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See page 66

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Check out the Woodworker's Software Library, a collection of woodworking shareware programs you can download to run on your computer. In the library you'll find a foot-inch-fraction calculator, a program for generating cutting diagrams, another that figures tilt and miter settings for compound miters, and one that lays out templates for cutting dovetail joints.

To connect to the internet, go to <http://woodmagazine.com>, then click on the button for Woodworker's Software Library.

THE EDITOR'S ANGLE

Turned wooden hats? You bet!

Just a few of the many hat styles that Johannes Michelson turns in his rural Vermont woodshop.



It was during our last staff issue-planning meeting when our features editor Pete Stephano suggested that we do an article on Johannes Michelson, a Vermont hatmaker. Eyebrows raised around the room. Most of us have been around woodworking long enough to know that you can make almost anything from wood. But hats?

It's true, folks! And they're impressive beyond belief. It turns out that Johannes, formerly a home builder and stair maker, just happened to think of this novel idea after reading an article about David Ellsworth's thin-walled bowls and a book on wood movement by Bruce Hoadley.

Although this craftsman has been turning his hats for only six years, his end product will amaze you. Whether you're a woodturner or not, be sure to treat yourself to Pete's article, "Hats Off to Turning," beginning on *page 39*.

P.S. The staff and I were so interested in Johannes' technique that we asked him to come to Des Moines to show us how he does his thing.

On another note, be sure to check out our 1997 Build-A-Toy® contest rules on *page 17*. As

always, the prizes are great, and often worth over several thousand dollars. More importantly, proceeds from the contest go to needy kids across the country.

Project Showcase— It's Back!

Those of you who have been with us for several years will remember that we used to have a feature called "Project Showcase" in **WOOD** magazine. In it, we featured projects built by our readers as a way of giving a tip of the hat to quality craftsmanship.

Now, after a hiatus of several years, we're making room for "Project Showcase" again. Starting with this issue, we'll run it two times a year. The first time out, we'll show you some of the work the **WOOD** magazine staff have been doing. After that, it's a readers-only feature. Be sure to see *page 37* for information on submitting your woodworking projects for consideration. 🌲

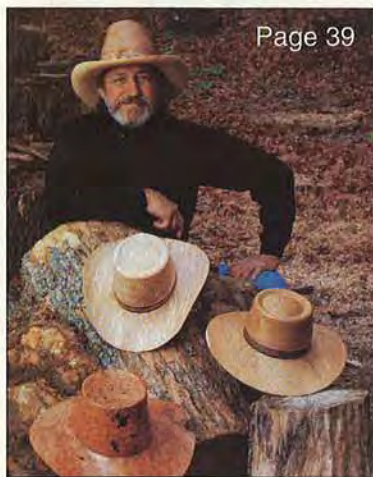
Larry Clayton

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WOOD®

THE WORLD'S LEADING WOODWORKING MAGAZINE

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THIS SIDE OUT

When we listen to woodworkers, we understand what you mean — after all, we are woodworkers! You told us you needed a dado to cut plywood, solid wood, hardwood veneered plywood, laminates and melamine chip-free. You told us that it needed to cut precise slots and maintain accuracy. And it especially needed to accommodate today's undersized plywoods.

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TALKING BACK

Wants to know what's going on with CMT

In your August 1996 issue, No. 89, you recommended CMT router bits in an article on stile and rail cutters. At the time, I couldn't agree with you more. Since 1993 I have purchased only CMT router bits because of their high quality. However, when I recently ordered a stile and rail set from CMT, and compared it to a set I purchased in 1995, I noticed there was a definite difference. It appears to me that CMT has reduced its quality.

When I called CMT to inquire about this change, the response from the technical support division was that all of the bits shipped in the U.S. are now manufactured in the U.S., and the new manufacturing plant in the U.S. is using different specifications than the previous bits that I received which were manufactured in Italy. They assured me that these new bits would perform just as good as the ones shipped from Italy, and I am sure that they will, but I feel that when you are paying top dollar for the best router bits, they better be top quality. For my future purchases, perhaps I'll fly to Italy.

—Bernard J. Bobinski, Riverhead, NY

Don't contact your travel agent just yet, Bernard. You can still buy the Italian-made CMT bits through distributors that deal with the Italian manufacturer's office in this country—CMT USA, P.O. Box 4185, Greensboro, NC 27404-4185. Call 910/854-0201 for the dealer nearest you.

Although CMT USA and CMT Tools of Oldsmar, Fla. both sell router bits, sawblades, and other tooling labeled CMT, the companies are separate. CMT Tools formerly imported the Italian-made products, but now has its own manufacturing plant in Florida.

We welcome comments, criticisms, suggestions, and even compliments. Send your correspondence to: Talking Back, *Better Homes and Gardens*® WOOD® Magazine, 1912 Grand Ave., Des Moines, IA 50309-3379. To contact us via computer, use these on-line addresses: CompuServe: 74404,3516 Internet: 74404.3516@compuserve.com

In our conversations with representatives of both CMT USA and CMT Tools, it is clear that both companies are aware of the market confusion created by this situation, and that both companies desire a solution. To that end, the companies are engaged in legal proceedings that may take some time to conclude.

We have previously tested and reported on the Italian-made router bits, and like you, found the quality to be top-notch. Now, we're waiting for the legal dust to settle before reporting on the U.S.-made bits from CMT Tools. In the meantime, you can easily distinguish the two bits because both are marked with their respective countries of origin.♣



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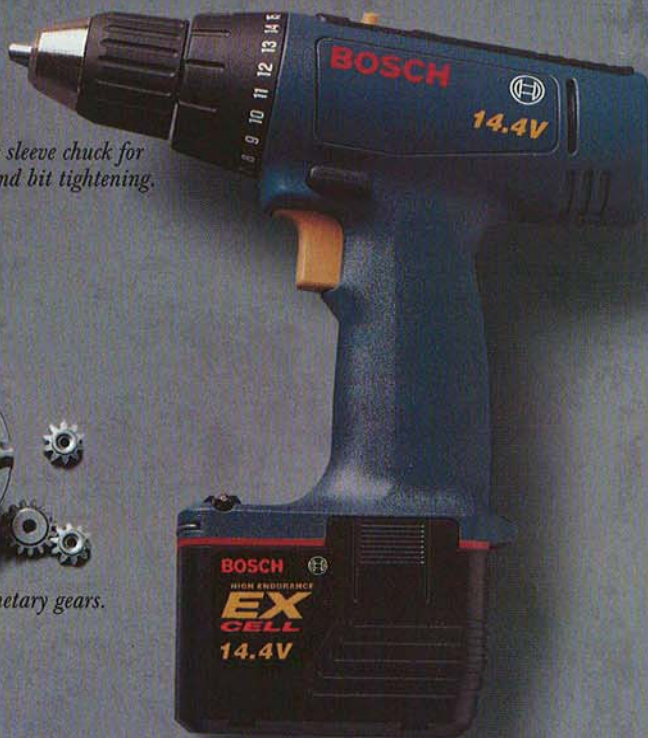


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BUILD-A-TOY® WINNERS

Tell all...almost

Want to capture a prize in **WOOD®** magazine's 1997 Build-A-Toy Contest? Then heed this advice from two perennial winners.

In the seven-year history of the annual Build-A-Toy contest, two names consistently have appeared high on the winners' list in the professional division. So we thought there just might be a toy-building secret or two they'd be willing to share with would-be entrants. And their advice comes just in time for you to craft a toy for the 1997 edition of Build-A-Toy, which is announced on *page 17*.

Humor and motion, a winning combination

According to Mike, the 1989 toy contest was the first woodworking contest of any kind that he had entered. "Part of the reason I did—and still do—was that toys represent a welcome change for me. I really don't make any toys, except for the Build-A-Toy contest," he says. "And prizes were attractive, but the fact that it is a charity event for underprivileged kids was an important factor."



To win the grand prize in 1994, Mike crafted this creepy, crawling spider with moving legs.



This crab pull toy by Mike walked off with the grand prize in 1995.

Mike Jagielo is a 37-year-old furniture maker from Almond, Wisconsin. Here's his sterling record in the contest's professional division:

1989, Special Citation.
1990, Best Finish.
1991, Grand Prize, Best Pull Toy.
1992, First Prize, Best Finish, Best Pull Toy.
1994, Grand Prize.
1995, Grand Prize, Best Pull Toy.

And that first entry taught him a few things. "I didn't have enough self-confidence to think that I would really win anything, but I did think that an original design would rate higher in the judges' eyes," Mike recalls. His 1989 entry, an apple pull toy with an animated pop-up worm, won only a citation. "It did have a few rough edges, like the stem that stuck out of the top," Mike admits. "For safety reasons, the judges might have frowned on it. Since then I've designed my toys around the rules, such as smooth edges and no small parts that children could swallow."

Mike's 1990 entry, a tumbling acrobat pull toy, earned a citation for best finish. After that, he pulled out all the stops, and has won either a grand prize or a first place nearly every year.

Part of Mike's winning record he owes to the pull-toy action mechanism he developed beginning in 1991. No matter the body style, the leg action looks like the rowing oars of a galley ship—back and forth, all in unison. "Then, I try to take something from nature that has a movement like my mechanism produces," he explains. "I think about something that might be appealing in that type of motion, such as a



Mike Jagielo's original animated all-creature pull toy was this ladybug from 1991.

ladybug, spider, or a crab [see photos *this page*]. And I mean appealing to children as a toy, and secondarily to the judges.

"The toy should be humorous, too," he adds. "In the contest over the years, I've seen so many trucks and boats and other typical toys that I try to do something that's really unique."

Mike also covers the bases. "With the different citation categories in the contest, such as best use of wood or best clear finish, or best pull toy, I try to build an entry that will have a chance to win something in as many categories as possible."

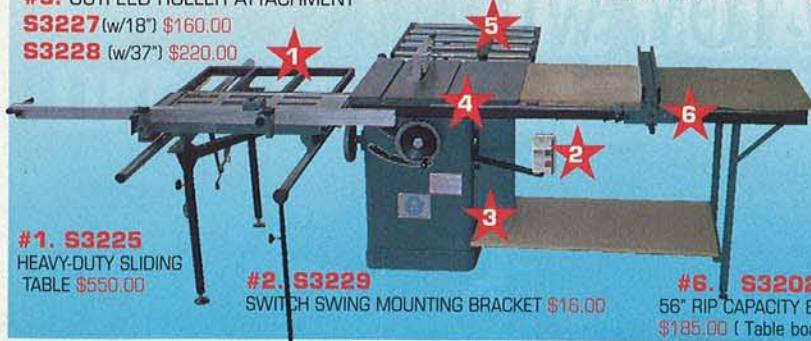
And he feels that finish is important. "I try to use a number of wood species and leave them their natural color with a few coats of Minwax Antique Oil Finish," he says. "But a good finish really gets down to the sanding. I usually end with 220-grit, sanding all the parts before assembly."

Continued on page 10

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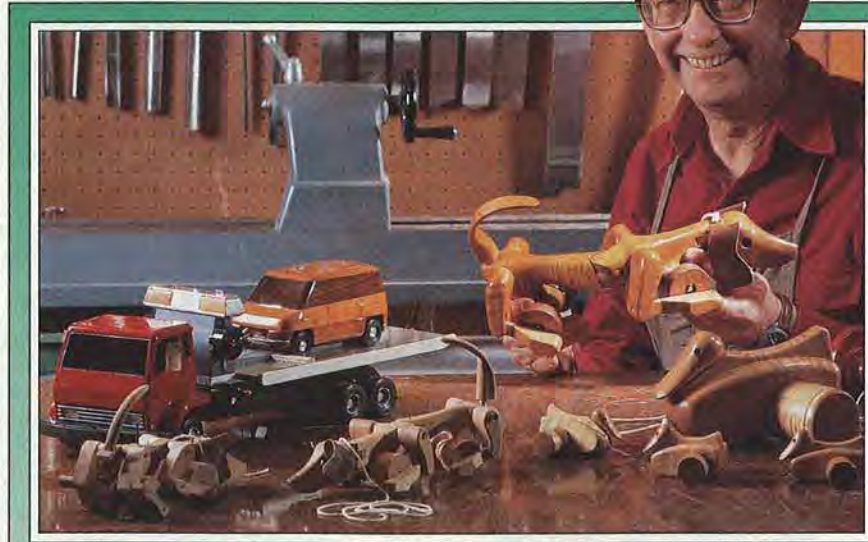
BUILD-A-TOY® WINNERS

Tell all...almost

Continued from page 8



In 1992, Neil Seely captured yet another grand prize with this tractor/trailer rig.



"The idea behind my UFO pull toy [shown *below left*] came from a thought I had that a 1½-year-old child would be perfectly content pulling a block of wood around the house. Just drill a hole in it and attach a string. But a rectangular block would catch on everything. So, it would have to have the corners rounded off. Then, it would look like a UFO. Eventually, I elaborated on that a little bit by adding noise with jingle bells inside. Of course, for the parents' benefit, there are times when it should be quiet, too, so I made it silent-running when it is flipped over."

Neil encourages anyone with an idea to keep at it. "Don't give up because it's not working out. Just work on it a little harder. Or, put it on the back burner for a while and maybe a light will come on and you will know what to do."

This craftsman's toy entries (see photos on *this page*) have ranged from the simple to the complex. One common factor they have all shared, however, is a degree of fascination. And if Neil has any one strategy for winning, it's that.

"My biggest secret—that I probably shouldn't tell—is that I try to keep the judges entertained longer with my toy than anyone else does," says Neil. "I believe that if I can keep them playing with my entry for five minutes longer than the others, they'll feel that they ought to give me a prize. Otherwise, they've wasted their time! I think that's the game Mike Jagielo plays, too. He really gets them enchanted." ♣

Written by Peter J. Stephano
Photographs: Jim Kascoutas, John Hetherington,
David Brennon, Mary Jagielo

A retired industrial designer and design engineer for Eastman Kodak, Neil Seely, 62, walked off with the top professional prize for a pull toy in the very first contest. Since then, he has racked up quite a record from his woodworking shop in Rochester, New York.

- 1989, *Grand Prize.*
- 1990, *First Prize and Best Painted Finish.*
- 1991, *First Prize.*
- 1992, *Grand Prize, Best Use of Wood, Best Truck.*
- 1993, *Second Prize, Best Pull Toy.*
- 1994, *Second Prize.*
- 1995, *Second Prize.*

Keep those judges entertained

"Careful workmanship is very much a part of winning in the Build-A-Toy contest," Neil advises. "And originality—a design has to be a cut above the average. So, I try to do something that I haven't done before. And I can afford to make my entry somewhat complex because I'm only making one of them [actually two—he keeps one]."

Although he takes pride in producing a winner, Neil feels that the contest's prizes are a bonus. The real reward for entering is the creation of a new toy design. And unlike his contest competitor Mike Jagielo, Neil gives little thought to categories and extra citations. "I just want to develop the idea I have for the toy, and then see where it falls," he says.

Here's how his 1995 second-prize winning toy came about.

A noise-making UFO pull toy earned Neil a second prize in 1995.



The New York craftsman's waddle duck was a 1989 contest grand-prize winner.



THE DELTA Q-3. LIKE A FORMULA RACE CAR WITH A BLADE.



We're talking pleasure here. Precision. Power. Wait 'til you get your hands on this high-performance machine. It just gets better and better around every turn. The Delta Q-3 18" Variable Speed Scroll Saw. A scroller's dream machine.

Its Quickset™ II Blade Changing System is the second generation of a Delta exclusive. The fastest in the industry. No wrenches, no aggravation, no wasted time while threading or changing blades. You'll find it on no other saw.

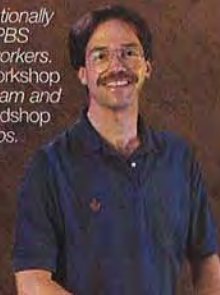
The arched, graphite composite arm eliminates vibration. So smooth and quiet you can listen to the sweet sound of your blade cutting wood, instead of your saw breaking the sound barrier. And at the very tip of that graphite arm you'll find the control switches. Right under your nose, instead of having to fumble around below the table.

As you'd expect, the cast iron table tilts to allow bevel cutting. But what you might not expect is the fact that the adjustable steel stand also tilts forward to give you a better view of the job, and just the right angle for comfortable operation.

This one's ready to test drive right now at your Delta dealer. If you're ready to cut circles around the rest, call us for the dealer

nearest you. Delta International Machinery Corp., 800-438-2486. In Canada, 519-836-2840.

Delta is proud to nationally fund these two PBS programs for woodworkers. The New Yankee Workshop hosted by Norm Abram and The American Woodshop with Scott Phillips.



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<http://www.deltawoodworking.com/delta>

**THE
POWER
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PROS**



DELTA
WOODWORKING MACHINERY
A Pentair Company

TOP MONEY RAISERS



Mike Jagielo's happy crab pull toy raised \$545.

Find out which Build-A-Toy® entries sold best

WOOD® magazine readers' Build-A-Toy entries from across the nation raised enough for \$18,000 in toys for Christmas distribution by the U.S. Marine Corps Reserve's Toys for Tots program. Entries that brought at least \$100

at the 1995 Crafted for Joy toy auction held November 15, 1995, in Des Moines were notified by letter. Here are some toys that exceeded \$100 in the bidding. Thanks, entrants. Let's look to an even better 1996 money raiser!

Mike Jagielo, Almond, Wis.
Crab pull toy, \$545.

Robert C. Bretz, Decatur, Ill.
Semi with road grader, \$500.

Hank Gorczynski, Batavia, N.Y.
N.Y. Central tugboat, \$470.

WOOD magazine, Des Moines, Iowa
Walnut rocking horse, \$450.

Dee Cook, Lawrenceville, Ill.
Doll-sized kitchen cabinet, \$400.

Robert Trace, Toledo, Ohio
Passenger train pull toy, \$380.

Robert Benson, Tyler, Texas
Noah's ark rocking chair, \$365.

Jack W. Dalton, Jackson, S.C.
Marine Corsair rider airplane, \$350.

James Blyth, Huntersville, N.C.
Roscoe Rabbit airplane, \$325.

Frank Risso, Paso Robles, Calif.
Semi truck with flatbed, \$300.

Ken Barkley, North Palm Beach, Fla.
Riding car, \$255.

William E. Sullivan, Weymouth, Mass.
Military six-by truck, \$250.

Charles Frodl, Belmont, Mich.
Boxed alphabet train, \$235.

Kerry Sadowsky, Fargo, N.D.
Tractor with disk, \$230.

William Howe, Rolling Hills Estates, Calif.

Gypsy camper truck, \$230.

Jerry Eaton, Eau Claire, Wis.
Pickup camper w/canoe, \$225.

Art Bartelme, Fort Pierce, Fla.
Dodge truck with 1910 Ford on trailer, \$225.

George Campbell, Owensboro, Ky.
Corsair airplane, \$220.

Harold Clark, Greensburg, Kan.
Cherry vault savings bank, \$180.

John Gentile, Goose Creek, S.C.
Log cabin bank, \$175.

Peter Friedel, Baltimore, Md.
Car with rumble seat, \$175.

Robert Thompson, Harrisburg, Pa.
Jeep and driver, \$170.

Harold Clark, Greensburg, Kan.
Walnut vault savings bank, \$170. 🌲

\$50 REBATE.

Contractor's Saw® with any Unifence®, Biesemeyer® Fence or Precision Saw Guide. (Shown here with Biesemeyer Homeshop Fence and accessory table board and legs.)



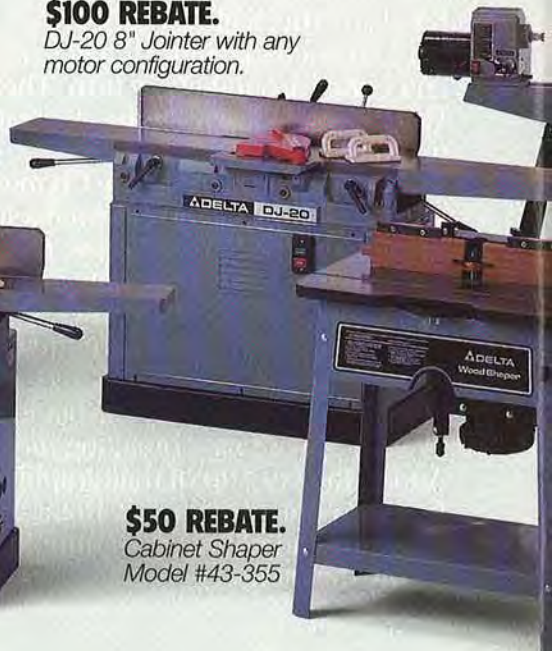
\$50 REBATE.

14" Band Saw with 3/4 hp Model #28-275
14" Band Saw with 1 hp Model #28-280



\$100 REBATE.

DJ-20 8" Jointer with any motor configuration.



\$75 REBATE.

DJ-15 6" Jointer with any motor configuration.

\$50 REBATE.

Cabinet Shaper Model #43-355

Ailanthus

The tree that you really don't want to grow

For some unknown reason, the tree that many people call "tree of heaven" or "paradise tree" after its Chinese local name, was brought to North America from the Far East in the late 1700s. The bearer must have meant well, for the ailanthus (*Ailanthus altissima*) isn't a terrible-looking tree. It grows straight—to 60' or 80' tall—and quickly.

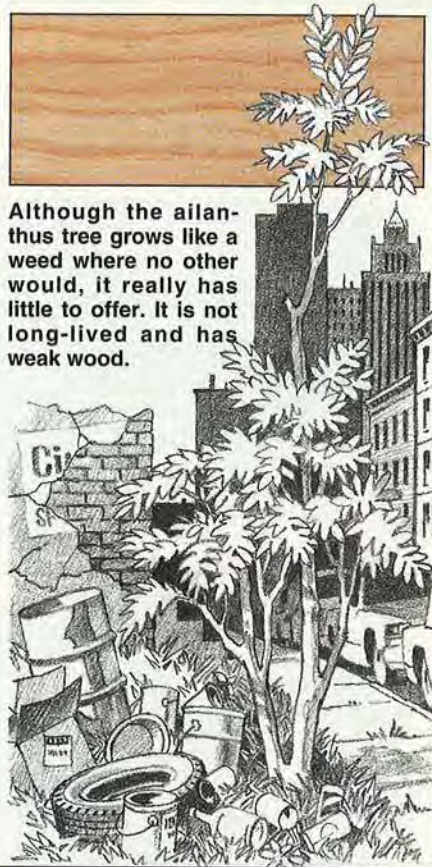
You'll find it in a wide "natural" range that stretches from the Plains States to the East Coast and northern Michigan to Florida's panhandle. In fact, heat or cold doesn't hinder this species much. Nor poor soil. Nor city smog and smoke. Even dryness won't bother it. And the tree can survive submergence in salt water. So, there's little to stop its propaga-

tion (it spreads by seeds and sprouts from its deep root system). In many places, the ailanthus has become a real nuisance by aggressively crowding out native or ornamental species.

So why give this tree a bad rap? For one thing, it stinks. The blossoms of the male ailanthus produce a stench. The leaves and wood also have a formidable and unpleasant odor. And, it's not a very convincing shade tree. Nor does ailanthus live long—maybe 75 years. Lastly, ailanthus wood looks like white ash, but is weak and brittle.

Ailanthus' only claim to fame is that it is the tree referred to in the book and motion picture *A Tree Grows in Brooklyn*. Unfortunately, it really does. ♣

Illustration: Jim Stevenson



Although the ailanthus tree grows like a weed where no other would, it really has little to offer. It is not long-lived and has weak wood.

TODAY, YOU'LL APPRECIATE THE REBATES. LATER ON, YOU'LL APPRECIATE THE QUALITY.

Here's a chance that doesn't come along every day. A chance to put Delta Quality in your shop and get a check in the mail from Delta to boot. But only from September 1-December 31, 1996.

Granted, that rebate check will probably be spent by the time you get around to cashing it. But that new Delta machine will become more valuable each time you flip the switch. And you can take that to the bank.

Call for the name of your nearest participating Delta dealer. Delta International Machinery Corp., 800-438-2486. In Canada, 519-836-2840.

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DELTA
WOODWORKING MACHINERY
A Pentair Company

\$25 REBATE.

12" Variable Speed Lathe
Models #46-700/701 with
or without stand.



\$50 REBATE.

15" Planer
with stand
Model #22-675



Delta is proud to nationally fund these two PBS programs for woodworkers. *The New Yankee Workshop* hosted by Norm Abram and *The American Woodshop* with Scott Phillips.



Our super-sturdy SCROLLSAW STAND



Elevate your benchtop scroll saw to new heights with this sturdy shop-made stand. It provides solid support directly beneath the saw to help minimize vibration.

We recommend that you elevate the scroll saw table to a comfortable height, typically at elbow level. So, you may have to adjust the height of the uprights (C) slightly. We dry-clamped our pieces together before drilling the mounting holes to verify a comfortable working height.

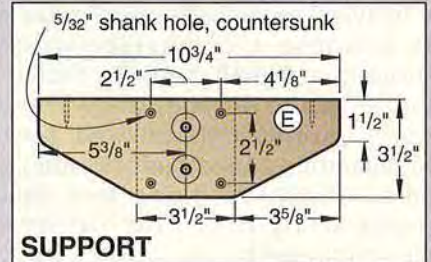
For additional strength, drill the mounting holes, and drive the lag screws through the uprights (C) and feet (D) and into the $\frac{3}{4}$ " dowels in the mating pieces.

Project Design: James R. Downing
Illustrations: Roxanne LeMoine
Photograph: Dean Tanner

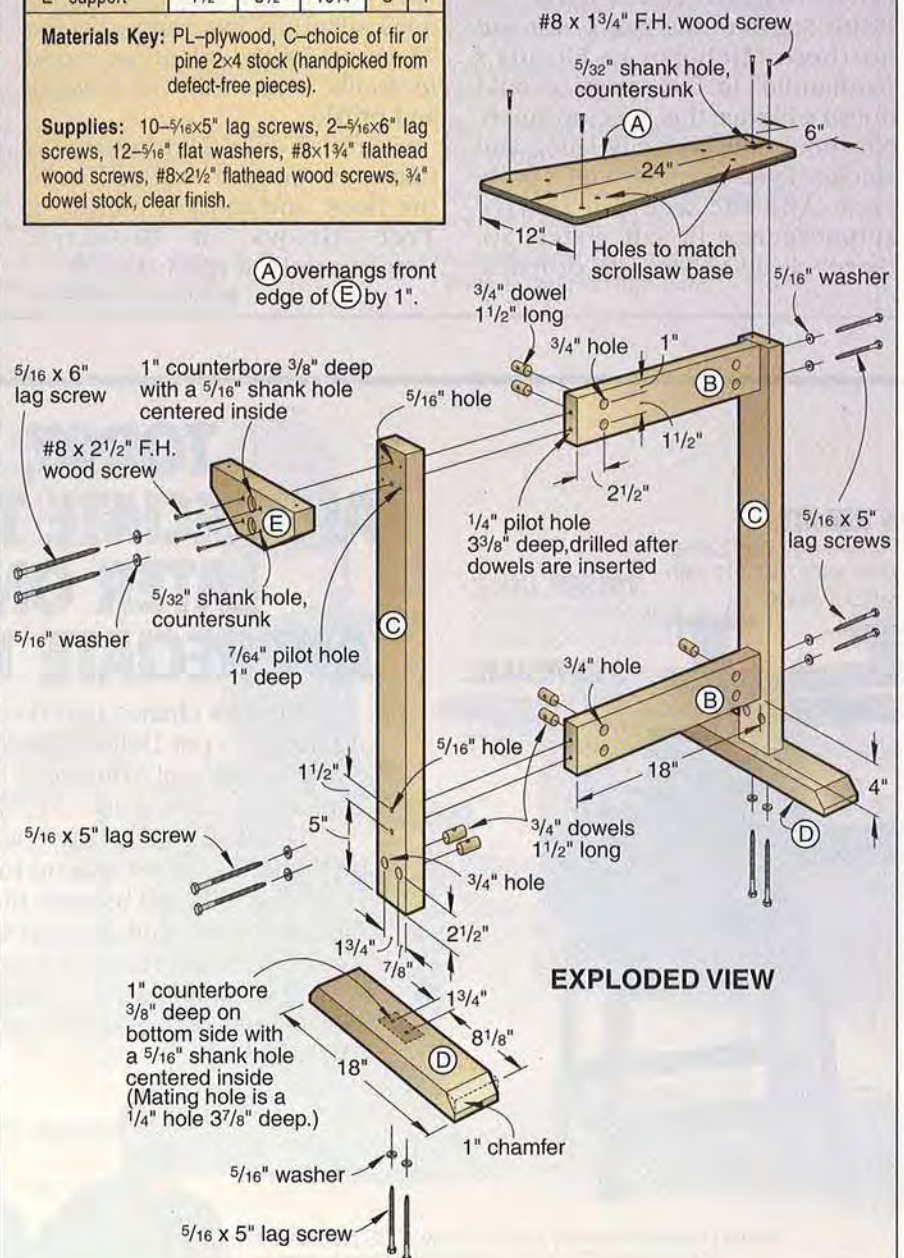
Part	Finished Size			Mati.	Qty.
	T	W	L		
A top	$\frac{3}{4}$ "	12"	24"	PL	1
B cross members	$1\frac{1}{2}$ "	$3\frac{1}{2}$ "	18"	C	2
C uprights	$1\frac{1}{2}$ "	$3\frac{1}{2}$ "	$31\frac{1}{2}$ "	C	2
D feet	$1\frac{1}{2}$ "	$3\frac{1}{2}$ "	18"	C	2
E support	$1\frac{1}{2}$ "	$3\frac{1}{2}$ "	$10\frac{3}{4}$ "	C	1

Materials Key: PL—plywood, C—choice of fir or pine 2x4 stock (handpicked from defect-free pieces).

Supplies: 10- $\frac{5}{16}$ x5" lag screws, 2- $\frac{5}{16}$ x6" lag screws, 12- $\frac{5}{16}$ " flat washers, #8x $\frac{1}{4}$ " flathead wood screws, #8x $2\frac{1}{2}$ " flathead wood screws, $\frac{3}{4}$ " dowel stock, clear finish.



SUPPORT



EXPLODED VIEW

**FOR THOSE OF YOU WHO KNOW BETTER
THAN TO CONSIDER AN IMITATION.**



Limited Edition Unisaw® includes 52" Unifence®, 50-tooth ATB combination blade, chrome handles and personalized insignia plaque.

Your choice of Unifence or Biesemeyer® Fence available on all models other than Limited Edition.

A HUNDRED DOLLAR REWARD FROM DELTA.

Old-timers will tell you that you're not just buying that Unisaw for right now. You're buying it for what it'll be doing for you ten, fifteen—maybe twenty years down the road. That's when you'll be glad you didn't try to save a couple hundred bucks way back in 1996—by settling for a saw that was touted to be as good as the Unisaw.

Feature for feature, the Unisaw stands unmatched, period. Equally important to consider, are parts and service. (Truth is, we can still provide parts and service today, for a 1937 Unisaw.)

All that said, we know how tempting it can be to save a few bucks by buying a knock-off from overseas. (Meanwhile—the Unisaw you've always wished for could be coming off our production line in Tupelo, Mississippi, as we speak.) This calls for a special deal.

Okay, here goes: Buy any Delta Unisaw between July 1 and December 31, 1996 and we'll send you a rebate check for \$100. Even on this Limited



Edition Unisaw, as seen on *The New Yankee Workshop*—a saw that'll be offered this one time only.

Call for the name of the Delta dealer nearest you where you can take advantage of this one-time offer. Delta International Machinery Corp., 800-438-2486. In Canada, 519-836-2840.

**THE
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OF THE
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Delta is proud to nationally fund *The New Yankee Workshop* hosted by Norm Abram on PBS.



Visit us on the web:
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Just how strong is the Magna-Set™ Fence?

THE STRONGEST AND MOST ACCURATE ON THE MARKET - PERIOD!

Don't try this at home!

We hoisted this 500 pound tablesaw into the air to demonstrate the clamping power of our Magna-Set™ Fence. After letting it dangle in the air as shown for almost a whole day we brought the saw down and tested for accuracy. The fence showed no deflection on our dial indicator which measured in one thousandths of an inch. Not only was there no damage to the fence, but we were able to slide it with one finger!



PATENT PENDING

- Locks on both ends
- Fits saws with 27" tables
- Moves on ball bearing guides
- T-slotted for attaching fixtures
- Remains parallel to blade when unlocked
- Parallelism easily adjustable
- Fine positioning knobs on both sides for left or right handed use

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Enter **WOOD**® magazine's 9th Annual **Build-A-Toy**® Contest

All entries from the 1997 Build-A-Toy contest will be sold at a public auction in November 1997, and the funds raised donated to the U.S. Marine Corps Reserve's Toys for Tots program to purchase new toys for needy children at Christmas. All Build-A-Toy contest entrants receive a colorful, "I Crafted a Toy for Joy" sticker.

