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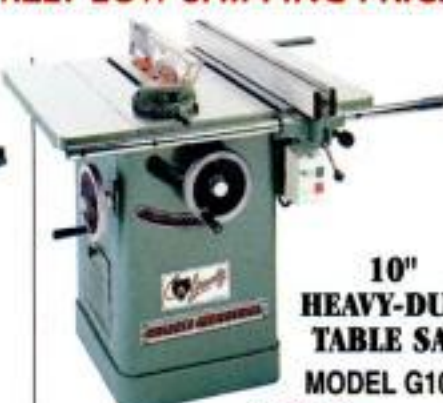
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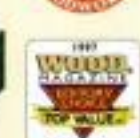
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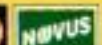
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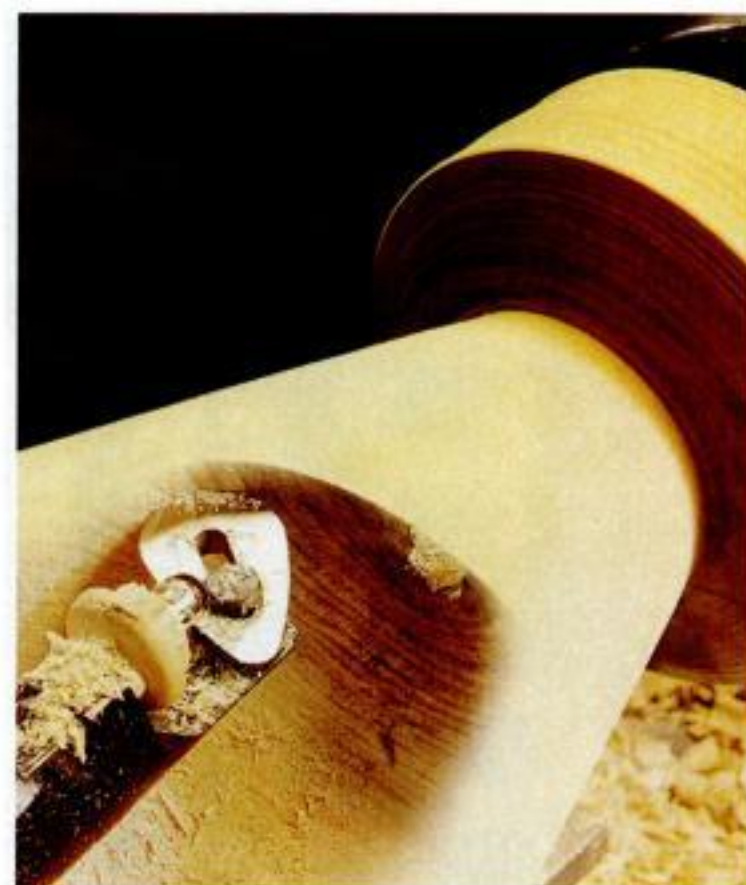
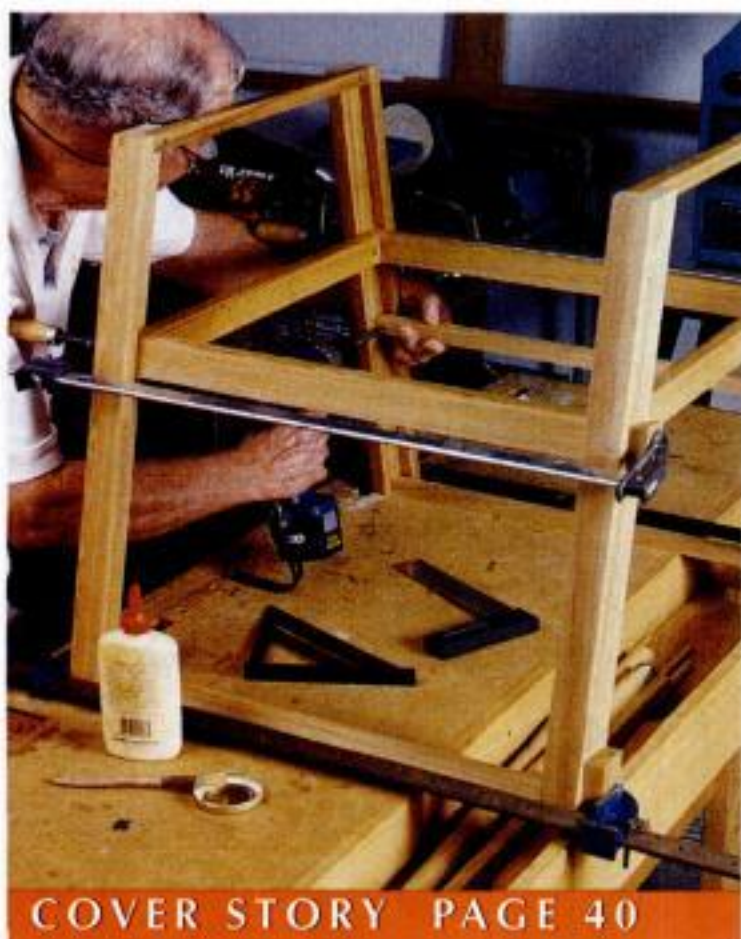


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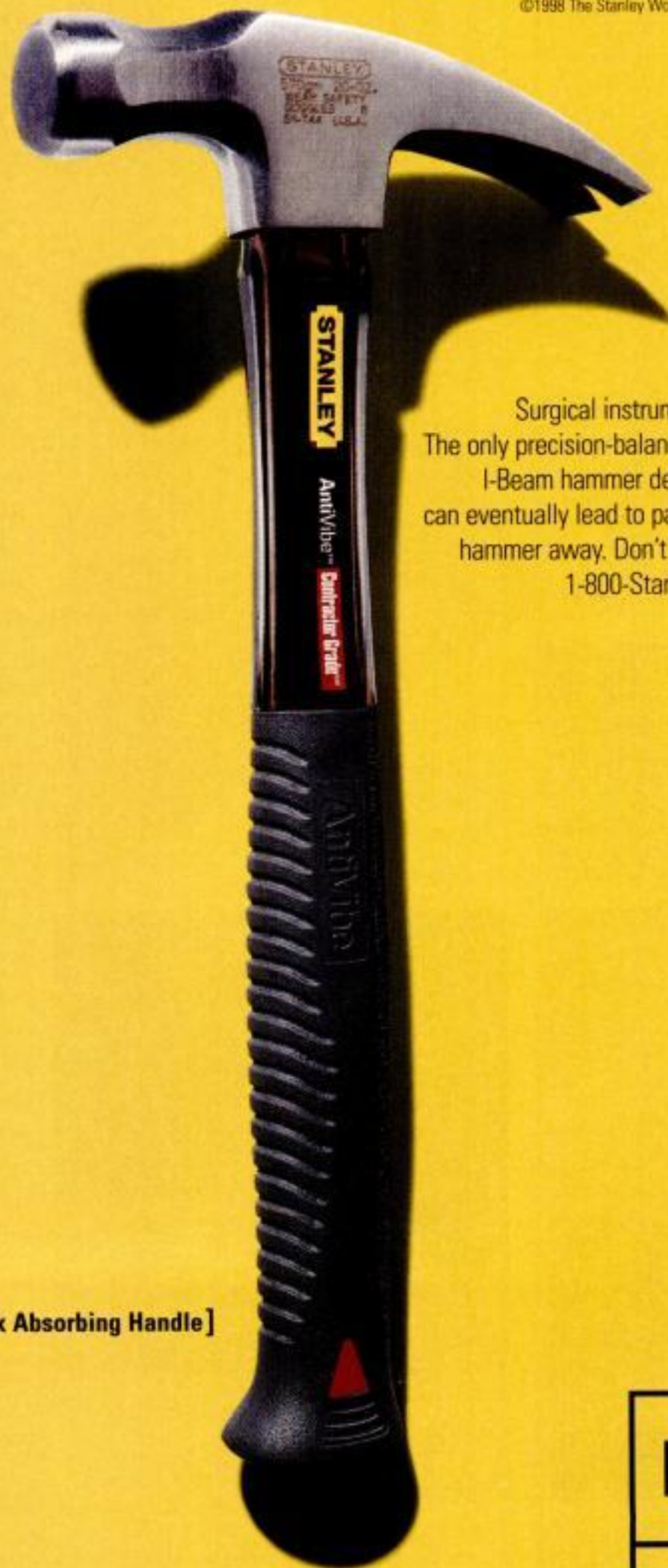
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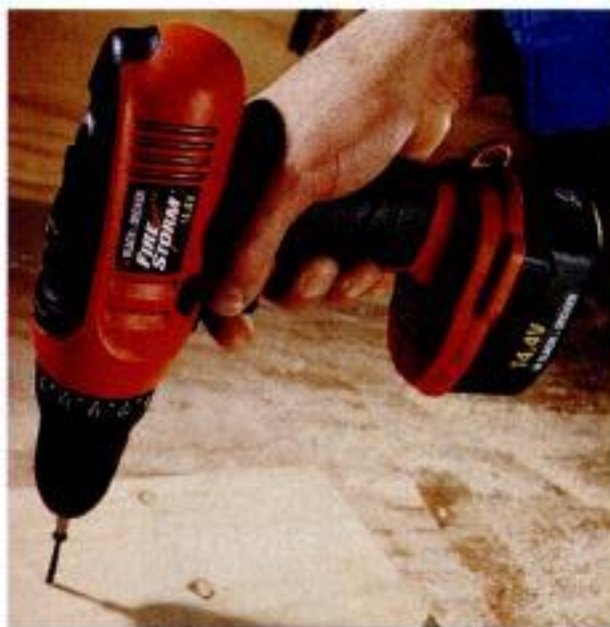
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HOW TO REACH US

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AMERICAN WOODWORKER.

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This One



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Your favorite things

I have to confess—lately I've been thinking more about the **American Woodworker** shop than what's supposed to come out of it.

We're setting up our new shop, and because shop and offices are under one roof, we're struggling to keep the shop noise from driving us crazy in our cubicles. Our planer, like most of its breed, makes a particularly obnoxious and penetrating whine. Our acoustical consultant described it as "bad enough to use as a siren." Even the foot-thick sound wall we had built wasn't enough to contain it. We considered issuing hearing protectors as standard office garb, but instead we're sealing every last little opening around the doors, pipes, and electrical con-

duit. Cross your fingers.

Is shop noise a problem for you, too? One of my first shops was in our basement, and I had to quit working whenever the baby was taking a nap. Not that I minded—I needed the time to catch up on my own sleep—you know how babies are.

This magazine has been like a new baby for me, and it too has caused a few sleepless nights. Mainly it's that my-brain-is-spinning-so-fast-I-can't-sleep syndrome, as I chew over new projects, articles and departments. You see, we're busy planning the next two years worth of issues, and there are more great stories than we can ever hope to publish. You want to help us sort them out? Let me know

your favorite (and least favorite) articles from past years. What are your favorite departments? What project did you build that was a great success? (Send us a picture and brag a little, if you want.) What tool purchase did we make a difference on? What technique changed the way you work? Oh, yeah, and while you're at it, if you know any tips for noise control, send those along, too. Thanks.



Ken Collier
Editor

CONTRIBUTOR GUIDELINES

We encourage you to write to us with anything you think would be interesting for other woodworkers. It doesn't have to be fancy, just describe your idea or project briefly, and we'll take it from there. Address your letter to one of the following departments, or simply to Editor.

Workshop Tips

Send us your great ideas! We'll pay \$100 for each tip that's printed. Enclose a sketch or photo of your tip and make sure your return address is enclosed. Due to the volume of tips we receive, they cannot be returned.

Shop Solutions

If your idea is more complex than a tip, send it here. We pay \$200 for each solution we publish. Send sketches and photos and make sure to include your return address.

Q&A

Confused about a technique? Wondering which tool to buy? Bewildered about what wood to use or where to buy supplies? Write to our Q&A department. Due to the volume of questions, not all can be answered.

Projects

Photos of projects may be used in our Gallery department, as part of an article on technique, finishing or materials, or your project may become the basis for a project-building article. We pay \$100 for each photo we publish, and more if it becomes a project article. Send transparencies, and include your name, address and phone number, along with all relevant facts about the piece: wood(s), finish, techniques, etc. We will return all materials.

Techniques

If you've figured out a good way to build something, let us know. We'll work with you to make it a technique article. Techniques can be simple or difficult, for hand tools or power tools, general-purpose or specialized. Drop us a note about it. Payments start at \$500.

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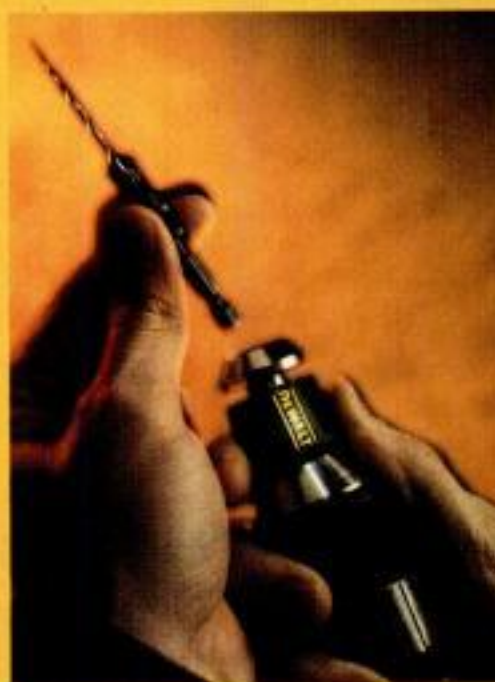
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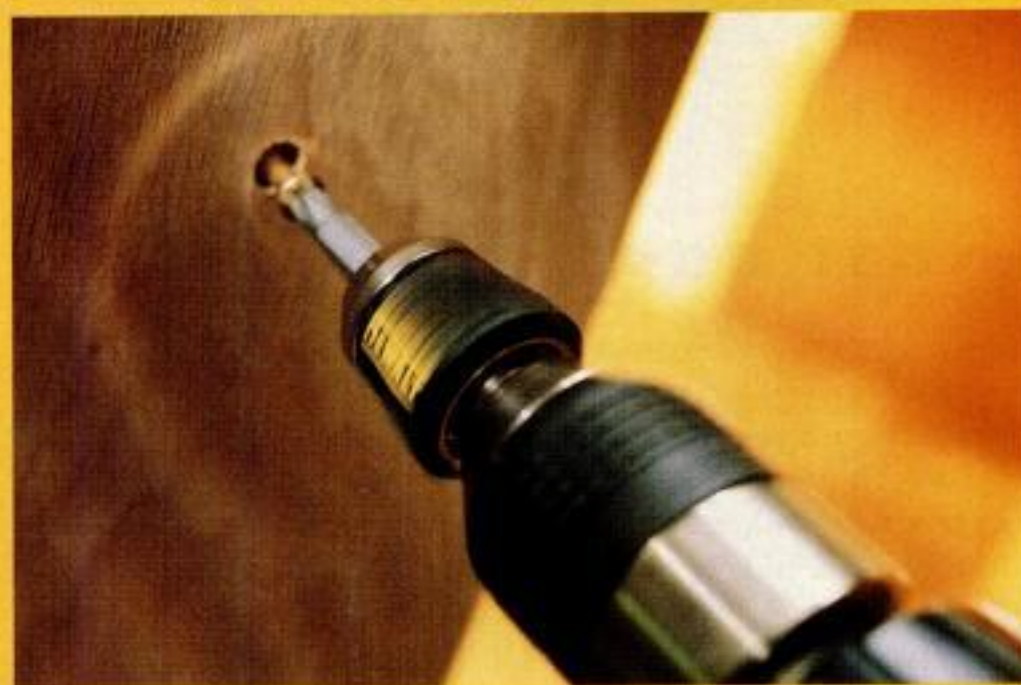
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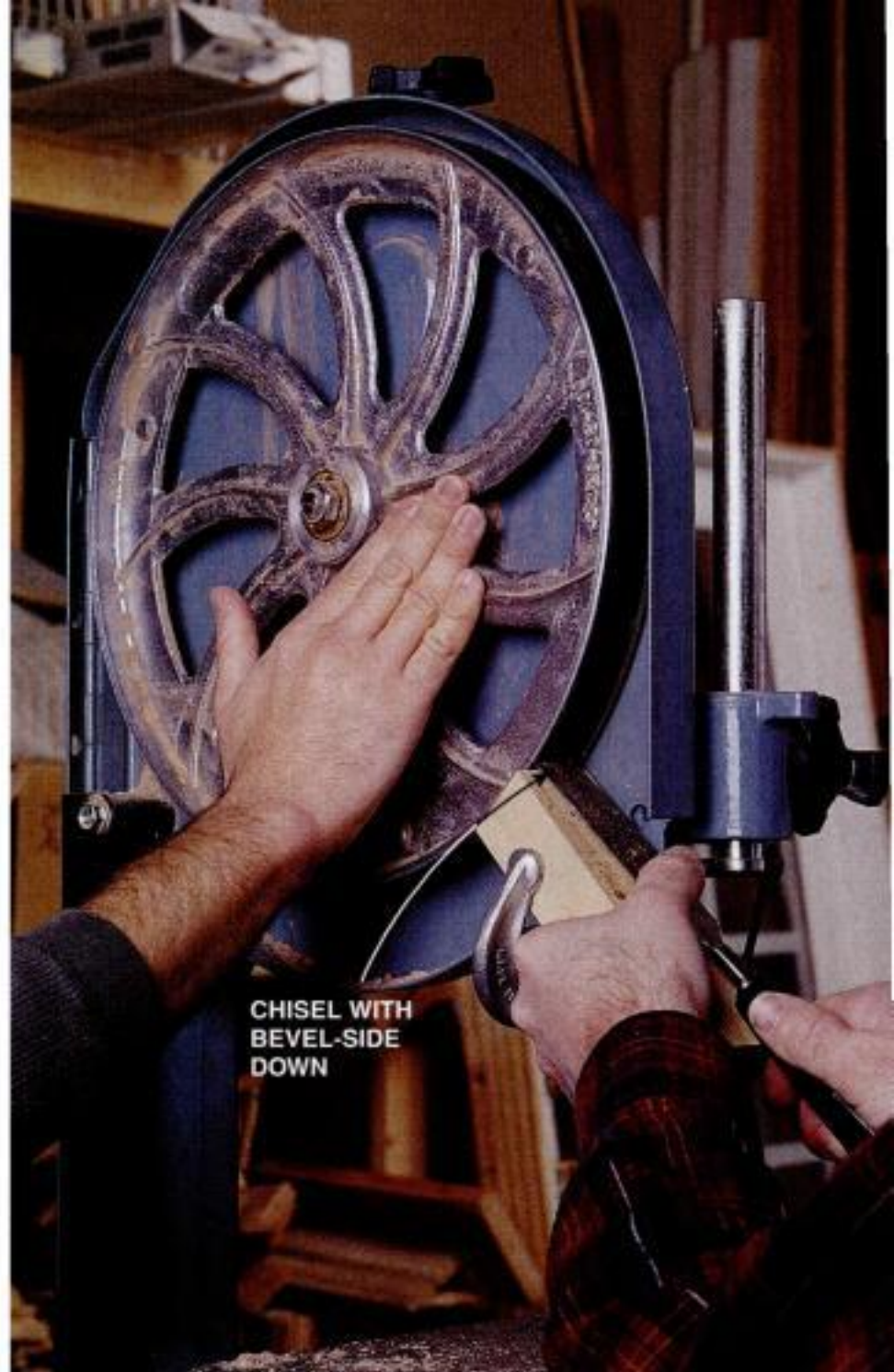
Q How can I fix a bandsaw tire with irregularities that bump the blade? I'm getting a lot of side-to-side movement with the blade.

Raymond Wilson
Scottsdale, AZ

A Truing the hard rubber tire that goes around the rim of each bandsaw wheel should solve your problem. There are several ways to do this, but the one I like to use comes from my turning background.

First, unplug your saw and remove the bandsaw blade. Clamp a block of wood to the frame of the bandsaw, near the tire's outside edge and perpendicular to the wheel, to serve as a tool rest. Spin the wheel to make sure it doesn't rub against your tool rest. Then have an assistant slowly turn the bandsaw wheel by hand while you hold a sharp chisel on the wooden tool rest. Shave the tire true, making a scraping cut with the chisel. Remember that you want a slight crown in the tire for best blade tracking. Watch your fingers so they don't get caught in the spinning wheel.

Steve Blenk
Sequim, WA

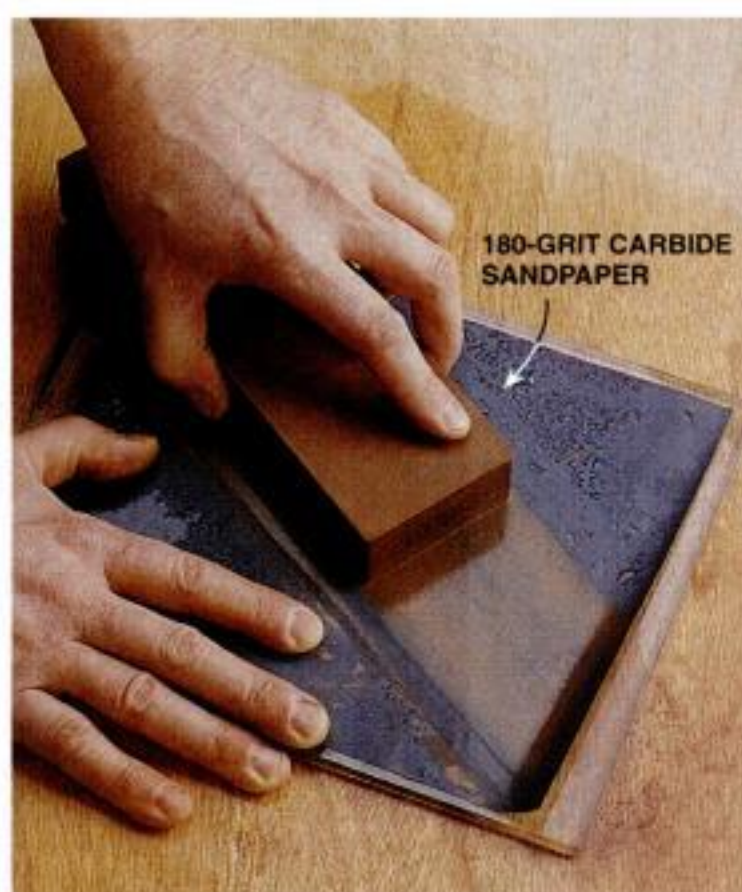


Rust and Mold on Waterstones

Q My set of Norton waterstones has recently developed two problems. First, a brownish stain appears when I sharpen my chisels and plane irons. Could this be rust? My second problem is mold, probably the result of storing my stones in damp conditions. Can you recommend a way to get rid of the rust and mold?

Ted Bonnema
Aurora, CO

A You're right about the first problem. The brown stain is from the oxidation of small steel particles. This doesn't affect the functioning of the stone and is only an aesthetic concern.



To prevent mold from growing, put a few drops of chlorine bleach in the water that you soak your stones in. To clean up moldy stones, you can lap them on a piece of 1/4-in. plate glass with either 180-grit silicon carbide sandpaper, or 90-grit carbide particles (available from auto parts stores). Despite any remaining stains, the stones should function as well as ever. From time to time, your waterstones will need further lapping. This keeps the stone flat and clears it of any clogging particles.

Leonard Lee
Lee Valley & Veritas Tools
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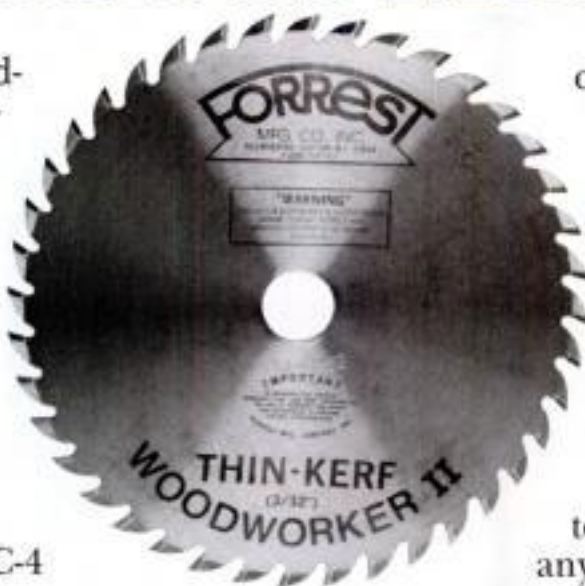
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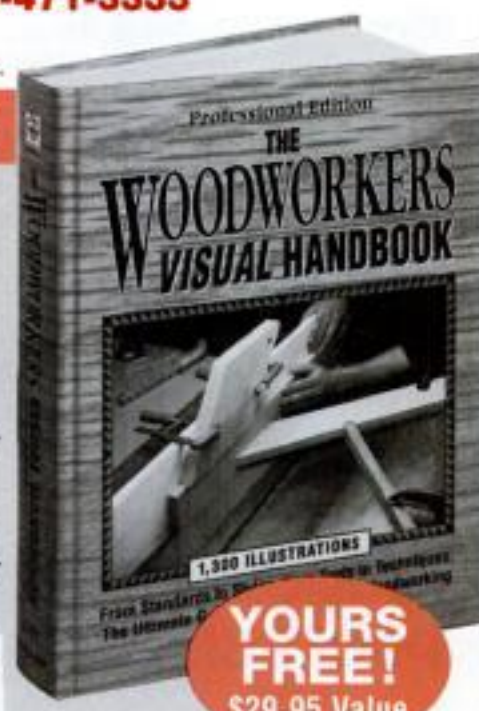
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Clean Cuts in a Countertop

Q I have a plastic laminate countertop that's about 12 in. too long. I know that plastic laminate tends to chip when cut. How can I trim the countertop to size without creating unsightly chips or splinters?

John C. Aspel
Newark, OH

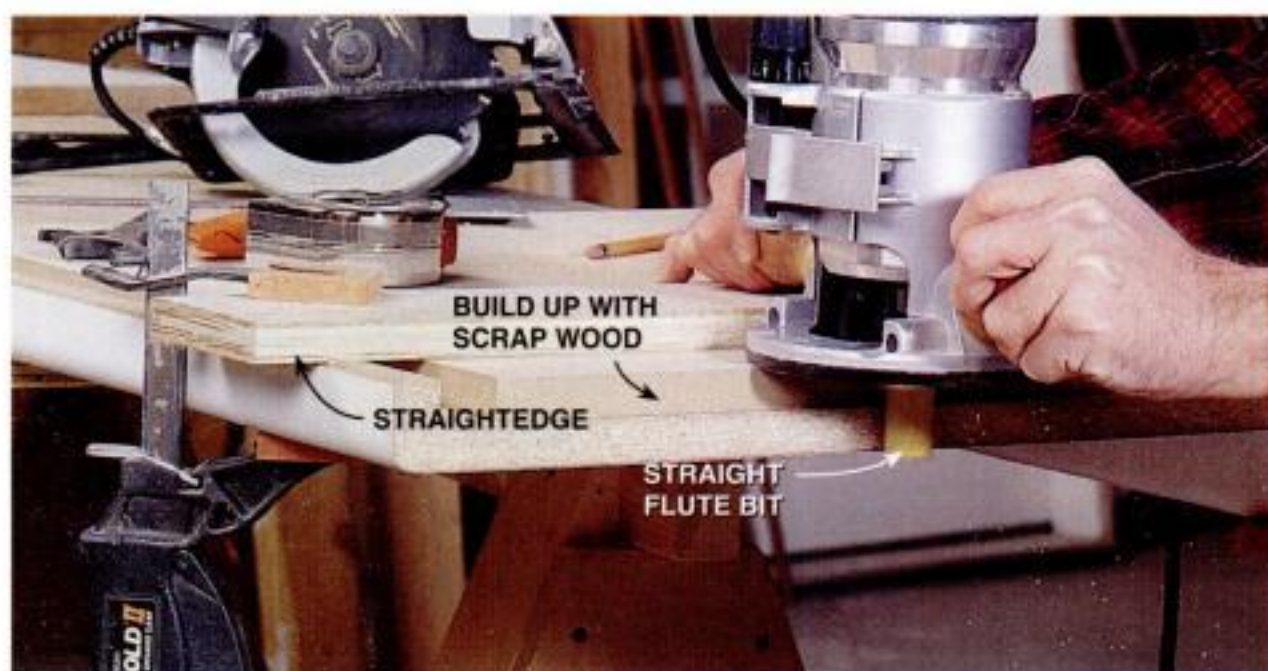
A If not cut properly, plastic laminate will chip. Here's how to cut your countertop cleanly: To remove the bulk of the material, turn the countertop upside down and rough cut with a circular saw, 1/8 to 1/4 in. longer than your final length. To minimize chipping be sure to use a sharp, carbide-tipped, finish-cutting blade.

For a chip-free cleanup cut, a router with a straight flute cutter works well. To guide the router, clamp a straightedge across the countertop, parallel to the cut line. It's best to rout from the

underside of the countertop to avoid scratching the laminate. Most countertops have built-up front edges, so you'll need to build up the underside with some scrap wood. Next, clamp your straightedge to the countertop, and use it to guide your router. If there is an attached backsplash, cut it

the same way. Even with a router, you need to watch for chipping at the front edge of the countertop. You may need to pre-score the front edge of the laminate with a sharp utility knife as an added precaution.

Fred Matlack
Vera Cruz, PA



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Knot Repair

Q I'm working on an oak table with a top made from three 12-in. wide, 3/4-in. thick boards. One of the boards has a tight knot that's about 1-1/2 in. across. There are some small voids around the knot that need to be filled, and I'm concerned about it loosening over time. I considered cutting an inlay, but I'd rather find some way to stabilize the knot.

Do you have any recommen-

dations? I'm planning to apply a gel stain, followed by a tung oil finish.

Craig Williams
Athens, OH

A I'm glad you've realized that knots aren't necessarily defects; in many cases, they're marks of character. My standard technique for knot repairs is to fill the voids with a mixture of clear epoxy and fine sawdust.

Make your sawdust by sanding a scrap piece of oak with 220-grit sandpaper. Make plenty because there won't be time to create more once you mix the epoxy.

Apply masking tape to the underside of the knot to prevent epoxy from leaking out. Place the board on your workbench, good side up.

Put on protective gloves and mix the epoxy according to the manufacturer's instructions. Blend in oak sawdust



gradually until you have a creamy mixture. Push this mixture into and around the knot. Use a flexible palette knife (available from an art supply store) or you could use an old, bent, table knife. Confine the epoxy to the repair area, but mound it slightly. Stir the filled-in area with a pin to eliminate air bubbles. When the epoxy is dry, level it with a plane or scraper, and sand with at least 220-grit sandpaper before applying your finish.

Andy Rae
Lenhartsville, PA



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Spray-On Crackle Finish

Q Is it possible to get a crackle finish in a pigmented, water-based lacquer that is applied with an HVLP spray gun? If so, please tell me how.

John Ready
Costa Mesa, CA

A Yes, it can be done. Put down a base color first (the color that will show through the cracks of the finish) and let it dry completely. Now brush on a thick coat of liquid hide glue, cut 50/50 with water. Let it dry for several hours, then spray on your colored-lacquer top coat. The size of the cracks will depend on how heavily you spray the lacquer. The heavier the coat, the bigger the cracks.

Michael Dresdner
Puyallup, WA

Chisel Sharpening Angles

Q I'm confused about sharpening angles for chisels. One book suggested 30 degrees, but my new chisels are ground at 25 degrees. What gives?

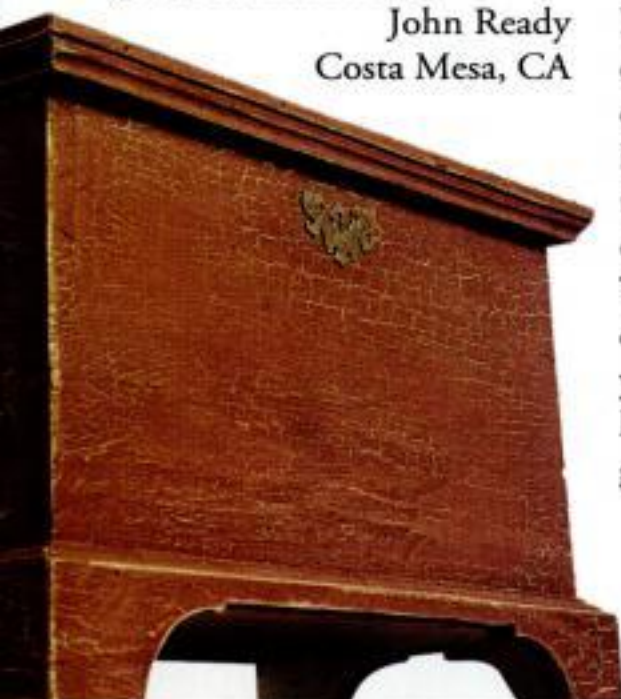
Gary Robbins
Birmingham, AL

A The grind angle on a chisel depends on what the chisel is used for. Most chisels will function well with a low grind angle, but they tend to dull quickly. Because a mortising chisel is commonly used with a mallet, it's not as important that it cuts easily, therefore,

a larger grind angle, such as 35 degrees, provides a longer edge-life. A paring chisel needs to easily slice through wood fibers, so it should have a lower grind angle (25 degrees).

Because a chisel's life span depends on the number of times it's sharpened, you want to maintain the largest grind angle that suits the purpose of the tool. A 30-degree grind angle is considered appropriate for a general purpose bench chisel providing adequate cutting ease and edge life.

Tom Caspar
AW Associate Editor



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Nailer Blowout

Q I am building an entertainment center with a solid-oak face frame, and an MDF-core plywood and oak-veneer carcass. When I was nailing the face frame to the carcass, the nails kept coming out the sides, even though I was holding the nailer straight up and down. Can you help me, please?

Harvey Stolz
Greensboro, NC

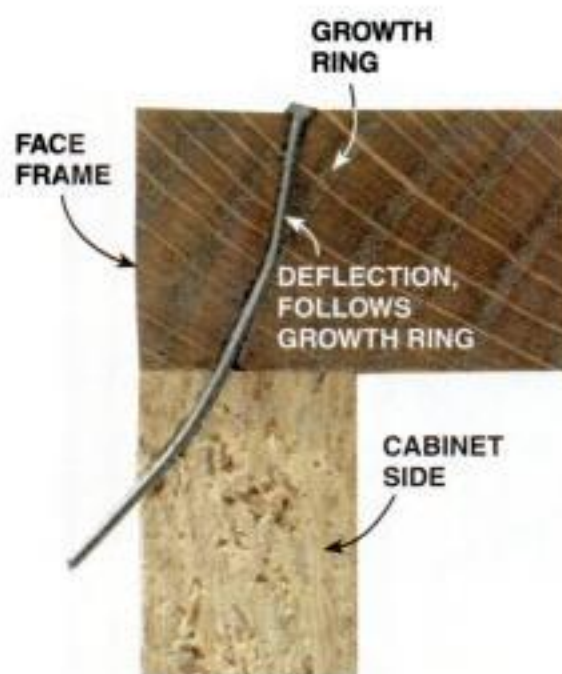
A The type of blowout you describe is often caused by the orientation of the growth rings in the face frame material. If the growth rings are almost parallel with the direction of the nail, the nail may follow the rings. To avoid blowout, tilt the gun so the nail cuts across the growth rings, and has less tendency to follow the growth rings.

Most nails used in pneumatic nailers have a wedge-shaped point that pushes the wood grain aside. Turn the nail-tip wedge perpendicular to the length of the growth rings so it cuts

through the fibers. Most 15-gauge nailers should have the handle parallel with the face frame, and 16- and 18-gauge nailers should have the handle perpendicular to the face frame.

If the air pressure to your nailer is low, the nail will have a greater tendency to deflect. When driving nails into dense wood, I prefer to keep my air pressure set to the highest level recommended by the manufacturer.

Rick Christopherson
AW Associate Editor



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40-560	16" 2 speed Scroll Saw	230	129
40-540	16" var/spd Scroll Saw	240	159
11-990	12" Bench Drill Press	255	184
11-090	32" Radial Bench Drill Press	405	279
43-505	1/2" Bench Router/Shaper	398	299
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22-560	12" 1/2" Planer w/ extra knives	329	
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5090DW	3-3/8" Saw Kit 9.6 volt	290	159
DA391D	3/8" angle Drill Kit 9.6V	166	114
DA391DW	3/8" angle Drill Kit 9.6V	341	175

NEW 18 VOLT MAKITA TOOLS

6343DWA6	1/2" Drill Kit	249
5620DWA6	1/2" Circular Saw Kit	259
DK1016	1/2" Drill & 6-1/2" Saw combo kit	389

CORDLESS DRILLS

WITH 2.0 AMP HIGH CAPACITY BATTERIES

6213DWA6	12V 3/8" Drill Kit	325	189
6233DWA6	14.4V 3/8" Drill Kit	358	205

9900B	3"x21" Belt Sander w/bag	347	165
9924DB	3"x24" Belt Sander w/bag	360	175
N1900B	3-1/4" Planer with case	263	142
1912B	4-3/8" Planer	352	205
N9514B	4" Disc Grinder 4.8 amp	118	65
DA3000R3/8"	Angle Drill	355	185
2708W	8-1/4" Table Saw	637	295
6405	3/8" Drill Rev. 0-2100 rpm	115	65
6013BR	1/2" Drill Rev. 6 amp	270	159
9401	4" x 24" Belt Sander w/bag	458	219
5007HBK7-1/4"	Circ Saw w/ case	250	125
LS1011	10" Slide Compound Saw	995	429
LS1211	12" Slide Compound Saw	1620	895
3901	Plate Joiner Kit	376	159
3612C	3 HP Plunge Router	492	259
LS1040	10" Compound Miter Saw	460	259
LS1013	10" Dual Compound Slide Miter Saw	1088	599
BO5010	5" Random Orbit Sander	142	72
LS1220	NEW 12" Compound Miter Saw	379	
9227C	NEW 7/9" Polisher	350	195
SJ401	NEW 16" Bench Scroll Saw	300	175
2702	NEW 8-1/4" Table Saw	512	299
2703	NEW 10" Table Saw	519	319

SENCO AIR NAILERS

SFN1+	Finishing Nailer 1" - 2" w/ cs448	299
SFN45	NEW Stapler 7/16" crown, 1" - 2"	540
SLP20	Pinner w/cs 5/8 - 1-5/8"	422
SKS	Stapler 5/8 - 1-1/2"	390
SN70	Framing - Clip Hd 2 - 3-1/2"	725
SN65	Framing - Full Hd 2 - 3-1/2"	709
SN600	NEW Framing 2 - 3-1/2"	699
SFN40	Finish Nailer 1-1/4 - 2-1/2"	569

NEW Accusert Nailers by SENCO

A100LS	Finish Stapler 1/2" - 1"	190	119
A150LS	Finish Stapler 1/2" - 1-1/2"	220	149
A125BN	Brad Nailer 5/8" - 1-1/4"	160	99
A200BN	Brad Nailer 5/8" - 2"	215	139

BOSTITCH AIR NAILERS

Model	Description	List	Sale
N00S-1	Stick Nailer	316	325
RN45	Coil Roof Nailer 3/4 - 1-3/4" nails	557	269
N60FN-2K	Finishing Nailer w/ case, 5/8" w/ case, oil, & brads	279	125
ML1FS	Finishing Stapler 15 gauge 902	539	
S32SX-1K	Finish Stapler 1/2" - 1-3/8" with case & oil	269	139

JORGENSEN ADJUSTABLE HANDSCREWS

Item#	Length	Capacity	List	Sale
#0	8"	4-1/2"	20.35	12.10
#1	10"	6"	23.30	12.90
#2	12"	8-1/2"	26.75	14.90
#3	14"	10"	33.85	18.55

PONY CLAMP FIXTURES

Model	Description	List	Sale
50	3/4" Black Pipe	15.45	8.50
52	1/2" Black Pipe	12.65	6.95

PANASONIC CORDLESS

EY6100FQKW	12V 3/8" Drill kit w/ 2 Ironman batteries, 15 min. charger, & case	379	179
EY6230FQKW	NEW 15.6V Drill Kit with 2 Ironman batteries, 30 minute charger & case	425	209
EY3503FQKW	5-3/8" 12V Wood Cutting Circular Saw Kit	500	259
EYC103	EY6100FQKW drill, EY3503FQW saw, 2 batteries, 15 minute charger, and case	512	299

BIESEMEYER FENCES

B-50	50" Commer. Saw	443	325
T-SQUARE 52	52" Homeshop	360	275
T-SQUARE 40	40" Homeshop	335	255
T-SQUARE 28	28" Homeshop	325	245

AIRY AIR NAILERS

Model	Description	List	Sale
0241SK	Brad Nailer 3/8" - 1-3/16"	180	98
0626SK	1/4" Crown Stapler 3/8" - 1-1/4"	194	98

ABOVE NAILERS come w/ case, fasteners, oil & wrenches

0241/0626

0241 Brad Nailer, 0626 Stapler, case, fasteners, oil & wrenches

Super Sale 129.95

STABILA LEVELS

25010	10" die cast Torpedo Level	43	19
24640	24" Level w/ hand holes	62.20	47
24670	48" Level w/ hand holes	79.70	59

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DEWALT TOOLS

Model	Description	List	Sale
DW309K	Recipro Saw 10 amp	318	179
DW376G	7-1/4" Framers Saw	210	169
DW222	3/8" Drill, 0-1200 rpm	184	105
DW231	1/2" Drill, 0-850 rpm, 7.0 amp	240	129

DW236	1/2" Drill, 0-850 rpm, 7.8 amp with keyless chuck	264	149
DW124K	1/2" right angle Drill	590	329
DW321K	Top Handle Jigsaw Kit	300	164
DW364	7-1/4" Circ. Saw w/brake	294	162
DW610	1-1/2 HP 2 handle Router	266	149
DW411K	1/4 sheet Palm Sander w/ case	58	
DW682K	Biscuit Joiner with case	448	169
DW705	12" Compound Miter Saw	734	359
DW621	2 HP Plunge Router	400	218

DW621 comes with Free DW6956 fine height adjuster!

