO LEARN MORE about community tree planting, contact:

- American Forestry Association, (202) 667-3300
- National Tree Trust, (800) 846-8733
- Tree People, (818) 753-4600

Handmade Office Furniture

Handcrafted Executive Furniture is a new venture to help small-shop furniture makers succeed in a whole new market: high-end office furniture.

The business is the brainchild of Paul Reilly, an amateur woodworker and former marketer for IBM. "Many executives make major corporate decisions from factory-made desks. Why not give them furniture that helps them do their jobs better? That's where our guild comes in."

Each guild member develops a desk, a credenza, a bookcase and a conference table. Reilly and the member assemble a presentation sheet. (See photo, below.) Then, in exchange for 15% of the sale price, Reilly finds clients and makes sales.

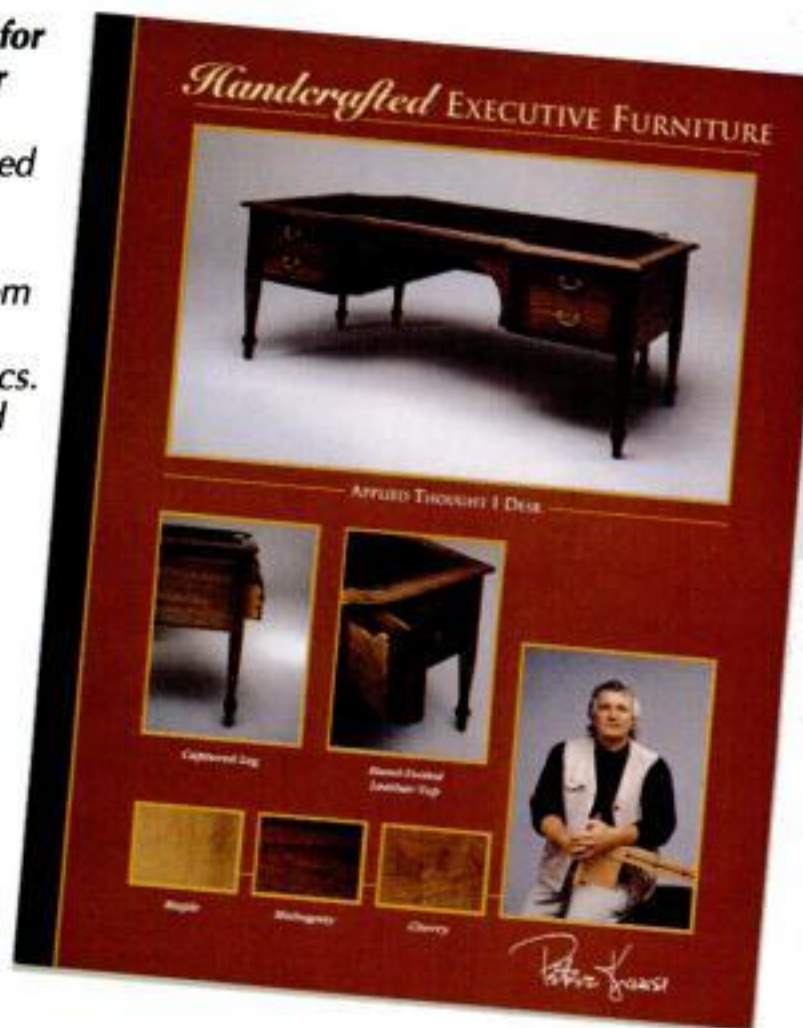
Six craftspeople have joined so far, and guild is still growing. To join, your designs must be original and your shop must be capable of a 12- to 16-week turnaround time.

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<http://www.ihserve.com/handcrafted>

Furniture for the corner office.

Handcrafted Executive Furniture sells custom furniture to top execs. Each guild member has a presentation sheet like the one shown here.



What's up at AW Online

Guilds & schools database! Maybe you've moved and want to make some new woodworking friends. Or maybe for New Year's you resolved to *finally* take a cabinetmaking class. AW's online guilds & schools databases have just what you need. You can even fan out to Europe and Australia. Names of contact people are also included, for more info. Don't miss it!

AMERICAN WOODWORKER Online is part of the America Online computer service. From the AOL main menu, enter keyword "wood." **For free AOL software and 15 free hours of online time, call (800) 764-4400.**

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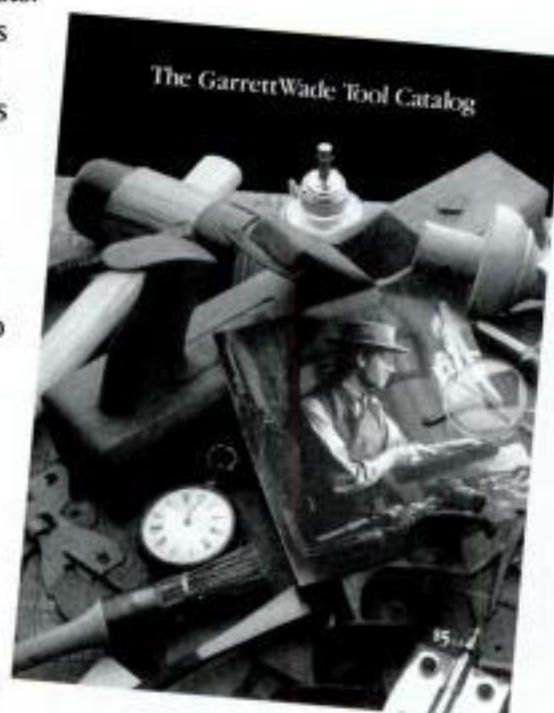
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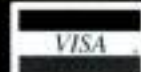
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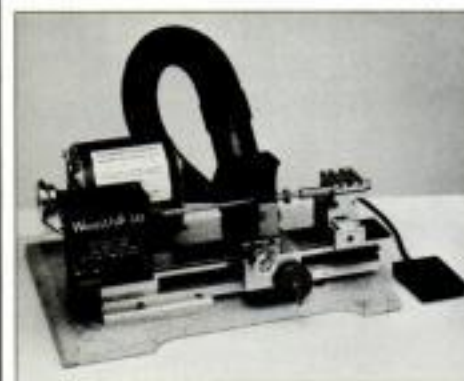
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1613EVS	2 HP VAR SP PLUNGE ROUTER	193
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9830	9.6V CORDLESS DRILL KIT W/2 BATT & CASE	148
9853S	12V CORDS DRILL KIT W/2 BATT, CASE	159
9862	12V CORDLESS DRILL KIT W/2 BATT & CASE	178
97310	LAMINT TRIMMER KIT W/3 BASES & CS	188
97549	JIG SAW W/CASE & 3 BLADES	144
0241NK	18 GA. BRAD NAILER 3/8"-1 9/16" KIT	96
0565T	ANGLE FINISH NAILER 1"-2 1/2"	208
0626NK	NARROW CROWN 1/4" STAPLER 1.2"-1"	103
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DW621	2 HP VS DUSTLESS PLUNGE ROUTER ..	218
DW625	3 HP HYY DTY PLUNGE RTR, VAR SP ...	274
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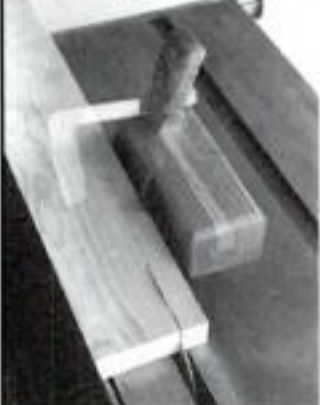
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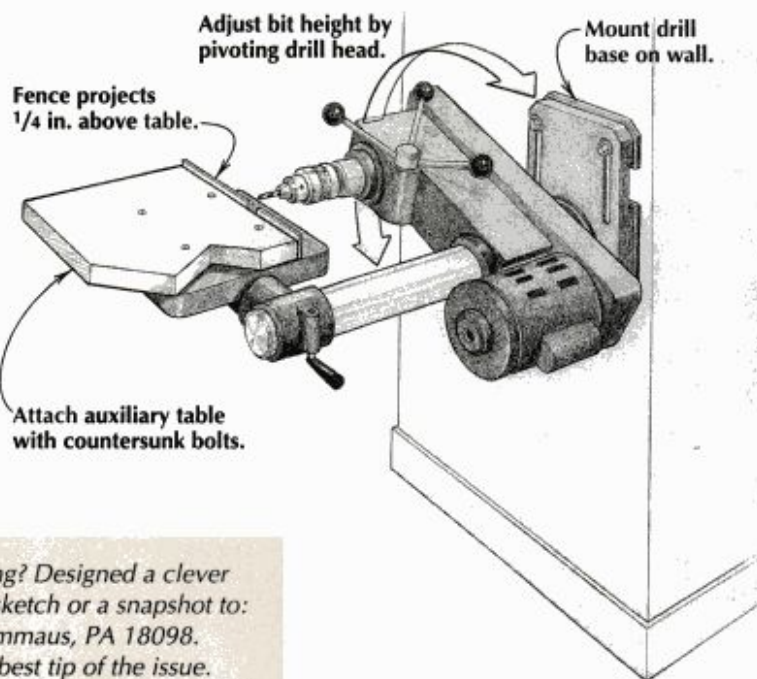
Horizontal Drilling

Best tip of the issue

I could never afford a horizontal boring machine, so I finally decided to make my own. I bought a bench-top drill press for \$60 and removed the drill head and table. I lag-bolted the base to my shop wall at a convenient height, and replaced the drill head and table as shown in the drawing at right.

Then I made an auxiliary table out of MDF and bolted it to the metal table. A metal strip screwed to the back edge of the table acts as a stop or fence. To adjust the height of the bit above the table, I loosen the setscrews that lock the head assembly to the column and pivot the entire head assembly. To determine the boring depth, I simply set the stop nuts in the usual way.

Curtis Erpelding
Port Orchard, WA

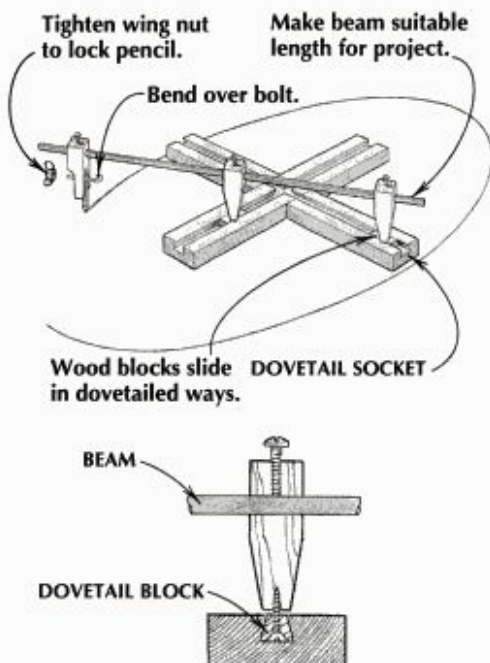


Best tip wins \$200. Know a better way of doing something? Designed a clever jig? Send your original woodworking tips, along with a sketch or a snapshot to: "Tech Tips," AMERICAN WOODWORKER, 33 E. Minor St., Emmaus, PA 18098. We'll pay \$50 for each tip we publish and \$200 for the best tip of the issue.

Ancient Ellipse

Doug Foster's tip in AW #52 is actually one-quarter of a jig known as a *croix ou equerre mobile*. This is a sliding jig that generates perfect ovals for mirror and picture frames, moldings or whatever. It has been in use at least since 1816.

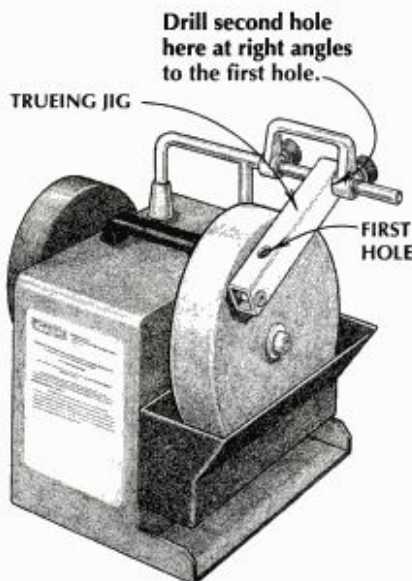
Bill Durow
Mountain Home, AR



Trueing Whetstone Sides

I recently bought a Tormek sharpening system and found that the stone had a distinct wobble. The trueing jig that comes with the machine works only when dressing the round surface, not on the sides. I cured this by drilling a second hole in the jig—the same size but at right angles to the first, at the opposite end.

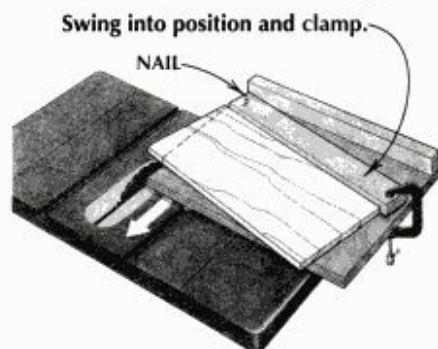
Forest Nerbitt
Lafayette, CA



Cutting Angles

When I need to make an angled cut on a rail or panel, I use the jig shown here. Choose a straight piece of wood, at least 1 1/2 in. wide, nail one end and clamp the other. To reset the jig at the same angle, pencil a line on the base board.

Yeung Chan
Fort Bragg, CA



Power Waxing

I don't own a buffer, and waxing the surfaces of my several machines was a considerable chore. Finally I got smart. I mounted 80-grit sandpaper on my random-orbit sander and placed the sander on a folded cotton rag. Now I can buff large surfaces quickly and easily.

David Wechter
American Falls, ID



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EAST COAST

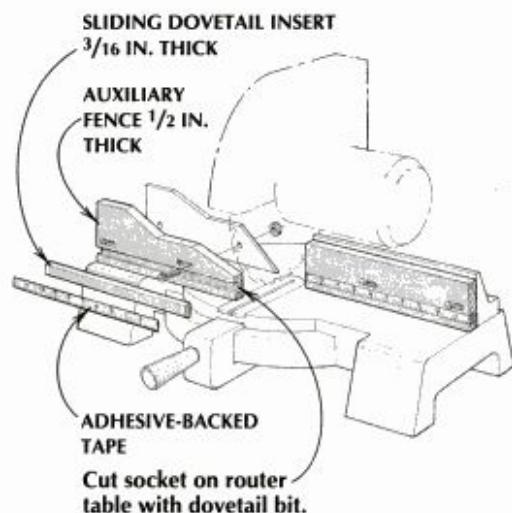


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Adjustable Rules for Chop Saws

I stuck rules to auxiliary fences on both sides of my chop saw so I could cut short lengths of stock accurately. I bought one right- and one left-reading adhesive-backed measuring tape, and attached both rules to sliding dovetail inserts. The inserts slide so I can zero in

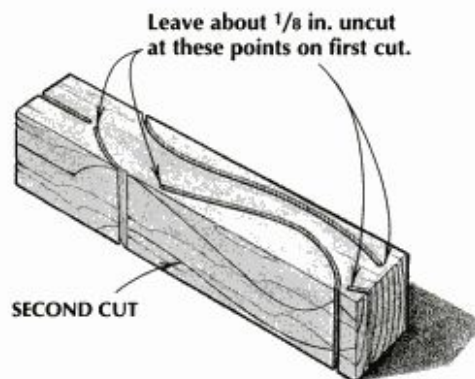


to the blade should I need to reposition the fence. Make the inserts fit snugly so they don't wander during cutting.

Andy Rae
Associate editor of AW

Compound Cutting

When bandsawing two-sided shapes such as cabriole legs, you usually have to reattach the first offcut with tape before

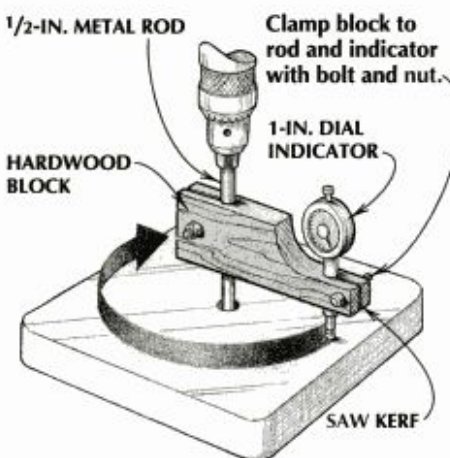


making the second cut. A better way is to refrain from completing the first cut but leave a thin "hinge." Only after making the second cut do you go back and sever the waste.

Michael Burton
Glorieta, NM

Squaring Your Drill-Press Table

This simple jig lets me set the drill-press table exactly perpendicular to the spindle. I chuck a metal rod in my drill press

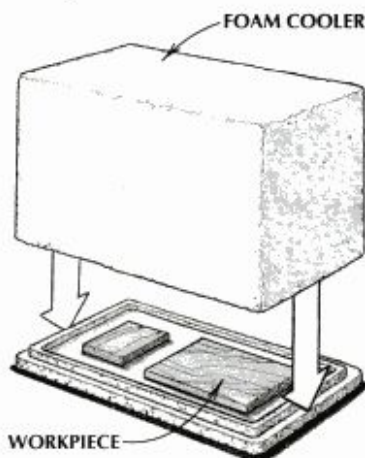


and attach a hardwood arm fitted with a dial indicator. Then I adjust the table until the indicator reads the same on both sides, and front to back. If you don't have a dial indicator, substitute a metal scribe point.

R. Brucken
Martinez, CA

A Cooler Finish

When finishing small parts with varnish or paint, place them on the inverted cover of a large Styrofoam™ cooler. When you're done painting, turn the cooler upside down and set it on its

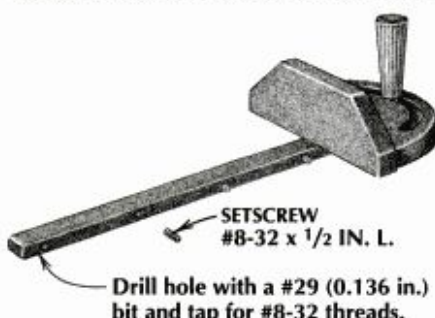


base. This traps the solvent, which slows down the drying and helps the finish flow. The result is a smoother, dust-free and more even finish.

Norman Stewart
Tumwater, WA

Miter Gauge Upgrade

Miter-gauge bars seldom fit their grooves snugly, and some are downright sloppy. I took the bar off mine, put it in

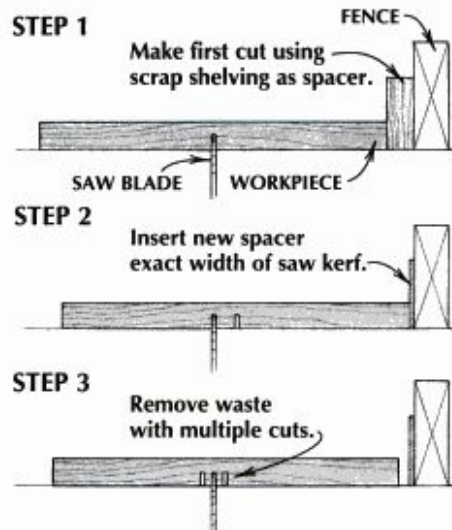


the vise, then drilled and tapped five holes. I smoothed the ends of some setscrews, put a dab of thread-locking compound on the threads, and inserted them. Now I can set the screws for a snug fit in any size slot.

Jeff Pieper
Strasburg, IL

Perfect Dadoes

When you're cutting dados with a saw blade for shelving, it would be handy to use a scrap of the same shelving as a



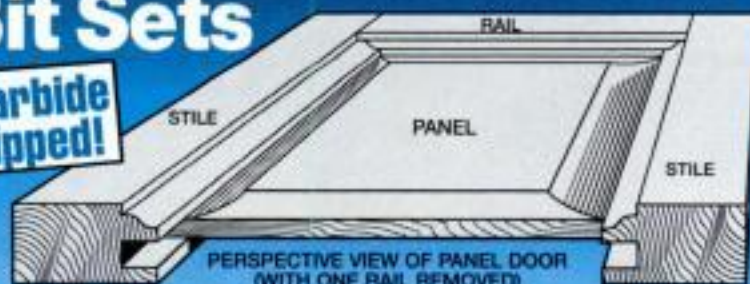
spacer. However, if you do so, the slot will always be too wide by the thickness of the kerf. My solution is to make a thin spacer the exact width of the saw kerf, and insert it before making the second cut.

The same trick works equally well when cutting slots with a router, a table-saw or radial-arm saw.

L. Jerry Hess
Tacoma, WA

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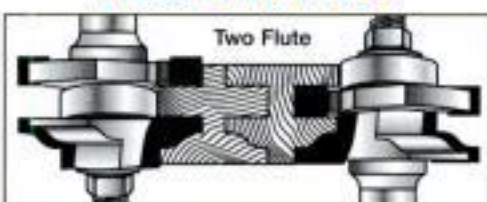


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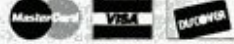
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Solid and simple. This fence and stop-block system is a great upgrade for tablesaws, chop saws and other machines. A turn of the handle locks the stop on the fence. The micro-adjusting stop-block arm swings up out of the way when not in use.

SUPER STOP

Make this rock-solid stop block for precise repetitive cuts

by Bob Moran

You don't need to sell woodworkers on the importance of stop blocks; we've all used them in one form or another to make repetitive cuts quickly and precisely. But factory-made fence and stop systems are expensive: You can easily pay \$200 or more for a length of extruded aluminum and the adjustable stop that goes with it.

My shop-made fence and stop can do everything the manufactured versions can, and you won't pay more than about \$20 for the wood and hardware required to build it. Unlike other stops I've used in the past—including some manufactured versions—my stop won't shift out of alignment when a workpiece butts against it. The stop adjusts

easily along the fence. And it flips up out of the way on a pair of heavy-duty brass knife hinges, so you can square one end of a piece of wood before cutting the other end to length.

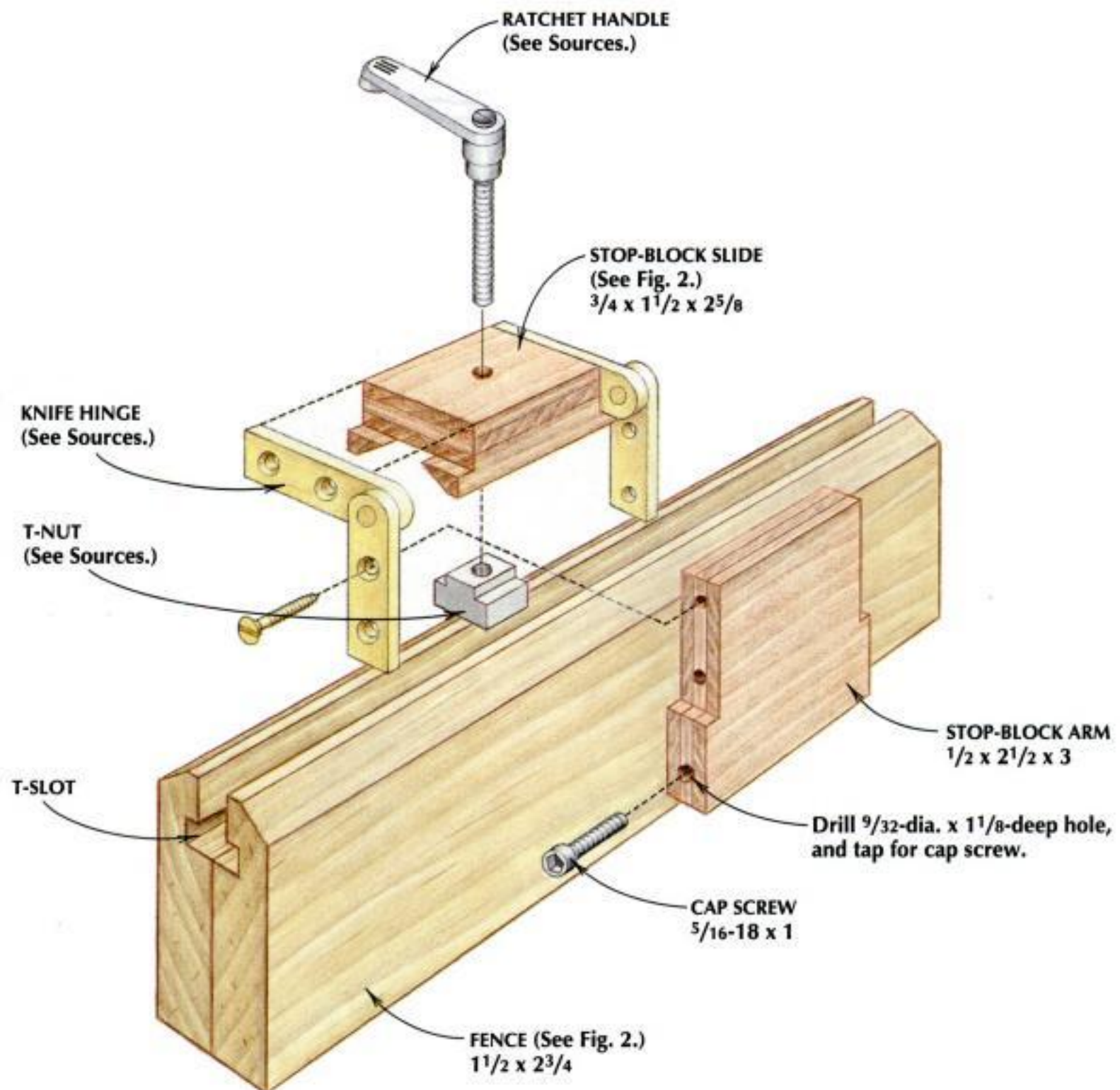
The secret to this stop's solid locking action is in the matching bevels cut in the stop and fence. With a turn of the stop's ratchet handle, the beveled bottom of the stop wedges against the top of the fence and locks there. The wide spacing of the hinges keeps the stop-block arm perfectly rigid and aligned. And like any premium stop, this one is micro-adjustable. The two cap screws on the stop-block arm can be adjusted in or out to change the stop setting with micrometer accuracy.

You can make the fence any length, to fit different machines or jigs. Even if you only make one stop, I suggest making several extra feet of fence. This is bound to come in handy on the other machines in your shop, or for those you might buy in the future.

A word or two about the wood for this project: Clear, kiln-dried hardwood is a must. For the stop-block arm (see Fig. 1) I recommend laminating your own blank of 1/2-in.-thick hardwood plywood. The first arm, which I made from solid cherry, ended up cracking near the tapped holes for the micro-adjustment screws. My plywood replacement arm won't suffer the same fate.

FIG. 1: ADJUSTABLE STOP BLOCK

You can make the stop-block fence any length, to suit different machines. The stop block itself is made from two wooden parts connected by a pair of knife hinges. A T-nut and ratchet handle lock the stop to the fence. Cap screws on the pivoting stop-block arm make it micro-adjustable.



Making the Parts

The parts aren't difficult to make, but proper setup is critical for the stop-block slide to fit exactly on the top of the fence. The cutting work gets done on the router table, using a $\frac{1}{4}$ -in. straight bit; and on the tablesaw, using a premium quality combination blade. The instructions in Fig. 2 show you how to set up the bit, the blade and the fences.

When you've finished making the fence half-profile, cut this workpiece into halves, then glue and clamp them together. Make sure the top and bottom edges of the halves are aligned, and wipe the T-slot free of glue squeeze-out.

For silky-smooth sliding action once the fixture is assembled, you need to

smooth out the saw marks from the bevel cuts on the fence and the stop-block slide. Stick a length of fine-grit, self-adhesive sandpaper to the fence bevels and run the slide against the sandpaper. Then reverse the operation, sticking sandpaper to the slide and running the slide over the top edge of the fence.

Drilling comes next. First, drill a $\frac{1}{4}$ -in.-dia. hole for the handle stud through the center of the stop-block slide. Then lay out and drill the holes for the two micro-adjustment screws in the stop-block arm. As shown in Fig. 1, each of these holes is $\frac{9}{32}$ in. in dia. and $1\frac{1}{8}$ in. deep.

Next, tap the micro-adjustment holes with a $\frac{5}{16}$ -18 tap. If you don't have this

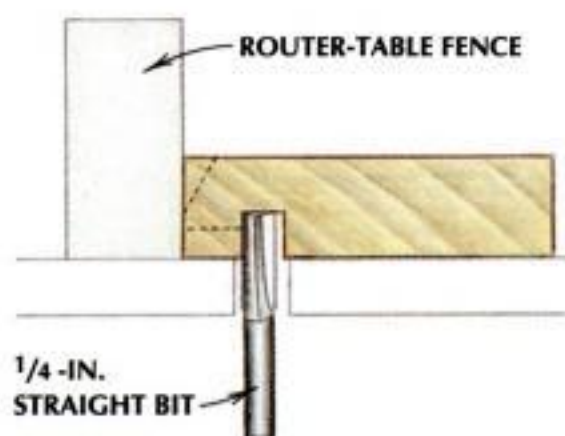
tap, you can make your own simply by filing three or four shallow grooves in the side of a $\frac{5}{16}$ -18 machine bolt. The notched threads work like teeth to cut matching threads in the wood. After tapping the holes, reinforce the threads with a light coat of epoxy. Coat a machine bolt with epoxy and run it in and out of each hole. When the epoxy hardens, your threads will be extra durable, and they'll wear longer.

Now you need to cut the mortises for the knife hinges in the stop-block slide and stop-block arm. This is tablesaw work, but don't try cutting these small parts on their own. Instead, secure each part to a square-edged waste block with double-faced tape, and set up your rip

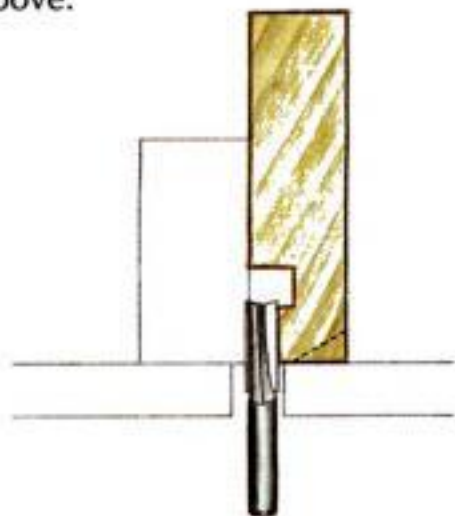
FIG. 2: MAKING THE FENCE AND STOP-BLOCK SLIDE

The mating, beveled surfaces of the stop-block slide and the fence are the secret to the rigidity of this stop block. Make the slide from shop-made plywood (see text) and the fence from a single piece of hardwood. Cut the fence piece in two and glue up the halves to create the T-slot fence. (See drawing at right.) Both parts can be machined in five easy steps, with a router and tablesaw as shown below.