Toys will be judged on Originality, Durability, Craftsmanship, Kid Appeal, Safety, and Finish. Only toys of your original design will be eligible for Best Toy Entry, and Grand through Third prize

in the Home Hobbyist and Professional divisions. Toys built from plans as well as those of your original design will be eligible for all prizes in the Junior Craftsman division (ages 19 and younger) and all citation awards. The special award Best Entry from a Shop Class will be presented to the most outstanding entry (a multiple entry also qualifies) submitted by a shop class (elementary through high school) in the Junior Craftsman division.

Deadline for entries is September 1, 1997. Judging will take place in mid-September and winners will be notified by mail by mid-October. Names of winners will be published in *WOOD* magazine's September 1998 issue.

Turn the page to see more than **\$22,000** in tools and supply prizes!

Enter a Toy and You're Automatically Entered in Our Drawing!

When you enter a toy in the contest, you're automatically entered in a drawing to receive one of these great prizes:

- **3M™ Woodworker's Packet** — 3M™ 2" Sanding/Finishing Kit, 3M™ Aluminum Oxide Sandpaper, 3M™ Synthetic Steel Wool, 3M™ Sanding & Fiberglass Insulation Respirator, Scotch™ Painters' Masking Tape
- **Power Press pipe clamp spreader from American Tool**
- **WOOD Plan from *WOOD* magazine**

No toy necessary to enter. See Drawing Rules for full details.

PowerPress 3M



**Home Hobbyists • Junior Craftsmen
Shop Classes • Professionals**

ENTRY FORM

WOOD® magazine's 1997 **BUILD-A-TOY**® Contest

Please limit entries to 25 toys per individual or group. Please provide the following information for each entry submitted.

Division entering: Junior Craftsman
 Professional Home Hobbyist

My entry is: Original design* Built from plans

Check affiliation if applicable: Shop Class

*For Original Design entries: I certify that I have designed and built this toy myself. Should my entry win, I agree to cooperate with *WOOD* magazine to supply builder's notes and a bill of materials for publication.

Signature _____ Date _____

Name _____

Address _____

City _____

State _____ ZIP _____

Phone (_____) _____

Send toys to: 1997 BUILD-A-TOY, *WOOD* magazine, 1912 Grand Avenue, Des Moines, IA 50309-3379. 1996 BUILD-A-TOY ENTRY DEADLINE: SEPTEMBER 1, 1997

(Attach one entry form to each toy. Copies okay)

DEWALT

SKIL

DREMEL

Milwaukee

MEISEL
PROFESSIONAL TOOLS

PORTER-CABLE
PROFESSIONAL POWER TOOLS

1997 Build-A-Toy Contest Prizes

Over \$22,000 in tools and supplies to win!



Best Toy Entry
\$3,000 in Delta tools
(Original design only, all divisions)

Junior Craftsman

(19 yrs. and younger, all designs)



Grand Prize
\$1,400
RBI Hawk Ultra scroll saw



First Prize
\$1,000 in
Skil power tools



Second Prize
\$750 in
Dremel tools



Third Prize
\$500 in
Meisel Hardware merchandise

Home Hobbyist

(original designs only)



Grand Prize
Grizzly stationary power tools valued at \$2,500



First Prize
\$2,300 in Craftsman stationary machines (1963B radial-arm saw, 29941 table saw, 2483 bandsaw, 22580 oscillating spindle sander, 23512 12" compound miter saw)



Second Prize
\$750 in
Skil tools



Third Prize
\$500 in
Dremel tools

Professional

(original designs only)



Grand Prize
\$2,500 in
Bosch tools



First Prize
\$2,000 in
DeWalt tools



Second Prize
\$1,050 Milwaukee sliding compound miter saw



Third Prize
\$500 in
Porter Cable tools

Citations (All designs, all divisions eligible)

- Best Use of Wood**, \$300 HVLP paint system from Campbell Hausfeld
- Best Pull Toy**, \$300 in MLCS woodworking products
- Best Educational Toy**, \$250 in Constantine's merchandise
- Best Action Toy**, PowerPress pipe clamp spreader and Speedbor2000 flat bits worth \$170 from American Tool
- Best Model**, Quick-Grip bar clamp and Horsepower handy clamp worth \$185 from American Tool
- Best Clear Finish**, \$250 in Formby's finishing supplies
- Best Painted, Dyed Finish**, \$250 in Formby's finishing supplies
- Best Transportation Toy**, \$399 Vicmarc mini lathe from Craft Supplies USA

Special Award

Best Entry/Shop Class (no limit on number of toys per class entry): \$250 in Delta tools; \$1,000 in 3M supplies; Quick-Grip bar clamps, 10 Micro bar clamps, and 5 Jack PLUS hand saws worth \$375 from American Tool; \$250 in Klockit merchandise



1997 CONTEST RULES

1. Toys must fit into a box no larger than 2' x 2' x 2'. The primary material should be wood but may incorporate other materials.
2. Please follow Consumer Product Safety Commission guidelines: nontoxic wood finishes only; no parts smaller than 1 1/4" square on toys for children under three years of age; no sharp corners or points; pull strings longer than 12" should not have beads or other attachments that could tangle and form a loop.
3. Entries must be received by September 1, 1997. All entries must be postpaid; collect entries will be refused. Attach an entry label, photocopy of an entry label, or a 3 1/2" x 5" card with entry information and your name and address to each toy.
4. Woodworkers (except Junior Craftsman) who build toys from existing plans will be eligible for Citation prizes only. Woodworkers who build their own original designs will be eligible for all prizes.
5. Entry constitutes permission to use winner's name, hometown and photograph for promotional purposes, unless prohibited by law. Employees and immediate family members of Meredith Corporation and co-sponsors and their affiliates and subsidiaries are ineligible. Void in Quebec.
6. Winners will be selected and notified by mail on or about October 15, 1997, and will receive the prize directly from the manufacturer/distributor. Value of prize is suggested retail price. For a list of winners, send a separate, self-addressed stamped envelope after November 1, 1997 to BUILD-A-TOY, 1912 Grand Avenue, Des Moines, IA 50309-3379.
7. Meredith Corporation will donate all entries or auction money received from entries to the U.S. Marine Corps Reserve Toys for Tots program.

8. For woodworkers who enter their toy as an original design: Toy must be your own original design. A different approach to an existing toy would qualify. Toys based upon published patterns are not eligible.
9. A panel of representatives from the U.S. Marine Corps Reserve, Meredith Corporation, and woodworking experts will judge the toys on or about Sept. 15, 1997, on child's appeal, craftsmanship, originality, durability, safety, and finish. The panel's decision will be final.
10. Professional woodworkers include woodworking teachers and anyone earning an income by selling wooden items.
11. Winners are responsible for applicable taxes.

DRAWING RULES

1. NO PURCHASE OR CONTEST ENTRY NECESSARY.
2. To enter, fill out the Official Entry Form or place this information on a 3 1/2" x 5" postcard. Up to 25 entries per person allowed. Persons who enter the contest are automatically entered, one entry per toy up to 25 toys.
3. Sweeps begins on September 1, 1996. Entries must be received by September 1, 1997. No responsibility is assumed for lost, late or misdirected entries.
4. Sweeps open to residents of the U.S.A., except employees of Meredith Corporation, contest sponsors, their agents, affiliates, subsidiaries and immediate families.
5. The winners will be selected on or about October 15, 1997. Winners will be notified by mail and prize delivered on or about October 30, 1997.
6. Selection of winners by a random drawing from all eligible entries received will be under the supervision of Meredith Corporation whose

decisions are final.

7. Odds of winning depend on number of entries received.
8. Prizes are not exchangeable or transferable. Only one prize per entrant is allowed.
9. Entry constitutes permission to use winner's entry, name, hometown, likeness and photograph for editorial, public relations, promotional and advertising purposes on behalf of Meredith Corporation, unless prohibited by law. Winners will be required to sign an Affidavit of Eligibility and Release of Liability within ten (10) days of notification.
10. Subject to all federal, state and local laws and regulations. Void where prohibited. Applicable taxes are the sole responsibility of the winners.
11. For a list of prize winners (available after October 15, 1997) send a separate, self-addressed, stamped envelope to: Build-A-Toy Sweepstakes, 1912 Grand Avenue, Des Moines, Iowa 50309-3379.
12. Prizes: 25 woodworker's packets (approximate retail value \$25 each) 25 Power Press pipe clamp spreaders (approximate retail value \$xx) and 150 WOOD Plans (retail value \$9.95 each).

With the Hitachi approach

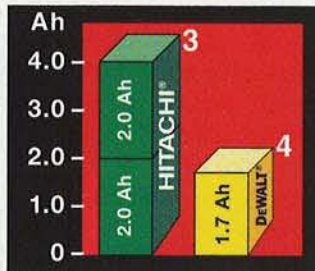
CORDLESS TOOLS WORK LONGER AND WEIGH LESS

The best in cordless freedom, power and weight is only available with the unique Hitachi Battery Belt Pack. Other approaches are just a pain in the wrist. Plus, the Hitachi approach is interchangeable for all same-voltage Hitachi tools, including flashlights.

Other approaches put all of the weight on the wrist



For example:



Compare the work-weight Compare the power

- 1 The Hitachi DS13DV2B 12V Cordless Drill has a work-weight of only 3.1 lbs. using the unique Hitachi Battery Belt Pack (EB12BH).
- 2 The DeWalt drill, pictured above, has a work-weight of 5.6 lbs.
- 3 The Hitachi Battery Belt Pack supplies 4.0 Ah of power utilizing two 2.0 Ah batteries.
- 4 The DeWalt battery, supplied with the drill pictured above, provides only 1.7 Ah.

• DeWalt is a registered trademark of DeWalt Industrial Tool Company



The Hitachi approach offers the option of putting the battery weight on the waist belt

EXTRAORDINARY PERFORMANCE
IT WILL AMAZE YOU.

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POWER TOOLS

For the Hitachi dealer nearest you, call:

1-800-546-1666

For more information, call:

1-800-59-TOOLS

(1-800-598-6657)

When cardboard carpenters sold tools

A one-of-a-kind Stanley window display from 1939

"A good tool window always gets attention," the Stanley Works counseled hardware dealers in a 1939 flyer. "This is especially true in the Spring when the building business opens with a bang; when home and camp owners are fixing up their places; when schools are requisitioning tools."

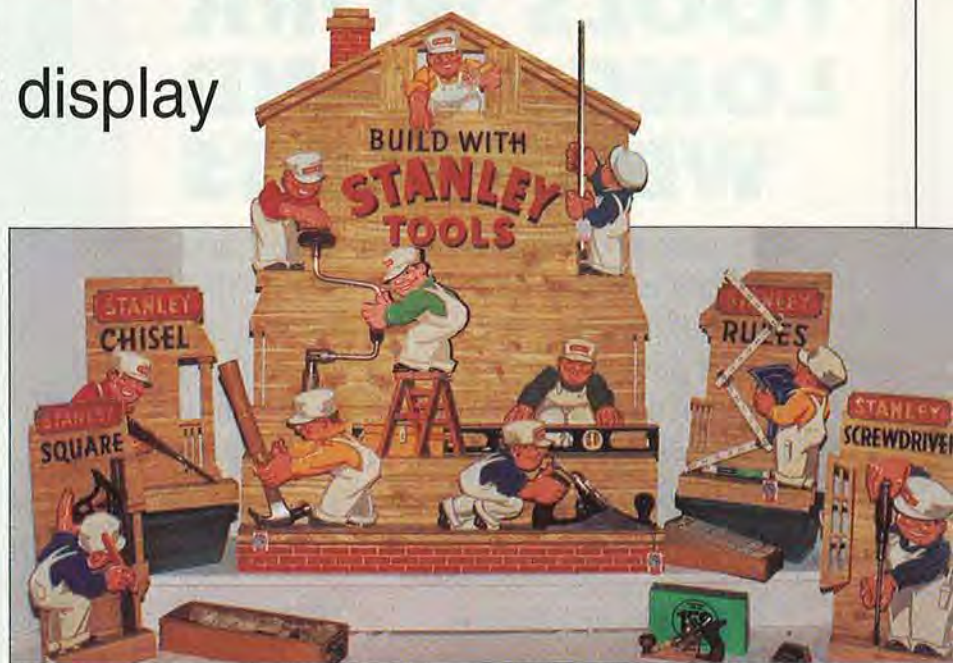
The flyer accompanied a boxful of colorful die-cut cardboard pieces depicting carpenters working around a house, and showed how to set them up in a store window. Intended for use during the last two weeks of March 1939, the display aimed at touching off that springtime burst of business.

The forgotten package

H.B. Craven of Wayne, Nebraska, was one retailer slated to receive the display. Apparently, though, Craven's cardboard cutouts weren't even shipped from the printer in Chicago until March 30.

Perhaps the spring tool-buying frenzy in Wayne already was underway when the package finally arrived, or maybe another display was in place. In any case, the carton was set aside unopened.

And so it remained until the 1970s, when a tool dealer discovered the package of props and displayed the set once. Then, for a convention of Stanley Tool Collectors in 1993 in Hartford, Connecticut, current display owner Clarence Blanchard constructed a mock storefront window and set up the display with tools from his collection. He showed it again at a Mid-West



Happy cartoon carpenters show off their real tools in this 1939 Stanley window display. The planes in the front are new reproductions of old Stanley models, sold by collector and dealer Clarence Blanchard.

Tool Collectors Association meet in Charleston, West Virginia, the following year.

Many old-tool authorities believe this is the only complete Stanley window display in existence. "Some collectors have one or two Stanley Happy Carpenters, but not complete units," Clarence says.

Costly cardboard

And what is such a rarity worth? "Advertising is well established in antique collecting, and good samples demand high prices. Plus, Stanley point-of-sale advertising is hard to find," Clarence says.

"But this takes up considerable space," he points out, "so it wouldn't be desirable to many collectors." Clarence figures the display's value falls in the low five-figures, and he's turned down at least one offer in that range. That just shows the kind of attention a good tool window gets, even one more than half a century old. ♣

Top ten tools for display

The eleven "happy, busy Stanley Carpenters" displayed these ten tools. Prices are 1939 retail prices.

- Stanley Bailey jack plane, no. 5, \$4.40.
- Stanley combination try square and miter square, no. 21-12", \$1.20.
- Stanley Atha nail hammer, no. 51½-16oz., \$1.25.
- Stanley Green End Zig-Zag rule, no. 106-6 ft., 65¢.
- Stanley Everlasting chisel, no. R40-1", \$1.70.
- Stanley bit brace, no. 915-10", \$4.40.
- Stanley screwdriver bit no. 26-¼", chucked in brace, 20¢.
- Stanley aluminum level, no. 313-24", \$3.00.
- Stanley Pull-Push rule, no. 7506N, 65¢.
- Stanley Hurwood screwdriver, no. 20-6", 50¢.

ONE THOUSAND TWO-BY-FOURS. TWENTY-SIX DECKS. THREE OAK FLOORS. AND IT'S STILL SUITABLE FOR FRAMING.

YOU WANT TOUGH? FRAME THIS. RUGGED ALUMINUM HOUSING. SPINDLE-LOCKS FOR EASY

BLADE CHANGES. BALL AND ROLLER BEARINGS. 24-TOOTH CARBIDE BLADE. AND A POWERFUL

2.75 HP, 13 AMP MOTOR. THE CRAFTSMAN SAWMILL. ANYTHING LESS JUST DOESN'T CUT IT.

CRAFTSMAN

EXCLUSIVELY AT SEARS AND SEARS HARDWARE STORES



Looking for resawing alternatives

My projects seldom use full-thickness 3/4" stock, so my thickness planer is in almost constant use. As you well can imagine, I lose a lot of valuable wood to my planer in the form of shavings. Can you suggest a method of resawing without a bandsaw? My benchtop bandsaw doesn't have the guts (or the clearance) to resaw anything much wider than 3" pine.

—Jon Haverstick, Santa Ana, Calif.

Jon, you can resaw wood using a tablesaw. To do this, cut into the board on both edges, and use a handsaw to cut through the remaining wood in the center of the board (see drawing right). Here's one easy way to do this:

1 Set your rip fence so the space between the tablesaw blade and the rip fence equals the final thickness of the resawn boards plus $\frac{1}{16}$ ". This extra thickness will allow you to plane or sand the wood to remove the saw marks.

2 Adjust the blade height to 1" or less, and make a cut into each edge of the board. Be sure to keep the same face of the board against the rip fence while you make these cuts.

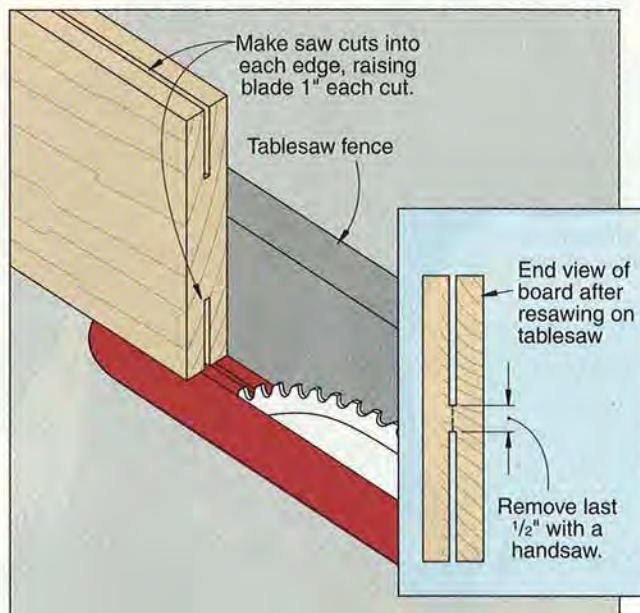
3 Raise the sawblade an additional 1", and deepen the cut on each edge. Repeat this process until you have reached the height limit of your sawblade, or you have a $\frac{1}{2}$ " "web" of wood separating the two cuts in the center of the board.

It's important that you leave at least a $\frac{1}{2}$ " web of unsawn wood in the middle of each board. With less material remaining to be cut, the board becomes too unstable to safely cut on the tablesaw.

4 Separate the sections by cutting through the $\frac{1}{2}$ "-thick area of wood in the center of the board with a handsaw. Place the board to be resawn upright in

Whether your woodworker's license reads "Beginner," "Intermediate," or "Advanced," you're bound to have a few questions about your favorite hobby. We can help by consulting our staff and outside experts. Send your questions to Ask WOOD®, Better Homes and Gardens® WOOD Magazine, 1912 Grand Ave., Des Moines, IA 50309-3379. You can contact us via computer at these on-line addresses:
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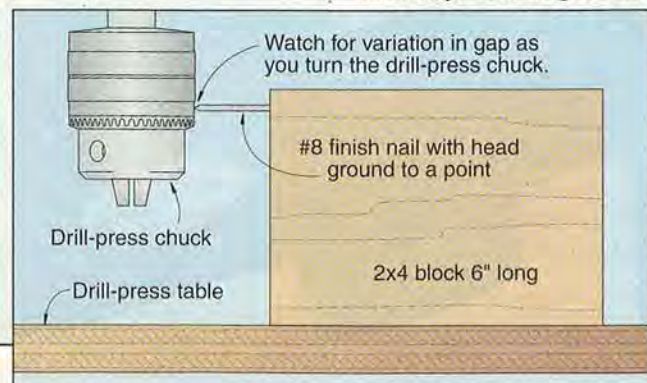
a vise, with about two-thirds of the board above the vise. Use the handsaw to cut the center web down to just above the vise. Then, reverse the board, placing a spacer between the cut halves. Reposition the board in the vise, and saw through the remaining center web.



Rosette cutters need the right power tool

I recently purchased a rosette cutter for my drill press, but to date have been unsuccessful using the tool. I can get the cut started okay, but then the wood tears as I apply more pressure, and the cutter chatters and damages the pattern.

—Ron Gray, Oak Ridge, Tenn.



Ron, you're encountering a problem common to many woodworkers who try to use a rosette cutter on too small a drill press, or on a drill press with excessive spindle runout. These cutters, with their multiple shaping blades, exert tremendous drag while cutting. That drag causes smaller drill spindles to flex and then jump, tearing at the wood. And the deeper you make the cut, the more you'll experience this problem.

We suggest that you use a large drill press with a thicker spindle to resolve your problem. If you already have a floor-model drill press, you can check the spindle runout with a dial indicator, or use the homemade gauge shown in the drawing left. Contact your tool dealer on how to reduce the runout of the drill-press spindle.

Continued on page 24

THE NEW RYOBI DETAIL BISCUIT JOINER

THE DIFFERENCE BETWEEN WOODWORKING AND WOODNOTWORKING.

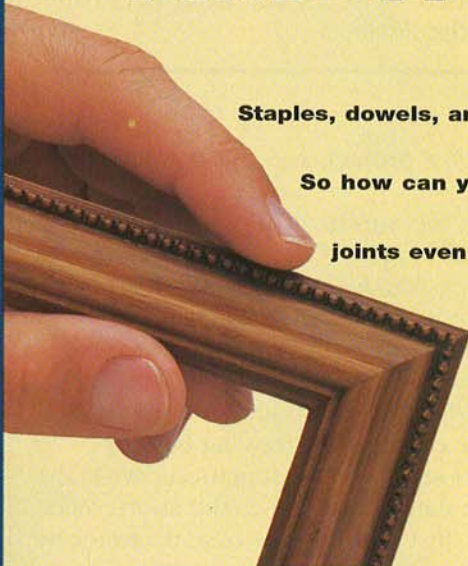
Staples, dowels, and glue won't do. Standard-size biscuits won't fit.

So how can you make neat, tight, professional joints even in small stock? With Ryobi's new

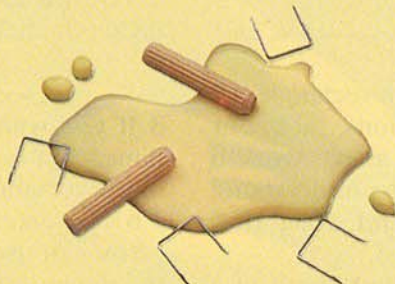
Detail Biscuit Joiner, that's how.



Standard biscuits stick out of small joints, and the mis-match shows, even after you trim the excess.



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Ye olde sawdust filler

I get fine sawdust from my scrollsaw, and I would like to use it as part of a wood filler. What can I mix with this sawdust that will take a stain and won't turn white when varnished?

—Earnest Lemcke, Sioux Falls, S.D.

Ernie, you can mix the sawdust with yellow woodworker's glue to make a filler for small holes. Keep the sawdust content of this mixture high, and it will take stains and not turn white when varnished.

To make this filler, first apply some yellow woodworker's glue to the area to be filled. Then, add the sawdust, working it into the glue with your finger. While the glue is still damp, sand the area, working more sawdust into the glue. Repeat this process as many times as necessary to fill the defect in the wood. Thoroughly sand the filled area to remove any glue residue around the patch, preventing the dreaded "white spot" from occurring when you apply the finish.

Golden proportions

I have heard of the "golden rectangle" theory that's used to calculate the proportions of furniture parts. However, I have not heard it explained so I can understand it. Can you give me a simple explanation? How can I apply it to my candlestick designs so that the various parts are in proportion to each other?

—Jack Fildes, Grafton, Ohio

When we first researched the "golden rectangle" or "golden section" theory of proportions, Jack, our eyes kind of glazed over. However, as we worked with the theory, it became easier to understand. We'll try to explain it in a simple and straightforward way.

This proportional system relates the length of a rectangle to its width, and was used by the Greeks as early as the 4th century B.C. For our technically minded readers, this system states that the smaller section of a line (AB) is related to the larger section (BC), as the larger section is related to the whole (AC). (Whew! see Golden Section drawing right.)

Now that we've got you confused, let's see about getting out of this swamp. The mathematics of this system (fortunately done by a whole lot of other people over the centuries) produces a ratio between the width and length of a rectangle of approximately 5 to 8, or, more precisely, 1 to 1.618.

To apply this ratio to a rectangle, consider the length of the short side to be 1 unit. Then multiply this length by 1.618 to get the length of the long side. For a rectangular solid (for example, a box or chest) obtain the third dimension by adding the lengths of the rectangle sides ($1x + 1.618x$) as shown in the drawing right.

When designing a project, use these calculations in this way:

1 Determine one measurement of your candlestick (either the overall height of the candlestick or the width of the base). For our example, we'll arbitrarily choose a height of 6".

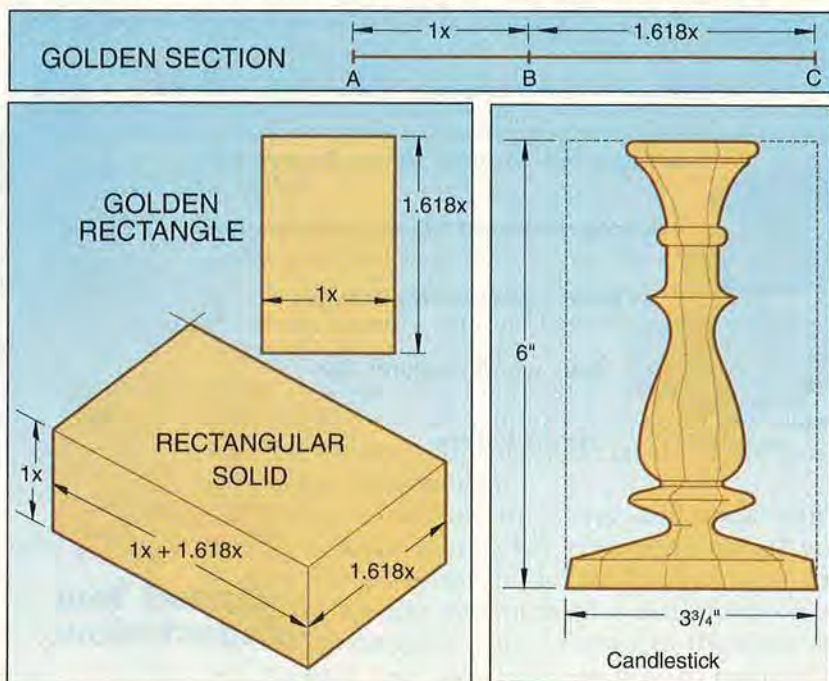
2 To find the diameter of the candlestick base, divide the height (6") by 1.618:

$$6" \div 1.618 = \text{about } 3\frac{3}{4}"$$

(see the candlestick drawing below)

3 If you want to start your calculations with the dimension of the candlestick base (the shorter side of the rectangle), just multiply the base diameter by 1.618 to determine the height of the candlestick.

You can use this proportional system to calculate the dimensions of any project where you know one dimension. For example, a 16"-high coffee table designed using the golden rectangular solid would have a top width of $16" \times 1.618$, or approximately $25\frac{3}{4}"$, and a top length of $16" + 25\frac{3}{4}"$, or $41\frac{3}{4}"$.



Continued on page 26

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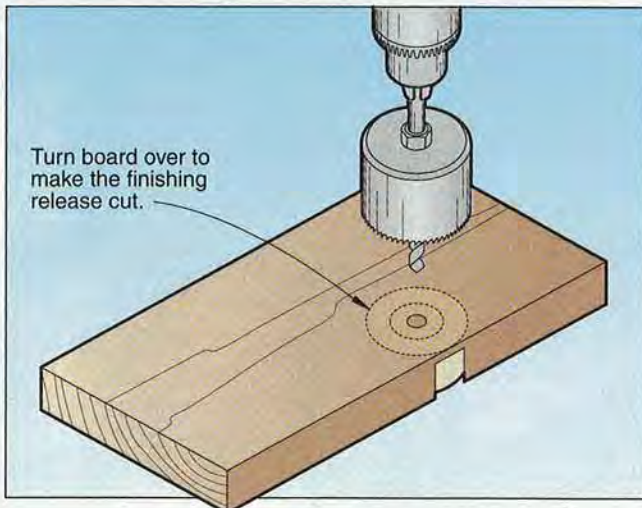
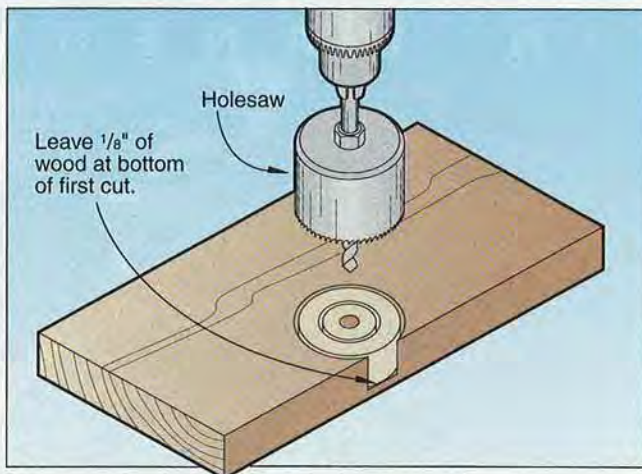
ASK WOOD

Continued from page 24

Wholesale holesaw tire making

I am looking for a way of making tires for spoked wheels on my toys. I need an inside diameter of 7/8" and an outside diameter of 1 3/8". Can you help?

—Merwin G. Willman, Schertz, Texas



Merwin, the following procedure will help you cut accurate wheel tires:

- 1 Use a 7/8" holesaw with a pilot bit and cut through all but 1/8" of the thickness of the wood.
- 2 Change to a 1 1/2" holesaw, and aligning the pilot bit to the pilot hole, cut through all but 1/8" of the wood. Flip the board over, and using the pilot hole as a centering guide, cut through the remaining 1/8" of stock. Be sure to leave 1/2" or more of the wheel protruding from the holesaw to make it easier to remove the wheel from the saw.
- 3 Sand the outside of the wheel. You can also turn it on a lathe equipped with a screw center, or an arbor on a drill press.
- 4 Take the turned and sanded wheels back to the drill press. Use the 7/8" holesaw, and working from the back, cut through the remaining 1/8" of thickness in the center of the wheel. ♣

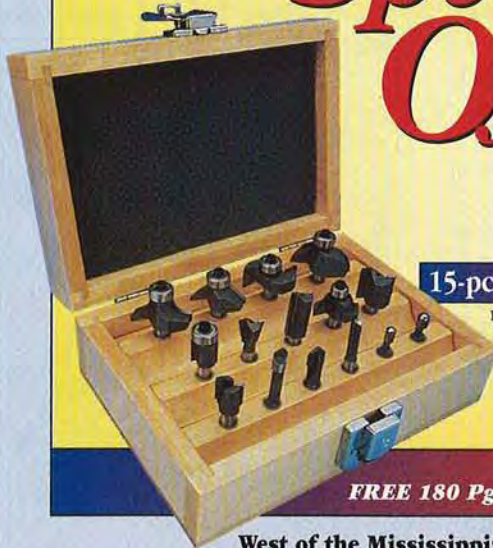


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Circle No. 81



A hand will work as a hold-down. But our shop tip of the month *right* shows you a better and safer way.

If you own a radial-arm saw, you know that holding the workpiece securely to the saw table can prove difficult to do. But one alert reader, Dave Yarkosky, has come up with a terrific solution. We think his tip is so useful that we awarded him the top-tip tool prize.

If, like Dave, you've come up with ways to improve the tools in your shop, or if you've invented any useful jigs or techniques, we want to know about it. We'll pay you \$40 if we select your tip for publication, and you'll be eligible to win a tool prize for the best tip of the issue. To be considered, send a letter with a photo or drawing of the tip to:

**Tips From Your Shop
(and Ours)**

**WOOD® Magazine
1912 Grand Ave.**

Des Moines, IA 50309-3379

Our goal is to publish only new and original shop tips, so please send your idea to just one magazine. Also note that we cannot return your submissions. Thanks, and keep those shop tips coming.

Kerry Gibson

GENERAL-INTEREST EDITOR

Hold-down steadies workpieces on saw table

Feather boards and hold-downs are easy to find for tablesaws and router tables. Now, here's one you can build for your radial-arm saw. It makes your operations safer, and stops the subtle creep or movement of the stock that occasionally ruins cuts.

To build this helper, attach two screw eyes to your saw's fence about 8" to the right and left of the blade. Then, fashion the hold-down out of 3/4x3" stock, and fasten a handle as shown *below*. The length of the hold-down should equal the width from the fence to the front edge of the saw table.