DW675K	3-1/8" Planer with case	292	164
DW677K	3-1/4" Planer w/ case	268	155
DW431	3 x 21 vspd Belt Sander	338	188
DW421	5" Palm Ran. Orb Sander	144	74
DW423	Palmgrip Random Orbit Sander - variable speed	170	94
DW421 & DW423 come with Free DW4317 case!			
DW673K	Laminate Trimmer Kit	364	188
DW272	Drywall Gun, 0-4000, 6.3 amp	160	95
DW276	Drywall Gun, 0-2500, 6.5 amp	160	95
DW935K	14.4V 5-3/8" Trim Saw Kit	444	237

DEWALT CORDLESS DRILLS

DW972K-2	3/8" variable speed w/ two 12V XR batteries	362	184
DW991K-2	3/8" variable speed w/ two 14.4V XR batteries	415	209
DW994KQ	1/2" variable speed w/ one 14.4V XR battery	458	239

Above drill kits come w/ charger & steel case!

DW991KS-2 DW991K drill, DW935 trim saw, 2 XR batteries & case. Sale 345

DEWALT 18 VOLT CORDLESS TOOLS

DW933K	NEW Jigsaw Kit	468	269
DW938K	Recipro Saw Kit	520	269
DW995K	1/2" Drill Kit w/ 1 battery	428	229
DW995K-2	1/2" Drill Kit w/ 2 batt.	540	299
DW997K	1/2" Drill Hammer Drill Kit	454	249
DW936K	5-3/8" Saw Kit	458	249
DW995KS-2	DW995K Drill, DW936 Saw and case	540	385
DW991KC-2	DW991K 14.4V drill kit, DW937 14.4V reciproc saw, & case	375	
DW995KC-2	DW995K 18V drill kit, DW938 18V reciproc saw, & case	395	
DW997KC-2	DW997K 18V drill kit, DW938 18V reciproc saw, & case	419	

DEWALT BENCH TOP TOOLS

DW708	12" Dual Compound Slide Miter Saw	649	
DW780	20" Scroll Saw	546	469
DW733	12" Planer w/ extra blades	399	
DW744	10" Portable Table Saw	549	
DW756	NEW 6" Bench Grinder	164	75
DW758	NEW 8" Bench Grinder	184	115

NEW DEWALT VACUUM CLEANERS

DW792	15 gallon	279
DW795	20 gallon	399



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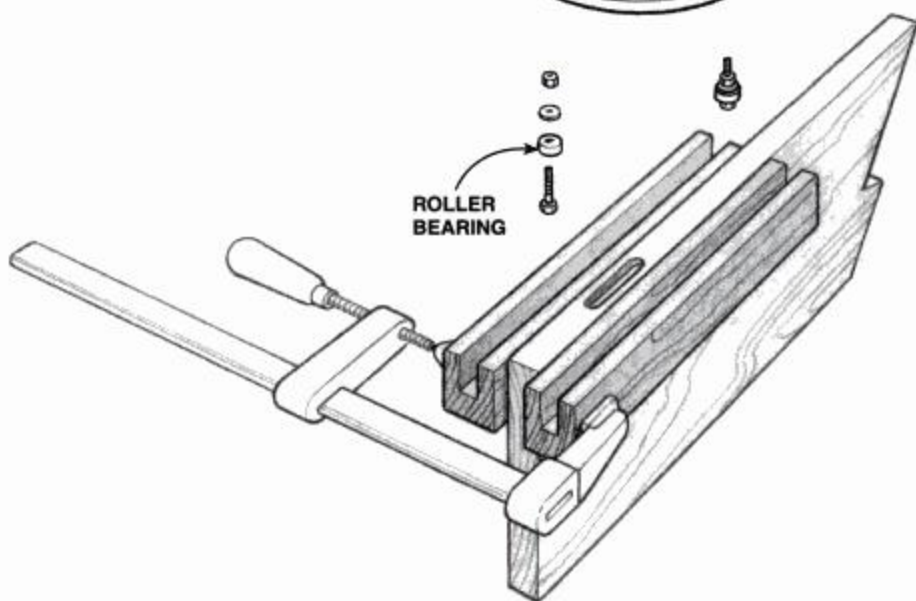
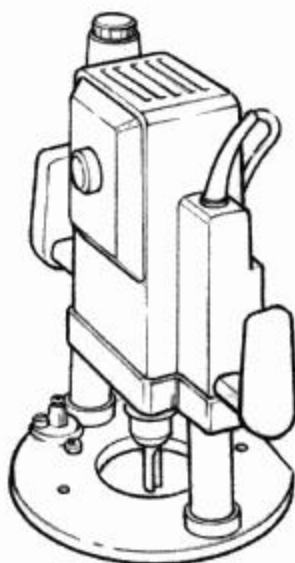
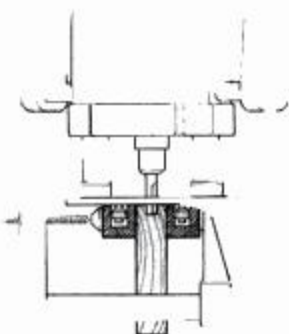
Mortise Centering Jig

With this jig I can rout mortises exactly centered on the workpiece—no measurement or layout necessary. First I drilled and tapped two holes in my router base plate to take 10-32 machine screws. Both holes were located directly opposite each other along a line that runs through the center of the router base. Then I mounted roller bearings with lock nuts and washers, as shown in the illustration. Finally I cut slots in two 1-1/2 by 1-1/2-in. guide beams to match the diameter of the bearings. Make the beams about 1 ft. longer than your longest mortise.

To use the jig, lay the beams on the bench with the work face down between the beams. Clamp the assembly, turn it right side up and put it in a vise. You can either mark the limits of the mortise in pencil or clamp stop blocks.

Roger Wong
Huntington Beach, CA

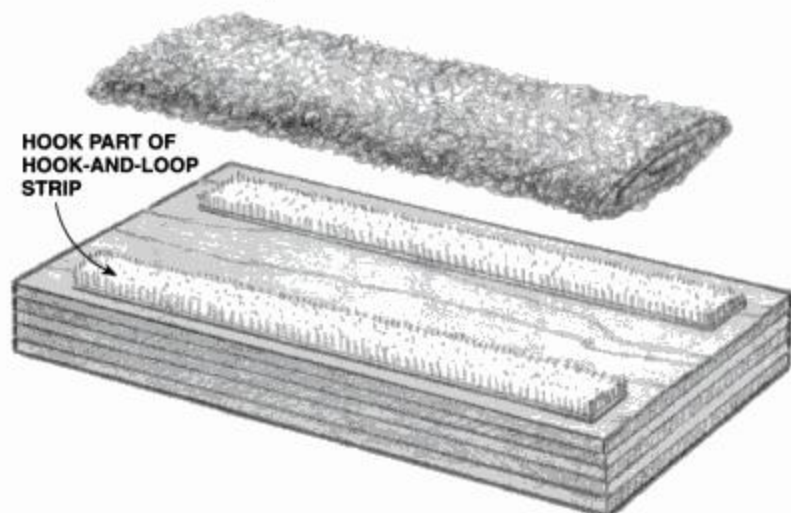
Editor's Note: For added convenience you can use "cam-follower" bearings, which are just like normal bearings, except they have their own built-in bolt. They're available through McMaster Carr, Chicago, IL; (630) 833-0300. Part number 5977K62 has a 1/2 in. dia. and a 10-32 thread. They sell for \$6.81 each.



Steel Wool Holder

I came up with this idea because I often use steel wool, bronze wool, and synthetic-steel wool. I attach the hook part of adhesive-backed, hook-and-loop strips to a piece of plywood about the size of a flattened pad (3/4 by 2-3/8 by 5-1/4 in). The hooks grab the pad and hold it flat. The block keeps my hands clear of the mess when I'm rubbing out a finish. Best of all, the pads last longer. To clean any residue off the pad I use a file card or wire brush.

Jay Geisel
LaConner, WA



If you have a tip you'd like to share, send it to Workshop Tips, AMERICAN WOODWORKER, 2915 Commers Drive, Suite 700, Eagan, MN 55121. We pay \$100 for tips we print. Original contributions become our property upon acceptance and payment. We're sorry, but tips can't be returned.

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#1302	1/2" Shank Router	*3-1/2"	\$79.95
#1303	1/2" & 3/4" Shaper	4-5/8"	\$99.95

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*Raised Panel Router Bit



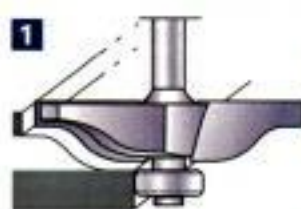
*Reversible Combination Rail & Stile Bit

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1 OGEE RAISED PANEL

#1423 2" Large Diameter\$29.95



2 TONGUE AND GROOVE

#1333 Straight\$29.00

#1335 Wedge\$29.00



3 BULL NOSE

#1330 1/2" Dia. of Circle\$16.00

#1331 3/4" Dia. of Circle\$21.00



4 LOCK MITRE BIT

#1433

2" Dia., Stock thickness: 1/2"-3/4"\$37.50



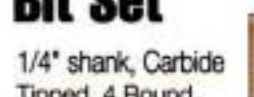
5 RABBETING KIT

4 depth of cuts: 3/8", 7/16", 5/16", 1/4".

Set: 1/4" shank rabbeting bit, 4 bearings

(3/8", 1/2", 5/8", 3/4") & hex key.

#1425 1-1/4" Large Diameter\$25.00



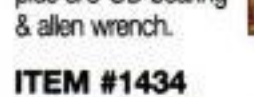
6 BRASS PILOTED

Rout into tight spaces and sharp corners. These bits have Brass Pilots, measuring only 5/32" in dia., instead of usual 1/2" bearing.

#1428 1/8" R Round Over\$16.00

#1429 1/4" R Round Over\$17.00

#1430 3/8" R Round Over\$19.00



7 SOLID CARBIDE UPCUT AND DOWNCUT SET

2 flute flat bottom cutters. Upcut spiral ideal for mortise and tenon joints. Downcut will plunge cut and plane edges.

#1437 1/4" dia., 3/4" cutting length

Special Set Price\$19.95

Round Over/Beading Bit Set

1/4" shank, Carbide Tipped, 4 Round Over Bits with 1/2" OD bearing: (1/8", 1/4", 3/8", 1/2"), plus 3/8" OD bearing & allen wrench.



ITEM #1434
\$72 IndividuallySale \$39.95

Biscuit Joining Set

5/32" Slot Cutter-1/4" Shank and 250 #20 Biscuits

Instruction sheet included.



ITEM #1385
REG. \$35.00Sale \$29.95



The Award Winning MERLE ADJUSTABLE CORNER CLAMP

- Adjustable, uniform clamping pressure on all corners • Great for wide cabinet frames (for center or edges)
- Forces a frame into perfect square
- Almost NO capacity limitation, ships with 23 ft. reel of steel banding!
- Aluminum & Steel construction



ITEM #1420
REG. \$39.95Sale \$24.95



The Can-Do Clamp

- Join picture and cabinet frames
 - Clamps to 2-34" wide
 - Easy Mounting • Use as bench vise
- Sturdy aluminum clamp is great for framing, drilling, doweling, and more.
- High clamping pressure
 - Movable jaws • Two swivel points

ITEM #1367 REG. \$29.95Sale \$24.95



16 Piece Forstner Bit Set

High Quality Steel - ground for heavy use

This set comes with the following sizes: 1/4", 3/8", 1/2", 5/8", 3/4", 7/8", 1", 1-1/8", 1-1/4", 1-3/8", 1-1/2", 1-5/8", 1-3/4", 1-7/8", 2", 2-1/8".

ITEM #1418 REG. \$141.20Sale \$43.95



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ITEM #1426 REG. \$35.95Sale \$21.95



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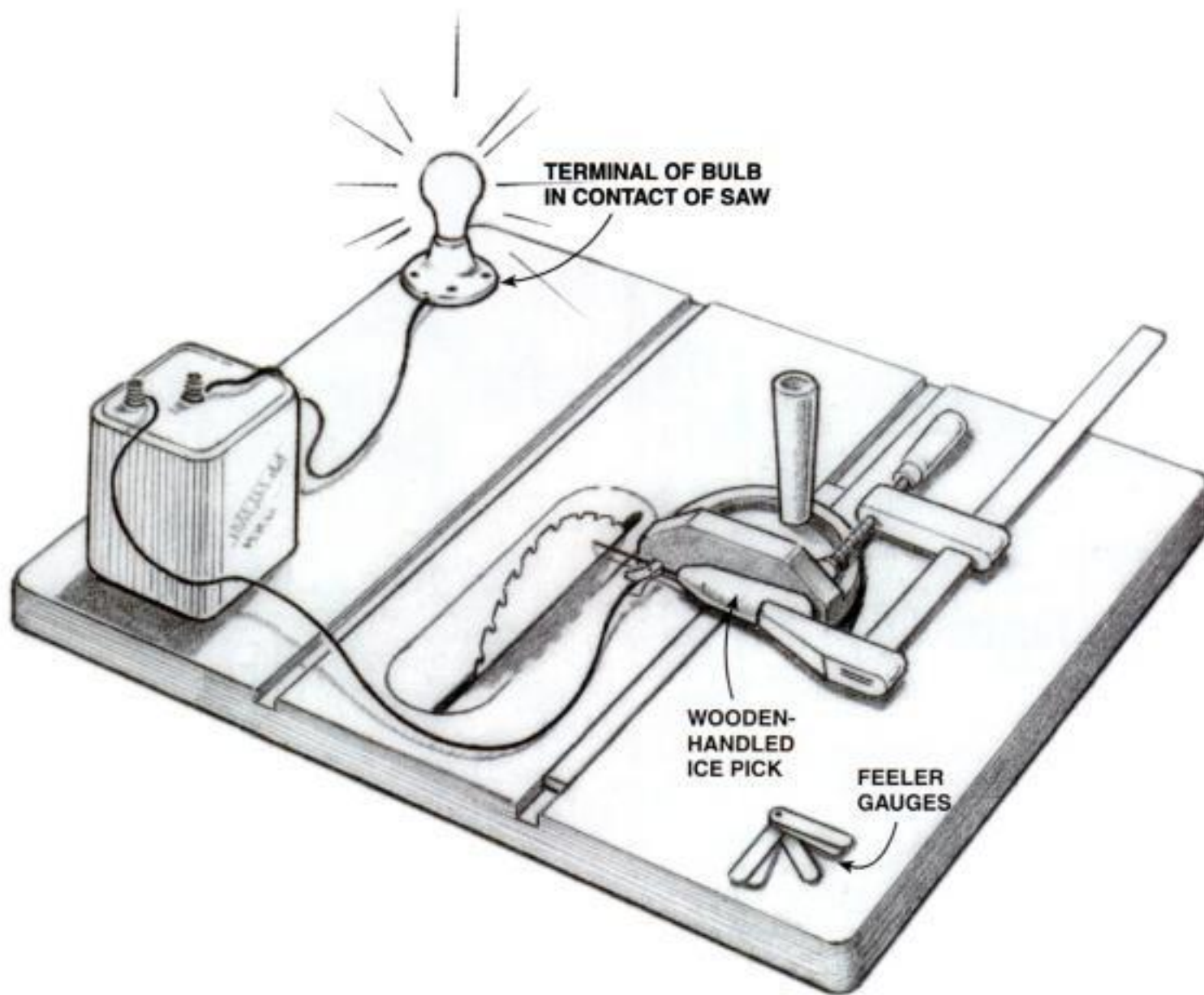
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Blade Alignment

I made this rig to check the alignment of my tablesaw blade with the miter gauge slot. I don't own a precision dial indicator, so I devised one using an ice pick and a continuity tester.

First, I slid the ice pick forward until it just touched the blade. Then I clamped the pick to the miter gauge. I rotated the blade, moved the miter gauge forward and checked the same spot. The lamp did not light so I inserted feeler gauges until it did. This measured how far the blade was out of alignment.

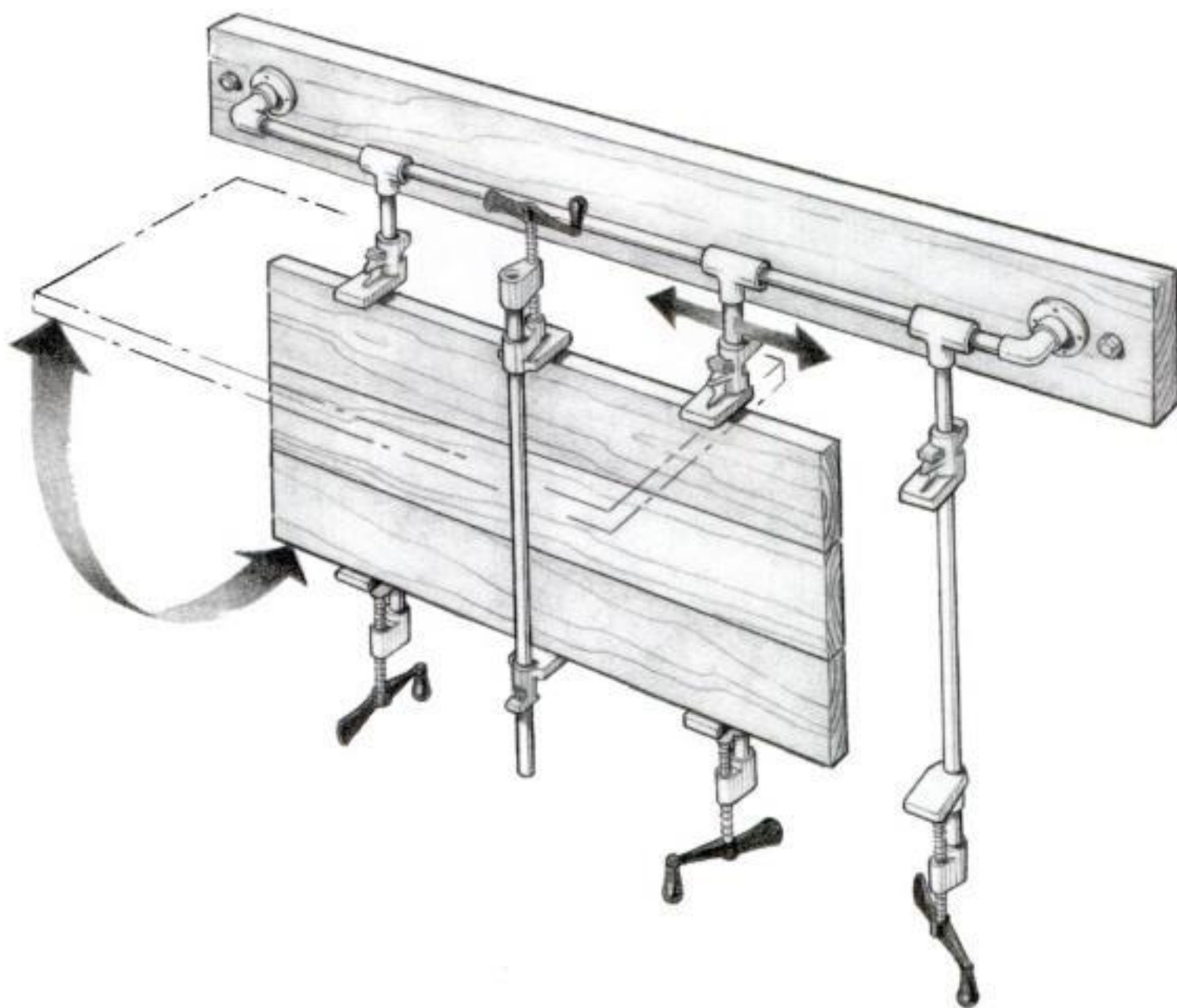
Charles Von Farge
Wilmington, DE



Vertical Panel Clamping

Gluing panels and other large assemblies vertically saves floor space and is easier on your back—you don't have to carry anything. Make the crossbar from 1/2-in. pipe and attach it securely to the wall. 3/4-in. pipe tees slide along the pipe. Thread the ends of 3/4-in. pipe-clamps into the tees, as shown. After tightening the hanging clamps, add additional clamps between them on the opposite side of the panel.

Joe Hurst-Wajszczuk
Jersey City, NJ

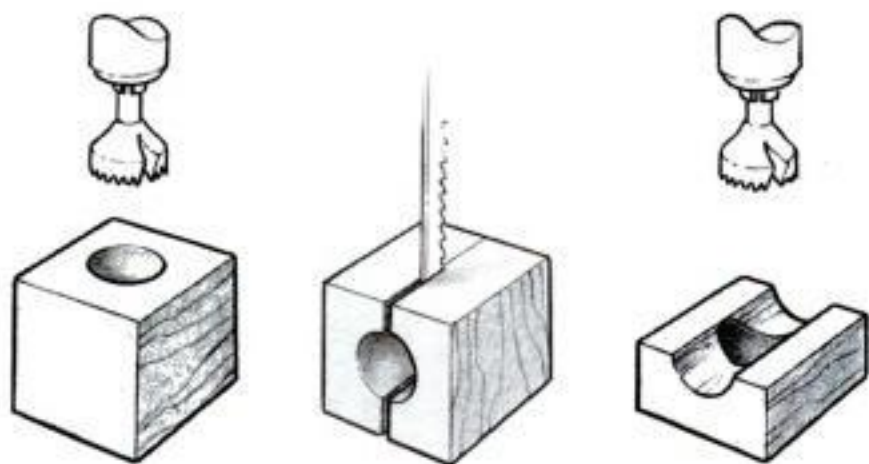


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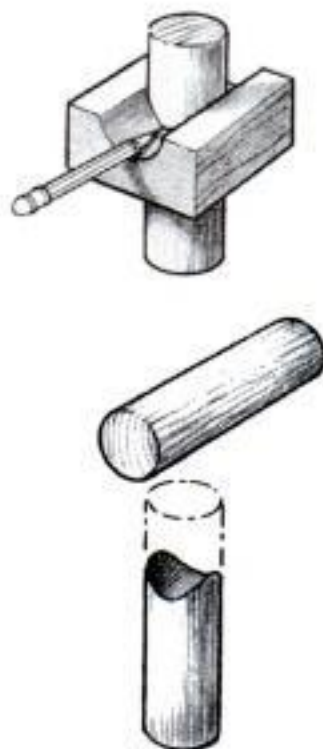
To locate the retailer nearest you, call 1-800-US-STAIN ext. 343.



Drawing Intersecting Rounds

Joining two pieces of round stock to make a "T," such as where a chair post joins a rail, requires a tricky intersection. Your layout must be precise so that you can fit one piece to the other. To find this exact shape, drill a piece of scrap, as shown, and use it to mark the correct curve.

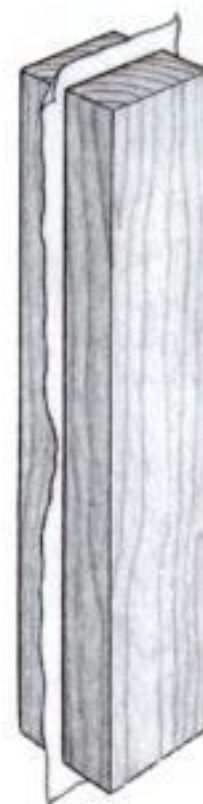
Yeung Chan
Millbrae, CA



Turning Halves

I often make decorative turnings that I later divide into two halves. Sawing the turnings down the middle is awkward and reduces the diameter by the width of the saw kerf. The trick is to glue up the turning blank in two halves, with kraft paper in between. After turning, I simply take a chisel and split the turning neatly down the middle. The paper adheres to both sides and is easily removed with water and a little scraping with a chisel.

Paulo Ricardo
Tonetta
Canela, Brazil



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purchase of these tools is advised to follow the stampede to your local JET dealer to round up the tools you've always wanted. JET is offering rewards of up to \$100 for the purchase of these notorious tools.

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up to **\$100**

Deadline extended to March 31, 1999.
See your JET dealer for details.

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Planer/Molder

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REBATE



DC-650 Dust Collector

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REBATE

DC-1200 Dust Collector

\$20
REBATE



JTAS-10
Left or Right
XACTA SAW™

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REBATE



JSL-10TS
SHOPLINE™
Tablesaw

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REBATE



JDP-17MF
Drill Press

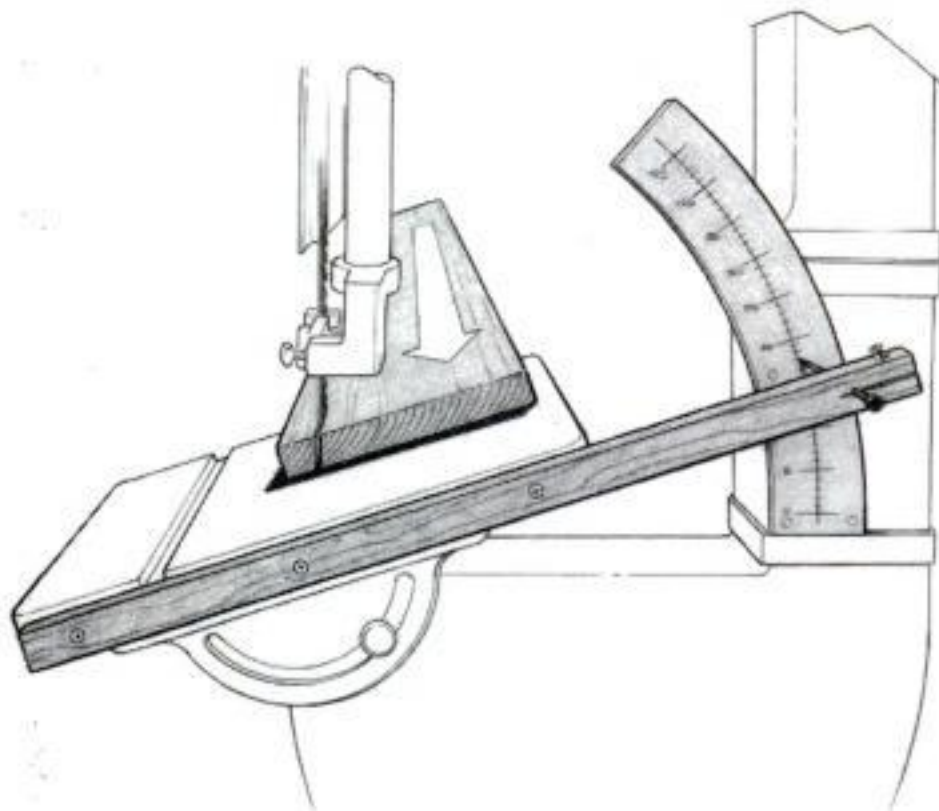
\$20
REBATE

For the name of your local JET dealer, call (800) 274-6848 or go to www.jettools.com.
Amounts shown are manufacturer's rebates. Rebates also apply to 40th Anniversary Limited Edition tools.

Accurate Bevels

The standard angle scale on my bandsaw is too small to read accurately. I made a large, new scale on the back side of my bandsaw and attached a pointer stick to the back edge of the cast iron table. Now I can cut bevels and miters to a tolerance of less than one degree.

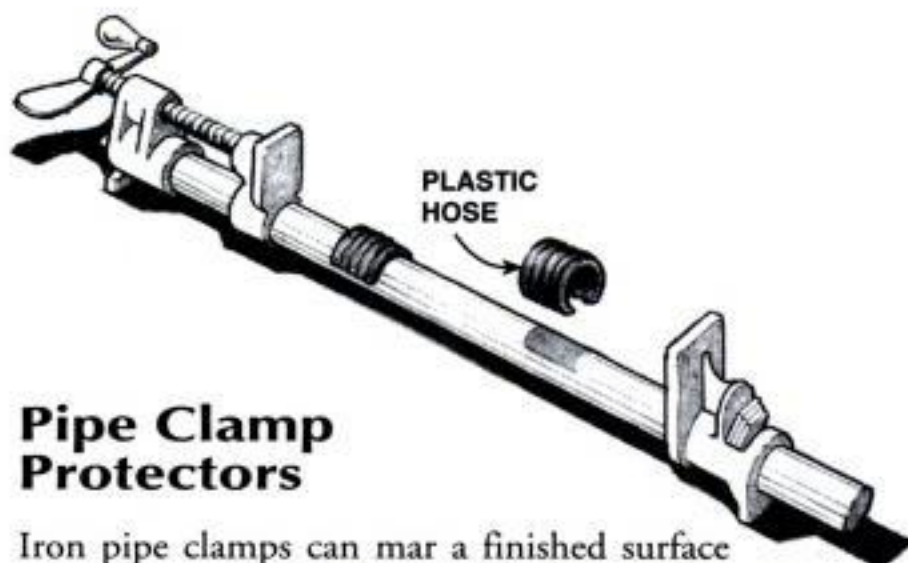
Simon Watts
The Arques School
Sausalito, CA



Back-Saver Grinder

I've always found the average bench grinder much too low for comfort. I raised mine closer to eye level, and find it a tremendous improvement. No more stooping, and it's easier for me to see exactly what I'm doing.

Eric Nichols
Crockett, CA



Pipe Clamp Protectors

Iron pipe clamps can mar a finished surface and leave nasty black stains if they touch a wet glue line. My solution is to raise the pipe above the surface with corrugated-plastic wiring harness covers sold in automotive stores. They come in a variety of sizes and are already split so you can slip them on the pipe at strategic points.

F.G. Lutz
Milwaukee, WI

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The **Model 360** includes all of the above, a motorized saddle drive, **PLUS** automatic stop switches at the head and tail stock. Ask about it! It's the **Dream Mini-lathe**.

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The Veritas® Cyclone Lid Can Turn Your Shop Vacuum into a High-Capacity Dust Collector.

A. Veritas® Cyclone Lids

Capacity is a problem in every dust collection system, but particularly in small shop systems. This Cyclone Lid will let you sidetrack up to 99% of jointer/planer shavings and lesser amounts of fine dust (such as from sanding) to a barrel or trashcan. It lets you convert a standard shop vacuum into a high-capacity dust collector.

In fact, if your shop vacuum draws 6 amps or more, you can use it with our dust collection network to power a complete collection system. If you have a lower-powered vacuum (less than 6 amps), you can still use it with the cyclone on a single machine, such as a planer.

The secret to all of this is good design. Ours is an in-line system with minimum deflection of airflow. Inlet air is swirled around the out-



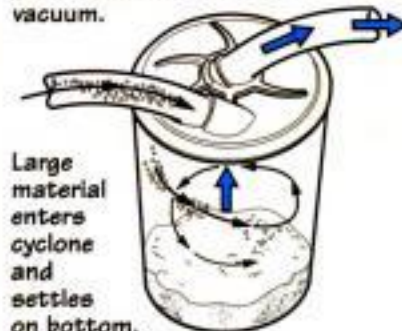
Cyclone Lid 4" Hose Inlet

side of the collector container while outlet air is drawn from the top center, leaving all but the finest dust inside the collector container. Our tests showed that the only other unit on the market in this price range allowed more than five times as much material to escape the cyclone. You can collect a dozen or more trashcans of shavings before you have to think about emptying the vacuum cleaner. The Cyclone Lid, made from black ABS, can be used on any round container with a top diameter between 20" and 23 1/2"; it has registration ledges for standard trashcans at 20", and 45- to 55-gallon drums at 23 1/2". Lids come drilled for use with either 2 1/2" or 4" hose.

The lid seals so well to a trashcan or barrel that the system can be used for wet vacuuming as well as dry. Hoses and attachments not included. Patent pending.

AW701 Cyclone Lid - 2 1/2" Hose Inlet \$29.95
AW702 Cyclone Lid - 4" Hose Inlet \$29.95

Airflow continues on to vacuum.



Large material enters cyclone and settles on bottom.



2 1/2" Fittings for Shop Vacuums

These fittings will either fit shop vacuums or adapt to 4" dia. dust collection systems. The 2 1/2" dia. by 80" long hose has an integral swivel coupling. The adapter connects a 2 1/2" dia. hose to a 4" system. Available individually or as a set. The dust port has a 2 1/2" outer dia. and a 3 5/8" x 4" mounting plate.

B. AW709	80" Hose, 2 1/2" dia.	\$ 9.50
C. AW708	Adapter, 2 1/2" to 4"	\$ 2.75
AW710	80" Hose & 4" Adapter	\$11.75
D. AW707	Dust Port, 2 1/2" dia.	\$ 1.95



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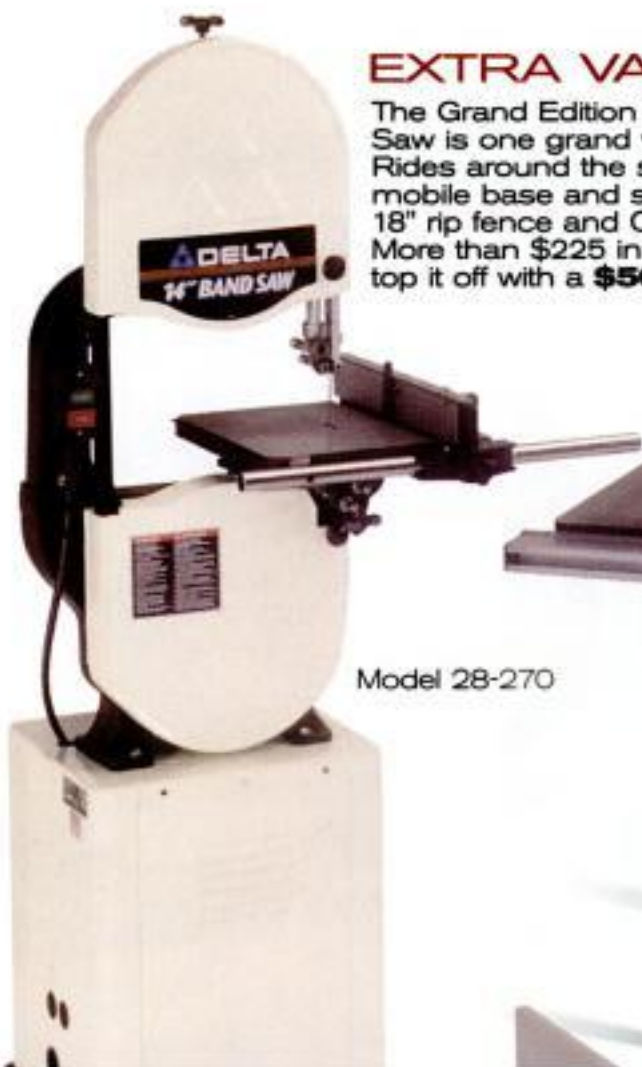
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The Grand Edition 14" Band Saw is one grand value. Rides around the shop on a mobile base and sports an 18" rip fence and Cool Blocks™. More than \$225 in extras. Then top it off with a **\$50 rebate**.



Model 28-270

EXTRA VALUE

The Grand Edition 10" Contractor's Saw.* Loaded with over \$200 in extras. A 30" Unifence Saw Guide, cast iron extension wing, white laminated table board and white adjustable support legs, plus a 50-tooth ATB&R carbide-tipped blade. Then add your **\$50 rebate**.



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Model 36-920

The Grand Edition series from Delta. Each a Delta classic. Each done in white. And each made in the USA and loaded with extra goodies. These babies are hot. And they'll be built in limited quantities, for a limited time only. (Extra values and rebates in effect through March 31, 1999.) For the name of your nearest participating dealer call Delta International Machinery Corp., 800-438-2486. In Canada, call 519-836-2840. Rebates are available in Canada (in Canadian funds) on these models only.

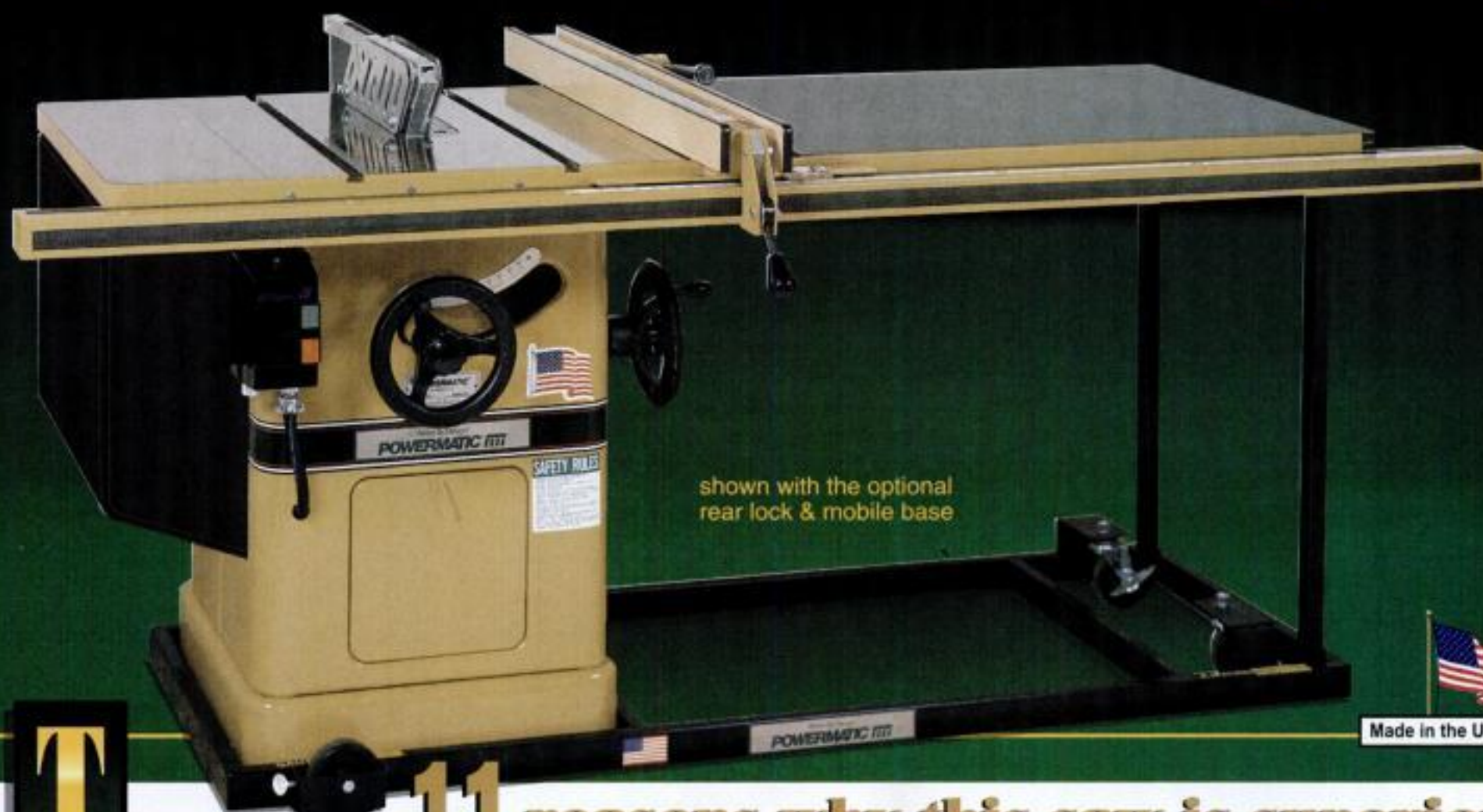


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The Powermatic Model 66 10" Tilting Arbor Saw remains the **heaviest saw** in its class. A one-piece cast iron trunnion makes this machine virtually vibration free and offers superior cutting accuracy. Powermatic pioneered the **left tilt blade** and it has *always* been a feature of the 66 (those other guys are just now catching on!) Tilting away from the fence prevents binding and substantially reduces the risk of kickback. The **Accu-Fence®** is the premier table saw fence system on the market. It features a positive lock so you set it only once - no more searching for position. The laminated side panels can be adjusted or replaced in mere minutes.

Why bother with three belts like those other saws? Our **3VX belt drive** system requires only two! Our system distributes torque more efficiently and generates less heat, meaning longer life for components. And a 3/4" shaft (turned down to take a standard 5/8" blade) allows the use of **larger arbor bearings**. These all add up to one thing- **POWER!**

Other saws have backlash in their tilting and elevating mechanisms. The Model 66 has **exclusive adjustments** in its tilting and elevating mechanisms to *prevent* backlash! And **cast iron handwheels** allow smoother adjustments to the trunnion. While other manufacturers import their iron, Powermatic uses the **Meehanite™ process** in its *own* foundry, ensuring quality control of all its castings.

The 66 table is bolted to the stand in three places - not four - offering easier adjustment if needed. A **dust chute** comes standard, and the **cleanout door** means no more reaching around saw components at clean up time.

And to top it off, the **table is fine ground** to a mirror polish. After all, not only should the 66 perform the best... it ought to *look* the best!

Convinced yet? We've iced the cake by offering several freebies in our Value Added Package. *The best has never looked so good!*

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Bleaching Wood

*Subtract color
to add life*

by Michael Dresdner

There are four types of bleach that woodworkers commonly use: chlorine, two-part wood bleach, oxalic acid and peroxide. Two-part bleach changes the actual color of wood and the other three remove stains. Read on to find out what each one does and how to use them safely.