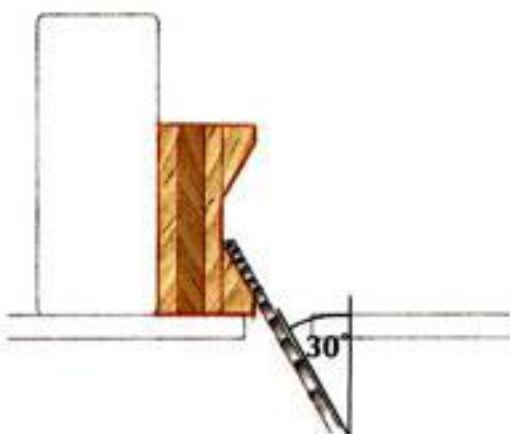
Step 1: Rout the groove in each fence piece in two passes on the router table.



Step 2: Rout the vertical part of the groove.

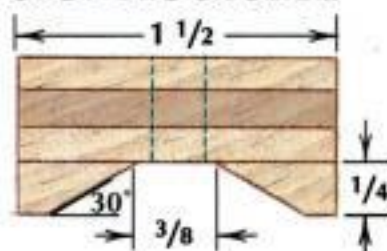


Step 4: On the tablesaw, rip the bevels on the stop-block slide. Hold the slide firmly against the table and fence to prevent kickback.

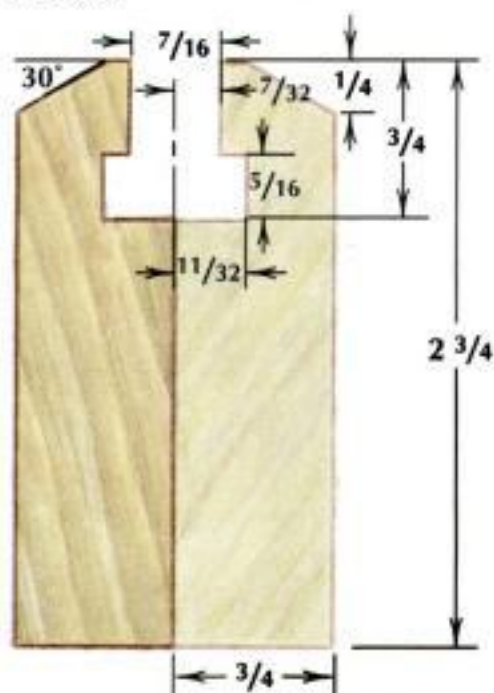


END VIEWS

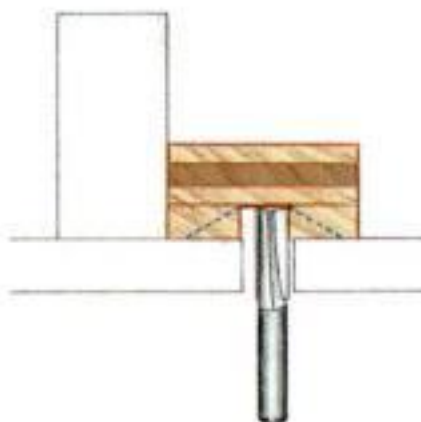
STOP-BLOCK SLIDE



FENCE



Step 3: Rout the groove in the underside on the stop-block slide.



Step 5: Without changing the bevel setting, rip the top bevel on each fence piece. Glue two fence pieces together to complete the fence.

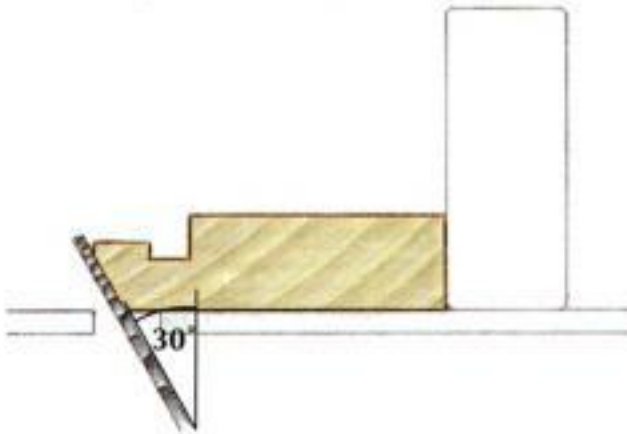
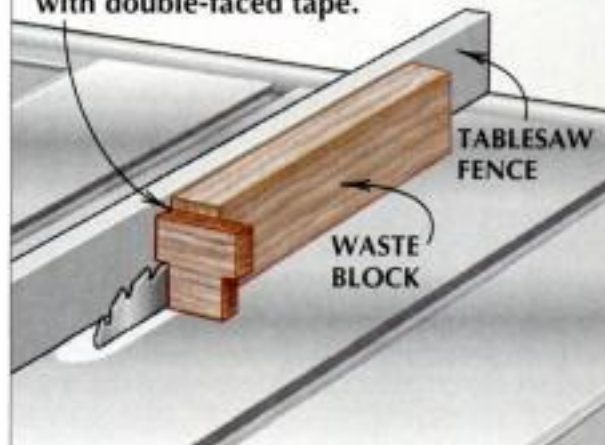


FIG. 3: MORTISING THE ARM

Attach stop-block arm to waste block with double-faced tape.

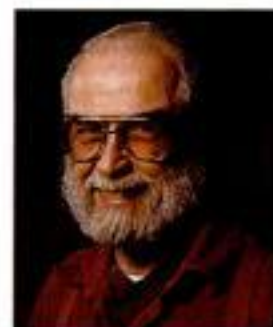


fence to guide the waste block. This is a much safer way to make the mortise cuts. (See Fig. 3, above.) You will need to make two passes to complete each mortise.

Assembling the Stop

Install the knife hinges last. Orienting the hinges as shown in Fig. 1, lay out and drill 5/64-in.-dia. pilot holes for the hinge screws—first in the stop-block slide, then in the stop-block arm. Shim the hinges with paper if necessary; aim for a fit that allows the arm to pivot easily, but without play.

Your stop and fence are just about ready to go. A light coat of polyurethane on the wooden parts is a good idea. It gives this shop fixture the finished look it deserves, and makes it much easier to keep it free of sawdust. When the finish is dry, put the studded handle through the top of the stop-block slide and thread the T-nut onto it. Install your fence, slide the assembled stop block into place, and start cutting. ▲



BOB MORAN

edits Rodale books.

This article is adapted

from Woodworking:

The Right Technique

(1996, Rodale Press,

33 E. Minor St.,

Emmaus, PA 18098).

SOURCES

Complete hardware packages for this stop block are available for \$24.95 from Woodworker's Supply, (800) 645-9292. Ask for product #900342. Circle #601

Nesting Tables

A space-saving duo you can build in a weekend

by Ellis Valentine

A while back, a customer brought a delicate little mahogany table to my shop for repair. She had bought it in an antique store and noticed that it was missing a rail. I realized that the rail had been omitted on purpose, so that another, smaller table could “nest” underneath it.

Usually made in sets of two or three, nesting tables were very popular in the first half of this century. Some were fancy, with lyre-shaped legs and complicated inlay work; others were very simple. What they had in common was their outright usefulness and their ability to stow away neatly when not in use—a winning combination that still makes sense today.

The nesting tables shown here require only about 6 bd. ft. of lumber. And they’re easy to make with common tools and a few basic techniques—mortising, cutting tenons and tapers on the table-saw, and attaching a top to a leg-and-rail assembly.

Making the Tops

Begin by making the tops. (See drawing, page 38.) Use full-width boards if you have them; if you don’t, glue them up from narrower stock. Surface the boards and cut them to finished size. Round the corners with a bandsaw or jigsaw, and smooth them with a sanding block or smooth mill file. Rout the ogee profile with a ball-bearing pilot bit, then sand it lightly with 220-grit sandpaper to remove the evidence of routing.

Making the Legs

The legs and rails are joined with mortise-and-tenon joints. For the mortises, I used the time-honored method of drilling and chiseling. (See photos, page 38.) To protect against breaking out the fragile end grain above the mortises, leave the legs about 1/2 in. longer than necessary. Mark out the locations of the rails and mortises with a sharp pencil, then mark the sides of the mortises with a

mortise gauge. Remember that the larger table will have only three rails, so two of those legs have only one mortise each.

To take the guesswork out of drilling a lot of holes in a straight line, clamp a fence to your drill-press table. Then, drill out the waste with a 3/8-in. Forstner bit, overlapping the holes so there’s less to chisel.

Now, chisel the openings square with a 3/8-in. mortising chisel and a wide par-

ing chisel. Use the curvature of the holes to check your progress when paring; as soon as you’ve removed the last traces of the holes, the mortise is perfectly aligned and dimensioned.

Drilling and chiseling the 14 mortises took about two hours. You could do it faster with a plunge router (see “Plunge Routing Mortises,” page 62), but you’d still have to square the mortise corners or round the tenon corners.

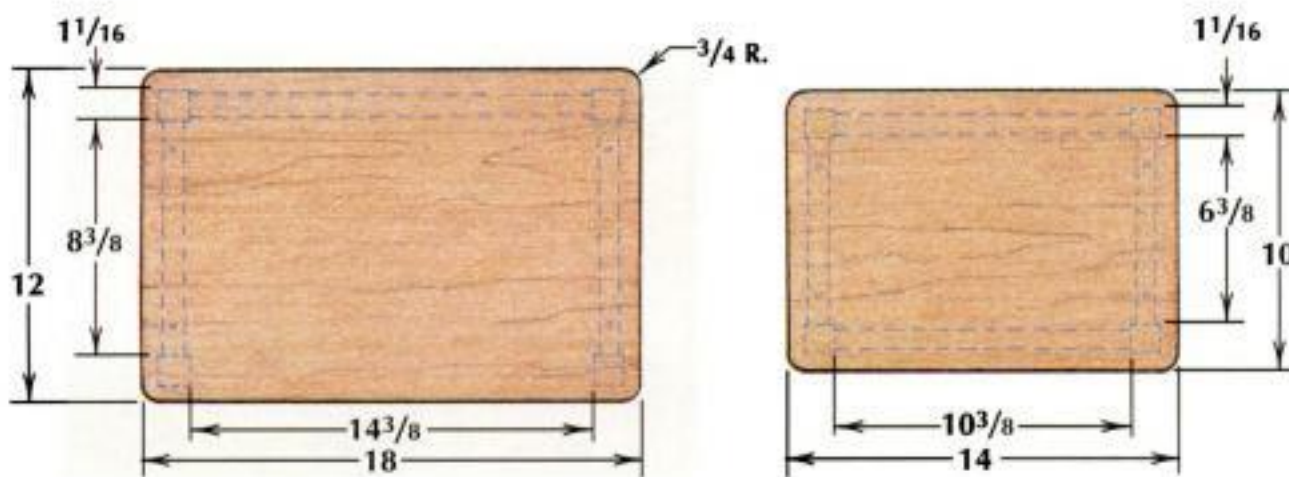


Two for tea. These delicate tables are perfect for entertaining, and the smaller one “nests” under the larger one when not in use.

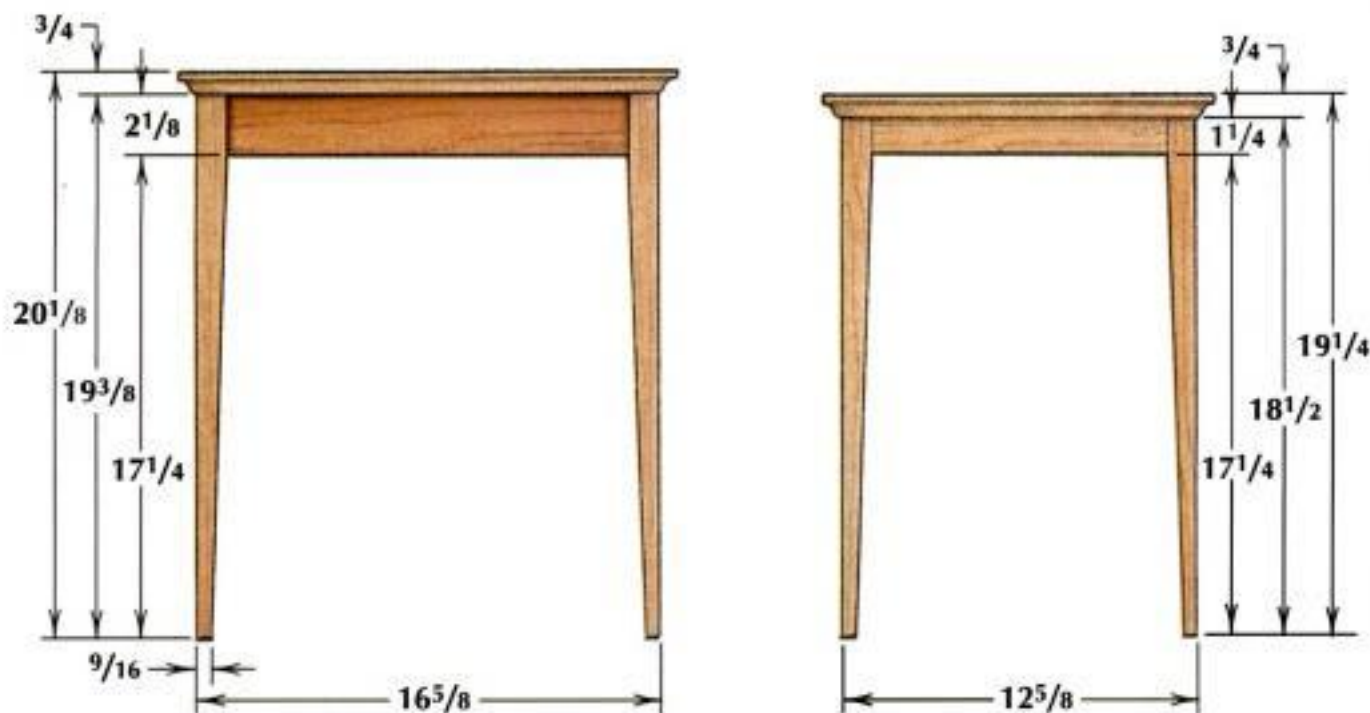
NESTING TABLES

These tables are identical in their details and their construction, except that the larger one has only three rails.

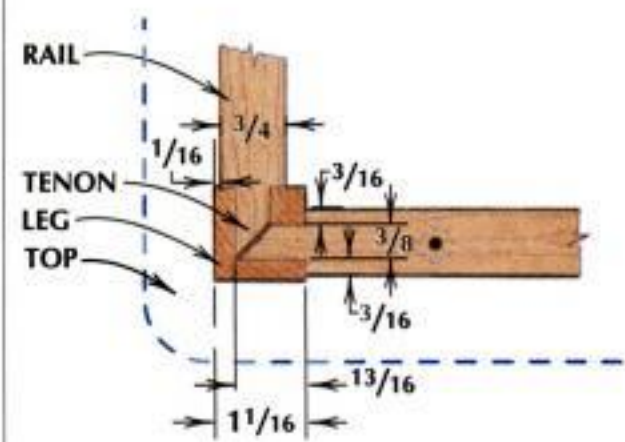
PLAN VIEWS



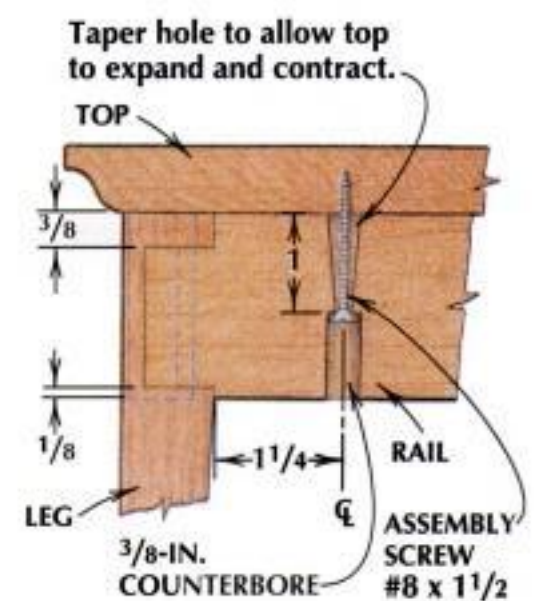
ELEVATION VIEWS



SECTION THROUGH JOINT



TOP ATTACHMENT DETAIL



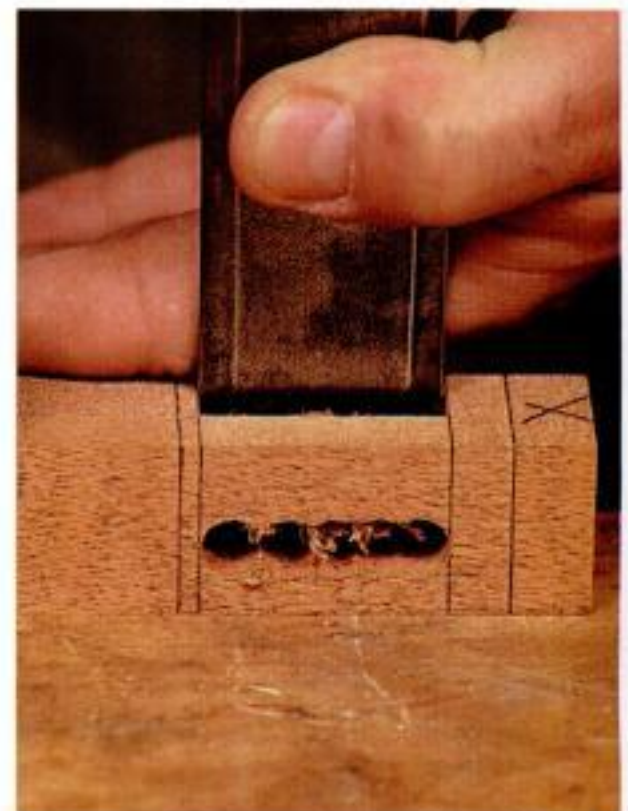
LOW-TECH MORTISES



Lay them out. Use a mortise gauge to lay out the mortises. Pencil lines locate mortises and rails. Cut off the 1/2-in. waste section after mortising.



Drill the waste. Remove the bulk of the waste with a Forstner bit, overlapping the holes. The fence keeps the holes in a straight line.



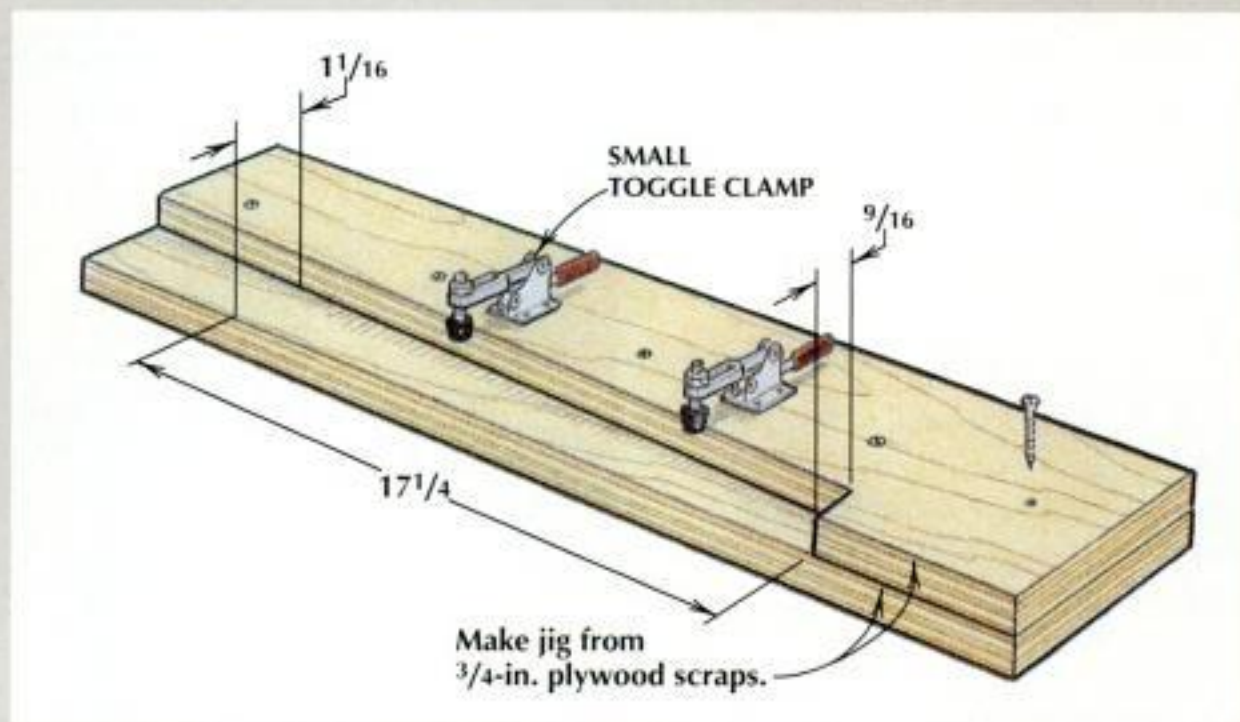
Chop and pare. Square the ends first, then pare the cheeks with a long-handled chisel, using the drilled holes as a depth gauge.

MAKE A HOLD-DOWN TAPERING JIG

Tapering thin workpieces with a typical tablesaw tapering jig can be dangerous: You have to hold the workpiece down to the saw table and tight to the jig as you push both the jig and workpiece through the saw. This hold-down jig is simple to make from two scraps of $\frac{3}{4}$ -in. plywood and two small toggle clamps, and it will keep your hands away from danger. Make sure the tips of the clamps don't extend over the edge of the jig. —E.W.



Hands-free tapering. Small toggle clamps hold the work, so your hands never get near the blade.



Next, saw the tapers on the two inside surfaces of each leg. I made a simple shop-made tapering jig for this. (See sidebar, above.) Hand-plane the sawn surfaces smooth with a sharp bench plane, break the sharp edges with 180-grit sandpaper, and finish sand all the surfaces to 220 grit.

Making the Rails

After cutting the rails to size, cut the tenons—I used a simple tablesaw tenoning jig (see AW #54)—and miter the ends at 45° so they'll clear each other in the bottom of the mortises. This miter isn't very critical—you could cut it with a tablesaw, bandsaw or hand saw.

Next, drill the holes for the screws that hold the finished leg-and-rail assemblies to the tabletops. (See drawing detail, opposite.) I drilled the $\frac{3}{8}$ -in. counter-bore first, then continued through the rail with a $\frac{1}{8}$ -in. drill bit. I enlarged each clearance hole with a $\frac{3}{16}$ -in. tapered bit. The tapered holes allow the top to expand and contract slightly with seasonal changes in relative humidity.

Glue-Up

Before gluing the legs and rails, dry assemble them upside down on a clean, flat surface and clamp them with a small band clamp. Use a piece of scrap as a spacer to take the place of the missing rail on the larger table.

Now, check with a square to see that

the outsides of the legs are exactly perpendicular to your work surface. You may be able to compensate for slight discrepancies by repositioning your band clamp. If that doesn't work, you have the choice of paring the tenon shoulders or lightly planing the flat part of the leg where the shoulder meets it.

Once you've successfully dry assembled the leg-and-apron assemblies, glue them up, again checking for squareness. I used yellow glue, brushed only on the surfaces of the tenons and the cheeks of the mortises.

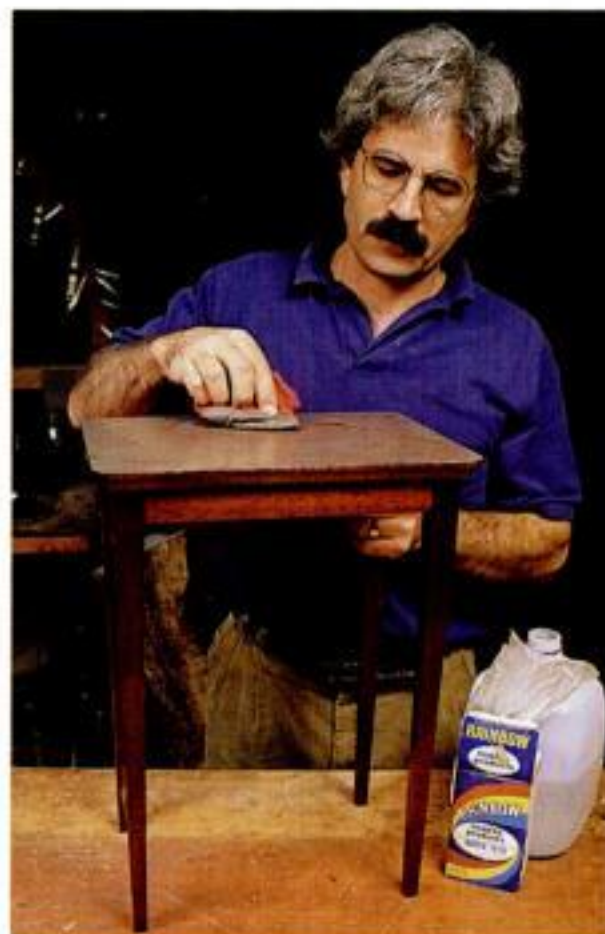
I attached the tops to the tables with square-drive assembly screws (available from McFeely's, 800-443-7937). These resemble drywall screws, but they have deeper, more steeply pitched threads. Center the leg assembly on the underside of the top and mark the screw locations with an awl or drill bit. Then, remove the leg assembly and drill pilot holes on your marks, taking care not to drill through the top.

Finishing Up

I stained the tables with "brown mahogany" NGR (non-grain-raising) stain (available from Constantine's, 800-223-8087) and finished them with three coats of high-gloss varnish. I sanded the second coat of varnish flat with 180-grit sandpaper wrapped around a sanding block. (See "Sanding Blocks," AW #56.) Then, I brushed on two more coats.

I sanded the final coat with 320-grit stearted sandpaper, followed in turn by 400-grit and 600-grit wet-or-dry paper. I rubbed out the finish with pumice and linseed oil on a cotton rag (see photo, below), and finished up with rottenstone and water to raise the final gloss. ▲

ELLIS VALENTINE is executive editor of AW.



Gloss by hand. Rub the varnish to a high gloss with pumice and linseed oil followed by rottenstone and water.

Dye Stains

Discover a world of exceptional color, clarity and control

by Tom Brown

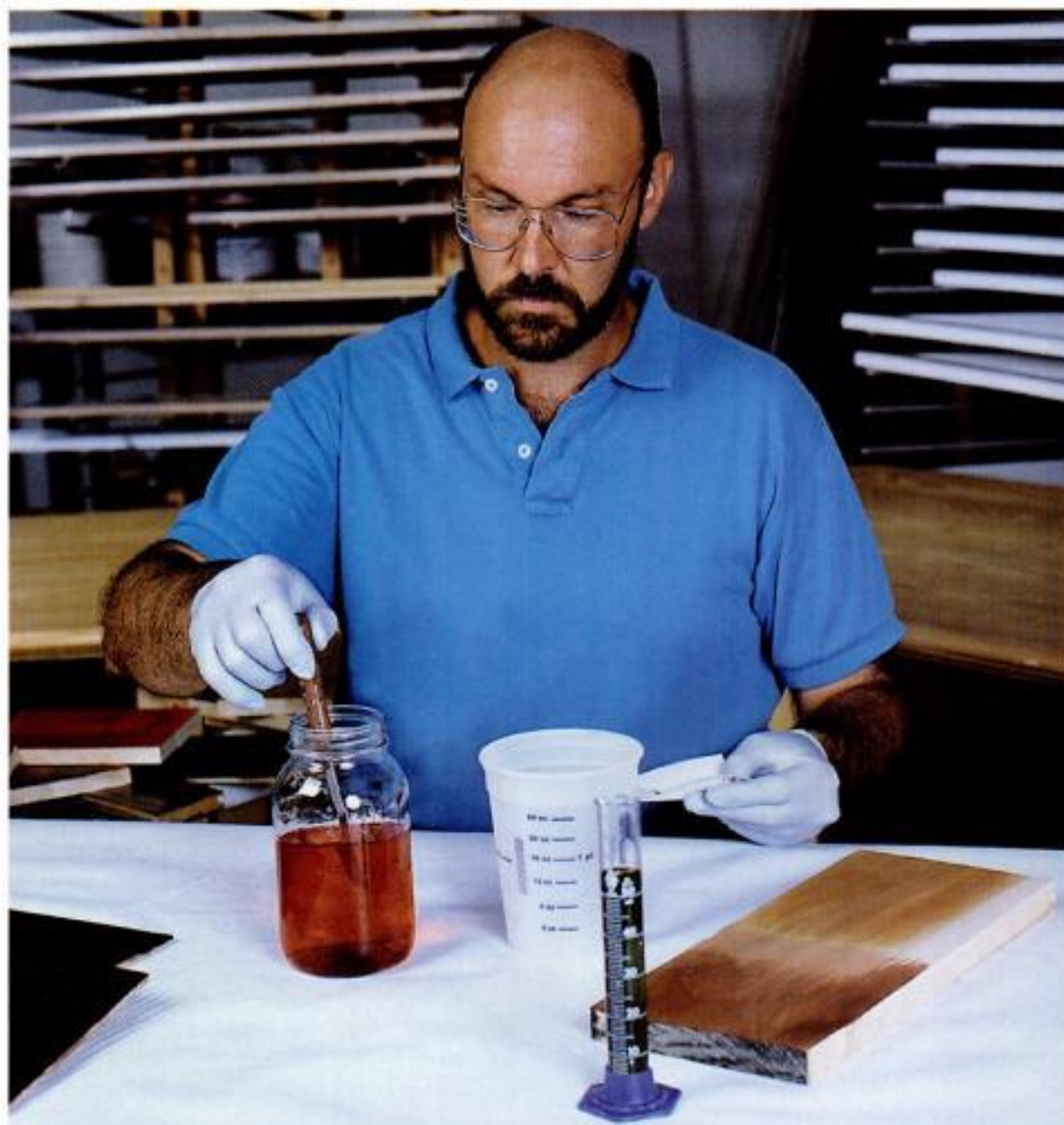
I wish I'd found out about dye stains earlier in my woodworking career. Anybody who's worked with pigment stains knows—a little time on the shelf, and all the pigment settles to the bottom of the can. And those same pigment particles can sometimes hide the best in your wood grain while bringing out the blotchy worst in it. I've since learned how to get better results with pigment-type stains. But I've also come to appreciate the increased control I have when using dye stains. Dye stains offer quite a few advantages over pigment-type stains. In this article, I'll explain the advantages, and show you how to dye-stain wood with excellent results.

Why Dye?

If you haven't used dye stains before, you're in for some surprises—most of them pleasant:

Color and transparency. Dyes yield their color by filtering light, instead of by absorbing it as pigments do. This basic difference—filtering light instead of blocking it—explains why dye stains do a superior job of changing wood color or tone without obscuring grain or figure. Dye stains are unmatched in their ability to impart color without blocking your view of the wood. (See photo, opposite page.)

Solubility. Dye stains are solutions; they're not suspensions like pigment stains are. This means that the dye compounds dissolve fully in their solvent or "carrier," and they stay that way during storage and use. There's no need to worry about pigment particles settling out because they weren't mixed thoroughly prior to application. But since most dye stains are sold in powder form, proper mixing is important. With the right equipment and a few guidelines, which



Mix up some magic. Powdered dye stains are inexpensive and easy to use, and they change wood color without obscuring grain or figure. Here, Brown adds a carefully weighed amount of dye powder to a quart of distilled water.