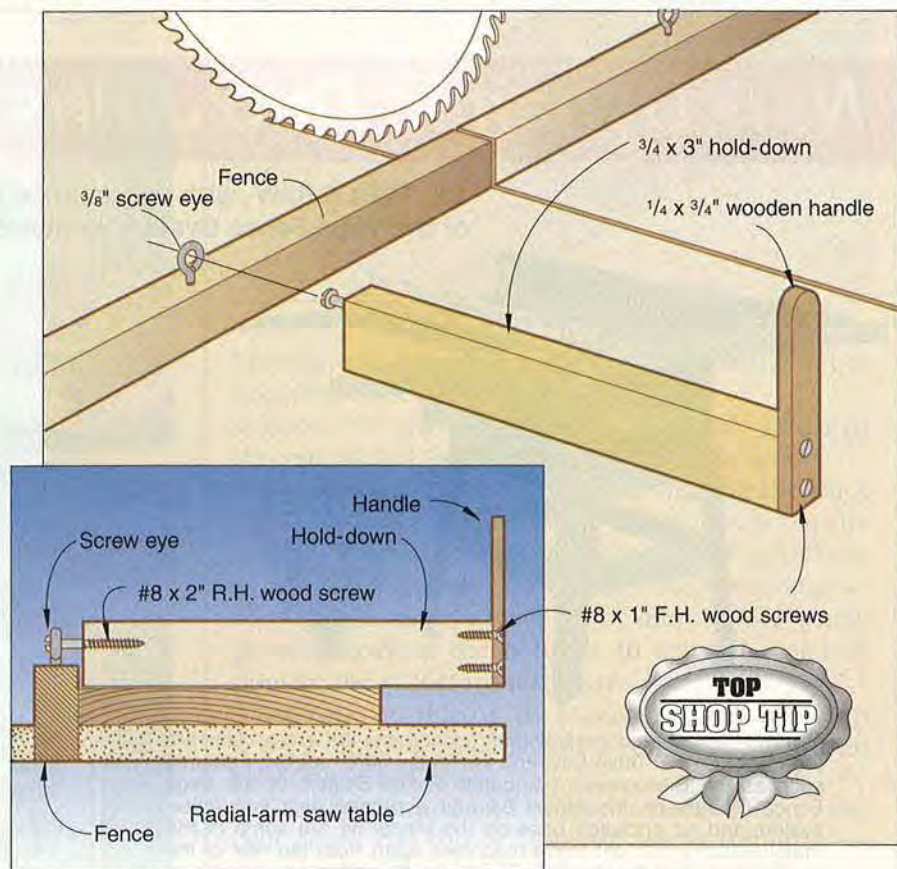
Position a roundhead screw in the end of the hold-down so that the hold-down sits flush with the most common thickness of stock you normally cut. For thicker or thinner stock, make another hold-down accordingly. Make sure your fence

is securely anchored so it doesn't pull up when you push down on the hold-down.

—Dave Yarkosky, Albia, Iowa



For submitting the best tip in this issue, Dave Yarkosky receives a Delta Sidekick 10" Sliding Compound Miter saw.



Continued on page 30

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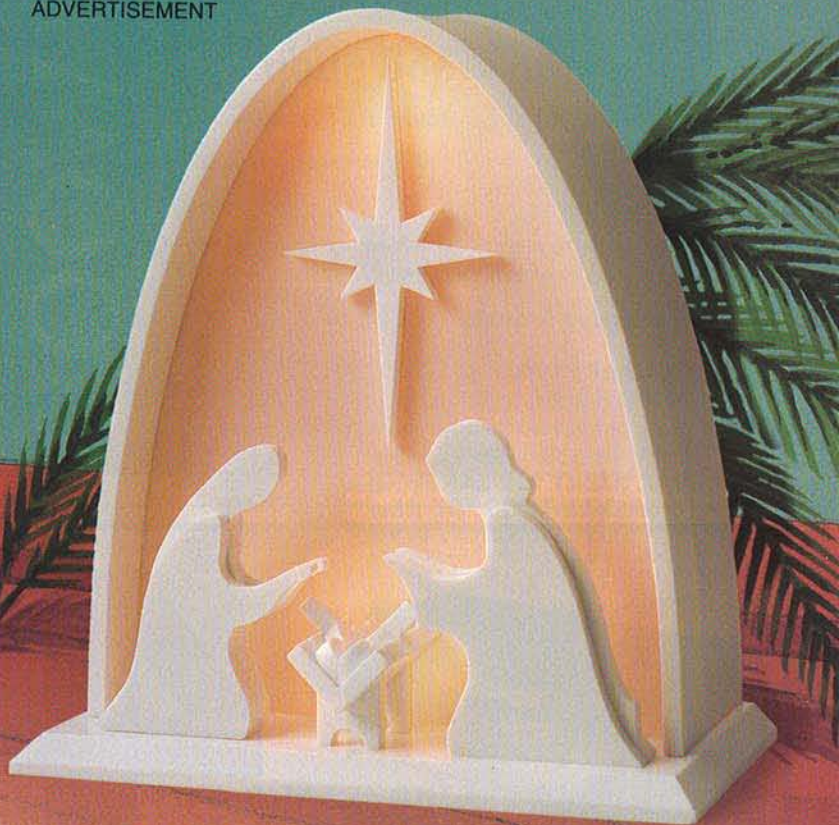
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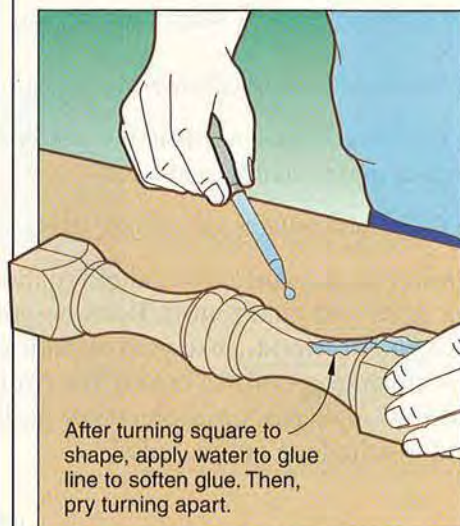
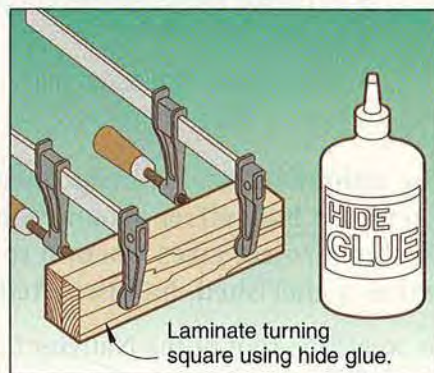
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Hide glue helps you with pry-apart turnings

To make two half-round turnings, most woodworkers glue the stock together with thick paper between the stock pieces and pop apart the paper-to-wood joint after turning. But this procedure can ruin small or delicate turnings because of the force needed to pry apart the pieces.

To prevent this problem, glue your stock together with bottled hide glue. When you finish turning the piece, place a few drops of water along the glue line on both sides and wait 5-10 minutes. Since hide glue is hydrophilic, or "water-loving," it will pull the moisture into the glue joint, soften, and lose much of its bonding strength. This allows you to pry the two half-round pieces apart easily with a putty knife.

—Carl Davis, Owens Cross Roads, Ala.



Continued on page 32

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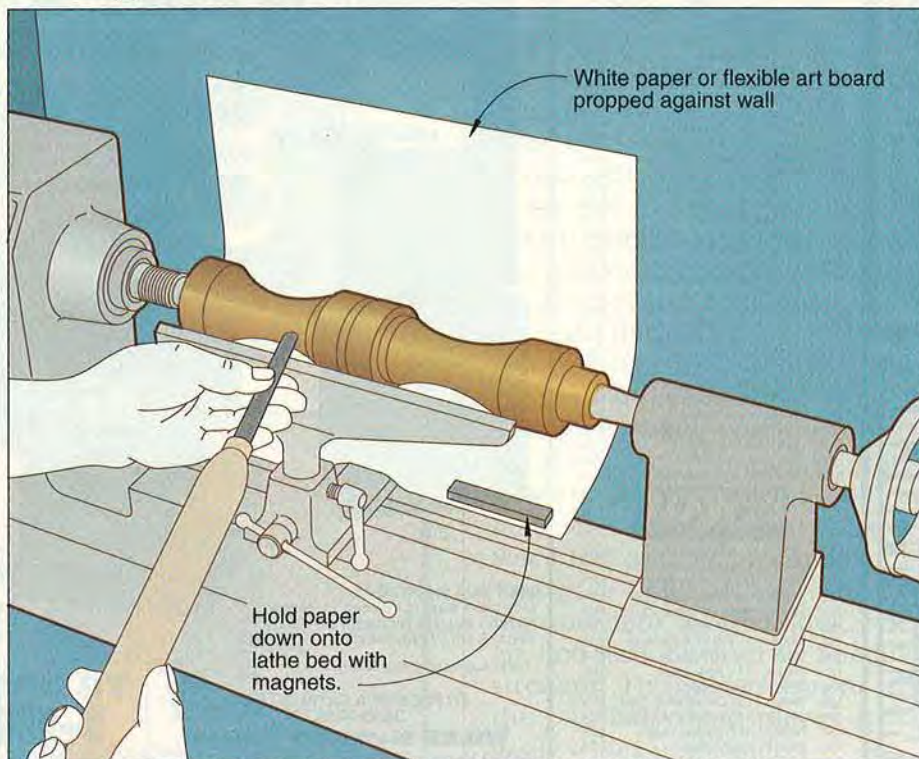
Continued from page 30

White backdrop helps turnings stand out

Some home shops are not the clean, well-lit places they could be. And on projects with intricate shapes, like the profile of a turning, a clear view of the workpiece may ultimately make the difference between success or failure.

If the area behind your lathe is dark and dingy, you can improve the view of your turnings by placing a piece of white paper or flexible art board behind the workpiece. Hold the bottom of the paper to the lathe with a pair of magnets as shown in the drawing, and prop the top against the wall. The contrast between the white paper and the wood will give you a crisp silhouette for clearly judging the progress of your work.

—Michael Locke,
Huntington Beach, Calif.



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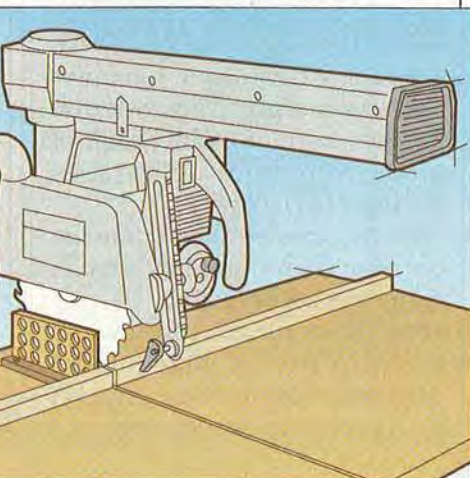
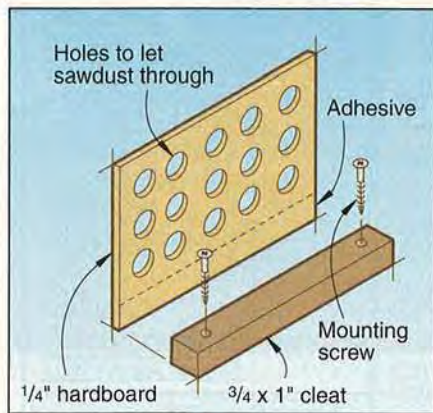
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—Cecil Lau, Burnaby, B.C.



Continued on page 34

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Continued from page 32

For softer bristles, clean them with dish detergent

It seems like even the most careful cleaning of a paintbrush in solvent still results in a stiff, hard-to-use brush after it dries. To keep your brushes as soft and springy as they were when new, try this:

First, clean your brush in mineral spirits or the appropriate solvent. Then, wash the brush thoroughly with warm water and dishwashing detergent. The water and detergent remove minute traces of finish and solvent that otherwise will dry on the bristles and cause them to stiffen.

—Jeff Isom, Waterloo, Neb.



A FEW MORE TIPS FROM OUR WOODWORKING PROS

- Master woodturner Johannes Michelson shares the expertise he uses to transform a chunk of green wood into a wearable, Western hat, *page 39*.
- See the Corner Detail drawing on *page 65* for a clever way to conceal a corner joint.
- Put those pieces of plywood scrap to use by edge-joining them into panels. See *page 65* for details on this simple and economical technique. 🌲

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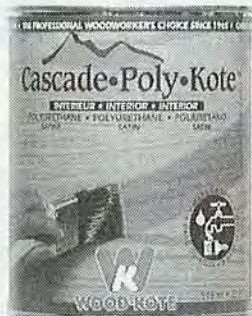
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Project Showcase

We'll feature your best work

If you've been a *WOOD*® magazine reader for a while, you might recall Project Showcase. This feature, highlighting reader-designed and -built projects, appeared periodically throughout our first few dozen issues.

Now, we're bringing it back. A couple of times per year, we'll select a few of the best project photos submitted by readers and publish them along with a little information about the project and the builder.

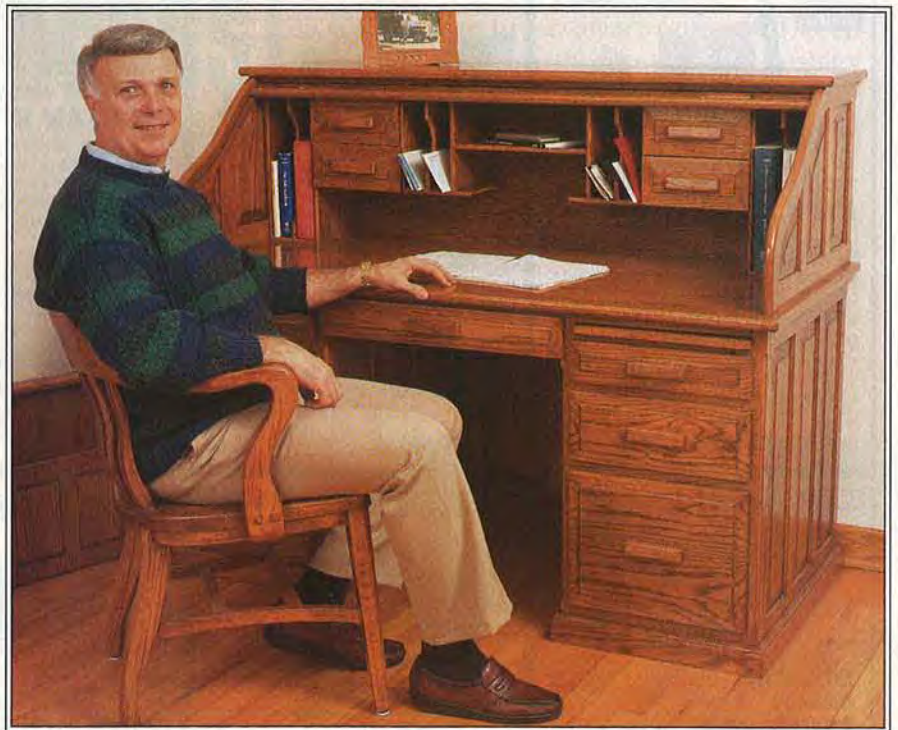
We'll start by showing you some items built by *WOOD* magazine staff members. On the *next page*, find out how you might get yours shown next time.

Note: We cannot provide plans, drawings, patterns, measurements, bills of materials, additional photographs or descriptions, construction details or instructions for projects shown.

Nor can we pass out addresses or telephone numbers of Project Showcase exhibitors.



◀ Correspondence writer Don Mostrom loves to build folk-style stringed instruments. This octave mandolin is his latest design. Despite the fancy inlay work (he used Corian), this one's only his prototype.



▲ Project builder Chuck Hedlund doesn't shy away from big-time projects in his free time. He spent 268 hours designing and building this oak rolltop desk. Matching accessories round out Chuck's home office.



◀ Senior how-to editor Marlen Kemmet styled his mahogany dining table and chairs after the early 20th-century furniture of Greene and Greene, noted southern California architects and designers. The plugs are simulated ebony.





▲ Art director Lee Gatzke built this chess set for his son Mike. Drawers in the cocobolo box hold the turned cocobolo and spalted maple chess pieces. The light squares on the board are highly figured maple.

▼ Associate art director Perry McFarlin constructed this wall-hung oak shelf for his wife's collection of antique tin cups. He designed the display shelf around oak dentil molding he bought at a local home center.



Want to show your stuff?

You can send photos of practically anything you've built (no decks or other home improvements, please), with just one limitation: It must be an original design.

Items built from kits or directly from published plans are ineligible. Carvings must be original pieces, not taken from pattern books, roughouts, or carved in a class.

You may enter a project you built that's inspired by a plan, kit, or something you saw, but please tell us. Generally, minor changes to a published plan, such as using different wood than specified or altering a few dimensions, won't be enough to warrant selection.

Here are some factors we'll consider in making selections:

- Eye appeal. A graceful, well-proportioned design is certain to catch our eye, as will a clever or unusual one. Interesting details or exciting use of wood also will likely grab our attention.
- Craftsmanship. We'll look for evidence of careful construction. Grain matching, the way parts fit together, and quality of the finish will be just some of the things we'll watch for.
- Originality. Is there something that distinguishes your blanket chest (or whatever) from hundreds of others? Tell and show us how it departs from the commonplace.

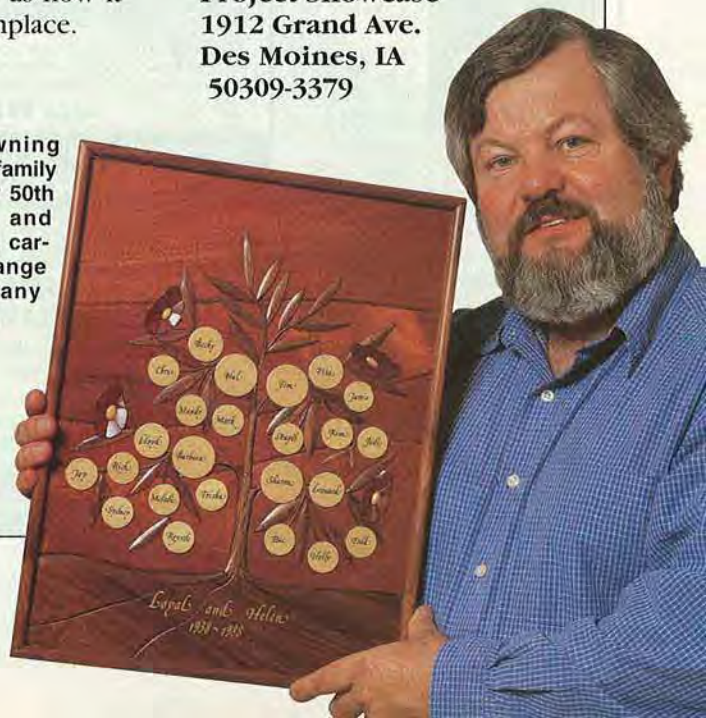
► Design editor Jim Downing crafted this intarsia-style family tree for his parents on their 50th anniversary. Pieces cut and shaped from walnut, maple, cardinal wood, and osage orange are inlaid into the mahogany background.

Here's how to enter

- Send sharp, properly exposed color photographs of the item. Include an overall view plus any detail views necessary.
- We prefer slides, but can use sharp, glossy prints. (We may need to borrow the negatives for publication.) We cannot use Polaroid photos. Photos cannot be returned.
- Avoid cluttered or confusing photo backgrounds. Include a prop or two to indicate scale. (For instance, coins next to a small turning help viewers visualize its size.)
- Even if it seems painfully obvious to you, explain what the project is or what it does—we don't want to call your lamp table a plant stand.
- Describe unusual features, special construction techniques, approximate building time, wood and finish used, overall dimensions, and anything else of interest.
- Tell us a little about yourself, too. Let us know how old you are, your occupation (or former one, if you're retired), how long you've been a woodworker, and so forth.
- Include your daytime telephone number in case we want to know even more.

• Then send everything to:

**WOOD magazine
Project Showcase
1912 Grand Ave.
Des Moines, IA
50309-3379**

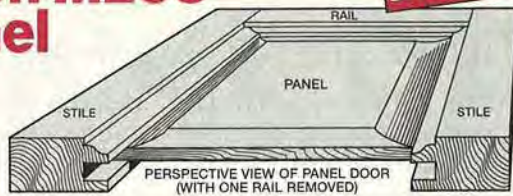


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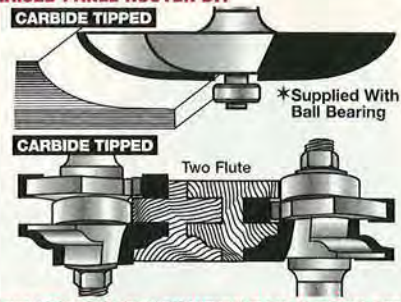
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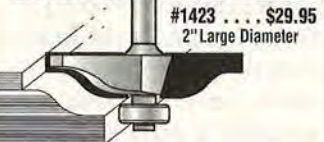
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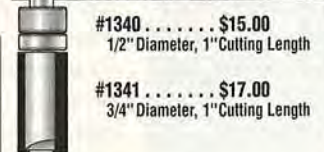
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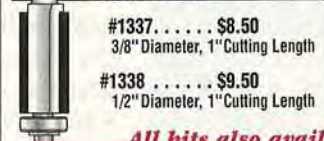
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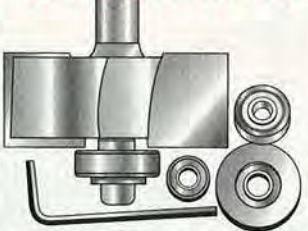
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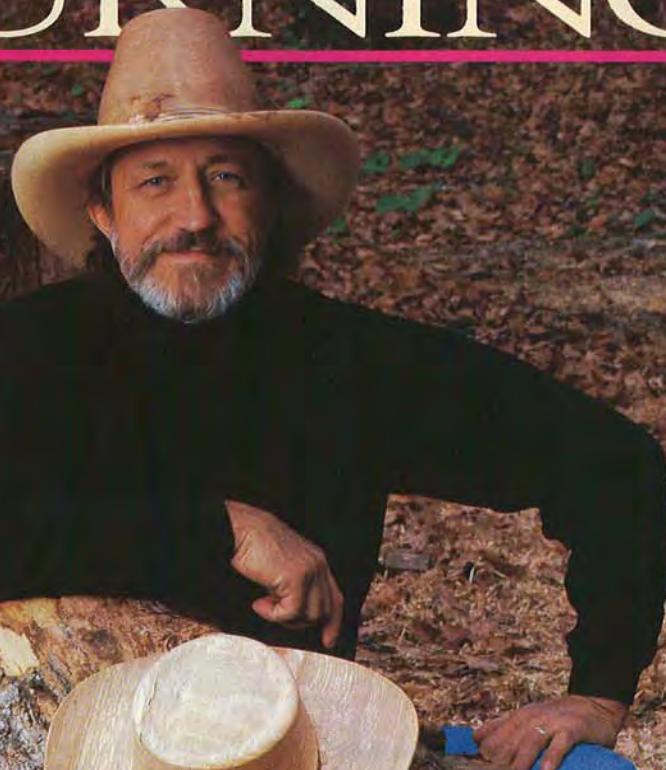
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HATS OFF TO TURNING

Read on and you'll see how Vermont craftsman Johannes Michelsen uses his lathe to perform some neat hat tricks.

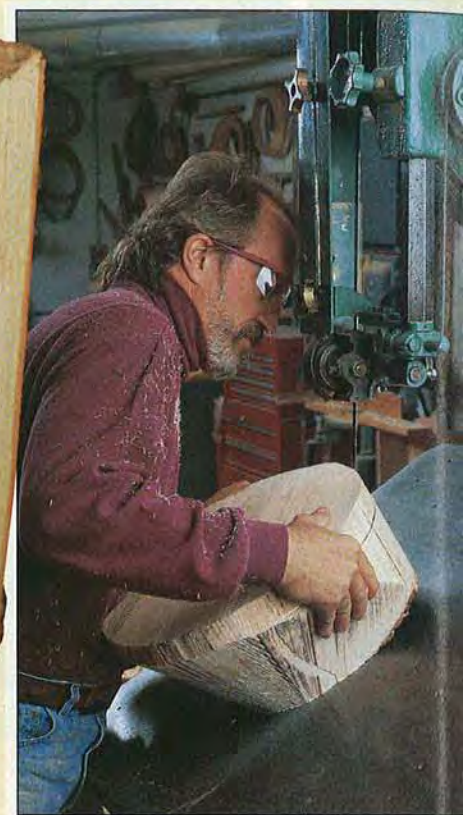
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At the edge of the forest behind his shop, Johannes Michelsen displays a selection of his turned wooden hats, made strictly from native Vermont stock.



Above: A wooden hat begins as a split chunk of wood, its brim laid out to the pith so that after turning, it will bend toward the bark side.



Above right: To rough-shape the wood, Johannes manhandles it through the bandsaw with the table tilted to 35°. Then, he'll run the hat blank through his 12" jointer to get the top and bottom parallel for mounting on the lathe.

Some things you just have to see to believe. Such as wooden hats. Even *The World Book* encyclopedia fails to mention hats of wood, although in two pages it traces hat history back to 3100 B.C. Throughout the centuries, there were bonnets, berets, cloches, fezzes, sombreros, tricorne, turbans, and many others. But they were all made of something besides wood.

Certainly, when Zadoc Benedict founded the first hat factory in the United States in 1780 in Danbury, Connecticut, he didn't start out fitting chunks of wood to people's heads. Zadoc might have considered it, though, if woodturner Johannes Michelsen had been around back then.

With his Manchester, Vermont, workshop separated from Zadoc's original hat factory by only 100 miles or so, Johannes no doubt would have been an influence. He couldn't have avoided it. After all, a wooden hat once seen can't

help but be remembered. And to 50-year-old Johannes, turner of wooden hats, that's always good for business.

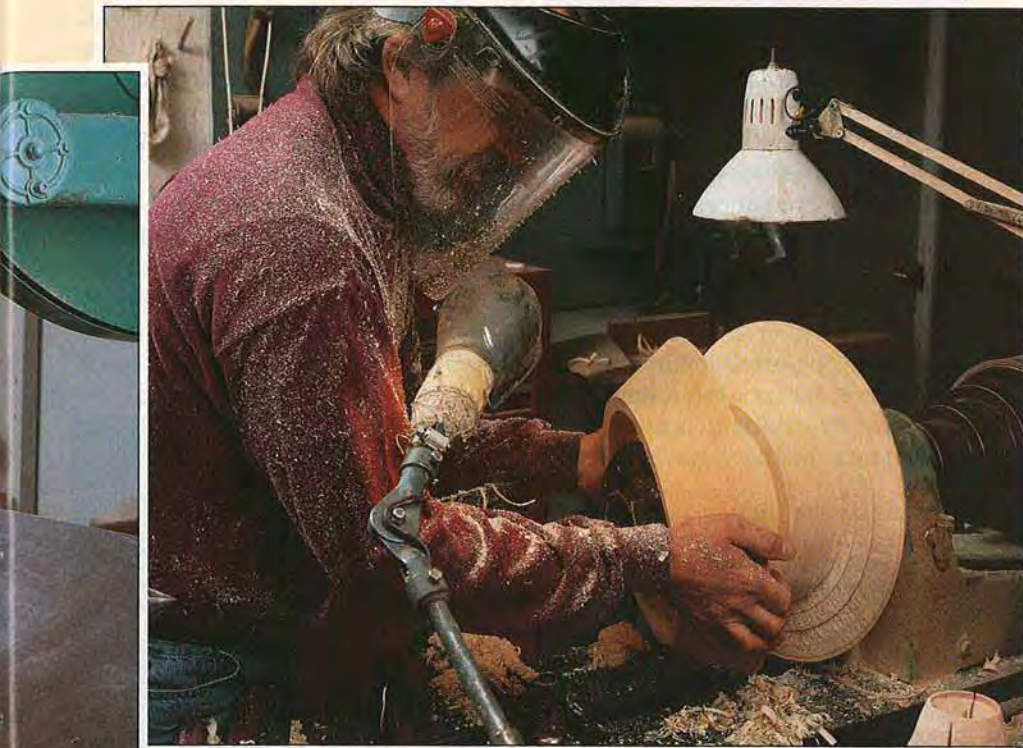
From staircases to Stetsons

Johannes was born in Denmark and raised in Connecticut. After his return from service in Vietnam in 1969, he gradually established himself as a homebuilder and land developer in the Manchester area. By 1980, however, the local economy was slowing, and Johannes began specializing in custom stair building, which he occasionally still does. Yet, he wanted to create something else with wood,

something more personally expressive than staircases.

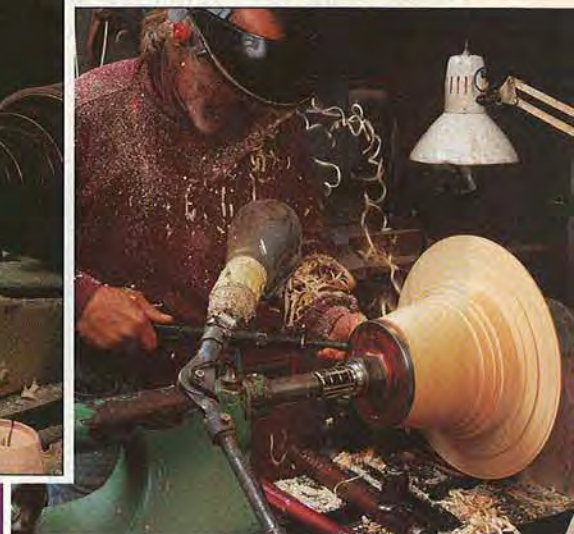
"I read a magazine article about David Ellsworth, and how he turned hollow vessels," Johannes remembers. "It showed his finished work and what they sold for. I thought, 'Wow! He gets \$400 to \$600 for them. I could become a bowlturner and actually make a living at those prices.' I started looking through the newspaper for a used lathe."

Eventually, Johannes located one and began to turn green wood into bowls. It wasn't all that new to him. "I had done some turning in my father's shop when I was a kid. I think he bought the lathe just to keep me and my brother away from the radial-arm saw," chuckles Johannes. "But turning green wood was all different. Then I read a book by Bruce Hoadley. He explained how green wood distorts as it dries, and saw



Left: After rounding down the blank with a 1" gouge, Johannes uses a parting tool to part off from the hat crown a round rim of wood that will become a mirror frame.

Below: For a smooth, ridgeless surface on the hat, the woodturner lays the cutting edge of his gouge over on its side for a shearing cut.



it as a handicap. But the more bowls I did, I began to look at distortion as maybe something good."

Working with distortion in the green wood became a challenge that continued through Johannes' 10 years of bowl turning. During that time, he got better and better, eventually selling his work at large craft fairs and to galleries across the nation. "After a while, I started turning vases because I liked to do big things," he recalls. "In fact, I made one pair of vases that stood 6' tall. They sold for thousands of dollars, when they sold. But it's like the real estate market—the higher the price, the fewer buyers there are. And the economy just happened to tighten up. By 1990, I had pretty much quit doing shows and had gone back to building staircases when the idea for the hats came along."

A brim on a whim

"It just popped into my head—why not turn a hat? And I told Wendy, my wife, 'One of these

"It just
popped into
my head—
why not turn
a hat?"

days I'm going to turn one,'" recalls Johannes as he leans back against the lathe bed. "The hat thing was always a joke."

Hats of wood may have been a joke back when Johannes turned nothing but bowls. Today—some 600 wooden hats later—they're not funny anymore. At \$550 to \$1,200 apiece for wearable ones, and \$180 for small hats, shown *next page*, they're serious business. Johannes' first hat was even a prizewinner, of sorts. "In the fall of 1990, woodturner Albert Lecoff [founder and director of the World Turning Center in

Philadelphia] invited us to his wedding," says Johannes. "It was going to be a country-western affair, so I decided to turn that wooden hat I'd been thinking about for years, and wear it."

The hat was a hit. In a vote taken by the guests for best items of apparel, Johannes' wooden cowboy hat was the hands-down favorite. "And the hat was ridiculous, not anything like I'm doing now," says the turner. "It was unanimous—people were stomping on the floor, beating on the walls, to give me the prize. That was the only wooden hat maybe in the world at the time, and to them it was pretty special. As I look back, Albert Lecoff wasn't the inspiration for the hats, but he certainly was the catalyst."

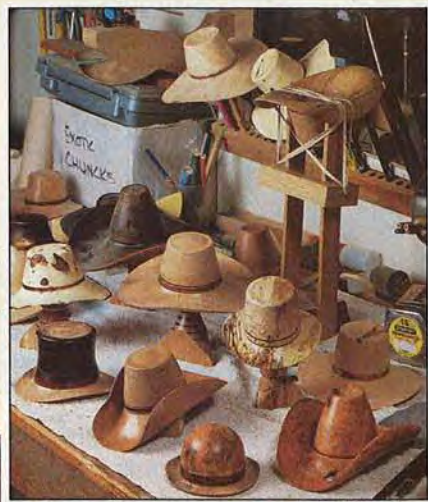
And with the hats, Johannes' knowledge of turning green wood—with its inherent distortion in drying—began to pay dividends. "The hats allowed me to take advantage of the way green wood

Continued

shrinks," he says. "And for them, I need all the shrinkage I can get."

Hats from the home front

For his hats, Johannes relies on local woods from the surrounding Green Mountains—yellow birch, sugar maple, red maple, black cherry, white oak, butternut, and some boxelder. "It's all available around here. I don't have to go more than 20 miles away to get it," he says.



The height and shape of the wooden hats' crowns matter little in planning. But, their brim diameter can't exceed the 16" swing of Johannes' lathe. "The biggest hat, my Trail Boss model, takes the full swing," the craftsman notes.