CHLORINE BLEACH

Common household laundry bleach (sodium hypochlorite) will kill mildew on your deck and outdoor furniture, and will remove dye-based stain, but not pigment-based stain, from wood. Chlorine bleach can irritate skin and mucous membranes, so wear gloves and goggles.

Deck cleaner. To remove mildew from your deck or exterior furniture, first hose off the wood to remove any loose debris. Mix about a quart of chlorine bleach (Clorox, Purex, etc.) to each gallon of water. Use a synthetic-bristle brush and scrub the surface with the bleach mixture. Be sure to wear goggles—it's easy to splash. Reapply the bleach if necessary in

order to keep the surface wet for about 15 minutes. Then, brush off the surface again and hose it down thoroughly with water. Keep the runoff away from plants, pets and other wildlife.

Fortunately, deck stains are formulated with pigments, so they are not affected by the bleach. Let the wood dry completely if you plan to re-stain. If you live in an area where mildew is a problem, choose a deck stain that contains a mildewcide, or add some yourself. Most home centers and paint stores sell them.

Dye remover. Chlorine bleach will remove most dye-based stains from raw wood but will not lighten the wood itself. This is handy to know if you finish your project with a dye, and then decide you want to "erase" it and start over. Chlorine bleach will also remove old dye that you might encounter during a refinishing project.

Use a synthetic-bristle brush or a clean rag to apply the bleach full strength. It should remove the color by the time it dries, but for stubborn stains, repeat the process. If you are removing the stain from an old piece of furniture that you are refinishing, make sure all the finish is off the surface and lightly scuff-sand it first. Bleach will not go through a finish.

As bleach dries, it breaks down to salt and water. Once the water evaporates, you'll have salt residue on the wood. Brush it off before you finish the wood.



Alabaster Oak Wardrobe

Tim Johnson, Minneapolis, Minn., 1991

Use bleach like stain. Two-part wood bleach turns red oak bone-white, without obscuring the grain the way a pickling stain would. The top coat is water-based polyurethane.

CHLORINE BLEACH, full strength, easily removes most dye-based stain (right) but will not bleach raw wood white (center), nor will it remove pigment-based stain (left).

Pigment-Based Stain

Raw Wood

Dye-Based Stain



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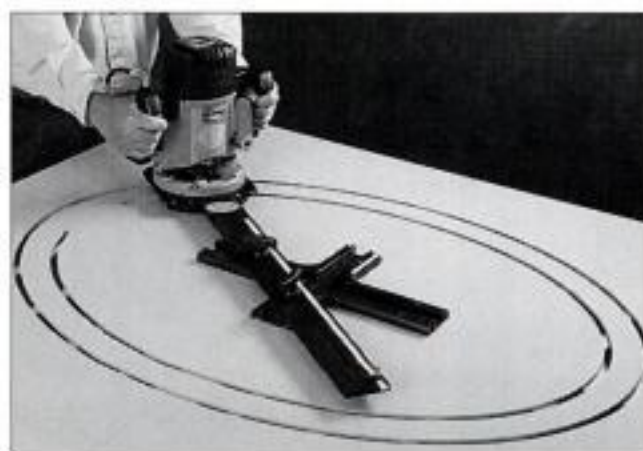
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TWO-PART (A/B) WOOD BLEACH

Wood bleach actually lightens the color of wood. It can also de-color many pigments and dyes.

A package of wood bleach contains two bottles, usually labeled "A" and "B." One contains lye (sodium hydroxide) and the other peroxide (hydrogen peroxide). The bleaching action occurs when the two chemicals come together in contact with wood.

TWO-PART WOOD BLEACH takes the color out of most dark woods and blends maple heartwood color with its sapwood.

Instructions for use vary from brand to brand. Some say to put part A on first, then apply B before A dries. Others suggest mixing the two just before application. The object is to get both chemicals and the wood all in the same place at the same time. Read the directions.

Use a synthetic-bristle brush or a clean rag to apply the bleach. When the lye goes on first, it initially darkens the wood. Once the peroxide goes

on it is likely to foam as it reacts with the wood and lye. Let the wood dry completely, usually overnight, then sponge off all residue with plenty of clean water.



APPLY A/B BLEACH SAFELY

Wear long neoprene gloves, with ends cuffed to catch drips, a waterproof apron, and goggles.

Brush carefully. A/B bleach is extremely caustic and will quickly burn your skin and eyes.

Mahogany

Walnut

Maple

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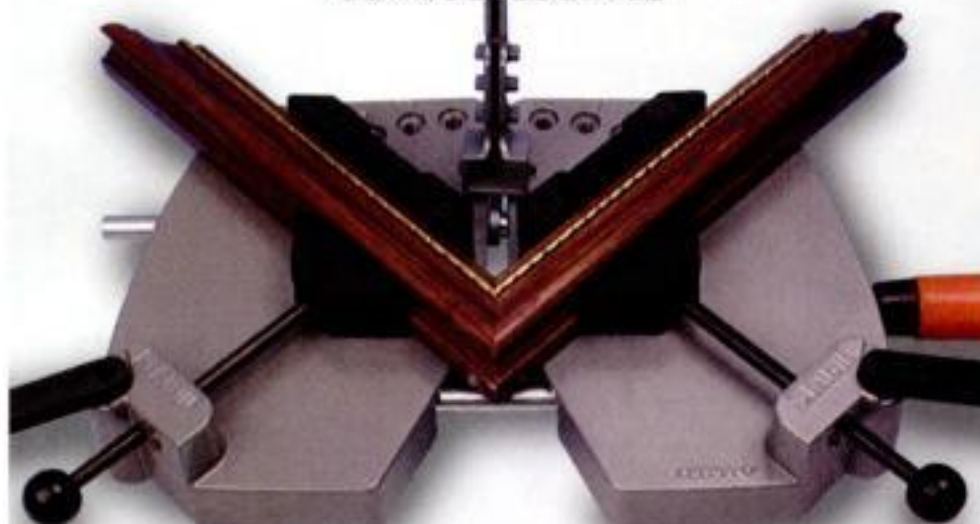
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OXALIC ACID

Iron, in the form of nails, hardware, or even bits of steel wool, often leaves a blackish stain on woods high in tannin, like oak. A wash of oxalic solution removes these stains as well as the grayed color of oxidized wood.

Oxalic acid is sold in most hardware stores and home centers as a dry, white crystalline powder. The crystals are toxic and irritating to mucous membranes, so wear goggles and a dust mask when handling the dry powder. In a glass or plastic container, dissolve an ounce of oxalic acid into a pint of warm water.

Make certain that you have removed all the offending metal before you bleach the wood. Sometimes stains are caused by broken-off nails or bits of fencing that are hidden in the wood. Wet the surface with the oxalic acid mixture and let it dry. Repeat if the stain is not completely gone. Once dry, sponge the

wood with plenty of clean water to remove the crystalline residue. Any oxalic acid residue left in the wood will make irritating dust when you sand, so wear a dust mask and eye protection.

PEROXIDE

Maple is prone to a particular type of blue stain that is caused by mold during the drying process. A strong, 35-percent peroxide solution, like the "B" portion of wood bleach, can usually remove the stain.

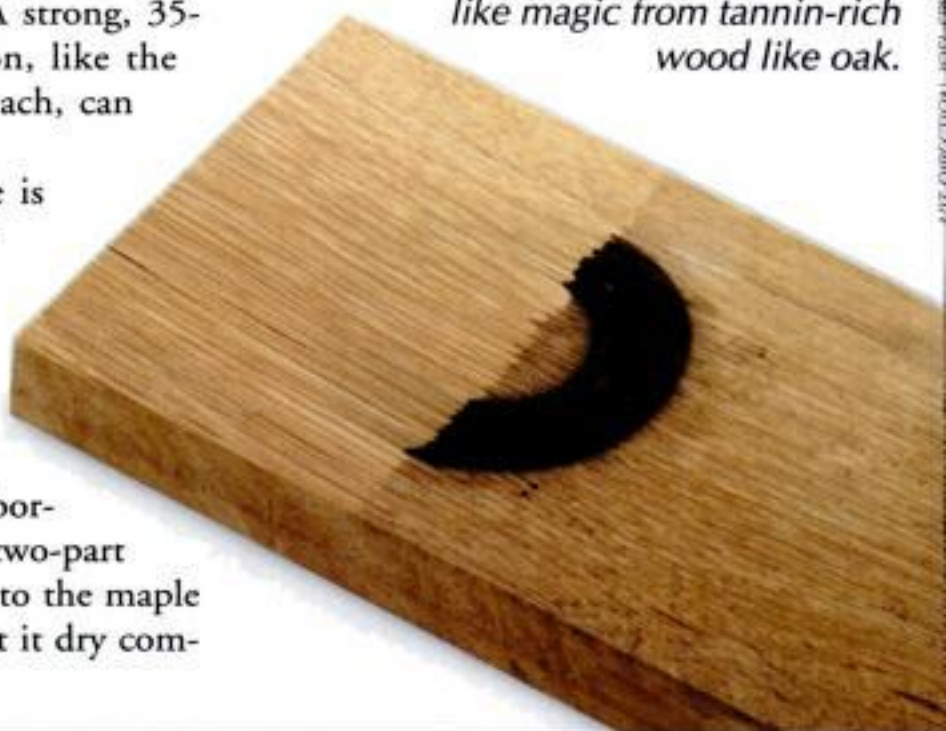
Concentrated peroxide is very caustic, so wear goggles, gloves, and a waterproof apron.

You can buy 35-percent peroxide solution from a chemical supply company, or borrow it from your box of two-part wood bleach. Flood it onto the maple with a foam brush and let it dry com-

pletely. There is no need to wash it down, since peroxide (H_2O_2) neutralizes itself to water and oxygen. In extreme cases, when the peroxide alone won't do the trick, two-part wood bleach will. ▲

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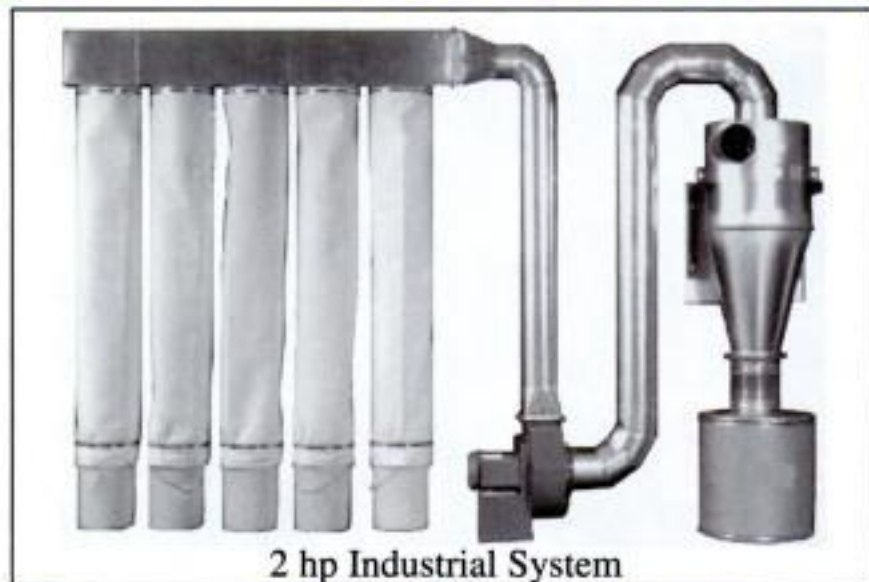
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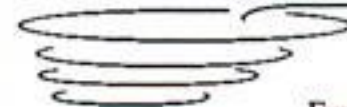


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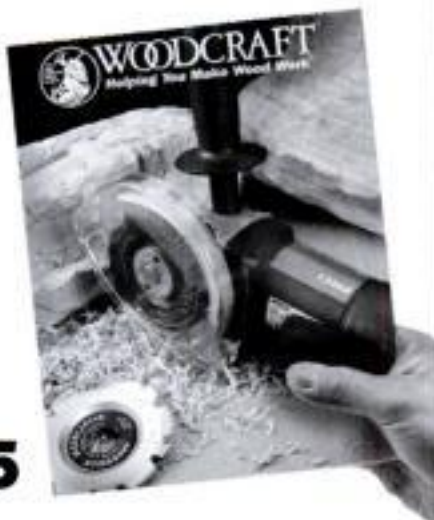
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Patio CHAIR

By Carroll Davidson



A curved seat and back make this chair extra-comfortable.

With a set of outdoor chairs like this on your patio or deck, you and your guests can enjoy the open air in comfort and style. This chair is comfortable (the seat contours were patterned after a Mercedes Benz seat!), and so simple to build you can put one together in a weekend. You'll need only basic tools: a table-saw (or radial-arm saw), bandsaw, drill press and router.

Because I live on the coast of Florida, I designed my patio chair to stand up to the ravages of salt-laden air, hot sun and heavy rain. And I didn't want a patio-full of chairs that required heavy maintenance. You can enjoy these without worrying about scraping and painting every year.

One of the tricks to building a low-maintenance chair is to select the right wood. I made these chairs

from vertical-grain cypress. The grain pattern is visually appealing, and cypress holds up extremely well outdoors, without any finish. Other suitable woods are teak, mahogany and cedar. Another secret to a long-lasting chair is to select the right hardware. I used square-drive stainless steel screws, which won't rust or stain the wood (available from McFeely's, 800-443-7937). Also, be sure to use a weather-resistant glue. I've had good luck with Titebond II, a yellow glue that's easy to work with and holds up well in moist

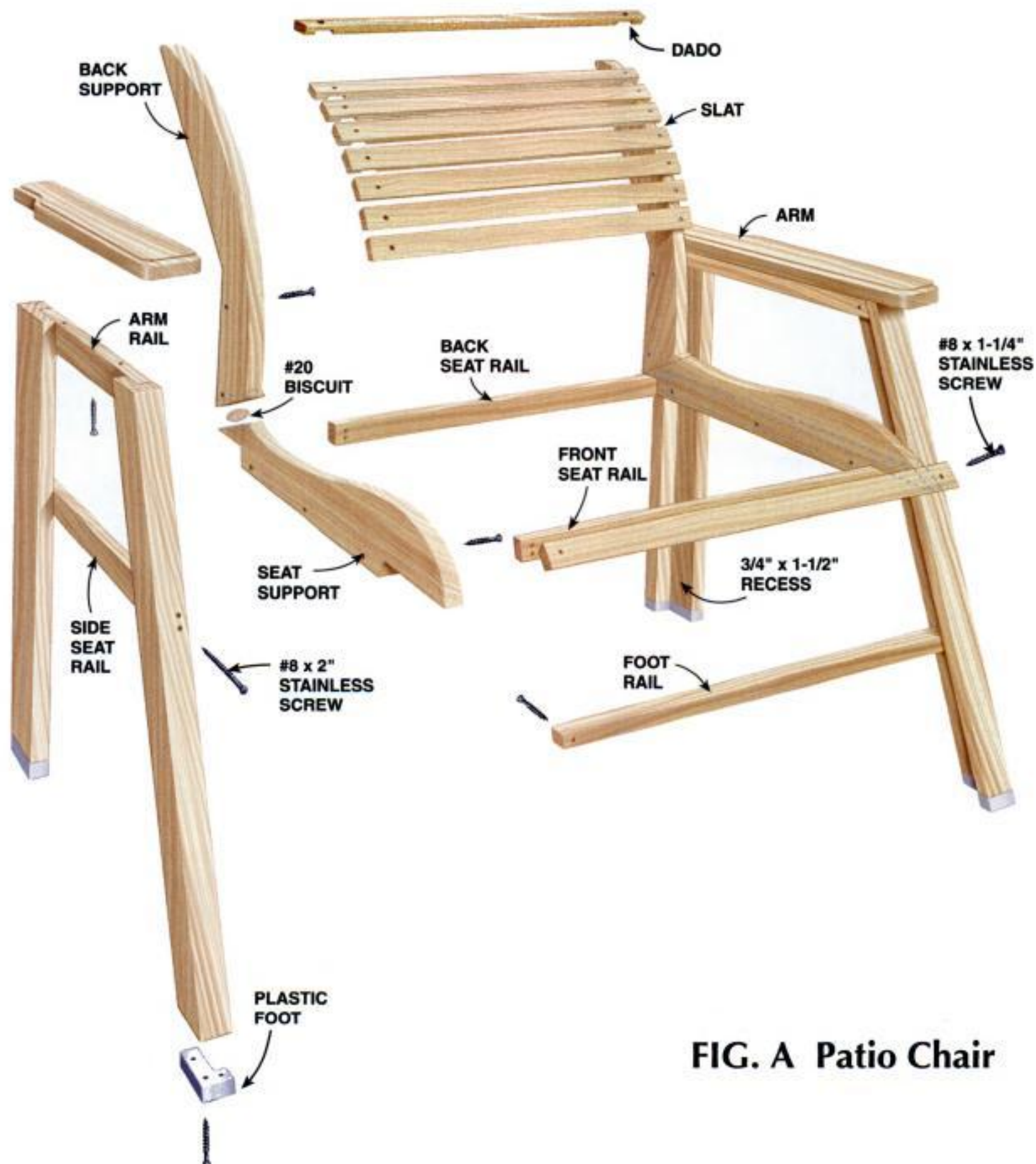


FIG. A Patio Chair

conditions. Alternative glues are resorcinol, epoxy and plastic resin. (For more on glues, see AW #34, Oct. '93). Finally, to protect the end grain of the legs and to keep them out of any surface water, I added plastic feet.

CUTTING THE FRAME PARTS

Begin construction by cutting the legs. They have an L-shape in cross-section, which I made by ripping the

center out of 1-1/2 by 2-1/4 in. stock, leaving a 3/4 by 1-1/2 in. recess. You could also glue together two pieces of 1-1/2 by 3/4 in. stock. Once you have the L-shaped stock, cut a 12-degree miter at both ends so the legs are 23 in. long. When cutting the miters, remember to make two right legs and two left legs!

Next, make the front and back rails, which have a 12-degree beveled top and bottom edge. Starting with 1-3/4 in. stock, bevel-

rip the first edge of both pieces at 12 degrees. Next, flip the boards over, reset the saw's fence and bevel-rip the other edge of both boards. The width of the board's face should be 1-1/2 in. Crosscut the two rails to length and keep the offcuts to use later as spacer blocks (Photo 1).

Cut the foot rail to length, then cut the arm and side rails to the rough length shown in the Cutting List (p. 45). They will be cut to final length during assembly.



1 **ASSEMBLE THE SIDES** on a jig to keep the legs in position. The side rails are cut to fit, using spacer blocks to stand for the front and back rails.



2 **CONSTRUCT THE FRAME** by attaching the front and back rails to the two side assemblies. A couple clamps and a spacer between the back legs will help.

FRAME ASSEMBLY

I made a jig (Photo 1) to help assemble the sides. The jig has blocks to position the legs so the outside corners are 27-1/2 in. apart at the bottom, and the legs slope inward at 78 degrees. A horizontal block locates the side rail at the correct height (Photo 1).

Place two legs on the jig, and cut one end of an arm rail to 12 degrees. Put the arm rail in position, mark the opposite end, and make the opposing miter cut so the rail fits tightly. Drill and countersink the arm rail, then attach it with glue and 1-1/4 in. screws. To assemble the seat rail, first retrieve the two beveled pieces of scrap that you saved earlier and position them on the jig (Photo 1). These are stand-ins for the front and back rails. Cut one end of a seat rail to 12 degrees, then cut the rail to fit between the legs as you did the arm rail. Remove the spacers.

With the two sides assembled, you're ready to attach the front, back and foot rails. This can be awkward for one person, so get another set of hands, if you can. A piece of scrap cut to the same length as the rails will also help.

On a perfectly flat surface, clamp the two sides, the three rails and the spacer, without glue. If everything fits, glue and screw the rails in position, foot rail first (Photo 2). Be sure to drive the eight screws that go through the front and back legs and into the ends of the side rails, because they lock the joint together.

THE SEAT SUPPORTS

The shape of the seat supports is the key to the comfort of the chair. To get a comfortable curve, I traced the seat contour of my neighbor's Mercedes, a seat revered for its relaxed fit. I made a full-size template of the curve from heavy card stock.

To make the blank for the seat support, make a 75-degree cut on the end of a 1x4, as shown in Fig. C. There are two ways to do this: Mark out the cut, bandsaw it roughly and then plane to the line; or make a jig

to clamp down the stock at a 45-degree angle, then make the cut with a tablesaw, radial-arm saw or miter saw set at 30 degrees. Save the offcut. Attach a 1x6 to the 75-degree cut face with a biscuit, using the offcut to help you clamp the joint tight (Photo 3).

When the glue is dry, saw out the shape of the seat support on the bandsaw and smooth it. Glue and screw the seat supports to the side rails, making sure that the bottom edge of each seat support is flush with the side rail. Clamping the seat support to the frame before driving the screws will make the joint tight.

THE ARMRESTS

It's now time to tackle the armrests. First make a template for the shape of the arm out of card stock (Fig. C). Bandsaw the arms to shape and sand the edges smooth. Rout the decorative cove on the upper edges.

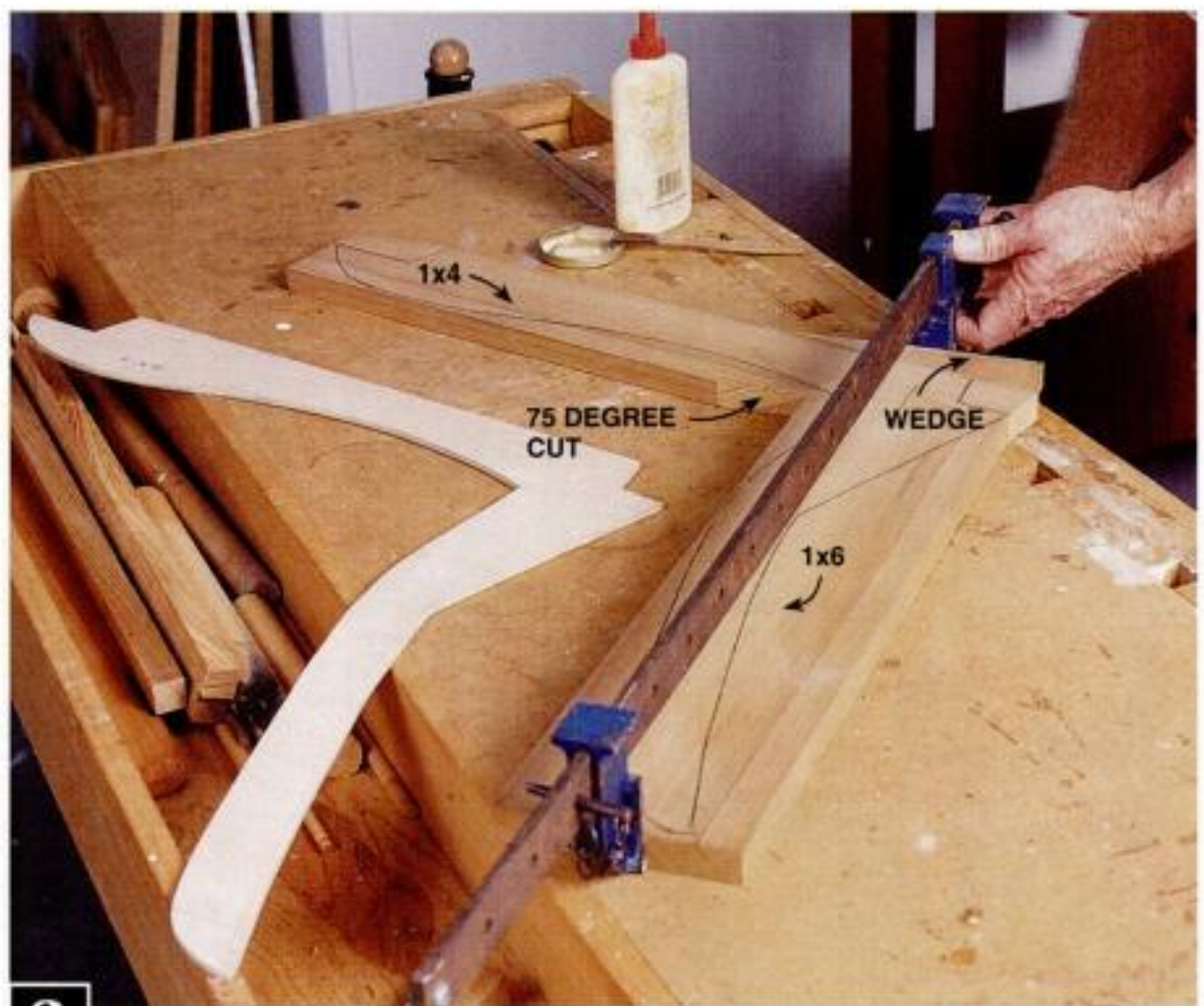
Secure the armrest to the arm rails with glue and screws. The arm should overhang the front leg by 1-1/2 in. (Fig. B). Once again, clamping the joint before screwing will result in a tighter joint.

THE SLATS

To make the slats, first cut some wide boards to 21-1/2 in. Allow enough material for 23 slats per chair, plus a couple extras. To strengthen the chair, each slat has a dado that fits over the seat support. I cut these dados in the wide boards using a radial-arm saw, with a stop block to ensure that each dado is 3/4 in. from the board's end (Photo 5). Once you've cut the dados, rip the wide boards into 1-1/2-in. strips and bevel-rip at 12 degrees to a final width of 1-3/8 in. Trim two of the slats to 20 in.—these two fit between the legs and arms.

Drill and countersink two holes in each slat, using a simple jig to keep the holes positioned correctly (Photo 6). Drill holes in the shorter slats without the jig.

Next, install the slats. Start with the three slats in front, including the 20-in. one that goes between the legs. Use

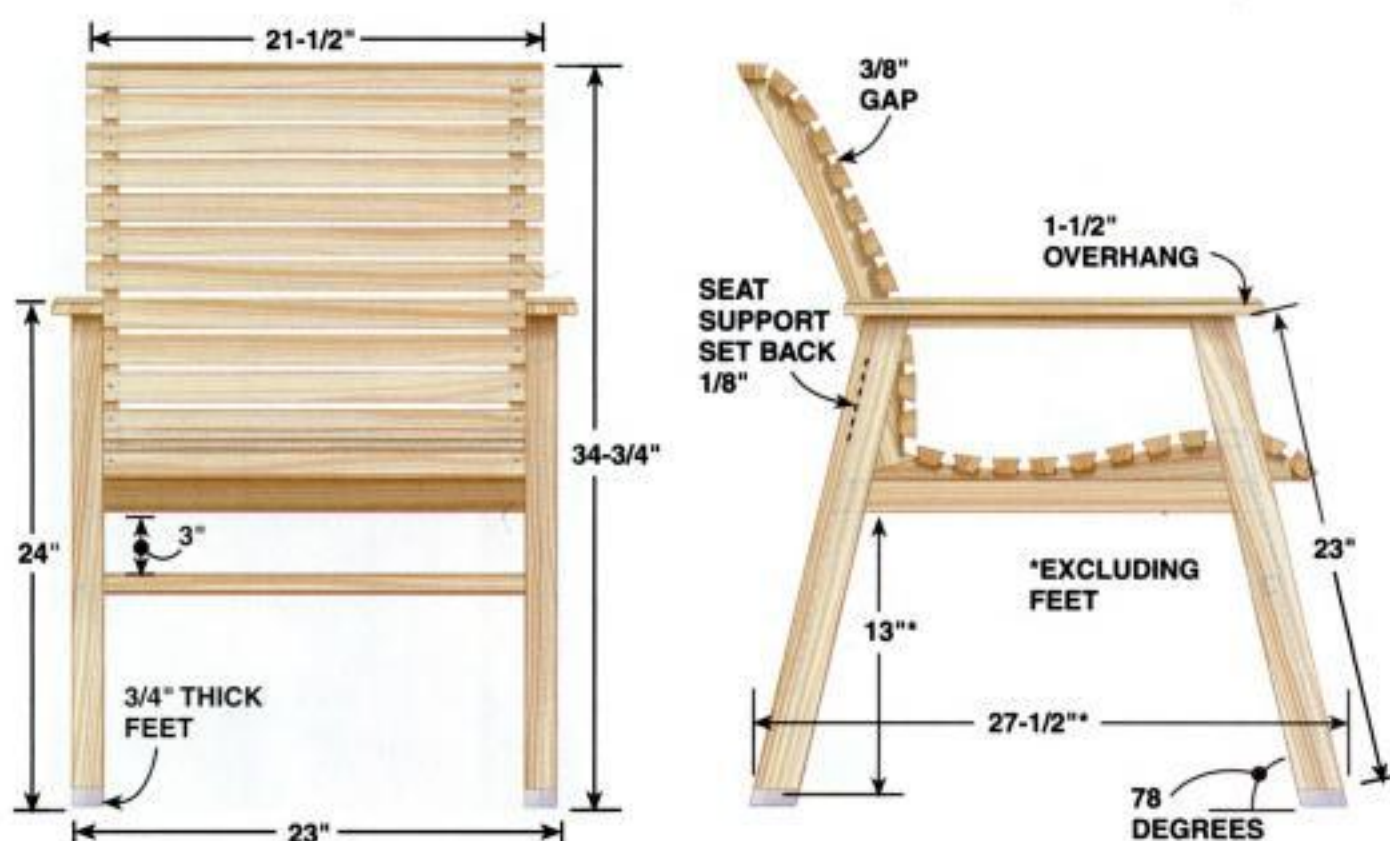


3 MAKE THE ROUGH BLANK for the seat support from a 1x4 with a 75-degree cut and a 1x6, joined with a biscuit. An angled wedge allows you to clamp the joint tight. When the glue is dry, bandsaw the seat support to shape.



4 SCREW THE SEAT SUPPORTS to the seat rail and the rear leg, checking to make sure they are parallel and 1/8 in. in from the back edge of the leg. Shape the armrests, then glue and screw them on.

FIG. B Chair Elevation



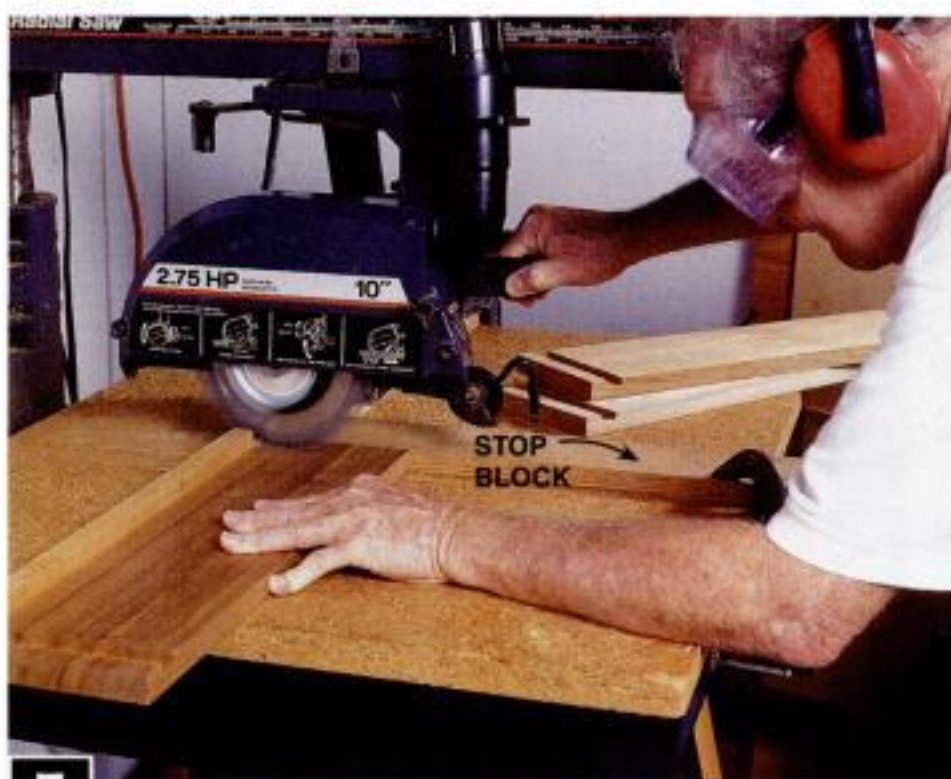
glue and screws, predrilling the seat supports for the screws. Then install a slat at the top of the back, two slats at the "crook" of the seat support, and the short one between the armrests (Photo 7). The upper edge of this slat should line up with the top of the decorative cove cut in the arms. Install the remaining slats, spacing them by eye.

PLASTIC FEET

In Florida we get some colossal rain storms. To keep the ends of the legs from standing in water, I shod them with plastic feet. They're made from ultra-high molecular weight (UHMW) plastic, that can be cut with normal woodworking tools. (Look in the Yellow Pages under "Plastics" for a local supplier.)

UHMW plastic is slippery, so the chairs slide easily on rough surfaces.

I cut the plastic into bevel-edged rectangles first, then cut them into L-shapes on the bandsaw, tilting the table to get the bevel on the final inside cuts. Again, make sure you have two right and two left feet. Counterbore and drill the feet, then screw them into the bottom of the legs.



5 **DADO THE SLATS** before they're ripped to width, using a stop block to ensure consistent location. Then rip the slats and bevel their edges.



6 **DRILL AND COUNTERSINK** the slats, using a drill press and simple jig to get the holes properly located. Two slats must be cut short and drilled separately. One fits between the legs and one between the arms.

FIG. C Chair Parts

Arm

Back Support

SQUARES
EQUAL 1/2"

75 DEGREE
MITER

Seat Support

FINISHING

Cypress naturally weathers to a beautiful silver gray. An annual coat of a water-repellent preservative with UV inhibitors and a fungicide, like Thompson's Wood Protector (available at home centers), will keep the wood looking its best. ▲

CARROLL DAVIDSON IS AN ENTHUSIASTIC HOME WOODWORKER. HE LIVES SOUTH OF MIAMI, FLORIDA WITH HIS WIFE, HELEN.



7 INSTALL THE SLATS beginning with the three in front, then the top of the back, the two in the "crook" of the seat, and the short slat between the arms. Fill in the remaining slats, spacing them by eye.

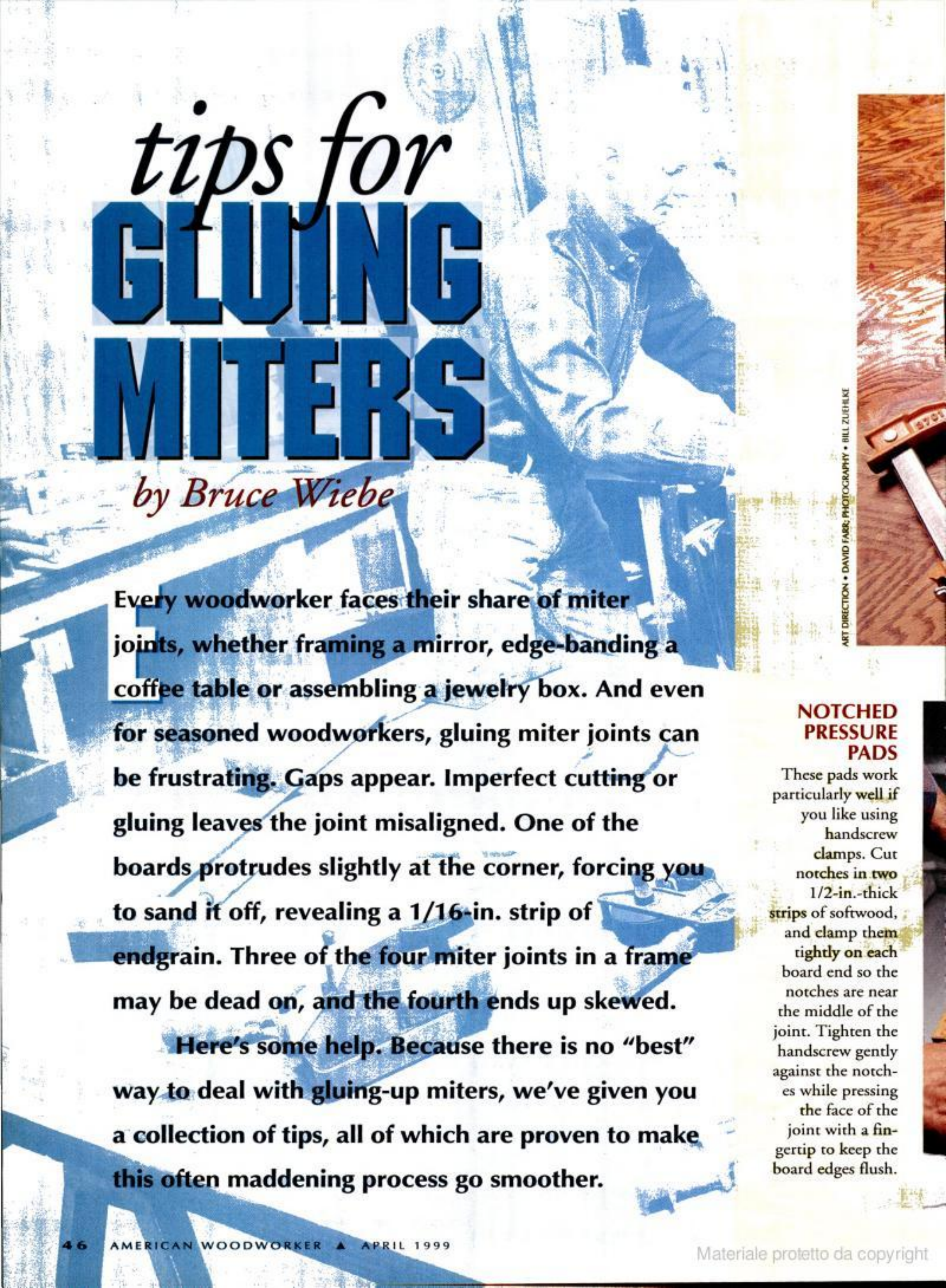
CUTTING LIST

PARTS	PCS.	DESCRIPTION
Legs	4	1-1/2 x 2-1/4 x 23
Arms	2	3/4 x 2-1/2 x 20
Arm rails	2	3/4 x 3/4 x 17*
Side seat rails	2	3/4 x 1-1/2 x 19-1/2*
Front seat rail	1	3/4 x 1-1/2 x 21-1/2
Back seat rail	1	3/4 x 1-1/2 x 21-1/2
Foot rail	1	3/4 x 3/4 x 21-1/2
Back supports	2	3/4 x 5-1/2 x 20
Seat supports	2	3/4 x 3-1/2 x 23
Slats	21	3/4 x 1-3/8 x 21-1/2
Back slat	1	3/4 x 1-3/8 x 20
Seat slat	1	3/4 x 1-3/8 x 20
Plastic feet	4	3/4 x 1-1/2 x 2-1/2 (bevel to final length of 2-1/4)

*Cut to final length during assembly

HARDWARE

- 2 #20 biscuits
- #8 x 1-1/4 stainless-steel screws, as needed
- #8 x 2 stainless-steel screws, as needed



tips for **GLUING MITERS**

by Bruce Wiebe

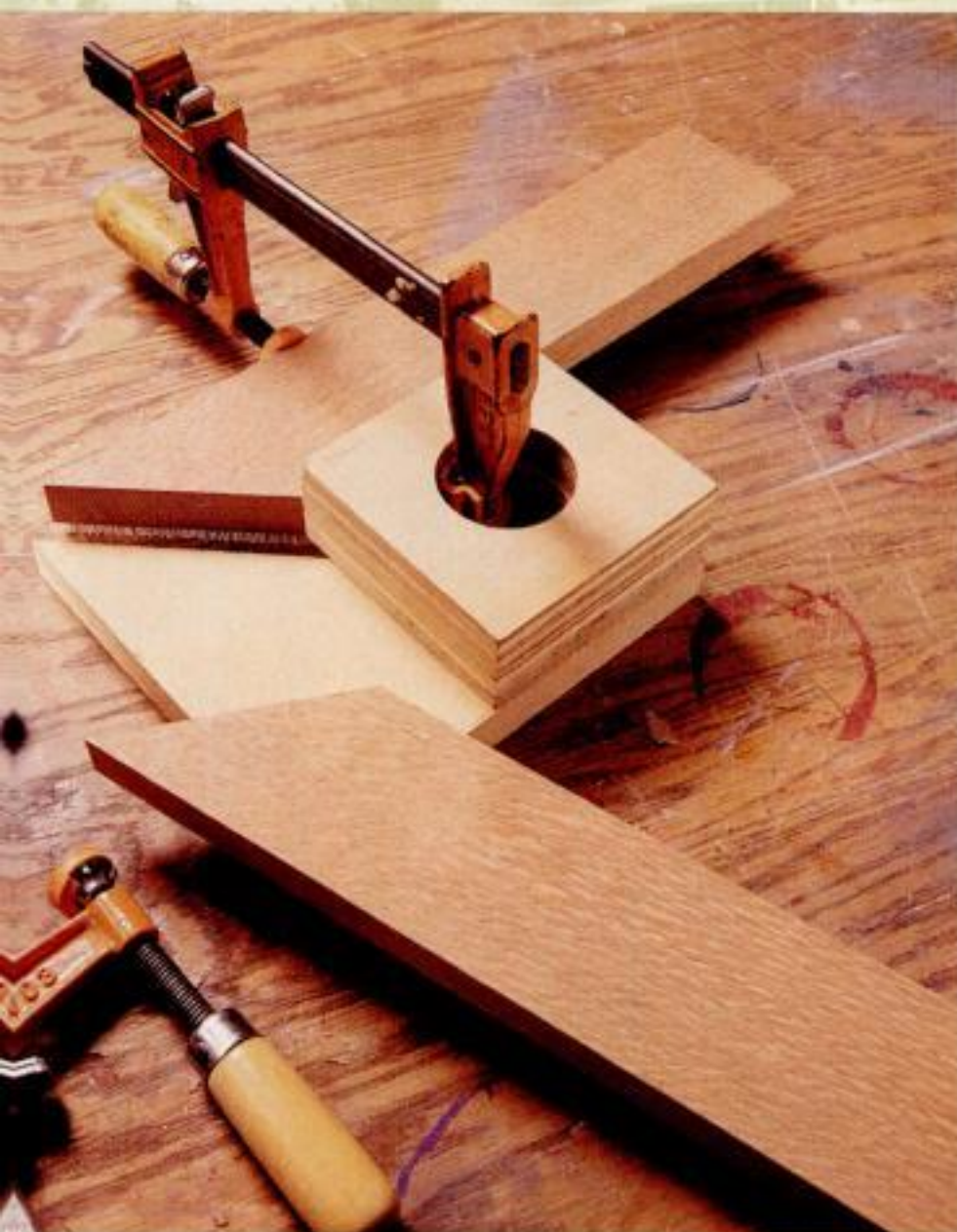
Every woodworker faces their share of miter joints, whether framing a mirror, edge-banding a coffee table or assembling a jewelry box. And even for seasoned woodworkers, gluing miter joints can be frustrating. Gaps appear. Imperfect cutting or gluing leaves the joint misaligned. One of the boards protrudes slightly at the corner, forcing you to sand it off, revealing a 1/16-in. strip of endgrain. Three of the four miter joints in a frame may be dead on, and the fourth ends up skewed.