I'll discuss below, dye stains are easy to mix. They're reasonably priced, too. For less than \$12, you can buy enough dye powder to make a gallon of stain.

Creativity and control. With dye stains, your palette is incredibly broad. There are hundreds of standard colors available. And you can easily vary the color concentration and intermix colors to create your own custom blends. You can mix dye stain into a compatible top coat to fine-tune the color—a technique called *toning*. You can even remove a stain's effect with applications of bleach. If you haven't tried dye stains before, they're likely to win you over with the creativity and control they offer.

Types of Dye Stain

In times past, dyes for wood finishing were prepared from a coal tar derivative called *aniline*—a toxic substance that gave dye stains a hazardous reputation. But today most dyes are prepared from other raw materials, so these stains aren't any more hazardous to use than other varieties.

Woodworking dyes are divided into three main types, based on the solvent—the liquid in which the dye is dissolved. You can buy all three types of stain premixed, but I prefer to buy mine in powder form and make up my own mixtures. This saves money and gives me a much broader selection of colors.



Clearly different. Applied on bare oak, an oil-based pigment stain leaves a dark tone, but obscures some of the wood grain (right). A similar board, colored with dye stain, shows the wood grain more clearly (left).

Water-soluble dyes are made by dissolving dye powder in distilled water. A premixed, water-based gel dye is also available and has become very popular recently. (See [Gel Stains, page 43](#).) Alcohol-soluble dyes require alcohol as a solvent, and oil-soluble dyes will dissolve in oils or mineral spirits. Each type of dye has advantages and disadvantages. For example, water-soluble dyes are more lightfast (fade resistant) than those soluble in alcohol or oil. On the other hand, oil-soluble dyes present no problems with grain raising. (See chart, above.)

How to Mix Dye Stains

Because powdered dyes are exceptionally concentrated, careful mixing is important—especially if you're formulating a stain that you might need to duplicate sometime in the future. Here's how to ensure success when making up a dye stain from dry ingredients and a solvent.

Use clean, pure solvents. When you prepare a dye solution, use clean solvents that have been stored in tightly sealed containers. Distilled or deionized water is the best choice for mixing water-based stains. Use clean, "dry" alcohol for alcohol-based stains. Alcohol that has been poorly capped or stored for long periods of time will absorb water. This will compromise the consistency of your stain, and the presence of water will contribute to additional grain raising. Oil should likewise be fresh and pure for dye stain.

Work safely. If you're working with alcohol- or oil-soluble stains, make sure you have adequate ventilation. Wear a filter mask when you're handling dye in

COMPARING THREE TYPES OF DYE STAIN

	WATER SOLUBLE DYES	ALCOHOL SOLUBLE DYES	OIL SOLUBLE DYES
SOLUBILITY	Distilled water	Alcohol	Oils, lacquer thinner, mineral spirits
RANGE OF COLORS	Very broad	Very broad	Relatively narrow
LIGHTFASTNESS	Excellent	Good	Poor
GRAIN RAISING	High	Low	None
TOP-COAT NOTES	Be sure to allow sufficient drying time before topcoating. Dye can bleed from wood into waterborne top coats.	These dyes dry more quickly than other types and can be topcoated sooner. Dye can bleed from wood into shellac top coats.	Allow sufficient drying time before topcoating. Dye can bleed into lacquer top coats. Avoid waterborne and post-catalyzed top coats.
FOR SHADING	Mix only with waterborne finishes.	Mix with lacquers, shellac, varnishes.	Mix with varnishes and oils.

powder form, and protect yourself and your surroundings from the effects of concentrated dyes. Powder and prepared stains can change the color of your skin as effectively as they alter wood color, so vinyl gloves are a must. They're cheap, disposable, and solvent resistant.

Measure accurately. Dry dyes must be measured by *weight*, not volume. Settling during shipping and storage can cause dye concentration to vary significantly, even though the volume of dye appears to be equal. To weigh your dye powder, use a scale that can register to ± 0.1 gram. (See Sources.)

Measuring by *volume* is advisable when you're diluting or mixing one dye solution with another. It's useful to have a good set of dedicated dye-measuring containers. I use containers of various sizes for mixing and intermixing. Stainless-steel and glass containers will work for mixing and storing dye stains, but I mostly use plastic. Soda bottles work well. Be sure to test the container first for resistance to your solvent.

Most dye-stain manufacturers and suppliers offer instructional sheets for mixing dye powder. Generally, you agitate the dye and solvent mixture over a period of time to ensure adequate mixing. Don't worry if some of the powder remains undissolved; this simply means that the solution is completely saturated. Just pour off and use the clear solution, leaving the undissolved dye.

Surface Preparation

Prepare the wood surface just as you would for other types of stain. I recommend sanding the wood to 220 grit or scraping the surface with a hand scraper. Scraped surfaces will absorb less dye than sanded ones.

If you're planning to use water-based stain, it's important to wipe down the wood with a clean, wet cloth. Prewetting the wood will raise the grain noticeably. When the wood has dried, sand the sur-

face with 220-grit paper to remove the raised "nibs." This treatment will minimize or eliminate the grain-raising effect of the stain itself. Since alcohol-based stains will also raise the grain to a lesser degree, it's a good idea to prewet (with alcohol) and sand prior to application.

Application

There are many ways to apply dye stains, but the objective is always the same: Get the wood to absorb as much stain as possible, then wipe off the excess. The best way to control color is to adjust the concentration of the dye, not the "wetness" of your application. Here are some application options:

Rags, sponges and pads. These low-cost or no-cost tools carry large amounts of stain to the work. The downside is a bigger mess—so make sure you have plenty of dye, and prepare your work area accordingly. Keep some clean rags on hand to wipe off the excess.

Brush. Apply your solution liberally and quickly, so that the surface you're working stays wet. Alcohol-based dyes can dry very quickly, and streaking can result if you brush into an area where the dye has already dried.

Spray. This is the application method I prefer because it gives me great control over the amount and location of the dye. And of course, spraying saves time on large work.

Just about any spray gun will apply dye quite nicely. If you're using water-soluble dye, however, make sure your gun has plastic or stainless-steel components to avoid corrosion. Since dye solutions aren't very viscous, you won't need high pressure to atomize them. Test your setup on scrap first.

Dipping. This is a good method if you have large batches of small parts that need to be stained over a short period of time. Immerse the parts in dye for a couple of seconds, then remove them and use a clean rag to "tip off" any drops

that remain on the underside. Dip application usually calls for extended drying time, due to the greater penetration of the dye.

Experiment!

There's no substitute for experimentation if you want predictable results with dye stains. Collect some wood scraps of different species and prepare them for staining. Order small quantities (1 to 4 oz.) of powdered dye in the primary and secondary colors—red, blue, yellow, green, purple, orange—and a selection of basic wood tones—mahogany, cherry, walnut, honey/amber, brown, and black. Mix up some dye solutions and play around. Follow the manufacturer's directions where applicable, and keep track of the custom mixes you make. Note the mix information on your samples. Put a clear top coat on your samples, so you can see the true appearance of the wood. A non-yellowing aerosol lacquer for sealing artwork works well.

With a little experimentation, you'll soon accumulate a "catalog" of stain effects on different types of wood. (See photo, below.) Professional woodworkers use their samples to help customers decide what combination of wood and finish to specify. But any serious woodworker will benefit from such a collection of stain effects.

Bear in mind too, that dyeing and pigment-stain use are not mutually exclusive. As you develop your catalog of dyed samples, experiment by using your favorite pigment stains on previously dyed wood. Most large manufacturers



A catalog of colors and tones. Try out different dye-stain formulations on scrapwood to create a portfolio of stain effects. Record the dye-mixing details on the back of the scrap, and topcoat samples with clear sealer.



Neutralizing unwanted color. Red dye can turn the undesirable green in poplar to a neutral brown tone.

take advantage of the flexibility and control they get from a combination of effects, rather than using either one alone.

Controlling Dyes

If you've done the experiments above, you'll have a good shot at getting the results you expect on your project. But if you don't get the right look, don't worry—it's not hard to reverse, accentuate or adjust the effect of a dye stain. Here's how to troubleshoot:

Darkening a stain. The easiest fix is to apply a second coat. For a significantly darker appearance just dye again, this time with a darker dye.

Lightening a stain. If the workpiece looks too dark after staining, dampen a rag with the appropriate solvent and wipe down the darkened areas. The solvent will dissolve and remove some of the dye, creating a lighter effect. If you remove too much, just reapply. You can repeat this cycle a couple of times before it becomes ineffective.

Altering color. If the result you've obtained from your first application isn't quite right, you can apply subsequent coats of other colors. Since dyes add color by filtering rather than obscuring, there's no risk of muddying the wood. Secondary dyeing is a great way to eliminate the green heartwood color in poplar—just add some reddish dye, and you've got brown. Or if you want to neutralize a purple streak in walnut, try applying a light orange dye.

Removing color. You can remove color by bleaching with common household chlorine bleach. This can be done to water- or alcohol-soluble dyes, but not to oil-soluble dyes. *Caution: Chlorine bleach is toxic and should never be used without adequate ventilation. Apply the bleach with a rag or sponge, and be sure to wear gloves and eye protection.* Bleaching should remove the color created by the dye, without affecting the natural color of the wood. After bleach treatment, you'll need to rinse the wood surface thoroughly with fresh water. Once the wood has dried thoroughly, sand it to remove the raised grain, and you're ready to reapply dye.

Finishing After Staining

Whatever top coat you apply, it's important to let the dye solvents evaporate completely before applying the finish. This can take as little as several hours if you're using alcohol-soluble dyes. But with water- and oil-soluble dyes, it's best to wait at least 24 hours before applying a different finish. Drying times will vary, depending on the moisture in the air.

Dye stains offer a broad range of topcoat choices. Waterborne finishes will work well over water- and alcohol-soluble dyes. (For more on waterborne finishes, see AW #49.) Oil, shellac and lacquer may be used over all types of dyes. Avoid using waterbornes over oil-soluble dyes, since this can result in adhesion problems. An oil-soluble dye can also cause adhesion problems if you're topcoating with conversion varnish, polyester, or other post-catalyzed finishes.

When applying sealer and other top coats over a dye stain, always follow the manufacturer's recommendations for best results. If by chance you still don't get quite the color or tone you're after, you can still correct with shading, as I'll explain below.

Special Effects

You can use dyes to achieve some effects that you can't get with other stains. Here are a few of my favorites:

Contrasting filler. Treat an open-grained wood like oak or ash with a dye stain, then fill the pores with wood filler tinted with a contrasting color. This adds some "punch" to flat-grained boards. If you're tinting a filler, you'll need to test for compatibility between the type of dye stain and the type of filler.

Changing walnut to ebony. Apply some black dye to walnut and you'll get

SPECIAL EFFECTS WITH DYE STAINS



Changing walnut to ebony. Apply black dye and you'll get a dark-colored wood resembling ebony.



Weather and age. Use gray and combinations of silver and blue dyes to create a weathered appearance.



Shading stains. At left, the wood tone has been fine-tuned by mixing dye stain with a clear finish.



Contrasting filler. Treat an open-grained wood with dye stain, then fill the pores with a contrasting filler.

a dark-colored wood resembling ebony. The wood grain will still show through.

Weather and age. Both these effects may be simulated with dyes. I've used gray and combinations of silver and blue dyes to create a weathered appearance. This treatment can really improve furniture made with a light-colored wood such as pine or birch.

Shading stains. Dye stains may be mixed with a compatible clear finish and used to fine-tune the color or tone

of wood—a process called *shading* or *toning*. (See AW #54, page 88.) This technique is useful when you want to change a wood's color without accentuating the figure—for example, when you're finishing burl or tiger stripe.

Be sure to follow the manufacturer's recommendations for diluting clear finish—particularly when you're working with waterbornes. A shading coat should always be followed by a compatible clear top coat to protect and seal in the color.

Here again, it's wise to experiment with your formulation before trying it out on "good" wood, where it counts. ▲



TOM BROWN is a polymer chemist and finishing consultant. He also runs a custom woodworking business in Florida.

GEL STAINS

A different kind of dye stain

The Clearwater Color Company has developed a line of gel stains that work like water-soluble dye solutions but handle a bit differently. The manufacturer recommends applying these stains with a nonwoven nylon pad such as 3M's Scotch-Brite™, but I've also had good results using brushes, rags and fabric pads. (See photo, right.)

With gel stains, it's easy to control where the stain goes. You can actually mask areas for selective dyeing—something that's difficult to do with liquid dye stains. The gels can be sprayed or brushed, if you reduce them slightly with propylene glycol (RV antifreeze). Gels can be intermixed, just like liquid dye stains, and there's a clear gel base available for diluting the intensity of a color.

Gel stains are more expensive than ones you mix yourself. But for small-scale work, gels provide all the benefits of dye stains without the fuss of mixing dry and wet ingredients.



Less mess. Thanks to their thick consistency, gel stains are easy to control.

—T.B.

SOURCES

For gel stains:
Highland Hardware
(800) 241-6748 Circle #602

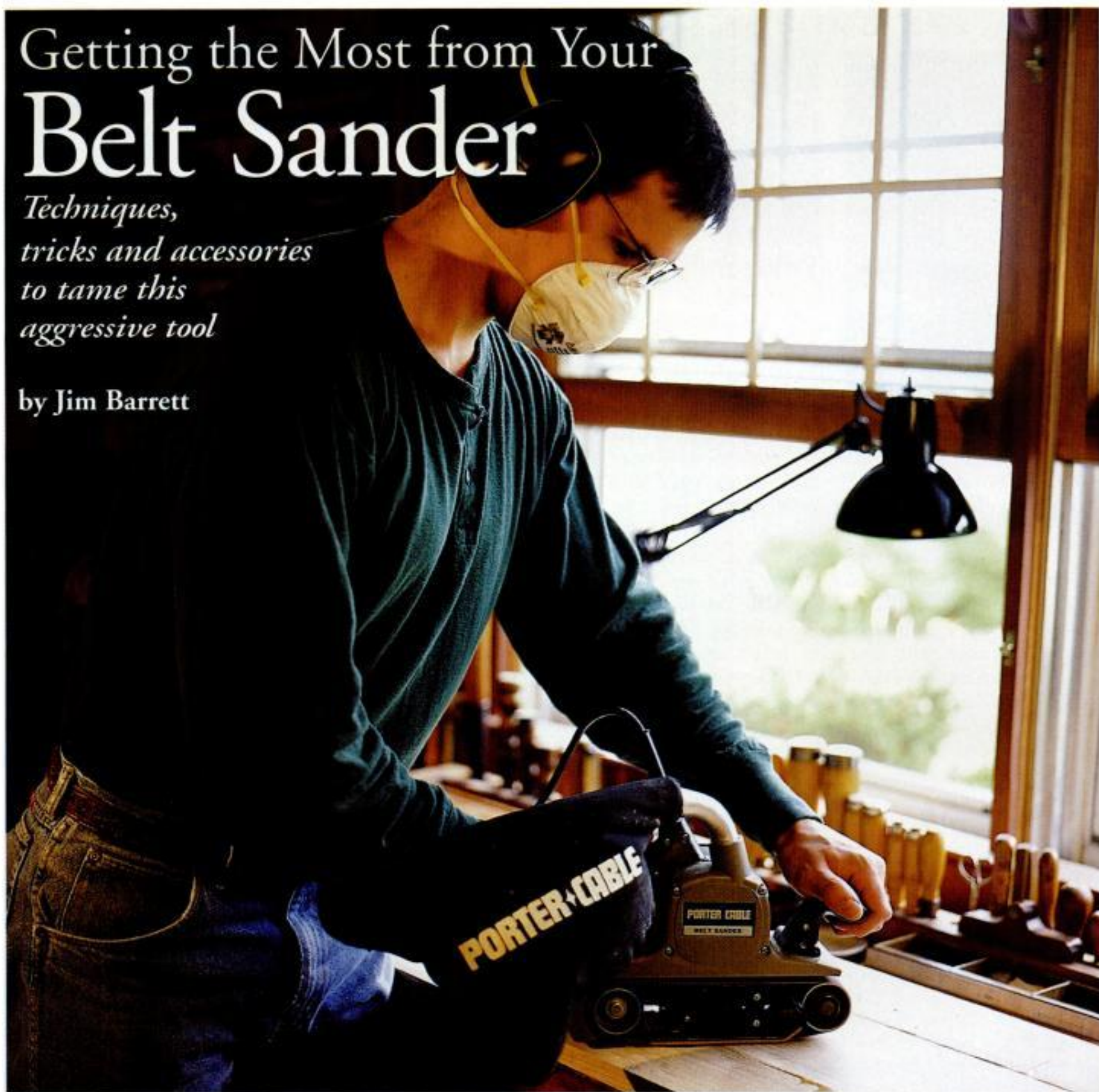
For other dye stains:
Constantine
(800) 223-8087 Circle #630
Lee Valley Tools
(800) 871-8158 Circle #631
W.D. Lockwood & Co., Inc.
(212) 966-4046 Circle #632
Mohawk Finishing Products
(800) 545-0047 Circle #633
Pylam Products Co., Inc.
(800) 645-6096 Circle #634
The Woodworkers' Store
(800) 279-4441 Circle #635
Woodworker's Supply, Inc.
(800) 645-9292 Circle #636

Weighing & measuring equipment:
Edmund Scientific Co.
(609) 573-6250 Circle #637

Getting the Most from Your Belt Sander

Techniques, tricks and accessories to tame this aggressive tool

by Jim Barrett



Power and control. By using the right techniques, you can perform great tricks with a belt sander. Running the belt diagonal to the grain removes stock quickly when you're flattening a glued-up panel.

Portable belt sanders have a reputation for being aggressive, rough-and-ready jobsite machines. But a belt sander can be a very versatile shop tool as well. Many cabinetmakers rely on them to flatten and smooth large glued-up tabletops and other panel assemblies too large to run through a surface planer. A belt sander will quickly remove milling marks to prepare wood for finish sanding. And, although it won't produce as flat a surface as a hand plane, a belt sander won't tear out the grain on troublesome figured woods like a hand plane often will.

In addition to smoothing and flattening large work, you can mount a belt sander upside down or vertically on a bench for shaping and smoothing smaller parts. You can even grind edge

tools like chisels and plane irons on a belt sander.

In this article, I'll offer you some tips for getting the most out of that little beast called a belt sander. Once you learn to master it, you'll find that it can perform all kinds of tricks for you.

Flattening a Panel

One of the most common belt-sanding jobs is flattening glued-up panels for tabletops, cabinet doors and case parts. Flattening a panel requires a slightly different approach from simply smoothing a panel, which I'll discuss later.

Before flattening a panel, use a cabinet scraper or paint scraper to remove excess glue, which can gum up the sanding belt. Draw wavy pencil lines all across the face of the panel as

shown in the photo at right. These lines will indicate your progress during sanding, showing which areas were sanded and which weren't.

If the panel is small or lightweight, secure it to your bench with clamps, bench dogs or stop blocks of some sort.

If the panel's surface is very rough, uneven or wavy, fit the sander with a coarse-grit belt. If the panel is already relatively flat, you may be able to begin work with a medium-grit belt. After installing the belt, adjust the sander's tracking control so the belt fully covers the sander's *platen*—the flat backing plate for the belt where it contacts the workpiece. If your sander has multiple speed settings, set the speed at its maximum for this rough work.

Flattening a panel is often best done by first sanding diagonally to the grain as shown in the lead photo. This removes stock more quickly than sanding parallel to the grain. And it helps create a flatter surface because the sander tends to skip over the troughs, much like a hand plane does.

Some manufacturers offer an optional "sanding frame" (see photo, above right) that works like the sole of a hand plane. Most sanding frames have a depth adjustment so you can control the amount of material removed with each pass. The frame also prevents the sander from tipping, which can cause gouges and ridges.

Never start or stop a sander while it is in contact with the workpiece. Instead, turn on the sander and let it reach full speed before setting it on the work. With a firm, two-handed grip, gently lower the sander, landing the platen as flat as possible on the workpiece. As soon as the sander lands, start moving it forward, letting it find its own balance.

Take down the high spots first, keeping the sander moving at all times to prevent it from gouging the work. Once the panel's surface is relatively level, begin at a corner of the panel and sand as far across its width as possible with evenly overlapped diagonal strokes. Extend each



Smoothing a panel. Drawing wavy pencil lines on the stock will help you monitor sanding progress. A sanding frame improves stability.

stroke across the full width of the panel if you can. The aim is to remove the same amount of material with each pass.

Keep a firm, two-handed grip on the tool at all times. But don't bear down on it—its weight alone should create the proper pressure on the wood. Pressing down will only slow down the belt and shorten the motor life.

Once you've sanded the entire panel diagonally, sand parallel to the grain using the same grit belt to remove the cross-grain scratches. Then inspect your work by shining a strong light across the work at a low angle—first along the grain, then across it. This will reveal any ridges, cross-grain scratches or gouges. Sand out any imperfections you find, then move on to smoothing the panel.

Smoothing a Panel

If a panel is flat, but has tool marks or scratches on it, you can very quickly belt sand them out. Draw pencil lines across the stock as before, and fit your sander with the finest grit belt that you think will do the job. You can easily switch to a coarser belt if the going is too slow.

Smooth a panel with the belt running



Belt sanding edges. To sand narrow edges, clamp a scrap board to one side of the workpiece for stability.

parallel to the wood grain. When I'm surfacing wide panels, I start at the lower left-hand side and move across the width of the panel, overlapping each stroke about halfway. Don't overreach—move the sander only as far as you can without changing your footing. On very large panels, sand as large an area as you can comfortably reach from one position. Then stop the sander, move to an adjacent, unsanded section and repeat the process.

BELT SANDER SAFETY

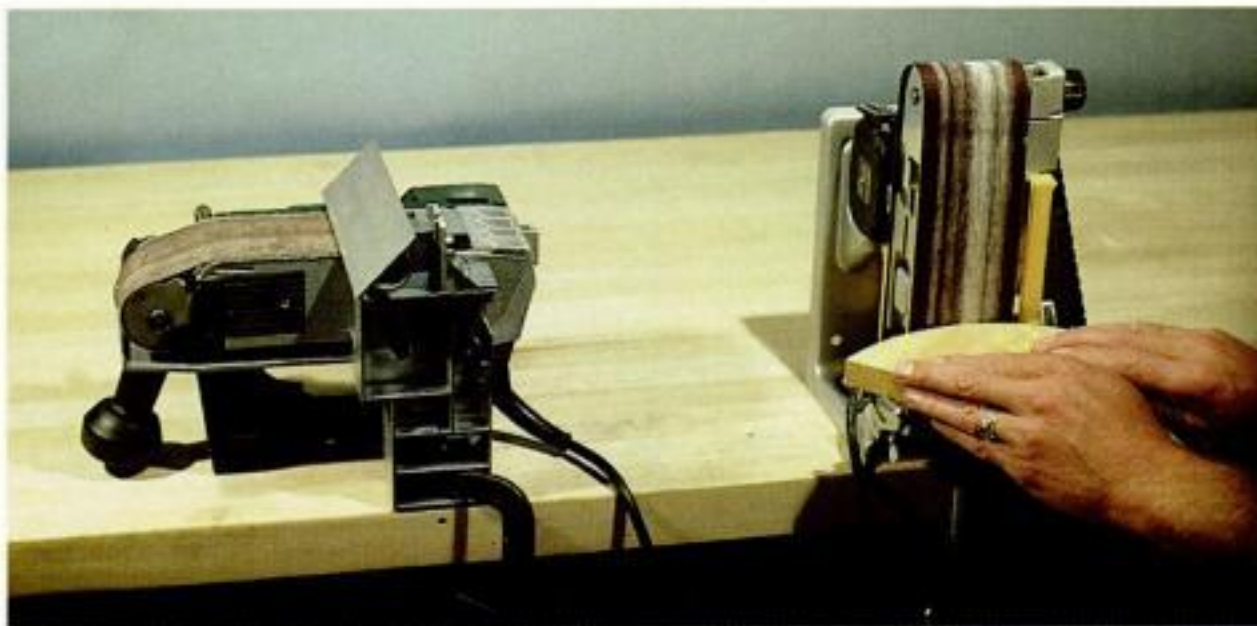
Belt sanders are real screamers and can throw a lot of dust, so wear ear protection, a good dust mask and safety glasses. Use the sander's dust bag, or hook the tool up to a shop vacuum.

Always make sure the trigger switch lock is off before plugging the tool in. Get in the habit of setting the sander down on its side, if possible. And remember to unplug it

before changing belts or emptying the dust bag.

Don't exceed the extension cord lengths and gauges recommended in your tool's manual. To keep the cords from pulling apart, tie a simple underhand knot at the extension-cord connection. When sanding, drape the cord over your shoulder to help keep it from snagging on the edge of the workpiece or bench.

—J.B.



Shaping small parts. Many sanders have optional clamps or stands that turn them into stationary models, for sanding small work.

Move the sander in a smooth, flowing motion, much like applying paint with a roller. Try to keep the platen perfectly flat on the work; even slight side-to-side tipping can make small grooves in the surface. When you reach an edge of the workpiece, don't extend more than a quarter of the platen over the panel's edge or you risk rounding it over.

As soon as your pencil lines disappear, inspect your work, again using a glancing light. If all looks well, draw lines again, switch to a finer grit and repeat the process. With each successive grit, sand just enough to remove scratches from the previous grit. If you can, slow down the sander speed when using fine belts. This helps prevent scorching and glazing, and provides more control.

With single-speed sanders, prevent scorching by taking faster strokes.

After belt sanding through 120 grit, I generally finish up with 220-grit paper, using a random-orbit sander. This usually leaves a smooth enough surface for most stains and clear finishes.

Belt sanding plywood and veneered panels requires care, so you don't chew through thin veneers. A few quick passes with a fine belt will usually do the trick. On variable-speed sanders, slow down the belt speed. A sanding frame adjusted for a very light pass is a real asset.

Belt Sanding Edges

A belt sander can also smooth the edges of a board or panel. To avoid a "sander balancing act" and ensure square edges,

clamp a sacrificial scrap board along one or both sides of the work to provide a flat surface about the same width as the belt. (See bottom right photo, previous page.) Clamp this assembly vertically in a vise or against the edge of your bench. Or, if you're working with multiple pieces, simply clamp them together.

Small Parts and More

The best way to belt-sand or shape small or curved parts is to mount the sander on your bench. You can even use the sander's front roller to smooth small concave pieces.

Some manufacturers offer optional bench-mount clamps or inversion stands. These let you mount your belt sander upside down or vertically on the bench. (See photo, left.) Some stands have adjustable fences so you can sand bevels from 45° to 90°. But you can make your own cradle to mount your sander in any position you like—including on its side.

You can even sharpen chisels, gouges and other tools on a bench-mounted belt sander. Just be sure to remove the sander's dust bag first, to keep metal sparks from smoldering inside the bag. ▲



JIM BARRETT is a freelance wood-working and home improvement writer in northern California.

PICKING YOUR GRITS AND MAKING THEM LAST

Most suppliers designate 36- to 60-grit belts as coarse, 80- to 100-grit belts as medium, and 120- to 150-grit belts as fine. But a supply of 50-, 80- and 120-grit belts will handle most woodworking tasks.

Most belts for wood sanding have an open-coat aluminum-oxide abrasive, which is bonded to a cloth belt with glue or resin. Resin-bonded belts outlast the cheaper glue-bonded ones. Closed-coat belts aren't recommended for sanding bare wood because they cut slower, clog quickly and cost more.

Typical belts are designed to run in one direction only. If you run the belt backward, the seam might rip. A few premium belts, such as 3M's purple, ceramic aluminum-oxide belts (see photo, right) will run in both directions, reducing clogging and increasing the life of the grit.

A belt-cleaning stick will increase the life of any belt. This eraserlike block, sometimes mounted on a handle, lifts sawdust, wood resin and dirt out of the sanding belt. To use a belt cleaner, simply rub it across the moving belt.

A graphite platen will also extend the life of your sanding belts. This accessory, which replaces the sander's stainless-steel platen and cork backing, reduces friction and heat buildup on the belts. If it's unavailable from your sander manufacturer, you can buy graphite platen material from Woodworker's Supply (800-645-9292) and trim it to fit.



Grits, graphite and a cleaning stick. Belts are sold in coarse, medium and fine grits. To increase belt life, use a belt-cleaning stick (left foreground) and equip the sander with a graphite platen (right).

—J.B.

Entertainment Center

Build a custom cabinet for your audiovisual gear

by Edward Schoen



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Inner beauty.

Behind this traditional exterior is a full-featured entertainment center. Turn the page for the inside story.

When I was growing up, the standard size for a television set was 13 inches and the most expensive sets came built into their own cabinets. When the TV gave out, you junked the cabinet as well as the picture tube.

These days, the picture has changed. TVs are much larger, and disposable cabinetwork is hopefully no longer an option. Instead, we have the entertainment center: a large cabinet that looks like fine furniture on the outside, but has an interior devoted to all kinds of electronic gear—not just the TV, but also a VCR, stereo components, extra speakers, video-game equipment, and plenty of storage space for compact discs and audio- and videocassettes.

Although entertainment centers come in all shapes and sizes, I find myself building the cabinet shown here—or variations of it—most often. I attribute the piece's popularity to its dual personality. Open the doors and you have a full-featured entertainment center that can handle a TV as large as 35 inches. Close the doors and you have a well-crafted cupboard that keeps the electronics out of sight.

In this article, I'll discuss the features and design considerations that go into a well-crafted entertainment center. Of all the projects you could build for your home, this one will return plenty of pleasure for the time, skill and money you invest. ►

Continued on next page

Design Guidelines for Entertainment Centers



PHOTOS BY JOHN HAMEL

In structural terms, an entertainment center is just a basic box—or two boxes, if you're building one like mine. There's nothing unusual about the joinery and construction. (See Fig. 1 on page 50 and Fig. 2 on page 52.) But to turn your cabinetry into a full-fledged entertainment center, you'll have to pay attention to some design considerations:

TV Storage

Most TV sets will fit in a cabinet with an interior depth of 22 in. Plan for an interior width that equals or (preferably) exceeds the diagonal measurement of the TV screen. Consider not just your current TV, but also any larger models you might buy in the future.

It's best to have the TV at eye level as you are seated. The set can sit directly in the cabinet, but I recommend placing it on a pullout TV swivel. This specialized hardware allows for more flexible seating arrangements. Buy a swivel with a high load rating—one that will support your current TV and the larger one that might replace it in several years. Use through bolts—not screws—to fasten the swivel to the shelf that supports it.