While the type of hat and its brim determine how large a chunk of wood goes on the lathe, sizing a hat gets a bit more complicated. "A wooden hat has got to fit," emphasizes Johannes as he taps the burl red maple Trail Boss on his head. "I can wear this

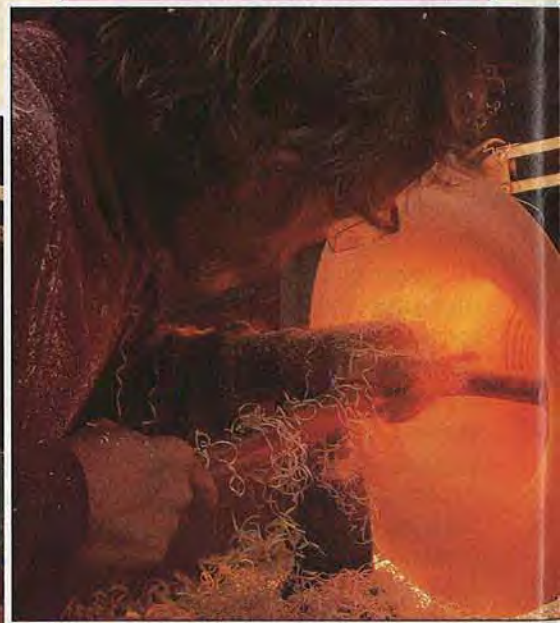
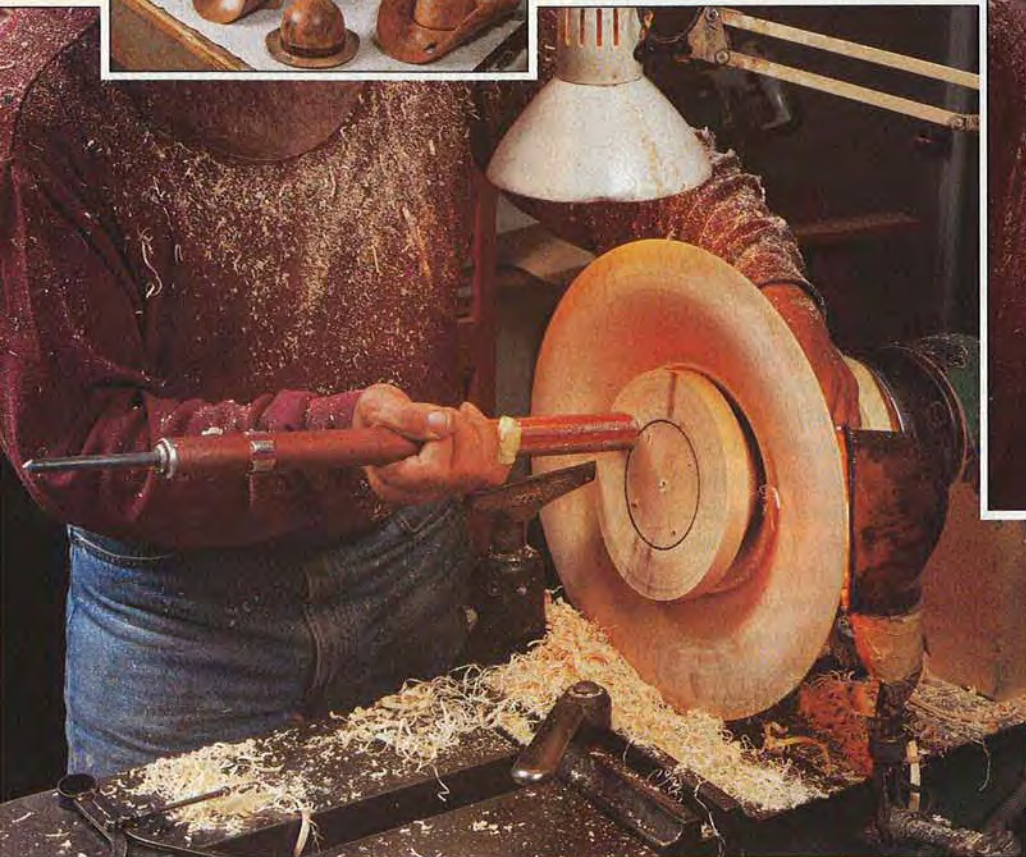
Left: Johannes' line of smaller hats duplicates the range of styles found in his full-sized ones, but also includes top hats and suburban "crushers."

Below: A tap with the gouge handle and the parted-off center of the crown pops out. The piece will become a small hat. For his turnings, Johannes prefers gouges with extruded aluminum handles filled with lead shot. (HiTec tools by Glaser Engineering Company, 310/823-7128.)

hat out in the wind. But mostly, we try for an acceptable fit."

For a custom hat, that "acceptable fit" comes from accurate measurements. "When I take an order for a custom-fit hat, I measure around the head with a flexible rule, or send the customer one with instructions," the turner explains. "Because heads are oval, I get the width and the length. Then I add 1/8" for wall thickness

"With enough experience, you don't need science."



Above: The evenness of the light glowing through the wood as he turns helps Johannes maintain a uniform wall thickness of 3/32" on the hat. The bent tool rest in the depth of the crown helps keep his hand steady.

and about 1/4" for shrinkage. That gives me the outside diameter."

Measuring, though, is only half the story of making hats that fit. The rest of the crafting deals with shrinkage and shaping.

Crowns without pith, please

Green wood shrinks more across the grain and parallel to the growth rings than it does perpendicular to the growth rings. Shrinkage along the length—in most woods—is negligible. In making wooden hats from green wood, these realities are crucial.

"The hat brim, not the crown, almost always faces the pith," says Johannes, turning a log chunk over. "That way, the brim will bend easily up and out from the center of the log. And the crown will distort into an oval as the wood dries. To get the oval shape to fit a head, I

need the wood to shrink across the grain. But normal shrinkage isn't enough. That's why I clamp it later and let it dry (see photo *below*). Also, turned hats want to dry in a somewhat bulbous shape, and the clamps help reduce that."

Making the most of wood

Just counting lathe time, Johannes can turn a wooden hat in a couple of hours (see *photos*). "A hat sure takes a lot of wood," you might say. At first glance, it seems so. But as a businessman as well as a turner, Johannes has learned that waste doesn't make money.

The ring of wood that he parts off the brim becomes a mirror frame. From the wood removed in hollowing the crown, Johannes creates mini hats. And from the wood removed from inside the mini hats he makes micro hats that will fit on your thumb!

No matter the size of the hat, though, he'll sand each with 120-through 220-grit abrasive, then brush-coat it

with lacquer on the lathe to slow down the drying. The coating also protects a hat from stains and finger marks during handling, and any discoloration from the rubber bands used in the bending rack.

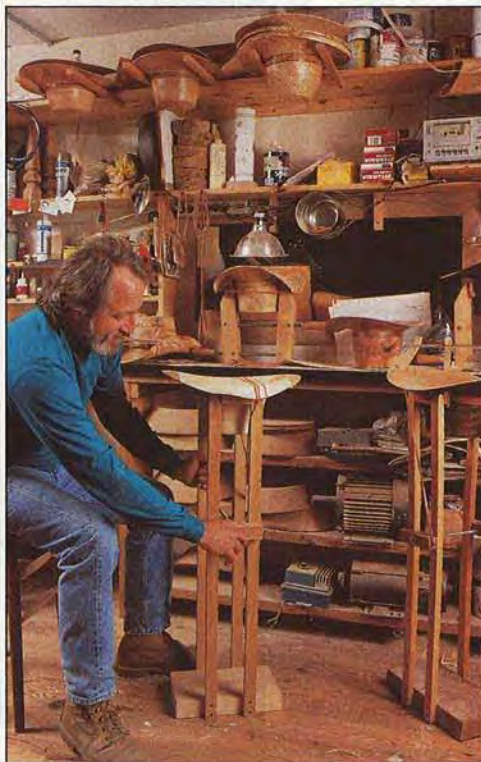
After spending two or three days in a bending rack, a hat requires a day's clamping. Then, Johannes sprays on 10 coats of lacquer. When a hat is completely dry, he polishes it with a superfine, micro-grit abrasive.

Despite all the thought and turning skill that go into the making of his wooden hats, Johannes laughs at any reference to working the green wood as a "science." According to the turner, "With enough experience, you don't need science." ♣

Want to see more hats?

For a brochure describing Johannes' wooden hats, write with a SASE to: Johannes Michelsen, P.O. Box 562, Manchester Center, VT 05255.

Written by Peter J. Stephano
Photographs: Steve Uzzell



Top left: Some final turning on the crown completes the hat. The dark color on the "band" was created by burnishing the turning wood with a scrap of padauk. "Exotic woods, such as ebony, purple-heart, padauk, and rosewood, are my crayons," says Johannes.

Bottom left: As the hat nears completion, Johannes blows out moisture from the thin green wood with compressed air to speed up drying.

Left: Under tension from rubber bands, hat brims dry to shape in 2-3 days. From the racks, hats move to the workbench, where Johannes clamps the crowns into more of an oval shape.

SIMPLY SENSATIONAL Shutter

This stylish, but easy-to-build, shelving unit has lots going for it. Thanks to the exterior window shutters, the carcass goes together in a hurry. And by incorporating adjustable shelf standards into the design, we've made changing the spacing between the glass shelves a breeze. And if that weren't enough, we've included a couple of can lights to cast a flattering glow onto your collectibles sitting on the shelves.

For starters, let's construct the basic carcass

1 Start with a pair of 15×71" exterior wood shutters. (We purchased ours at a local home center for under \$26 each.) Note that these are nominal dimensions; each shutter actually measures 14¾×71½". If the shutter stiles protrude past the edges of the rails (ours protruded about ¼"), trim the ends of the stiles flush with the edges of the rails.

2 Install a ⅝" dado head into your tablesaw, and adjust it to cut ⅜" deep. Cut a groove in a piece of scrap stock, and check the fit of the shelf standard in the groove. Adjust the cut if necessary. (See the Buying Guide for our source of shelf standards and lights.) Now, cut a groove along the *inside face* (with the wide rail at the bottom and louvers pointing down) of the shutter stiles. See the Exploded View and Carcase drawings for reference.

3 Cut a ¾" rabbet ¾" deep along the *inside bottom edge* (across the wide rail) of both shutters.

4 Cut a pair of filler blocks to ¾×⅝×2⅝" to fill the bottom end of the groove running along the back edge of each shutter stile.



Shelving

Bill of Materials

Part	Finished Size			Mater.	Qty.
	T	W	L		
CARCASE					
A sides	1 1/16"	14 3/4"	71 1/2"	S	2
B top stretchers	3/4"	1 5/8"	36"	P	2
C bottom stretcher	3/4"	2 5/8"	36"	P	1
D bottom	3/4"	14 1/2"	37 1/2"	PL	1
E banding	3/4"	1/4"	37 1/2"	P	1
TOP					
F panel	3/4"	14 1/4"	37 7/8"	PL	1
G* front & back	3/4"	3"	38 5/8"	P	2
H* sides	3/4"	3"	15"	P	2
I* front cove	9/16"	1 3/4"	41 1/8"	C	1
J* side coves	9/16"	1 3/4"	16 1/4"	C	2
BASE					
K front & back	3/4"	2"	37 7/8"	P	2
L sides	3/4"	2"	14 1/4"	P	2
M* frt.&back	3/4"	3 1/2"	38 5/8"	P	2
N* sides	3/4"	3 1/2"	15"	P	2
O* front molding	3/4"	3 1/2"	40 1/8"	P	1
P* side molding	3/4"	3 1/2"	15 3/4"	P	2
Q back	1/8"	37 5/8"	73"	H	1

*Initially cut parts oversized. Then, trim each to finished size according to the how-to instructions.

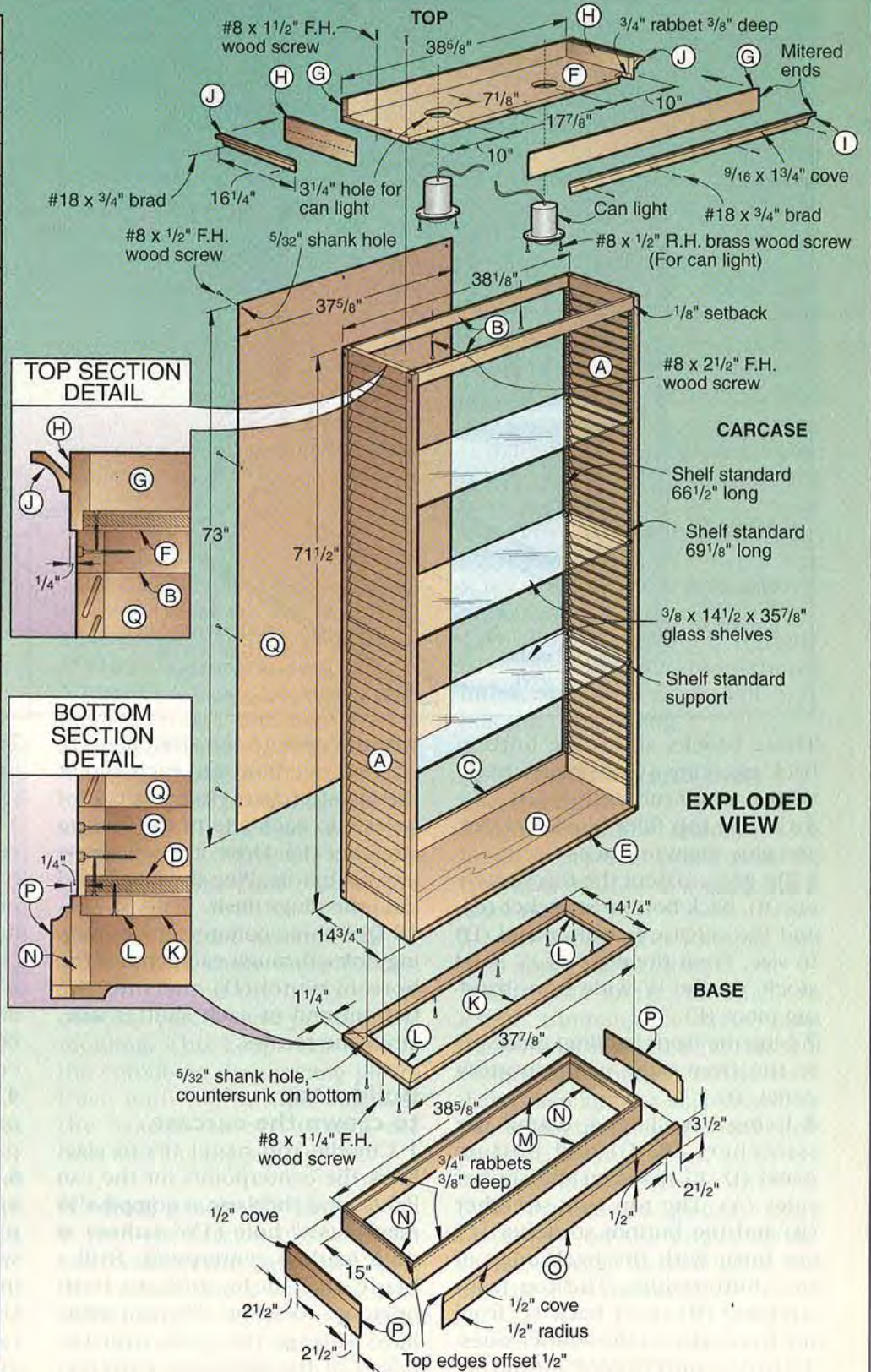
Materials Key: S—shutter, P—pine, PL—plywood, C—cove molding, H—hardboard.

Supplies: two 15x71" exterior shutters; #8x1/2", #8x1 1/4", #8x1 1/2", and #8x2 1/2" flathead wood screws; #8x1/2" roundhead brass wood screws for can lights; #18x3/4" brads, primer and paint, 3/8" glass for shelves.

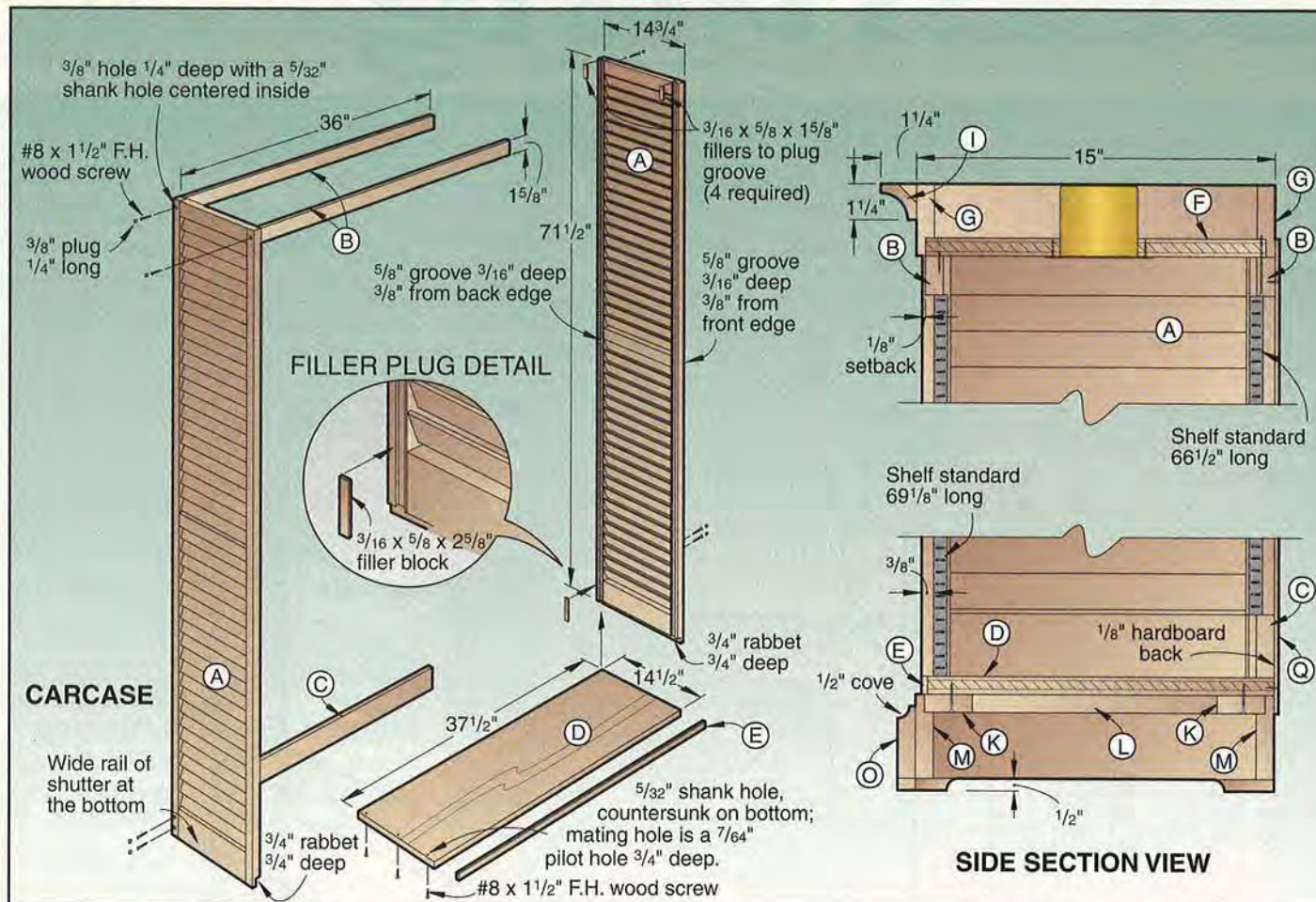
Buying Guide

Shelf standards and lights. Two fixed-focus can lights, polished brass, with 40-watt bulbs. The starter unit has a 10' line cord with roll switch, and one 24" connector cord with a female plug for adding the second light. Add-on unit (second light) has bulb and two 24" cords. Catalog nos. SPL8 and SPL9. Four 72" shelf standards, #125B6, and shelf supports, #SS21B. Constantines, 2050 Eastchester Rd., Bronx, NY 10461 or call 800/223-8087 to order.

Continued



Shutter Shelving



These blocks allow the bottom back stretcher (C) to mate totally with a wood surface.

5 Cut the top filler blocks to size, and glue them in place.

6 Rip and crosscut the top stretchers (B), back bottom stretcher (C), and the carcass bottom panel (D) to size. From the edge of $\frac{3}{4}$ " solid stock, rip the $\frac{1}{4}$ "-wide front banding piece (E).

7 Glue the front banding piece (E) to the front edge of the bottom panel (D).

8 Using bar clamps, clamp the stretchers (B, C) and bottom panel (D, E) between the shutter sides (A). The top rear stretcher (B) and the bottom stretcher (C) are flush with the back edge of the shutter sides. The top front stretcher (B) is set back $\frac{1}{8}$ " from the front edge of the shutter sides.

9 Drill counterbored mounting holes through the shutters (A) and

into the ends of the stretchers (B, C). Drill one hole into each end of the top stretchers (B) and a pair of holes into each end of the bottom stretcher (C). Drive a wood screw into each hole. Plug the holes, and sand the plugs flush.

10 Drill three countersunk mounting holes through each end of the bottom panel (D) and into the bottom end of each shutter side. Drive the screws.

Build a top to crown the carcass

1 Cut the top panel (F) to size. Mark the centerpoints for the can lights, and then use a compass to mark a $\frac{3}{4}$ " hole ($1\frac{5}{8}$ " radius) at each marked centerpoint. Drill a blade start hole, and cut both openings to shape. The can lights have a flange that will cover the edges of the holes, so a perfect edge isn't necessary.

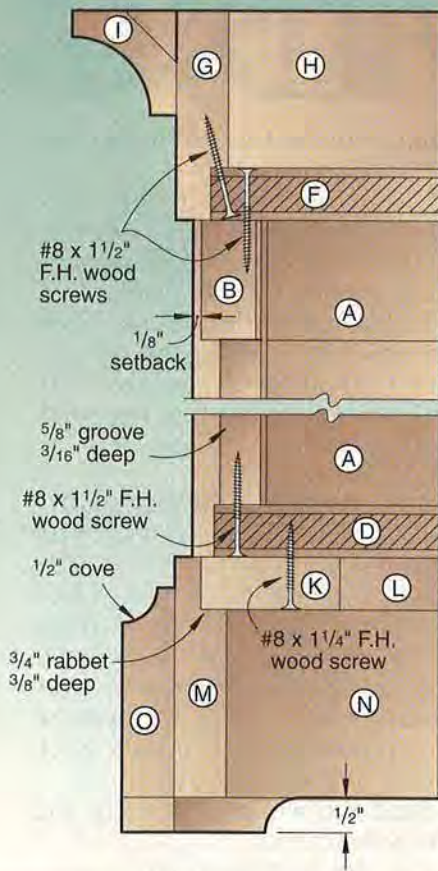
2 Rip and miter-cut the front, back, and side surround pieces (G, H) to size plus 2" in length.

3 Using the same setup used earlier, cut a $\frac{3}{4}$ " rabbet $\frac{3}{8}$ " deep along the bottom inside edge of each piece. Then, miter-cut the pieces to fit snugly around the top panel (F). As shown in the photo at right, we miter-cut one end, clamped it in place, and used a combination square to mark the cut at the other end.

4 Glue and clamp the surround pieces (G, H) around the plywood panel (F).

5 Cut the front and back cove molding pieces (I, J) to length plus 2". (The home center at which we bought the cove molding referred to it as $\frac{1}{16}$ "x $1\frac{3}{4}$ " cove.) Using the miter gauge on your tablesaw, miter-cut the mating ends of the cove molding where shown on the Exploded View

SIDE SECTION DETAIL



Now, construct a sturdy base

1 Rip and miter-cut the base frame front, back, and sides (K, L) to size. Glue and clamp the pieces together. Measure diagonally to check for square.

2 Cut the base-frame surround pieces (M, N) to size plus 1" in length. Cut or rout a 3/4" rabbet 3/8" deep along the top inside edge of each. Now, miter-cut the pieces to fit around the base frame (K, L). Glue and clamp the base-frame surround pieces (M, N) around the base frame.

3 Rip the base molding pieces (O, P) to width, and crosscut them to length plus 1". Miter-cut the molding pieces to fit around the base-frame surround. Do not glue the molding in place yet.

4 Lay out a 1/2" notch with 1/2" radius at each end on each piece of molding. Bandsaw the notches to shape. Sand the flat areas with a palm sander and the radii with a 1"-diameter drum sander.

5 Install a 1/2" cove bit into a table-mounted router, and raise it to cut 1/2" deep. Position the router table fence to cut about 1/8" of the cove. Rout the cove along the top outside edge of the base molding pieces (O, P). Move the fence in 1/8" increments until the entire cove is cut.

6 Place the base assembly (K, L, M, N) on 1/2"-thick scrap blocks. Spread glue on the backs of the molding pieces, and position the molding. This keeps the tops of the cutouts in the molding pieces flush with the bottom edges of the base assembly. Clamp the base molding pieces in place.

It's final assembly time

1 Turn the carcass upside down and position the base flush with the carcass back and centered side-to-side. Clamp the base in place, and drill countersunk mounting holes through the base frame members (K, L) and into

the carcass bottom (D). Secure with wood screws.

2 Turn the carcass/base assembly upright, and position the top flush with the carcass back and centered side-to-side. Clamp the top in place, drill mounting holes through the top panel (F) and into the sides (A) and front stretcher (B). Drive the screws. Drill holes through the rear stretcher (B) and into the bottom surface of the top panel (F). Drive the screws.

3 Cut the back (Q) to size from tempered hardboard or plywood. (So the outside edges of the back panel would be less noticeable, we cut the panel 1/2" less than the carcass width.) Lay the carcass/top/base assembly front side down on sawhorses. Position the back, centered side-to-side on the assembly, and clamp it in place. Drill the holes and drive the screws. See the Side Section View drawing for reference.

4 Position the assembly upright. Glue plugs into all counterbored holes, and sand flush. Fill brad holes in the molding.

Add the finish and then the hardware

1 Prime the entire assembly. (We found it easier to prime with the back removed. Also, a spray finish saves time.)

2 Sand lightly after priming, and then apply a satin enamel.

3 Trim the shelf standards to length, trimming the excess from the *bottom end* of each. This will ensure the notches in the standards align and the shelves will sit flat. Install the standards and clips. Measure the openings, and have 3/8"-thick glass shelves cut to fit. (We ordered a pencil edge machined on the edges of our shelves.) Install the can lights, and add the glass shelves. 🌟



Use a combination square to mark the miter cutlines on the pieces that surround the top plywood panel.

drawing. Attach an auxiliary fence to your miter gauge to prevent chip-out. Turn the top assembly upside down, and glue and nail the front cove into place with #18x3/4" wire brads. Fit the side coves (J) in place and mark the cutlines across the back ends for cutting the pieces to length. Be sure to check for tight miters before cutting the side coves to final length.

Written by Marlen Kemmet
Project Design: James R. Downing
Illustrations: Roxanne LeMoine
Photographs: Bill Hopkins

SPACE-**SAVING**



If you're looking for a quick way to add another work surface and more tool storage to your shop, look no further. This project fills the bill in both regards. The multi-drawer roll-around tool cabinets hold a ton of tools, and when pulled out, they can function as yet another work surface.

Note: The plywood cabinet surrounds in the Exploded View drawing are dimensioned to fit a Stanley Proto 27"-high storage cabinet. If you choose another make or model of rolling cabinet, be sure to change the dimensions

of your wooden surrounds to fit. Plan for about 1/2" of clearance around the sides and top of the rolling cabinets.

Start with a pair of matching cabinets

- 1 Cut the side panels (A) and back panels (B) to the sizes listed in the Bill of Materials from 3/4" plywood.
- 2 From 3/4" solid stock (we used maple), cut the trim strips (C, D) to size, and glue them to the front and bottom edges of the plywood side panels.
- 3 Cut the top cleats (E) and bottom caster guides (F) to size. The caster guides center the rolling cabinet in the opening, preventing the inside of the cabinet and the outside of the rolling cabinets from rubbing against each other

when moving the cabinet in and out of the surround.

4 Glue, clamp, and screw the two cabinet surrounds (A-F) together in the configuration shown on the Exploded View drawing.

5 Finish-sand both cabinets. Mask the solid stock, and paint the plywood. Then, mask the plywood, and add a clear finish to the solid-wood banding.

Add a heavy-duty worktop

1 To form a worktop (G) for your cabinets, cut enough 1 1/2"-wide strips, and glue them face to face to form a top measuring 1 1/2x21x88". You also can opt for a less-expensive worktop by laminating two pieces of 3/4" plywood and trimming the edges with pieces of 3/4x1 1/2" hardwood.

2 Sand the worktop smooth, and add a clear finish.

3 Cut the backboard (H) to size, and glue and screw it to the back edge of the worktop.

4 Position the wood cabinets exactly 28" apart (measure between the cabinet tops at front and back ends). Drill mounting holes through the cleats (E) and into the bottom side of the worktop. Screw the top in place, holding the cabinets squarely apart. You should have a 1/2" overhang on each end of the worktop.

And now, add a drawer for helpful storage

1 Cut the drawer guides (I), drawer front (J), sides (K), back (L), and bottom (M) to size.

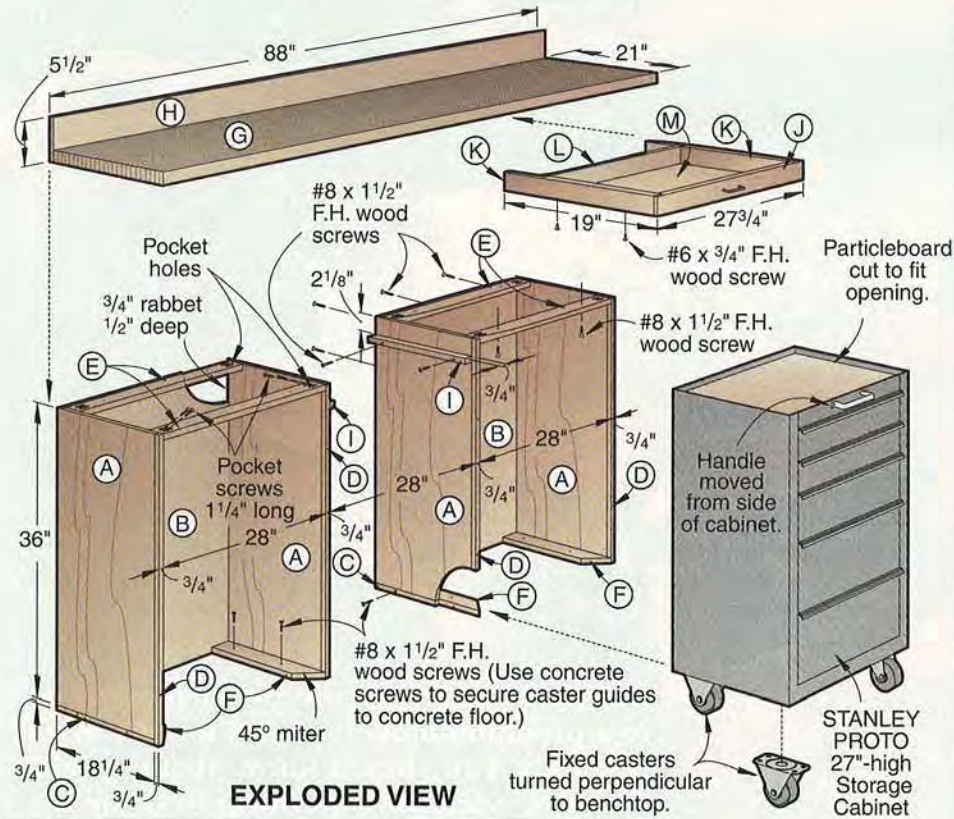
2 Cut the rabbets and dadoes in the drawer parts where shown on the Drawer drawing. Construct the drawer, and add a 3" wire pull to its front.