Here's some help. Because there is no "best" way to deal with gluing-up miters, we've given you a collection of tips, all of which are proven to make this often maddening process go smoother.

NOTCHED PRESSURE PADS

These pads work particularly well if you like using handscrew clamps. Cut notches in two 1/2-in.-thick strips of softwood, and clamp them tightly on each board end so the notches are near the middle of the joint. Tighten the handscrew gently against the notches while pressing the face of the joint with a fingertip to keep the board edges flush.

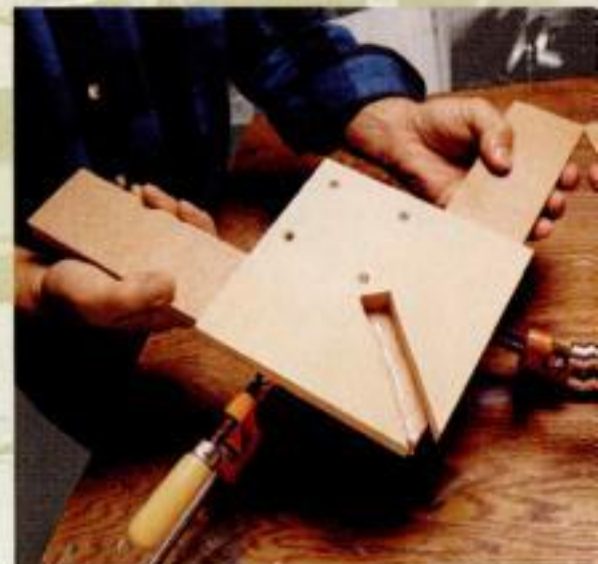
ART DIRECTION • DAVID FARR; PHOTOGRAPHY • BILL ZUREIKE



BORED BLOCK ON SLOTTED BASE

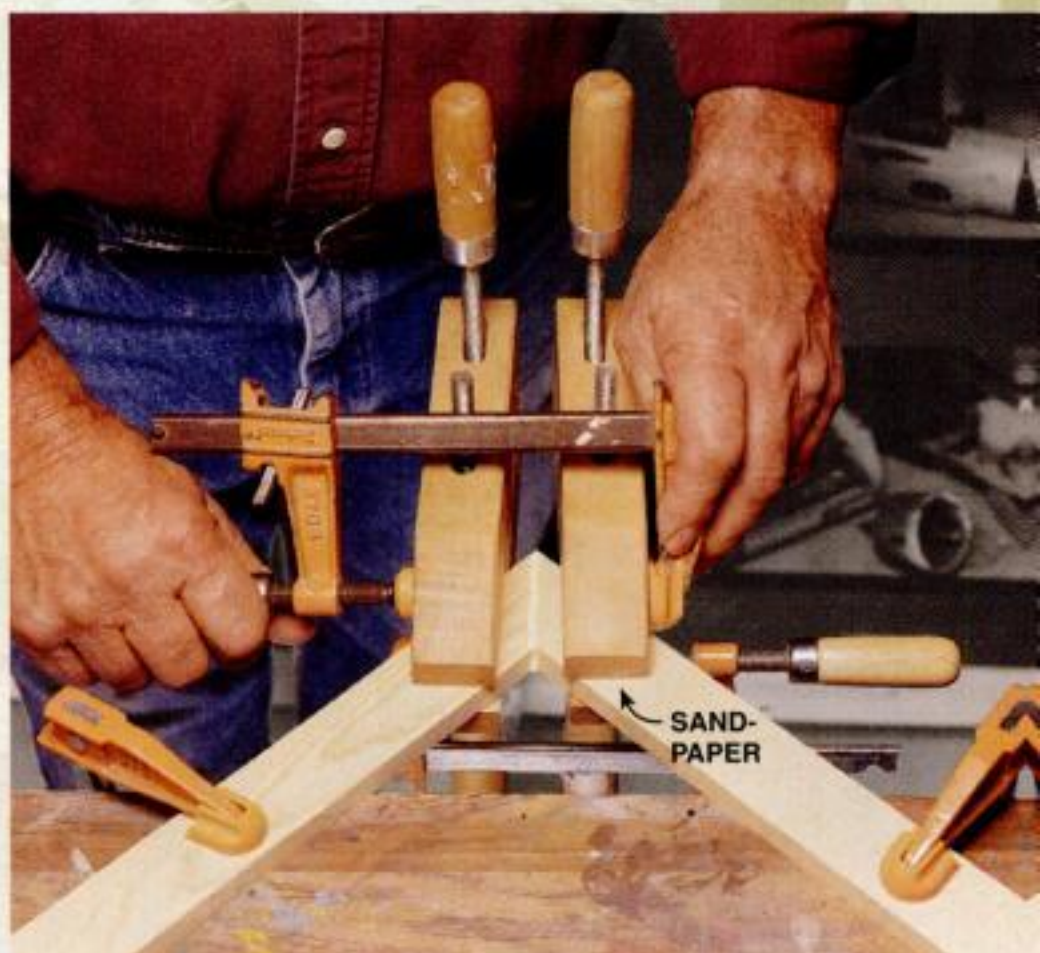
This benchtop gluing jig lets you see, and adjust, both faces of the miter joint while clamping it. Hold the joint tight, without glue, while you clamp one board in place. Then apply glue to both mitered faces. Push the unclamped board into place, then add the second bar clamp.

To make this jig, cut a diagonal notch halfway across a 7-in.-square piece of medium-density fiberboard. The notch lets you see if the joint is closed on the underside, as well as letting the glue dry thoroughly. For the clamping block, glue together two 4-in. squares of plywood, drill a 2-in. hole in the middle, and screw this assembly to the fiberboard with one square corner over the slot. Be sure the corner of the block is square, or your precisely-cut 45-degree joint faces won't be flush when you clamp them together.



HANDSCREWS WITH SANDPAPER JAWS AND BAR CLAMPS

Put strips of 60-grit sticky-back sandpaper in the jaws of two handscrews and clamp them parallel on either side of the joint. Now draw the joint closed by clamping the handscrews together with bar clamps on top and bottom.



tips for **GLUING MITERS**

STACKED PLYWOOD TRIANGLES

If you're gluing a box with mitered corners, cut several plywood triangles, and screw them together into a triangular block.

Cut off the inside corner so it doesn't interfere with the joint. Without glue, clamp the boards onto the triangular block, and when the joint's perfectly aligned, remove one board, apply glue, and reclamp.



MASKING TAPE

Masking tape works well on wider miter joints that don't bear much weight, as in a jewelry box. Tape the joint along the middle section first, apply glue, and close the joint. Now stretch tape at 45-degree angles on both corners. Allow plenty of time for the glue to dry when you use tape, because you're limiting air circulation.

PACKAGING TAPE AND WEB CLAMPS

The strong adhesive and tough plastic of packaging tape allow it to work as a hinge on long, mitered corners. After carefully cutting the miters, lay the boards outside-face up and side by side so their sharp edges touch. Apply strips of tape along each joint, pressing the tape firmly onto the wood, then flip the boards and apply glue. Use web clamps to tightly hold the joints together, and wipe the squeeze-out from the inside corners. Again, allow the glue to dry thoroughly before removing the clamps and tape.



tips for **GLUING MITERS**

BESSEY MITER CLAMP

This clamp works like a dream. At \$128 each, though, it's an expensive dream. A sliding block pushes on the inside of the joint to snug it against two pivoting, soft-jawed pressure pads. The pivoting pads work like a pair of thumbs to align the joint perfectly as they apply pressure. If you make a lot of miters, this clamp is a godsend.



PIVOTING JAW CLAMP

This clamp, with pivoting jaws and razor-sharp teeth, works great for single miter joints. But the barracuda-like jaws leave nasty scratches on the wood, so tape or clamp softwood strips on the corners to shield the project pieces. Reasonable at \$13 each.





BESSEY BAND CLAMP WITH PIVOTING CORNERS

If you're building smaller miter joints, give this clamp a try. It works especially well for assembling narrow frames that don't require a ton of clamping pressure. It has a geared winder that tightens and rolls up the band on both sides, and a handle you twist to increase the pressure. Slotted angle-clips press on each corner keeping pressure uniform. The jaws on the circular clips adjust to any angle. \$31 for the clamp and four angle clips. A box of six extra clips costs \$14.



BANDING MITERED EDGES

When you're finishing a plywood tabletop or cabinet door with mitered edging, cut four short pieces with a 45-degree angle on one end. The short pieces work great to help size and locate the edging. Tape and clamp the short pieces in place on two of the opposite faces, then glue on the first two edging strips. Remove the short blocks so they don't get glued on. ▲

SOURCES

Bessey Miter and Band Clamps are both available from American Clamping Corp., (800) 828-1004.



Beautiful Boule Work

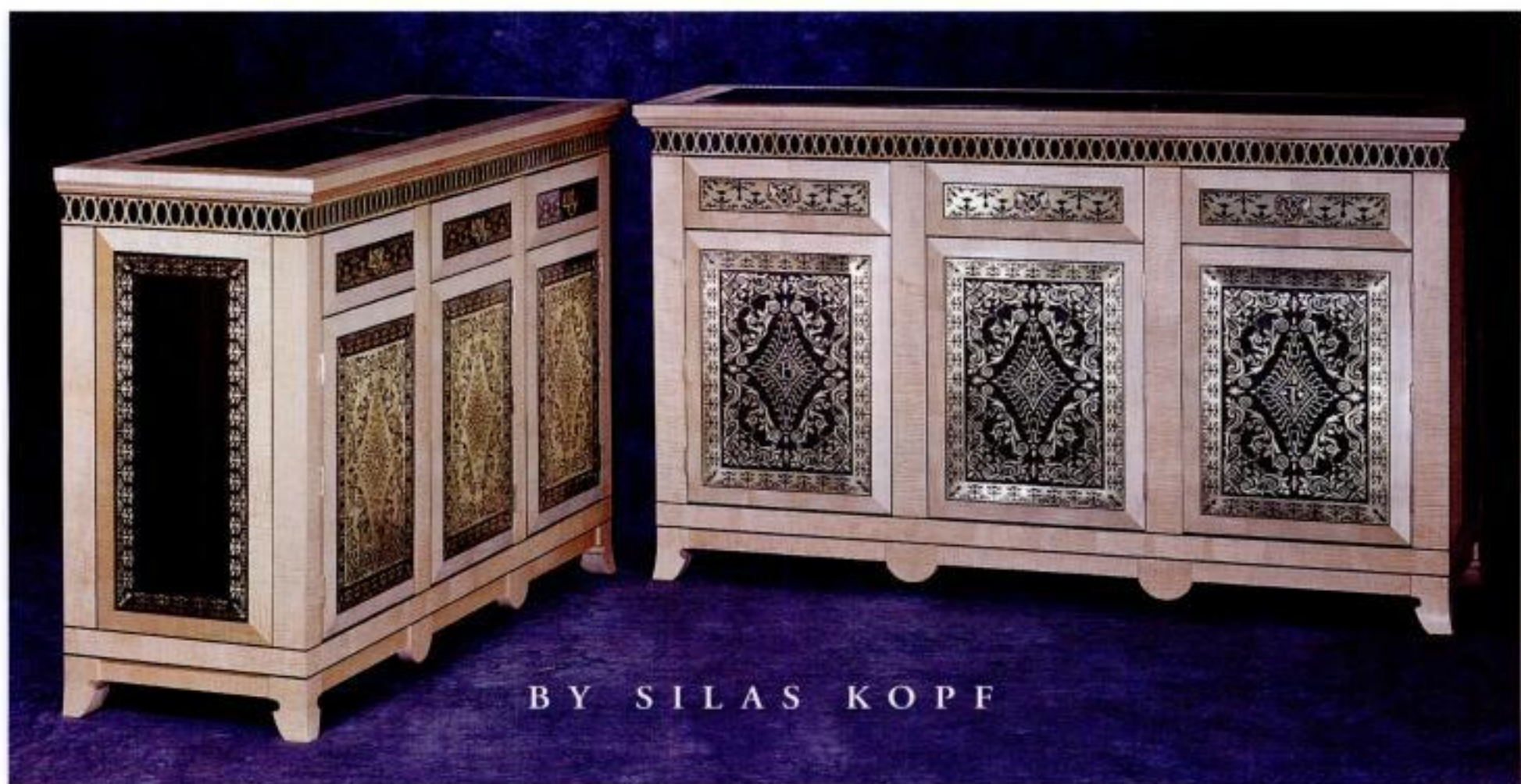
A MASTERPIECE OF

INLAID INTRICACY BEGINS
WITH A SANDWICH OF
BRASS SHEET, WOOD VENEER
AND WAXED PAPER.

*P*lus c'a change, plus c'est la même chose." This centuries-old French expression translates something like this: "The more things change, the more they stay the same." It's a bit of wisdom that seems appropriate for woodworkers. Though technological advances can change our tools and methods of work, we often work to standards that artisans established hundreds of years ago.

The marquetry and inlay work I do

today is inspired by and measured against the skill and creativity of woodworkers who have practiced the craft for 500 years. Most notable among these artisans was André-Charles Boule, whose last name is often used to describe the inlay technique that I used on the commodes shown here. During his lifetime (1642 - 1732), Boule supplied French royalty with furniture that was incredibly rich in surface ornamentation.



BY SILAS KOPF



THE ESSENCE OF BOULLE WORK is cutting intricate patterns in a packet consisting of thin brass sheet, dark-colored veneer, waxed paper, and sacrificial veneers, that are placed on the outside for stiffening. Veneer tape holds the layers together.

Boulle's inlay materials included tortoiseshell, brass, pewter and even animal horn. For contrasting woods, he often used rosewood, ebony, kingwood, and other dense, dark-toned tropical species.

Boulle's marquetry technique was to make two contrasting sheets of intricate inlay that were cut from a single sandwich of materials. If the sandwich, or packet, contained two layers that were light and dark, the two final products would be a sheet with a light pattern on a dark background, and a reversed sheet, with a dark pattern on a light background. One sheet would have been considered the primary pattern, in French the *première partie*. The opposite pattern was called the counterpart, or *contrapartie*. By sawing both patterns out of one packet and reassembling them on two trays, the background of the *première partie* becomes the motif of the *contrapartie*. Boulle made cabinets with both patterns in a single piece, or pairs of contrasting cabinets.

Preparing the Packet

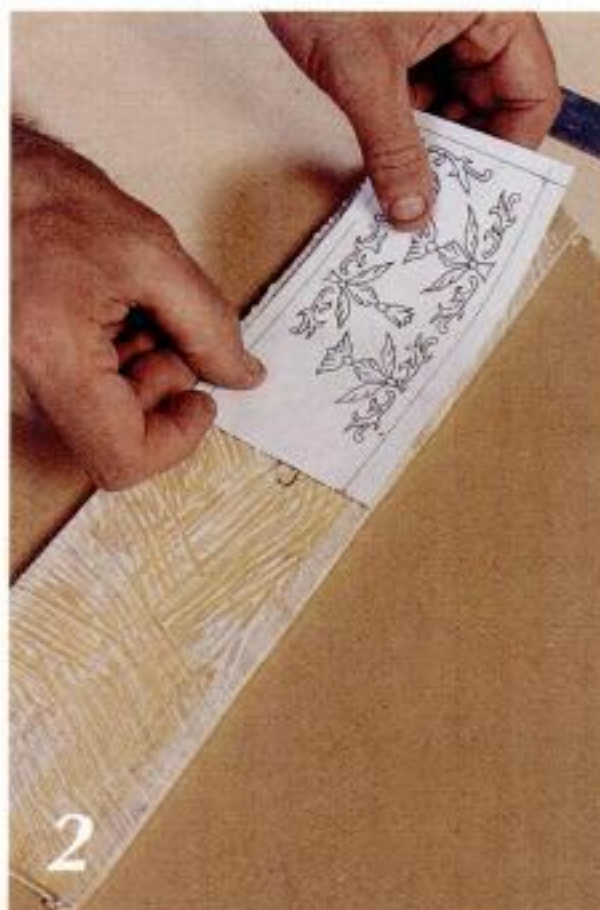
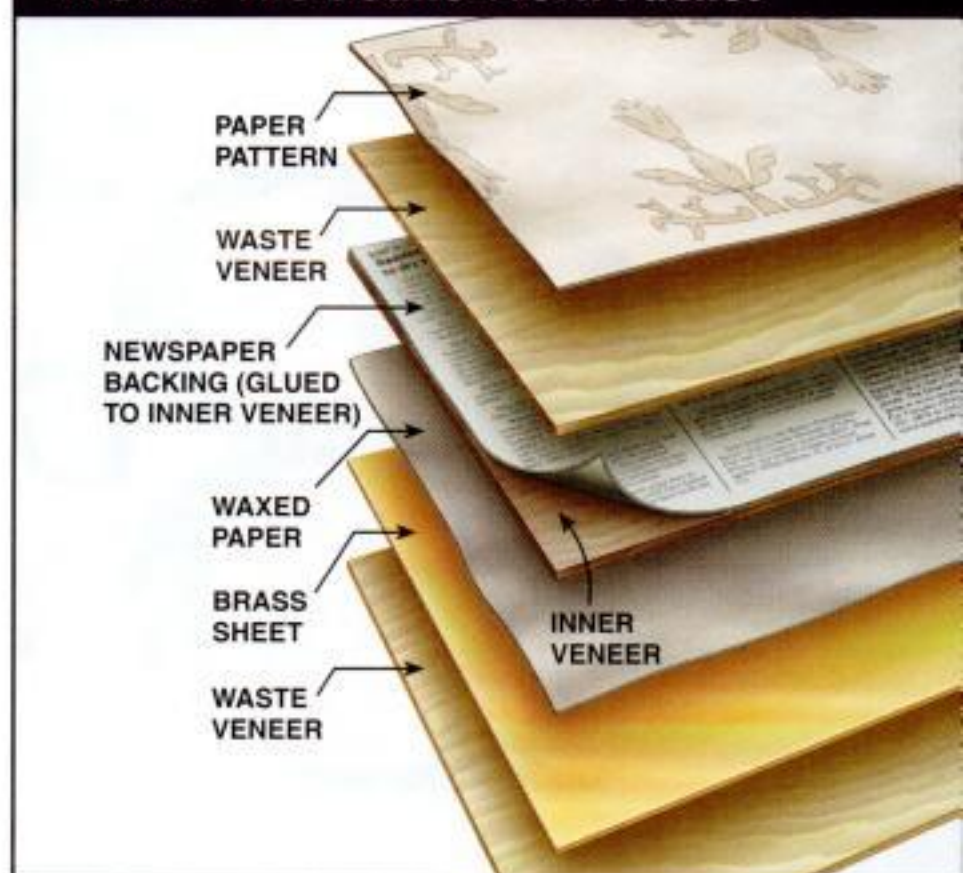
I have developed a way to do Boulle marquetry with modern tools and materials. This Boulle project uses two materials: sheet brass and dark bog oak veneer. They are assembled into a packet (Fig. A) with a sheet of waxed paper, backing layers of thick

veneer, and the pattern.

I use standard brass that is .032-in. thick and veneer that I saw myself and sand down to exactly the thickness I need. This veneer should be slightly thicker than the brass, to make the final cleanup easier (Photo 9). It's a lot easier to sand down wood to make

it flush with the brass than vice versa. For this leveling process I have found that the veneer I make on the band-saw holds up better than regular sliced veneer because the wood fibers haven't been crushed. Even so, I glue a piece of newsprint to one side of the veneer with hide glue to strengthen

FIG. A The Boulle Work Packet



THE PATTERN IS GLUED ON to the packet using yellow glue. After sawing the packet, it's possible to separate the layers, so that two complementary inlaid sheets can be made.



DRILL STARTER HOLES for the scroll-saw blade inside every motif, using a tiny drill bit. The best place to locate these holes is in sharp corners, where they'll be hard to notice.



CUT OUT THE PATTERN using a scrollsaw with an extremely fine blade. Cut directly on the lines.

the veneer when I cut the packet on the jigsaw. The brass is scuffed with a piece of fine hacksaw blade on the side that will be glued down to the cabinet. I use 1/16-in. thick poplar veneer for the two outermost veneer pieces, which are sacrificial—they only serve to stiffen the packet. The wax paper lubricates the saw blade.

When you make up your own Boulle packet, each layer should be the same width and length. Assemble the layers with veneer tape and use yellow glue to fasten the pattern on top (Photo 2).

Intricate Cuts

Before you begin cutting, drill starter holes for the scrollsaw blade in every motif (Photo 3). I usually put them at the apex of sharp corners so they're less noticeable. I use a No. 60 (.04 in.-dia.) bit for this work ([see Sources, p. 57](#)).

[You can do the pattern cutting by hand using a fretsaw, but I prefer to use an Excalibur parallel-arm scrollsaw and a superfine No. 1 wood-cutting blade with at least 20 tpi \(\[see Sources, p. 57\]\(#\)\). The advantage of the scrollsaw over sawing by hand with a fretsaw is that it keeps the cut square to the work and allows you to maneuver the work with both hands.](#)

I generally start sawing near the center, so the packet is supported fully by the saw table (Photo 4). This is espe-



ARRANGE THE CUTOUTS on a felt-covered board that is larger than the finished sheets will be. When you're done, separate the packet and you'll have a wood background and a brass background, each with the pattern cut in it.

cially important if there is a motif with lines inside other parts. Despite the minuscule size of the blade, it can still be hard to saw crisp points. I run the blade back and forth, turning it slightly each time. This "carving" usually broadens the kerf enough for a tight turn. When I get near the end of a cut, I slip a piece of cardboard under the packet to support the motif. This also prevents tiny cutouts from falling through the hole in the saw table. The leaves on this particular design have veins, made from saw kerfs, which will be filled with dark epoxy during final glue-up.

As I cut individual motifs free, I place them on a felt-covered tray that is larger than the final piece (Photo 5). The felt grips the pieces, preventing them from sliding and getting lost. You can discard the wax paper and

sacrificial veneers as the motifs are cut out, but keep the brass and wood layers together.

Preparing the Inlay Pieces for Gluing

When you're done cutting, you'll be left with two "grounds," the large pieces into which the inlay will be placed. One is wood, into which the brass will be inlaid (the *première partie*), and the other is brass, into which the wood will be inlaid (the *contrapartie*). Glue a piece of kraft paper to the top side of each ground, using yellow glue or hide glue. This creates a bottom for each of the cavities where a motif will go.

I typically assemble the *première partie* and *contrapartie* at the same time (Photo 6). Glue the brass piece into the wood ground, then glue the



ASSEMBLE THE INLAID SHEETS by gluing both the ground and the inlaid cutouts onto a piece of kraft paper, using yellow glue. This will hold all the pieces together. Keep the gap around each piece even.

corresponding wood piece into the brass ground. Use a small dab of yellow glue on the back of each motif. You're putting the assembly together upside down, so you should be gluing down the shiny side of the brass and the papered side of the wood. Do your best to keep the kerf from the saw blade even all around each motif.

Gluing the Inlaid Panels

With the inlaid pieces glued to the kraft paper, you're ready to glue them to the substrate that you will use in the cabinet construction. Traditionally, hot hide glue was used in this step, but I prefer the strength and workability of epoxy (Photo 7). It holds the scuffed brass and wood veneer to the substrate and fills the voids left by the saw blade, including those of the leaf veins. I use black wood dye to darken the epoxy so it matches the color of the bog oak.

For the cabinets shown here, I used MDF as a substrate, cutting the core pieces oversize so they can be trimmed later on the tablesaw. You can do the glue-up with clamps, a press (as I did), or vacuum equipment. Lay up the panel as follows: On the bottom place



COAT THE SUBSTRATE to which you plan to attach an inlaid sheet with epoxy. In this case, the glue was colored black to match the dark veneer. The epoxy fills the kerf left by the saw blade and firmly glues both wood and brass.

a thin sheet of rubber. This will absorb the bumpiness of the panels, with their differing thicknesses of brass and wood. For one-time use, non-corrugated cardboard will do. On top of the cushioning layer, lay newspaper or wax paper to prevent the epoxy from sticking to the cushion. Next, place the inlaid sheet, with the scuffed side of the brass up. Coat your core piece liberally with epoxy and turn it upside down on the inlaid sheet. Coat the other side of the core with epoxy, and cover with a piece of backer veneer. Top with a newspaper, a caul, and then clamp (Photo 8).

Cleaning Up the Panel

The panel will be plenty messy when it comes out of the press, but it's immensely rewarding to watch the inlaid pattern emerge during clean-up.

Use a cabinet scraper to remove the paper (Photo 9), then switch to a double-cut bastard file, working from all directions. Don't file too vigorously, or the heat will soften the epoxy. I usually switch back and forth between the two panels so they stay cool.

When the designs begin to appear, switch to hand sanding (Photo 10).



PRESS THE ASSEMBLY until the epoxy sets. You should epoxy a veneer to the back of the substrate for stability, and use a rubber or cardboard cushioning layer against the inlay work, because it's bumpy.



9 SCRAPE THE PAPER OFF the finished panel, using a cabinet scraper, and then use a file in all directions to level the panel. Work slowly so the brass stays cool; heat breaks down the adhesive.



10 FINISH BY HAND SANDING, using a hardwood block behind the paper to keep the work flat. Start with 80 grit and progress to 400. When you're done, lacquer the panel to keep the brass from tarnishing.

INTRICATE INLAID PATTERNS have been made for centuries. The author's cabinets capture the glory of the traditional Boulle technique, with modern tools and materials.

Although this is tedious, it's necessary to avoid heating the brass. Any voids that you discover can be filled with the tinted epoxy.

Trim and Finish the Panels

Once the panels are clean and flat, they can be trimmed to fit the intended cabinetry. Brass is soft enough to be cut with carbide-tipped blades, but use a high-quality ATB combination blade. The brass will tarnish unless it has a protective finish. Traditionally shellac was used, but I prefer sprayed-on lacquer. ▲

SILAS KOPF HAS BEEN PRACTICING BOULLE WORK, AND OTHER FORMS OF FURNITURE MAKING, FOR MORE THAN 25 YEARS.



SOURCES

Brass sheet stock (.032) and No. 60 .04-in.-dia. drill bits: Cardinal Engineering, Inc., 2211 155th Street, Cameron, IL 61423; (309) 342-7474; cardinal.eng@misslink.net
No. 1 scrollsaw blades: Woodcraft, 210 Wood County Industrial Park, P.O. Box 1686, Parkersburg, WV 26102; (800) 225-1153; www.woodcraft.com

Deep Hollowing Lathe Tools

A guide to systems for turning deep, thin-walled vessels

by Steve Blenk

After mastering spindles, plates, and bowls, it's natural for a turner to try his or her hand at creating deep, hollowed-out vessels. However, blindly cutting out the interior of a vessel through a small opening can be nerve-racking. The tool must often overreach its rest by 6 in. or more, which invites chisel flex and vibration. And because the handle on a standard lathe tool is often too short to provide good leverage, the tool can catch and twist in your hands.

Fortunately, there are specialized tools for turning deep, hollow vessels. I tested eight innovative systems specifically designed for the job. Most have long, beefy shanks and oversized handles to reduce vibration and improve leverage. Many have articulating tips that can be adjusted to cut at an angle to the handle. Some adjust enough to easily cut a reversed surface, such as the underside of a vessel's top.

To test the systems, I turned hollow vessels from seasoned, eastern maple and wet, green timber. I assessed vibration and quality of cut as the tools cut 6 to 10 in. beyond the tool rest and up to 6 in. off the center axis of the lathe. All the work was done on 12-in. and 16-in. Delta lathes.

Although each of the systems outperformed standard lathe tools, there are lots of differences in performance and price. I've summed up my findings in the reviews that follow.

Turn with the right tools.

Thin-walled, hollow vessels can be very difficult to make with standard lathe tools. Fortunately, tool manufacturers have responded to the challenge with deep hollowing turning systems designed specifically for the job. (Note: The vessel shown in the photos that follow was cut away to expose each tool's cutting angle.)

Materiale protetto da copyright



Oneway Boring Bar

PRICE: \$250

The Oneway Boring Bar is a torque-arresting system. The front end of the cutting bar is supported by a conventional tool rest, but an outrigger on the rear half fits through a secondary, slotted rest to eliminate tool twist. This setup preserves the feel of ordinary lathe work, although the cutter moves in only one plane. The teardrop-shaped, high-speed steel cutter can be rotated to offer different cutting radii to the workpiece. A 12-volt light mounted to the bar helps the turner gauge vessel-wall thickness. **SOURCE:** Oneway Manufacturing, 241 Monteith Ave., Stratford, Ontario, Canada N5A 2P6; (800) 565-7288.

PROS: Experienced turners will appreciate the feel of this torque-arresting system. The tool moves easily in the rest, and the tubular bar won't damage the edges of vessel openings. The system does a great job of eliminating torque, and allows very fine control of the cut. I found vibration to be minimal, even at a 10-in. rest overhang. The cutter holds an edge very well and can be easily rotated. The light provides a great wall-thickness gauge. I had no problems turning 1/8-in. thick walls on blind vessels.

CONS: I found the teardrop-shaped cutter to be relatively inefficient for heavy stock removal. The swing of the tool seemed overly restricted by the secondary rest, which could be wider. The diameter of the bar, the light and the size of the cutter don't allow for vessel openings smaller than about 2 inches.

SUMMARY: A great system for turning very thin-walled vessels, as long as you don't mind fairly wide openings.



HM-1 Hollowing System

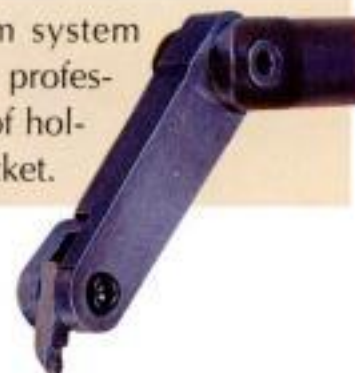
PRICE: \$1,200

The HM-1 Articulated Hollowing System is designed for turning large, hollow vessels with small openings. Extension arms of graduated length can be connected to the main bar to extend the cutter a whopping 7 in. from the lathe's central axis. The 3/16-in.-radius round-nose cutters are available with flat-face or a 12-degree relief, for more of a shearing attack. A slotted table rest prevents the bar from kicking up and an outrigger on the tool's shaft restrains twist. A caliper can be attached to gauge wall thickness. **SOURCE:** Maple Specialties, 43306 SE North Bend Way, #1 and #2, North Bend, WA 98045; (800) 409-9663.

PROS: This finely crafted system allows a savvy turner to create highly unusual shapes. The tool slides easily on the table, and the torque and kick restraints work great. I experienced no vibration or catching at a 10-in. rest overhang, and cutting 6 in. off axis was child's play. You can articulate the cutter extensions while still inside a vessel, allowing you to really turn the corner at the bottom of a long neck. The caliper gives accurate wall-thickness readings, and all tool adjustments are quickly made with a single T-handle hex key.

CONS: Initial setup takes some time, and learning to turn uniformly thick walls takes some practice, as the tool tends to cut more quickly than you expect. But a scraper tip, expected on the market soon, will help deal with this problem. The caliper is accurate, but tends to get in the way. I removed it for all but the final cutting.

SUMMARY: This is a premium system with a price tag to match. For the professional seeking to stretch the limits of hollow-vessel turning, this is just the ticket.





Stewart System

PRICE: \$238

The Stewart System is designed around a unique brace that cradles the turner's forearm while allowing a natural hand-grip on the handle. Straight or offset bars are locked into the brace, and various scraper cutters are locked into the end of the bars. You can swivel the cutter on the offset bar. Small 3/16- or 1/4-in.-radius cutters do the primary cutting, and a larger, teardrop-shaped finish scraper offers a choice of radii for cleaning up the primary cuts. **SOURCE:** The Cutting Edge, 7123 SW Freeway, Houston, TX 77074; (800) 790-7980; www.cuttingedgetools.com

PROS: I like the positive control of the Stewart System. It offers good leverage even at a 10-in. rest overhang, and vibration is minimal. The swivel tip, in combination with the offset holder, allows reverse cutting, and it's easy to maneuver the cutters into a vessel with a small opening. The 3/16-in.-radius cutter removed stock well without catching heavily, and the finish scraper effectively smoothed the tooling marks. The optional wall-gauge tool (\$43) is valuable when turning thin-walled vessels.

CONS: I don't like being locked into the brace. If the cutter seriously catches, the turner risks damaging his or her shoulder. The swivel-tip bolt tended to loosen under vibration when used on hard, dry material, but a longer bolt with a lock nut eliminated the problem.

OPTIONS: Many optional configurations, including various scraper tips and even a coring slicer.

SUMMARY: A very flexible system for an experienced turner. The grip feels tailor made. It gives a great feel for the work, especially when working blind in a closed vessel. Just be careful to keep it from catching.



Exocet System

PRICE: \$375

The Exocet system takes a different approach to cutting. Rather than using a scraper-type cutter, it employs a sharpened, ring-type shear cutter—a variation on traditional hook tools. An adjustable limiter caps the cutter, controlling the depth of cut and eliminating the biggest problem of hook tools—the uncontrolled catch. The system comes with a straight shaft, an offset shaft, and two different cutter profiles. **SOURCE:** Craft Supplies USA, 1287 E. 1120 S., Provo, UT 84606; (800) 551-8876.

PROS: The ring-type cutter leaves a much cleaner surface than a scraper, and removes material remarkably fast. The limiter adjusts quickly and smoothly for anything from a hogging cut to a fine, finishing slice. The double-ended ring cutters provide twice the life of a single ring, and are easily honed with a diamond lap. The small head easily enters a small vessel opening, and the locking collar on the shaft allows quick tool length adjustment.

CONS: The cutters have a limited life expectancy, and will have to be replaced if badly nicked because grinding them would be tricky. The cutter tends to clog up as it dulls, especially in soft, green timber. It should be honed fairly often. If too much of the cutter is exposed, it may drive itself too deep.

OPTIONS: A finish scraper tip is due on the market soon.

SUMMARY: My favorite among the systems that use a standard tool rest. Its shearing cut is a joy compared to the chopping cut of the small-radius scraper cutters on most of the other systems.





Mighty Midget

PRICE: \$157

The Mighty Midget also uses a ring-type cutter and limiter system very much like the Exocet's, except the cutter is single edged. There are two shanks, one fairly straight, the other offset. You adjust the overall length of the tool by inserting the shaft into the foam-rubber-covered handle section, then locking it in place with Allen setscrews. The entire tool is smaller overall than the other systems, and is intended for delicate work. **SOURCE:** Craft Supplies USA, 1287 E. 1120 S. Provo, UT 84606; (800) 551-8876.

PROS: The cutter removed material quickly, and clogged less than the Exocet, especially in wet material. Although the cutters appear more fragile than the Exocet's, they held up very well, and the cutter head is small enough to reach into vessels with very small openings. I had no cutting problems while overhanging the tool rest as much as 6-in., and I liked the soft-handled grip.

CONS: The Midget is smaller and less rigid than the other systems, and too short to provide a safe 10-in. rest overhang. I experienced significant vibration on hard, dry material, and would be leery of using the thin cutters on very hard or irregular vessels.

SUMMARY: An excellent system for small, delicate hollowing work.



Nichols Boring Bar

PRICE: \$250 to \$400

The Nichols Boring Bar system consists of a choice of custom-fabricated square-shaft boring bars and a massive slotted tool rest that prevents them from twisting. Each shaft can be constructed to accommodate either a dedicated cutter or a variety of cutters. Primary cutters include carbide ball-end mills and round-nosed scrapers. Circular scraper tips of various diameters are available for cleanup work. **SOURCE:** Nichols Enterprises, P.O. Box 936, 620 W. Coe Ave., Stanfield, OR 97875; (541) 449-1464.

PROS: The anti-torque design of the square shaft riding in a slotted rest does a great job of preventing tool twist, even when cutting at a 90-degree offset. Once I got used to being able to move the cutter in only one plane, the system worked well. I had no problem overreaching the rest by 10 in., and any vibration resulting from heavy cuts was absorbed by the rest.

CONS: The corners of the square shafts are very hard on the openings of narrow-mouthed vessels. Plan to leave until last the final dressing of the vessel mouth. The shafts tend to hang-up a bit in the rest when new, but sanding the corners helped, as did the occasional shot of WD-40. The bar stock rusts easily, especially when cutting green wood.

OPTIONS: Bars can be made to virtually any length or diameter, and fitted with a variety of cutter profiles.

SUMMARY: A great way for a turner to try his or her hand at difficult vessels, where tool control is hard to achieve. Experienced turners may miss the fine control of cut they surrender in exchange for less torque and vibration.





Kelton Hollower

PRICE: \$100 to \$160

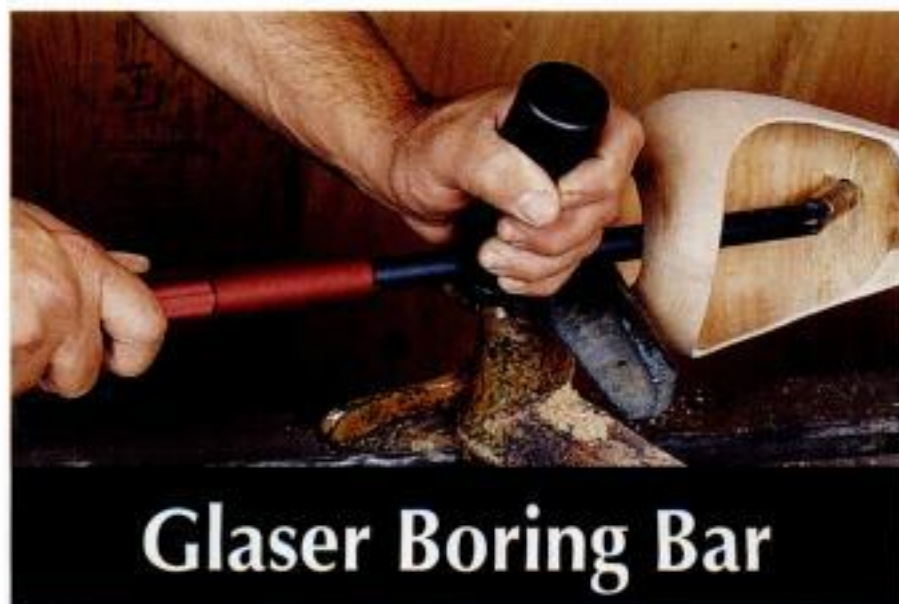
The Hollower from Kelton Industries is simply a set of three long-handled, 3/8-in.-radius round-nose scrapers on long shanks with plastic handles. Two of the shanks are offset to varying degrees. **SOURCE:** The Cutting Edge, 7123 SW Freeway, Houston, TX 77074; (800) 790-7980.

PROS: The cutter steel holds an edge very well, and the relatively large tip radius produces a smoother cut than the smaller tips on other systems. The tools are well balanced and hefty enough to handle the vibration of a heavy cut. The plastic-coated handles are comfortable and long enough to provide adequate leverage. Reasonably priced.

CONS: The two offset tools tend to twist and kick. I kept a death grip on these tools, but still found that a reach of more than 6 in. past the tool rest was risky. The cutting tips, although tough, are not replaceable and will eventually wear down.

OPTIONS: System available in three sizes. (Medium size tested; \$125.)

SUMMARY: These big scrapers are the least expensive of all the tools tested. They are much better suited to deep hollowing work than standard lathe tools, but should only be used on vessels less than 6 in. deep.