Pocket Doors

The doors on an entertainment center should be easy to open and close, and they should stay out of the way when you're viewing the TV. Pocket doors fill the bill. Partitions hide the pocket doors when they're retracted, and also support an adjustable shelf above the TV—where the VCR and “bookshelf” speakers go. I install the partitions with simple, inexpensive hardware called “magic” wires. (See page 52.) By packing out the top and bottom of the upper case and using magic wire supports, I make the partitions removable—a feature you'll appreciate if the pocket-door hardware ever needs adjustment.

Stereo Component Storage

The lower case is devoted to storing components, accessories and supplies. Most are no more than 17 in. wide, but I like to provide a shelf width of at least 19 in. Also important in the lower case: the center divider. It stiffens the structure, to support the TV's weight.



Lift, don't slide. To keep adjustable shelves from sliding forward, rout pockets for pins underneath.

Adjustable Shelves

Shelf-support pins are a great way to get adjustable shelving into a cabinet. They're inexpensive, easy to install and unobtrusive in the finished piece. To prevent shelves from sliding out every time you have to pull out a component, I rout four pockets on the underside of each shelf to fit over its support pins. This effectively locks the shelf in place until you lift it up. (See photo, above.)

Wire Access

Power, cable, antenna and speaker wires need to enter the cabinet. I bring them through a 2-in. by 6-in. notch in the bottom of the cabinet, near the back. Matched notches in the top of the lower cabinet and the bottom of the upper cabinet provide a passageway to connect



Removable panels. Narrow back panels allow easy access to wires. Leave them off for heat venting if the back will be against the wall.

the two cabinets. I usually screw an outlet strip at the back of one of the shelves in the lower cabinet and run the power cords from all my components to it. To facilitate wire management inside the lower cabinet, where the components are, I notch the inside corners of the shelves and keep the center divider 2 in. away from the back of the cabinet. (See Fig. 1.) And to maximize convenience when setting up components, I like to have a removable center panel at the back of each cabinet. This 6-in.-wide opening makes it much easier to run wiring between components. (See photo, below.)

Venting for Heat

You can get plenty of ventilation for most components simply by leaving the removable center panel off the back of the cabinet. If you need a full back for aesthetic reasons, you'll need to make some cutouts for ventilation. A 2-in. by 6-in. cutout in the back of the lower cabinet is enough to keep most audiovisual systems cool. Air will also come through the gaps around the doors. If you add a second amplifier or any other heat-generating equipment, add a second cutout or make a larger single opening. If your openings will show, upgrade them with vent covers. ([See Sources, page 55.](#))

Tape Storage

I really like the adhesive-backed plastic storage rails for discs and tapes. They're inexpensive, easy to install and widely available. (See Sources.) I fit my storage rails in drawers to keep discs and tapes out of sight when not in use.

Full-Extension Slides

I always use full-extension slides on my drawers. With these slides, even the tapes at the very back of a drawer are accessible.

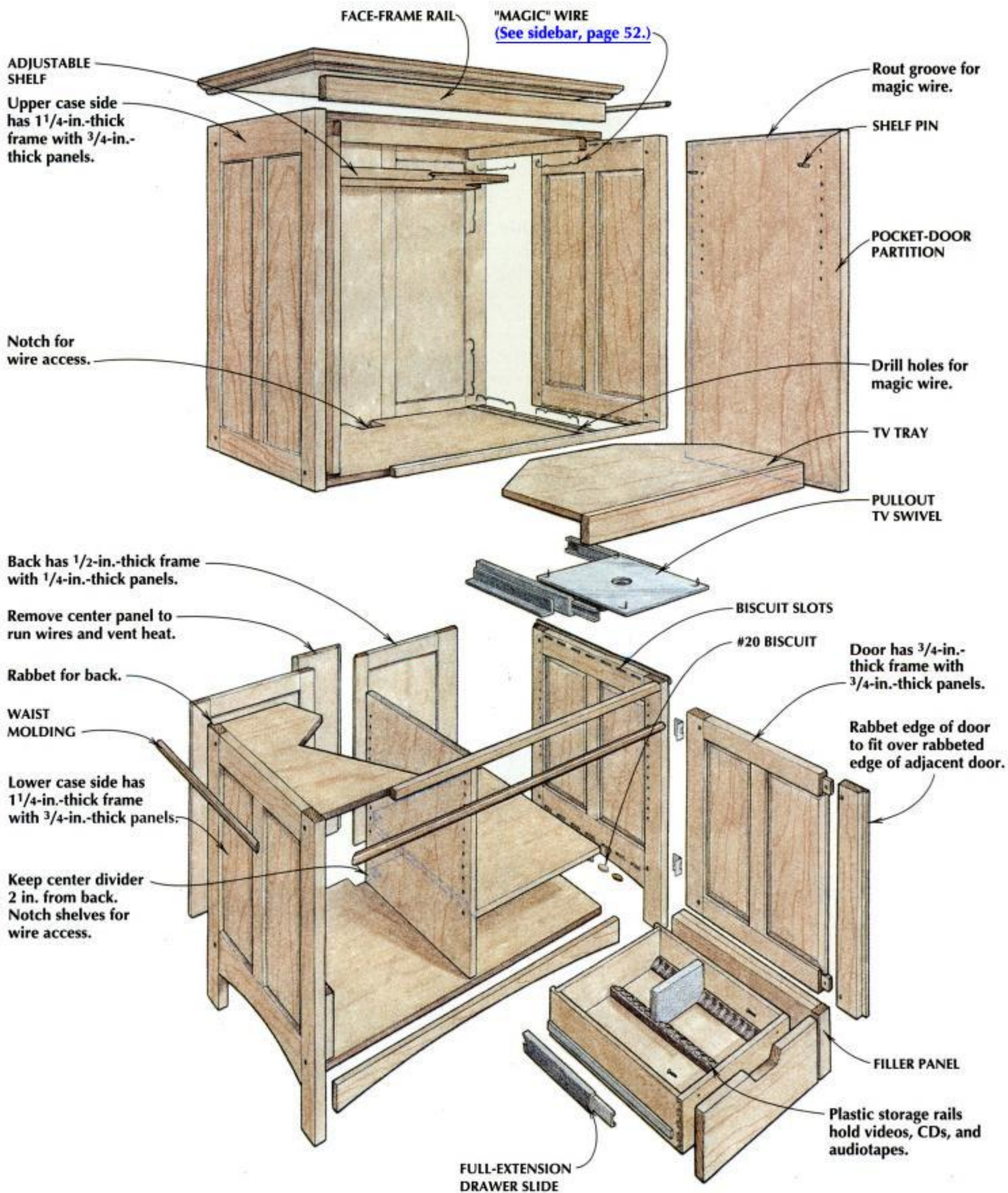


EDWARD SCHOEN

owns a custom woodworking shop and Signature Gallery in Pennsylvania.

FIG. 1: ENTERTAINMENT CENTER

The upper case aligns with the lower case and the two are screwed together. The upper case houses a TV, VCR and speakers. The lower case accommodates audio components and accessories. Notched openings at the back of each case allow passage of wires between both cases.



INSTALLING POCKET DOORS

How to install the hardware that makes cabinet doors disappear

Pocket doors—also called “flipper” doors—aren’t just for entertainment centers. They work well in any situation where a conventionally hinged door might obstruct view or access.

The success of a pocket door literally rides on the hardware that allows the door to swing open and then slide back into the cabinet. Pocket-door hardware attaches to the door with Euro-type cup hinges and relies on a mechanical system—usually a wood follower—to connect the slides for smooth operation. Here are some things to consider when designing and installing pocket doors:

- **Door width and slide length.** Door width and slide length affect how far the door will retract into the cabinet, so plan accordingly. When buying the pocket-door hardware, remember that actual slide travel is typically 3 to 6 in. less than the stated length of the slide. I leave 2 to 3 in. of the door proud of the cabinet as a handhold. Another option is to have the door retract fully and install a strip of wood on the inside edge of the door so you can pull it out.

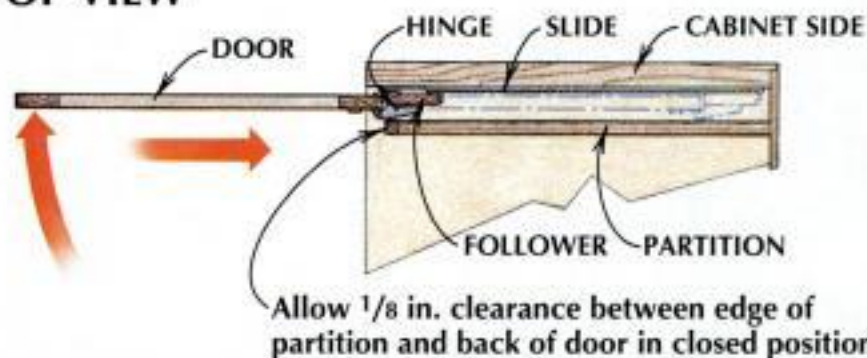
- **Door thickness.** Most pocket-door hardware will fit doors from $\frac{5}{8}$ in. to $\frac{7}{8}$ in. thick. You can adjust for thicker doors on face-frame cabinets by recessing the slides $\frac{1}{4}$ in. to $\frac{1}{2}$ in. behind the frame and packing out the follower by the same amount.

- **Clearance.** Plan for a $\frac{1}{8}$ -in. gap around the door top, bottom and sides. —E.S.

HOW A POCKET DOOR WORKS

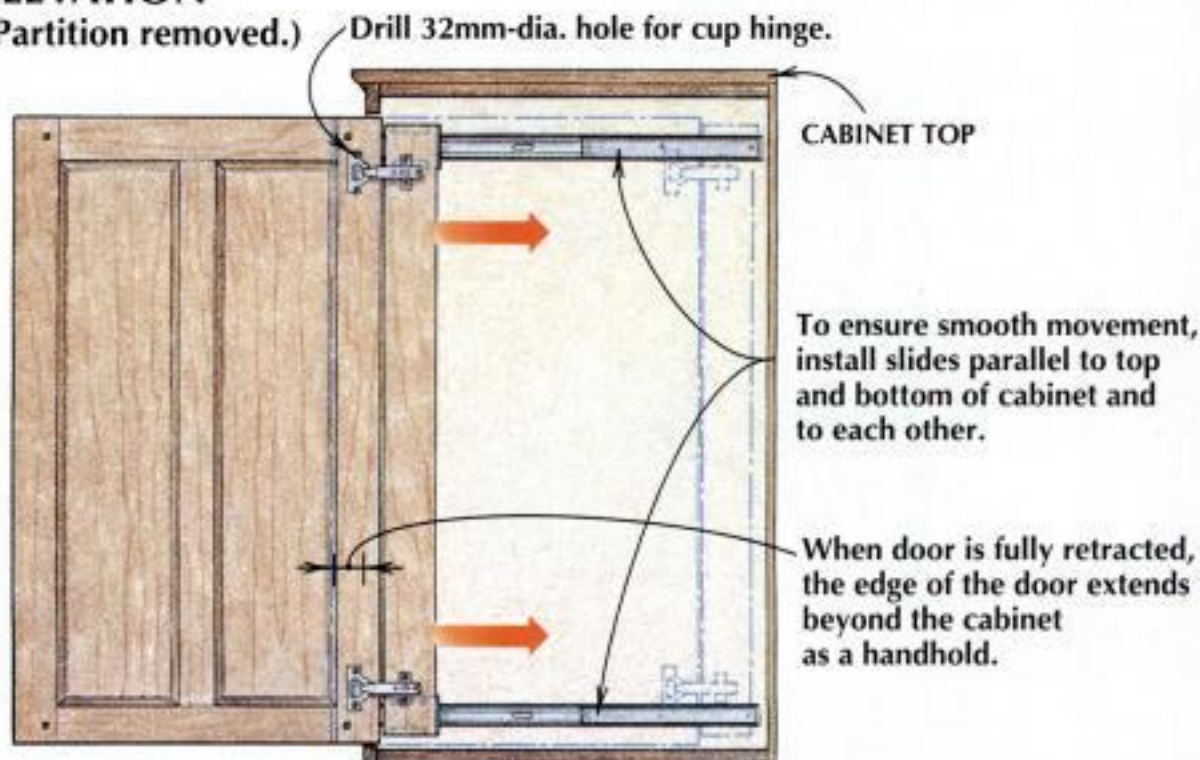
The door is hinged to a follower, which in turn is attached to a pair of slides. The follower moves along the slides, so the door can move into or out of the cabinet.

TOP VIEW

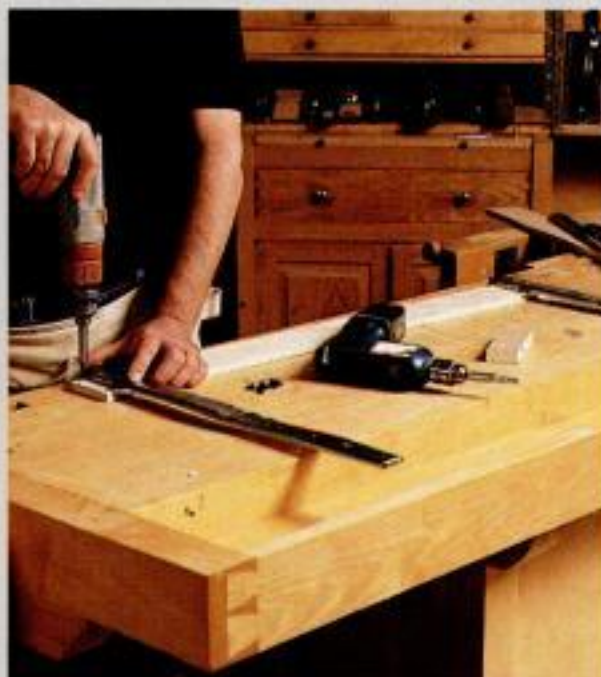


ELEVATION

(Partition removed.)



Drilling holes for hinges. Each hinge requires a single 32mm-dia. hole. Schoen's shop-made jig clamps to the drill-press table and registers the edge of the door to align the bit.



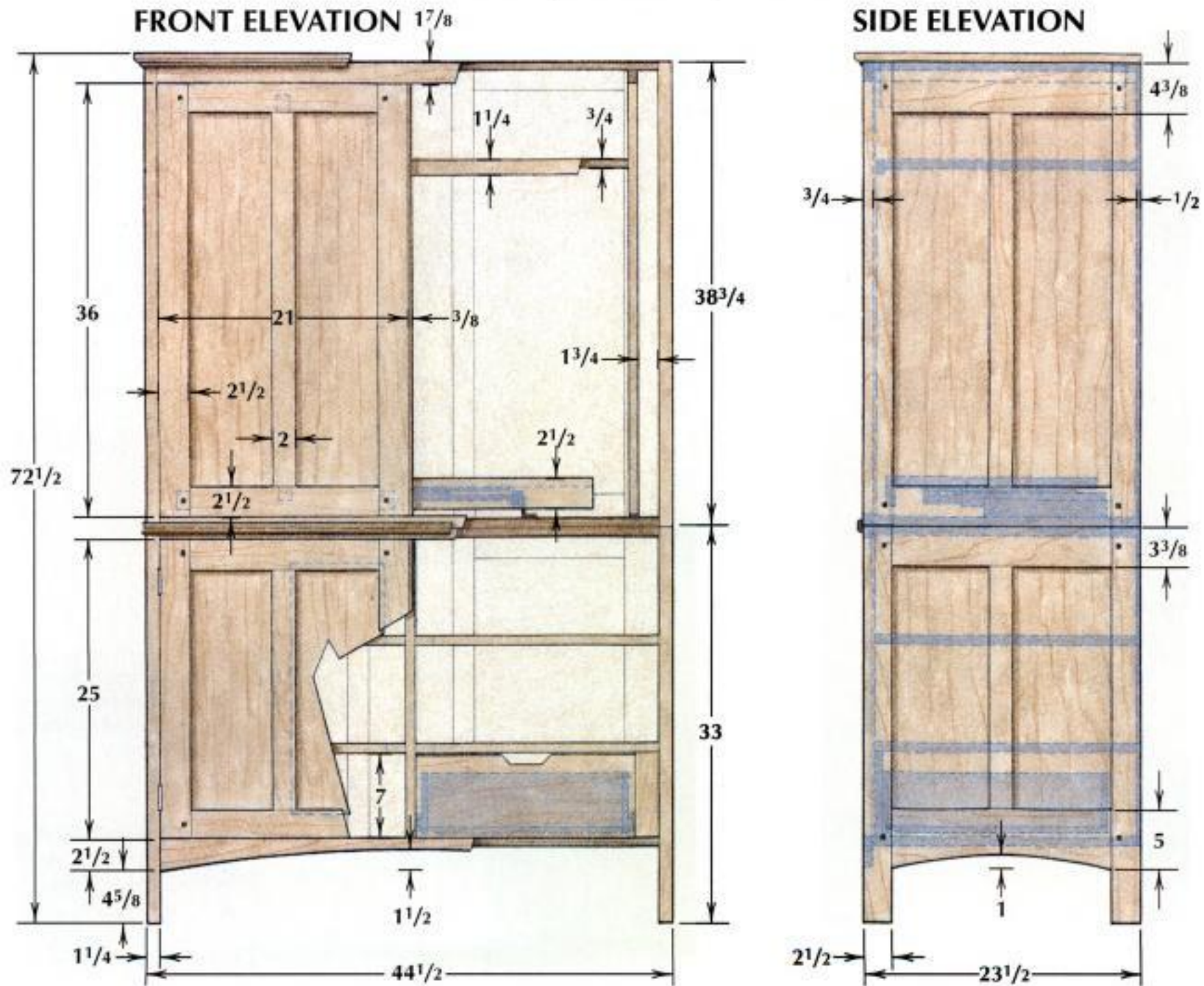
Preparing the slides. Screw or bolt the wood follower onto the metal plate on each slide. A raised lip on the plates keeps the follower square to the slides.



Sliding parallel. Install the lower slide using a spacer stick between the slide and the cabinet bottom. Then install the upper slide using a spacer stick between the two slides.

FIG. 2: ENTERTAINMENT CENTER ELEVATIONS

The 37-in.-wide TV compartment in the upper case will accommodate up to a 35-in. television set. You can vary the number of shelves and the drawer heights in the lower case to suit your audio components and media storage needs.



INSTALLING "MAGIC" WIRES

Magic wires, also called invisible wires or wire supports, are great for supporting partitions or shelves where you don't want to see the support hardware itself. Although magic wires are most often used for adjustable shelving, I find them useful for holding the pocket-door partitions in my entertainment center. Once they're installed, you can remove the partition or shelf without tools by simply sliding it out.

Installation is easy: Determine the wire length you need (7 in. and 10 in. are most common) then rout a $\frac{1}{8}$ -in.-wide groove in the panel. Stop the top and bottom grooves at the front of the partition. Next, drill $\frac{1}{8}$ -in. holes in the cabinet and install the ends of the wires in the holes. Slide the panel over the wires and you've got magical support. —E.S.

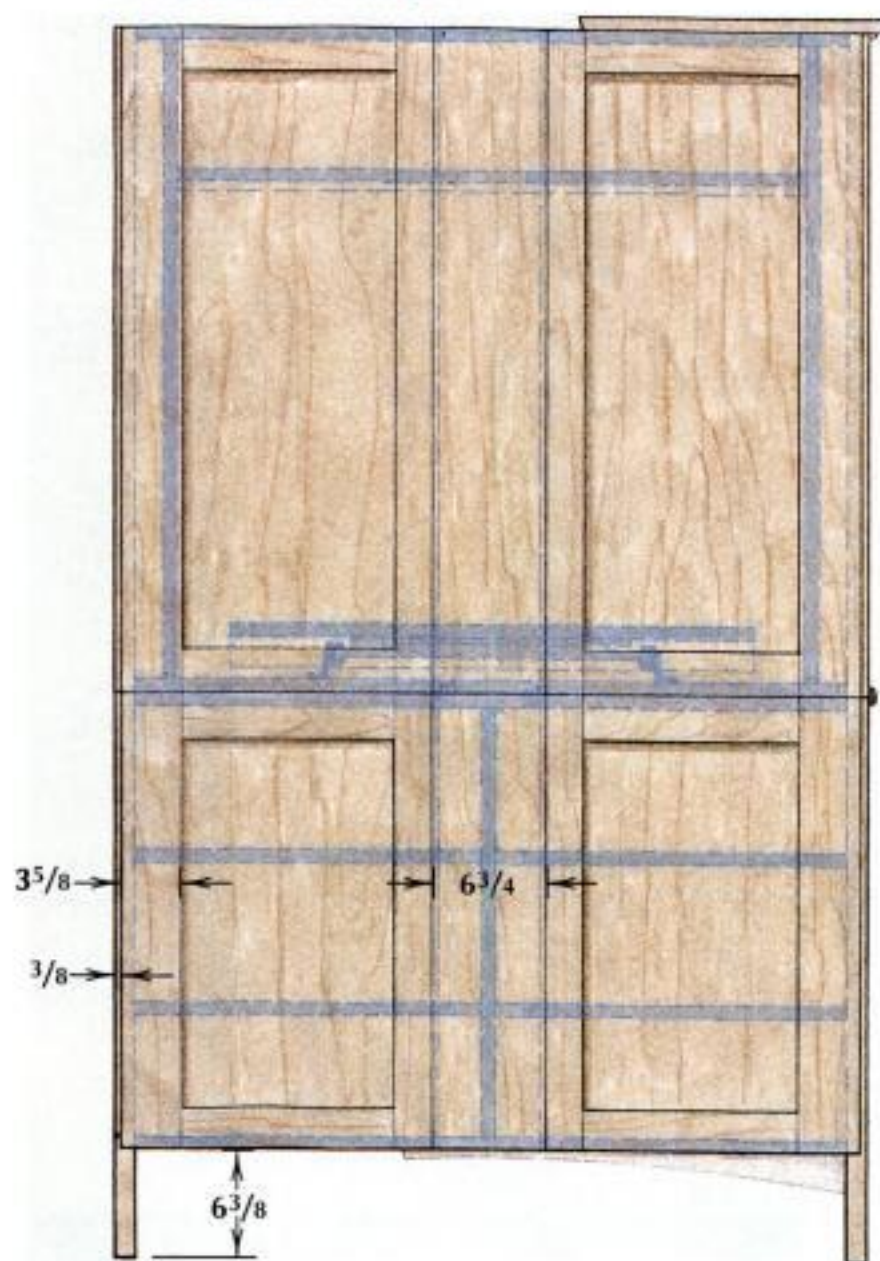


Routing the groove. Use a $\frac{1}{8}$ -in. slotting cutter in the router table to rout stopped grooves in the partition.



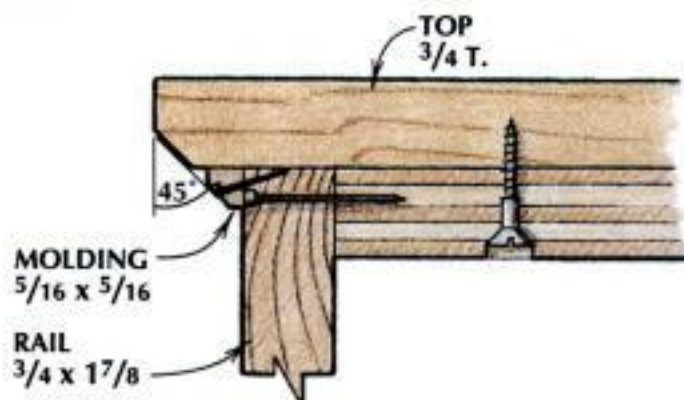
Drilling the holes. Drill $\frac{1}{8}$ -in. holes in the top and bottom shelves and the back to receive the ends of the wires.

BACK ELEVATION

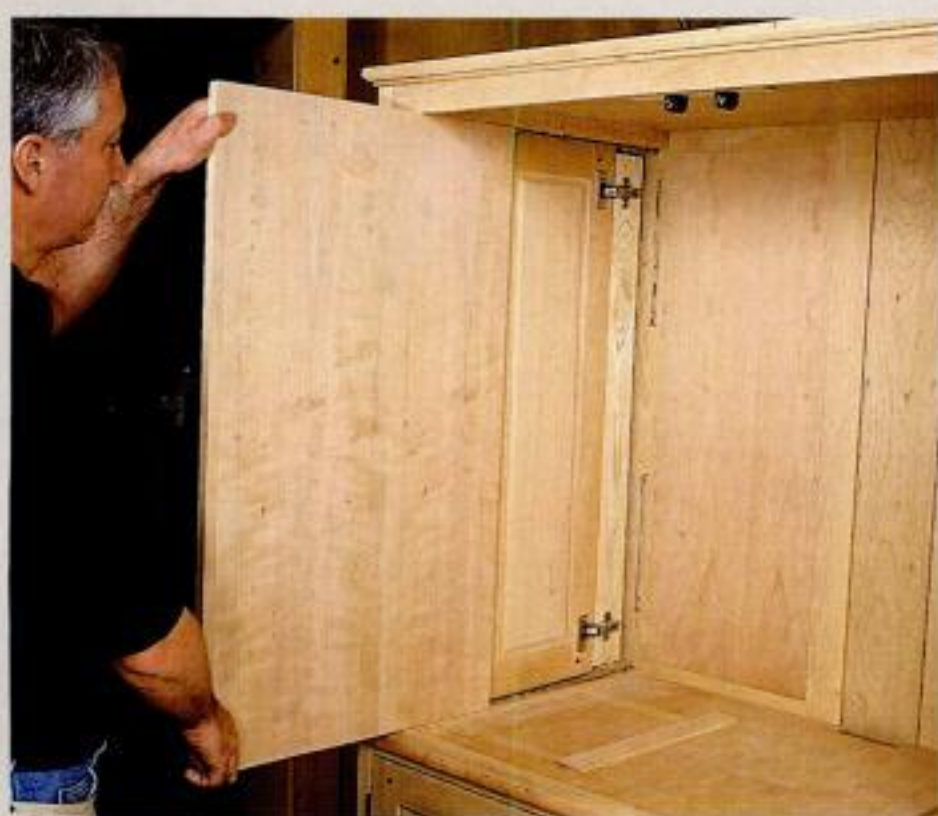
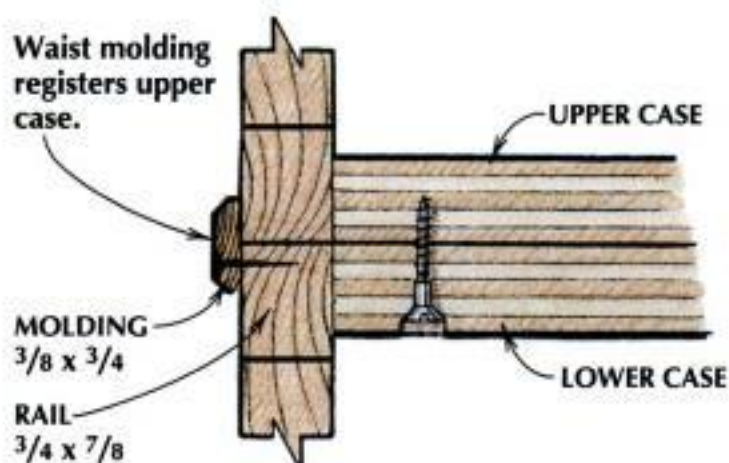


SECTIONS THROUGH MOLDINGS

TOP



WAIST



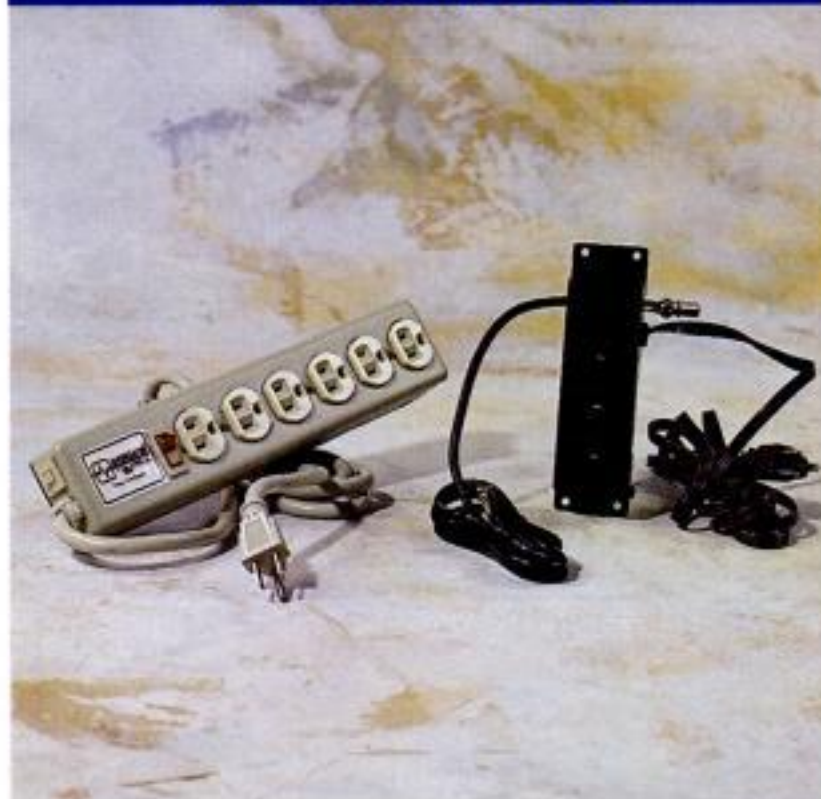
Installing the partition. After you tap the magic wires into place, slide the partition over the wires and into the cabinet case.

ORDER OF WORK

1. Mill and dimension all parts with square faces and ends.
2. Join and assemble frame-and-panel sides, backs and doors.
3. Cut biscuit joints for case assembly; rabbet sides for backs.
4. Drill shelf-pin holes in sides, dividers and pocket-door partitions.
5. Glue up upper and lower cases.
6. Attach top, face-frame rails and molding.
7. Slot partitions and drill cabinet for magic wires.
8. Assemble and install drawers and TV tray.
9. Fit and hang lower doors.
10. Install pocket-door hardware and hang upper doors.
11. Remove doors, drawers, partitions and hardware, and apply the finish of your choice.
12. Reassemble cabinet and install door pulls.