3 Drill mounting holes, and screw the guides (I) in place.

4 Fit the drawer between the cabinets on the drawer guides.

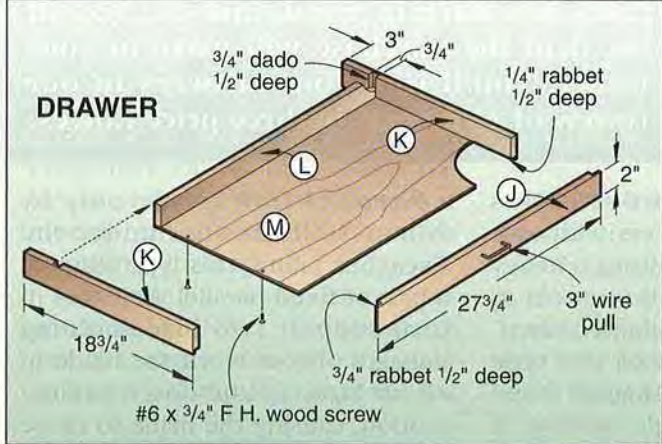
convenience

WORKBENCH



Bill of Materials					
Part	Finished Size			Matl.	Qty.
	T	W	L		
CABINET SURROUNDS					
A side panels	3/4"	18 1/4"	36"	P	4
B backs	3/4"	29"	36 3/4"	P	2
C trim	3/4"	3/4"	18 1/4"	M	4
D trim	3/4"	3/4"	36 3/4"	M	4
E cleats	3/4"	2 1/2"	28"	M	4
F caster guides	3/4"	3"	18 1/4"	M	4
WORKTOP					
G worktop	1 1/2"	21"	88"	LM	1
H backboard	3/4"	5 1/2"	88"	M	1
DRAWER					
I guides	3/4"	1"	18 1/4"	M	2
J front	3/4"	2"	27 3/4"	M	1
K sides	3/4"	2"	18 3/4"	M	2
L back	3/4"	1 3/4"	27 1/4"	M	1
M bottom	1/4"	15 3/4"	27 1/4"	P	1

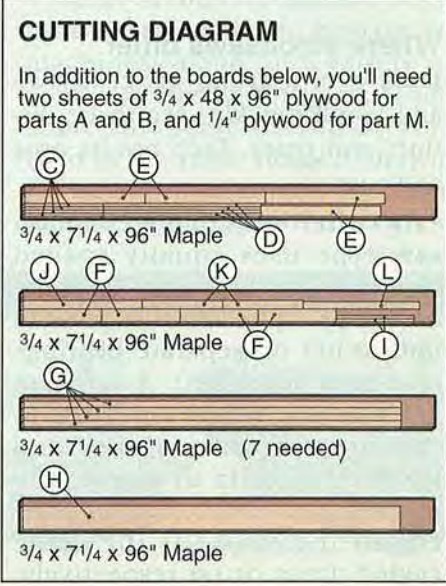
Materials Key: P-plywood, M-maple, LM-laminated maple
Supplies: 5-3" wire pulls (if needed), 1/4"-long pocket screws, #6x3/4" flathead wood screws, #8x1 1/2" flathead wood screws, primer, enamel paint, clear finish.



the front of the cabinet. Next, mount the fixed casters so that they roll *perpendicular* to the benchtop.
2 Finally, position the workstation in your workshop. Drill a pair of mounting holes through the caster guides (F) and into the floor

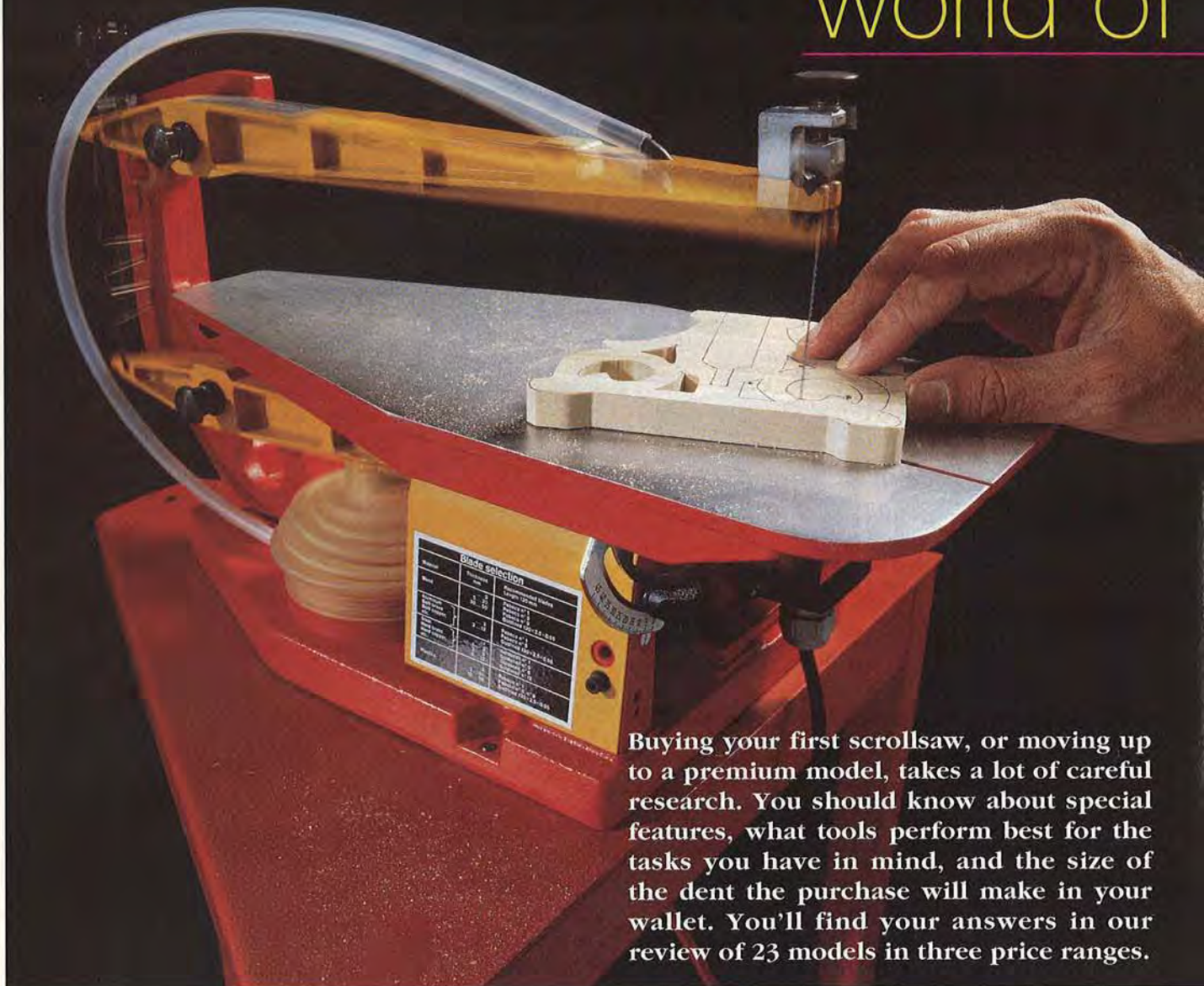
(you'll probably have to use a concrete bit, depending on your floor construction). Secure the caster guides to the floor to keep the workbench stationary. ♣

Written by Marlen Kemmet
Project Design: James R. Downing
Illustrations: Roxanne LeMoine
Photograph: John Hetherington



Some final fixes make it work all the harder
1 To make it easier to grasp the cabinets to roll them in and out of the surrounds, drill two mounting holes, and add a wire pulls or handle to the front of each metal cabinet. Or, if your metal cabinet has a handle on the end, relocate it to

The wide world of



Buying your first scroll saw, or moving up to a premium model, takes a lot of careful research. You should know about special features, what tools perform best for the tasks you have in mind, and the size of the dent the purchase will make in your wallet. You'll find your answers in our review of 23 models in three price ranges.

Where scrollsaws differ

Look over a group of scrollsaws and you'll quickly see three distinct arm types. Each has its pros and cons.

• **Parallel-arm.** This common saw type uses equally spaced blade-holding arms that are connected by a link and that pivot in unison but on separate bearings (see *next page, top*). A separate link that attaches the lower arm to the motor works to raise and lower the blade in an almost vertical path. Only at the beginning and end of the stroke is the blade angled down or up respectively.

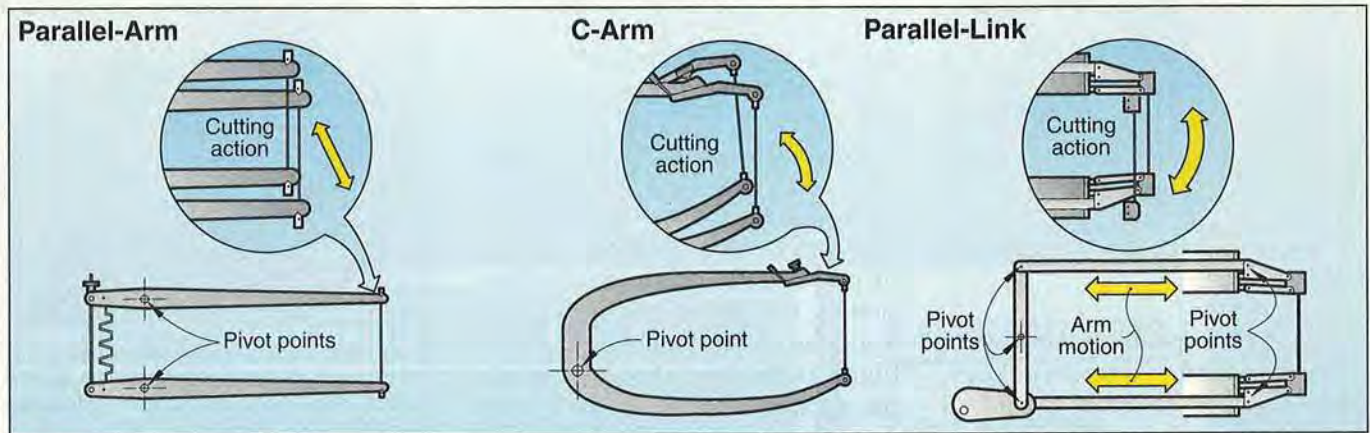
As a result, parallel-arm scrollsaws let you cut tight corners with ease and control, and without heavy stock removal. They do not cut as quickly as the following two saws.

• **C-arm.** Scrollsaws of this type consist of a rigid C-shaped frame that pivots on a single bearing. A drive shaft extending from the motor and attached to the lower arm of the C pulls the blade down at an angle, making for the most aggressive cutting stroke of the tested saws. That said, C-arms will not cut tight curves in thick stock as effectively as parallel arms. But they do excel at production work where cutting speed is important.

• **Parallel-link.** Made only by Sommerville Design under the Excalibur brand, this type features a pair of fixed parallel arms that in turn support two blade-holding linkages. These work the blade in an arching up-and-down sawing motion, causing the blade to move slightly toward the work at the middle of the stroke, and away from the work when the blade is fully raised or lowered. Because only the blade-holding linkage moves instead of the long arms, this scroll saw type vibrates little, allowing for maximum control while cutting tight, clean corners. And, though parallel links cut

SCROLLSAWS

Learn what makes a cutting-edge tool in our test of 23 models



faster than parallel-arm saws, they're not as fast or aggressive as C-arm saws.

Good performance starts with low vibration

Due to the rapid movement of the arms and drive mechanism in a scroll saw, vibration exists in every machine. In fact, some tools vibrate to the point of dramatically affecting cutting quality and control, causing the workpiece to catch on the blade teeth and jerk up and down. Of the saws we tested, the Woodtek 826398 vibrated the most due to an imbalanced crankshaft. On the other hand, the Hegner 14E and the two Excalibur models ran the smoothest when operating at full speed.

Interestingly, many other saws (such as the RBIs, the Sears and Delta C-arms, and the Hegner Multimax 18 and Multimax 22, for

instance) performed equally well when we slowed the tools down slightly. We discovered a cutting "sweet spot" on these and other variable-speed saws—that is, a speed at which the tools cut at an optimum level.

What should you watch for? For starters, try running the saw if the retailer you plan to buy it from has a floor model. Unless a well-timed counterbalancing weight or action exists in the linkage, you'll feel a vibration transferring through the entire saw. Loosely fitting parts in the arm/motor linkage result in the same poor performance.

Provide a solid base

In addition, an improperly tensioned blade, poorly assembled tool, or wobbly stand can cause a tool to shake. Assuming that the first two problems are quick fixes, we'll focus on the third.

Fortunately, you can dampen much of a tool's vibration by supplying a firm base. With benchtops, simply attach your tool to a $\frac{3}{4}$ "-thick rectangle of plywood. Then, place a same-sized piece of carpet pad beneath the plywood, and clamp (or bolt) the assembly to a rock-solid workbench with leg support directly beneath the saw. (Avoid mounting the saw in the middle of the bench where the benchtop may have some unwanted springiness.) Better yet, build our sturdy but inexpensive benchtop scroll saw stand featured on *page 14*.

Metal stands—standard with many of the mid- and high-priced machines—come in a variety of configurations and heights. While some suit seated scrollsawyers (two of the three Hegners shown, for instance), taller models accommodate standing scrollsawyers.

Continued

Scrollsaws priced under \$300



Craftsman 236090



Delta 40-560



Dremel 1672



Dremel 1695



RBI offers a special wheelchair accessible leg package for its Hawk Ultra 226 scrollsaw.

RBI created a special stand just for wheelchaired woodworkers, shown above. Overall, we liked the three-legged stands for uneven shop floors. The rear leg on Delta's C-arm stand adjusts, letting you tilt the tool forward for more scroll-sawing comfort.

Blade installation: the quicker, the better

For scrollsawyers who make lots of inside cuts, quick blade changing is a must. Here's what to look for in this area.

• **Blade-tensioning systems.** Nothing is more frustrating than having to take several minutes to replace a broken blade or reinstall an upper blade end. Today, several manufacturers offer quick-blade-change systems so you can complete these processes in seconds.

In our tests, we preferred cam-operated tension-release levers or threaded rod-type knobs at the easy-to-reach front of the machines. Several scrollsaws feature blade-tensioning mechanisms

The wide world of SCROLLSAWS

at both the front and rear locations. With these, you first use rear tensioning when installing a new blade. Then, when making inside cuts, you simply work only with the front quick tension-release system to rapidly disengage and reengage the top of the saw blade.

Heading the class in ease of blade changing was Excalibur's EX30, shown *right*. It impressed us that the upper clamp didn't rotate out of place while clamping and tensioning the upper blade end. The upper arm also lifted up for handy blade threading through work-piece blade start holes. In a close second were the Deltas; the RBIs and Hegner's Multimax 22 tied for third place.

• **Blade-clamping systems.** These consist of two metal blocks that tighten down on the flat, straight ends of plain-end scrollsaw blades. Most of the tested saws feature this system. One, however, employs only pin-type blades—blades with small metal pins running through their ends. Here, the blade-holding systems amount to springy metal forks or grooved arm ends that the blade pins rest in once fully tensioned. You'll note in our chart that some saws provide the holders needed to use both blade types.

Why is this important? If your scrollsawing interests lie solely in cutting out patterns or making large interior cuts, a pin-type blade system may be just what the doctor ordered. But, though pin-type blades change quickly and easily,



Excalibur's cam-operated tensioning lever and thumbscrew-action blade clamp help you install upper saw-blade ends quickly.

their blade ends require at least a $\frac{3}{16}$ " blade start hole. That would make them a poor choice for fine fretwork. By contrast, plain blades come in a much broader range of tooth patterns and sizes (and slightly lower prices). In the plain-end type you can buy fine blades for delicate materials, those with reverse teeth at the bottom for avoiding chipout, and blades for cutting glass, bone, and metal.

Blade types aside, blade clamps remain at the heart of any quick-blade-changing system. These systems include levers or thumbscrews that open and lock the clamps in seconds. Those not considered quick-blade-change machines typically have setscrews in the blade clamps. These systems require one or two tools to install the blade ends, a task that devours precious time, especially when making inside cuts.

Scrollsaws priced under \$300 *Continued*



Grizzly G1257



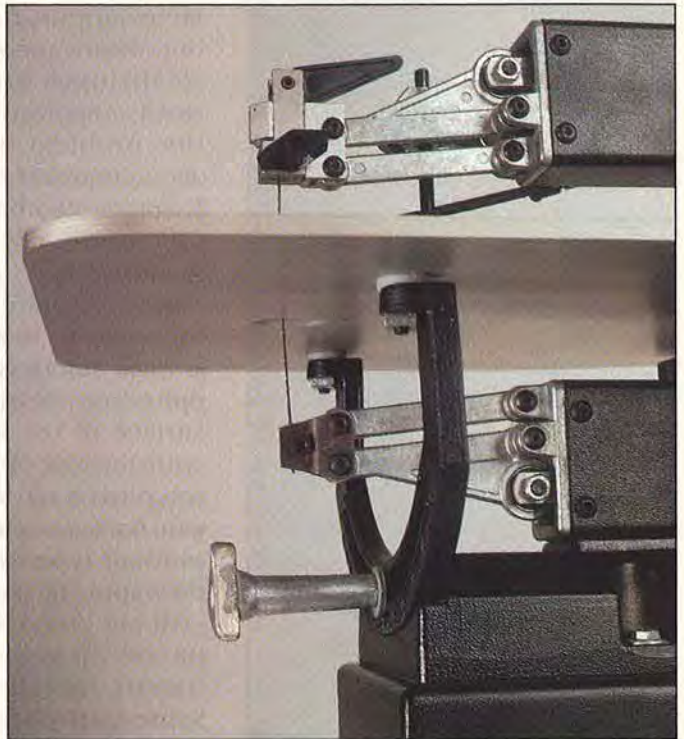
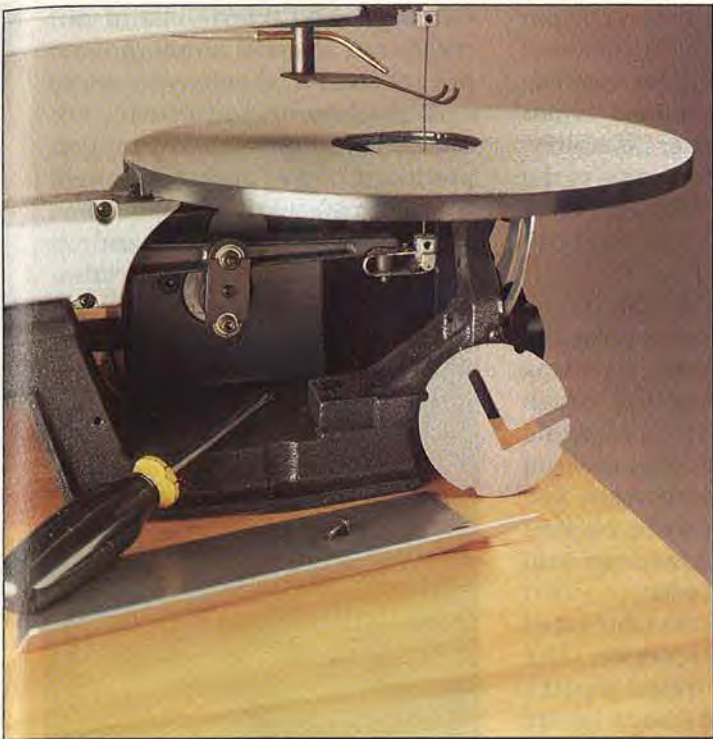
Grizzly G1572



Grizzly G1060



Skil 3333



With some of the lower-priced scrollsaws, such as the Dremel *left*, you need to remove a side cover to get at the lower-blade clamp. The Excalibur's lower-blade clamp, shown *right*, is exposed and easy to reach when changing blades.

Perhaps most irritating of all are those machines that make it difficult to install the lower blade ends beneath the saw tables. With the low-price-range Dremels, the Ryobi SC160, and the Skil 3333, you have to remove side-mounted covers and work in a confined space—a tough task for those with big hands. (See photos *above*.) And with some tools, you must take the upper and lower clamps out to complete the installation.

Machines offering user-friendly lower-clamp access include the Tradesman 8350, the Sears 236090, the Grizzlys, Deltas, RBIs, Hegners, and the Excaliburs.

More features to consider

Consider these other important components to better customize your scroll saw selection.

• **Throat depth.** In our roundup, we included saws that span from a 14" throat depth (the clearance between the blade and the back of the saw where the arms connect) to 30". How much is enough?

Only you know what kinds of projects you will try. But, if you go by the sizes of scroll saw patterns found in this publication, you may find that a saw with a 16" to 18" throat depth handles most tasks. Note, too, that some saws let you turn the blade 90°, expanding your

capacity for extra-long workpieces. With regard to the actual depth of cut, the range here goes from 2" to 2 5/8".

• **Table talk.** Larger workpieces require more support and therefore a larger table. If your choices boil down to two saws equal in performance, buy the one with the larger table. The RBIs feature some of the largest tables on the market (now with improved table-locking systems); the Sears 236400, Woodtek 826398, and the Delta 40-650 also stand out for all-around workpiece support.

Manufacturers use cast iron, sheet aluminum, anodized (or

Continued



Ryobi SC160



Ryobi SC162VS



Tradesman 8350



Tradesman 8365

The wide world of **SCROLLSAWS**



A roughly finished table surface like that of the Sears C-arm, *top photo*, can cause resistance when cutting a work-piece. The smooth surface of the Hegner saw, *bottom photo*, avoids this problem.

coated) aluminum, and alloy aluminum for scroll saw table construction. While the sheer weight of a cast-iron table helps dampen vibration, the table surface needs to be coated with wax to prevent rusting. By contrast, aluminum

tables do not rust; they are light but when uncoated can leave a small black streak on cutting stock. Anodized aluminum avoids this problem. Harder, tougher, alloy-aluminum tables, such as the Hegners, combine the rigidity of cast iron with an ultra-smooth work surface.

Keep in mind that table finish becomes an issue only when the surface interferes with a cutting operation. (Compare the rough surface of the Sears C-arm table with the smooth Hegner table in the photos *left*.) Fortunately, you can fix a rough surface by first sanding it smooth, wiping, and then applying paste wax.

All but one scroll saw table tilted to 45° in one direction. The Grizzly G1060 stopped at 30°. Some tools, as indicated in the chart, tilt to the left *and* right for trouble-free bevel cutting.

• **Air blowers.** Every saw features a device for blowing sawdust from the cutting area. Usually, these consist of a bellows, an air hose, and, in some cases, a nozzle. Delta's model 40-650 delivered the strongest air jet, and we especially liked systems that blow dust sideways—not at you. These tools were the ones with an adjustable metal nozzle extension at the end of the air hose.

• **Things electrical.** All of our scroll saws showed ample power, but differed in motor type, speed options, and switches. For instance, those with DC motors produced power and torque right from the start; they maintained power cutting thick stock, and yet could operate at very low speeds.



The most innovative saw in the bunch, Delta's 40-650, introduces a convenient above-table switch that couples an on/off rocker with a variable-speed dial.

Scrollsaws priced between \$300 and \$799



By contrast, tools with AC induction motors slowed markedly under heavy loads. At low speeds, AC variable-speed saws showed limited power when challenged. Universal motors provide basic service, while their close cousins, the permanent-magnet motors, offered more reliable variable-speed performance.

Related to this, variable-speed scrollsaws have an edge over one- and two-speed saws. Though for most cuts in wood, one- or two-speeds do the job reasonably well, variable-speed tools give you superior cutting control. They lead the pack at cutting thin stock, metal, glass, and making fine cuts.

Scrollsaw switches take the form of a lever or toggle, a rocker switch, and a rotary dial. (The 19" Excalibur uses an in-line switch located in the cord.) With some rotary dials, you simply pull out the dial to start the saw. Others combine a dial with an on/off toggle or rocker. While some switches seemed out of the way, the most convenient switch of all belongs to Delta's variable-speed C-arm shown *left*. Its above-table location proved to be a real plus.

Our recommendations

In every price range, we found standouts and value leaders. The

costlier tools tend to offer more desirable features—deeper throats, less vibration, variable speed, and superior blade-changing systems.

In the under \$300 benchtop class, we like Delta's two-speed 16" scrollsaw, model 40-560, for its up-front lever-action blade clamp and lever tensioning system. The tool's table provided all-around support, and the cutting quality, though slightly aggressive, impressed us.

For best value, we give the nod to Grizzly's G1060 and the Sears 236090. The Grizzly is the only tool in this price range that features a 22" throat depth. And though its table is small, it serves most needs. Spend another \$30 for an updated aftermarket blade-clamp system from Seyco (see the phone number in the chart on the *following pages*) and you'll have a real winner.

We placed the Sears tool in the same boat because it offers variable speed, a quick-blade-change system, and ran admirably well. All of this for only \$160!

Every tool in our mid-priced range (\$300-\$799) comes with a stand, except for the Hegner Multimax 14E. (The stand shown with the 14E *below left* is optional.) In a tight race, however, this

tool outperformed the competition. Small table aside, it proved to be the smoothest-running saw in the test. That, coupled with a high-quality quick-blade-changing system, made it the ideal tool for fine cutting work such as that found in marquetry.

The innovative Delta 40-650 takes home the top-value award in the entire test group. Its stand adjusts, letting you tilt the DC-motored saw forward for more convenient cutting. The lightweight, graphite C-arm kept vibration to a minimum while the up-front quick-blade-change system made inside cuts a breeze. Also, only the Delta 40-650 offers an easy-access above-table switch and variable-speed dial.

In the over \$800 range, nothing topped Excalibur's EX30. For its smooth, clean operation, quick blade changing, and 30" throat depth, it owns the spotlight. Our tester, along with our staff project builders, praised the way the upper arm lifts so you can quickly and easily feed the blade through a blade start hole for inside cuts.

Finally, after a lively debate, we chose RBI's model 220V as our top-value award winner. It offers quality performance and a wide range of desirable features at a fair price. There were, however, several very close runner-ups. ♣

Continued

Scrollsaws priced over \$800



The wide world of SCROLLSAWS

SCROLLSAWS FROM \$100 TO \$1300

PRICE RANGE	MANUFACTURER/ IMPORTER	MODEL	ARM TYPE (1)	MOTOR			CAPACITY (INCHES)			TABLE			PERFORMANCE (8)				
				AMPS	SPEED (2)	TYPE (3)	THROAT DEPTH	MAXIMUM DEPTH OF CUT (4)	STROKE LENGTH (5)	MATERIAL (6)	SIZE W X L (INCHES) (7)	TILT RANGE LEFT/RIGHT (DEGREES)	TABLE QUALITY	VIBRATION	EASE OF CHANGING BLADES	EASE OF UPPER BLADE CLAMPING FOR INSIDE CUTS	EASE OF LOWER BLADE CLAMPING (ACCESS)
\$0 - \$300	DELTA	40-560	PA	1.2	2	IND	16	2	3/4	CI	11 3/4 R	45L	G	G	G	E	G
	DREMEL	1672	PA	1.7	2	UNIV	16	2	7/8	AL	12 R	45L	F	F	F	G	F
		1695	PA	1.2	VAR	PM	16	2	13/16	AL	12 R	45L	F	G	P	F	P
	GRIZZLY	G1572	PA	1.6	1	IND	15	2	3/4	CI	7 3/4 x 17	45L	G	F	G	G	E
		G1257	PA	1.7	VAR	UNIV	16	2	5/8	CI	8 x 14 1/2	45L	F	F	G	F	G
		G1060	C	2.5	1	IND	22	2	11/16	CI	8 3/4 x 17 3/4	30L	F	G	F	P	E
	RYOBI	SC160	PA	1.6	1	IND	16	2	3/4	CI	10 x 15	45L	F	G	G	F	F
		SC162VS	PA	1.2	VAR	PM	16	2	13/16	AL	10 3/4 x 14 1/2	45L, 18R	G	F	F	F	G
	SEARS CRAFTSMAN	236090	PA	1.2	VAR	PM	16	2	7/8	AL	12 SQ	45L	F	G	G	G	F
	SKIL	3333	PA	1.6	1	IND	16	2	7/8	AL	10 x 16 1/4	45L	F	F	F	G	F
TRADESMAN	8350	PA	1.6	1	IND	15	2	7/8	CI	7 3/4 x 17	45L	G	F	G	G	E	
	8365	PA	2.0	VAR	IND	16	2	3/4	CI	8 x 14 1/2	45L	F	G	G	G	F	
\$301 - \$800	DELTA	40-650	C	1.3	VAR	DC	18	2 1/8	7/8	CI	16 1/2 R	15L, 45R	E	E	G	E	G
	HEGNER	MULTIMAX 14E	PA	2.8	1	UNIV	14	2	5/8	ALAL	7 x 15 1/4	45L	E	E	G	G	E
	RBI	HAWK 216	PA	2.0	VAR	IND	16	2 1/8	7/8	AL	10 1/2 x 18	45L + R	E	G	G	G	G
	SEARS CRAFTSMAN	236400	C	1.3	VAR	PM	20	2	7/8	CI	16 square	35L, 45R	F	G	G	G	G
	WOODTEK	826398	PA	2.2	5*	IND	21	2	1	AL	14 1/2 x 22 1/2	45L, 15R	E	P	F	P	G
\$801 - \$1300	EXCALIBUR	EX19SD	PL	5.4	3**, **	IND	19	2 1/2	3/4	AAL	12 x 17 1/4	45L + R	E	E	E	G	E
		EX30	PL	3.0	VAR	DC	30	2 1/2	3/4	AAL	12 x 17 1/4	45L + R	E	E	E	E	E
	HEGNER	MULTIMAX 18	PA	2.8	VAR	IND	18	2 3/8	5/8	ALAL	9 x 17	45L, 12R	E	G	G	G	E
		MULTIMAX 22	PA	2.8	VAR	IND	22	2 3/8	5/8	ALAL	9 x 17	45L, 12R	E	F	G	G	E
	RBI	HAWK 220 ULTRA	PA	1.5	VAR	DC	20	2 5/8	7/8	AL	14 1/2 x 22 3/4	45L + R	E	G	G	G	G
		HAWK 226 ULTRA	PA	1.5	VAR	DC	26	2 5/8	7/8	AL	14 x 22 3/4	45L + R	E	G	G	G	G

NOTES:

- (C) C-arm
(PA) Parallel arm
(PL) Parallel link
- (*) Requires belt change
(**) Also available as variable speed
(VAR) Variable speed
- (DC) Direct current
(IND) Induction
(PM) Permanent magnetic
(UNIV) Universal

- Per manufacturer
- As measured
- (AAL) Anodized aluminum
(AL) Aluminum
(ALAL) Alloy aluminum
(CI) Cast iron
- Overall measurements/shapes
R = Round SQ = Square

- E** Excellent
G Good
F Fair
P Poor
- Requires no tools

- (FT) Front top
(LR) Lower rear
(RT) Rear top
- (P) Accepts pin-type blades
(PL) Accepts plain-end blades
(PPL) Accepts pin-type and plain-end blades

- (BG) Blade guard
(BL) Blower
(BS) Blade storage
(H) Hold-down
(HA) Hold-down that adjusts to table angle
(VP) Vacuum port
(S) Stand

STANDARD FEATURES							OPTIONAL ACCESSORIES (14)	WARRANTY (YEARS)	COUNTRY OF ASSEMBLY (15)	WEIGHT (POUNDS)	SELLING PRICE (16)	COMMENTS
QUICK RELEASE BLADE CLAMPS (9)	QUICK TENSION RELEASE	TENSIONING LOCATION (10)	BLADE TYPE (11)	OTHER (12)	SWITCH (13)							
Y	Y	FT	PL	BL, HA	A, R	B, FS, ML, S	2	T	47	\$ 200	The only machine with a levered quick-change blade holder in this price range. Cuts aggressively.	
N	Y	RT	PPL	BG, BL, H, VP	A, R	B, ML, S	2	T	45	170	This two-speed saw offers quick tensioning and upper blade end clamping.	
N	N	RT	PPL	BG, BL, H, VP	B, ROT	B, ML, S	2	T	40	240	Variable speed, adjustable hold-down, plus uses both pin-type and plain-end blades.	
N	N	RT	P	BL, H	L*	B	1	T	37	110*	Solid basic tool at an extremely low price.	
N	N	LR	PPL	BG, BL, HA	B, ROT	--	1	T	40	170*	Poor blade-tensioning location, but scores points for variable speed.	
N	N	RT	PPL	BG, BL, HA	L*	--	1	T	60	160*	Very low vibration and deep throat make this C-arm stand out in the low-price range.	
Y	N	LR	PPL	BG, BL, BS, H, VP	L	QRBC	2	T	44	150	Lower blade holder hard to reach; built-in blade and tool storage.	
N	Y	FT	PPL	BL, BS, HA, VP	B, ROT	QRBC	2	T	24	170	Some vibration, but offset by quick tensioning and variable speed.	
Y	N	RT	PPL	BL, BS, HA	B, ROT	B, FS, S	1	U	35	160	A smooth-running variable-speed tool with an adjustable hold-down and quick-blade-change system.	
N	Y	RT	PPL	BL, BS, HA, VP	A, L	ML, S	2	T	43	140	Quick blade-tensioning and clamping system, along with a vacuum port.	
N	N	RT	PPL	BL, H	L	--	5	T	40	100	A starter saw with some helpful features.	
N	N	LR	PPL	BG, BL, HA	B, ROT	--	5	T	41	160	Rear blade tensioning not preferable, but a respectable variable-speed beginner saw.	
Y	Y	FT	PL	BL, HA, S	C, R	B	2	U	90	480	The most innovative tool in the test; loaded with features, plus smooth performance.	
N	N	RT	PL	BL, H	R	B, FS, ML, QRBC, S	6	G	30	600*	Limited throat depth, but excels at precision work.	
N	Y	RT	PL	BL, H, S	C, ROT	B, DT, FS, ML, W	5	U	69	790*	Nicely finished table, some vibration at top speed, but generally a fine tool. Blade changing requires a tool. Effective, new table-locking system.	
N	N	FT	PPL	BL, BS, HA, S	B, ROT	B	1	T	143	450	A very aggressive C-arm that excels at production work.	
N	N	RT	PL	BG, BL, S, H	R	B, BH, MB	1	T	85	350*	Unwanted vibration, but a large table and stand for the money.	
N	N	RT	PL	BL, HA	IL	DK, FS, ML, QRBC, S, TAL	5	C	65	830*	A smooth, powerful machine with many good points. Can be equipped with quick tensioning and lever-action blade clamps. Motor purchased separately.	
Y	Y	FT	PL	BL, HA, S	ROT	DK, FS, TAL	5	C	70	1200*	30° parallel-link arms keep vibration nil. This saw features the best blade-changing system in the lot. The lift-up arm for inside cuts is a real bonus as well.	
N	Y	RT	PPL	BL, H	C, ROT	B, FS, ML, QRBC, S	6	G	54	1100*	Another precision saw with variable speed, good blower, and easy tensioning.	
N	Y	RT	PL	BL, H	C, ROT	B, FS, ML, QBH, S	6	G	70	1300*	This deep-throat scrollsaw vibrates slightly at top speed. Still, a good saw, though at a premium price.	
Y	Y	FT	PL	BL, H, S	C, ROT	B, DT, FS, ML, W	5	U	93	990*	Good all-around scrollsaw with desirable features and quality performance.	
Y	Y	FT	PL	BL, H, S	C, ROT	B, DT, FS, ML, W	5	U	107	1140*	Big table, quality quick-blade-changing system, two-position blade holders, new table-locking system—this tool has much to offer.	