Glaser Boring Bar

PRICE: \$160

The Glaser Boring Bar accepts two different cutters: a 3/16-in.-radius round-nose scraper for aggressive work, and a larger radius finish scraper (not shown) for cleaning up tooling marks. The stainless steel extension that holds the cutter articulates in relation to the main bar, and the cutter articulates in relation to the extension. The main bar's handle is shot-filled to help absorb vibration, and an auxiliary, right-angle handle/counterweight helps prevent tool twist. **SOURCE:** Packard WoodWorks, 101 Miller Rd., Tryon, NC 28782, (800) 683-8876.

PROS: This is a good tool for deep removal of stock. The repositionable handle/counterweight helped prevent the tool from kicking over when cutting in the offset position. Cutting vibration was minimal, and the rigid, 29-in.-long bar provided plenty of leverage for a clean, stable cut, even at 10 in. deep.

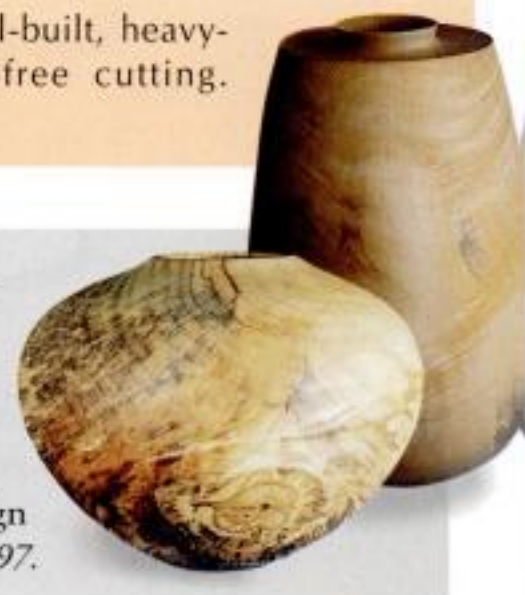
CONS: This tool is heavy, and extended use could be tiring for some. The adjustable handle/counterweight locks in place with a small Allen screw, which jammed on me and wouldn't release.

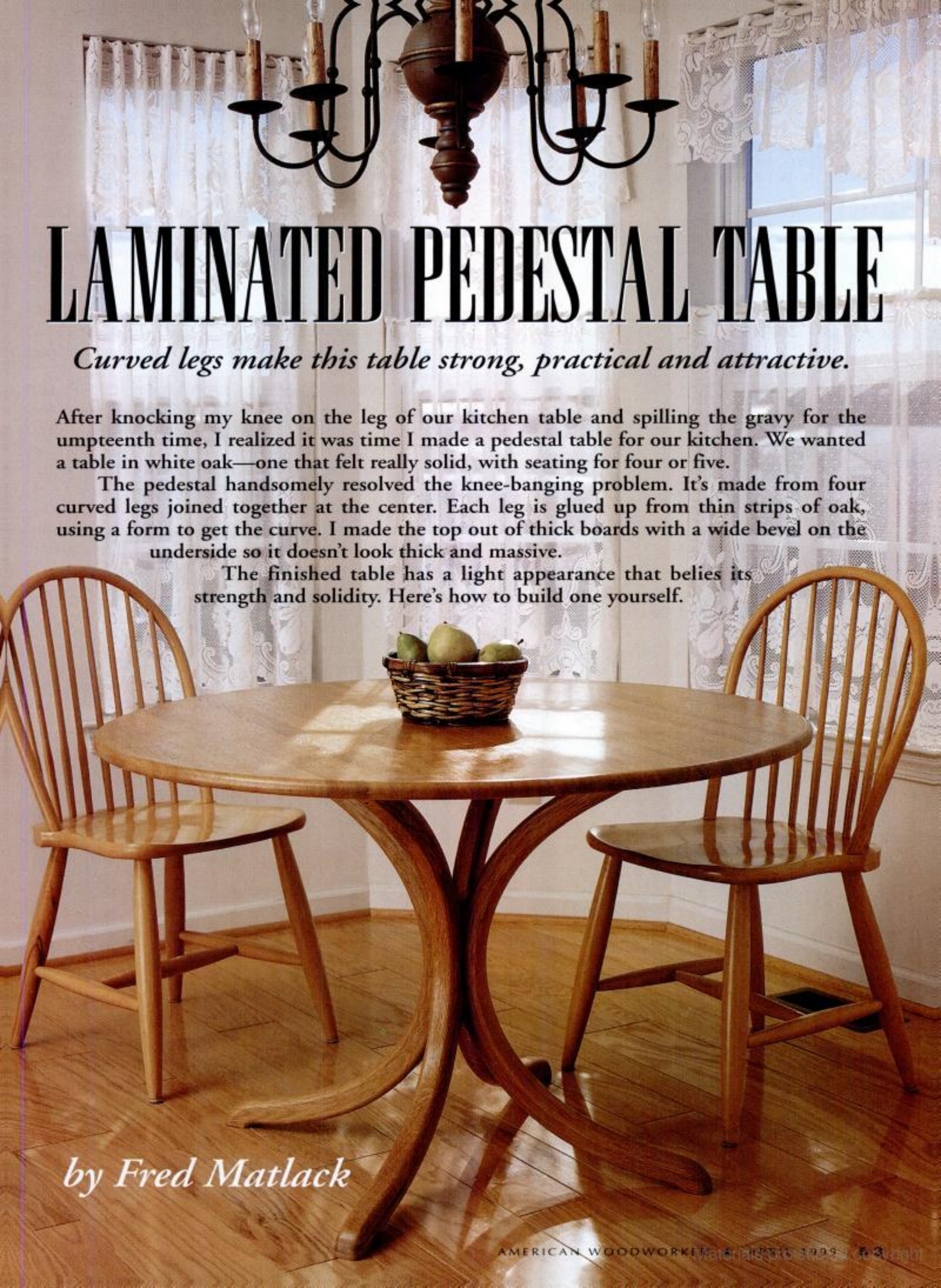
OPTIONS: Large scraper-tip for cleaning up standard cutter-tool marks.

SUMMARY: A very well-built, heavy-duty tool for vibration-free cutting. Reasonably priced.



The Bottom Line: Deep vessel turning is safer and more enjoyable with any of the systems tested. Novice turners should consider one of the rigid rest systems since the chances of a catastrophe are minimized while using them. The Nichols and the Oneway boring bars are both excellent choices. As an experienced turner, I really liked the Exocet system's shearing cut and control. But if my wallet were bottomless, I would consider the HM-1 system a great addition to my tools. Its precision craftsmanship and innovative design put it in a class by itself. ▲ *Further reading: "Adventures in Hollow Turning" AW #61, Oct. 1997.*



A round wooden pedestal table with two Windsor-style chairs in a dining room. The table has a light-colored wood top and four curved legs that meet at a central pedestal. A small woven basket of fruit sits on the table. The chairs are made of light wood with spindle backs. In the background, there is a window with white lace curtains and a dark metal chandelier with multiple candle holders hanging from the ceiling.

LAMINATED PEDESTAL TABLE

Curved legs make this table strong, practical and attractive.

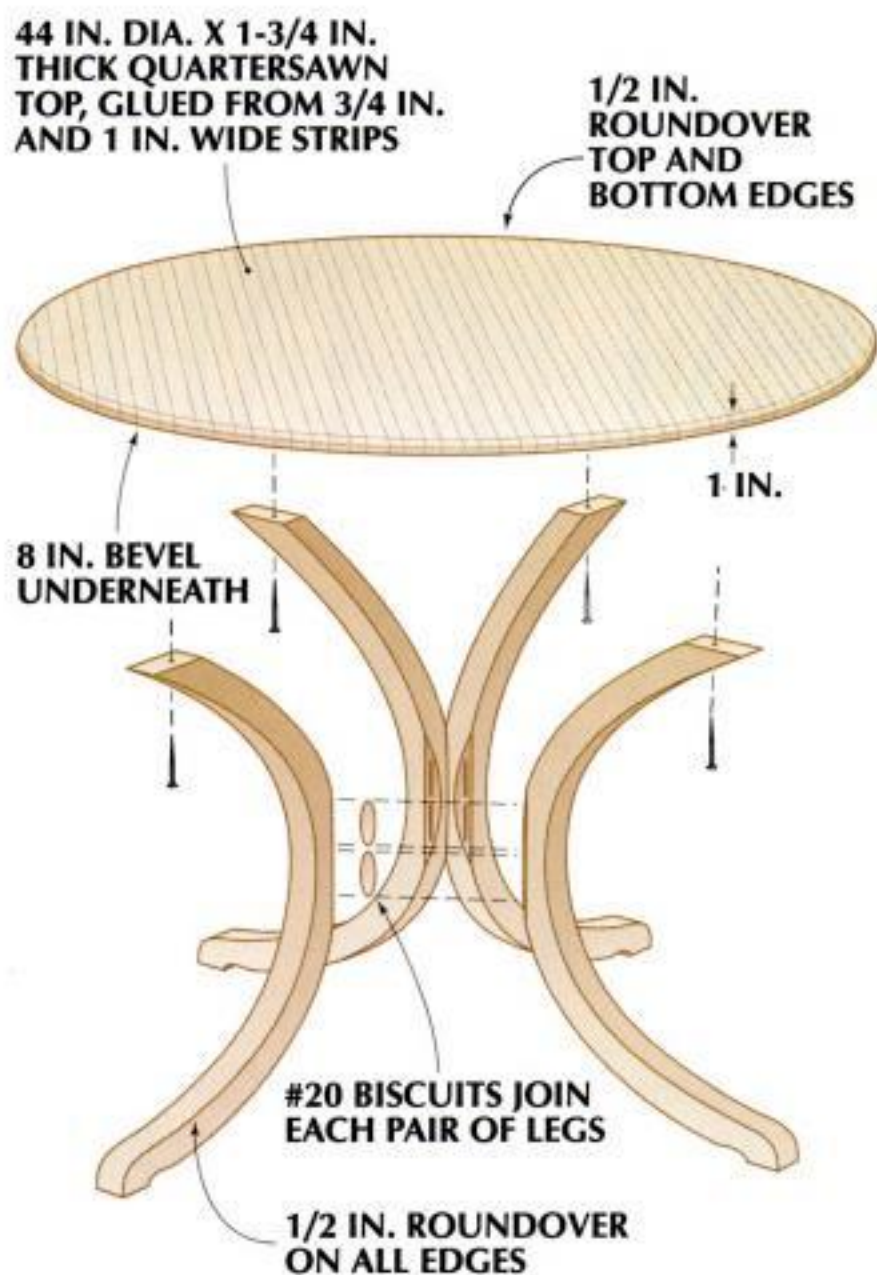
After knocking my knee on the leg of our kitchen table and spilling the gravy for the umpteenth time, I realized it was time I made a pedestal table for our kitchen. We wanted a table in white oak—one that felt really solid, with seating for four or five.

The pedestal handsomely resolved the knee-banging problem. It's made from four curved legs joined together at the center. Each leg is glued up from thin strips of oak, using a form to get the curve. I made the top out of thick boards with a wide bevel on the underside so it doesn't look thick and massive.

The finished table has a light appearance that belies its strength and solidity. Here's how to build one yourself.

by Fred Matlack

FIG. A



Laminate the Legs

First, make a curved form for gluing up the laminations. Glue and screw together two pieces of plywood to form a 1-1/2 by 16 by 28 in. blank. Enlarge the pattern shown in Fig. B, trace it onto the blank, and bandsaw to shape. (Watch out for the screws!) Smooth the curved side, then attach the foot.

Choose 2-in. thick rough lumber for the leg strips. Draw reference lines across the wood. After you've cut the strips you can assemble them in their original order and the grain will look continuous. Rip the 3/16-in.-thick strips, 11 for each leg. I used a thin-kerf, 50-tooth combination blade, which kept waste to a minimum and produced smooth enough surfaces for gluing. Not all woods bend as easily as oak, so if you choose another wood, try some practice strips—they may need to be thinner.

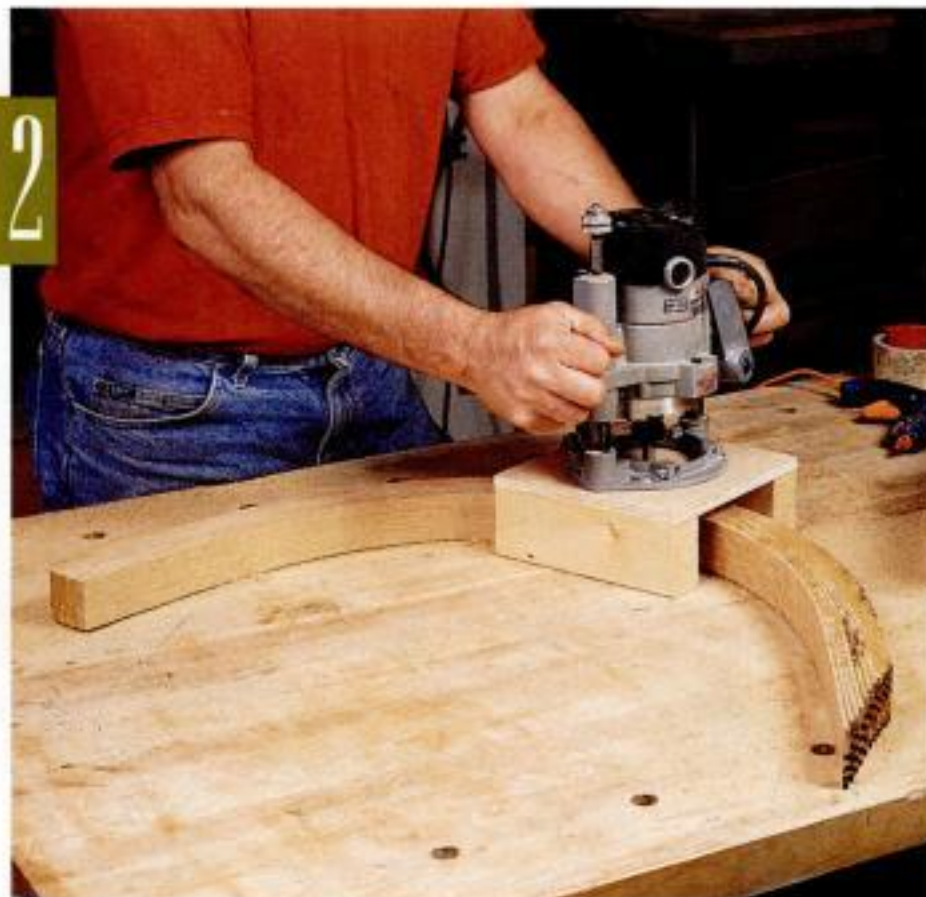
I recommend a urea resin glue, Unibond 800, to bond the strips that make up the legs (available from Vacuum Pressing Systems, 207-725-0935). It sets slowly, cures hard, leaves no dark glue line and doesn't creep over time. For speed, apply the glue to the strips with a 3-in. paint roller, working on a sheet of plastic to protect your bench. Stack the strips in order, and cover them with plastic film wrap so they don't stick to the form. Bend the strips over the form (Photo 1), and clamp. Let the glue dry overnight. Laminate all four legs before moving on.

Assemble the Pedestal

First, surface the legs to a uniform 1-3/4 in. thickness (Photo 2). Next, cut two opposing 45-degree bevels on each leg where they will be joined. The easiest way to do this is to take your bending form and attach two strips so



Laminate the legs on a curved form. Line up the strips at the foot of the form, clamp them, and proceed up the form, clamping every 4 to 6 in. A handscrew clamped loosely across the form keeps the strips from sliding around.



Surface the legs with a router in a straddling jig, using a wide, straight bit. Hot-melt glue the legs to a flat surface to hold them.

you can use it as a sliding table on your tablesaw (Photo 3). Bandsaw the foot shape on each leg. Then rout a 1/2-in. roundover on the edges of the leg, stopping 1 in. from the bevels. Later you'll finish these roundovers with a file.

Test-fit the four legs to make sure they fit together tightly. Mark each pair so you can glue them up in the same order, and mark each pair of legs for their biscuit slots. Cut two No. 20 biscuit slots on each bevel (Photo 4).

Join the legs in pairs (Photo 5). If the inner face that results on each pair is not flat, plane it flat before you glue the two pairs together (Photo 6). Make sure you do a dry run of this final glue-up on a large flat surface. The inner faces of the legs must meet well and all four feet must be flat on the bench (Photo 7). After glue-up, let the pedestal stabilize for a couple days, during which time you can complete the edge roundovers where the legs are jointed together. Scribe the tops of the legs for a good fit to the top (Photo 7).

Glue-Up the Top

I wanted a quartersawn look for the top, but thick quartersawn oak is very difficult to find. I cut thinner, flat-sawn boards to 2-in. strips, flipped them 90 degrees and glued them together to make the quartersawn top.

Make the 2-in. strips from both 4/4 and 5/4 flatsawn boards. The two thicknesses will make the top more attractive. Glue strips into slabs that will fit through your planer. Plane the slabs smooth and glue them together to form the top. **TIP:** Mark the quartersawn face of each strip with an arrow to indicate the "downhill" direction of the grain. When you're gluing the slabs together, make sure the arrows all point the same way. This will permit you to run the glued-up slabs through your planer with minimum grain tear-out.

Rout the rough top to a circle, as shown in Photo 8, working from the underside. I used a commercial trammel to hold the router, but you could make your own, as shown in Fig. C. Because you're working on the underside, you can screw the center of the trammel directly to the top.

FIG. B

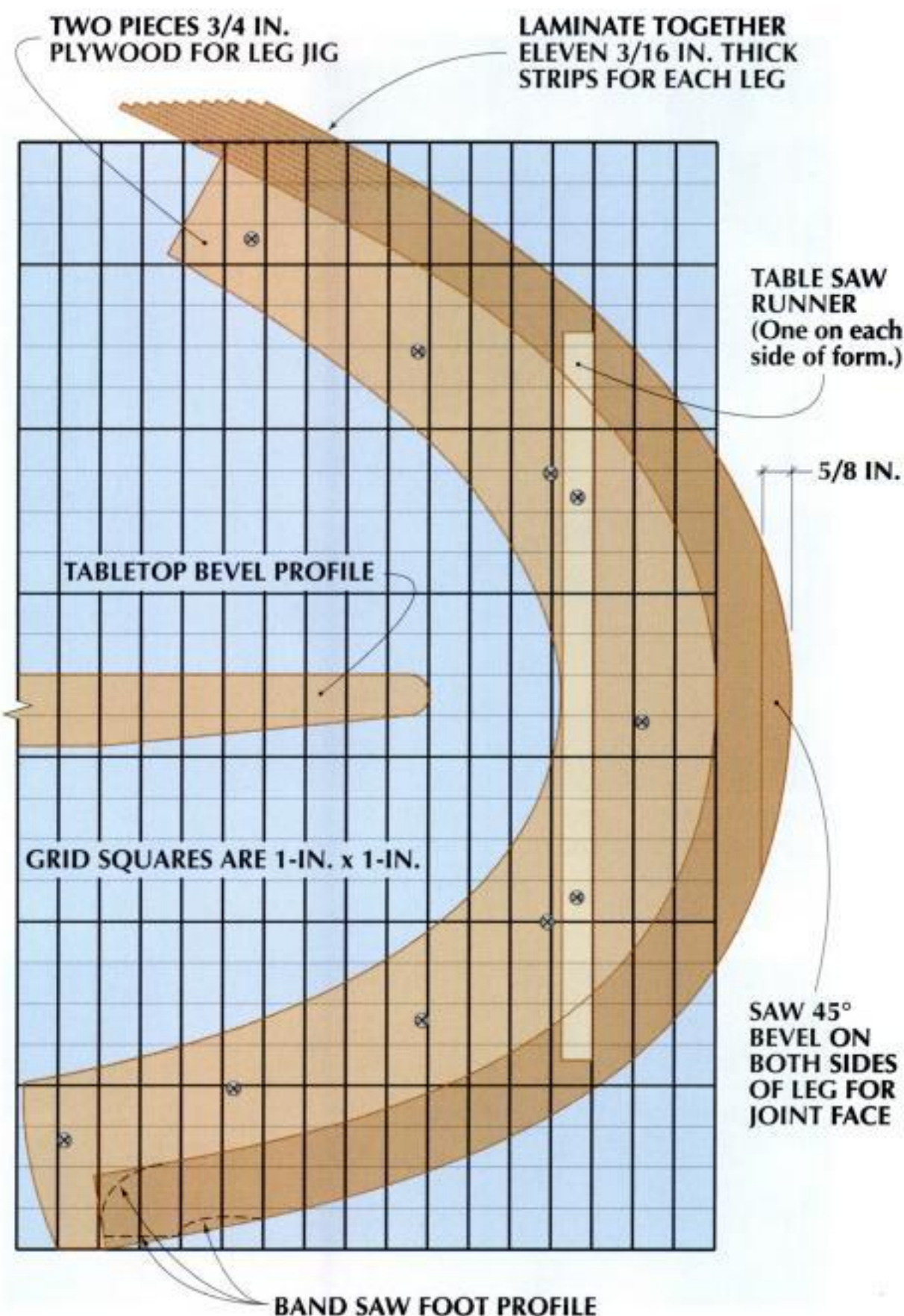
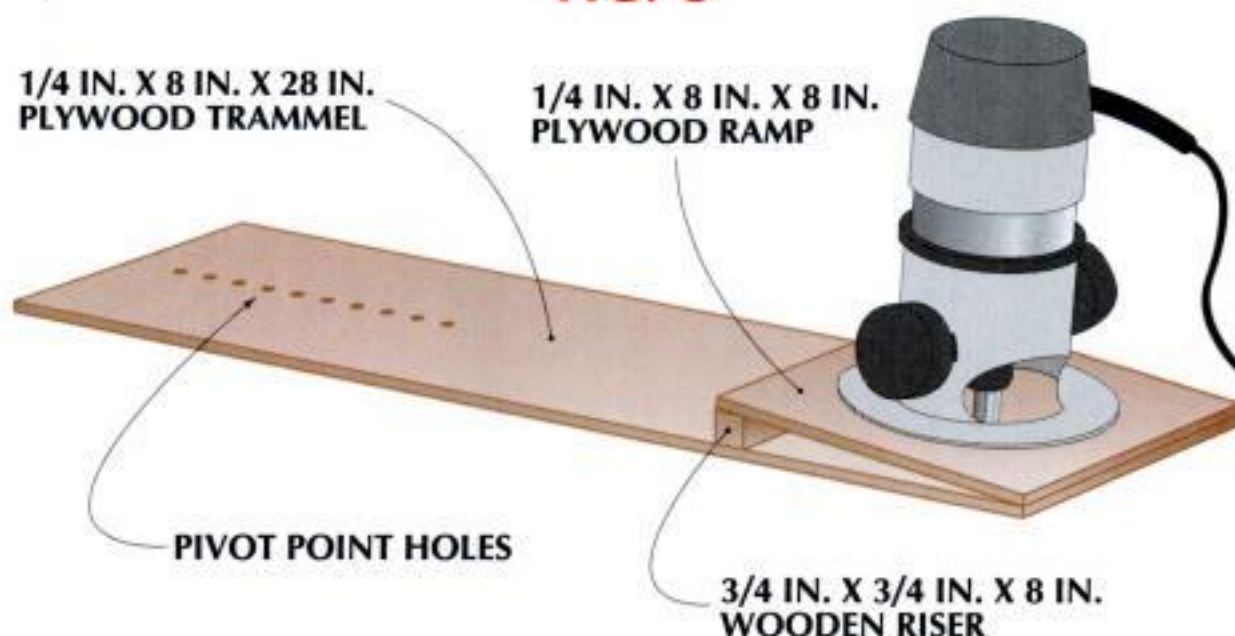
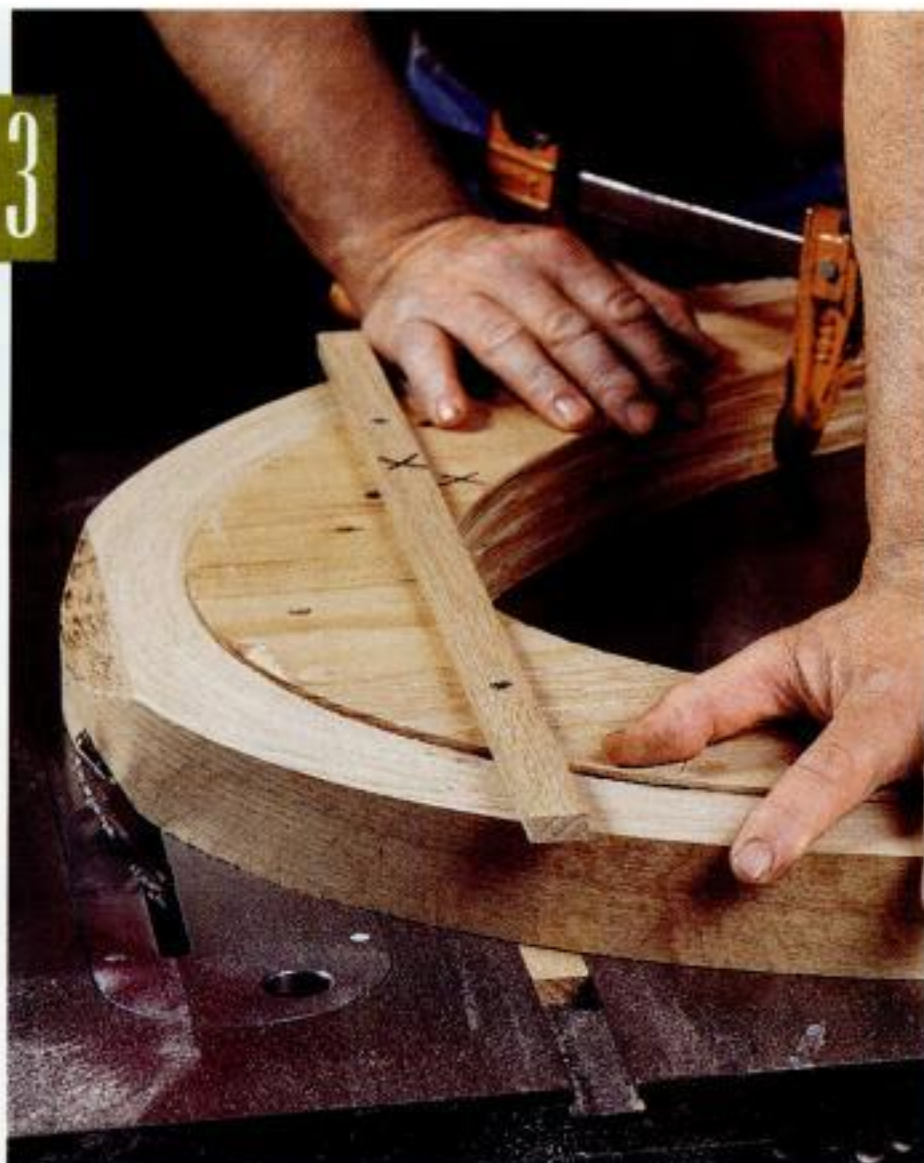


FIG. C

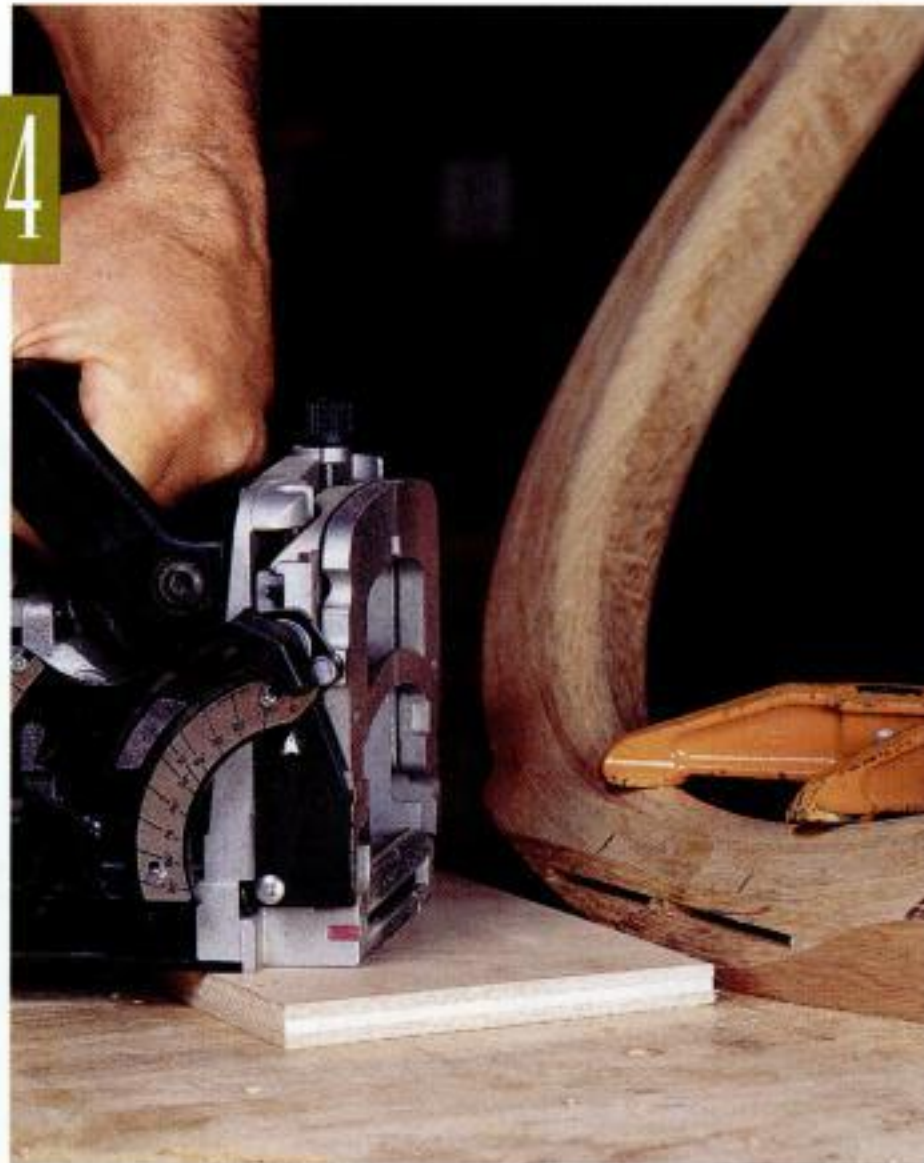


3



Cut 45-degree bevels on each leg where they will come together. The bending jig can be converted to a handy sliding tablesaw jig by attaching a pair of strips to fit the miter gauge slots.

4



Cut biscuit slots on the beveled faces of each leg. You'll need to clamp the leg with one bevel flat on the bench, and raise your biscuit joiner with a piece of 1/2-in. scrap to position the slots.

5



Join the legs in pairs using glue and biscuits. The inner face of each pair should be planed flat after the glue has dried.

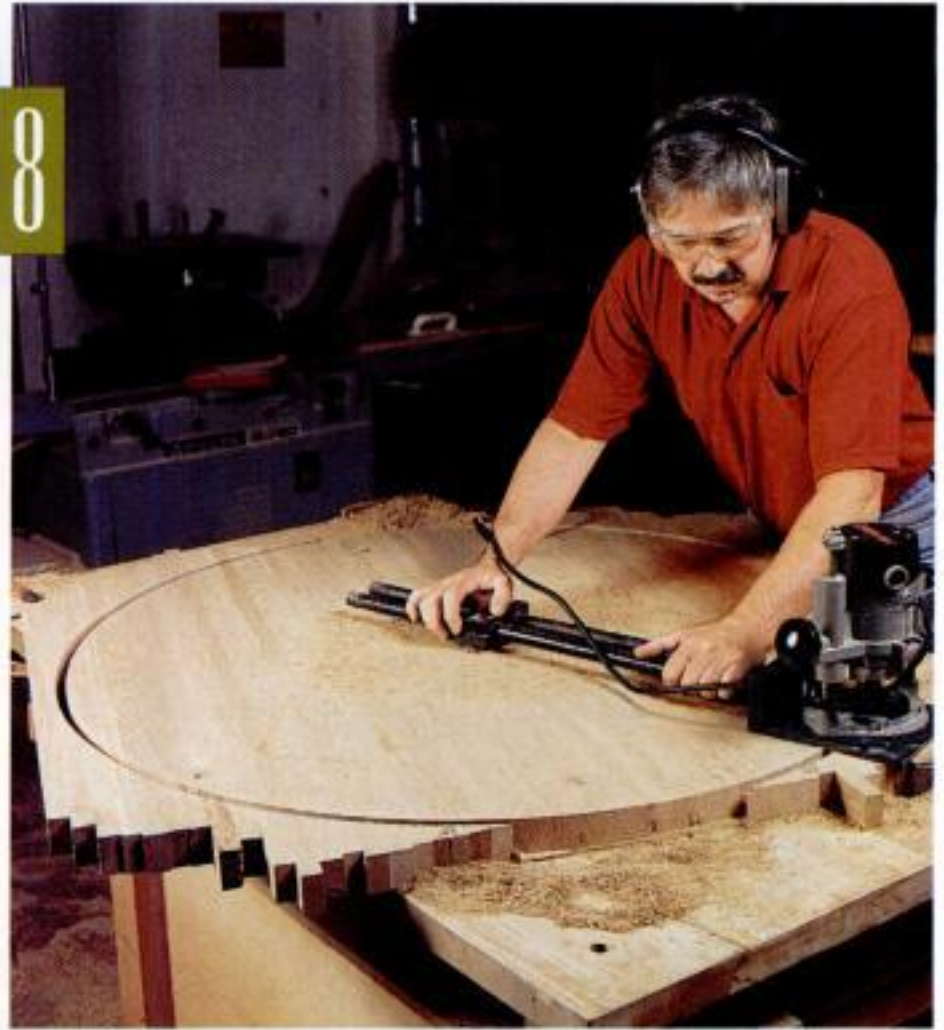
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Assemble the pedestal by gluing the two leg pairs together on a flat surface. All four feet must rest solidly on the surface. A dry run is helpful.



7 *Trim the leg tops* by flipping the assembled pedestal upside down, with a piece of plywood on the feet. Shim the legs so the plywood is parallel to the bench, then scribe and trim.



8 *Cut the circular top* using a router and a trammel. Do all but the final 1/8 in. of the cut, so the waste is still attached. This allows you to keep the top fastened down for routing the bevel.

Bevel the Top

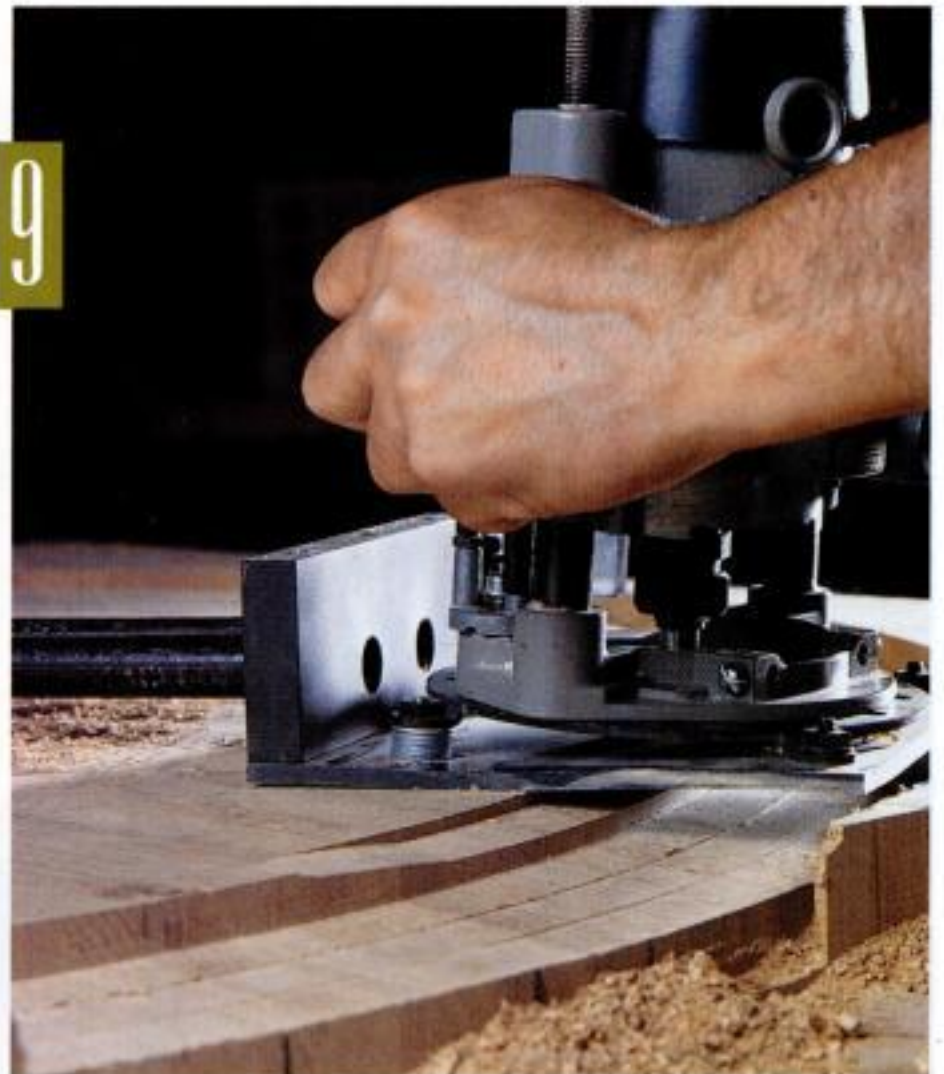
This design has an 8-in.-wide bevel that stops short of the ends of the legs. If you change the diameter of the top, be sure to change the width of the bevel to compensate.

To rout the bevel, tilt the base of the router on the trammel (Fig. C). Because the bevel rises 3/4-in. over 8 in. of width, adjust the router base so it does the same. Begin routing at the edge, making several passes until the edge is 1-in. thick. Use a wide, straight bit or a mortising bit, that leaves a smooth cut. I used a 1-in.-dia. bit. After the first cut, reset the trammel to a slightly smaller diameter and rout until you meet the first cut. Proceed until the entire bevel is cut.

Turn the top over and release the waste by making the final circular cut with your router and a flush trim bit. Clean up the top with a belt sander and round the top and bottom edges with a 1/2-in. roundover bit. Turn the top upside down and position the legs, then drill for the screws that connect them.

Finishing Touches

Finish-sand the entire table. I applied a brush-on lacquer, so I only needed to go to 120 grit on this coarse-grained wood. If you apply another finish or use another wood, you may need to do more sanding. Finish the top and base separately, then screw them together. You may want to add leveling feet to the pedestal if it came out a bit twisted or if your floor isn't flat. ▲



9 *Cut the bevel* on the underside by tipping the base of the router (washers act as shims on this commercial trammel). Using a wide straight bit, rout concentric circles, each shallower than the last.

HOW TO MAKE SMALL CARVING TOOLS

I learned to make small carving tools out of necessity. I do intricate, detailed carvings, and the selection of small carving tools in catalogs is painfully limited. Solution? I started making my own. Not only can I make unusual sizes and shapes, but the handles are shaped to fit my hands. Plus, these tools are very inexpensive. Give them a try—there's nothing like the feeling of using a tool that you have made yourself.

by Mike Burton

Supplies and Equipment

The raw material of these carving tools is drill rod, a tool steel available in various diameters. You can buy it from local machine shops or industrial suppliers for about \$2.50 for an 18-in. length.

You'll also need a metalworking vise, but it doesn't have to be fancy. Be sure it has a flat "anvil" area for flattening the rod. My vise cost \$15.

For heating the rod, use a MAPP gas torch (\$35 at home centers). This is just like a propane torch except it's designed for MAPP gas, which burns hotter than propane. You can't use MAPP gas in a common propane torch.

A selection of files, small grinding stones and a small diamond hone will be needed for shaping the tools.

Working Safely

The flame from a MAPP torch is even more dangerous than the flame from a propane torch, so follow these safe work habits.

- Prepare a safe work area. Remove sawdust, rags, finishes, wood scraps and any other flammables from your work area.

- Keep the lights down low. This makes it easier to see the flame, and easier to judge the color of the heated rod.

- Avoid tip-overs. The torch is top-heavy, and easy to tip over. I found an old, wide-mouth coffee pot that the cylinder of my torch fits into. When I'm not using it, the torch rests steady in the pot. You can rig up something similar.

- Wear safety glasses. Tiny pieces of hot steel and scale can be dislodged at just about any stage in this project. Always wear your glasses.

- Manage the heat. Whenever possible, work on long (18-in. or so) pieces of rod. Cut the finished tool off the end. If you need to heat a short piece, grip it with locking pliers. Don't try to use drill rod thicker than 3/16 in.; MAPP gas won't be able to get it hot enough.

THE BASIC V-TOOL

The simplest small tools are filed directly into the drill rod, without any forging. This small V-tool is a good example.



FORM A V-SHAPE with a triangular file on the end of an 18-in. piece of 5/32-in. drill rod. Bending the tip of the rod will give you room to work.



REFINE THE INSIDE with a diamond hone (\$10). You may need to file down the plastic sides of the hone so it will fit in the tiny V.



FORM THE CUTTING EDGE with a file and diamond hone, then straighten the shank. If this is the only tool you're making, proceed to heat-treating (Photos 10 and 11) and attaching a handle (Photo 12).



GOUGES, CHISELS & SKEWS

Very small gouges, chisels and skews can be filed directly from drill rod, just like the V-tool, using a small rat-tail or flat file. Refine the inside with a rolled-up piece of 320- to 600-grit sandpaper or a diamond hone. Larger tools need to be forged, as shown below.