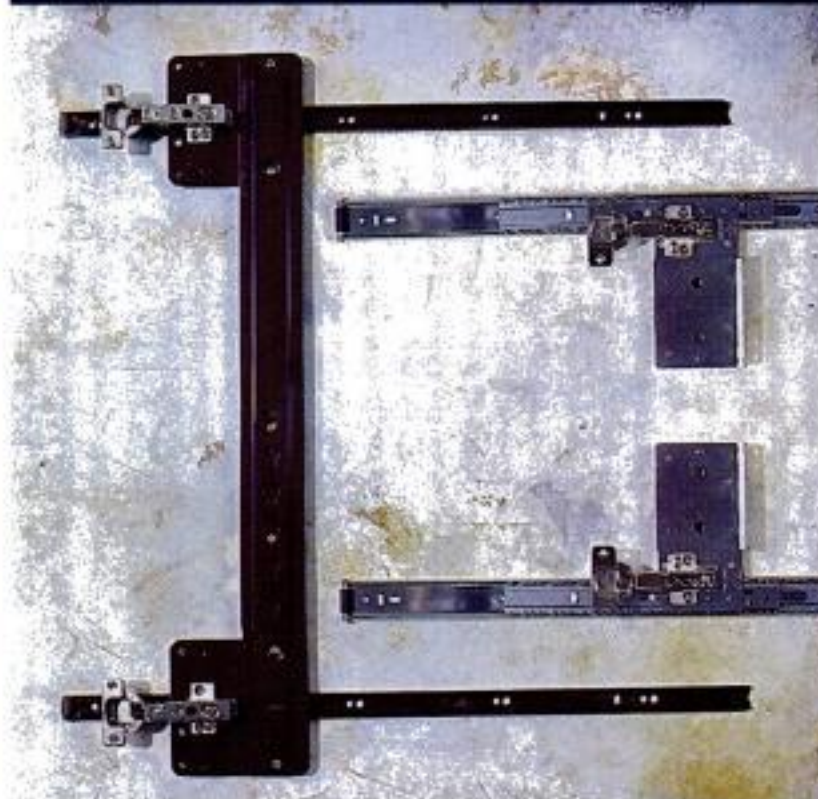
If you can build a box, you can build an entertainment center. The main difference is the specialized hardware and gadgetry inside. Here are some

POWER BLOCKS



Power blocks, or "plug strips," distribute electrical power to several components, so you'll have only one or two power cords exiting your cabinet. Power blocks are available with built-in fuses and surge suppressors to protect your equipment from electrical mishaps and overloads. Some models have a coaxial cable connector to simplify TV and VCR hookups.

POCKET-DOOR HARDWARE



Pocket or "flipper" door hardware solves a major entertainment center problem: What to do with the doors when the cabinet is open? (See page 51.) Several brands of pocket-door hardware are available, including systems that cost hundreds of dollars. Readily available slides like those shown here work fine for most situations.

CD AND TAPE ORGANIZERS



Molded plastic storage rails keep your music and video collections protected and easy to find. Available to fit CDs, audiotapes and videotapes, they're inexpensive and easy to install in a drawer or on a shelf. You can cut them to length or butt them end-to-end to fit a particular drawer depth.

TV SWIVELS



A TV swivel supports your TV and lets you pull it forward and/or rotate it, for viewing from anywhere in the room. The pivoting metal platform moves on two heavy-duty drawer slides. You supply the wooden shelf that screws to the platform. Be sure the swivel's load rating is adequate for your TV and shelf.

products that can help you transform an ordinary cabinet into a sophisticated home theater. See Sources at right for availability.

VENTILATION ACCESSORIES



Ventilation accessories keep the heat produced by electronic gear from damaging your equipment and tapes. Grilles and vents allow hot air to escape from enclosed cabinets, and they're more attractive than drilled or routed holes. For high-wattage equipment that generates a lot of heat, you might consider installing a small fan (available at Radio Shack stores).

WIRE MANAGERS



Wire managers come in handy for concealing unsightly wires in visible areas of your cabinet. Made of extruded plastic, they can be cut to length and attached with screws or double-faced tape. Grommets dress up wire-passage holes between and within cabinets. They hide raw wood edges and protect wires from wear and damage.

SPEAKER CLOTH



Speaker cloth, or "grille cloth," is acoustically transparent fabric that lets you build finished-looking speaker compartments in your entertainment center. Make a simple wooden frame slightly smaller than your cabinet opening, stretch a piece of the cloth over the frame and install it with touch latches or bullet catches.

REMOTE CONTROLS



Remote-control devices let you use your regular audio and video remote controls even when the cabinet doors are closed. Install an infrared sensor (bottom left and right) in the face frame or on an open shelf of your cabinet and connect the wires to your audio and video components.

SOURCES

Pocket-door hardware, hinges, TV swivels, full-extension drawer slides, magic wire, wire organizers, heat vents and plastic storage rails are available from one or more of the following suppliers:

Constantine's
(800) 223-8087
Circle #607

Woodcraft
(800) 225-1153
Circle #608

Woodworker's Hardware
(800) 383-0130
Circle #609

The Woodworkers' Store
(800) 279-4441
Circle #610

Woodworker's Supply, Inc.
(800) 645-9292
Circle #611

Wooden Bouquet

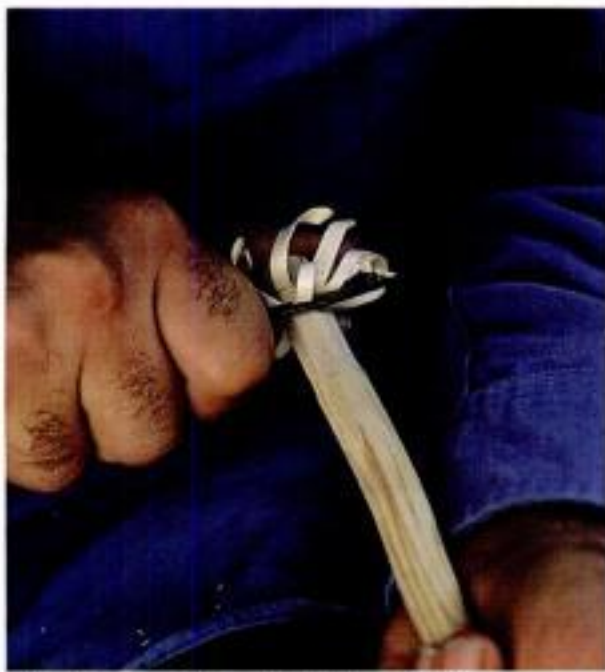


*Whittle a little
Valentine's gift
that lasts*

by Owen Rein

...she loves me.
*Wooden flowers
are long-lasting,
simple to make,
and a lot less expensive
than the real thing.*

PHOTO BY PAUL PEARSON



Cutting petals. Hold the knife at an angle to the stick, and slice straight down toward your thumb. Then rotate the stick slightly and cut again.



Beveling the base. Once you've cut halfway up the flower—about four rings or so—trim the base to a healthy bevel.



Twisting off the flower. When you reach the center of the flower, just gently twist it off the excess length of stick.

The next time you want to present a bouquet of flowers to a loved one, why not make it a wooden one? After all, a trip to the florist for a dozen roses could easily cost you \$50. And even the finest real roses won't be as impressive or long-lasting as wooden blooms like the ones shown here.

Whittling flowers is fun and requires very little in the way of tools and materials. All you need are some lopping shears or a small saw, a very sharp pocketknife, and an awl.

Twigs First

I learned this carving technique from my old friend, Mac Chitwood. Mac used to sit in my chair shop whittling flowers and selling them to the tourists. Mac always made his flowers from shoots of soft maple, but any straight-grained hardwood would work. You can cut your twigs any time of year, but before you whittle, let them dry indoors for a week or so with the bark on. If the wood is too green, the petals won't curl. If the wood is too dry, it's hard to cut and the petals curl too much.

Choose a twig about as big around as a man's thumb and 8 in. to 10 in. long. Make sure you have at least 3 in. of straight, knot-free wood at one end of the twig. This knot-free section is the "flower" end; the opposite end just gives you something to hold onto while you whittle.

When you're ready to whittle, remove all the bark. Then cut the flower end flat, and round the edges slightly so it's more comfortable to hold while you

whittle. Use your awl to poke a small hole in the pith of the twig. The hole is for the wire stem, which you'll add later.

Cutting the Petals

Here's the basic grip you'll use to make all your petal cuts: Grasp your knife with four fingers, with your thumb against the flower end, and grasp the midsection of the twig in your free hand. (See left photo, above.) To cut the first petal, reach up with the knife about 2 in. or 3 in. (whichever is more comfortable) and pull the blade down toward your thumb, holding it about 30° to the twig axis. The angle makes the petal curl sideways, away from the knife. Stop the cut a little more than 1/2 in. from the end of the stick (and the flesh of your thumb!). Then rotate the stick slightly and make an identical petal cut next to the first. Keep your petals about the same width and thickness; that way, they'll curl uniformly. Keep cutting until you've completed a "ring" of petals around the twig. I usually get six petals per ring.

With the first ring of petals completed, cut the next ring just slightly above it. I cut these petals so they fall in between the petals of the first set. Try to end the cuts close to where you ended the cuts on the first ring. After you've cut four rings or so, the petals are about half-finished.

Now trim the flower end again—this time giving the edges a healthy bevel (see center photo, above) so the flower will seem to taper naturally into the wire stem. Adjust the petals you've already cut

by pushing them down from the top or up from the bottom, so they curl gracefully. Then go back to cutting petals.

With each ring, the stick will get smaller and so will the petals. On the final ring—the "center" of the flower—the petals will be very short and stubby, and the excess stick will resemble a sharpened pencil pointing toward you. (See right photo, above.) Now, just gently twist the flower off the end of the stick.

Finishing Touches

You can leave your flowers plain or color them with spray paint. If you use spray paint, don't use too much or spray too close to the petals—the moisture from the paint can make the petals uncurl.

Insert a wire stem in the hole in the end. You can buy wire from your local florist. For a stiffer stem, I use 3/64-in.-dia. welding rod from my local auto supply store.

Wrap green florist's tape around the base of the flower and all the way down the length of the wire. The tape holds the flower on the stem and makes it look more realistic.

These flowers are very sturdy. They don't need watering, but they may need a little dusting now and then. ▲



OWEN REIN

is a chairmaker at the Ozark Folk Center in Mountain View, AR.

Jigs for Precision Sharpening

There's a grinder tool rest for every sharpening task

A bench grinder's abrasive wheels can quickly restore and shape your edge tools. But each tool requires a specific geometry for optimum performance.

That's where the tool rest comes in. A good tool rest helps you guide the tool across the wheel with control and repeatability. The standard tool rests on most bench grinders are crude, flimsy and small. For efficient, effective grinding, you need an aftermarket tool rest.

For this shop test, we evaluated six aftermarket tool rests that are designed to sharpen chisels and plane irons, as well as turning tools such as skewers, gouges and scrapers.

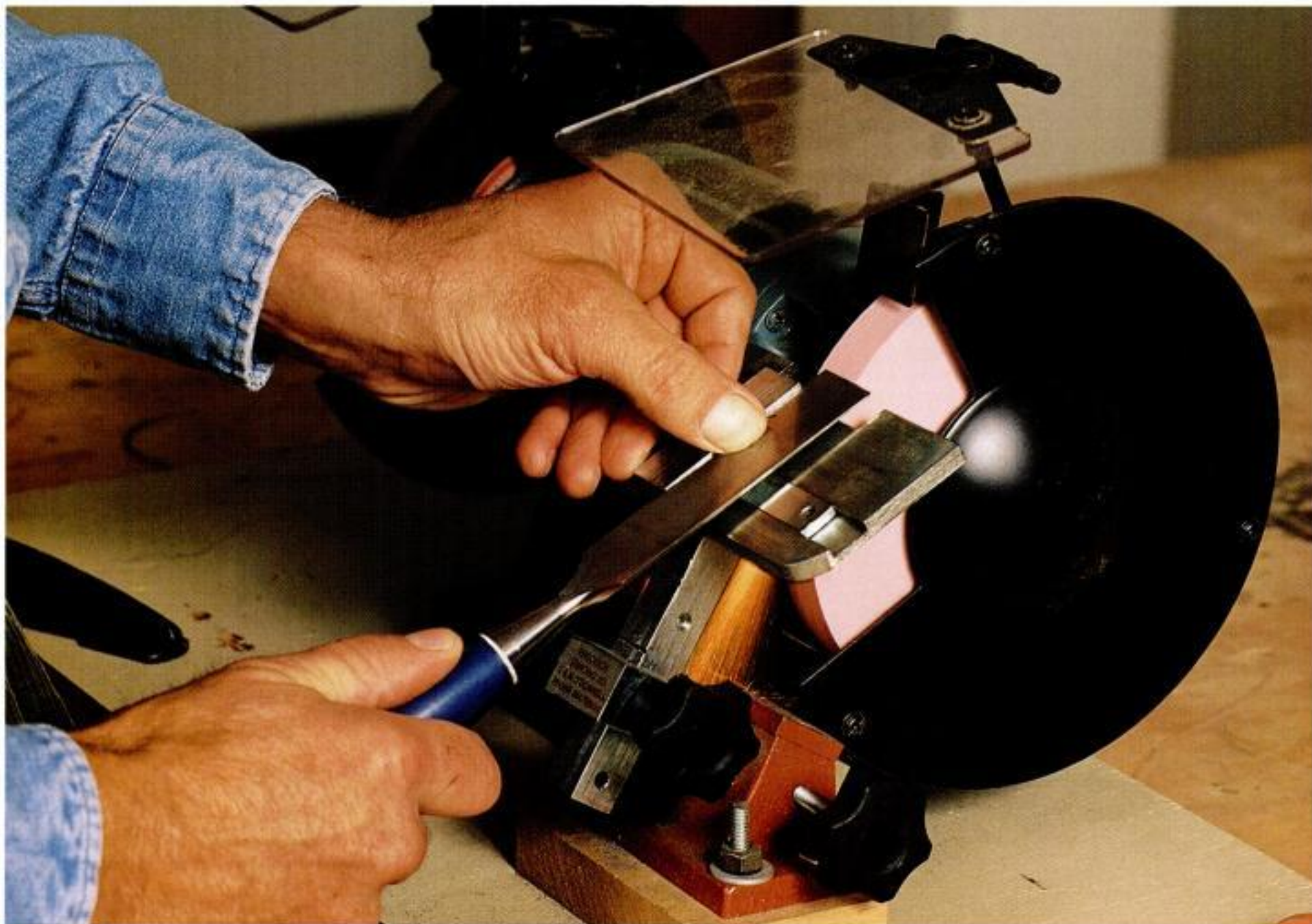
The tool rests featured here are really *rest systems*. The rest itself consists of a bolt-down base and a platform, connected by one or two arms. The platform may be slotted to accept various jigs or guides for various sharpening tasks. A slotted platform mechanically guides the jigs parallel to the grinding wheel. Some jigs are for holding different tools while you grind them; others help you dress a worn grinding wheel, creating a perfectly flat, clean face parallel to the tool rest. These accessories are standard on some tool rests; on others they cost extra.

For our tests, we installed each rest on a grinder or grinder platform according to the manufacturer's instructions. Then

we brought in a wide variety of edge tools and started sharpening. We checked out rest platforms and adjustments, and tried all the accessories. Our ratings are based on the jigs' performance with all the standard and optional accessories.

Which model is right for you? It depends on several factors—most notably, the kind of woodworking you do and how much you want to spend. As you'll see on the pages ahead, most models excel at certain tasks but fall short in others. And prices range from \$28 to \$124. Whatever your decision, remember to wear eye protection and grind safely.

Note: In some photos, grinder shields have been removed for clarity. ▶



Solid support. A good tool rest provides a stable platform so you can guide edge tools at the correct angle and get a perfect bevel. But different tool rests excel at different tasks.

PHOTOS BY DAVE SELLERS

DELTA 23-845 EDGE TOOL GRINDING ATTACHMENT

Street price: \$124

Standard accessories: None

Optional accessories: None

Delta's tool rest is the Sherman tank of grinder jigs: 6 lbs. of cast iron. It's the only jig that mounts on the grinder wheel housing instead of on the bench. A cast wheel housing will provide the best rigidity for this rest. The light-gauge, stamped-steel housings found on the cheapest grinders won't be stiff or strong enough.

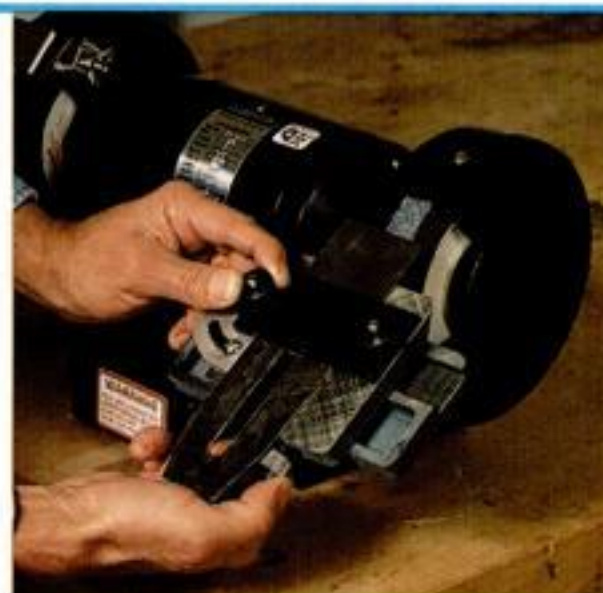
This jig is designed to sharpen straight-edged tools (no gouges). Two knurled nuts clamp the chisel or plane iron in a holder, which slides in a slot. By setting an angle quadrant, you can repeatably position skews. The platform tilts to set the bevel angle; you lock it by tightening bolts with a wrench. Levers would be much better here. A feed screw lets you advance the tool's edge into the wheel in precise increments, which helps you avoid burning the edge.

PROS

Heftiest jig we tested; feed screw gives precise grinding control.

CONS

Highest-priced jig tested; may be too heavy for some lightweight grinders; wrench required to set bevel angles.



RATINGS

(See key.)

Chisels & plane irons **4 1/2**

Skew chisels **4 1/2**

Scrapers **2**

Gouges **Not applicable**

BOTTOM LINE

A solid, precise jig for plane irons, chisels and skews.

VERITAS GRINDER TOOL REST

Street price: \$34.95

Standard accessories: Bevel-angle setting gauge

Optional accessories: Chisel and plane iron jig, \$15.95; skew chisel grinding jig, \$19.95; diamond point wheel dresser, \$19.50

Power Sharpening Kit: \$74.50, includes Veritas tool rest, chisel jig, 80-grit white aluminum-oxide wheel (6 in. dia. by 3/4 in.)

On the Veritas Grinder Tool Rest, both platform height and angle are adjustable—making it much more versatile than platforms that only tilt. You can fold the Veritas platform completely away from the wheel for unsupported, freehand sharpening. A handy plastic gauge is included for setting common bevel angles.

The chisel and plane-iron jig holds tools securely with a clamping bar, so you're less likely to stray from position and inadvertently grind multiple facets on the edge. Guide lines on the jig take the guesswork out of squaring a chisel or plane iron to the wheel. The optional skew accessory lets you grind a perfect curved radius on a skew—a shape preferred by some turners. Gouges must be sharpened freehand.

PROS

Great adjustability; large, easy-to-use locking levers; effective blade holder holds even short chisels; grinds curved edges on skews.

CONS

Guide lines on chisel jig are hard to see; gouges must be sharpened freehand.



RATINGS

Chisels & plane irons **4 1/2**

Skew chisels **5**

Scrapers **4**

Gouges **2 1/2**

BOTTOM LINE

Nicely designed, easy-to-use rest for chisels, plane irons, and skews. A good value.

KEY

Numerical ratings: 5 = excellent, 4 = good, 3 = fair, 2 = poor, 1 = unsatisfactory. **Not applicable** = Jig was not designed for this purpose.

SABRE SHARPENING CENTRE

Street price: \$79.95

Standard accessories: Two tool guides, wheel dresser

Optional accessories: None

The Sabre system does a good job with everything except gouges. Four index marks on the bracket indicate common angle settings for different tools. This jig's lack of height adjustment isn't a liability. But the wing nuts used to lock the platform angle are difficult to tighten; we prefer the large levers and knobs found on other jigs.

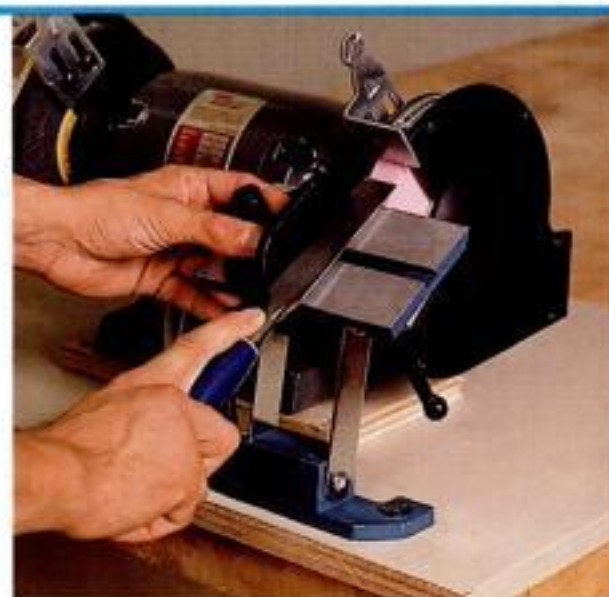
The Sabre includes two aluminum tool guides and a diamond wheel dresser. They all slide in a slot in the platform. One guide is for skews and gouges; the other is for chisels and plane irons. The guides work well for straight-edged tools, but gouges tended to shift a bit. We liked the diamond dresser; it has a feed screw that lets you fine-tune its setting, so you can take a very light cleanup pass on the wheel.

PROS

Tool guides and wheel dresser come standard; tool guides are easy to use; wheel dresser works great.

CONS

Fixed platform height can leave tool edge unsupported at steeper angle settings; chisel guide can't handle short-bladed chisels; wing nuts are difficult to tighten.



RATINGS

Chisels & plane irons 4

Skew chisels 4½

Scrapers 4½

Gouges 3

BOTTOM LINE

Easy to use and effective for sharpening, but lacks degree marks for setting angles.

O'DONNELL SHARPENING SYSTEM

Street price: \$99.95

Standard accessories: None

Optional accessories: Set of 3 guides, \$21.95; diamond dresser, \$49.95; reference posters for common bevel angles, \$12.95

Complete O'Donnell system: \$159.95, includes everything but the reference posters

Designed by Michael O'Donnell, the noted turner and engineer, this solid cast-iron and steel tool rest fits wheels up to 1¾ in. wide. A clever telescoping post lets you quickly set the platform for different bevel angles. Standard angles—15°, 25°, 30° and 45°—are marked and indexed, so you can reset them easily. The maximum bevel angle is 45°. If you want a steeper angle, you'll have to shim the platform.

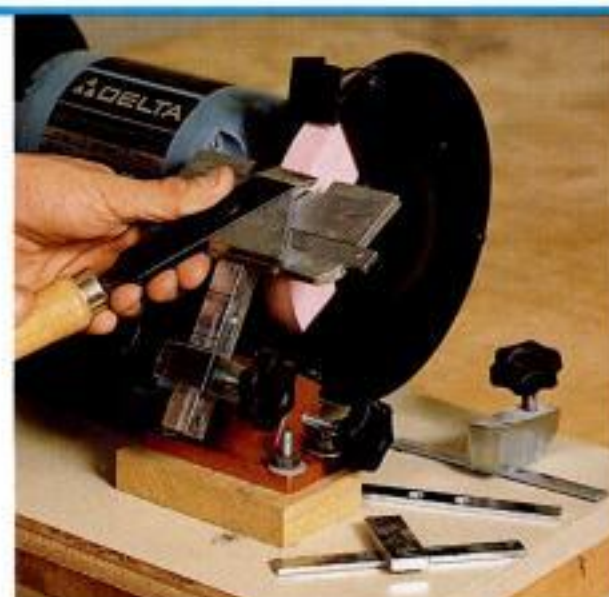
The complete system includes three guides that slide in a platform slot: a 90° guide for chisels and plane irons, a 60° guide for skew chisels, and a slide bar for attaching your own custom-made guides. You hold the tool against the guide and feed the edge into the wheel by feel. The diamond dresser works like a charm thanks to its screw feed, which advances the dresser into the wheel.

PROS

Grinds short chisels; simple guides are easy to use; it's easy to set bevel angles and to repeat settings precisely.

CONS

Limited grinding angles for skew chisels and scrapers; can't grind bevels steeper than 45°.



RATINGS

Chisels & plane irons 5

Skew chisels 4½

Scrapers 4½

Gouges 3½

BOTTOM LINE

Highest-rated jig for chisels and plane irons.

AG100 MULTI-ANGLE GRINDING JIG

Street price: \$27.95

Standard accessories: Miter gauge

Optional accessories: None

The Multi-Angle Jig is designed for grinding straight-edged tools. Its construction is simple and robust. The large aluminum platform tilts for angle adjustment. Height is not adjustable, but you can move the platform closer to the wheel to avoid gaps at steep angle settings. To grind precise bevel angles, you hold the tool against a small, adjustable miter gauge that rides in the platform's slot.

PROS

Least expensive jig tested; large locking levers ensure solid angle settings; adjustable miter gauge makes it easy to grind different skew chisels.

CONS

Fixed platform height makes some angle settings awkward; platform makes grinding short-bladed chisels or skews difficult.



RATINGS

Chisels & plane irons 4 1/2
Skew chisels 4 1/2
Scrapers 4
Gouges 3

BOTTOM LINE

A low-cost jig with no bells & whistles for sharpening straight edges.

WOLVERINE GRINDING JIG

Street price: \$79.95

Standard accessories: Two bases, V-arm

Optional accessories: Vari-Grind attachment, \$48; Wheel-dressing attachment, \$64.95

The Wolverine jig is designed for turning tools, but it will also handle chisels and plane irons. It's the only jig tested that has two platform bases, one for each wheel of your grinder. Each base has a quick-acting cam clamp that holds accessories firmly. The large platform—used for chisels, plane irons and scrapers—is set at a fixed height, but you can adjust its angle for different bevel angles. The platform has no sliding jigs; you hold these tools flat on the platform and sharpen them freehand.

Sharpening gouges is a treat with the V-arm attachment, which consists of a long bar with a pocket that supports the tool's handle. You slide the arm in or out until the gouge's bevel contacts the wheel, then rotate the handle to grind the bevel.

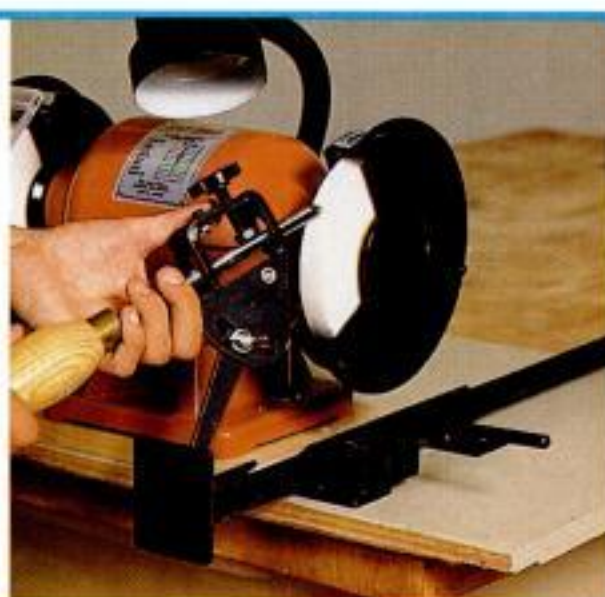
With the optional Vari-Grind attachment in the V-arm (shown at right) you can accurately grind any gouge profile from a traditional fingernail to the radical "side grind" preferred by many turners. The wheel-dressing accessory has a fine-adjustment knob for controlled trueing cuts.

PROS

Only jig with two bases; best jig for gouge sharpening; great wheel-dressing attachment; very solid construction.

CONS

No attachments for chisels or plane irons; large platform makes short chisels difficult to sharpen.



RATINGS

Chisels & plane irons 3
Skew chisels 4
Scrapers 4 1/2
Gouges 5

BOTTOM LINE

If gouge sharpening ability is important to you, you won't find a more versatile jig.

SOURCES

Craft Supplies USA

Multi-Angle,
O'Donnell & Sabre
(800) 551-8876 Circle #612

The Cutting Edge

Veritas & Wolverine
(800) 790-7980 Circle #613

Garrett Wade

Sabre & Veritas
(800) 221-2942 Circle #614

Highland Hardware

Veritas
(800) 241-6748 Circle #615

Lee Valley Tools

Veritas
(800) 267-8767 Circle #616

Oneway Mfg. Wolverine

(800) 565-7288 Circle #638

Packard Woodworks

Veritas & Wolverine
(800) 683-8876 Circle #617

Skarie, Inc., Delta

(410) 728-6000
Circle #618

TrendLines Veritas

(800) 767-9999 Circle #619

Woodcraft

Sabre & Veritas
(800) 225-1153 Circle #620

The Woodworker's Store

Sabre & Veritas
(800) 279-4441 Circle #621

Plunge Routing Mortises

Bits and techniques for precision joints

by Tim Snyder

There are many reasons to own a plunge router. But the way these tools really earn their keep is by routing mortises quickly and precisely. With a plunge router, you can take on all the mortising work you'd do at a drill press or mortising machine, and still enjoy all of the router's edging and shaping capabilities.

Plunge routing a mortise produces a first-class excavation—you get smoother, straighter sides than you can attain with a hollow-chisel mortiser, or by drilling and chiseling out the waste. What you don't get with a plunge-routed mortise is a square-cornered opening. The radiused shoulders of a plunge-routed mortise present you with

three joinery options: 1) Square the shoulders with a chisel, then cut a matching tenon. 2) Round over the edges of your tenon to match the mortise. 3) Rout matching mortises, and join your parts

together with loose tenons. (See Fig. 1.) This last option is by far the fastest and easiest joinery approach, since it eliminates the separate setup and cutting operations required to make tenons.

There are some great jigs for routing mortises—aftermarket versions designed to replace the router's standard sub-base, and shop-made versions like the self-centering jig featured in AW #54. But you can also make perfect mortises without spending any extra time or money to soup up your plunge router. All you need to do the job right are a fence for your router, a couple of bits and some way to hold the work. Here are the basics of plunge routing mortises quickly and accurately.

Plunger Preferences

Any plunge router can make mortises, but some models will do the job more easily than others. The features discussed below will help you choose a plunger that's well-suited to mortising.

Power and size—I've plunge routed mortises with 3-HP routers, but these big fellows are overpowered and oversized for most mortising work. It's easier to maneuver a 1¾-HP or 2-HP router. One disadvantage you'll discover with some smaller routers is the restriction of a ¼-in. collet. Routers with ½-in. collets can chuck a wider range of spiral-flute bits—which are best for mortising, as I'll explain later.

Plunge post and depth adjustment—The router's plunge post rotates to register different depth settings against the depth stop. Some routers, like the Hitachi at left, have just three depth settings; others have six or more. More is better for plunge routing mortises—you

Quick and clean. Clamped square against ledger strips, a set of four legs forms a platform for plunge routing a series of identical mortises. A wooden auxiliary fence attached to the router's standard fence promotes stability when you move the router.