13. (A) Twin switches
 (B) Push/pull
 (C) Separate speed and power
 (R) Rocker
 (IL) In-line cord
 (L) Lever
 (ROT) Rotary
 (*) Indicates removable safety switch

14. (B) Blades
 (BH) Blade holders
 (DK) Drill kit
 (DT) Drip-tank system for cutting glass
 (FS) Foot switch
 (ML) Magnifier light
 (MB) Mobile base
 (QRBC) Quick-release blade clamp
 (S) Stand
 (TAL) Pedal-operated top arm lift
 (W) Wood

15. (C) Canada
 (G) Germany
 (T) Taiwan
 (U) United States
 16. *Mail-order tool; shipping will be added to the selling price.

MANUFACTURERS' PHONE NUMBERS:

Delta 800/438-2486	Hegner 800/322-2226	Skil 312/286-7330
Dremel 414/554-1390	RBI 800/487-2623	Tradesman 800/243-5114
Excalibur by Sommerville 800/357-4118	Ryobi 800/525-2579	Woodtek 800/645-9292
Grizzly 800/541-5537 (West) 800/523-4777 (East)	Sears 800/377-7414	Seyco 800/462-3353

Written by Jim Harrold Technical consultant: Dave Henderson Photographs: Dean Tanner Illustrations: Kim Downing

Turned tops enhance glassware's glamour

SHOW

Looking for a great evening at the lathe? You can't miss with these quick, fun, and practical toppers for cork stoppers. See the Buying Guide for our source of glassware and corks.

Project Prep

Stock: Turn the lids, stoppers, or cruet stand from domestic or exotic hardwoods. Blank sizes are:

Jar lids 1×2×2"

Stoppers 1¼×1¼" stock,
2–3½" long

Large stoppers . . . 1½×1½×2"

Twin-cruet stand . . 2×5½×5½"

Lathe equipment: 3–4" faceplate, live (rotating) tail center, jaw chuck (if available).

Turning tools:

¼" and ½" spindle gouges

½" and 1" skewers

⅜" parting tool

Lathe speeds:

Roughing: 500–800 rpm

Finish-turning: 1000–1200 rpm

TWIN-CRUESET (See page 61)



LET'S GET GOING WITH THE JAR LIDS

Turning a jar lid calls for gluing the blank to a wasteblock, turning a recess in the bottom, parting it off, then completing the lid on a jam chuck. A fixture that serves as both a wasteblock and a jam chuck eliminates a lot of faceplate changing. Here's how to build the two-in-one fixture.

First, trace around your 3" (or thereabouts) faceplate onto a piece of 1½"-thick stock (2× softwood lumber works great). Bandsaw the disc, then screw it to the metal faceplate. Use screws long enough to penetrate about ¾" into the wooden disc.

Mount the assembly on the lathe headstock. True the side and face with a gouge, then flatten the face with a scraper. Form a tenon tapering to a 2"-diameter face, similar to the one shown *below*.



Glue the lid blank to a wasteblock, getting it as close to centered as possible.

Mount the lid blank

Start with 1×2×2" stock. You can use practically any wood; we even laminated scraps of ¼"-thick Baltic birch plywood for one blank.

Draw diagonal lines to locate the center of the face that will be the top of the lid. Draw a 2"-diameter circle around the center. (Open your compass to 1".)

Now, glue the blank to the tenon on the lathe fixture, centering the tenon inside the circle. Woodworking

BOTTLE STOPPERS (See page 60)



STOPPERS

glue, epoxy, or instant glue (cyanoacrylate, or CA, adhesive) would work for this.

To attach the blank with CA adhesive, first spray a mist of accelerator on the end of the fixture's tenon. While that dries, put a few drops of gap-filling CA adhesive inside the circle on the blank. Then, press the blank onto the tenon, holding it for a few seconds while the glue cures.

Start on the bottom

With the blank glued to the fixture, slide the tailstock (with a live center installed) up to the workpiece. The tailstock adds support and minimizes the chances of dislodging the workpiece while you round it.

Using a gouge, turn the blank to the largest diameter possible. Then, slide the tailstock out of the way and true the blank's face with a gouge or scraper.

Measure the cork's top diameter. Draw a centered circle of that diameter on the face of the workpiece. To draw the circle easily, hold a pencil at the center of the spinning turning to make a center mark. Then, open your compass to the appropriate setting—half the circle's diameter—and lay it on the tool rest. Aim the point of the compass at the center marked on the turning, then push the pencil against the spinning turning to draw the circle.

(Our corks measured $1\frac{1}{16}$ " in diameter. Instead of setting a radius of $\frac{23}{32}$ ", we went with a slightly smaller $\frac{11}{16}$ " compass opening. This allowed us to sneak up on the correct recess diameter rather than running the risk of making it too big initially.)

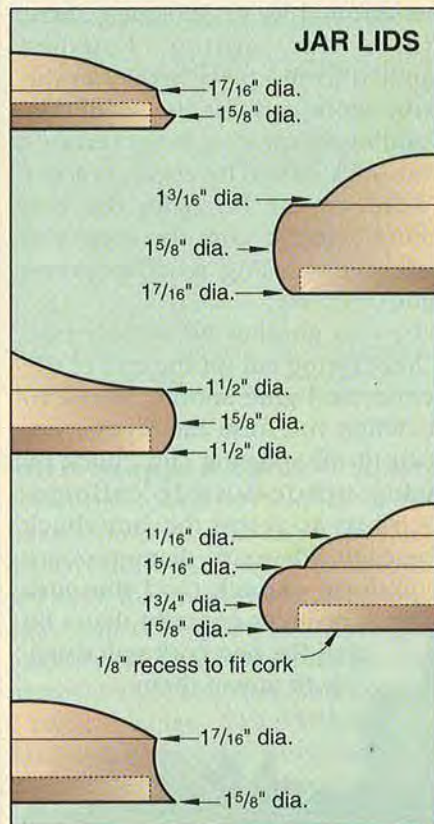
With a parting tool, cut in about $\frac{1}{8}$ " deep just inside the circle, as shown *above right*. Expand this



Establish the diameter for the cork recess with a parting-tool cut.

groove into a recess, using the parting tool or a gouge. The cork will fit into this recess, and should fit snugly. So, taking small cuts, enlarge the recess toward the layout line. Stop frequently to check the cork's fit. When you reach the right diameter, true the recess bottom to provide a good gluing surface for the cork.

Measure the recess depth; it should be in the $\frac{1}{8}$ " to $\frac{3}{16}$ " range. If it's too deep, shave a bit off the rim with a gouge or scraper.



SHOW STOPPERS

Turn the top to shape

Separate the turning from the fixture. If you attached it with CA adhesive, a sharp rap on the side with the gouge handle (or a mallet, if you insist on always using the correct tool) will often knock it loose. Otherwise, you can part it off in the usual fashion.

Now, turn the fixture's tenon to match the inside diameter of the blank's recess. This will be the jam chuck to hold the turning, so the workpiece must fit over it snugly. Reduce the diameter in small steps with the parting tool, checking the fit frequently.

Press the turning onto the jam chuck, seating it firmly so it will run true. Now, turn the top and edge profile, following one of the five designs shown or one of your own. If the turning tends to pop off the jam chuck, secure it with double-faced tape.

Sand the completed lid. (We used progressively finer sandpapers from 150- to 320-grit.) Then, finish the turning. Finishes applied to the piece while on the lathe work well for the small lids. Padding lacquer or woodturner's wax stick would be good choices.

Remove the lid from the jam chuck. Finally, glue the cork into the recess, using woodworker's glue or epoxy.

To turn another lid, simply take a light facing cut on the end of the tenon, and glue another blank to it. When you form the recess, size it to fit the existing jam chuck by using inside-outside calipers. Don't try to resize the jam chuck for each lid—cork diameters are uniform enough (and the cork itself resilient enough) that a lid that fits one cork will usually fit any of them.



neck suits you.

We thought the tops would look better with less cork showing between the bottle top and the turning. So, we cut off the corks about $\frac{1}{4}$ " above the bottle top, as shown *below*. Shorten yours or not, as you prefer.



Cut off the cork with a fine-toothed saw to bring the turning closer to the bottle.

To begin, locate the center on one end of a $1\frac{1}{4}\times 1\frac{1}{4}$ " piece of stock about $\frac{1}{4}$ " longer than the height of the stopper. Drill a $\frac{3}{8}$ " hole $\frac{5}{16}$ " deep straight into the center. (Drill the hole with a drill press for accuracy.) Glue a $\frac{3}{8}\times 2\frac{1}{2}$ " dowel pin into the hole.

Chuck the blank

Later, the cork will fit onto the dowel to complete the stopper. But for now, that dowel makes chucking the blank easy.

SPINDLE-TURN THE STOPPERS

Turn the bottle stoppers employing spindle-turning tools and techniques. Before you start, though, insert the cork firmly into the flask's opening. Then, see if the height of the cork standing above the top of the bottle

For turning, you can grip the dowel in a three-jaw or four-jaw chuck or a Jacobs-type drill chuck mounted on the headstock. If you don't have one of those, a simple shop-made fixture will do the trick. Here's how to build it:

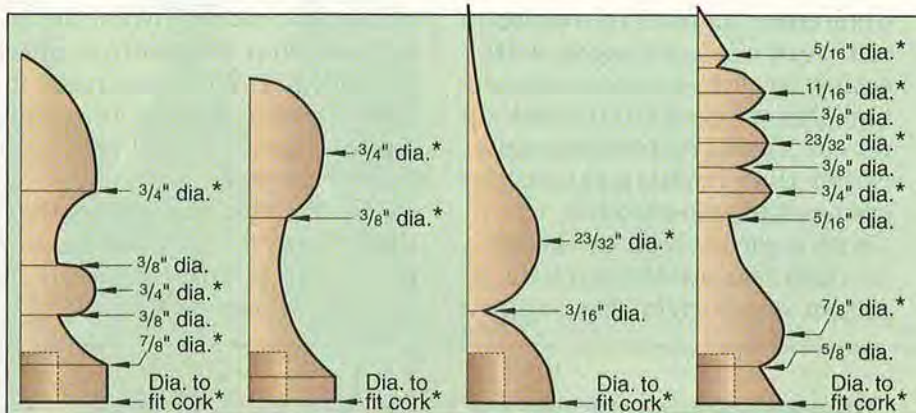
Cut a disc of scrapwood about $1\frac{1}{2}$ " thick to fit your lathe's 3" faceplate. Attach it to the faceplate with screws. (If you've already constructed the fixture described previously for turning jar lids, you can use that.)

Mount the assembly (or the previously constructed fixture) on the lathe's headstock. Turn the face and edge true, and find the center of the face. With the lathe running, you can find the center easily—just put a pencil point to the wood near what looks like the center. If it draws a circle on the face, you're not at the center. Keep trying until you get a point.

At that point, drill a $\frac{3}{8}$ " hole 1" to $1\frac{1}{4}$ " deep straight in. You can drill it with a twist drill or a gouge. Chuck the blank by inserting the dowel into the hole. (You may have to adjust the hole size; you want the dowel to fit tightly for turning, but you also want to be able to remove the piece.)

Shape the stopper

Install a live center in the tailstock, and slide it up to engage the workpiece. Then, with a gouge, round the blank to the largest possible diameter. Cutting in from the edge with the parting



tool, square the end with the dowel protruding from it.

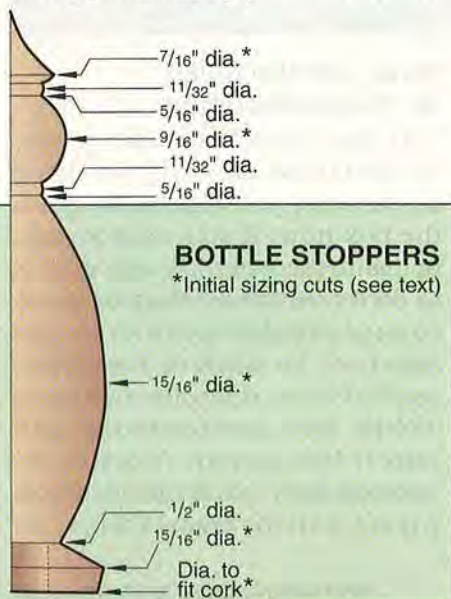
Lay out the stopper features on the blank. Here's an easy way:

Photocopy the stopper template you wish to use from the five shown *below and opposite page*. Fold it along the centerline, and lay it on the toolrest against the side of the blank. Align the bottoms of the template and blank. Then, with the lathe running, hold a pencil against the blank at each asterisked line on the template.

Determine the bottom dimension by measuring the diameter at the top of the cork. (We made some stoppers' bottoms a little larger than the cork diameter so they would overhang the corks.)

Then, with a parting tool, cut in to the specified diameter at each line and to the desired diameter at the bottom. Rough out the stopper profile, using the sizing cuts and the dimensions on the template for guidance. A small gouge and skew will do the job. Leave a connection to the waste at the top.

Finish-turn the stopper, and part off the waste at the top. Sand, and apply a clear finish. Remove the turning from the chuck, then glue the dowel into the predrilled hole in the cork. Saw off the dowel at the bottom of the cork. (We used a handsaw for safety.)



TRY THE TWIN-CRUIET SET

Dress up the twin-cruet set with a pair of stoppers and a matching stand. Turn these stoppers (templates *below right*) from 1½×1½×2" stock, following the turning procedure described previously.

Turn the cruet stand

True the bottom face of a 2×5½×5½" bowl blank. Draw diagonal lines on it to locate the center. Scribe two circles around the center, one the size of your 3" faceplate and another as large as possible, but at least 5" diameter.

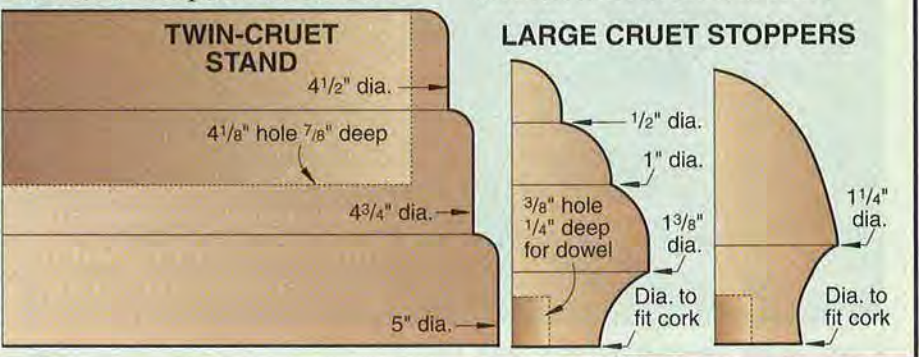
Bandsaw the larger circle. Place the faceplate inside the smaller one, and attach it to the blank with wood screws about 1" long (they shouldn't extend more than ¾" into the stock). Mount the block and faceplate on the lathe.

Round the blank to 5", using a bowl gouge. Reduce the thickness to 1¾" as you true the face.

Bore into the center about 7/8" deep with a ¾" gouge. Working from there, hollow out the center of the blank, forming a straight-sided, flat-bottomed recess 4½" in diameter. As you approach the final diameter, dismount the faceplate from the lathe. Then, check the fit of your cruet set in the recess. Remount, and adjust the depth or diameter as necessary.

Turn the outside profile, referring to the template *below*. Work from the bottom (headstock side) of the turning toward the top as you form the waterfall steps.

Sand the stand, and apply a clear finish. When dry, remove from the faceplate. Sand down the bumps created by the attaching screws. If you prefer, attach stick-on nonskid feet to the bottom of the stand or cover it with resilient material such as cork or felt. 🌿



Buying Guide

Italian glassware. Spice jars, 3", round or square, \$2.95 each; bottles, 12" tall, two styles \$4.95 each, one style \$5.95 each; single cruet, 5½" tall, \$4.95; double cruet set, 8" tall, \$19.95. Cork included with each piece. Shipping extra.

Bottle corks. Bottle-stopper corks, predrilled for 3/8" dowel. Package of 10, \$3; 50, \$12.50. Serrated dowels also available. Shipping extra.

Photographs: Hopkins Associates Illustrations: Roxanne LeMoine; Lorna Johnson

Bottle-stopper blanks. Square stock 1¼×1¼×2", available in ten species (bocote, cocobolo, padauk, zebrawood, Madagascar rosewood, bird's-eye maple, goncalo alves, bubinga, Amazon rosewood, and pau rosa). Package of five pieces, one species, \$9.95; assortment, one piece of each species, \$19.95. Shipping extra. All from Craft Supplies USA, 1287 E. 1120 S., Provo, UT 84606. Call 800/551-8876 to order, 800/398-2743 for customer service.

Sun-loving Indoor



Too often, indoor potted plants don't get all the attention they deserve. You can change that, though, by building this eye-catching planter. As you can see, its height makes it perfect for placement in front of a window.

Let's start with the basic box assembly

1 Cut the planter box front and back (A), sides (B), and bottom (C) to the sizes listed in the Bill of Materials from $\frac{3}{4}$ " oak plywood. See the box on *page 65* for our method of utilizing scrap plywood for this and other projects. See also the Cutting Diagram for layout reference.

2 Fit your tablesaw with a $\frac{3}{4}$ " dado blade, and cut $\frac{3}{4}$ " rabbets $\frac{3}{8}$ " deep along the edges of the front and back pieces (A). See the Box

drawing for reference. Now, using a $\frac{3}{8}$ " dado blade, cut grooves $\frac{3}{8}$ " deep and $\frac{3}{8}$ " from the bottom end on the inside face of the front, back, and side pieces (A, B).

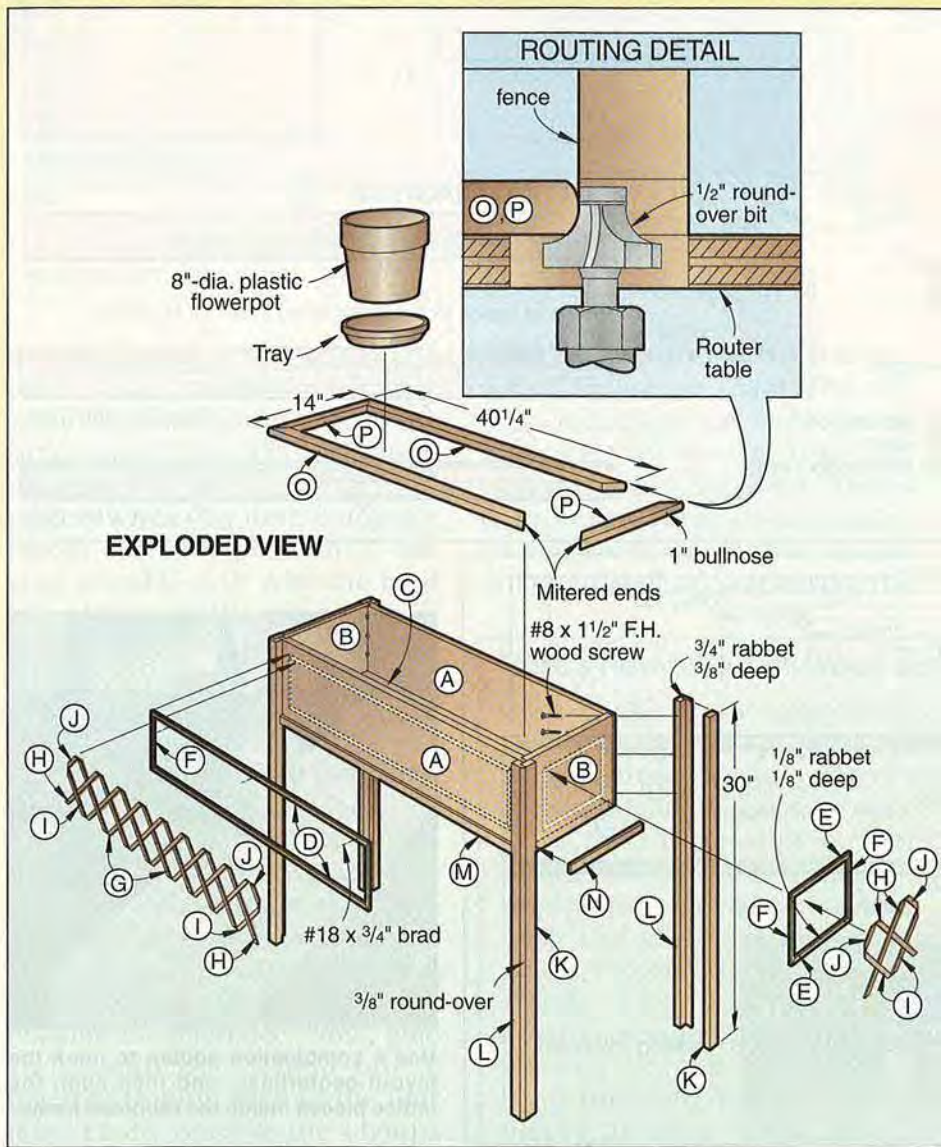
3 Cut a $\frac{3}{8}$ " rabbet $\frac{3}{8}$ " deep along the bottom edges of the bottom panel (C).

4 Dry-clamp the plywood pieces together to check the fit. Adjust if necessary, then glue and clamp the box pieces together, checking for square. Later, remove the clamps, scrape off excess glue, and sand smooth.

Now, add the finish to the plywood box

1 If you want the same white-washed finish on your plant stand as on ours, you'll need to finish the box now. If you want to stain or paint the box, it's also easiest to do it now before the lattice surround and lattice pieces are attached. To achieve the white-washed look, dilute two parts of interior latex paint with one part water. Use a cloth to wipe the watered-down paint on the wood, wiping with the grain. Then, use a

planter



Bill of Materials					
Part	Finished Size			Matl.	Qty.
	T	W	L		
BOX					
A front & back	3/4"	37 1/2"	8 1/2"	OP	2
B sides	3/4"	10 1/2"	8 1/2"	OP	2
C bottom	3/4"	36 3/4"	10 1/2"	OP	1
LATTICE SURROUND					
D* frame	1/4"	1/2"	33 5/8"	O	4
E* frame	1/4"	1/2"	7 21/32"	O	4
F* frame	1/4"	1/2"	51 3/16"	O	8
LATTICE					
G* strips	1/8"	3/8"	7 1/16"	O	28
H* strips	1/8"	3/8"	7 5/16"	O	8
I* strips	1/8"	3/8"	41 5/16"	O	8
J* strips	1/8"	3/8"	2 1/4"	O	8
LEGS					
K* legs	3/4"	1 1/8"	30"	O	4
L* legs	3/4"	1 1/2"	30"	O	4
BOTTOM AND TOP TRIM					
M trim	3/4"	1/2"	36"	O	2
N trim	3/4"	1/2"	9 3/4"	O	2
O trim	3/4"	2 1/4"	40 1/4"	O	2
P trim	3/4"	2 1/4"	14"	O	2

Length is measured with the grain.
 * Initially cut parts oversized. Then trim each to finished size according to the how-to instructions.

Materials Key: OP—oak plywood, O—oak

Supplies: #18x3/4" brads, #8x1 1/2" flathead wood screws, white latex house paint, oil-based enamel, clear finish.

clean, damp cloth to immediately wipe off most of the paint mixture. (We tried this on a piece of scrap plywood first to get the hang of it.)

2 After the paint has dried, lightly sand the surfaces of the plywood box with 220-grit sandpaper to bring back as much of the wood grain and color as desired. If you lose too much of the white-washed effect, you can always wipe on and rub off some more of the paint mixture.

Cut and nail on the lattice-surround pieces

1 From 1/2" oak stock, rip seven pieces from the edge to 1/4" wide by 36" long for the 1/4x1/2" lattice-surround strips (D, E, F).

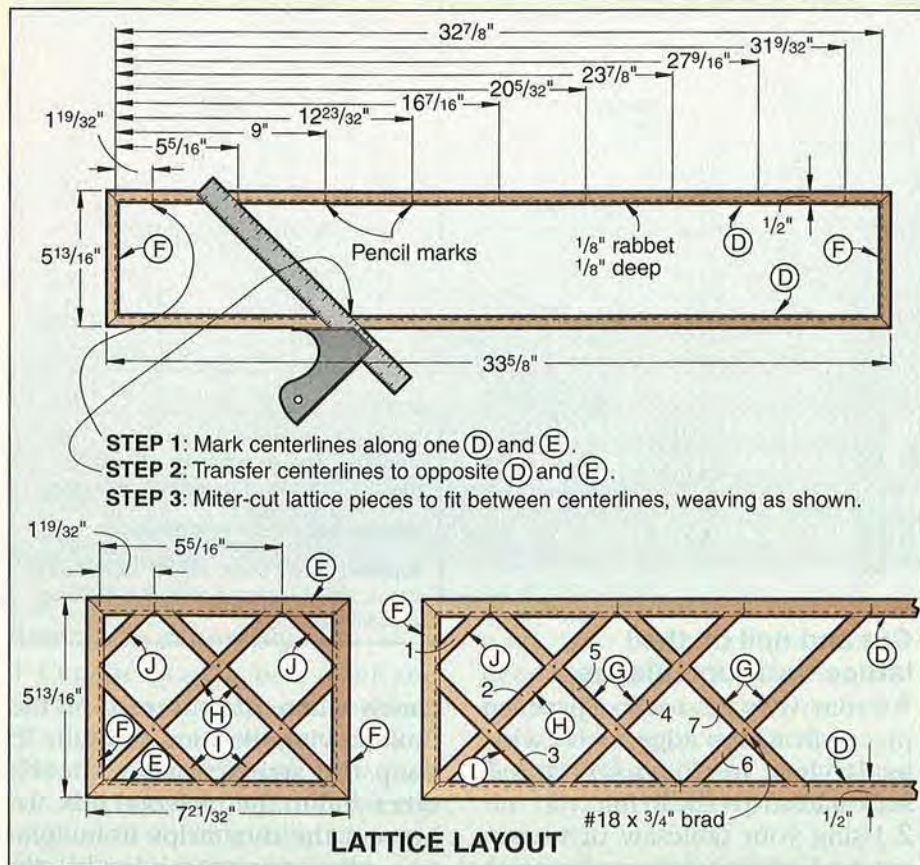
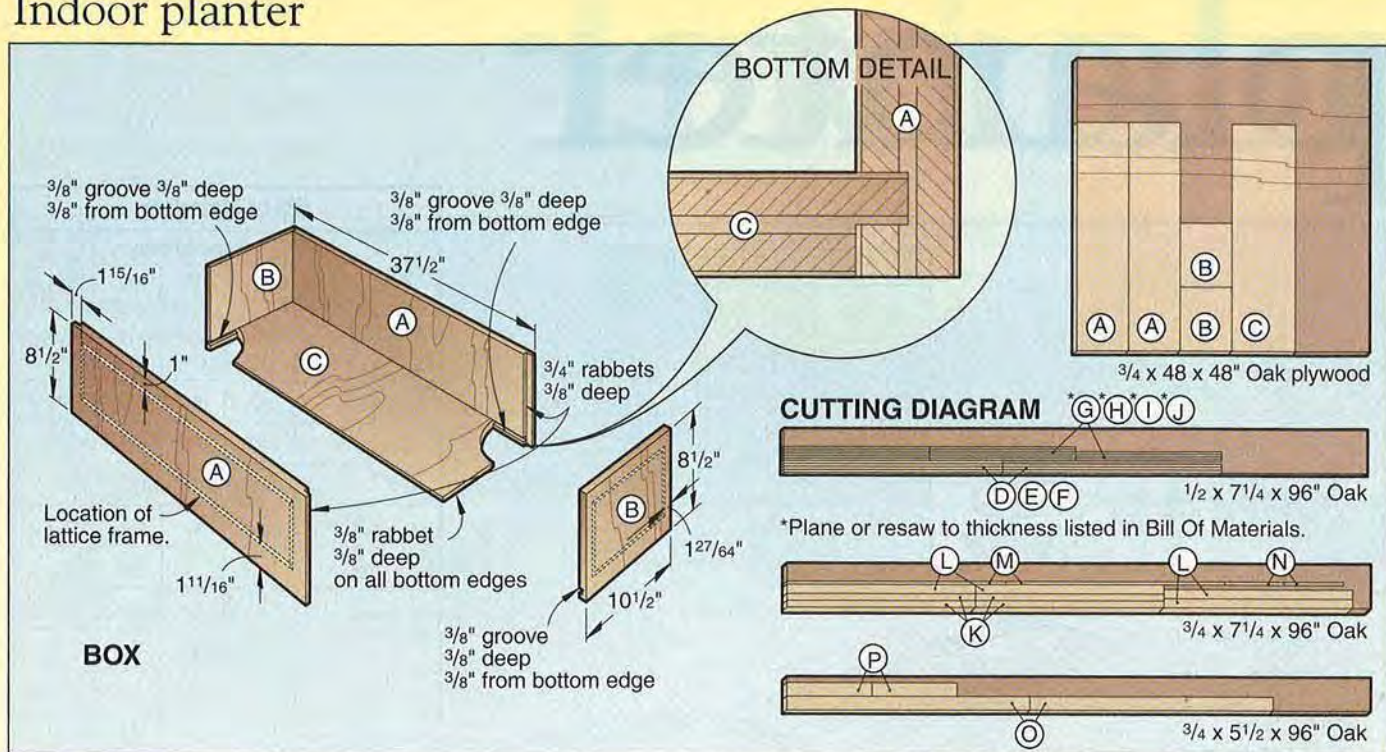
2 Using your tablesaw or router, cut a 1/8" rabbet 1/8" deep along one edge of each 36"-long strip.

3 Miter-cut the lattice-surround pieces (D, E, F) to length from the 36"-long strips. Sand the pieces smooth. Then, nail each surround piece to the front, back, and side

panels where dimensioned on the Box drawing. Position carefully to keep the strips square to each other and to the plywood box. To prevent the thin strips from splitting when driving the brads, clip the head off one of the brads, and chuck the brad into your drill press. Use the brad as a bit to drill pilot holes through the surround pieces.

Continued

Indoor planter



Use a combination square to mark the layout centerlines, and then align the lattice pieces inside the rabbeted frame.

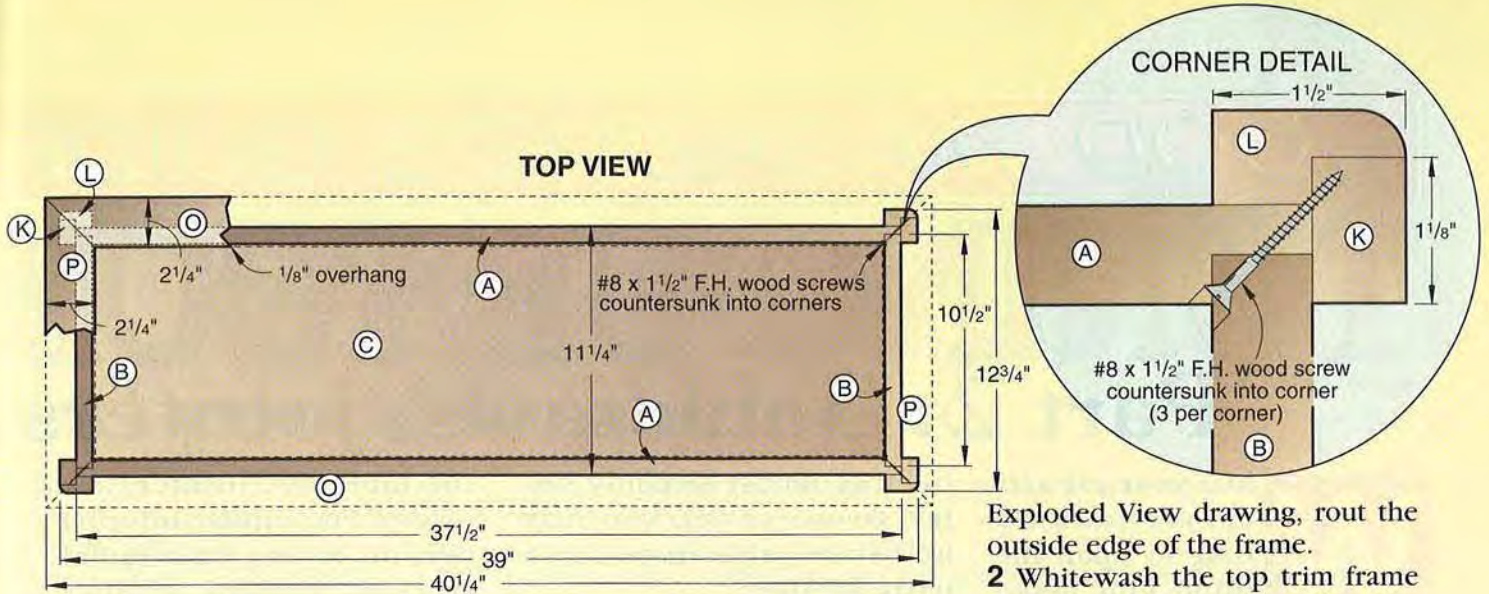
3 Apply masking tape to the top and bottom pieces of the lattice surround (D, E) on each of the four frames where shown in the photo above. The masking tape allows you to make all your pencil marks for positioning the lattice strips now. Then, you simply peel off the tape later to remove the pencil strips.