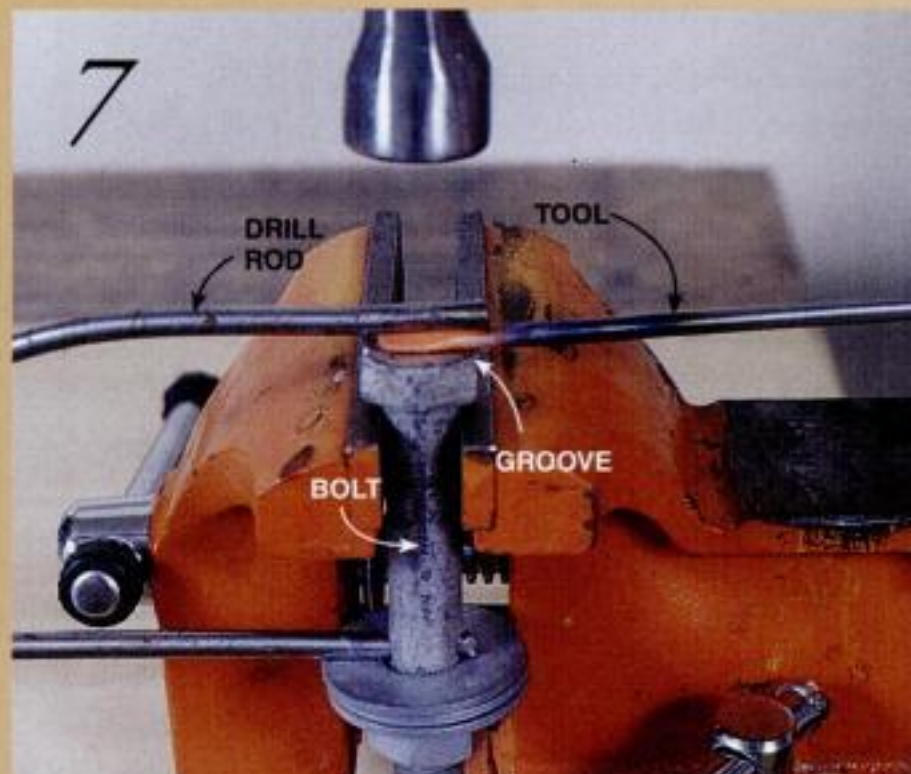
FLATTEN THE TIP of the drill rod for larger tools. Heat the tip to a bright red glow with a MAPP torch, quickly place it on the anvil section of the vise, and hammer it flat.



FOR WIDER TIPS, first thicken the end of the drill rod by heating it to bright red and pounding the end to "upset" (compress) it. You can make the rod half-again thicker this way. After upsetting, heat the tip again and flatten it.



MAKE A CREASE to further widen the tip by hammering it against the edge of the vise. For more width, make several creases in a fan pattern. Heat the rod again, and hammer out the creases.



USE A SWAGE to hammer the heated rod into a gouge shape. The swage is made from a length of 3/16-in. drill rod and a large bolt. The rod fits on a groove filed into the head of the bolt with a 1/4-in. rat-tail file. Sandwich the red-hot tool blank between the rod and the groove; then hammer.



8
USE A SOCKET AS AN ANVIL to open up or form gouge shapes. Different socket sizes can be used for gouges of different shapes. This is also a good method for making curved detailing knives.



9
GRIND THE INSIDE to refine the shape of a gouge using a cone-shaped grinding wheel in an electric drill or rotary tool. Roughly form the bevel, but don't sharpen yet. The tool must first be heat-treated.



10
SLOW COOLING on an electric burner (annealing) will reduce stresses built up in the metal during forging. Heat the first 1/2 in. of the tool tip bright red, keep it red for 30 seconds, then place between the coils of a burner set on high. Every 10 minutes, lower the heat until the tool is cool.

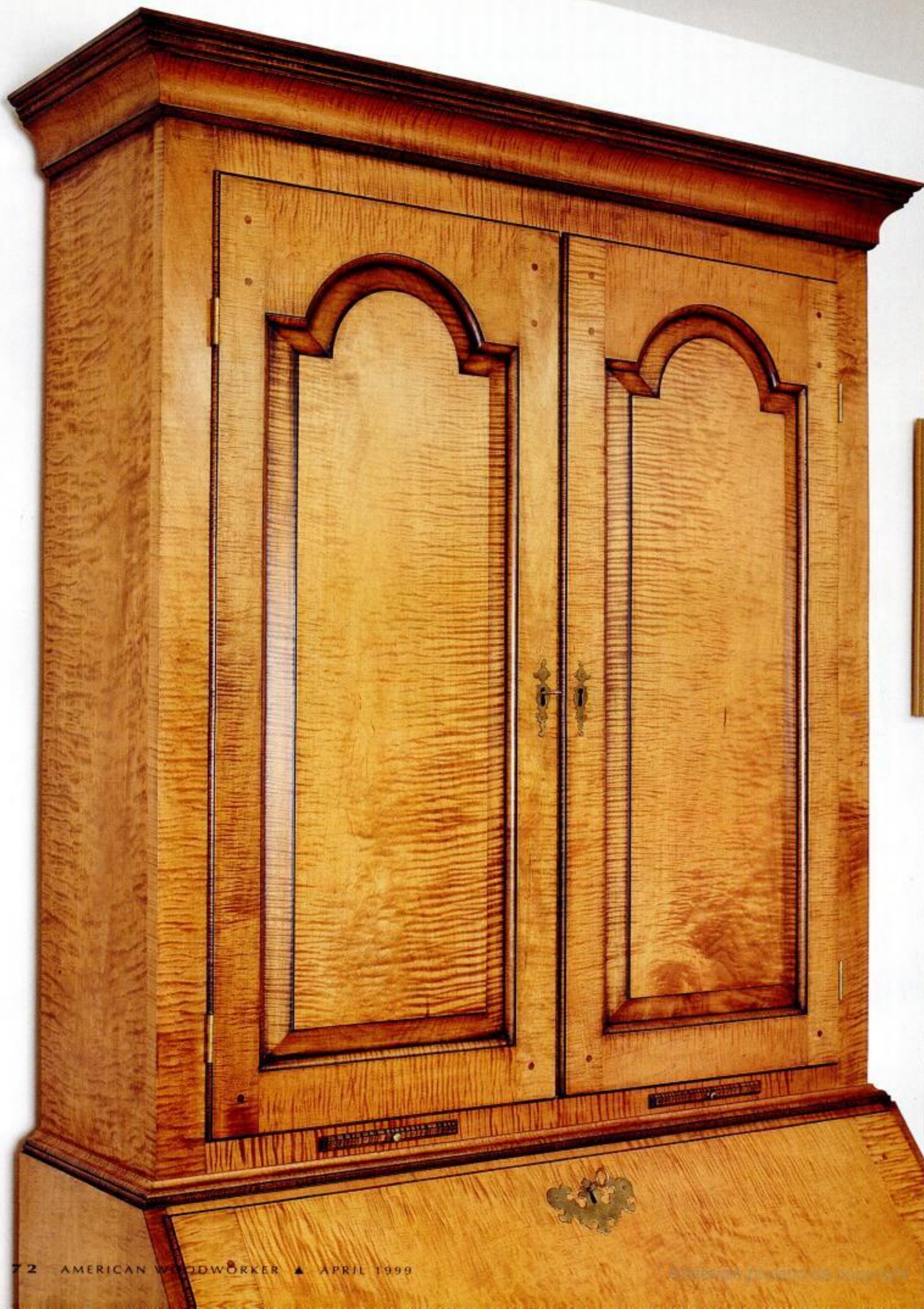


11
TEMPERING produces a hard, durable edge. Heat the tool tip to a bright glow for 30 seconds, then plunge into cold water. Polish the end of the tool to a mirror shine with fine sandpaper or emory cloth. Heat the tool slowly, keeping the flame about an inch below the cutting edge. When the edge turns a medium straw color, plunge it into cold water. (You may want to practice this!)



12
ATTACH THE HANDLE LAST Heat the handle end of the tool and hammer the last 1/2 inch or so square to prevent twisting. Drill a hole in the handle, add a bit of carpenter's glue and pound the handle onto the tool. For bent tools, hold the shank with locking pliers and pound on the pliers. Give the bevel a final grind, sharpen, and you're ready to carve. ▲





TOMBSTONE DOORS

BY LONNIE BIRD

THROUGH MANY YEARS studying and building 18th-century furniture, I've learned that this era produced countless fine examples of good design. One example is the arched-top door. Often called a tombstone door because its shape resembles a grave marker, the panel on this type of door is curved at the top and is capped by a matching curved rail. The overall effect is quite elegant, as shown at left.

Fortunately, you don't have to be a period furniture maker to incorporate tombstone doors into your work. The design looks right at home with modern furniture, or it can work with paneling or kitchen cabinets. In fact, you can use tombstone doors wherever you want to dress up an otherwise plain cabinet.

Eighteenth-century cabinetmakers used a variety of tombstone designs in their work. Fig. C shows four basic doors, illustrating simple to elaborate designs. I'll show you how I make a standard arched-top door as shown in Figs. A and B.

Lay Out the Top Rail

Figure C shows four traditional types of doors, with different arch configurations. I'll be making the most common type, the standard, where the centerline of the arch is aligned with the shoulders of the field. The other types of doors are made like the standard door, but with differing layouts.

Planning an arched-top door begins with the top rail. The panel is then made to fit. Make a full-size drawing of the top rail for each different width of door. Follow the steps in Fig. D. When you know the dimensions of the top rail, you can make the remainder of your cutting list.

Prepare Your Stock

As with any door, it's very important that the stock be well-dried and stable. I store it in the shop for a couple of weeks to let it settle before working with it.

I mill the frame parts to 7/8 in. thickness for a stout, traditional-looking door. Cut the stiles 2 in. extra-long for ease in gluing up the door.

FIG. A TOMBSTONE DOOR

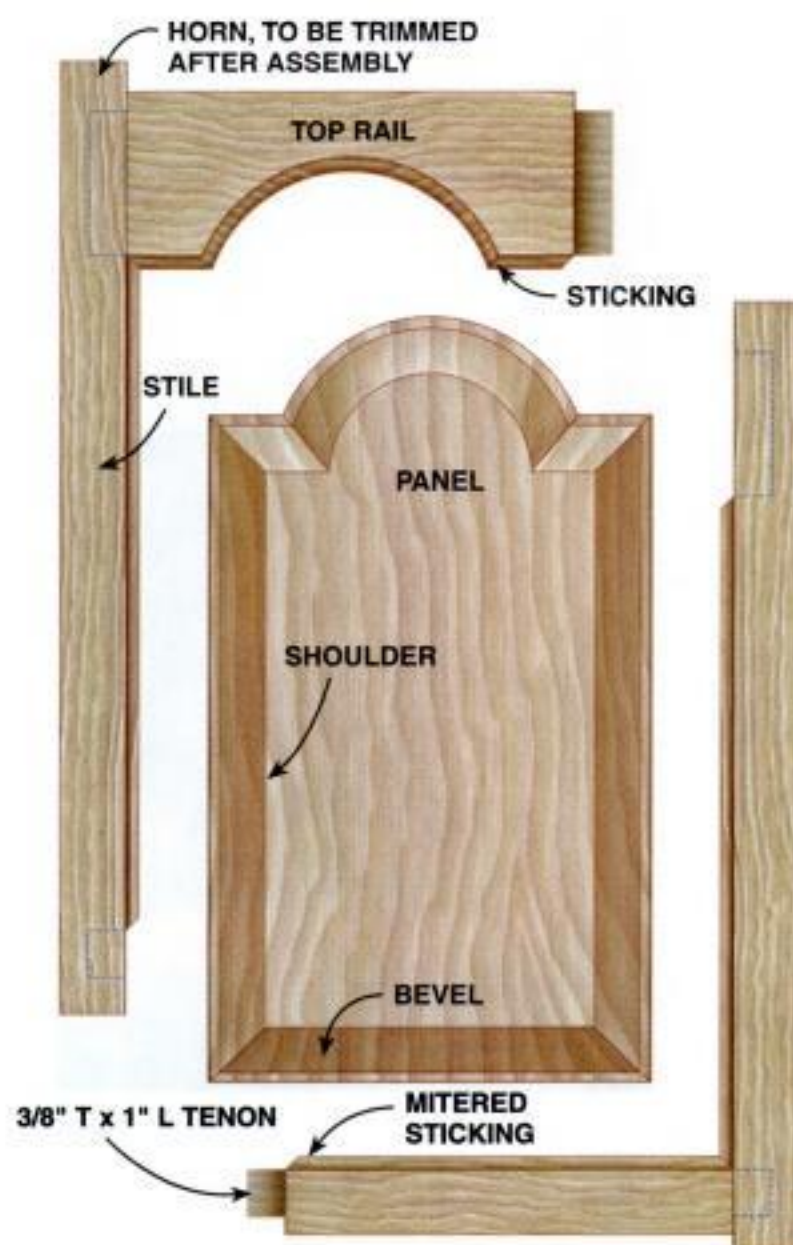
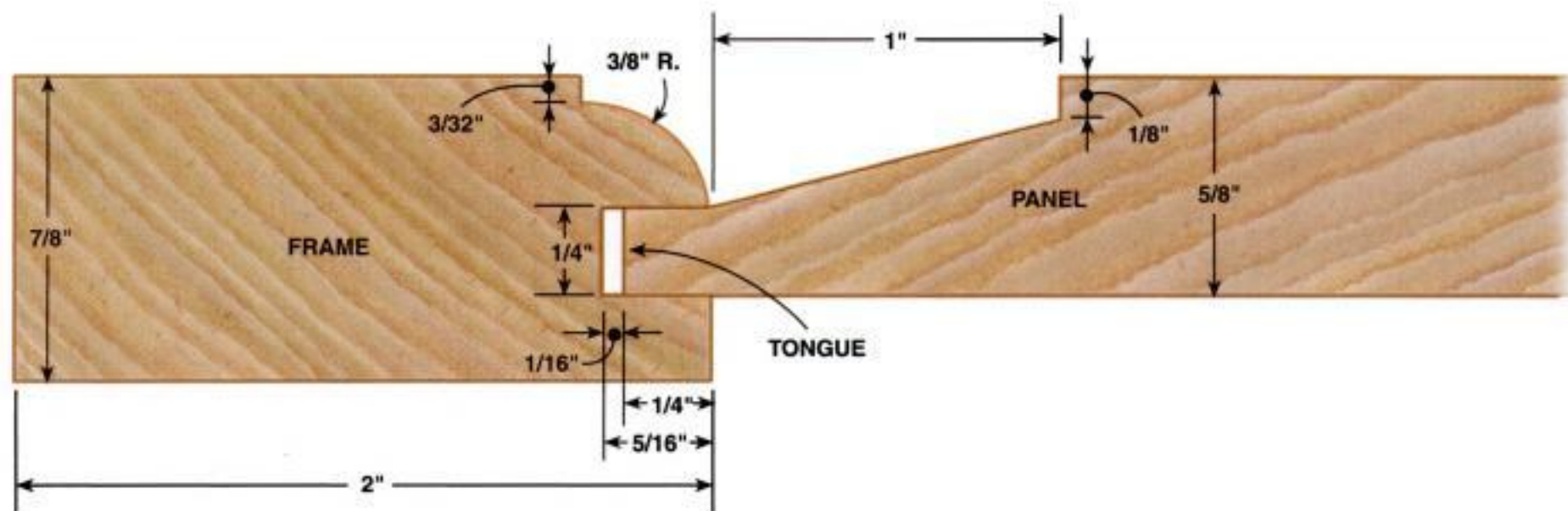


FIG. B DOOR DETAILS



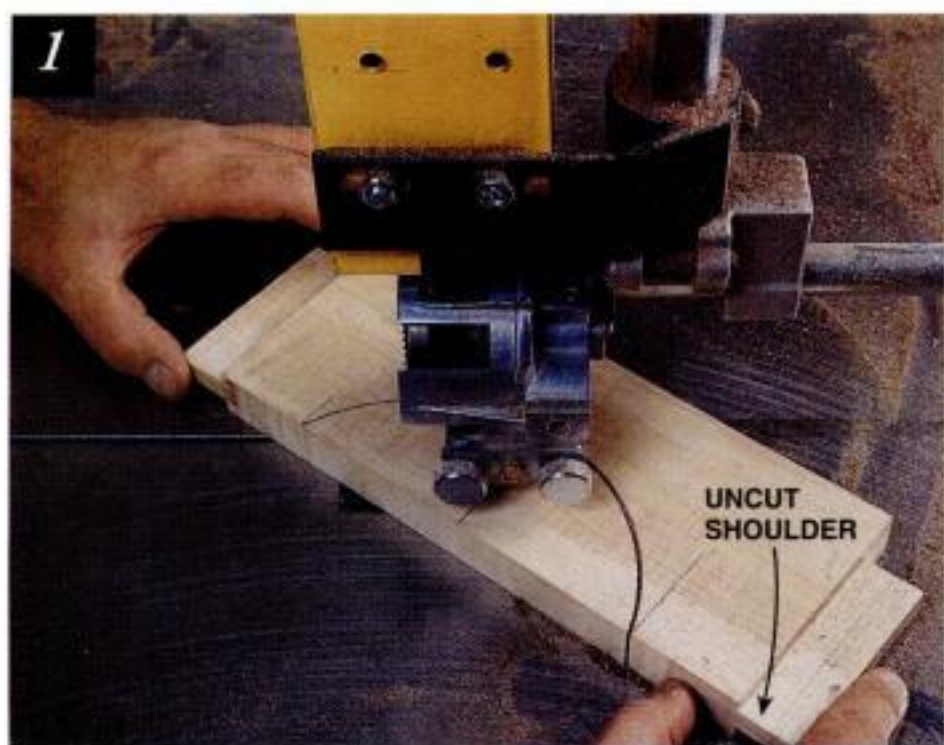
This results in "horns" that will be trimmed off later (Fig. A).

Cut the mortise and tenon joints for the frame. I chop the mortises in the stiles using a hollow-chisel mortiser, and saw the tenons on my tablesaw. When cutting the tenons on the top and bottom rails, cut only the face-side shoulders (see Photo 1).

Shape the Frame

Draw the curve on the top rail, saw to shape (Photo 1) and sand the shape smooth (Photo 2). On traditional frame-and-panel doors like these, I prefer a molded inside

edge on the frame, called "sticking." Rout the molded edge on your top rail, bottom rail and stiles, using a 3/32-in. roundover bit in your router table (Photo 3). Use a starter pin in your router table for the curved top rail, and a straight fence for the other parts. Then groove the frame members to receive the panel (Photo 4), using a piloted slot cutter. Miter the molded edge on both rails and stiles (Photo 5), and cut the back-side shoulders on the tenons. Use a tablesaw to cut the unwanted molded edge from the ends of the stiles. (For more details on making this kind of molded frame, see "Mitered Sticking," #50, Feb. 1996.)

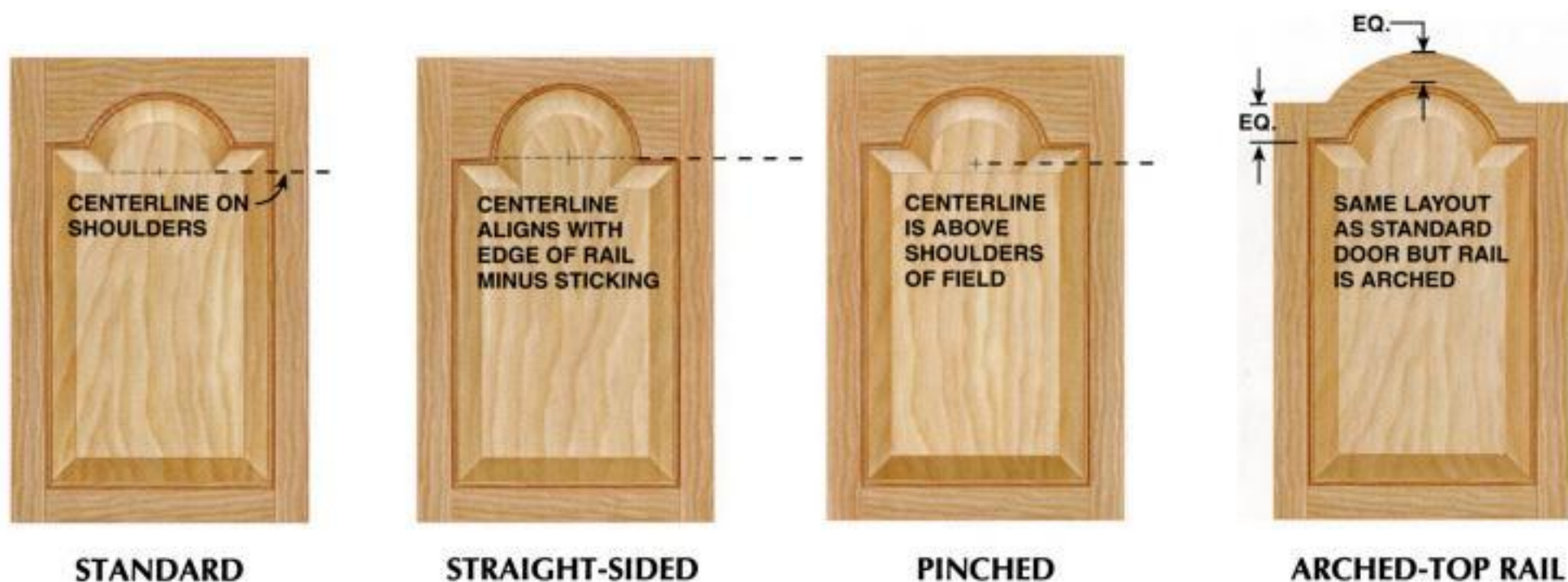


1 *BANDSAW THE CURVE in the top rail, after cutting the tenons. Saw on the waste side of your layout line. Only one shoulder of the tenon is cut at this stage.*



2 *SAND THE CURVE SMOOTH and to your layout line using a spindle sander or sanding drum in a drill press. Be sure it's a fair curve without dips or flat spots.*

FIG. C ARCHED-TOP DOOR DESIGNS



Shape the Panel

Dry-assemble the frame to make sure everything's OK. Then measure for the panel by adding 1/4 in. to the opening size all around. Because the grooves are 5/16-in.-deep, this gives the panel a little room to expand.

Mill the panel stock to 5/8-in. thick. Because wide boards can cup, I try to assemble the panels into the door on the same day I plane them. Using your full-size drawing of the top rail, set a compass to the radius of the top rail curve, plus 1/4 in. for the tongue on the panel. Lay out the curve and shoulders of the arch on the panel (Photo 6) and cut to shape (Photo 7). Smooth the cut sur-

faces to fair the curve, but don't sand the edge—it will be housed in the groove.

Raise the Panel

I use a shaper and a cutter with guide bearings to raise the beveled edges on the panel (Photo 8). You could also use a large router in a sturdy router table. To control the mass of chips and to keep my fingers safe, I built two jigs: one for the curved edges (Photo 8) and another for the straight edges (Photo 9). An acrylic shield on the top of each jig (hard to see in photo) keeps the chips contained. I plug a dust collection hose into the back of the jig.

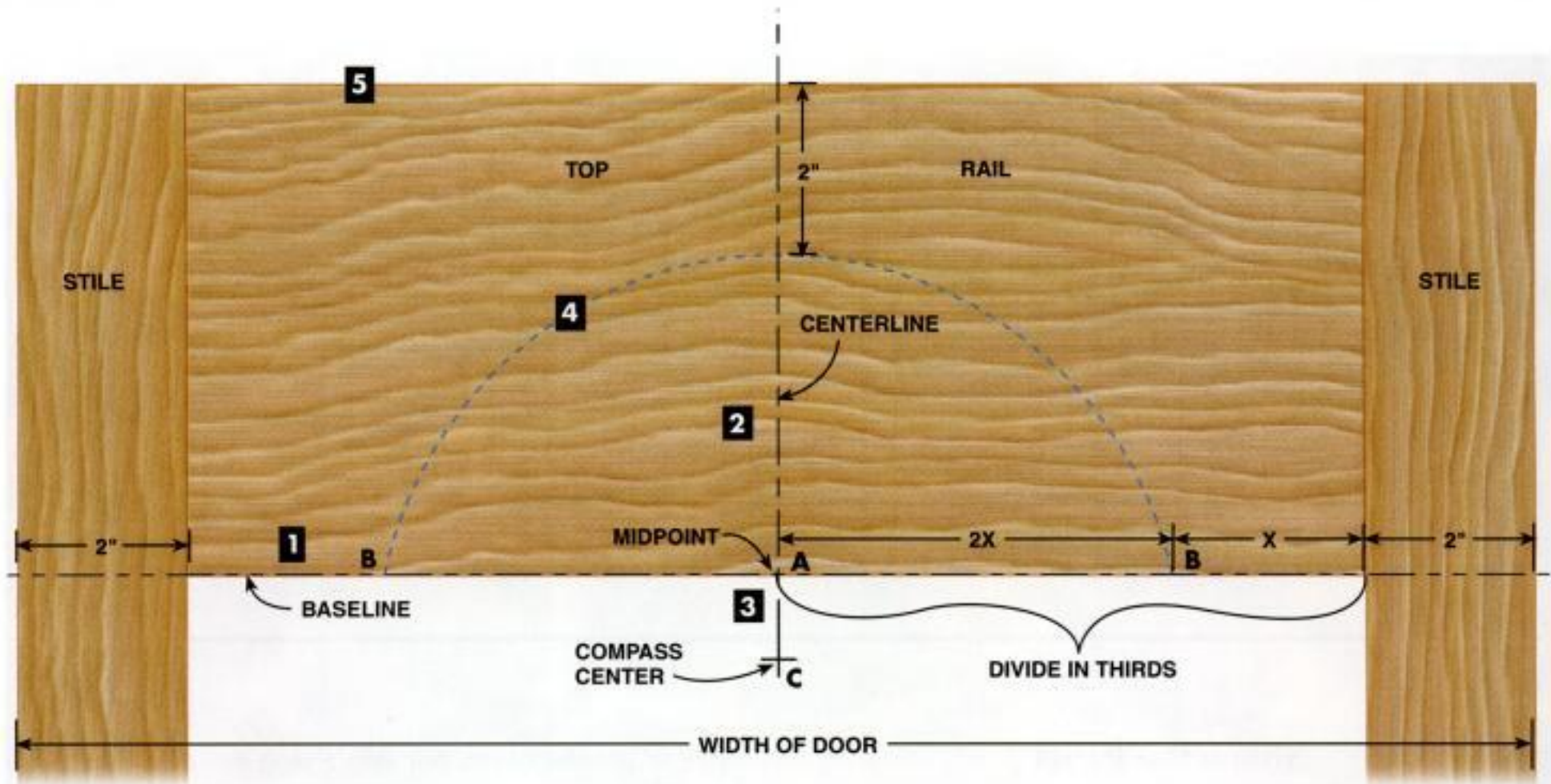


ROUTE THE MOLDED EDGE on all frame parts, using a roundover bit in a router table. A pin helps start the cut on the curved rail. Use a fence on the straight parts.



CUT A GROOVE FOR THE PANEL in all the frame parts, using a ball-bearing piloted-slot cutter in the router table. Again, use a fence for straight edges, and start the curved edges against a pin.

FIG. D LAYING OUT THE TOP RAIL



DETERMINE THE ARCH OF THE UPPER RAIL. 1. On a piece of paper, draw a baseline and mark on it the overall width of the door. Then, to determine the length of the rail, mark the positions of the two stiles. 2. Draw the centerline of the rail. Divide each half of the rail into thirds and mark points B on the baseline. 3. Line AC extends below the baseline by the width of the panel bevel (in this case 1 in.). Point C is the center of the arch. 4. From point C, swing an arc with a radius equal to the distance BC. This is the rail arch. 5. Draw the top of the rail. Make the distance between it and the top of the arch the same as the width of the stiles.



MITER THE MOLDED EDGE on the frame parts. To align the cut, screw a wood fence to your miter gauge, and mark the end of the cut. Align the shoulder of the tenon with this mark. After mitering, cut the second shoulder on the tenon.



MARK OUT THE PANEL for cutting the arch. Masking tape protects the surface when you use the compass. Lay out the shoulders with a small square.

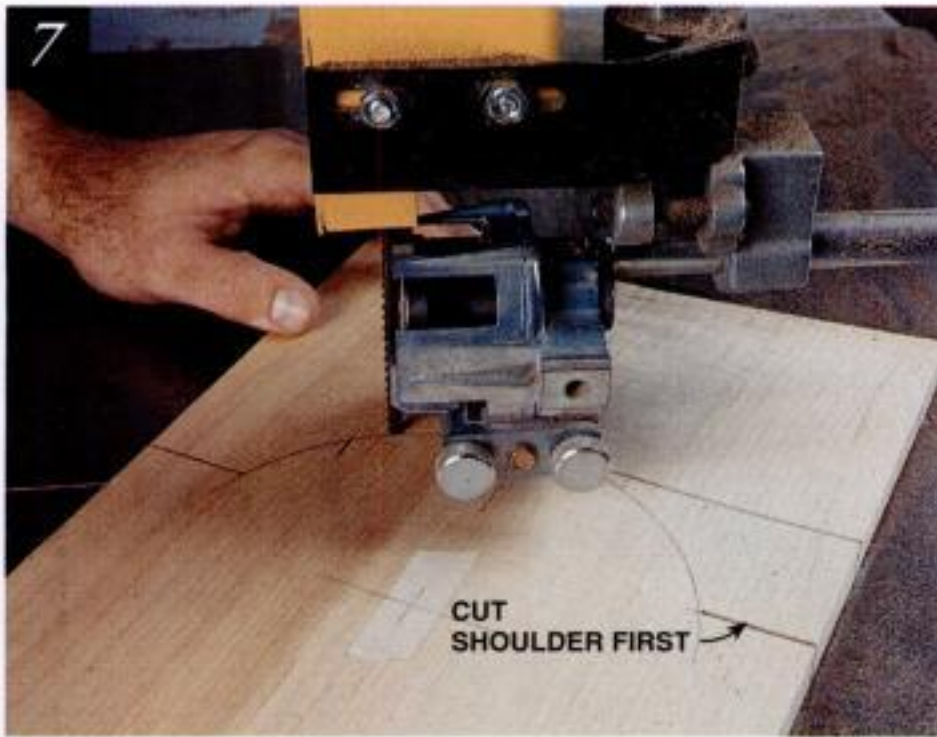
Make a few test cuts and adjust the thickness of the tongue on the panel to 1/4 in. You can make several passes if you need to, but with a sharp cutter you can usually make the bevel in one pass. Start curved cuts against a pin in the table and use a fence for straight cuts.

Carve the Corners

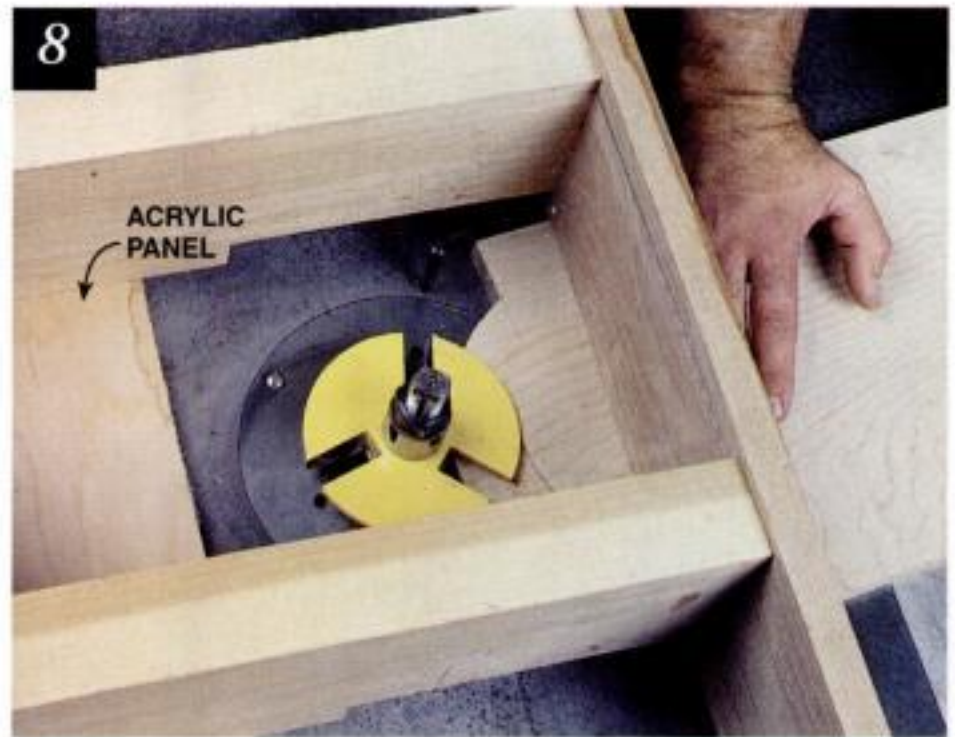
The inside corners of arched-top doors are distinctive and they must be carved by hand. First, lay out the straight and curved sides of each corner, following the shoulders already cut (Photo 10). Chop the waste with a bench chisel, stay-

ing 1/16-in. away from your lines. Then, pare the waste away across the grain (Photo 11). Check your progress with an adjustable square set to the shoulder depth.

Now, cut to the line at the shoulders. For the curved section, a 1/2-in. gouge with a No. 2 sweep usually works well (Photo 12). For smaller doors, try one with a No. 3 sweep. With the shoulders cut, mark the bevel with a knife, connecting the inner and outer corners of the curve (Photo 13). Finish carving the corner using left- and right-skew chisels ([see Sources, p. 78](#)) Be sure your chisels are razor sharp and make light cuts to avoid tearing the grain.



BANDSAW THE ARCH in the top of the panel, staying on the waste side of the line. Smooth the curve with a file so it has no dips or flat spots.



RAISE THE CURVED EDGE of the panel on a shaper or powerful router table, using a cutter with a guide bushing or pilot bearing. A wooden jig with an acrylic top makes the cut safer and allows you to collect the chips.



RAISE THE STRAIGHT EDGE of the panel with a similar jig, but use a fence instead of the guide bushing or pilot bearing.



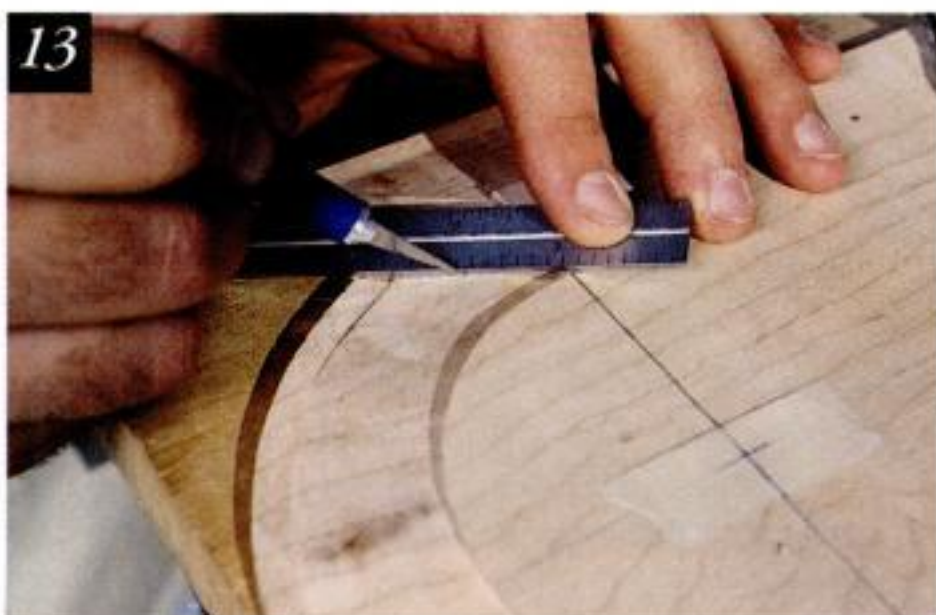
MARK THE INSIDE CORNERS that the panel-raising bit couldn't reach, by extending the shoulder using a compass and small square.



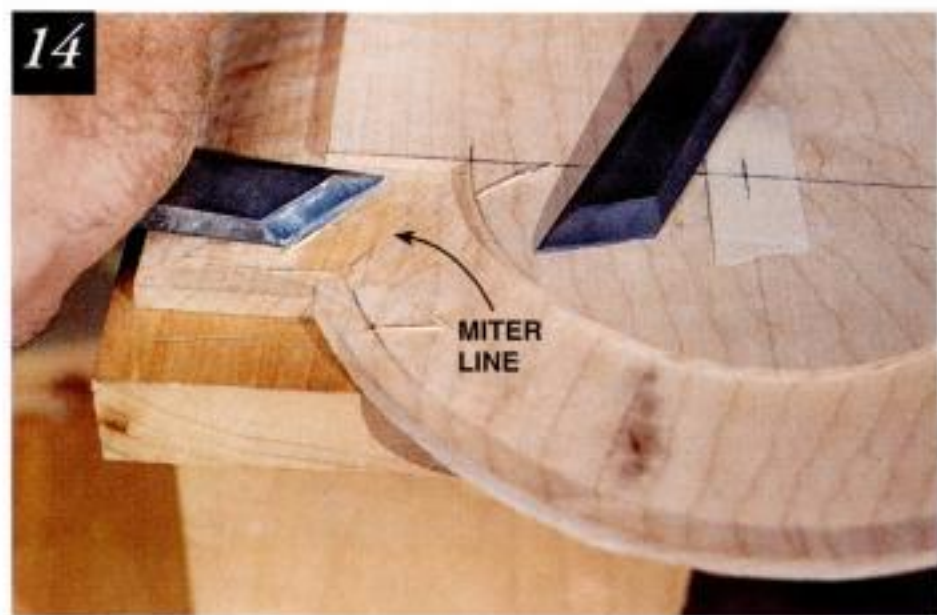
11 *CHOP THE WASTE* from the inside corners by making a series of chopping cuts to the depth of the shoulder, then paring horizontally to remove the waste. Stay inside your layout lines.



12 *PARE THE SHOULDERS* using a straight bench chisel for the straight sections and a gouge with a shallow sweep (No. 2) for the curved parts.



13 *SCORE THE MITER LINE* with a sharp razor knife, following a small straightedge laid from the inner to the outer corner.



14 *CARVE THE BEVELS* up to the miter line, using a pair of left- and right-skew chisels. The tools must be very sharp and the paring cuts light to keep from tearing the grain.

Assembly

Finish-sand all the parts. Completely finish the panel before assembly. This helps to avoid any unfinished parts being revealed when the panel shrinks a bit in the frame. It's also just plain easier to work on the panel when it's not in the frame.

Assemble the frame around the panel (Photo 15), brushing glue on both the tenons and in the mortises. Be careful not to let glue get in the panel grooves or on the panel, and work on a flat surface so the door stays flat.

When the glue is dry, cut off the projecting horns and plane the edges of the door. Now they're ready to hang. ▲

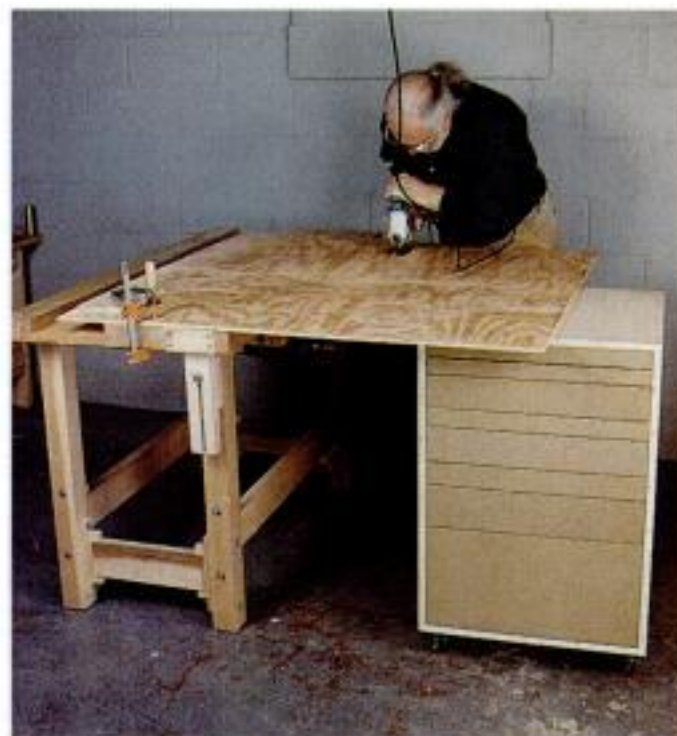
SOURCES

Left- and right-skew chisels are available from Garrett Wade, (800) 221-2942, for \$40 a pair.



15 *PUT IT ALL TOGETHER.* Spread glue in mortises and on tenons and clamp the frame around the panel. Work on a flat surface and place the clamp heads on the midline of each rail to keep the doors flat.

Roll-Around SHOP CABINET



This wooden cavern holds tons of tools, plus it doubles as a bench outrigger.