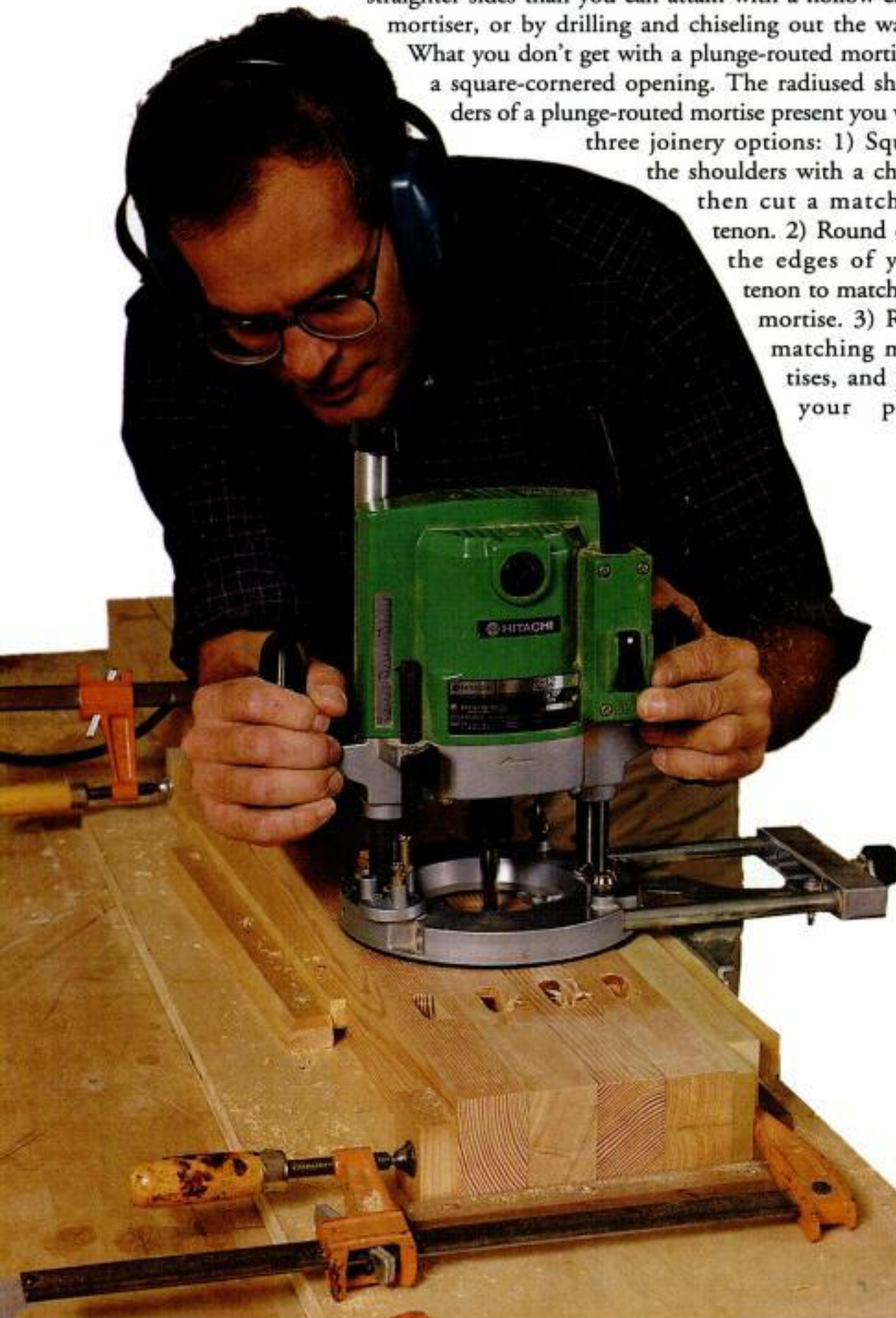


FIG. 1: THREE MORTISING OPTIONS

Plunge routing a mortise leaves an opening with round ends. This presents three different joinery options.

1. Chisel the mortise square, and fit a square-edged tenon.



2. Leave the mortise rounded, and fit a round-edged tenon.



3. Rout matching mortises, and fit a round-edged loose tenon.



can creep up on your final depth in smaller increments. A “zeroing” depth indicator is also desirable: It enables you to set plunge depths quickly and easily. For more on important plunge-router features, see AW #33.

A good fence—Also called an edge guide, this accessory provides a straight, flat surface that can guide the router for all kinds of straight-line work. The fence should lock securely, without wobbling. A micro-adjustment screw will make it easier to fine-tune fence position as you adjust the bit’s position on the workpiece. I like to extend the length of the standard fence by attaching a wooden auxiliary fence. This provides a broader surface to bear against the workpiece or the straightedge that guides the cut.

The Best Bits

While it’s possible to plunge rout mortises using a conventional straight bit with one or more straight flutes, spiral-flute bits are really the way to go. They’re more expensive than their straight-fluted counterparts, but they’re far better all-purpose cutters. (See photo, right.) With a spiral-flute bit, there’s always a cutting edge in contact with the work, and the cut is made with a shearing action rather than a straight chipping action. The benefits: You can cut faster and deeper than with a straight-fluted bit, without sacrificing smoothness of cut or taxing the power of your router. And spiral-flute bits remove the chips and sawdust from the excavation as you rout. *Upcut* spiral bits are the most common; they’re designed to pull the waste up and out—just what you want when cutting a stopped mortise. If you’re rout-

ing a through mortise, a *downdcut* bit will direct the waste downward.

Many woodworking catalogs offer spiral-flute bits in different diameters. Solid carbide bits are more expensive than high-speed steel (HSS) versions—\$48.95 vs. \$17.95 for a 1/2-in. bit in one catalog. But the extra cost is usually offset in edge-holding ability.

For another source of spiral-flute bits, look for *end mill* bits in an industrial supply catalog. MSC Industrial Supply Co. stocks a wide selection (phone 800-645-7270).

Though they’re designed to be used in milling machines on metal, plastic and other materials, most end mills work well on wood, too. And they’re also economical—a 1/2-in.-dia. HSS end mill can cost as little as \$10. The type to order is a two-flute, center-cutting end mill designed for cutting aluminum.

For the best savings, use end mills with shank diameters that match standard router-collet sizes—1/2 in., 3/8 in.,

or 1/4 in. End mills with odd-sized shanks will require bushings to fit in your router.

Lay Out, Clamp & Cut

Layout work for plunge-routed mortises can be quick and easy. If you need to rout a mortise in the same location on several identical pieces—as with table legs, for example—it’s only necessary to do a full layout on one piece. On the remaining pieces, simply mark the two ends of each mortise.

Once your layout is done, you just need a way to hold the workpiece securely and a straight edge for the router’s fence to run against. With many furniture projects, you can gang identical parts together so the workpieces support and guide the router. (See photo, opposite page.) It’s easy to keep multiple parts aligned if you screw a pair of ledger strips to a flat work surface and hold your parts against these strips with clamps or wedges. Adjust the router’s fence to center the bit over one mortise location, and



Straight vs. spiral flutes. A carbide-tipped straight bit (left) will plunge rout mortises if you make ramped cuts. (See Fig. 2.) But the best plunge-routing bits have spiral flutes, like the end mill (center) and the solid carbide bit (right).

USING A SIMPLE MORTISING JIG



One piece at a time. Clamp a workpiece to a simple, box-shaped jig to provide a platform for the router base. Here, the edge of the workpiece guides an auxiliary fence fastened to the router fence.



End mortising. Clamp the workpiece vertically to rout end mortises. For this cut, the top of the jig supports the router and also guides the router's auxiliary fence. Slats on the jig's side make clamping easy.

you can rout identical mortises in the remaining parts simply by shifting their order and reclamping them.

To set up for plunge routing a mortise in just a single part, you'll probably need to provide a broader surface to support the router. Scrap stock, ripped to the same height as the workpiece and clamped against it, will work fine. Or you can make a simple jig that provides a broad surface and some means of clamping the workpiece. (See photos, above.)

Additional support will also be necessary when you're mortising small parts, or when you're routing a small mortise

in the end of a piece. As shown above, the jig I use for this mortising work is easy to make and use. It lets you clamp small or odd-sized parts vertically and guide the router with a straight edge.

Now make the plunge. If you're using a spiral-flute bit, the best way to excavate the mortise is to plunge to its full depth at each end, as if you're boring a pair of blind holes. Then simply remove the waste between the holes by making a series of passes at progressively deeper settings. (See Fig. 2.)

The cutting depth you can take with each pass depends on the size of your

bit, the hardness of the wood, and the power of the router. Judge your depth by feel: You're going too deep if the motor bogs down, if the bit chatters or if you have to force the tool with uncomfortable feed pressure.

I like to pull the router toward me on cutting strokes, using the push stroke just to clean up. This technique gives more control. It's also best to move the router against the rotation of the bit. Both of these strategies make it easier to keep the fence against the edge that's guiding it.

If you're mortising with a straight-flute bit, don't use the two-hole approach described above. Instead, make a series of slanted and level cuts from one end of the mortise to the other. (See Fig. 2.) Increase your router's plunge depth by about 1/4 in. with each slanted cut.

If you're routing duplicate mortises in numerous parts, you can set up stops for the router so you don't have to "eyeball" the bit's approach to each layout line. ▲

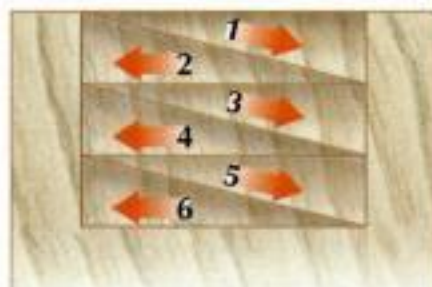
FIG. 2: HOW TO REMOVE THE WASTE

The best routing sequence for mortises depends on the type of straight bit you're using. Spiral-flute bits can make deep plunge cuts, so you can bore the ends of the mortise before removing the waste in the middle. Straight-fluted bits work best for shallower plunge cuts.

SPIRAL-FLUTE BIT: Bore a blind hole to the full depth of the mortise at each end. Then remove waste with progressively deeper cuts.



STRAIGHT-FLUTE BIT: Make a slanted cut in one direction, then level the cut in the opposite direction. Repeat slanting and leveling cuts.



TIM SNYDER
is managing editor
of AW.

Valentine Box

Router templates are the key to perfectly shaped parts

by Paul L. McClure

Valentine's day was approaching, and the stores were loaded with the same old stuff—schmaltzy cards, cardboard boxes of candy, and stuffed bears clutching “I ♥ you” signs. My squeeze deserved better. So I made her a heart-shaped wooden box and filled it with her favorite sweets. I installed a musical movement inside to remind her of my feelings whenever she opened the lid. The chocolate didn't last long, but the box has become a treasured gift.

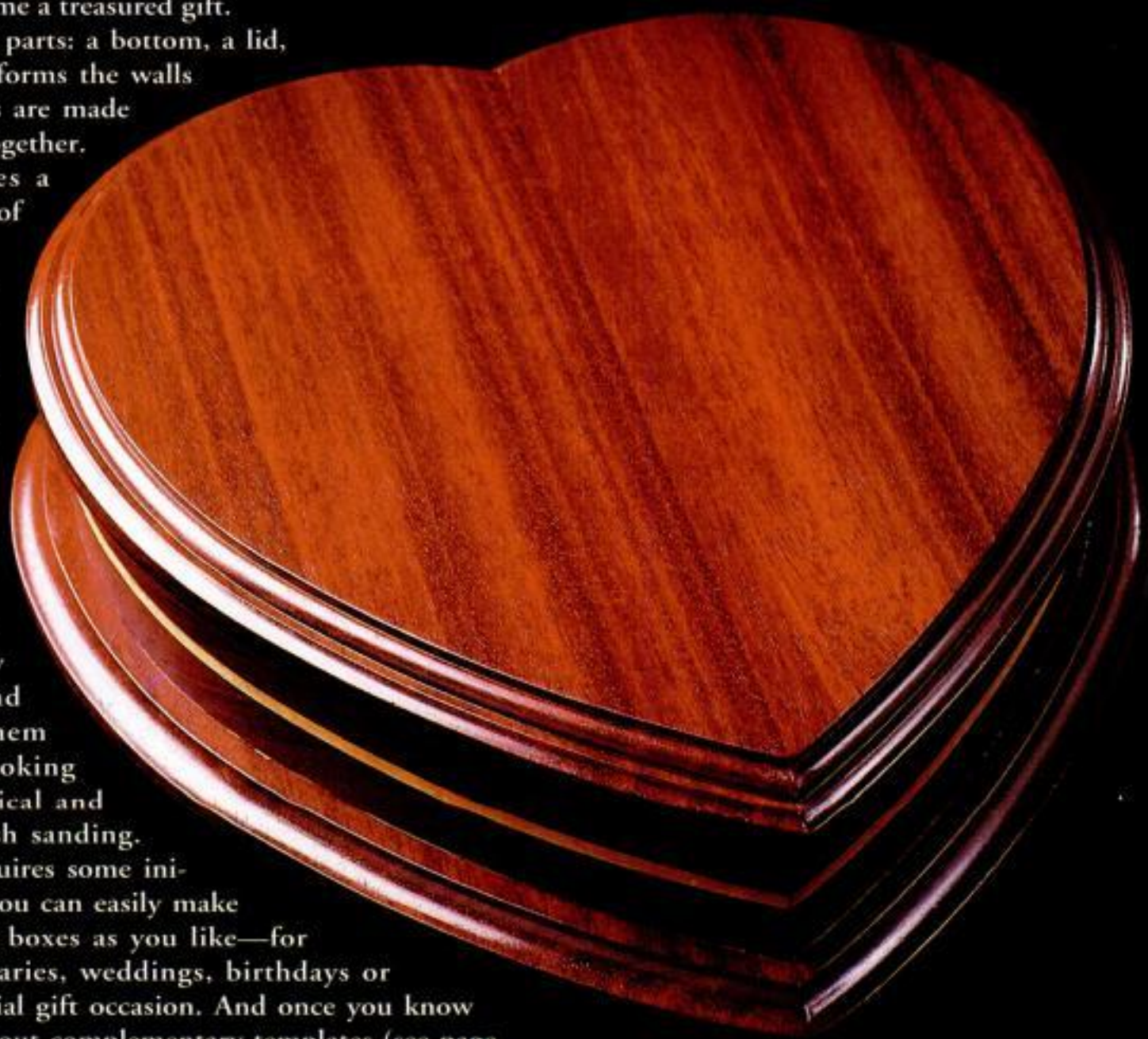
The box has three main parts: a bottom, a lid, and a center section that forms the walls of the box. All three parts are made in halves and then glued together. This approach produces a nice, sharp cleft at the top of the heart.

I built this box from bloodwood (see Sources, page 69), a rare species in my collection. You could make it from mahogany or any other medium-density wood.

Building the box is a great opportunity to improve your template-routing skills. Although you could simply bandsaw and sand the parts, I find that template routing them creates a much better-looking box. It is truly symmetrical and requires only minor finish sanding. Making the templates requires some initial effort, but afterward you can easily make

as many boxes as you like—for anniversaries, weddings, birthdays or any special gift occasion. And once you know how to rout complementary templates (see page 67) you can do all kinds of inlay work as well. ♥

PAUL L. MCCLURE *lives, loves and works wood in Colorado.*

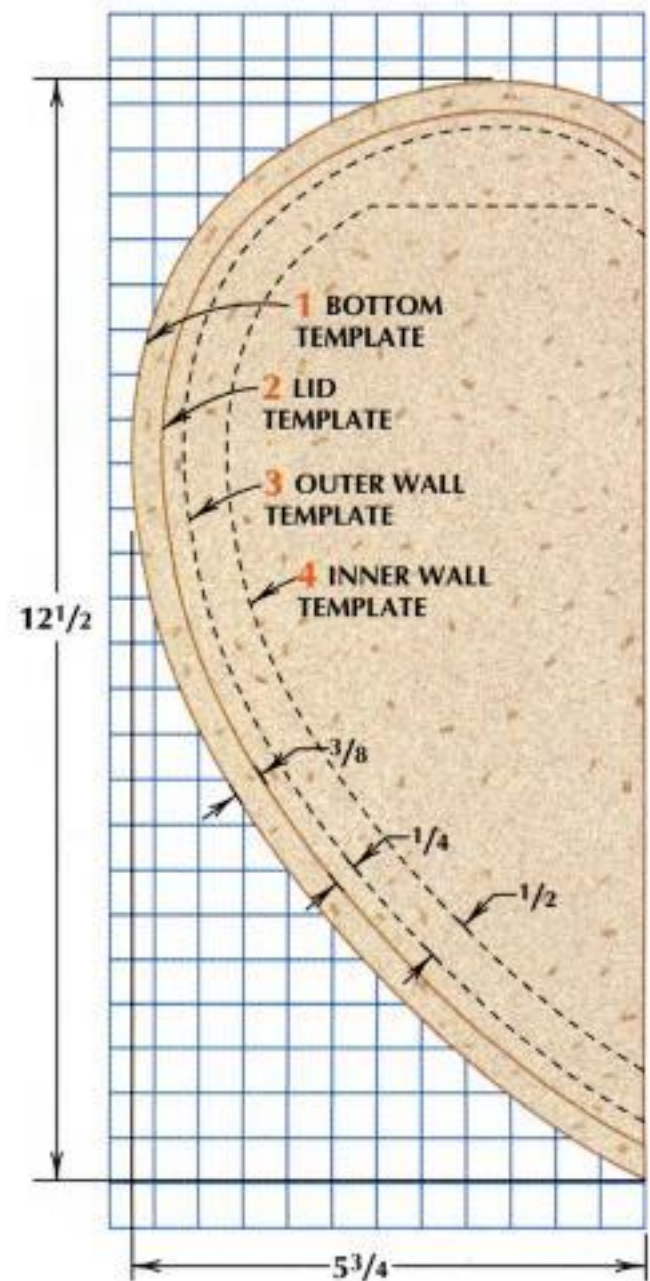
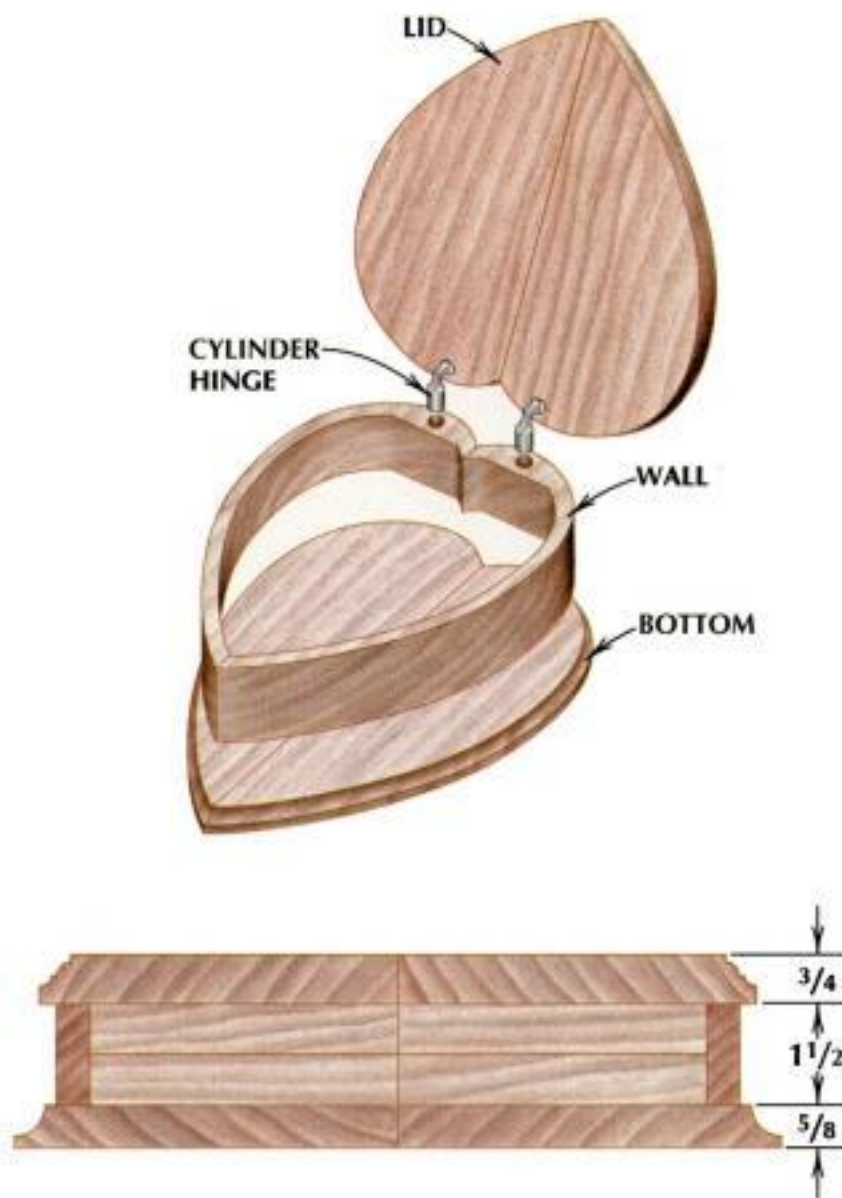


Valentine's Day surprise. This heart-shaped box, created from shop-made templates, is a beautiful, easily duplicated gift for special occasions.



VALENTINE BOX OVERVIEW

Templates are the heart of this project. All three parts—the lid, the wall, and the bottom—are template routed in halves with a flush-trim bit, then glued together to form heart shapes. The drawings at bottom and opposite show how to make the templates; the ones on pages 68 and 69 show how to use them.



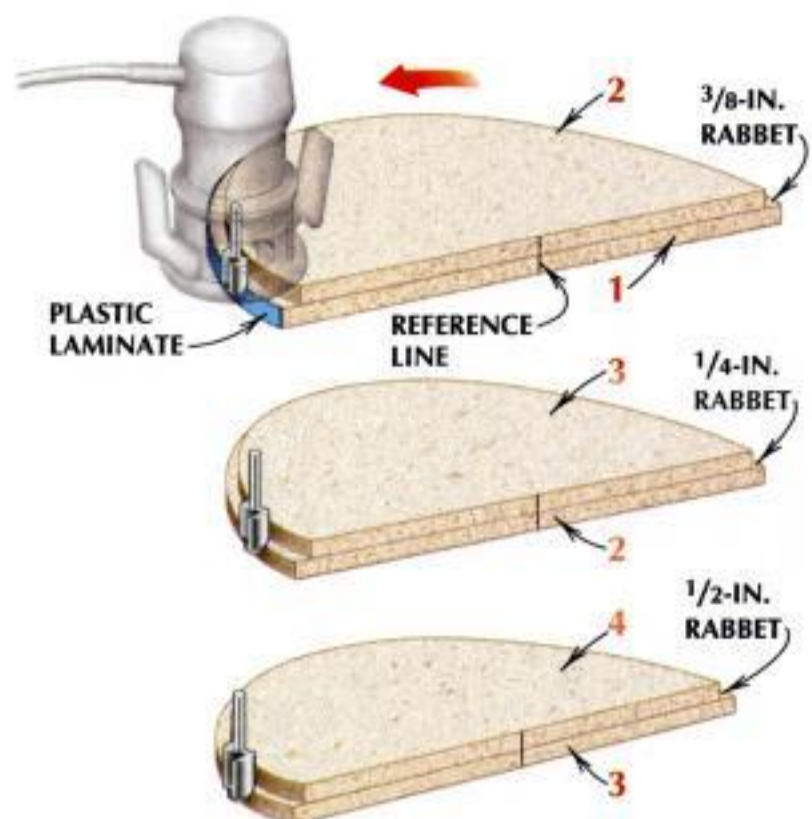
STEP 1: MAKE THE TEMPLATES FOR THE LID AND BOTTOM

You'll use these four half-heart templates to rout the lid and bottom. You'll also use them to make the cradle, which supports the wood for routing the wall parts.

Make master template 1. Enlarge template pattern 1 (see Box Overview, above) and trace its outline onto a piece of $\frac{1}{2}$ -in.-thick medium-density fiberboard (MDF). Bandsaw the template slightly oversize, then disc sand up to the outline. To eliminate imperfections, glue a strip of plastic laminate to the template's outside edge.

Now make templates 2, 3 and 4. Simply "downsize" templates 2, 3 and 4, in succession, using the previous template and a rabbeting bit with the appropriate pilot bearing to yield the offsets shown at right.

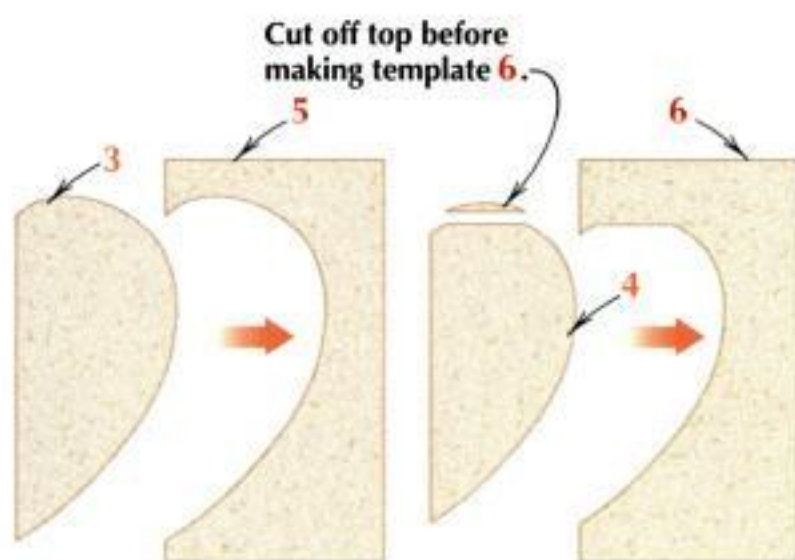
For example, to make template 2, trace the outline of template 1 onto a piece of $\frac{1}{2}$ -in.-thick MDF and extend a reference line across both edges. Bandsaw to this line. Reposition template 2 on template 1, aligning the straight edges and reference lines. Clamp the templates together and rout template 2 to final size using a rabbeting bit with a $\frac{3}{8}$ -in. offset. (For multi-bearing rabbet bit sets, [see Sources, page 69.](#))



STEP 2: MAKE THE CRADLE

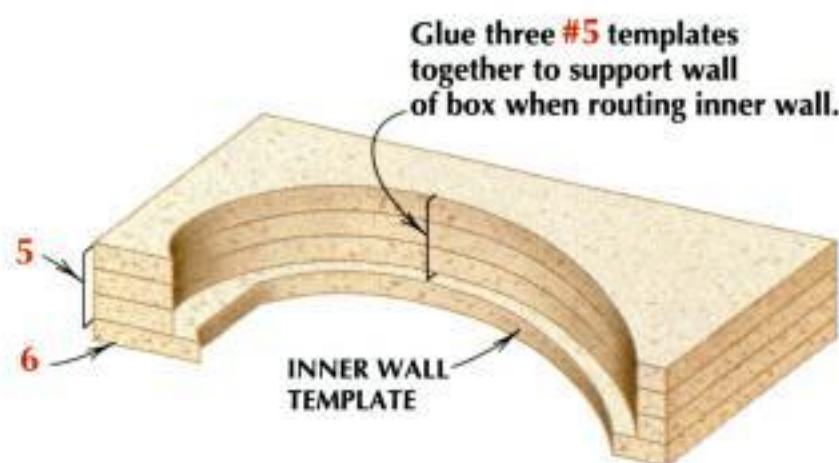
The cradle is made from templates 5 and 6. It supports the stock and guides the router bit as you shape the inner wall of the box.

Make templates 5 and 6. Templates 5 and 6 are reverse-image, or complementary, templates. They're made from templates 3 and 4; the sidebar below shows you how. Note that template 6, like template 4, has a flat spot at the top. This creates the thicker wall section that you need to mount the two cylinder hinges.



Now build the cradle. It takes four stacked templates to make this holding jig. The bottom layer of the cradle guides a flush-trim router bit so you can shape the inner wall to final size.

To build the cradle, make two copies of template 5 with a flush-trim router bit. Then carefully align the three #5 templates on top of template 6, and glue and screw them all together.



MAKING COMPLEMENTARY TEMPLATES

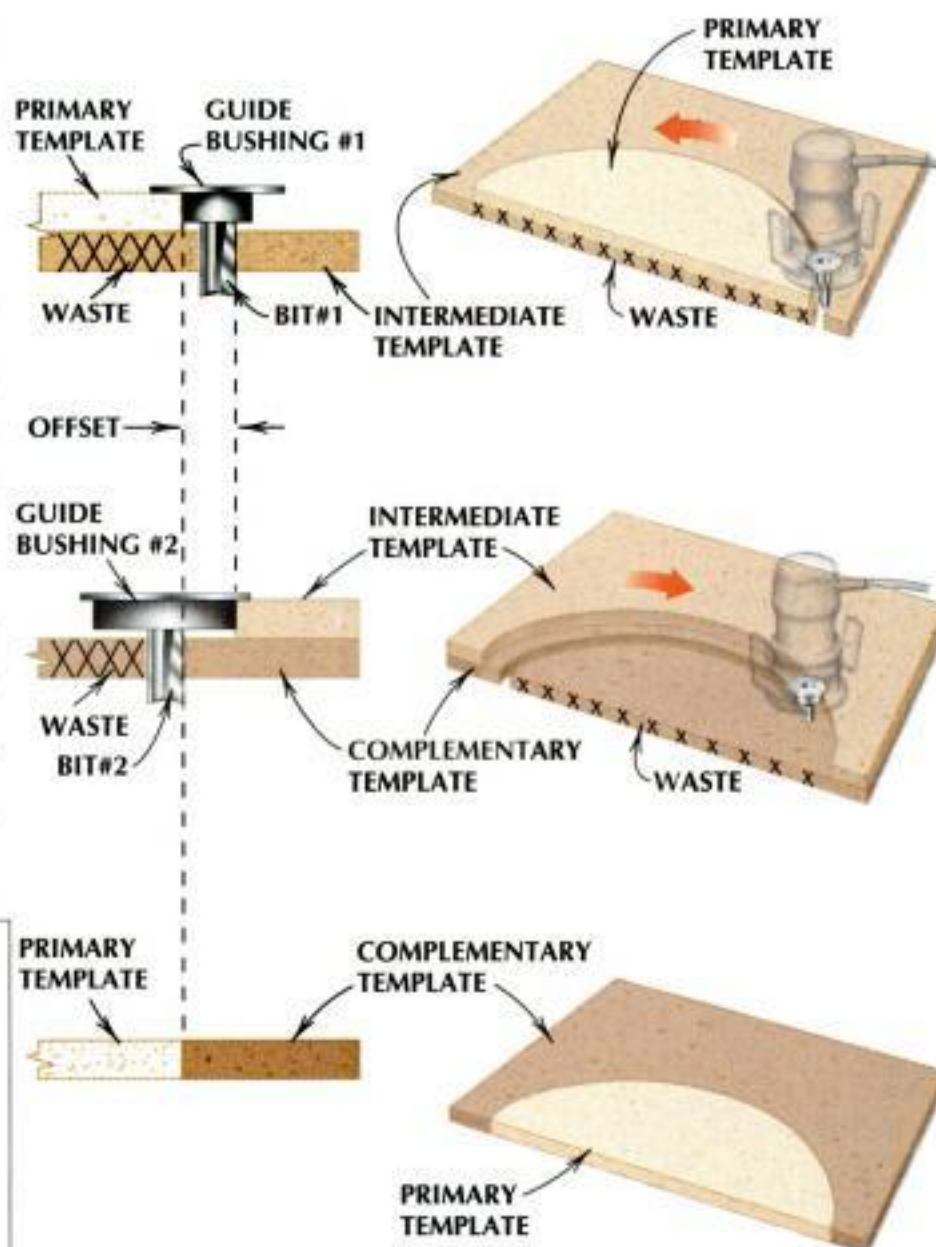
Reverse-image, or complementary, templates are required to make the cradle shown above. But complementary routing is a technique you can use for all sorts of other projects, including inlay work.