4 As noted on the three-step drawing, mark the centerlines, then weave and nail the pieces in place in the order marked on the

It's time to add the lattice

1 Rip 1/8" strips from the edge of 3/8" stock. (We planed thicker stock, and then cut 16 pieces measuring 1/8 x 3/8 x 24" each.) You'll use these for the lattice (G-J).

2 Sand the strips smooth. Use the previously stated procedure to whitewash each strip. Let the strips dry. Then, miter-cut one end of each strip.



drawing and as shown in the photo. Use a combination square as shown in the photo to keep the lattice pieces at a 45° angle from the top and bottom surround pieces. When you have the lattice pieces correctly positioned, use your portable drill with the brad pilot bit to drill a pilot hole at each point where two pieces cross. Drive the brads. The short pieces (J) are just glued in place.

Add the legs to raise the box to window level

- 1 From 3/4" stock, cut the leg parts (K, L) to size plus 1" in length.
- 2 Cut a 3/4" rabbet (or the same exact thickness as your stock) 3/8" deep along one edge of each L piece. See the Exploded View drawing for reference. Now, glue and clamp one K and one L together to form each of the four legs. Later, remove the clamps and crosscut the legs to length.
- 3 Rout a 3/8" round-over along the outside edge of each leg. See the Exploded View drawing for reference. Sand the four legs smooth, and whitewash them if desired.
- 4 With the top ends of the legs flush with the top edges of the planter box, glue and clamp the legs in place. Drill three countersunk mounting holes on the inside of the box at each corner, and drive screws through the box and into the legs to further secure the legs to the box.

Add the top and bottom trim

- 1 Cut the bottom trim pieces (M, N) to size. Then, cut the top trim pieces (O, P) to size. Glue and clamp the top four trim pieces together to form a rectangular frame. Now, as shown on the Routing detail accompanying the

Exploded View drawing, rout the outside edge of the frame.

- 2 Whitewash the top trim frame and bottom trim pieces if necessary, and then glue and clamp them in place. See the Top View drawing for reference.

- 3 Apply three coats of clear finish (we used Deft Semi-Gloss Lacquer) over the whitewashed finish. Paint the inside of the box with an oil-based enamel paint. 🌿

Here's how to put plywood scraps to good use

If you're like most woodworkers, you've got pieces of plywood lying around your shop. Here's what we did to use some of ours.

To form the panels for our planter, we cut the narrow strips of plywood to length (measured with the grain) plus 1". Then, as shown in the photo *at right*, we edge-joined the individual pieces, using C-clamps at each joint to keep the surfaces flush. We didn't use biscuit joints or

splines on our panels. If you're using the plywood in a situation where strength is important, use either. Later, we removed the clamps and trimmed the top and bottom ends to obtain the 8 1/2" final length.



Cut long, narrow pieces of scrap plywood into shorter pieces. Then, carefully edge-join the individual pieces to form wider, more usable panels.

WOOD[®] MAGAZINE'S GUIDE

TUNING UP YOUR

Part 2: Tablesaws, jointers,

When your car acts up, you know it's time to open the hood and make some adjustments. Likewise, if you don't keep your power tools in tune, the quality of your woodwork-

ing will almost certainly suffer. Or worse yet, you may be setting the stage for a nasty accident.

To prevent such occurrences, and to maximize precision performance from your tools, we've developed a trustworthy guide to keep your major power tools in tip-top shape. Here, we look at three shop stalwarts:

the tablesaw, jointer, and planer. For similar information on tuning up a radial-arm saw, bandsaw, or miter-saw, see the October 1995 issue of *WOOD[®]* magazine.

Start by gathering up your tune-up tools

You probably already have all or most of the basic tune-up tools: 8" and 12" plastic drafting triangles, a 4' level or aluminum rule, a set of SAE or metric wrenches (depending on the type of screws



TO

POWER TOOLS

and portable planers



and bolts used on your machine), spring or C-clamps, a few shingle shims, and several pieces of scrap stock. You'll also need a set of feeler gauges for checking clearances. You can buy these pocket-size sets of thin metal blades in .001" increments at auto-parts stores and some hardware stores. These sets cost only a few dollars each, so it's a good idea to have an extra set or two for use as precision shims, too.

That's the low-tech list. For greater precision, consider investing in a dial indicator, such as the A-Line-It (shown in the photo *left*). It's available for \$139.95 ppd. from In-Line Industries, 661 S. Main St., Webster, MA 01570. Call 800/533-6709.

A dial indicator measures dimensional differences as small as .001"—about one-third the thick-

ness of a human hair. Accessories that come with the A-Line-It let you configure the indicator to perform many different tasks on several machines.

For tuning up a tablesaw, or any other saw that uses a 10" circular blade, you also might want to purchase a calibration plate like the one shown in the photo *below right*. These are precision-ground blades with no teeth to get in the way of your measurements. A calibration plate also doubles as a disc sander. You can order a 10" "Set and Sand" Disc from CMT for \$24.90 plus shipping (call 800/531-5559), or a 10" "Calibration and Sanding Disk" from Freud dealers (\$38 list). Call 800/472-7307 for a nearby dealer.

To take some of the tedium out of setting the knives on a jointer, consider a magnetic setting tool such as the Magna-Set (\$27-\$70 depending on model, plus shipping, from Grizzly Imports. Call 800/523-4777 east of the Mississippi river, 800/541-5537 west of the Mississippi). We show and tell you more about these high-tech tools on the pages that follow.

Next, do a quick inspection of moving components

Before you tune up any machine, examine its belts, pulleys, and bearings. Check belts for cracks, fraying, and wear. If the top of

a belt is more than 1/8" below the edge of the pulley, replace it.

Even if the belt looks okay, remove it and inspect the pulleys. Look for a shallow groove on the pulley's inside bevel, where the belt makes contact. If you can feel a ridge between this groove and the portion of the pulley that does not contact the belt, replace the pulley. Worn pulleys shorten the life of your belts and bearings, and sometimes cause annoying vibration as well.

Finally, before you reinstall the belt, spin all bearings. They should turn smoothly and silently, with no detectable back-and-forth movement. A dial indicator can tell you the precise amount of movement. It should be 0. Up to .001" is acceptable, but keep an eye on them because any play at all causes bearings to wear faster.



Continued

TABLESAWS

As the workhorse in most woodworking shops, the tablesaw gets more use than any other stationary power tool. Properly tuned, it's also one of the most accurate machines you'll ever operate. Timely tune-ups ensure cuts that are right on the money—and promote safety by eliminating most of the causes of dangerous work-piece kickbacks.

Getting to know your saw

Tablesaws fall into three general categories: direct-drive saws, contractor's saws (pictured *right*), and cabinet saws. No matter what type you own, we'll show you how to get top performance from it. Here are the key differences between the three types:

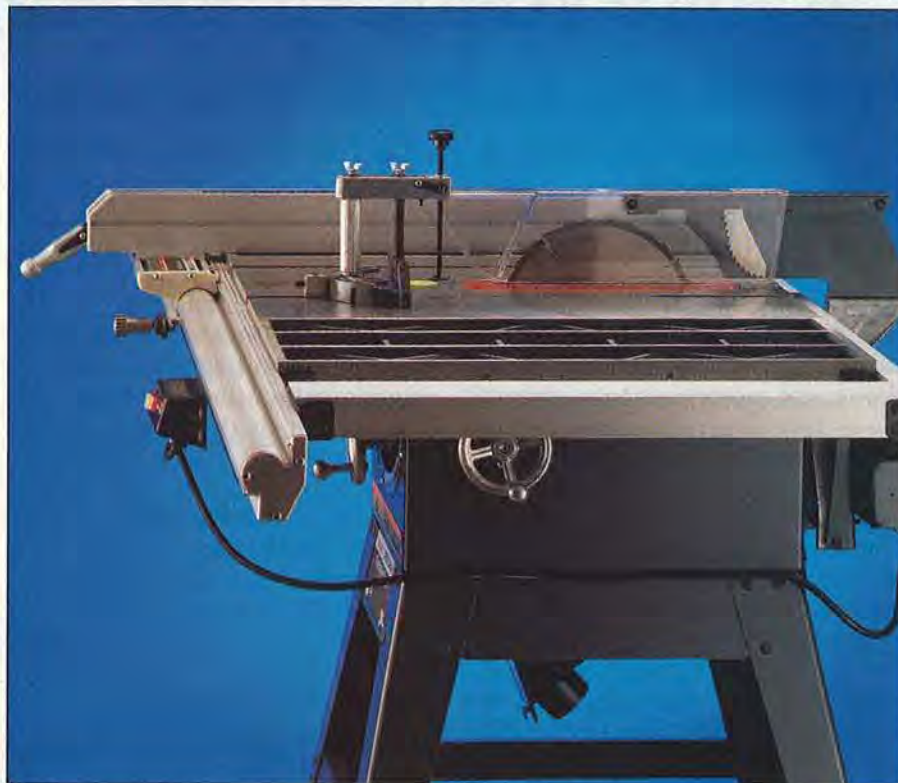
With direct-drive saws, the arbor is mounted on the motor shaft; there are no belts or pulleys. Most direct-drive saws are lightweight bench-top models.

With a contractor's saw, the motor mounts out behind the saw and drives the arbor with a single belt. A contractor's saw bolts to a lightweight frame and can be readily relocated from one part of a job site to another.

Cabinet saws connect the motor to the arbor via two or three belts and pulleys. These powerful heavyweights are a good choice for a saw that never leaves the workshop.

A few opening procedures

Begin your tune-up by unplugging the saw. Remove the blade so the blade, arbor flange, blade washer, and arbor threads can be thor-



oughly cleaned and inspected. (If you're not sure about the position of these parts, see the Aligning the Drive Pulleys drawing on the *opposite page*.) Now, rub the blade washer and nut lightly across a sheet of 320-grit abrasive mounted to a flat surface such as a piece of plate glass. Any burrs or high spots will show up as bright, shiny areas. These should be flattened with emery cloth or a whetstone.

Also check the blade's arbor hole, using a finger to feel for burrs. Remove any you find with a small whetstone. The same goes for any nicks or burrs you detect on the arbor flange.

Finally, if yours is a contractor's saw, check and tighten all of the stand's nuts and bolts. Snug them up for rattle-free performance.

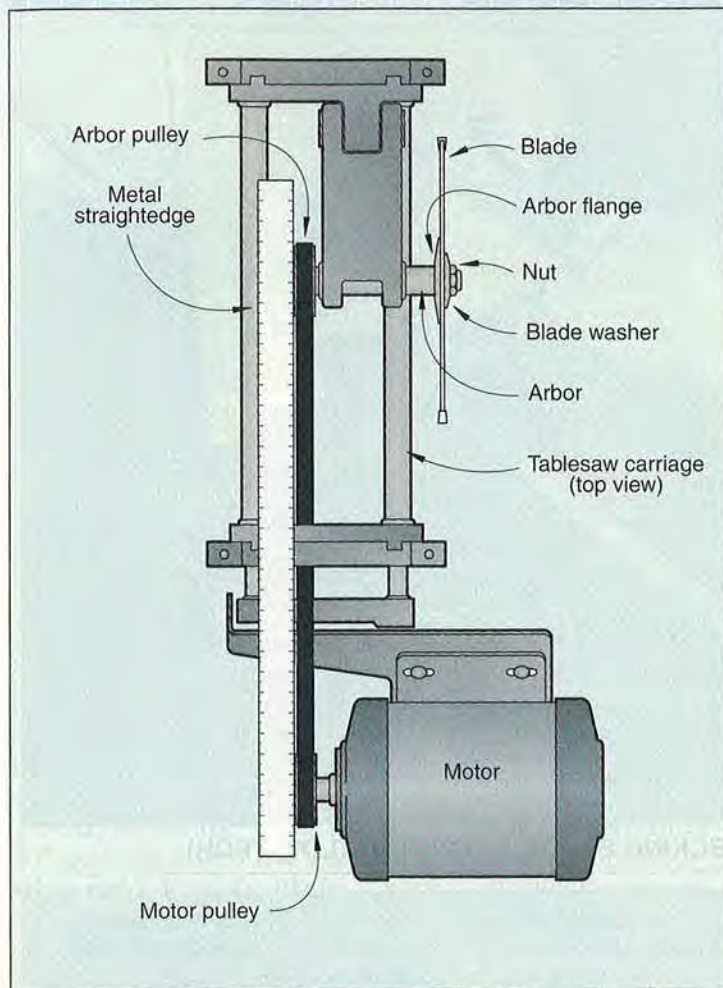
The nine steps to a perfectly tuned tablesaw

Now you're ready to get that saw in tune. Because each of these adjustments depends on the one that goes before it, make them in the order described here.

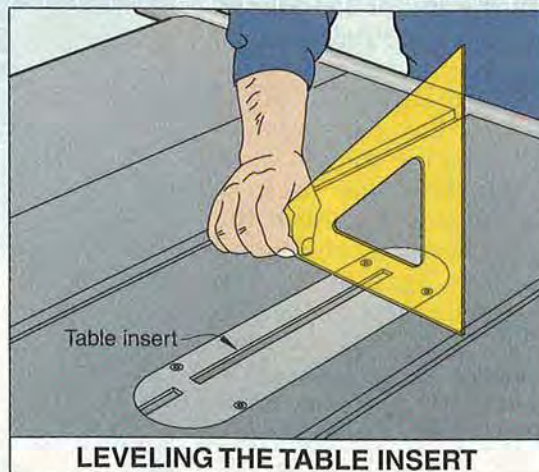
1 Align the drive pulleys

If you have a direct-drive saw, you obviously can skip this step. Multi-belt cabinet saws rarely go out of alignment, either. But contractor's models, which have a motor that hangs from the back of the saw with a long belt, are prone to vibration that transmits directly to the blade.

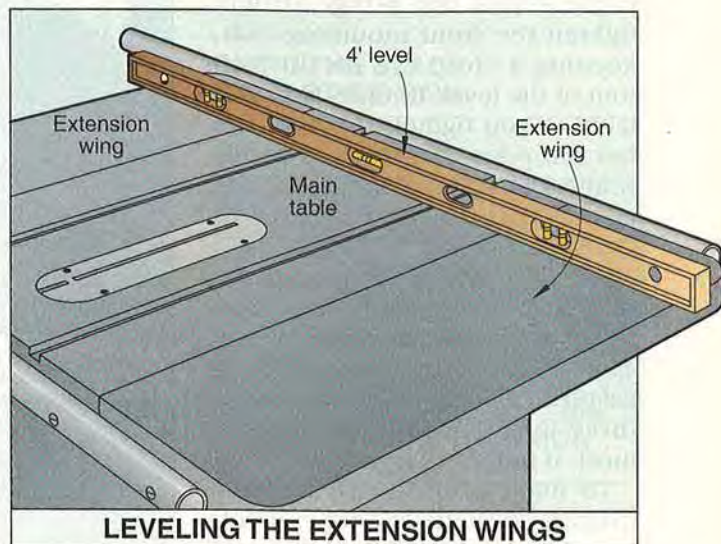
First, check the motor's pivoting base. Its job is to tension the belt, and the pivot should only be free enough to let the motor swing downward as the blade lowers



ALIGNING THE DRIVE PULLEYS



LEVELING THE TABLE INSERT



LEVELING THE EXTENSION WINGS

and upward as it rises.

Now, if space permits, lay a straightedge against the outer edges of the arbor pulley and motor pulley as shown in the drawing *above*. If both sides of each pulley touch the straightedge, the pulleys are in alignment. If one or more points of the pulleys don't make contact with the straightedge, adjust the motor or pulleys until the straightedge lies flush against both pulleys.

If you can't maneuver a straightedge into your saw, you'll have to align the pulleys by eye. Crouch behind the saw so you can sight along the belt and pulleys with your dominant eye. (Close the other one.) Once they're aligned

properly, be sure to tighten up the pulleys or motor mount.

2 Level the table insert

Now check that the table insert fits flush with the tabletop. Most inserts have four leveling screws at the corners. Turning these screws raises or lowers the insert. If your saw's insert doesn't have leveling screws, you may have to file the underside of the insert to lower it, or use layers of masking tape to raise it.

Use an 8" drafting triangle to determine if the insert is flush. With a triangle, stand it on edge at 90° to the miter slot. First, bridge the insert at the front edge, and raise or lower the insert until it

touches the triangle. Move the triangle to the rear and do the same. Finally, slide the triangle over the entire insert. If you feel it catch, lower the insert some more.

3 Level the extension wings

For accurate cuts and controlled handling of large workpieces, your table saw's extension wings should be perfectly flush with the table. Check this with a 4' level as shown *above*.

If they're not flush, you'll need the level, a fine file or 220-grit sandpaper, a spring or C-clamp, and a set of feeler gauges you can use for shims.

Begin by removing the wings

Continued

TABLESAWS

and, with the file or sandpaper, gently radiusing the top edges of the saw table and wings. This removes sharp edges and burrs. Also sand off any paint on the mating edges of the wings.

Now, bolt the wings back on the saw, but don't tighten the bolts all the way. Let the wings sag, with a $\frac{1}{16}$ " gap at the top where the wings meet the table.

Place the level across the front edge of one wing and the table-top. Clamp the level to the extension wing at the outer edge. Pushing the level flat against the table aligns the wing. Slowly tighten the front mounting bolt, keeping a close eye on the bottom of the level. If it lifts from the table as you tighten the bolt, the bottom edge of the wing needs shimming; if a gap appears at the center of the level, you need to shim the top edge.

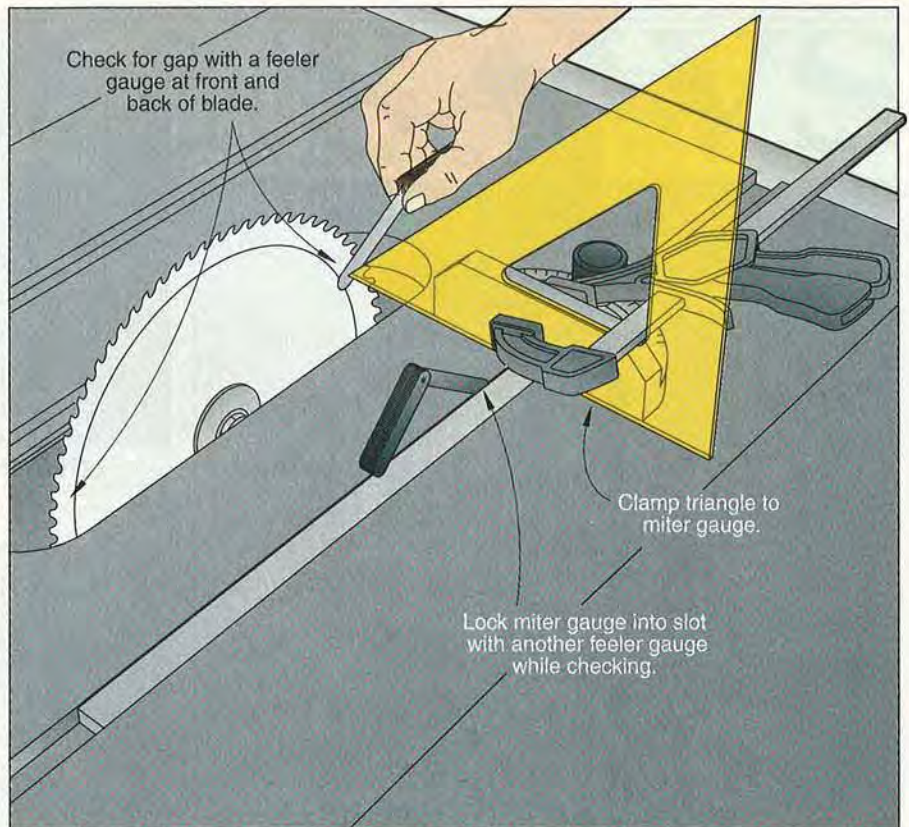
Check at a minimum of three points along each table edge. You need to do this because wings can bow along their length (even cast-iron ones). By shimming at three locations you can remove most, if not all, of any bow.

To make shims, insert feeler gauge blades one at a time directly above or below the bolt. Tighten and check the alignment. It may take some trial and error to find the right thickness. Once you do, cut enough $\frac{1}{4}$ "-long pieces of the blade to fit above or below all the wing bolts. Repeat this process with the other wing.

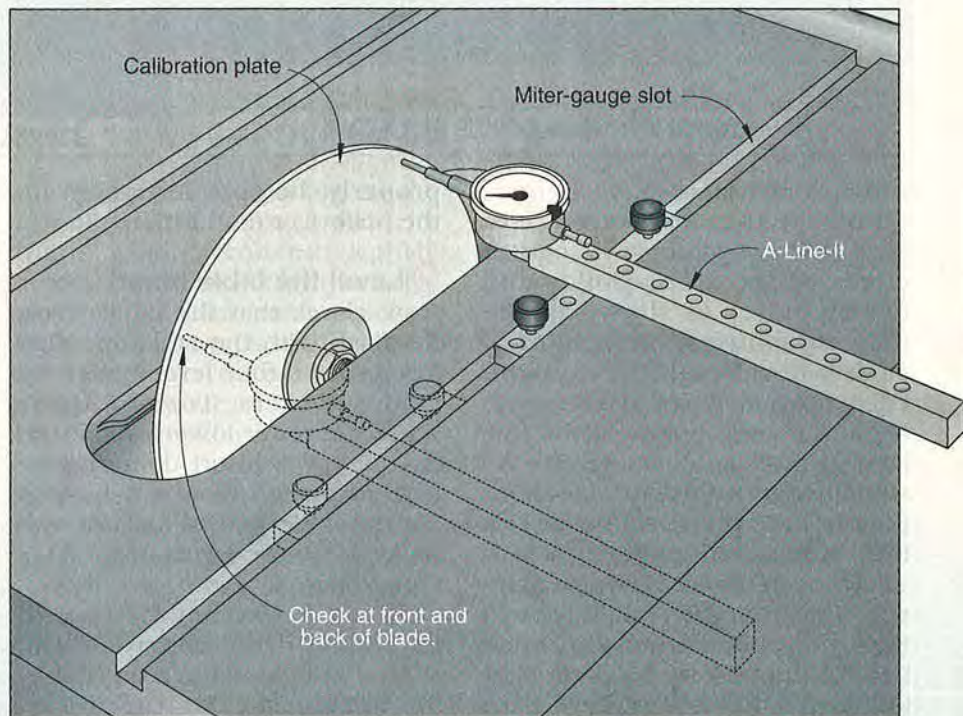
4 Check the blade for alignment with miter slots

For a saw to accurately crosscut and rip, its blade must precisely parallel the miter slots. A misaligned blade will force work into or away from the blade, causing burning or kickbacks.

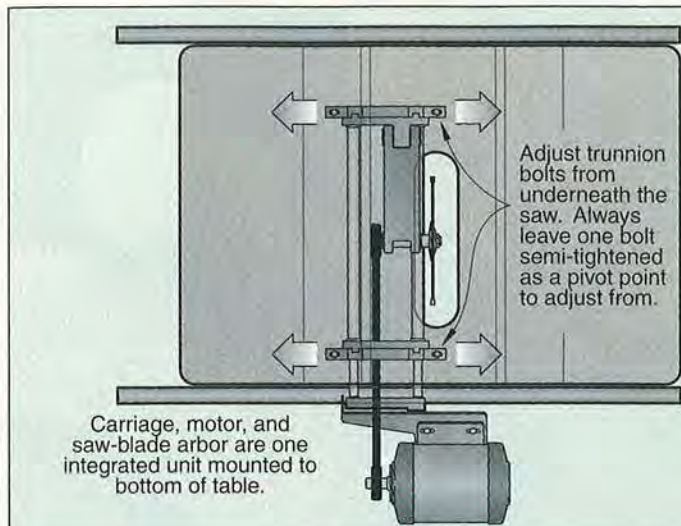
To check your blade's alignment, remove the guard and splitter, and install your best blade or a calibration plate.



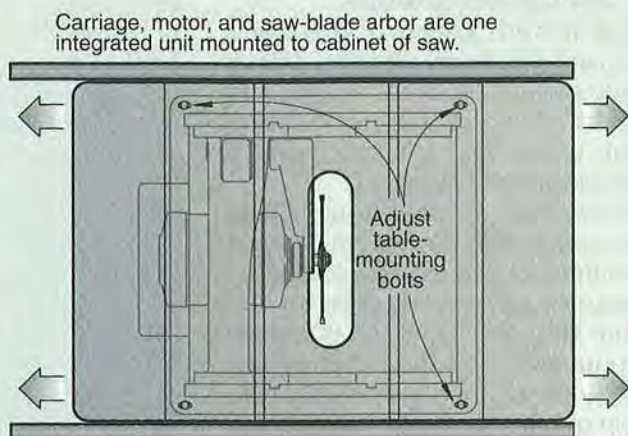
CHECKING BLADE ALIGNMENT (LOW-TECH)



CHECKING BLADE ALIGNMENT (HIGH-TECH)



**ALIGNING THE BLADE
(CONTRACTOR-STYLE SAW)**



**ALIGNING THE BLADE
(CABINET-STYLE SAW)**

Raise the blade or calibration plate to the top of its travel, then lower it slightly. (We've tuned many saws that slightly skew the blade at its topmost setting, which can throw off your settings.)

Next, adjust the miter gauge to 90°, and set it into the slot on the arbor nut side of the blade. If your miter gauge fits sloppy in the slot, use feeler gauges to shim it snugly against the side of the slot nearest the blade.

Mark a reference point on the blade just below the teeth or gullets, and rotate the mark to the front of the table. Now, stand an 8" drafting triangle against the miter gauge, with the point lined up with the mark on your blade. Lock the miter gauge in place, slip a .010" feeler gauge between the triangle's point and the blade, take up all play, and clamp the triangle to the miter gauge.

The feeler gauge should slide in and out without deflecting the blade. Remove the feeler gauge and rotate the blade mark to the rear. Slide the miter gauge to the rear—again lining up the point of the triangle with the mark on the blade—and lock the miter gauge in place. The same feeler gauge

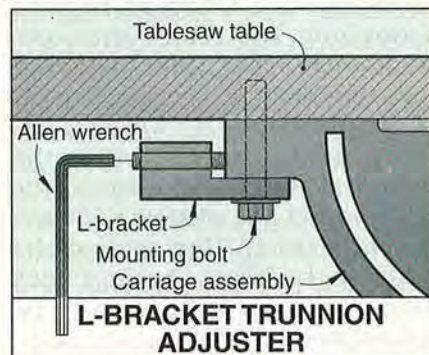
should fit. If it doesn't, try others until you determine how far your blade alignment is off. If it's more than .002", determine which direction the back of the blade needs to go.

The illustration *opposite page, bottom*, shows a "high-tech" way of checking blade alignment with a dial indicator. Instructions packed with the A-Line-It explain how to read a dial indicator.

5 Align the blade parallel with the miter slots

Exactly how you get the blade into alignment varies somewhat, depending on the type of saw you have. Direct-drive and contractor saws have a pair of trunnions bolted to the bottom of the table. To align these, you loosen the trunnions and shift them to one side or the other as shown *above left*. We find it easier to move the rear trunnion assembly. Leave one of the front bolts semi-tightened and use it as a pivot.

Using a piece of stock and a hammer, gently tap the trunnion in the direction you want to move it. For greater control over this adjustment, you also can shift the trunnions with an L-bracket trun-



nion adjuster like the one shown *above*. This "Precision Alignment & Locking System (PALS)" is available for most tablesaws for \$19.95 ppd. from In-Line Industries at the address on *page 67*.

When the same feeler gauge can be inserted at the front and rear of the blade, the blade is parallel and the bolts can be tightened. After tightening them, check one more time to make sure the trunnion didn't move.

With cabinet saws, the trunnions and table are independently bolted to the cabinet, making adjustments easy. With these, loosen three of the table-mounting bolts as shown *top right*, and tap the table into alignment with a mallet or hammer and a block of wood.

Continued

TABLESAWS

6 Set the bevel stops

Built-in stops govern a table saw's 90° and 45° bevel settings. Check your owner's manual to find out where these stops are located, then use an 8" triangle to learn if they're accurately set.

First, raise the blade or calibration plate just shy of its highest position. Check the 90° setting by positioning the triangle on the table with one leg of the 90° angle on the table and the other against the body of the blade, taking care to avoid the teeth. If you see a gap at the top or bottom of the triangle, use the tilt wheel to move the blade until the gap disappears. Unlock the 90° stop, bring it into contact with its matching point on either the trunnion or lead screw nut, and relock the stop. With the triangle, double-check that the blade remains at exactly 90° to the table.

Set the 45° bevel stop in the same way, tilting the blade to the 45° position and placing the triangle with its 45° leg against the body of the blade. Again, check after you relock the stop to be sure it hasn't shifted.