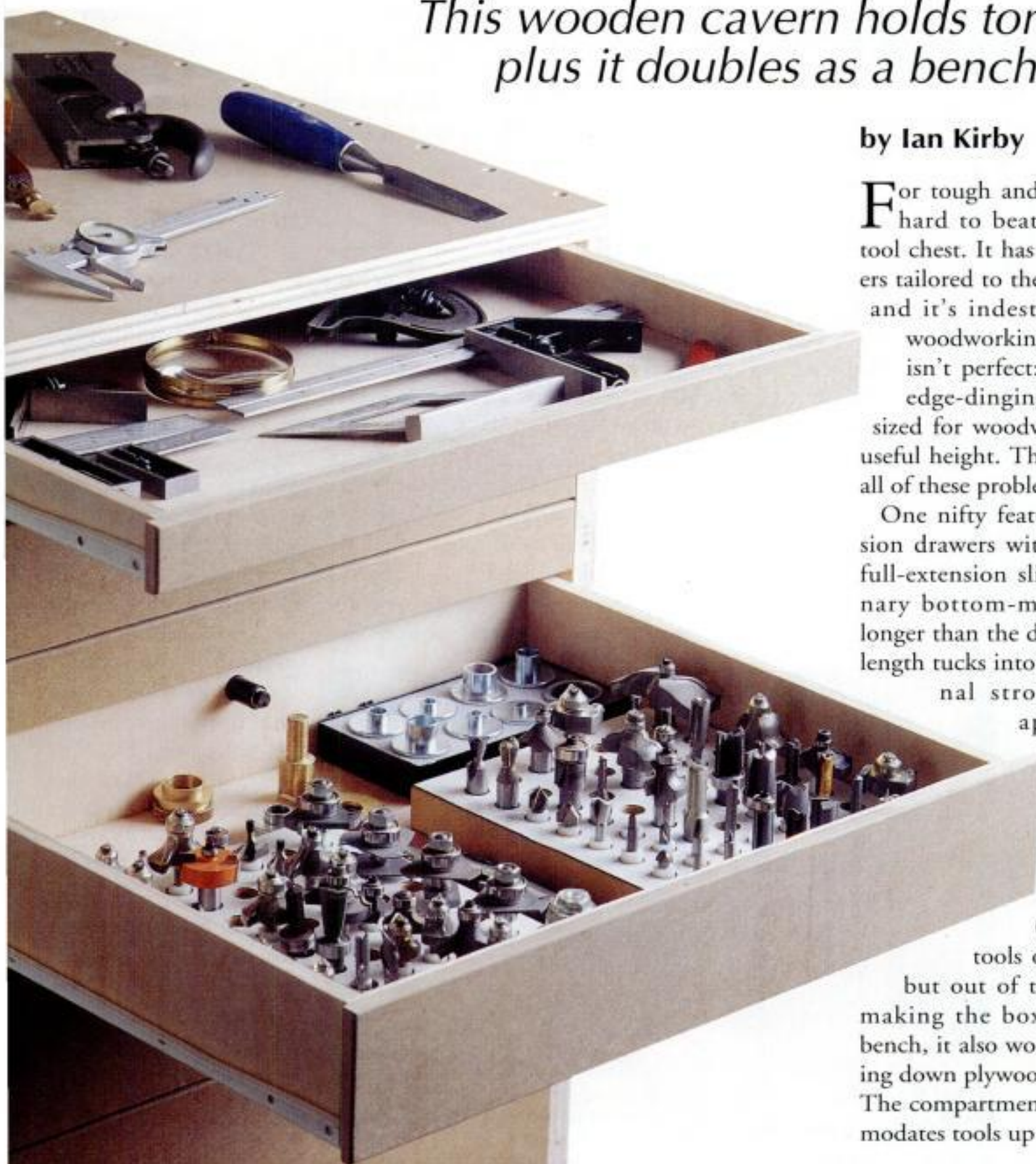
by Ian Kirby

For tough and intelligent tool storage, it's hard to beat a professional mechanic's tool chest. It has shallow full-extension drawers tailored to the tools inside, it rolls around, and it's indestructible. However, in the woodworking shop, the mechanic's chest isn't perfect: it's expensive, it's made of edge-dinging metal, the drawers aren't sized for woodworking tools, and it's not a useful height. This roll-around toolbox solves all of these problems.

One nifty feature is that it has full-extension drawers without the premium price of full-extension slides. Instead, you use ordinary bottom-mount slides that are 4 in. longer than the drawers themselves. The extra length tucks into a pocket alongside the internal strongback (Photo 2). This

approach easily saves you \$100. To build the box, plan to spend about \$80 on wood, and \$75 on hardware.

This toolbox works closely with your bench (Photo 1). It keeps your tools organized and close at hand, but out of the way of your project. By making the box the exact height of your bench, it also works as an outrigger for breaking down plywood and supporting large work. The compartment behind the drawers accommodates tools up to 28 in. long.





1 USE IT AS A WORK SUPPORT

If you make the box the same height as your workbench, it's easy to support a piece of plywood for cutting. Because of its width, the toolbox gives generous support to the cutoff piece. Drawers have touch-latches so there are no protruding handles.

There is a tradition among woodworkers of making extremely fine tool cabinets, as a way for the traveling journeyman woodworker to display his or her abilities. There's nothing wrong with following that tradition. But it's not what I was after in this design. This toolbox is in no way a showcase. It's a tough, utilitarian piece of shop furniture featuring exposed screw heads and naked plywood edges.

The big advantage to this design is that it doesn't take a lot of time or money to make. Of course you could edge-band the plywood, use biscuit joints instead of screws, and paint the plywood, but there's no functional reason for any of that.

Design your own drawers

You're the only one who knows what tools you have, so you have to design your own drawer layout. If you take a little time to do it, you'll be able to fit an incredible number of tools into the box, and you'll have

them grouped to suit your needs. Quick access is important, and workshop space is precious, so think about what tools you use together, which ones you use all the time, and which rarely see daylight. Make a drawer template out of plywood or cardboard, so you can lay out each group of tools (Photo 3).

I like to keep my measuring tools handy, so I put them in the top drawer, with gauges and layout tools in the next drawer down. Some things aren't compatible in the same drawer—chisels with files, for example. Spade bits

and drill bits can lie down in a shallow drawer, but router bits should stand up in holes drilled into a block, so they can't knock together. Group like tools together in shallow trays, with dividers to maintain order. **TIP:** You'll maximize useful space by running dividers from front to back instead of from side to side.

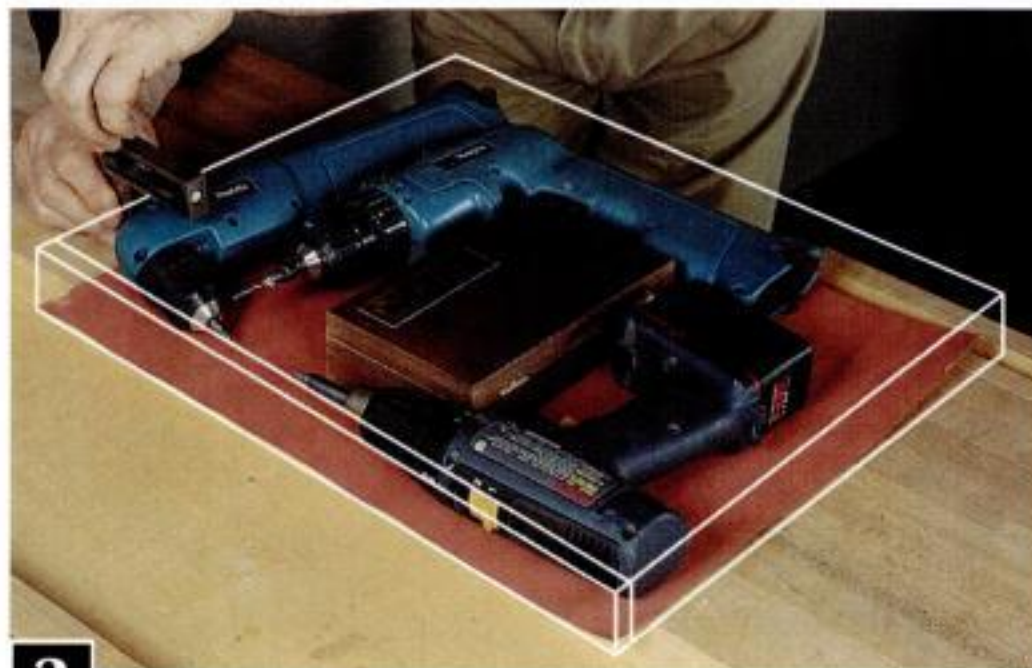
Once you've planned your layout, it's easy to dimension the drawer parts. To find the distance from one drawer bottom to the next, measure the height of the contents and add 1/2 in. for the bottom itself plus a little clearance. The

drawer sides and ends can be as wide as the depth of the contents, and they can be a lot narrower, too—routers and other big tools sit very well on shallow trays.

The top drawer should have sides that are about 1/2-in. narrower than the drawer opening, so the drawer can be tipped up for installation.

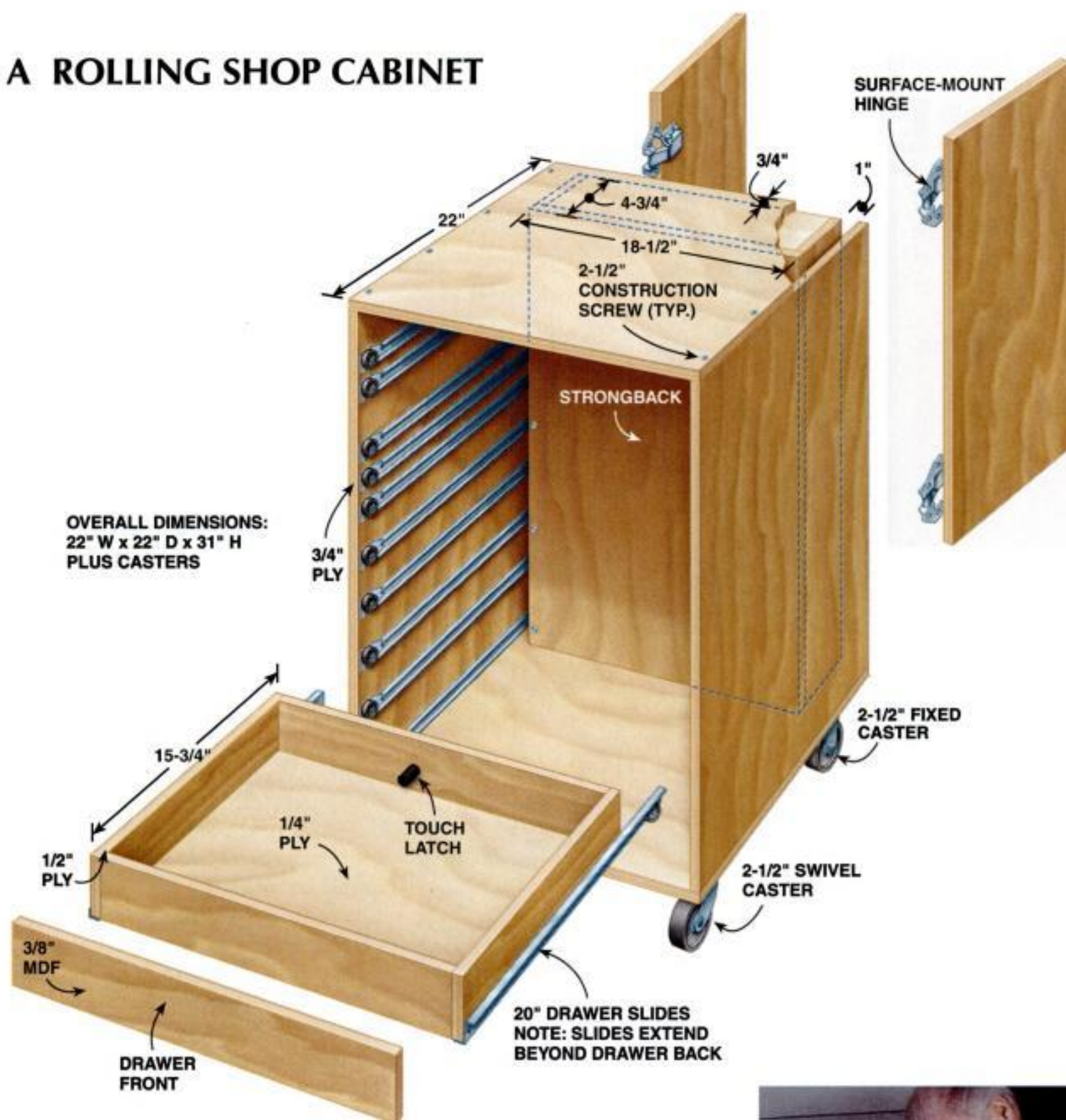


2 BACK DOORS reveal storage for longer tools in the "strongback"—a shallow box-inside-a-box. Because the drawer slides extend back alongside the strongback, the drawers are essentially full-extension, without the expense of full-extension slides.



3 DESIGN THE DRAWERS to hold your tools. A piece of cardboard the same size as the drawer bottom helps.

FIG. A ROLLING SHOP CABINET



Draw before you saw

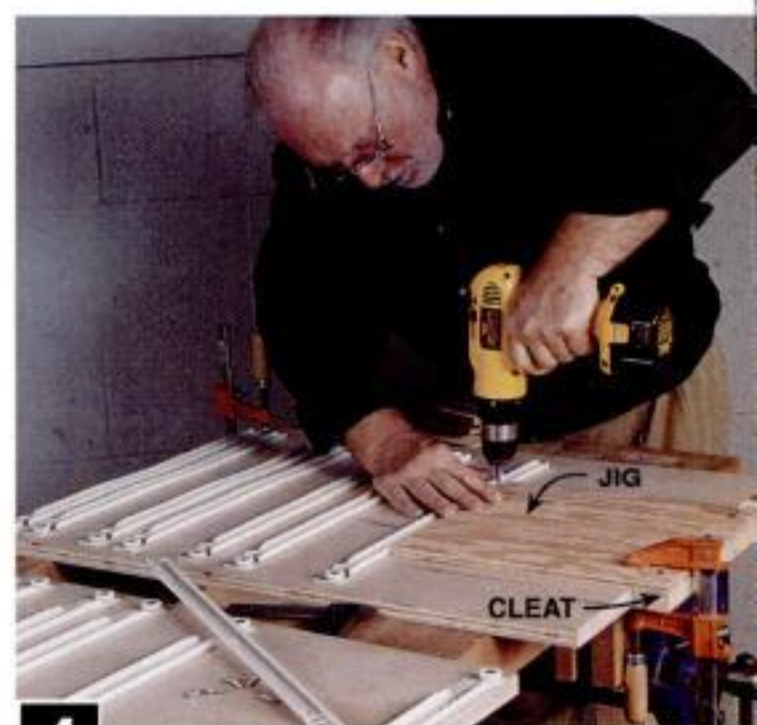
Don't charge into sawing your plywood before you buy the hardware. You can cut wood to suit the hardware, but you can't redesign metal hardware to fit your wood. Get all the hardware—drawer slides, hinges, touch-latches and wheels—before you start to build, then adjust your design to suit these parts.

You'll have to make a full-size sectional drawing to show how the drawers fit inside the case. The drawing will help you avert hardware conflicts. Pay close attention to the back-door hinges. You might have to rearrange the drawers to make room for them.

Magnetic touch-latches bypass the need for drawer pulls and keep the drawers closed while you roll the cabinet around the shop. Single latches won't have enough oomph to open deep drawers full of iron, but you can buy double latches, or combine two or more singles.

Assemble the box

Figure B shows how to get the whole box out of one sheet of 3/4 in. plywood. Note that seven pieces—the box sides, the rear doors, the strongback sides and back—are all sawn to the same height. Organize the plywood breakdown and sawing so you



4 **MOUNT THE SLIDES** onto the sides of the toolbox before assembly. A plywood jig with a cleat will ensure that the slides are square and at the same height on both sides.

DRILL AND COUNTERSINK **5**

the sides, and drill pilot holes in the top and bottom pieces. A piece of scrap clamped alongside ensures that the joint is flush. Screw the box together.



HANG THE BACK DOORS **6**

with surface-mount hinges. Screw them to the doors first, then screw the doors to the box.



INSERT THE STRONGBACK **7**

and screw it on top and bottom. Its edge should be set 3/4 in. back so it acts as a stop for the doors.



complete all seven pieces at the same fence setting, then trim off 1/8 in. from the rear doors, so they'll close easily.

Mount the drawer hardware on the plywood sides before you assemble the box, using the locator jig, shown in Photo 4. The jig shown consists of a piece of plywood with a cleat at one end. The top of the slide should sit tight against the bottom end of the plywood jig. Saw the depth of the next drawer off the jig after each pair of slides, to prepare it for the next pair. Saw the exact distance from the bottom of one drawer to the bottom of the next.

I assembled my toolbox with 2-1/2 in., No. 8 Phillips-head construction screws spaced about 3-in. apart. Lay out the location of the screw holes on the plywood top and bottom, so you can drill and countersink clearance holes with the plywood flat on the bench. Set up the first joint with the aid of clamps, as shown in Photo 5. Be sure to drill the pilot holes into the second piece of plywood. If you skip this step, the entering screw will make the wood bulge, interfering with a tight connection. Make the strongback in exactly the same way.

The screws don't make a rigid cabinet, but the strongback takes care of that. First, however, mount the hinges on the doors and screw them to the box sides, because you won't have easy access afterward (Photo 6). Then slide the strongback into the box and screw it to the top and bottom (Photo 7). Its edge sits 3/4 in. inside the box, so the doors can close against it. Once you glue the strongback, the box will not come apart again, so don't glue it until you're sure everything is in the right place. Add the casters (Photo 8), and the box itself is done.

Make the drawers

The toolbox features a straightforward plywood drawer. Saw the sides and ends from 1/2 in. uniform laminate or Baltic birch ply. Strength and squareness comes from the glued-on bottom, which is 1/4 in. ply.

To assemble the drawers, screw or nail the sides and ends together. Lay down a uniform coat of glue on the bottom edges of the drawer, then place the bottom on the glue. Line up the corners, and nail it all around (Photo 9).

Close-fitting drawer fronts will help keep shop dust out of the box. I made these drawer fronts out of 3/8-in. MDF with a 3/16-in. roundover; solid wood works as well. The fronts are 3/4-in. wider than the drawer

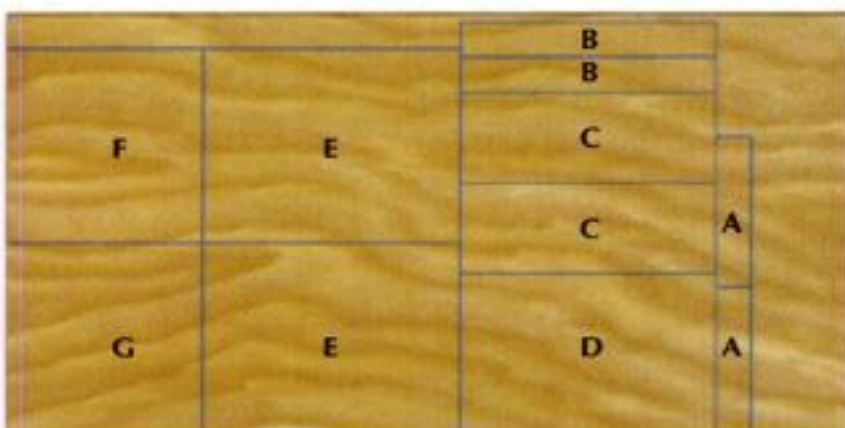
itself, and 1/8-in. higher. Because standard drawer slides need a 1/2-in. space on either side, this gives you 1/8 in. clearance each way. The false front fits flush with the bottom of the drawer, so there's also 1/8-in. top clearance.

Start attaching the false fronts around the middle of the case (Photo 10). Position the first one by measurement and you will be able to do the rest by eye. Glue and clamp the fronts to the drawers; if you have an air nailer, you can glue and nail without bothering with clamps.

If you like this toolbox, consider making more than one. You could size the drawers for portable power tools, router bits, wrenches, screwdrivers and other machine-maintenance tools, or for supplies like sandpaper and finishing materials. ▲

FREQUENT CONTRIBUTOR IAN KIRBY MAKES FURNITURE AND TEACHES FROM HIS STUDIOS IN MILFORD, CONNECTICUT. HIS NEW BOOK, *THE ACCURATE ROUTER*, IS AVAILABLE FOR \$14.95 FROM CAMBIUM PRESS, (203) 426-6481.

FIG. B PLYWOOD LAYOUT



CUTTING LIST

KEY	PCS.	SIZE & DESCRIPTION
A	2	18-1/2 x 4 Strongback Top & Bottom
B	2	29-1/2 x 4 Strongback Sides
C	2	29-1/4 x 10-1/8 Doors
D	1	29-1/2 x 18-1/2 Strongback Back
E	2	29-1/2 x 22 Cabinet Sides
F	1	22 x 22 Cabinet Bottom
G	1	22 x 22 Cabinet Top
Drawers Front & Back		18-1/2 wide x drawer depth
Drawers Sides		15-3/4 wide x drawer depth
Drawers False Fronts		19-1/4 wide x drawer depth + 3/8
Drawers Bottoms		19-1/2 x 15-3/4

MATERIAL LIST

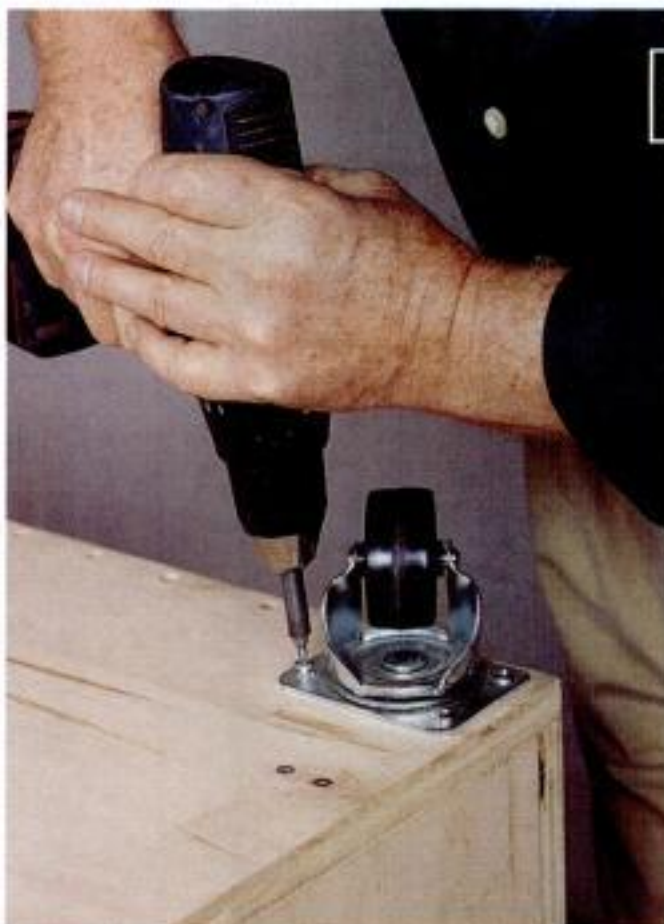
Tool Box	3/4 x 48 x 96 (one sheet) cabinet-grade plywood. Approx. \$35
Drawers	1/2 x 60 x 60 (one 5 x 5 sheet) Baltic birch or uniform laminate plywood. Approx. \$25
False Fronts	3/8 x 48 x 48 (one-half sheet) Medium Density Fiberboard (MDF). Approx. \$10
Drawer Bottoms	1/4 x 48 x 96 (one sheet) plywood. Approx. \$12

HARDWARE

Hinges	2 pair, surface mount, for rear doors (Rockler #28845, \$6.99 per pair, 800-279-4441)
Touch Latches	one per drawer (single latch, Rockler #28407, \$1.99, or double latch, Rockler #28456, \$2.99, 800-279-4441)
Drawer Slides	20-in. 100-pound load, bottom mount, one pair per drawer (Woodcraft #01V09, \$4.99 per pair, 800-225-1153)
Wheels	2-1/2 in. diameter, 2 fixed, 2 swivel (hardware store)

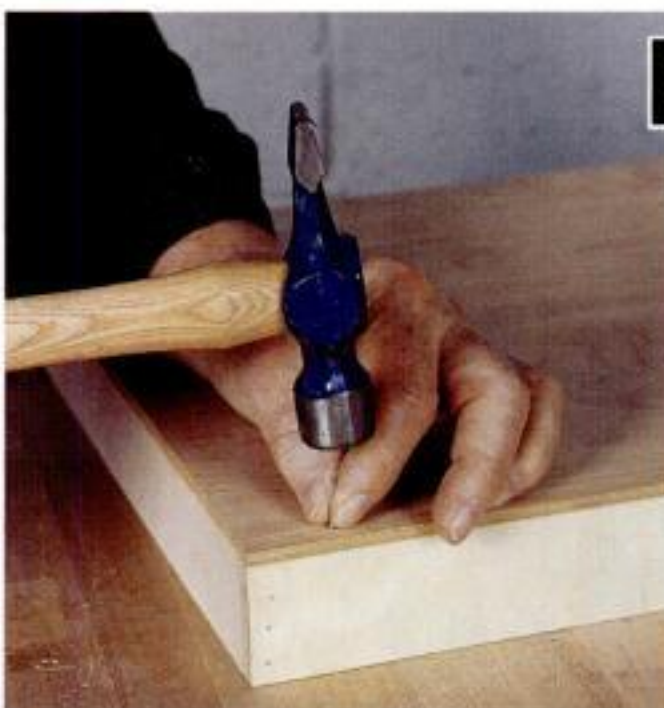
8 MOUNT THE CASTERS,

two fixed and two swivel. This allows for easy steering but some rigidity if you use the toolbox as a work support.



9 DRAWERS ARE SIMPLE BOXES,

butt-joined, glued and nailed, with a glued and nailed plywood bottom. The bottom makes the drawer rigid and square.



10 GLUE FALSE FRONTS

to the drawer boxes after the slides are screwed on. Use clamps, nails or screws to hold the fronts while the glue sets.



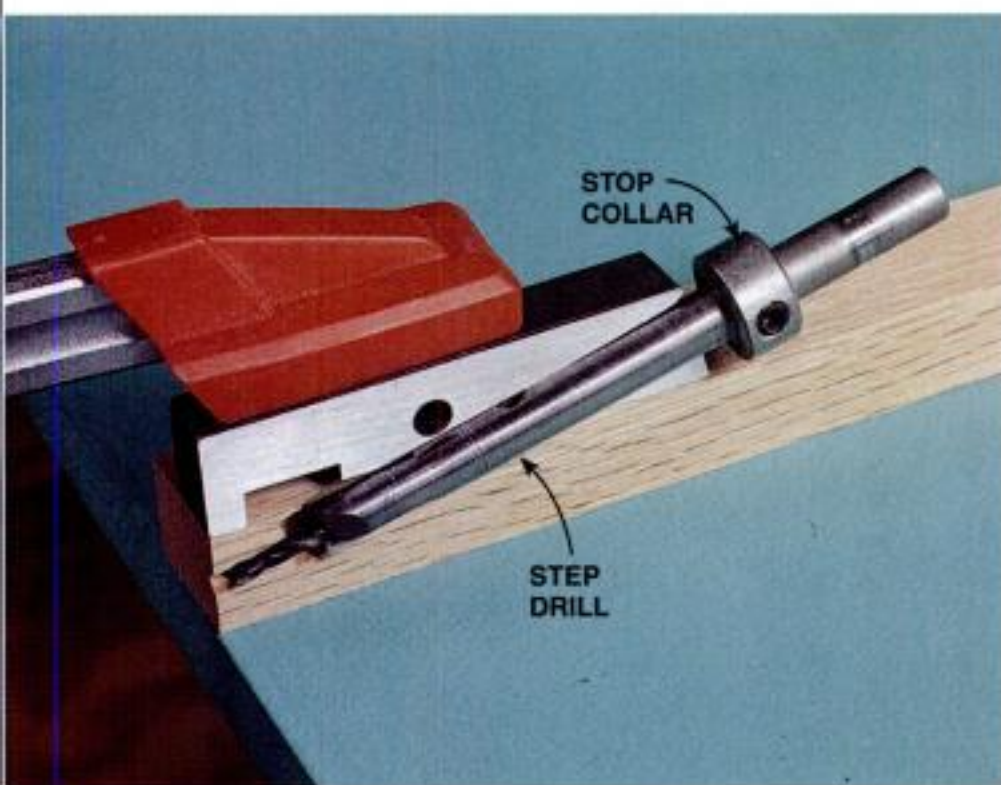
POCKET-HOLE JIGS

by George Vondriska

Pocket screws are a simple and effective way to join wood. They're particularly good for face frames, cabinet boxes or any situation where you need a fast, strong joint and appearance isn't a big deal. The catch? To drill them accurately you need a good jig. Unfortunately, there is a bewildering variety of pocket-hole jigs available at prices from \$50 to more than \$500. This review will help you get the one that's right for you.



POCKET-HOLE JIGS



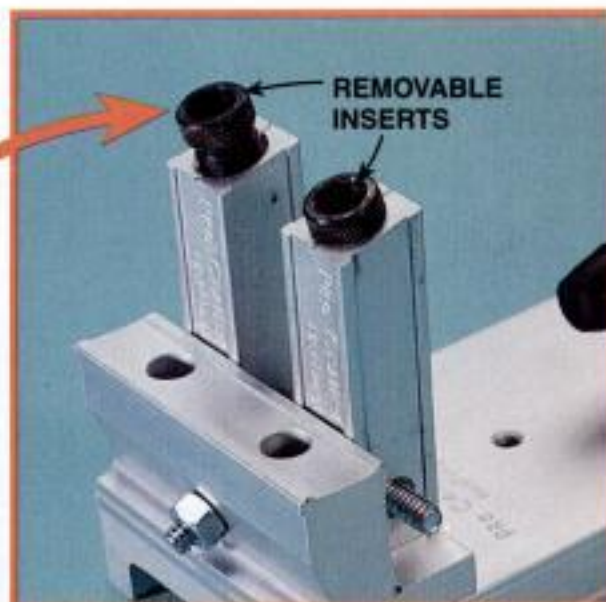
How These Jigs Work

The screw pocket itself is a hole drilled at about a 15-degree angle. The jig works as a guide for drilling the hole. The jig is clamped to the wood, and a special step drill with two different diameters is used to create both the screw pocket and the shank hole for the screw (photo at left). A stop collar on the drill controls the depth.

IMPORTANT FEATURES

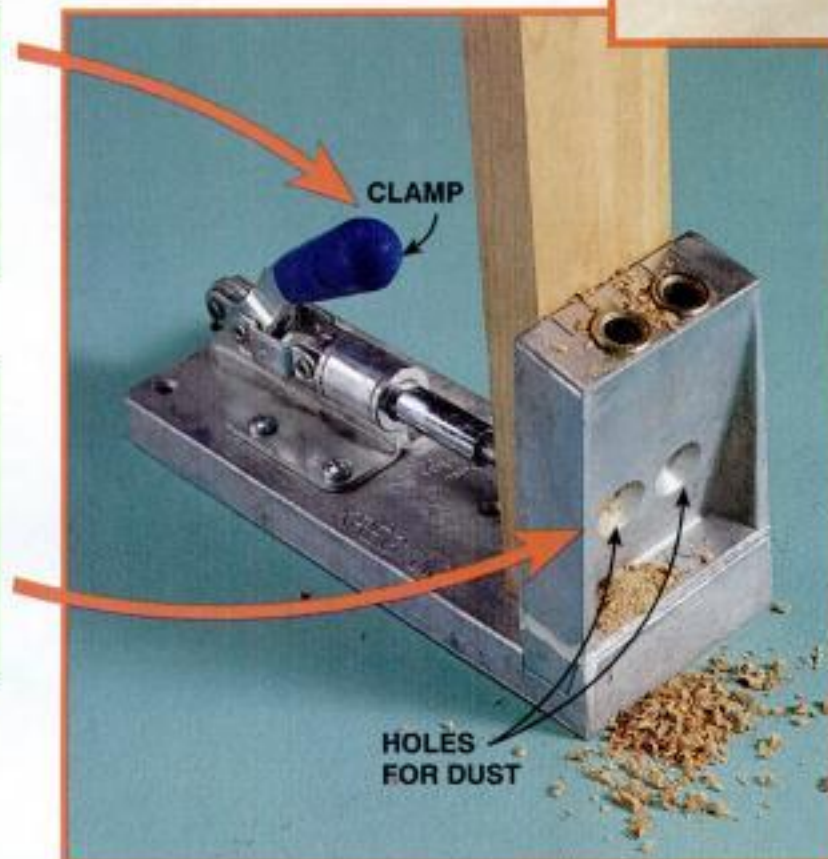
All of the jigs we tested make pocket-screw joints, but the more expensive ones offer added convenience, speed and the durability to stand up to use in a professional cabinet shop. But it's important to ask yourself, "How often will I use this tool?" Most woodworkers will only use their jig occasionally. Here are some features to look for:

Durability. Some jigs employ a hardened-steel drill guide to prevent wear, others are made from softer aluminum.



Clamping. Jigs on the low end of the price scale may require a separate clamp. The more complete jigs include their own clamping system, and are much easier to use.

Chip removal. Drilling the holes makes a lot of chips, and this can mean backing the bit out often in order to clear them. Some jigs provide holes or other means for the chips to escape.



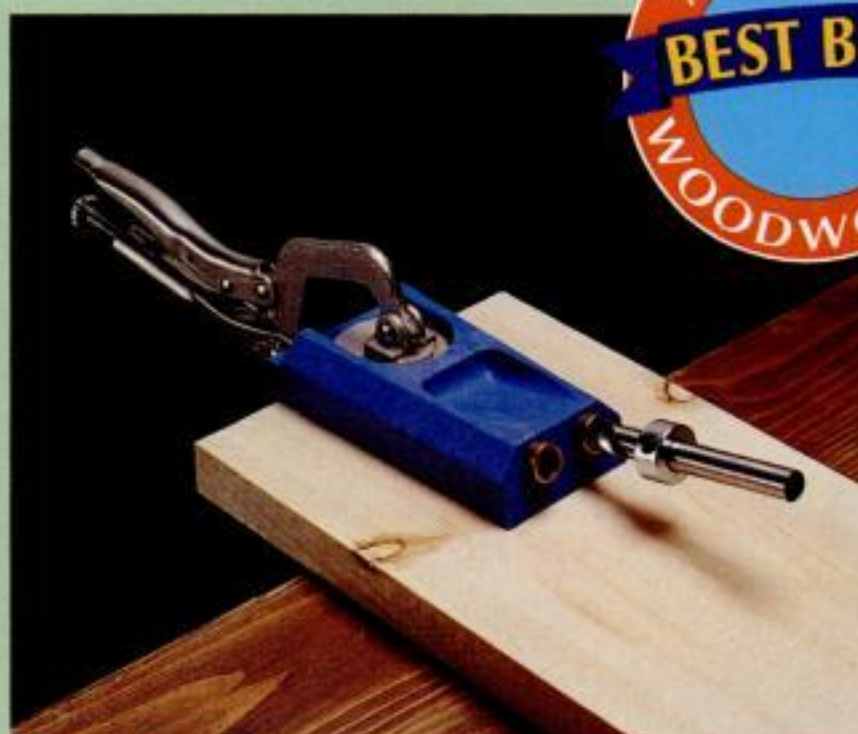
Versatility. Most jigs are designed for use with 3/4-in. thick material. The geometry of the jig and the start point of the pocket keep the exit hole in the end grain of 3/4-in. wood, approximately centered. If you tend to use thicker stock, look for a jig that can be stepped back from the edge.

POCKET-HOLE JIGS

THE JIGS

THE ROCKET

The plastic housing contains two hardened-steel bushings to guide the drill. The clamp (included) can be used to hold the jig down and also for assembly of parts. A fence locates the jig relative to the end grain, and an extension can be used for material thicker than 3/4 in.



- PROS**
- Hardened-steel drill guides carry lifetime warranty
 - Comes with an extension that allows pocket holes to be stepped back on thicker material
 - Includes clamp
 - Includes fence to place jig the correct distance from edge of material
 - Distance between holes is fixed

- CONS**
- Requires separate clamp
 - Slightly more awkward to use than jigs with toggle clamps

COST: \$65, plus s&h, from Kreg Tool; (800) 447-8638.

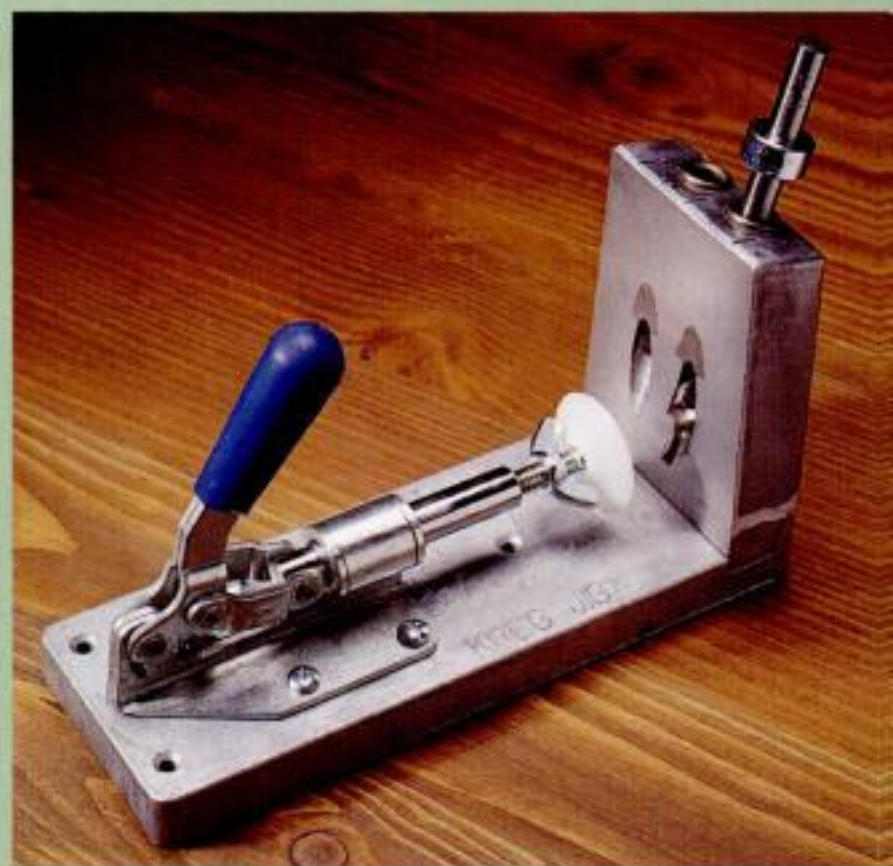
KREG K2

Self-contained and rigid, the K2 will take material up to 1-1/2 in. thick. Pocket spacing is fixed.

- PROS**
- Simple and sturdy jig
 - Hardened-steel drill guides carry lifetime warranty
 - One-piece assembly is rigid
 - Hole is provided for chips to clear

- CONS**
- Cannot adjust pocket locations except by moving material
 - Best suited for 3/4-in. thick material

COST: \$120, plus s&h, from Kreg Tool; (800) 447-8638.



THE JIGS

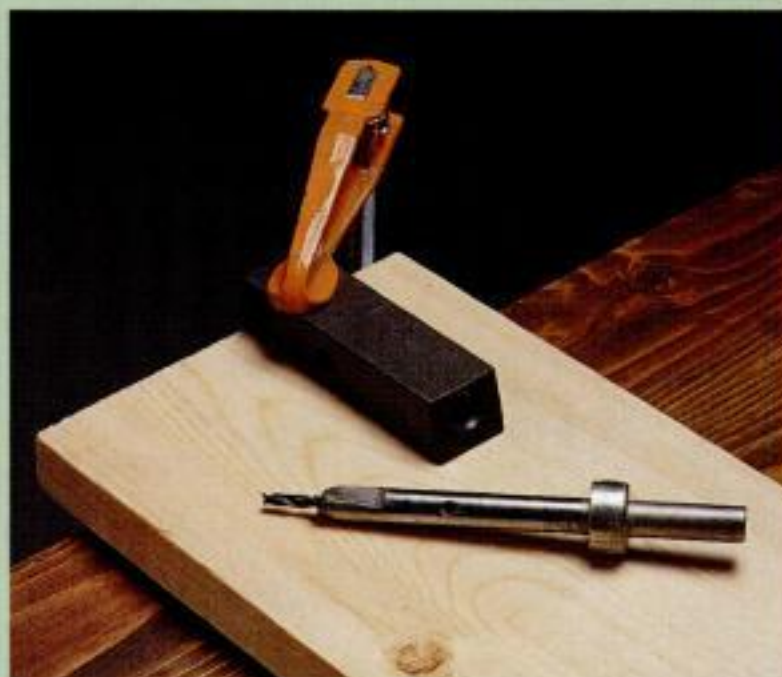
QUIK-JOINT FASTENING SYSTEM

A simple jig consisting of 3/4-in. by 3/4-in. aluminum bar stock bored with a guide hole. There is no fence system, so the jig must be manually aligned for each setup.

- PROS**
- Can be clamped anywhere on material
 - Carbide-tipped step drill is long lasting
 - Can be set up to create holes with any spacing
 - No limit on thickness of material

- CONS**
- No drill guide, prone to wear
 - Requires separate clamp
 - Must be manually aligned with end grain on material on every use
 - Awkward to use compared to self-contained units
 - Must be moved for multiple hole-boring applications

COST: \$45, plus \$3.50 s&h, from Kencraft; (419) 536-0333.