Routing complementary templates is a two-part process. First, you make an intermediate template from the original part. Then you make the complementary part from the intermediate template.

The chart below shows a few combinations of template bushings and straight router bits for producing complementary parts, but you can use other combinations that will produce the necessary offset. You can also buy a 1/4-in. "inlay bushing set" that will do the job for about \$40. (See Sources, page 69.)

First, make the intermediate template. Clamp the primary template to another piece of template material. Using the first guide bushing, rout an intermediate template.

Then make the complementary template. Switch to your second bushing and bit combination and rout the complementary template from the intermediate template. —P.McC.



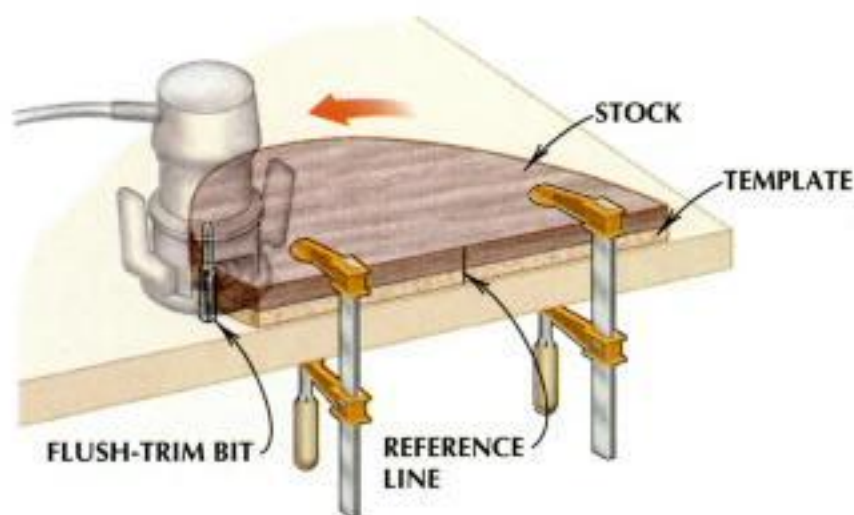
SOME BUSHING AND BIT COMBINATIONS FOR COMPLEMENTARY ROUTING

For intermediate template		For complementary template		
Bushing #1	Bit #1	Bushing #2	Bit #2	Offset
3/8	1/4	1	3/8	5/16
7/16	1/4	1	5/16	11/32
1/2	1/4	1	1/4	3/8

STEP 3: MAKE THE LID AND BOTTOM

Make the halves for the bottom and top. Use the appropriate template to trace the outline of each half-part onto your stock. Extend a reference line from the template to the stock. Bandsaw each half-part about $\frac{1}{16}$ in. oversize and clamp it to the template, aligning the edges and the reference lines.

Template rout the outsides to final shape using the appropriate template and a flush-trim router bit. I find that a shear flush-trim bit, which has a slight spiral, cuts more cleanly than a straight-flute bit. (See Sources.)



Now rout the profiles and glue up the lid and bottom.

Rout any decorative profile you want along the edges of the bottom and lid, then glue the halves together. I used a cove on the box's bottom piece and an ogee on the lid. (See [Box Overview, page 66.](#)) Bandsaw a couple of clamping cauls from scrap and carefully align the halves when gluing them.

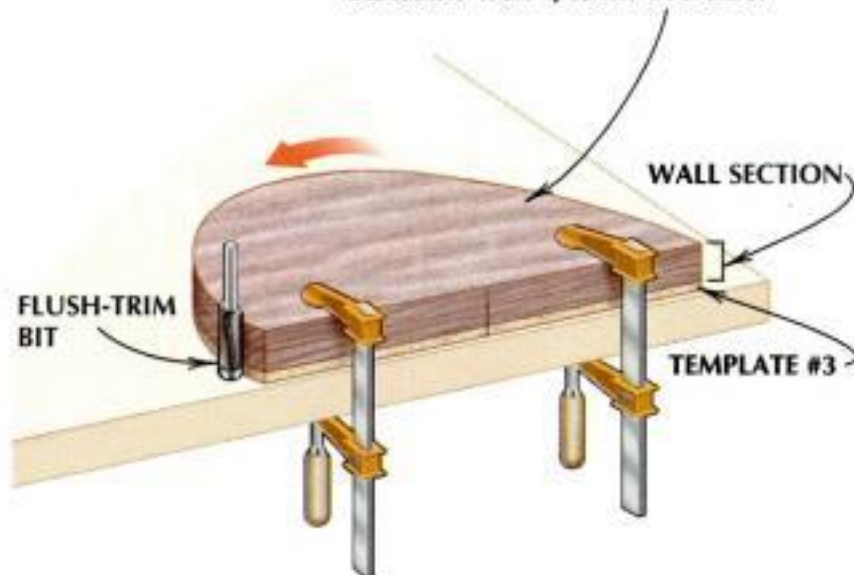


STEP 4: MAKE THE WALL

Bandsaw the two wall blanks to rough shape. If you don't have $\frac{6}{4}$ stock, laminate the blanks from thinner stock. Trace template 3 onto each wall blank, then bandsaw its outside shape to about $\frac{1}{16}$ in. oversize.

Next, rout the outer walls. Using template 3 and a flush-trim router bit, rout the outer wall profile on each blank.

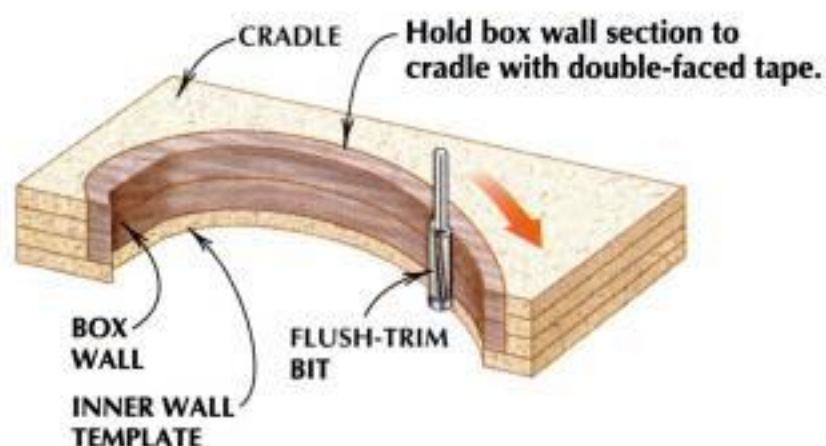
After routing the outside of blank, trace inner wall cutline and bandsaw wall $\frac{1}{16}$ in. oversize.



Now rout the inner walls. Here's where you use the cradle from Step 2. Place each wall blank in the cradle and trace the inner wall line onto the blank. Bandsaw the wall no more than $\frac{1}{16}$ in. oversize. Apply double-faced tape to the inside edge of the cradle, then lightly clamp the box wall to the cradle to help the tape adhere tightly.

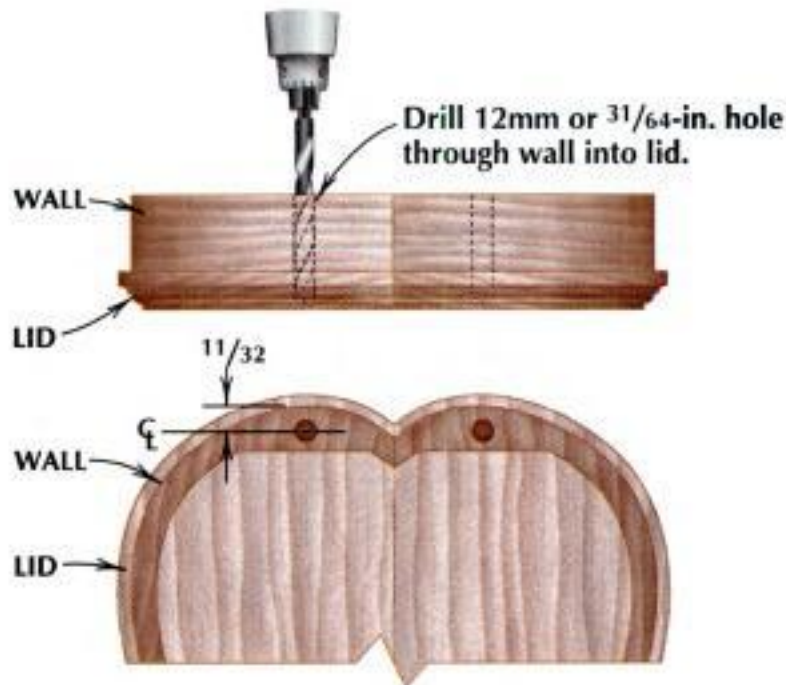
Move the router slowly to minimize chattering. Then, carefully remove the finished wall. You can loosen the tape with alcohol if necessary.

Glue the wall halves together. Use cyanoacrylate glue and hand pressure, or use yellow glue, taping the joint together until it dries.



STEP 5: ASSEMBLE AND FINISH THE BOX

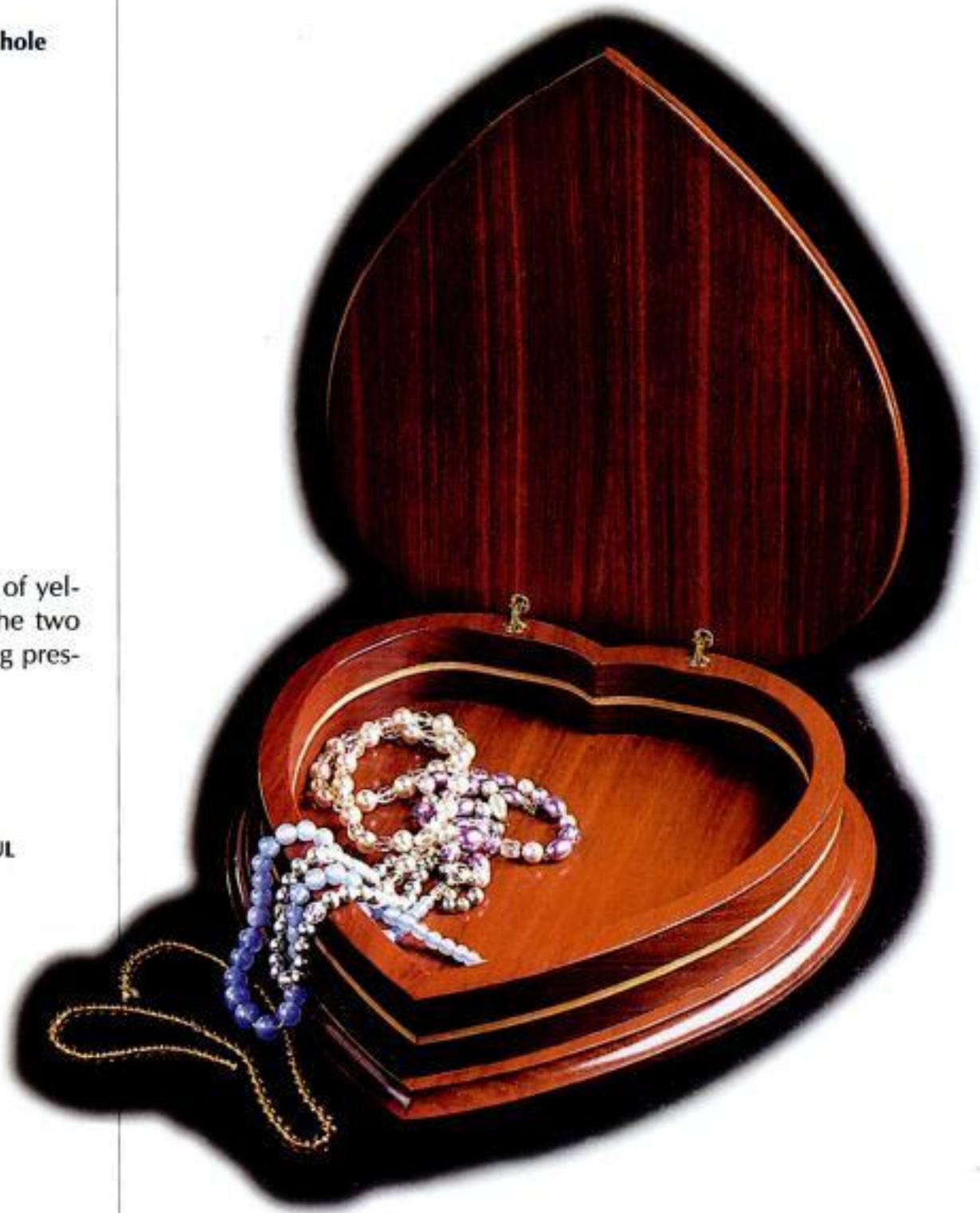
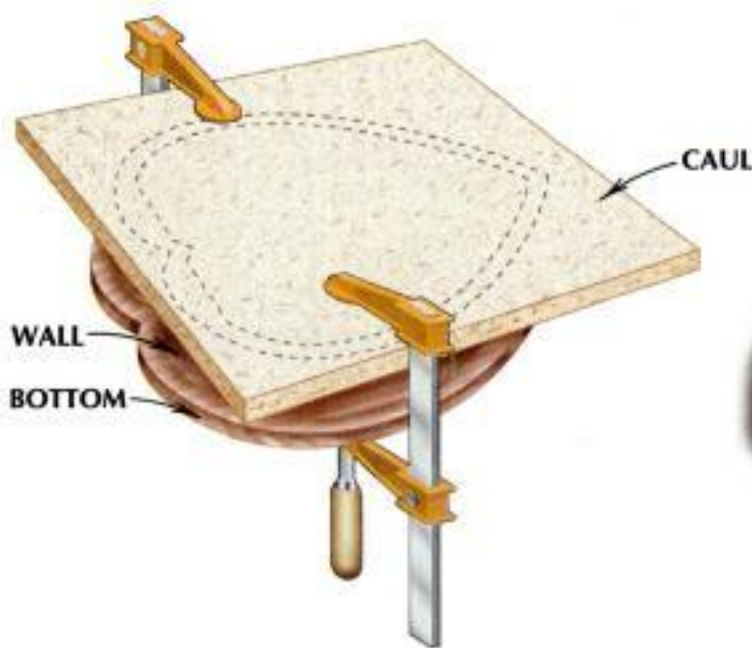
Drill the hinge holes. To make sure the hinges are aligned perfectly, place a straightedge across the tops of the heart's arches and square a line across the wall at the apex of each arch. Clamp the wall to the lid and drill all the way through as shown below. Be sure to set the depth stop of your drill press to avoid drilling through the lid.



Apply a finish. I recommend shellac for the inside of the box. Oils and varnishes may have an undesirable lingering odor in an enclosed space.

Finally, assemble the box. This is the easy part: Simply pop the hinges in place and secure them with a twist of a screw. Now fill the box with your sweet's favorite treats and get ready for a show of appreciation.

Now glue the wall to the bottom. Apply a thin coat of yellow glue to the bottom edge of the wall, and align the two parts carefully. A plywood caul distributes the clamping pressure evenly.



SOURCES

Multi-bearing rabbeting bit sets are available from Amana, (800) 445-0077 *Circle #602*, and from Woodworker's Supply, (800) 645-9292 *Circle #603*

Inlay bushing sets for 1/4-in.-dia. bits are available from Woodhaven, (800) 344-6657 *Circle #604*

Shear flush-trim bits with a 2-in.-long cutting flute are available from Klingspor's, (800) 228-0000 *Circle #605*

12mm cylinder hinges are available from Woodworker's Supply, (800) 645-9292 *Circle #606*

Bloodwood is available from:

- Constantine's, (800) 223-8087 *Circle #627*
- Groff & Hearne, (800) 342-0001 *Circle #628*
- Tropical Exotic Hardwoods, (619) 434-3030 *Circle #629*



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SECTION 4369, TITLE 39, UNITED STATES CODE,
FILED OCTOBER 1, 1996.
AMERICAN WOODWORKER is published
7 times a year at 33 E. Minor Street, Emmaus, PA 18098,
publication and general business offices.

1. The names and addresses of the publisher, editor and
managing editor are: Publisher: David Sloan;
Editor: Ellis Valentine; Managing Editor: Tim Snyder;
33 E. Minor Street, Emmaus, PA 18098.
2. The owner is: Rodale Press, Inc., 33 E. Minor Street,
Emmaus, PA 18098. The stockholders thereof being Anna
Rodale and Ardath Rodale.
3. The known bondholders, mortgagees, and other security
holders owning or holding 1 percent or more of the total
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A. TOTAL NO. COPIES (Net press run)	429,595	433,895
B. PAID CIRCULATION		
1. Sales through dealers and carriers, street vendors and counter sales	44,526	42,891
2. Mail subscriptions	288,998	288,406
C. TOTAL PAID CIRCULATION (Sum of B1 and B2)	333,525	331,377
D. FREE DISTRIBUTION BY MAIL	0	0
E. FREE DISTRIBUTION OUTSIDE THE MAIL	8,768	11,960
F. TOTAL FREE DISTRIBUTION	8,768	11,960
G. TOTAL DISTRIBUTION (Sum of C and F)	342,293	343,337
H. COPIES NOT DISTRIBUTED		
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2. Returns from news agents	83,182	85,665
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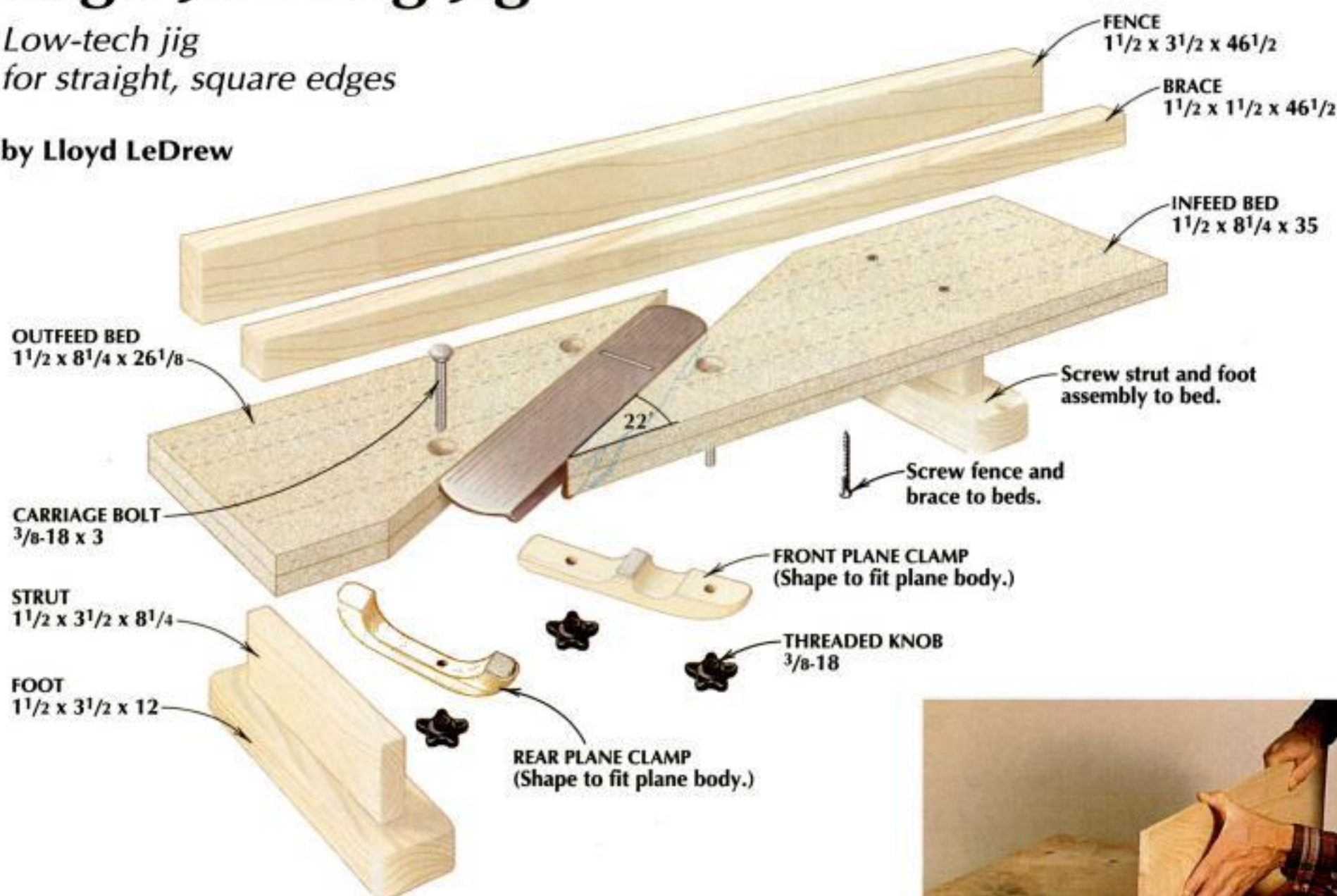
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Edge-Jointing Jig

*Low-tech jig
for straight, square edges*

by Lloyd LeDrew



Motorized jointers do an excellent job of straightening edges, but jointing an edge with a hand plane is still a lot more satisfying. My edge-jointing jig preserves some of that pleasure. It's as precise as a real jointer, but quieter and far less expensive. And its shear cutting action produces super-smooth surfaces.

The theory behind this jig is simple: Mount a hand plane upside down, and provide a long stationary bed and a fence. My jig holds a No. 7 jointer plane, but you could easily adapt the design for just about any size of bench plane.

I built my jig from kiln-dried 2x dimension lumber with a double layer of 3/4-in.-thick MDF (medium density fiberboard) for the bed. (See drawing.)

Dimension the bed in one piece, then crosscut it at 22° to form infeed and outfeed sections. Use your plane to establish the proper spacing between the infeed and outfeed tables, and attach the fence and brace boards that join the bed sections together. Screw, but don't glue, the fence and brace to the beds—you'll prob-

ably need to detach these pieces to install the carriage bolts for the plane clamps.

Shape your plane clamps to bear on flat, solid sections of the plane body—one near the heel of the plane and one near the toe. When shaping and positioning your clamps, try to direct clamping pressure where the plane sole bears against the fence and brace. Adhesive-backed weather stripping makes a good cushion where your clamps contact the plane body.

Bore holes through the beds and clamps for the carriage bolts. Then countersink the head of each bolt. Use threaded knobs to apply clamping pressure.

To use your jig, first clamp both feet of the jig to your workbench so that feed pressure won't shift the jig. Set your plane iron to cut a paper-thin shaving and push the stock across the jig as you would on a motorized jointer, applying pressure against the bed and the fence. ▲

LLOYD LEDREW is retired and lives outside of San Francisco, CA.



No motor necessary. This jig has infeed and outfeed tables and a fence, just like a motorized model. But the cutting is done by a hand plane.

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CIRCLE NO. 52 ON PRODUCT INFORMATION FORM



Walnut

by Paul L. McClure

Walnut trees have flourished on the earth for 90 million years. Today, walnut is found in North America, South America, Europe and Asia. There are 50 existing species of walnut, and three are considered among the world's best cabinet woods: black walnut, European walnut and claro walnut.

Black walnut is native to the U.S. but has also been cultivated in Europe. European walnut grows from Great Britain to Turkey and is generally named after its country of origin. Claro walnut grows mostly in California.

Walnut trees can live as long as 250 years, and can reach heights of 150 ft. and diameters of 6 ft. European walnut trees, widely cultivated in the U.S. for their nuts, are often grafted onto the hardier black walnut root stock. Lumber from the grafted section of the trunk often displays spectacular figure.

Appearance

Air-dried American walnut has a rich chocolate-brown to purplish heartwood. The white sapwood is sharply demarcated from the heartwood. Kiln-dried walnut is often steamed for a uniform brown color. European walnut is typically lighter brown, often with a gray cast and sometimes with dramatic darker streaks.

Walnut's moderately large pores give it a fairly coarse texture. Figure is typically straight or wavy but can also be curly and swirled, particularly in burl, crotch and stump wood. The wood has a distinctive, peppery odor. Sunlight bleaches walnut to a yellowish-tan color.

Workability

Although walnut is moderately hard, it works exceptionally well with both hand and power tools. It is very stable, has good bending properties, and glues well.

It sands easily and holds fasteners well, although preboring is recommended. Walnut sawdust can be a nose and throat irritant, so dust mask protection is recommended.

Walnut is a preferred carving wood. It also turns well. For turning, use sharp tools and a shearing—not scraping—action for a clean surface. The wood accepts all finishes, but you'll have to fill the pores for a glossy finish. Walnut is seldom stained, unless to blend the color of the sapwood and heartwood.

Uses

Walnut lumber is widely used for high-quality work of all sorts, including furniture, cabinetry, architectural woodwork, gunstocks, carvings, turnings and musical instruments. It is not recommended for outdoor use. Veneers are used for plywood and furniture. ▲

WALNUT



Black walnut



European walnut



Claro walnut

SPECIES AND COMMON NAMES

Juglans nigra—Walnut, black walnut, American walnut

J. regia—European, English or French walnut (or other country of origin)

J. hindsii—Claro walnut, Japanese claro walnut

GROWING RANGE

Temperate zones. American black walnut grows primarily from Ontario south to Texas and west to Nebraska. Claro walnut grows mostly in California.

SPECIFIC GRAVITY

0.64

DENSITY

40 lbs. per cubic ft.

WOOD MOVEMENT¹

Tangential (flatsawn): medium (less than $\frac{3}{8}$ in. per ft.)

Radial (quartersawn): small (less than $\frac{1}{4}$ in. per ft.)

DURABILITY

Heartwood resistant to decay; sapwood susceptible to decay and insect attack

SUSTAINABILITY

Sustainable at current harvest levels

AVAILABILITY

Hardwood lumberyards, mills, some home centers. Claro and European not widely available, except through custom sawyers and importers

SIZE

Thicknesses: $\frac{4}{4}$ through $\frac{16}{4}$. Widths: 5 to 10 in. Lengths: 6 to 12 ft.

COST

Lumber: $\frac{4}{4}$ through $\frac{12}{4}$, \$3 to \$5 per bd. ft. $\frac{16}{4}$, \$8 per bd. ft.

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¹Indicates wood movement across the grain from 6% to 12% moisture content.

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Maple (Hard)	4/4	Select	\$2.50	\$77.00
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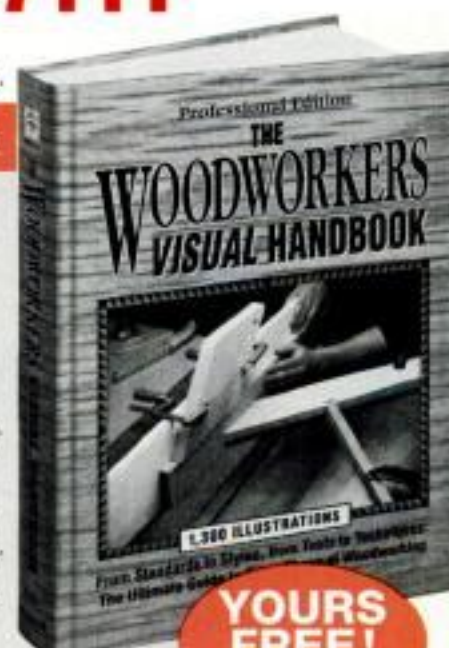
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surface with 220-grit paper; use 320-grit paper before the third and final coat. I use steared paper to make sanding easier, and I always sand with the grain to avoid making scratch marks. These coats don't sink into the pores of the wood as much as the first coat, so I have to be careful not to put too much on.

I wait a couple days for the finish to harden, then I wax the surface. I dip a ball of 0000 steel wool in a good-quality paste wax such as Butcher's Wax, and rub the surface evenly. Then I buff the wood with a soft cloth to remove excess wax and polish the surface.

Satin Finish

The finish I use most often is the satin or medium-sheen finish, which I get with six coats of Waterlox. This finish affords more protection, making it more suitable for utilitarian furniture such as tables, bookcases and chairs. And the medium luster is appropriate for many types of furniture.

Apply the fourth and fifth coats as before, sanding lightly with 320-grit sandpaper before each coat. After the fifth coat has dried, switch to 0000 steel wool instead of sandpaper. Rub the surface in the direction of the grain until it has an even, dull sheen. Then clean the surface with a tack rag to make sure there's no dust or lint on the wood.

To apply the sixth coat, use a lint-free cloth, available at most auto supply stores. Apply the varnish sparingly and evenly. Then smooth the finish by wiping the wet cloth in the direction of the grain. Wait a few days and wax the finish as before.

Gloss Finish

Ten coats or more will produce a glossy, durable finish that needs little if any maintenance. This is the finish for your best work—an elegant dining table, a jewelry box, an exotic wood that you want to really show off. The biggest drawback to building this many coats is the time spent waiting for each coat to dry.

Apply the next several coats as before, sanding before each coat with 320-grit paper. Wipe the surface clean, then apply the finish with a lint-free cloth.

Then, before each of the last two coats, rub the surface lightly with 0000



steel wool. Dust the surface with a tack cloth and apply a very thin coat of your finish with a lint-free cloth.

Rub the moistened rag in small circles, then finish up with long, straight strokes. Be sure to keep the cloth moving as you apply the finish, or you'll leave smudge marks. Lift your hand off at the end of each stroke and land it on the surface as you start another—just like an airplane landing and taking off. When you have a thin, even film, your gloss finish is done.

Buffing to a High Gloss

You can bring your gloss finish to a mirror shine by buffing the surface with a soft cloth and some polishing compound, available at auto supply stores.

When buffing Waterlox, it's very important to give the final coat enough time to dry. I always wait a minimum of two weeks after applying the last coat. The longer you wait, the harder the oil becomes and the better and easier your buffing will be.

I recommend that you experiment with this process on scrap before attempting it on a finished piece of furniture. Even with 10 or more coats, the film produced by my method is very thin, so it's easy to cut through the finish. You'll know you've cut through the previous coat of finish if you see a dull spot. Don't rub any more; that will only make it worse.

The good news is that Waterlox is easy to repair: Clean the surface with mineral spirits, rub it down with steel wool, then apply another coat of oil.

Build the shine.

Bottom to top:
Two or three coats of wiping varnish produce a low-sheen "Danish" look;
four to six coats create a satin look;
10 or more coats produce a gloss finish.

Remember to wait another two weeks before buffing the surface again.

Before you buff, wipe away any debris with a tack cloth. Then fold a cloth into a ball and put a little compound on it. Begin rubbing the surface using light, even pressure, moving in the direction of the grain. The idea is to gently smooth the finish without cutting through it.