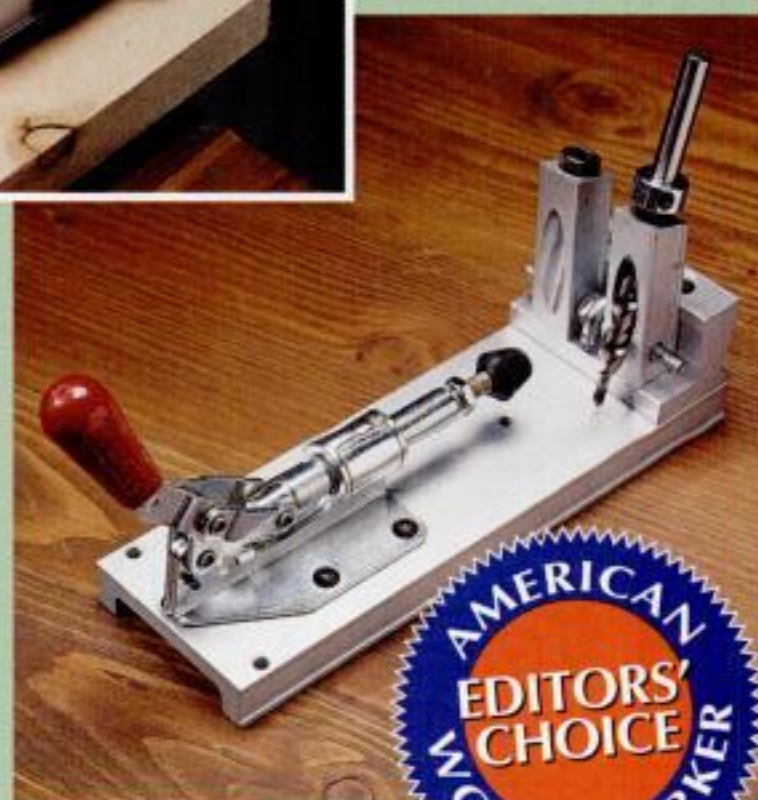
TASK PROCENTER

Completely self-contained, this tool has the flexibility to change the distance between pockets. It will accept material up to 1-1/4 in. thick. The guide assembly is removable, and can be used remotely. When used remotely, the fence can be adjusted to keep the exit holes centered on different thicknesses of material.

- PROS**
- Hardened bushings in holes, removable for replacement
 - Adjustable distance (1 in. to 2-7/8 in.) between pockets
 - Self-contained clamping
 - Guides are removable and can be used separately
 - Optional fence allows placement to better locate screws on thicker material when guides are used separately

- CONS**
- Clamping narrow material (1-1/2 in. or less) with toggle clamp is awkward
 - Fence assembly for remote application must be purchased separately
 - No hole for chips to clear

COST: \$95; \$5.95 for the fence, plus s&h, from TASK; (616) 795-7146.



POCKET-HOLE JIGS

THE JIGS

KREG 200

Very similar to the K2, but in place of a toggle clamp, material is held in place by a foot-actuated pneumatic clamp. The drill bit is guided through the bushing on a pair of spring-loaded rails. Adjustable flip-stops control pocket location.

- PROS**
- Hardened-steel drill guides carry lifetime warranty
 - Controlling the drill bit with the spring-loaded guide prevents the tip from contacting the top of the jig, keeping the bit sharp longer
 - Pneumatic clamp significantly speeds up the process

- CONS**
- Requires an air compressor
 - Best suited for 3/4-in. thick material

COST: \$329, plus s&h, from Kreg Tool; (800) 447-8638.



FACEMAKER CLAMPS

This system bores the holes and the pieces to help in assembly. The jaws can be opened to 7-1/4 in. and are self-centering on frame parts. Mating boards are clamped into the tool at the same time, so holes can be bored and screws driven in one set-up.

- PROS**
- Hardened-steel drill guides
 - No assembly jig required
 - Entire drilling and assembly set-up is done in one step
 - Jaws are self-centering, hole locations always consistent
 - Easy for chips to clear from drill path
 - No limit on material thickness

- CONS**
- Can only be used on face-frame type assemblies, not on cabinet boxes
 - Best suited for 3/4-in. thick material

COST: \$332, plus \$5 s&h, from FaceMaker; (800) 533-5000.

Recommendations

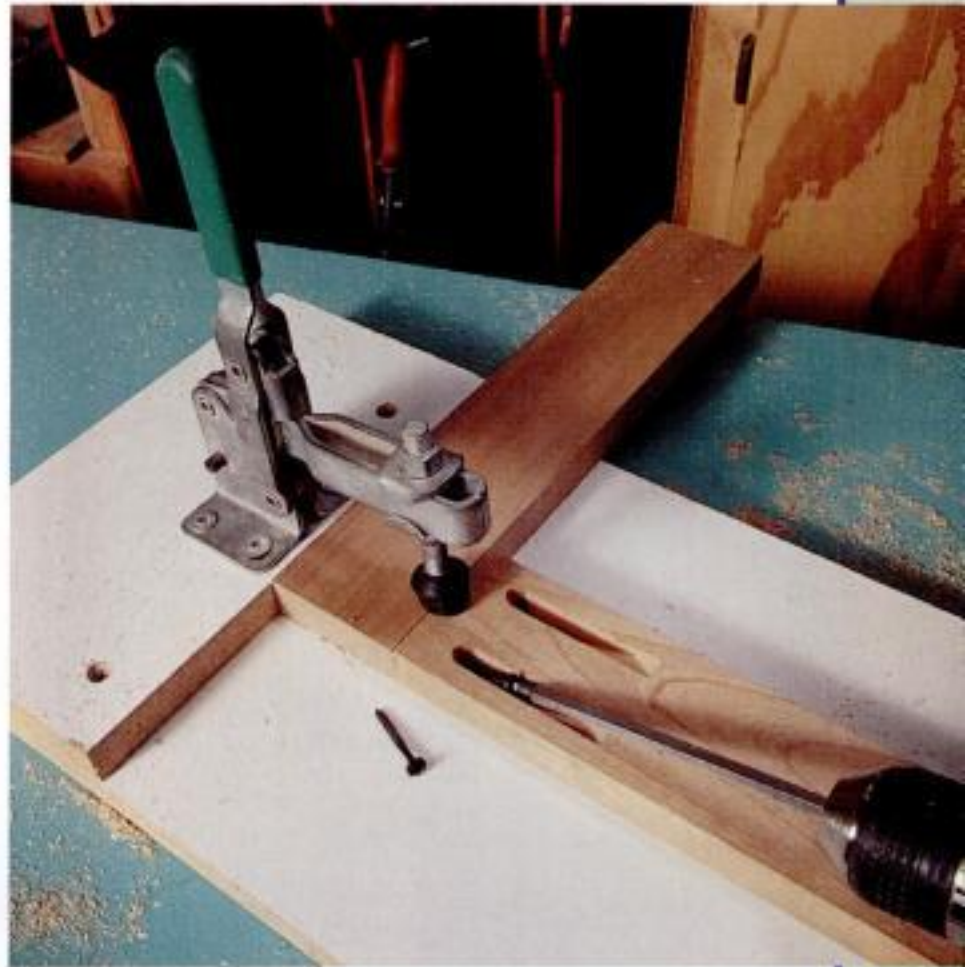
The Task ProCenter earned our Editors' Choice Award because of its versatility. With adjustable hole spacing and a guide system that can be used separately, this jig is a real workhorse.

Kreg's Rocket gets the Best Buy Award. If you need to do an occasional pocket hole and the convenience of a self-contained clamp is no big deal to you, this jig gives lots of function for the money.

TIPS FOR BETTER POCKET HOLES

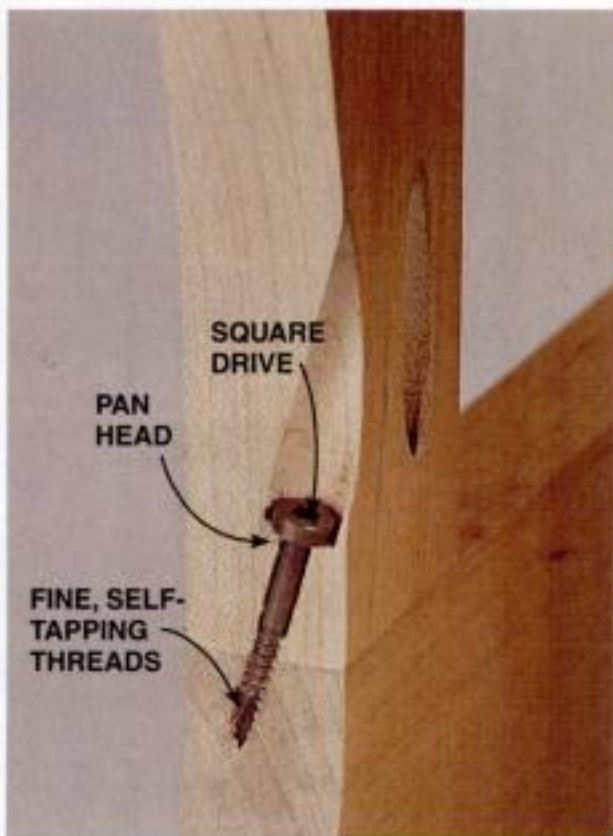
Keep the Joint Flat

When assembling parts using pocket holes, it's common for one part to slide past the other, causing an offset in the joint. To prevent this, clamp the parts to a flat surface for assembly, using a jig like we show at right. Clamp it to your bench, and you'll have both hands free for assembly.



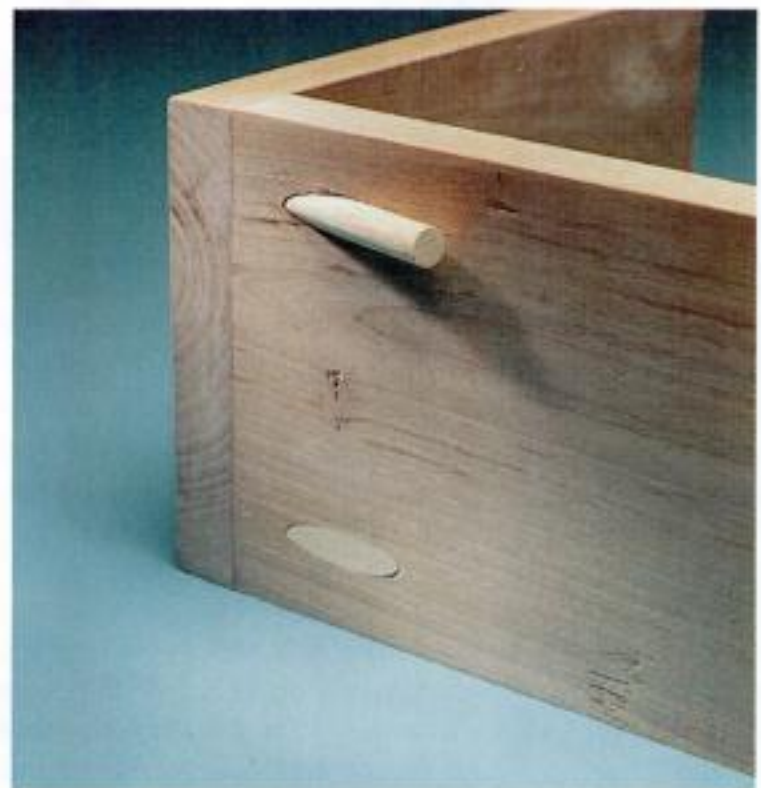
Use the Right Screw

Pocket-hole screws are pan-headed and self-piloting. You will not need to pre-drill the adjoining piece. A square drive makes it easier to keep the driver tip engaged (see Sources, below). The fine-thread version works best in solid wood, while coarser threads work better in man-made materials.



Fill Your Pockets

If the pocket will be visible in the finished project, use a 3/8-in. diameter dowel to fill it. Contrasting colors can add detail to the project. After the dowel is glued in, use a saw with little or no set to the teeth to cut it close to the surface, then pare it flush with a sharp chisel. ▲



SOURCES FOR POCKET-HOLE SCREWS

McFeeley's; (800) 443-7937

Woodworker's Supply, Inc.; (800) 645-9292

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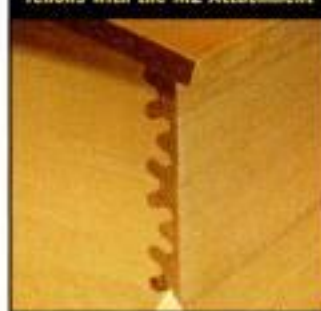
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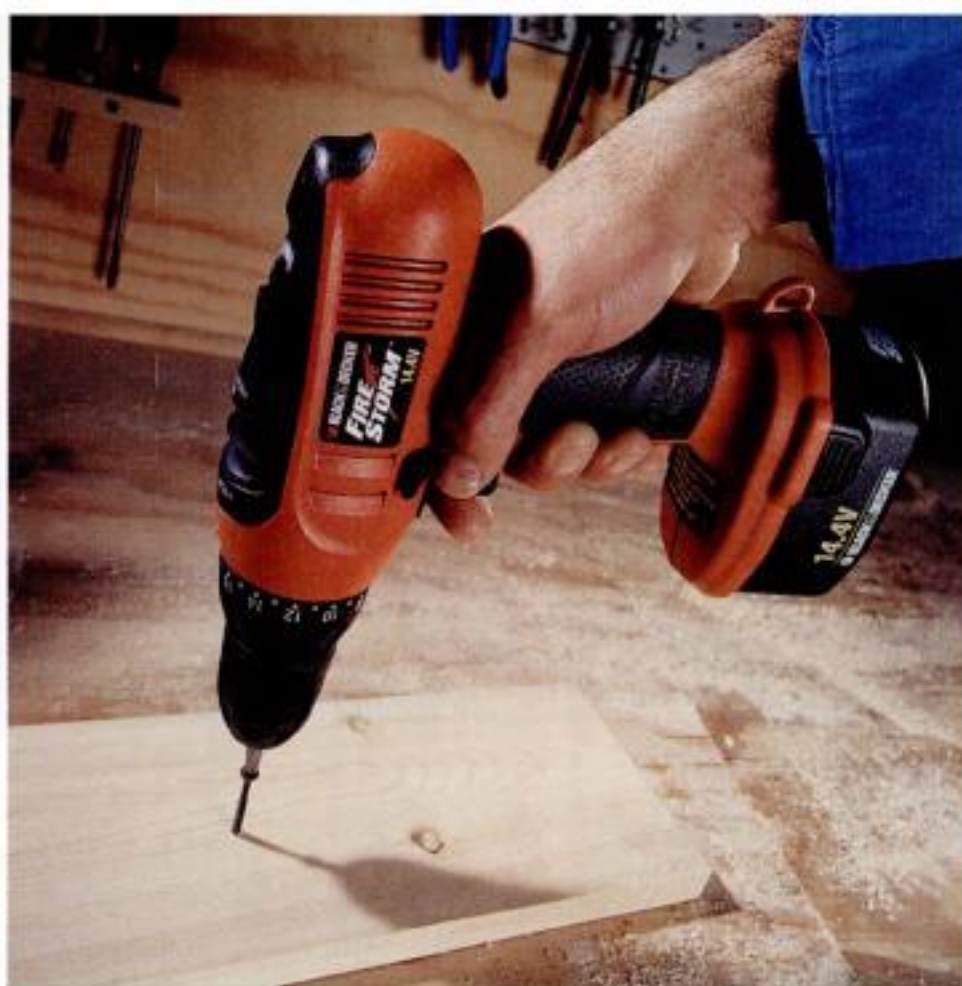
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Power tools can only cut accurately if you can set them up accurately. The Master Gage/Pro gets the job done. It features a dial indicator, protractor, depth-of-cut gauge and it can be used as a square. We found the tool useful not only for initial setup on tools, but also for day-to-day use. The scales were dead-on accurate and the tool was easy to use. It sells for \$229 and can be ordered by calling (805) 492-4616. If you would prefer a similar tool without the protractor, order the standard Master Gage for \$139.



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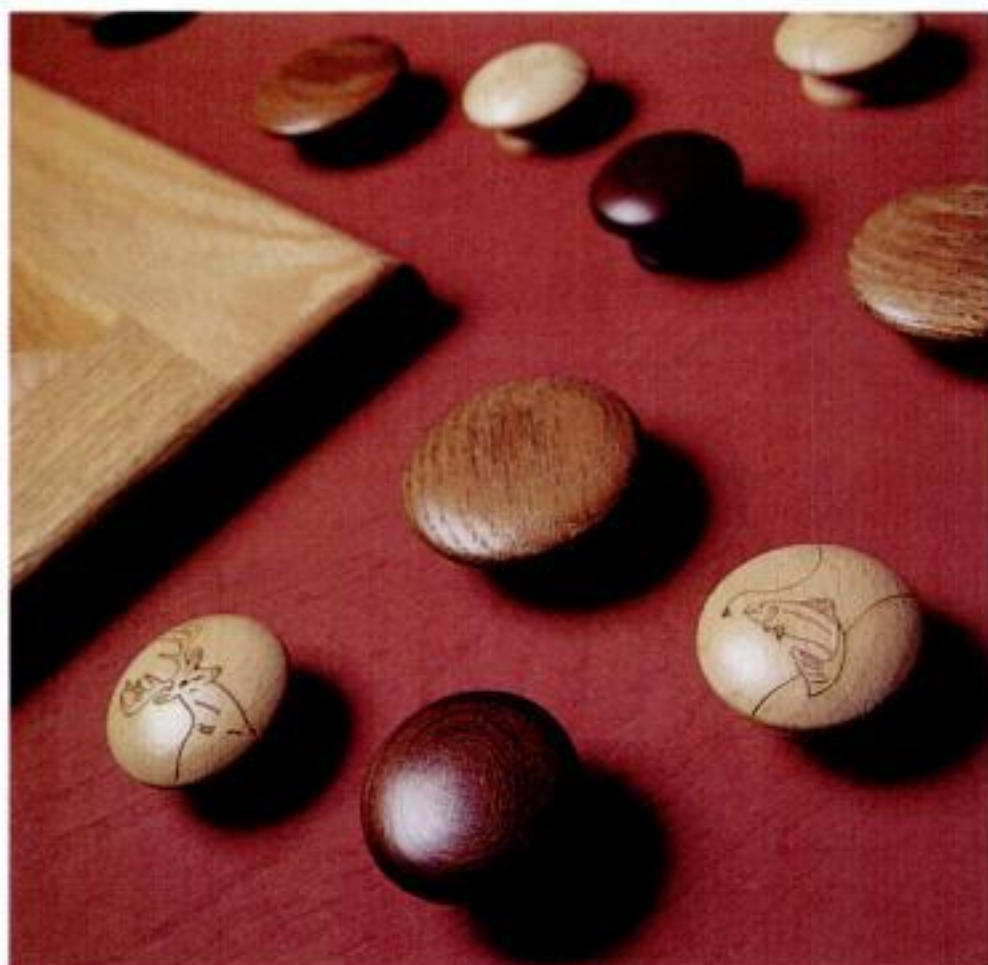


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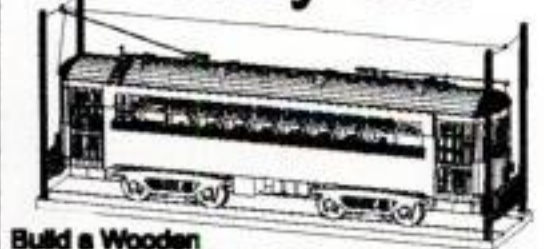
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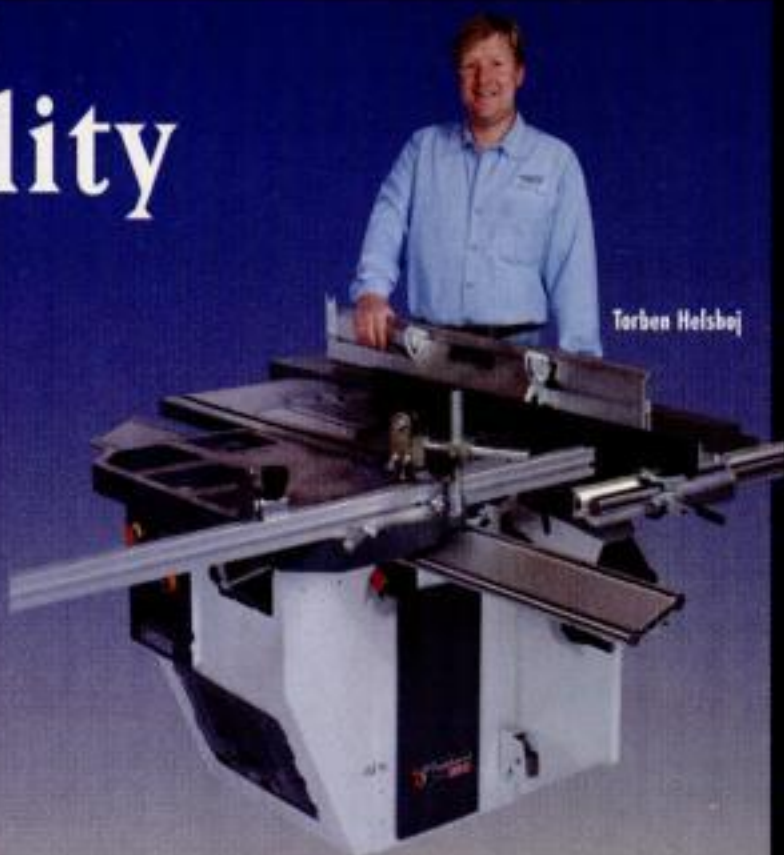
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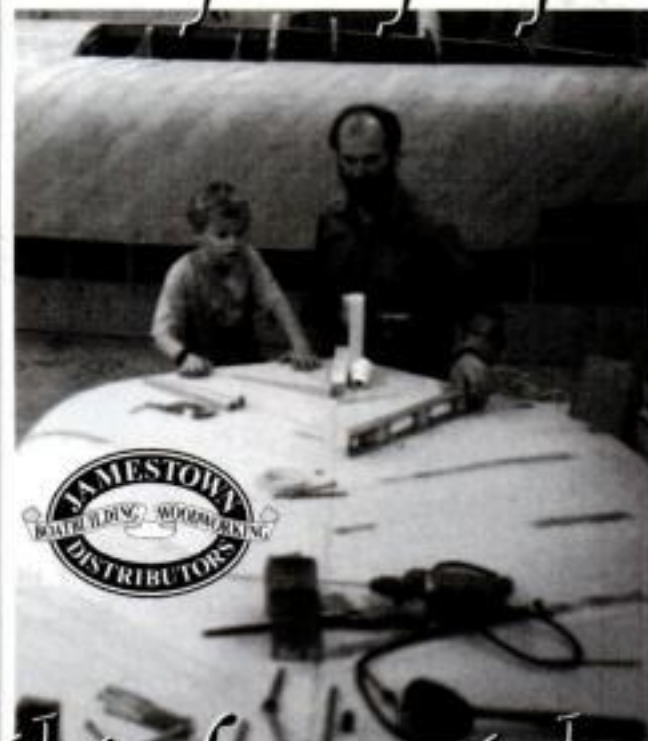
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Osborne EB-2 Miter Gauge

by George Vondriska

If you are a stickler for accuracy, your miter gauge may drive you bonkers when crosscutting on a table-saw. Make those precise cuts and keep your wits about you with the Osborne EB-2.

This reversible fence has lots of noteworthy features. It has one plain aluminum face and one face with a non-skid coating, to prevent creeping during angle cuts; a stop block that can be set for repetitive cuts; a guide that works on the left- or right-hand side of the blade; and a 3/8 by 3/4 in. guide bar that can be expanded so it fits your saw perfectly. And most notably, this guide is not just a giant protractor like most miter gauges. Angles are set by using an index bar that extends from the end of the guide bar to a point on the fence. This triangular configuration makes the miter

PROS

- Accurate cutting at factory preset angles
- Long fence with a flip stop
- Reversible for right- or left-hand operation
- Non-skid face for preventing creep on angle cuts
- Light weight
- Triangular relationship of guide bar, index bar, and fence makes tool very rigid
- Large divisions on index bar make setting angles easy and accurate

CONS

- Tape measure, to be used in conjunction with flip stop, can't be recalibrated after blade changes
- When cutting wide material, guide bar will project significantly off tablesaw on operator's side
- Unique configuration takes a little time to get used to
- Stop block doesn't stay out of the way

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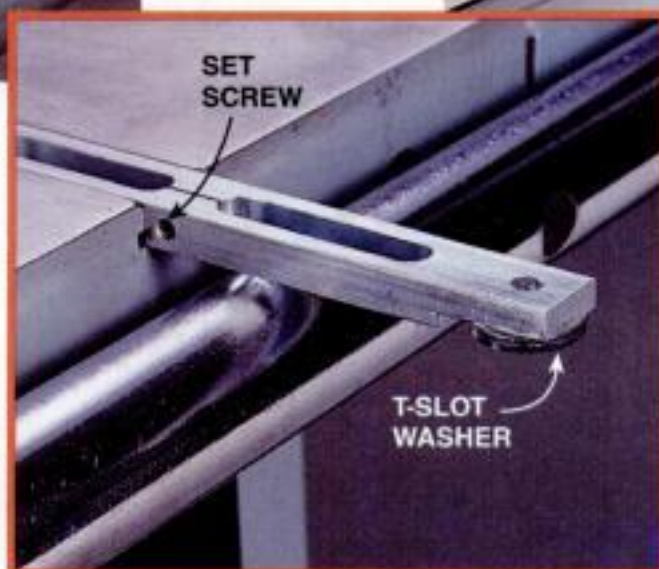
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FEATURES



Angles are set on the cross bar. Because of the wide distance between divisions, very precise angles can be set.

The guide bar has a washer for t-slotted saws, and set screws to custom fit the bar to the slot.



The triangular arrangement of fence and cross bar makes this gauge very rigid. Once set to an angle, it holds it.

gauge very rigid. When you set an angle, it holds it.

The fence of the guide will angle 45 degrees in one direction, and slightly more than 45 degrees in the other. If the miter guide is used to cut common angles (90, 45, and 22.5 degrees), the preset detents on the index bar can be used. As the index bar slides in and out of its housing, a spring-loaded ball bearing falls into a detent at preset locations. The bar is locked by tightening a threaded knob.

I found this arrangement a bit finicky. It is not as positive a stop as you might have with a spring-loaded plunger snapping into a hole. A screw above the bearing can be tightened to provide more pressure, but this also increases the drag of the bearing on the index bar, which causes additional wear. Osborne is developing a new model with a larger ball bearing that should make proper registration in the detents easier.

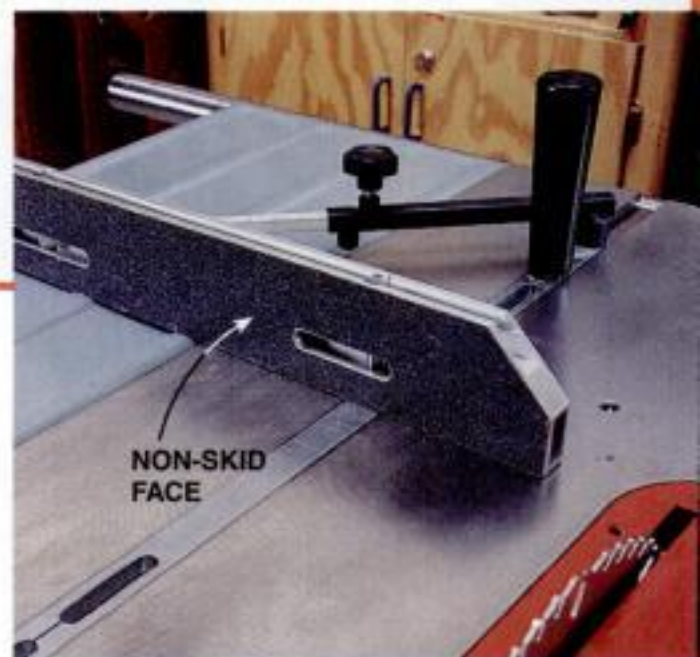
I found all the preset angles (90, 45, etc.) were accurate. This is essential because there is no way to adjust them. Setting the fence to angles other than the factory presets is easy. Individual angle divisions on the index bar are approximately 1/8-in.

apart. This simplifies setting the tool to accurate angles, or even fractions of angles.

The 25-1/2 in.-long fence provides plenty of support for long pieces. The stop block, that can be used on the non-skid face or the aluminum face, is designed to flip out of the way when not in use. I ended up removing it completely when I wasn't using it because it kept falling down when I tried to stow it. A self-adhesive tape measure is included, and can be adhered to the aluminum face. Unfortunately, you can't recalibrate the ruler when you change blades.

No miter guide will work well if the bar does not fit in the miter gauge slot of your tablesaw. The guide bar for the EB-2 includes two set screws that allow the user to fine tune the width of the bar and adjust it to the width of any tablesaw slot. The screw adjustment allowed the bar to fit perfectly in my Delta Contractor's saw. The guide bar has a washer at the end for saws with t-slots, but the washer is easily removed.

To make the triangular design of this tool work, the guide bar extends about 9-in. back from the fence, toward the saw operator. When cross-



The fence is reversible—plain aluminum on one side and a non-skid face on the other.

cutting wide stock, I found this projecting bar awkward, though I gradually got used to it. It helped that the EB-2 weighs only three pounds.

Bottom line: This tool is a good addition to the shop of the woodworker intending to use the tablesaw for accurate crosscutting. The unique design may take a little getting used to, but the pay off will be worth it. The EB-2 can be purchased for \$160 from Woodcraft, (800) 225-1153; Tool Crib of the North, (800) 358-3096; Eagle America, (800) 872-2511; or by calling Osborne at (800) 852-9655. Similar models, with fewer features, are available for slightly less. ▲



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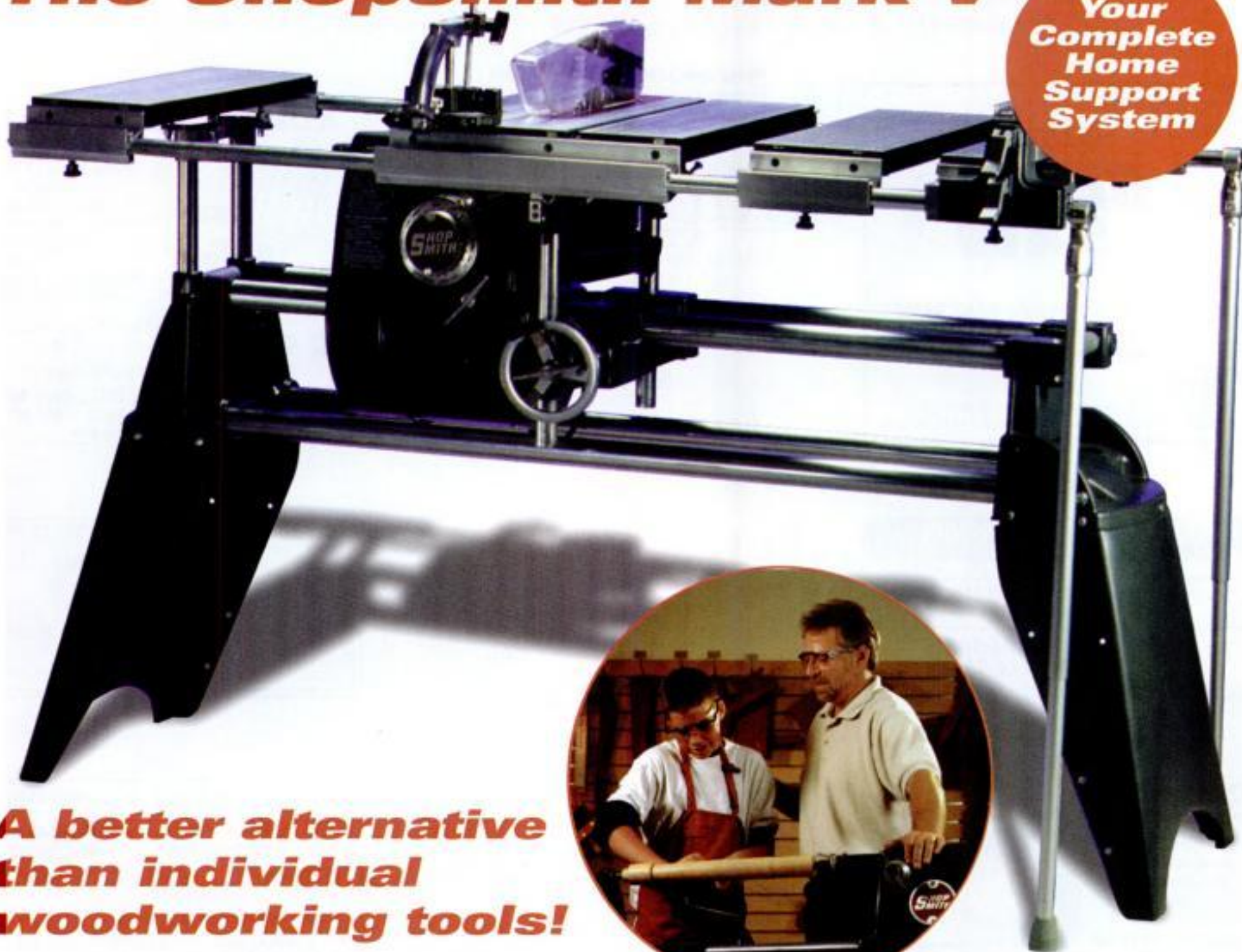
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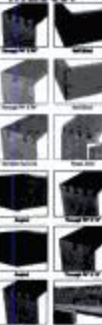
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FIG. A

You can upgrade your bandsaw with an old tablesaw fence. A larger wooden table can be made to fit around all four sides of the original table, leaving a slot on the right side for blade changing.

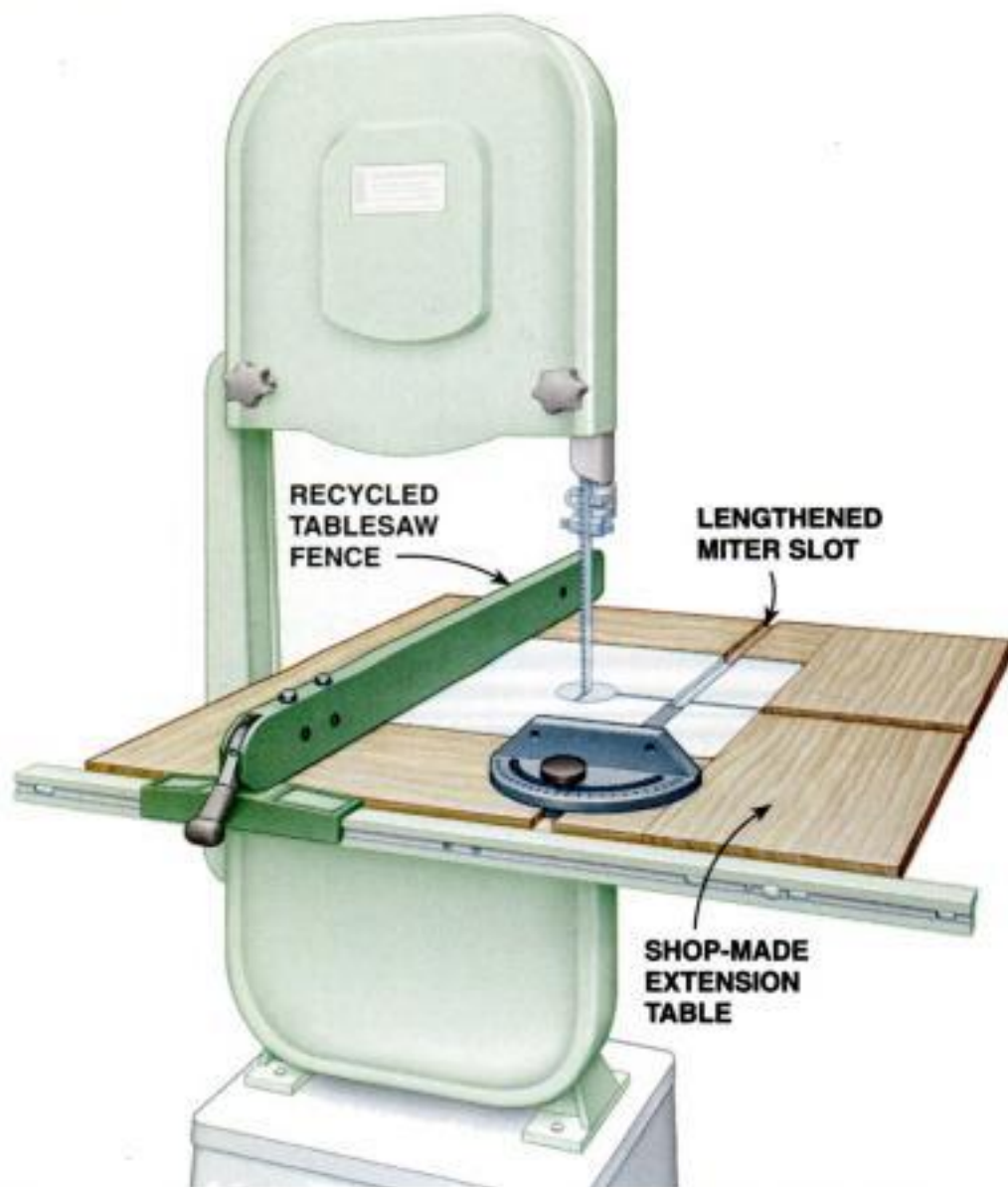


FIG. B

Pairs of simple wooden blocks fasten the new table to the old. One block is bolted directly to the edge of the iron bandsaw table. The other block is part of a glued and screwed table support. This block is slotted to allow the wooden table to be leveled.

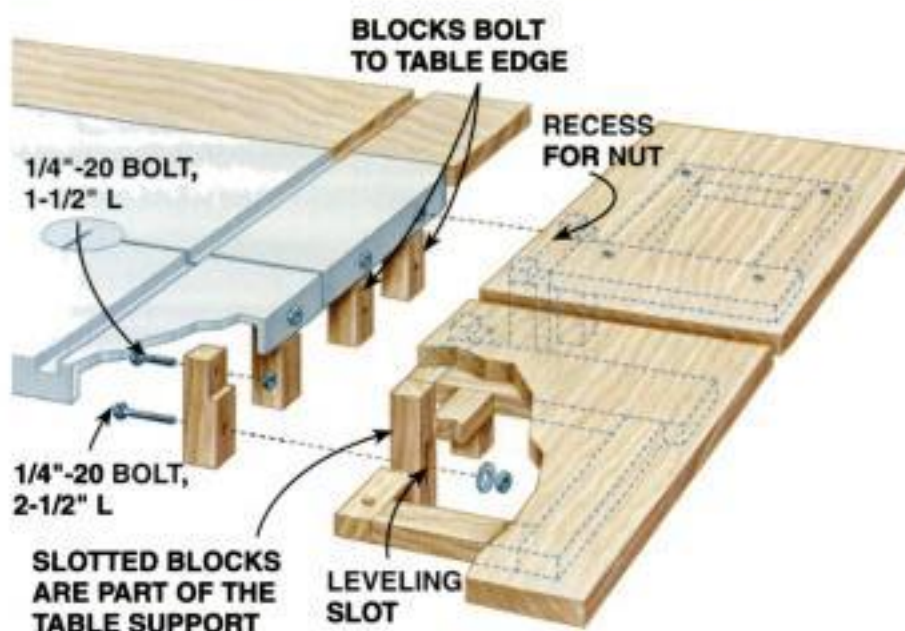
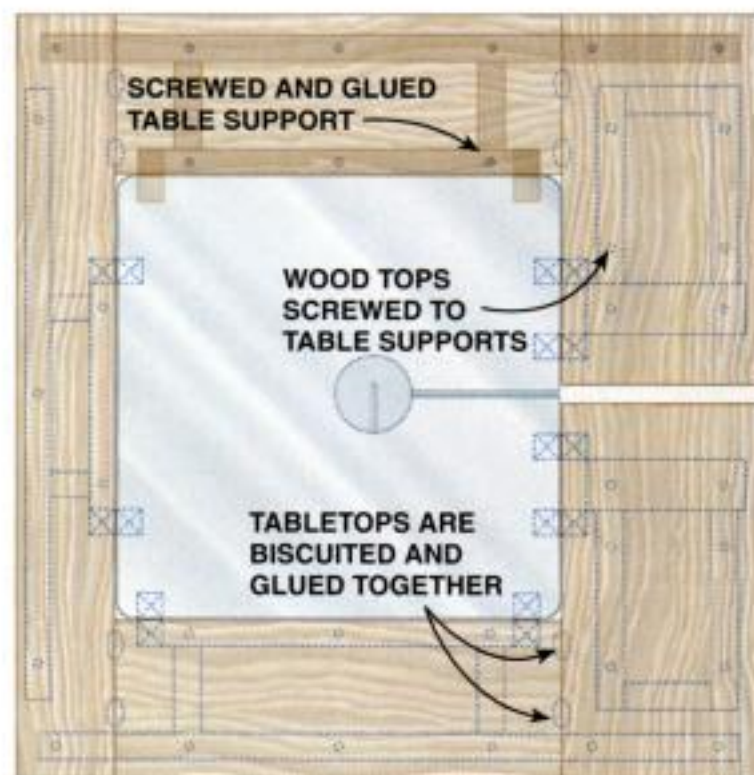


FIG. C

Overhead view of the supports for the new wooden table. Cut and glue-up five sets, then drill holes in the left and right edges of the iron table. Bolt all of the table supports to the bandsaw table. Then, mount the new wooden table on top of the supports and screw the table down from above. Finally, level the table.



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