After you've rubbed the entire surface to an even shine, fold the cloth over to expose a fresh, clean area, and repeat the rubbing. In a few minutes you'll bring the finish up to a higher, mirror-gloss sheen.

A Note on Storage

Waterlox and other varnishes have a relatively short shelf life once you open the can and allow air inside. Transfer the contents of partially used cans into smaller containers, or do as I do: buy the product in quart cans, and squeeze the can to remove excess air before screwing on the cap. ▲

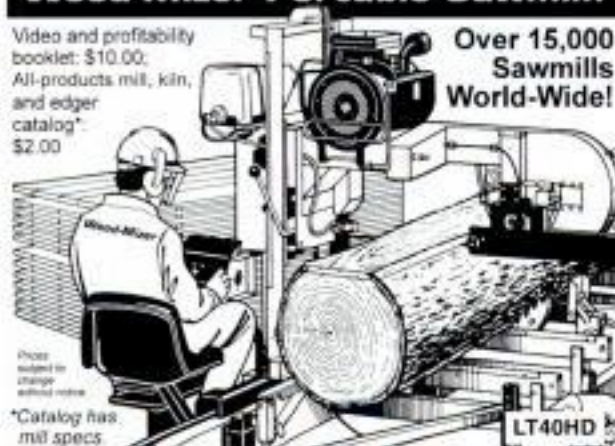
FRANK KLAUSZ is a master cabinetmaker and a contributing editor to *AW*.



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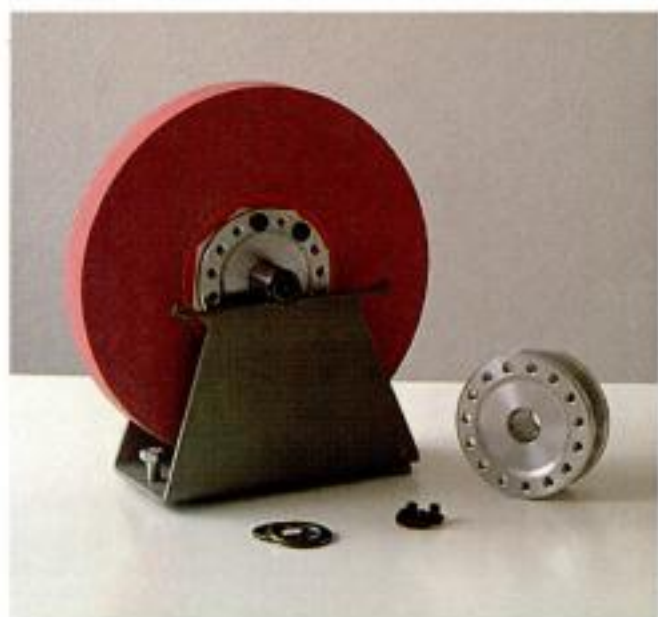
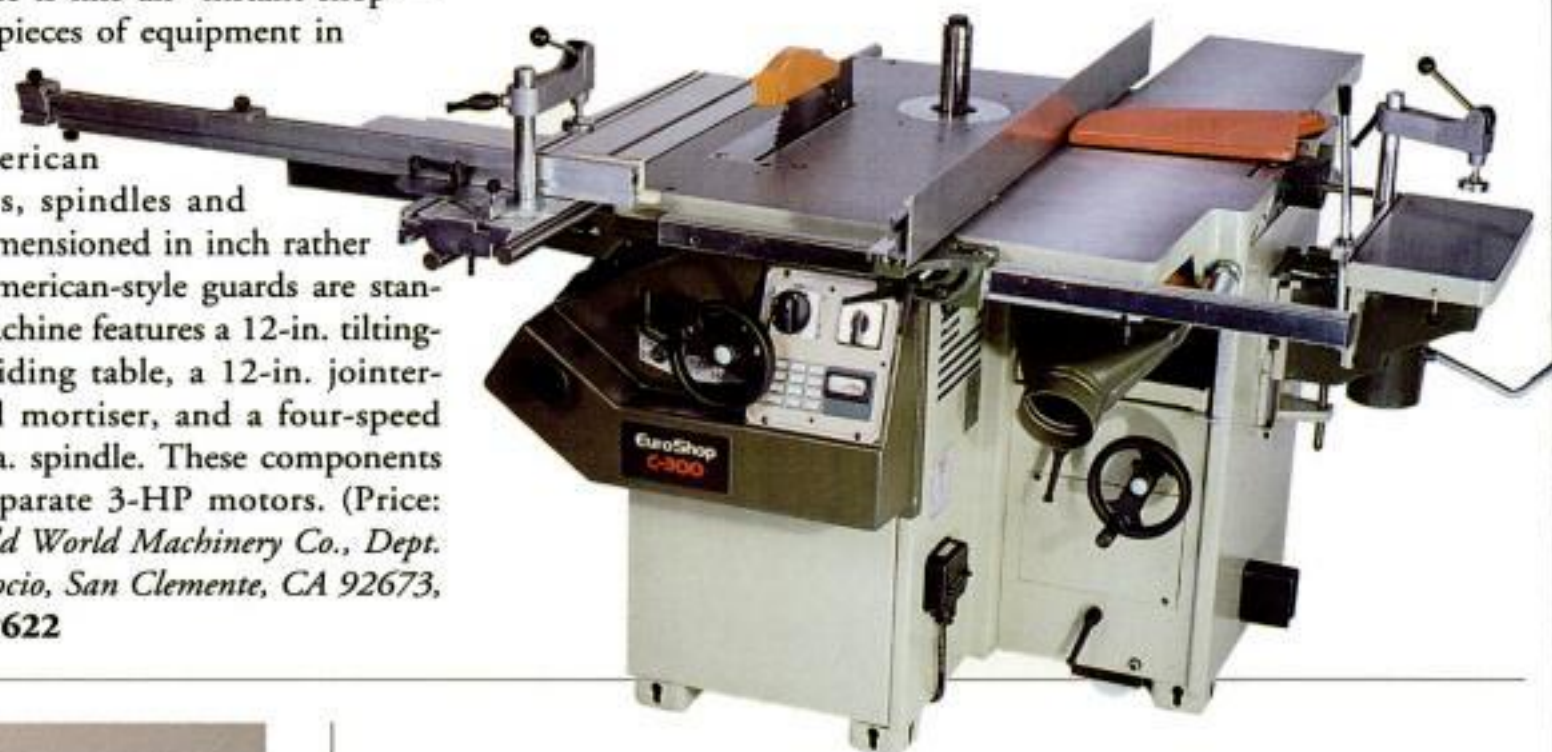
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The EuroShop 300 is designed with the American market in mind. Arbors, spindles and other critical parts are dimensioned in inch rather than metric sizes, and American-style guards are standard. This heavy-duty machine features a 12-in. tilting-arbor tablesaw with a sliding table, a 12-in. jointer-planer with a horizontal mortiser, and a four-speed shaper with a 1 1/4-in.-dia. spindle. These components are powered by three separate 3-HP motors. (Price: \$5,975 plus shipping) *Old World Machinery Co., Dept. AWT, 1062-H Calle Negocio, San Clemente, CA 92673, (714) 498-7205. Circle #622*



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When accuracy counts ... INCRA RULES!
Available in 6", 12" and 18" lengths. *Patents pending*

To learn more about this extraordinary line of precision Marking Rules, Bend Rules and T-Rules, call, write, or fax:
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CIRCLE NO. 31 ON PRODUCT INFORMATION FORM

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New Rulers Locate Lines Exactly

■ Reading rulers and marking out precise dimensions can be difficult if your eyesight isn't what it used to be. If that sounds like you, you'll love Incra's new Precision Marking Rules. These stainless-steel rules are clearly engraved with scales for 16ths, 32nds, and 64ths of an inch. (Metric versions are coming soon.) And at each scale line there's a precisely milled hole or slot that you fit an 0.5mm pencil point through to scribe the measurement right on target—you can't miss.

In addition to flat Marking Rules, Incra offers T-Rules (see photo, right) that let you easily mark lines perpendicular or parallel to an edge, and Bend Rules, which wrap around the corner of a piece for marking the top and edge simultaneously. Each type of rule is available in 6-, 12- or 18-in. lengths. (Prices: From \$12.95 for a 6-in. marking rule to \$105 for a set of three 18-in. rules) *Taylor Design Group, Inc., Dept. AWT, Box 810262, Dallas, TX 75381, (972) 484-5570. Circle #625*



SHOP TESTED

Porter-Cable Profile Sander

Tested by Jim Barrett

Detail sanders, with their small triangular sanding pads, are great for reaching into corners and other tight spots. But they work best on relatively flat surfaces. Porter-Cable's model 444 profile sander takes detail sanding to the next step: It can sand all kinds of contoured surfaces.

Unlike other detail sanders, which rely on orbital or oscillating sanding action, the Porter-Cable sands in a reciprocal (back and forth) motion. This in-line action eliminates swirls and cross-grain scratches and prevents rounding over the crisp peaks and grooves of a molding profile.

The sander comes with 17 different concave, convex and angled hard-rubber profile attachments. Attachments snap into a mounting plate which in turn clips easily into the sanding head. Centered and offset mounting plates are included.

I put the tool through its paces by sanding a number of different moldings. After a bit of trial and error, I found a rubber profile shape to match every groove and contour.

At 6,000 spm (strokes per minute) the Porter-Cable sands a lot faster and more accurately than you can by hand. In fact, the tool sands so aggressively that you need a light touch to keep from removing too much stock, especially with coarser-grit papers. Still, it only took me about half an hour to

learn to control the sander. A variable speed control would make the tool even more user-friendly.

The profile attachments use adhesive-backed (PSA) sandpaper. One roll of 80-grit PSA paper is included, but you can buy rolls separately in several grits, from 80 to 220, for about \$5 apiece. Each roll is 2 in. wide and 45 in. to 95 in. long, depending on the grit. Just snip off the amount you need and stick it on the profile tip. I found that the small pieces tend to wear out quickly, so I'd advise buying several rolls of each grit.

The kit also includes a flat, diamond-shaped, hook-and-loop style pad that accepts pre-cut sheets for flat surfaces. (A pack of five sheets costs about \$3.) Holes in the pad and sheets suck dust through a tube that connects to your shop vacuum with an optional 10-ft. hose (about \$20).

Other optional accessories include a diamond-shaped pad that uses PSA paper and a "shutter pad system" for sanding louvers.

While the profile assortment will handle a wide variety of shapes, I discovered a few limitations. The largest concave and convex profiles have only a 5/8-in. radius.



Smooth contours. The Porter-Cable profile sander's reciprocating action makes short work of sanding complex molding shapes.

But you can sand or shave the rubber profile face to conform to the shape you want. And because these profiles have square ends, you can't sand all the way into a mitered corner.

If you sand a lot of moldings, picture frames or other curved surfaces, Porter-Cable's Profile Sander will get the job done a lot quicker, with cleaner results, than sanding by hand. You can buy the kit through retail outlets and mail-order catalogs. (Street price: About \$120, including plastic case) *Porter-Cable, Dept. AWT, Box 2468, Jackson, TN 38302, (800) 321-9443. Circle #626*

JIM BARRETT is a freelance woodworking and home improvement writer in California.

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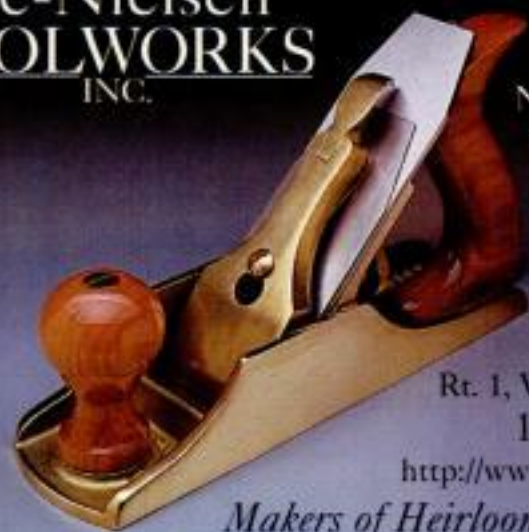
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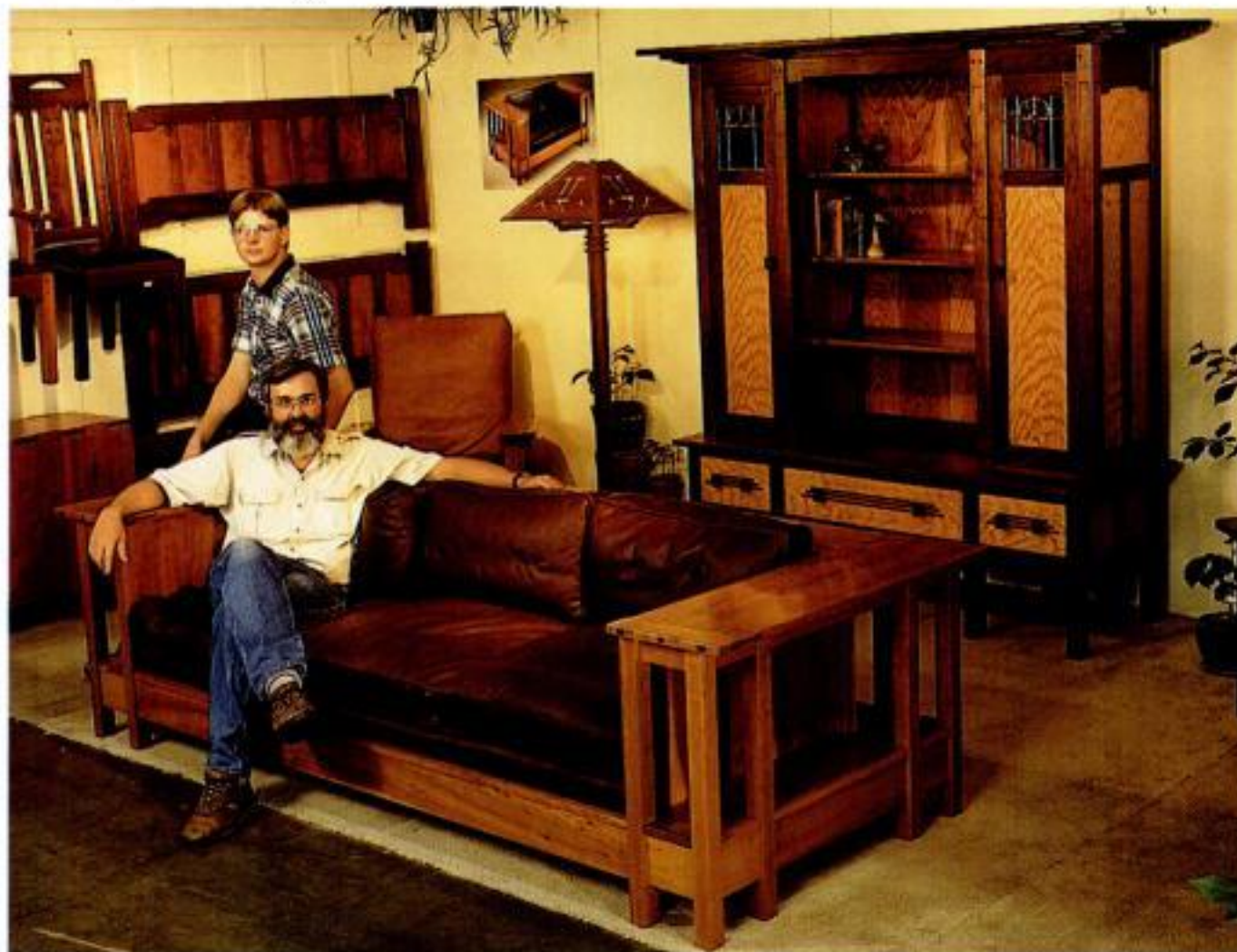
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The Winning Work of Jeffry Lohr



◀ **High-style lounging.** Furniture maker Jeffry Lohr (seated) and apprentice Aaron Roberts take a break at their booth display during last year's Philadelphia Furniture Show.

PHOTO BY J.D. CHIELLI

At the second annual Philadelphia Furniture Show last May, AMERICAN WOODWORKER was the proud sponsor of the *Best Emerging Artist in Wood Media* award, a \$1,000 cash prize given to the most promising new furniture maker at the show. When the votes were tallied, Jeffry Lohr of Schwenksville, PA, emerged as the clear winner.

Lohr began his professional woodworking career in 1990, after 14 years as a high school woodshop teacher. With the help of friends, he built a fully equipped woodworking shop in his barn and began making Arts and Crafts-inspired furniture and accessories.

In the spirit of the Arts and Crafts movement, Lohr pays careful attention to wood selection and joinery, hand-picking each board for color and figure. But he's not content to build reproduction furniture. Instead, he creates functional modern furniture using a variety of Arts and Crafts motifs in new and exciting ways.

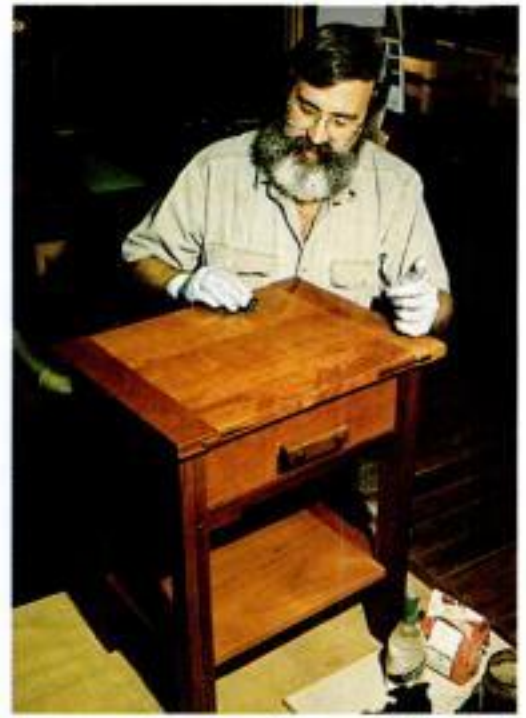
Lohr prefers durable finishes such as lacquer and polyurethane. He polishes the final coat with rottenstone, for a silky-smooth feel. "I could use a wipe-on finish, which is ridiculously easy to apply. But wipe-ons require maintenance and don't hold up over time. I expect my furniture to be around long after I'm gone." ▲

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▲ **Morris chair and ottoman.** Curly cherry, black walnut and leather. L: 59 in. W: 32 in. H: 33 in.

PHOTO BY MITCH MANDEL



▲ **Finishing touches.** Lohr rubs out the finish on one of his nightstands with a soft, damp cloth sprinkled with rottenstone.

PHOTO BY BERT LOHR

▼ **Console table with lamp.** Cherry and walnut. Table: W: 60 in. D: 17 in. H: 29 in. Lamp: W: 17 in. D: 17 in. H: 25 in.

PHOTO BY MITCH MANDEL

▼ **Bed and nightstand.**

Bed: Walnut and figured cherry.

L: 86 in. W: 64 in. H: 46 in.

Nightstand: Cherry and walnut.

W: 20½ in. D: 16 in. H: 24 in.

PHOTO BY MITCH MANDEL

▼ **Armchair.** Figured black walnut and leather. W: 25 in. D: 22 in. H: 47 in.

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For more information write, call or fax: American Woodworker, Ian Tauber, 33 East Minor Street, Emmaus, PA 18098, (610) 967-8343. Fax: (610) 967-7692.

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Siberian Birchbark Boxes

A Russian artisan shares his craft

by Valery Efimov

The birch tree is a national symbol of Russia, a plentiful resource with deep roots in the life of the common people. But not only the lumber is valuable. Since old times, its waterproof, flexible bark has been used for dishes and baskets, canisters, and even boats. In fact, birchbark crafts are actually more traditional than the *matrioshka* dolls that tourists often buy.

So how did I come to work birchbark? My home, Academgorodok—or “Academytown,” in Siberia—is built directly in a birch forest. At first, my woodland walks were simply a pleasant diversion from my work as a physicist and experimenter. But before long, the patterns and colors of the trees captured my imagination. Now my wife and three daughters help me make the birchbark boxes, trays and jewelry that we give to friends and occasionally sell.

Birchbark occurs naturally in many different shades and colors. By gathering it carefully, we can preserve these natural colors in our projects, for contrasting decorative effects. The gold-hued birchbark is particularly difficult to gather. There are only three weeks of the summer when it is loose enough to remove.

After our summer bark harvest, the real work begins. I’ve improvised nearly 150 different tools for cutting, stamping and burning out profiles in the bark. I make the designs; my wife and daughters do the cutting, stamping and burning. Once all the parts are prepared, I help them assemble the finished product. To make a box, we glue the first layer of bark to a cardboard or plywood frame. Then we glue layer upon layer of decoration, to achieve the results you see here.

I’d like to take part in an international exhibition, so more Americans could see my work. But, to my regret, Siberia is very far away from the U.S. Still, I hope... ▲

VALERY EFIMOV is a physicist and artisan in Academgorodok, Russia.



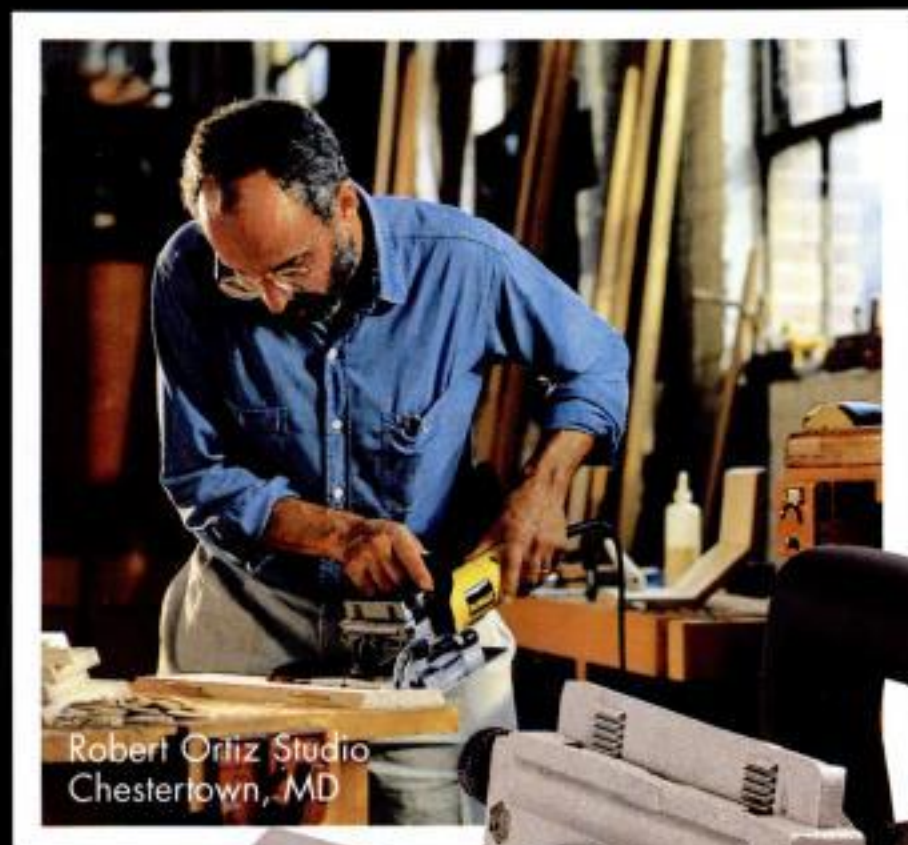
Art from the forest. Valery Efimov and his daughter display some of their intricately decorated birchbark crafts.



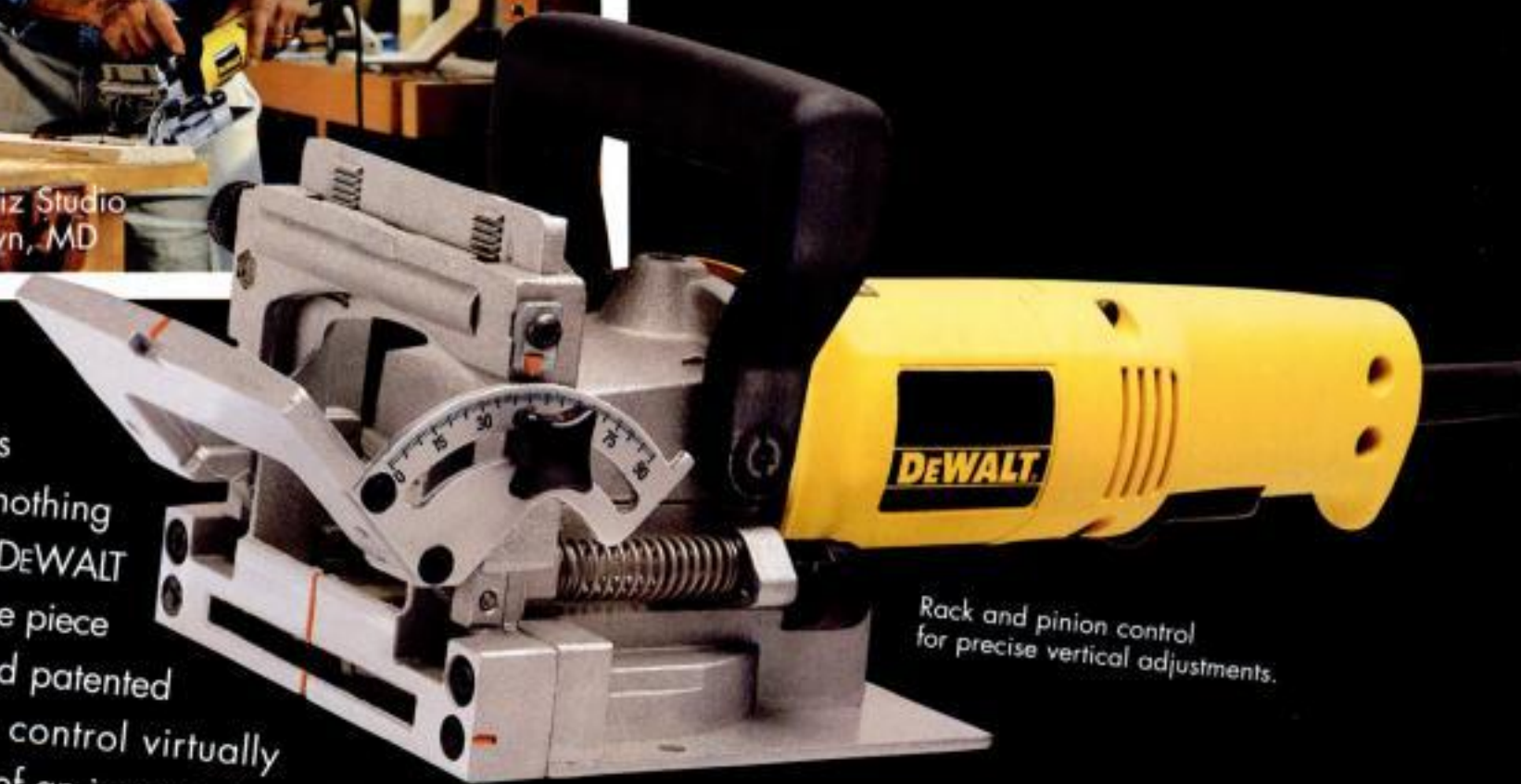
Intricate patterns. Each of these boxes is made from layer upon layer of cut birchbark. Most of the colors are natural variations in the bark.

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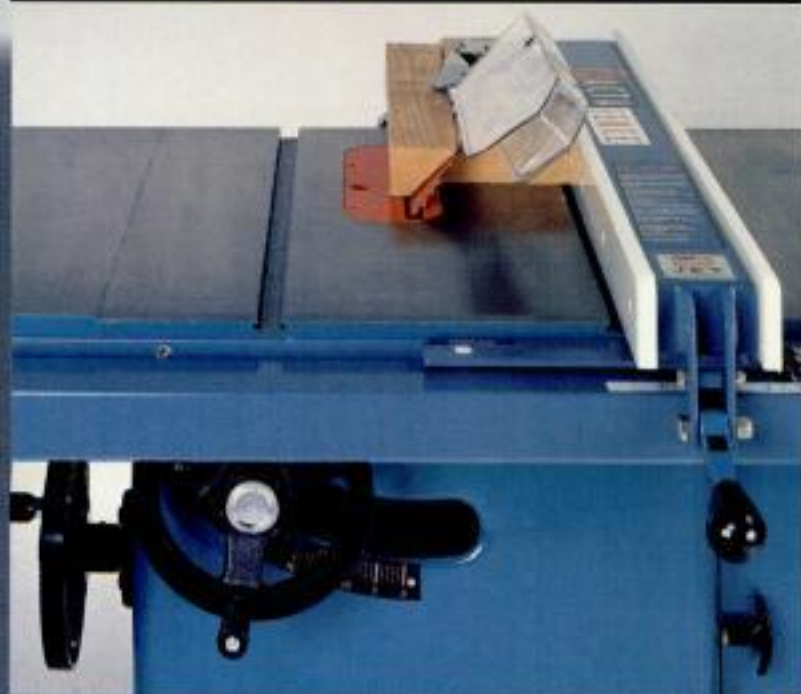


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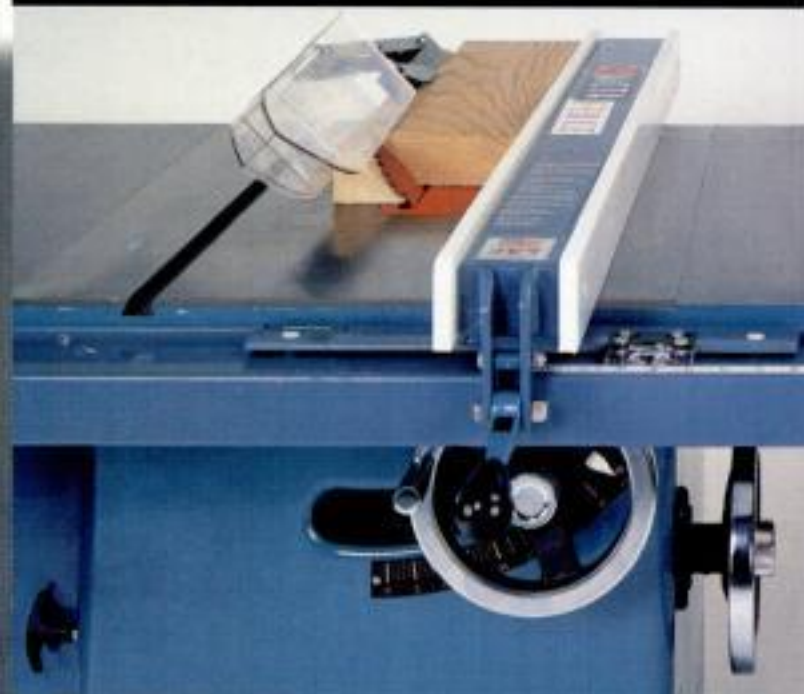
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