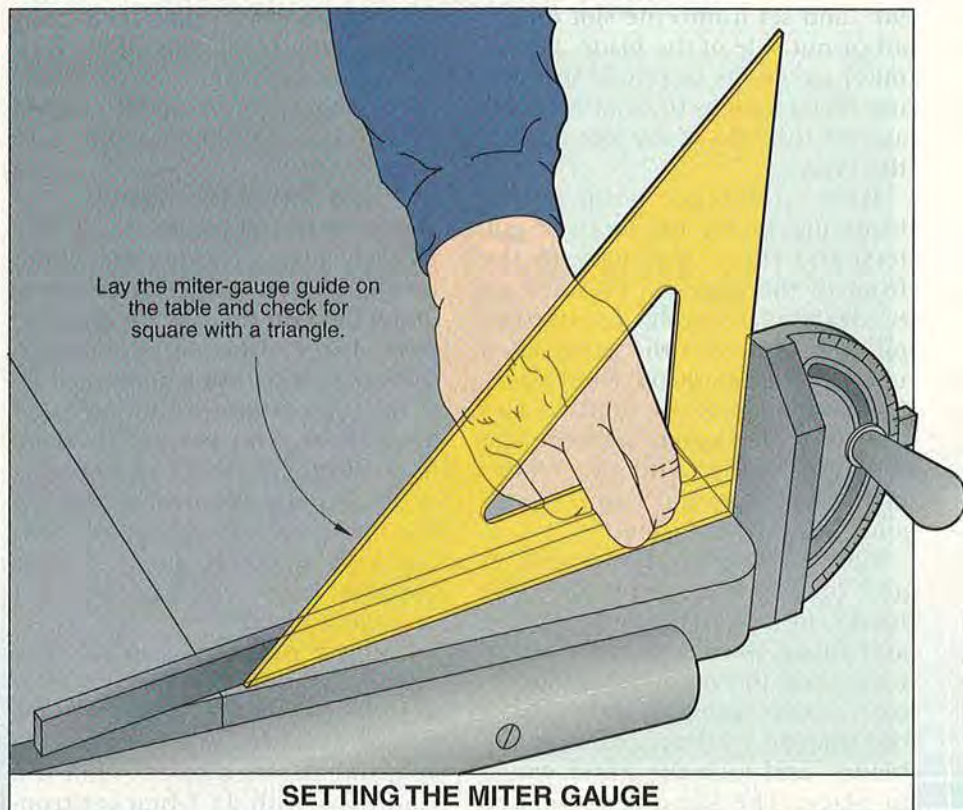
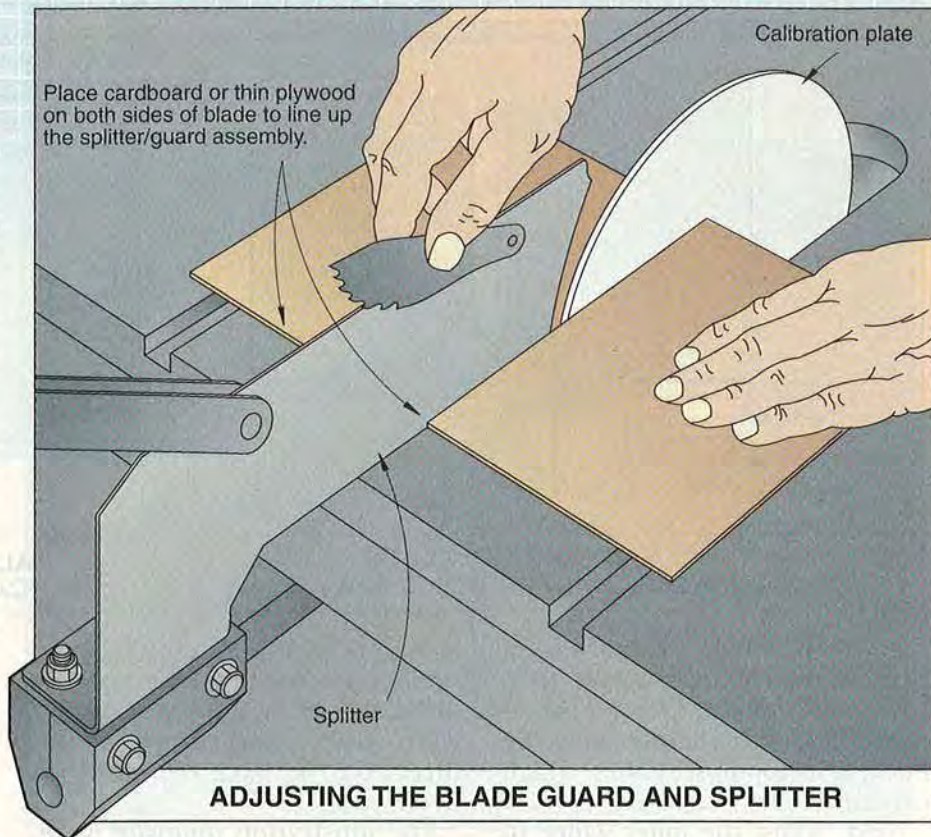
7 Adjust the blade guard and splitter

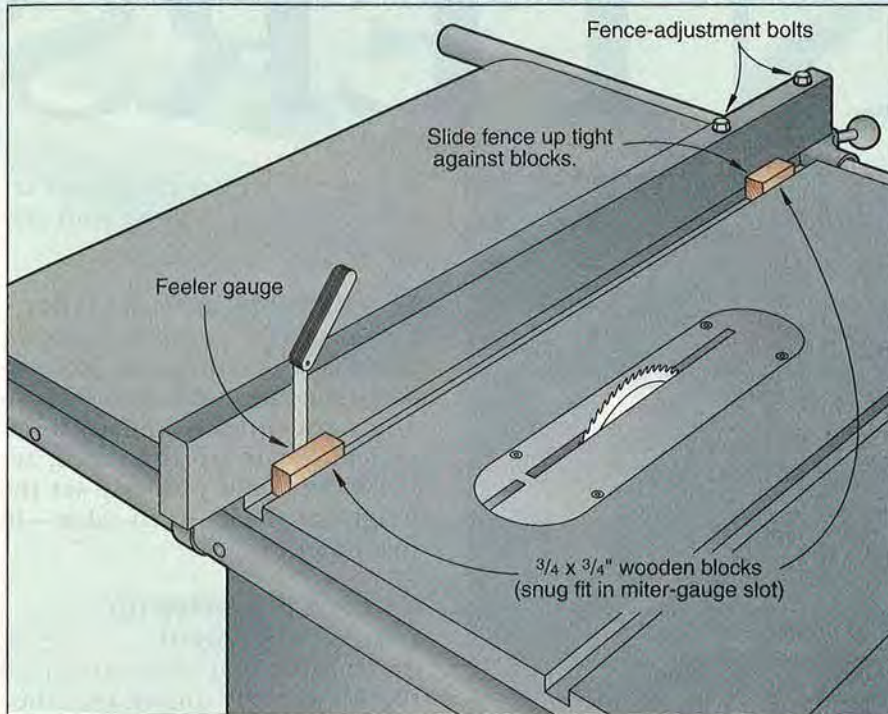
To do its job properly, the splitter must remain parallel with the saw blade, in the middle of the kerf. To set the splitter, cut a thin piece of cardboard or plywood in half, place the pieces against both sides of the blade or calibration plate, and center the splitter.

8 Set the miter gauge

For accurate cuts, check your miter gauge often. Place it on a flat surface, such as your saw's table, and use the 90° angle of a triangle to determine if the gauge is square, as shown *right*.

To set the 45° left and right angles, use the 45° edge of the triangle to establish and lock in your miter settings.



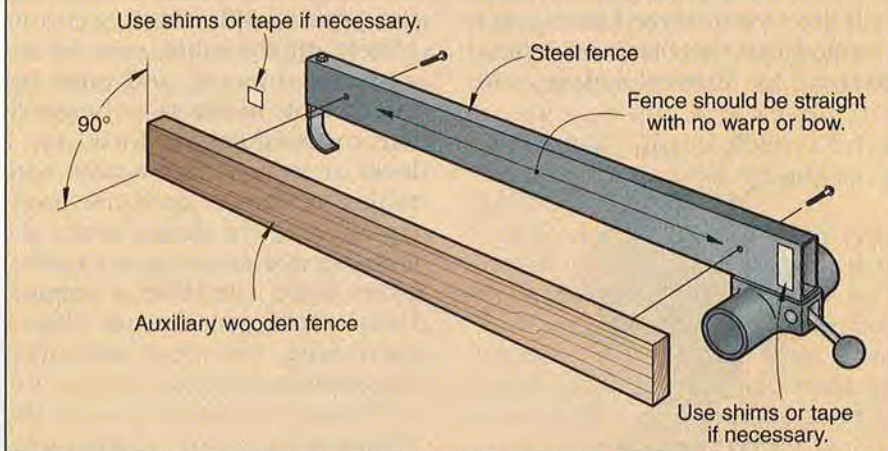


ALIGNING THE FENCE WITH THE MITER-GAUGE SLOT

How to straighten a warped tablesaw rip fence

Many stamped-steel fences tend to warp—and no amount of adjusting will compensate for a fence that’s bowed or twisted along its length, or doesn’t sit at a precise 90° angle to the table. Check your fence by holding a straightedge against it. Also, use the triangle to learn if the fence is 90° to the table.

If you spot any gaps between the fence and the straightedge or triangle, install an auxiliary fence as shown *below*. Select a stable board that’s flat and straight, cut it to size, and drive screws into the wood through prepunched holes in the steel fence. True up the auxiliary fence with paper or tape shims.



9 Align the fence

Kickbacks, excessive sawdust, burnt cuts, and crisscross saw marks are all symptoms of an improperly aligned fence. But properly aligned, you might be surprised to learn, doesn’t always mean that the fence should be set precisely parallel to the blade. Instead, for safe, burn-free ripping cuts, we recommend setting your fence .015" to .030" open at the rear. This prevents work from binding between the blade and the fence if the wood warps as you rip it.

The big trick to aligning a fence is keeping it that way, which means you should probably realign it before every major cutting project. To make this an easy adjustment now and in the future, rip a 4"-long, 3/4"-thick hardwood block to the width of your miter slot. Then, cut this piece in half to get two 2"-long blocks.

To align the fence, fit these blocks into the miter slot at the front and rear edges of the table. Loosen the bolts that adjust parallelism, drop the blade beneath the table, and slide the fence against both blocks.

At the rear, start with a .015" feeler gauge between the fence and block. With the fence pushed firmly against the block at the front and the block and feeler gauge at the rear, lock the fence head. Retighten the alignment bolts on the fence.

Now remove the blocks, plug in the saw, and rip a test cut. Inspect the fence side of the ripped edge for burns and crisscross saw marks. If you find any, add a little more space between the fence and blade. If you need to add .030" or more space, replace the blade and recheck.

(If you are getting less-than-clean cuts with a dado blade, reset your fence parallel with the blade. Just open it up again for ripping.)

Continued

JOINTERS



Except for the tablesaw, you may use the jointer more than any other machine in the shop. A jointer requires fewer adjustments than a tablesaw—just three or four, depending on the design of your machine. But they're critical if you want to mill stock that's perfectly straight and square.

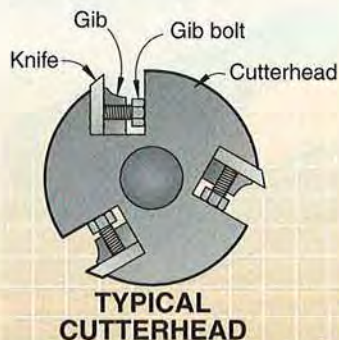
How your jointer works

Think of a jointer as a motorized hand plane turned upside down. In place of the hand plane's sole, jointers have a pair of tables that support the stock as you pass it over a rapidly turning cutterhead.

Down below, an elevation wheel provides a means for adjusting the height of the infeed

table, and many jointers have a control for the outfeed table as well. Machined dovetail ways align and guide the tables. You can fine-tune their alignment and lock them in place with accessible gib screws.

The cutterhead itself consists of a cylindrical assembly that typically holds two or three knives, each beveled like the blade on a hand plane. As shown *below*, the



knives of a typical cutterhead are tightly wedged in place with gibs and gib bolts.

Five surefire tune-up tactics

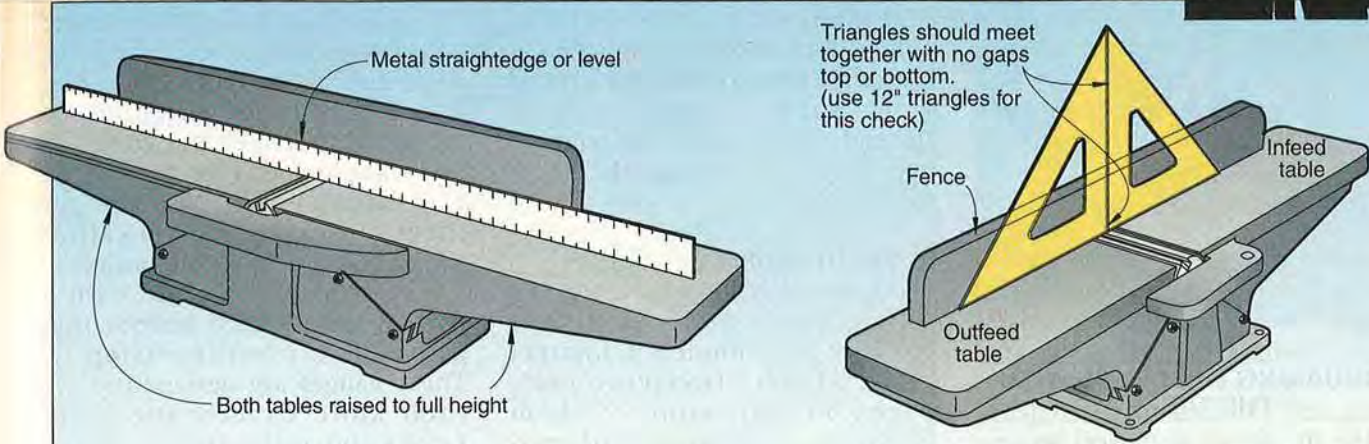
To guarantee yourself a jointer that makes smooth and accurate cuts time after time, you need to align the infeed and outfeed tables, square up the fence, set the knives, and properly set the height of the outfeed table—in that order.

1 Check the tables for parallel alignment

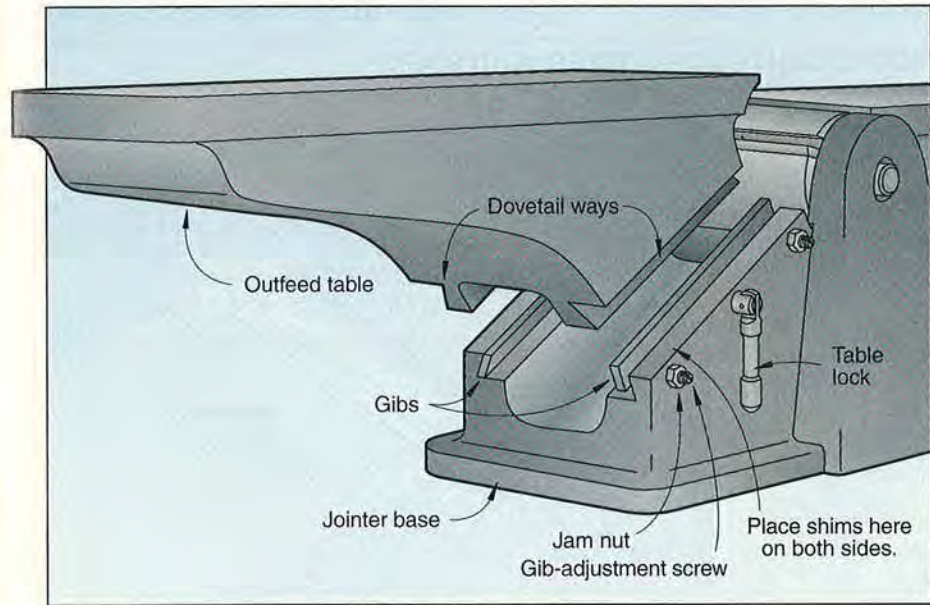
Though the two tables aren't on the same plane during use, they must be absolutely parallel with each other along their entire length. Tables that sag at one end or the other (or both) will cause concave cuts. Tables that are high at their outer ends will produce convex cuts. And an outfeed table that's parallel with the infeed table, but lower than the knives, will result in a condition called "snipe"—a small, hollow cut found at the end of a workpiece. This occurs when the infeed table no longer supports the workpiece.

To align the tables, first unplug the jointer, slide the fence completely off the table, remove the cutterhead guard, and raise the infeed table to the same height as the outfeed table. Now, lay a level or straightedge across both tables as shown *opposite page, top*. If any light shows under the straightedge at the outer end of either table, the table is sagging. Usually you can correct this by tightening the upper gib screw (see drawing *right*).

If you see light under the straightedge in the middle, next



CHECKING THE INFEEED AND OUTFEEED TABLES FOR PARALLEL ALIGNMENT



ALIGNING THE TABLES
(EXPLODED APART FOR CLARITY)

to the cutterhead, the offending table or tables are high at their outer ends. Loosening the gib screws lowers them.

For even more accuracy when checking table alignment, use a pair of 12" triangles, as shown *top right*. Set one triangle on each table (not necessarily at the same height) with the 90° edges of the triangles touching. If you see a gap at the top, one or both tables are sagging at their outer ends. If there's a gap at the bottom, one or both table ends are too high.

This method won't tell you which table is the offender, but you can quickly find out by tightening the gib screws on the infeed table; if this doesn't bring them into alignment, try adjusting the outfeed table.

If your machine is old or gets lots of use, you may discover that tightening the gib screws won't fix a sagging table. This happens because the dovetail ways have worn over the years and must be shimmed to compensate for the accumulated wear.

We prefer to shim the outfeed table, because its adjustment range is very small, but if your jointer has a fixed outfeed table, you have no choice but to work with the infeed side.

Shim with feeler gauges. To measure how much shimming is needed, loosen the lower gib screws, lift up on the outboard end of the table, and insert a feeler gauge 1/2" onto the surface where the table contacts the lower casting as shown *left*. Release the table, snug the gib-adjustment screws, and check to see if the table is parallel with the other one. After you've found the right thickness of shims, cut 1/2" lengths and install them. Finally, lock down the gib-adjustment screws and make a final check.

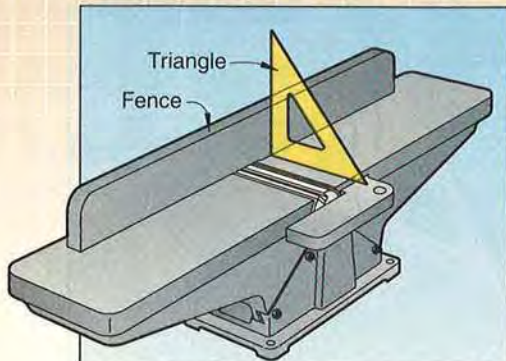
2 Square the fence for square cuts

A fence that's not exactly 90° to the tables can cause you a truck-load of grief. Even a slight angle error can multiply through the course of a woodworking project. That's why we like to precisely set the fence at the beginning of each work session.

With your drafting triangle, the job should take only a few minutes. Simply loosen the bevel lock, position the triangle as shown on the *next page, top left*,

Continued

JOINTERS



SQUARING THE FENCE WITH THE TABLES

move the fence until you see no gaps at the table or fence, and retighten the lock. Use the same technique to set the 45° angle.

(At this point, you may decide to adjust your 90° and 45° stops—but don't rely on them for critical work such as edge joining. Instead, check with the triangle every time you change the angle of the fence.)

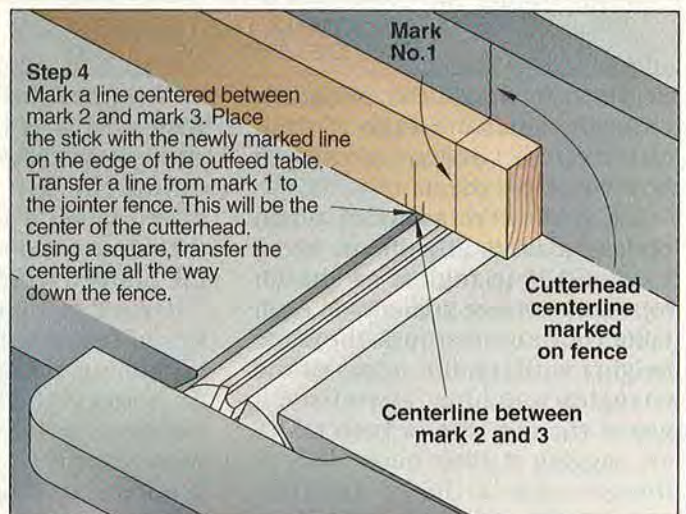
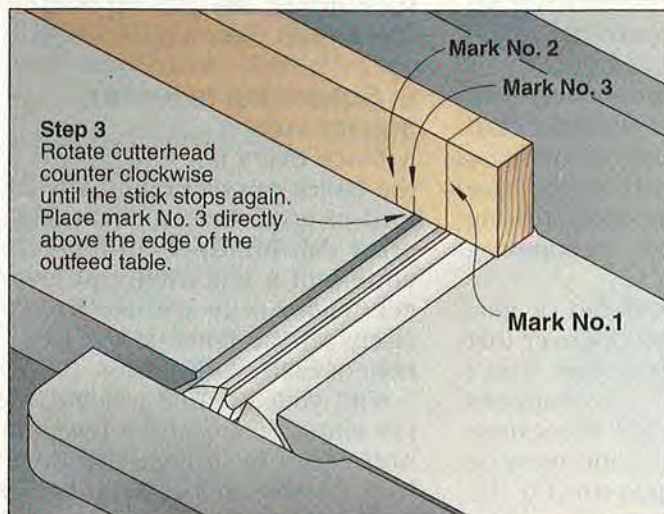
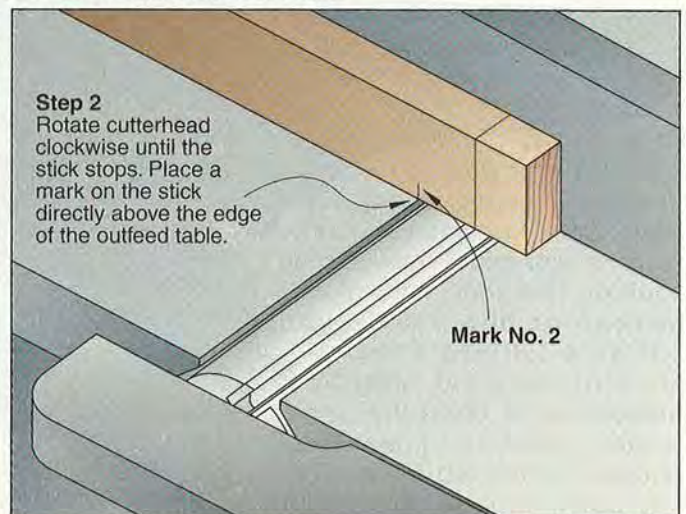
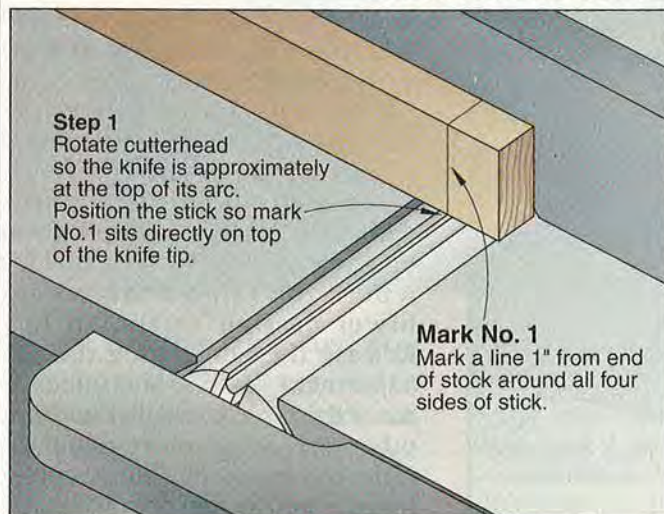
3 Set the knives

Even manufacturers have trouble setting knives perfectly. In our last test of 6" jointers ("Jointers Under \$1,000," December 1995, pages 44-49), none of them arrived in their boxes with perfectly set knives. But guess what? All the machines still produced straight, smooth edges.

That said, we'll show how to set your knives quickly and at least as accurately as the factory did. Aim for a maximum variance of .002-.003" between the knives. If you want to spend the better part of a Saturday at it, you can get them closer—but we'd rather spend that time building projects.

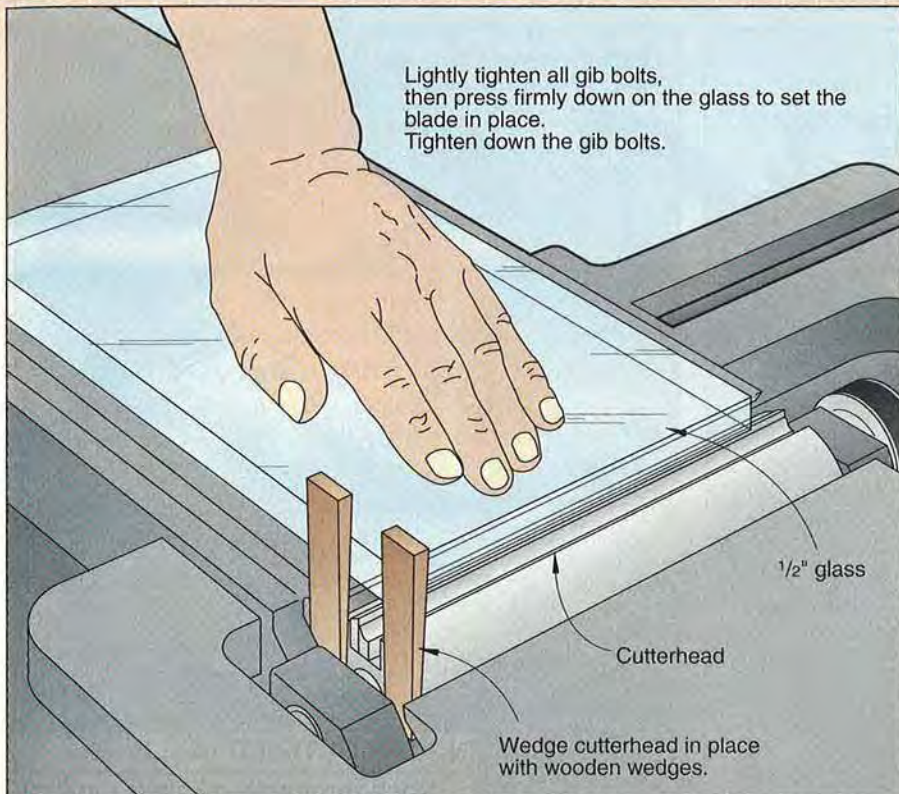
If your machine came with a two- or three-legged knife-setting gauge, don't bother using it. These gauges are designed to set each knife exactly the same height above the surface of the cutterhead. But few jointers have cutterheads that are perfectly parallel with the tables, which means

LOCATING THE CENTER OF CUTTERHEAD'S ARC





Lightly tighten all gib bolts, then press firmly down on the glass to set the blade in place. Tighten down the gib bolts.



SETTING THE KNIVES (LOW-TECH)

the cutterhead knives won't be parallel with the tables either.

We'll provide you with three options for setting the knives—one low-tech and two high-tech. Which you choose depends partly on the type of cutterhead your machine has.

The first might be called the king of low-tech. It uses a simple wooden stick and a sheet of window glass. The stick should measure about $\frac{3}{4} \times 1\frac{1}{2} \times 12$ " and have at least one flat surface. The glass should be cut to the width of the knives and about 12 inches long. To prevent cutting your hand, order polished edges.

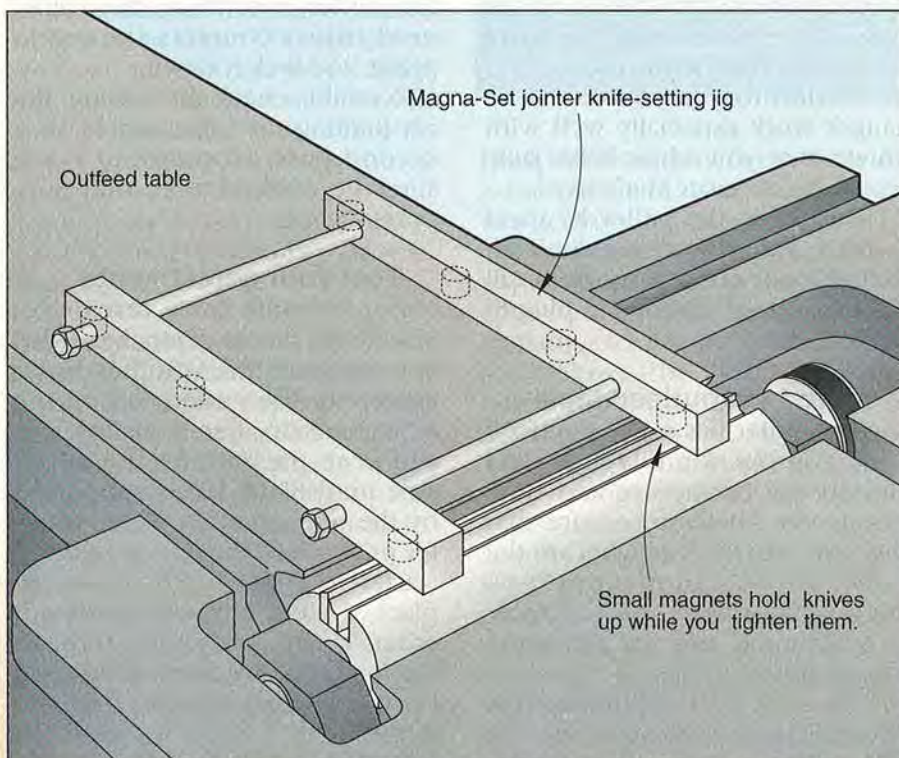
Use the stick to determine the top of each knife's cutting arc. Begin by drawing a mark all around the stick at about 1" from one end (known as "mark No. 1"). Then, follow Steps 1-4 in the drawings *opposite page*. In Steps 1-3 mark No. 1 should be directly above the knife tip at all times. (It may help to keep light finger pressure on top of the stick.) After marking the cutterhead centerline on the fence, permanently scribe it with a scratch awl and triangle.

To set each knife, rotate the cutterhead until the cutting edge of the knife aligns with the mark on the fence. Check the alignment by setting a triangle against the fence and touching the knife. Immobilize the cutterhead by inserting tapered wood shims between the head and bearings, as shown *top left*. Loosen the knife gib bolts just enough so that the knife moves with firm hand pressure. Raise the knife slightly higher than the top of the outfeed table. Now, lay the glass on the outfeed table, extended to fully contact the knife. Press the glass to the table and slowly snug up the gib bolts, starting with ones at the ends and alternately working toward the middle.

Take care that you don't overtighten the bolts. Too much

Magna-Set jointer knife-setting jig

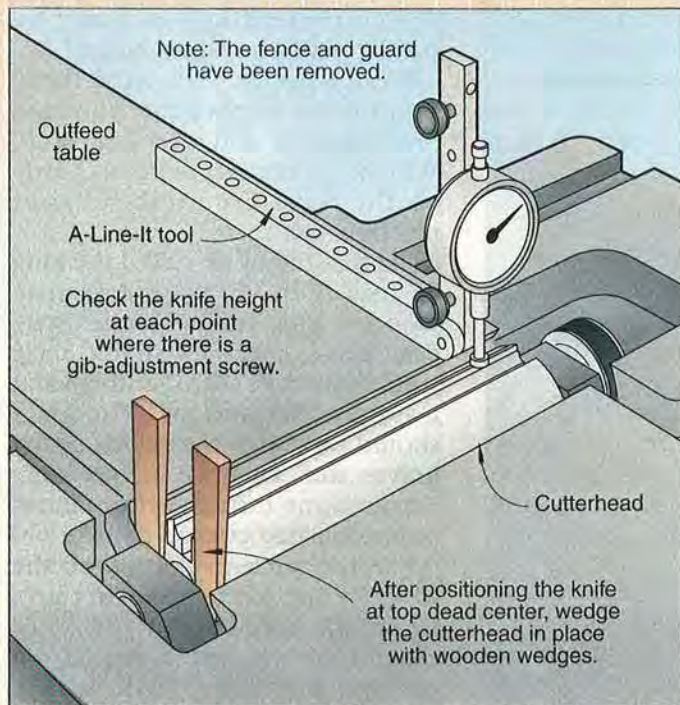
Outfeed table



SETTING THE KNIVES (HIGH-TECH)

Continued

JOINTERS



SETTING THE KNIVES (HIGH-TECH 2)

torque can force a knife out of alignment. To limit the amount of pressure you can apply, turn the wrench with only your thumb and forefinger. Set each knife in turn, aligning it with the mark on the fence.

Now, use the stick to check that each knife is set the same height as the others. Lay the stick on the outfeed table, lining up any one of the three table edge marks, and rotate each knife past it. All should move the stick the same distance at both ends.

For a high-tech way to set jointer knives, invest in a setting tool such as the Magna-Set (see page 67 for a source). It consists of two steel or plastic bars that slide along a pair of parallel rods. As shown *previous page bottom*, each bar has small but powerful magnets that hold the jig to the table and the knives. This keeps each knife flush with the outfeed table while you tighten the gib bolts. Of course the Magna-Set won't work with an aluminum outfeed table.

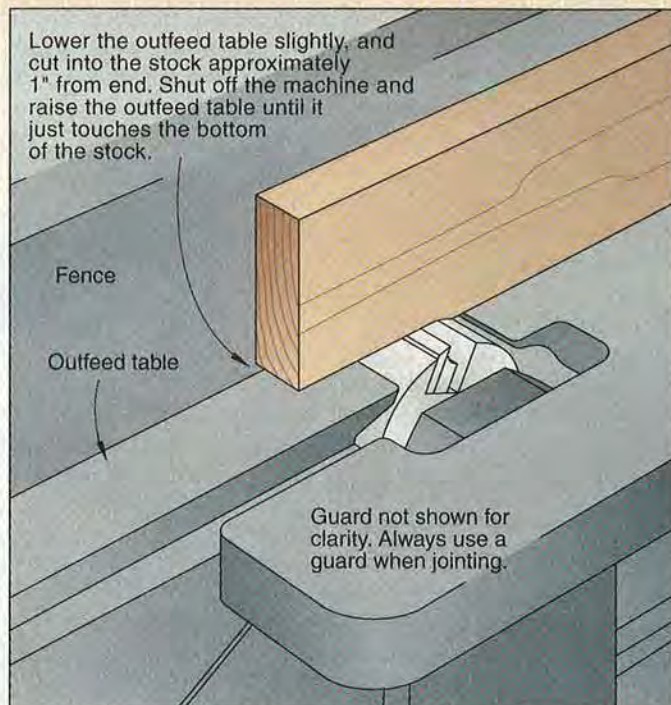
A dial indicator setup, such as the A-Line-It, offers yet another way to set the knives. (See the drawing *above left*.) The indicator tells you exactly how high the knives are from end to end, and in relation to each other. These gauges work especially well with knives that you adjust with jack-screws that elevate the knives.

Finally, spin the pulley by hand to make sure the knives don't hit the tables or other parts. Reinstall the cutterhead guard, and plug in the machine.

4 Adjust the outfeed table

If your jointer has a fixed outfeed table, you can skip this step—and should use extra care and time setting the knives to ensure that the table and knife heights are the same. If you can move it, you need to adjust the outfeed table to exactly the same height as the tops of the knives.

We've found that the easiest way to do this is to lower the table slightly, set the infeed table for a light cut, and slowly feed



ADJUSTING THE OUTFEED TABLE

stock through the knives until the cut edge projects over the outfeed table about 1". Now, shut off the jointer, raise the outfeed table until it just contacts the workpiece, and lock it down.

To double-check this setting, finish jointing the edge and make a second pass, stopping to make sure the outfeed table fully supports the cut.

5 Test your adjustments

Now, it's time for a test drive. Select two pieces of stock that are approximately $\frac{3}{4}$ " \times 4" \times 36", and pass each over the cutterhead on the $\frac{3}{4}$ " dimension. Use a shallow cut and keep pressure on the infeed side until 8" to 10" is supported by the outfeed table. Then, transfer pressure to the outfeed side.

After you've milled both boards, place the cut edges against each other. If any light shows through the joint, unplug the machine and recheck the alignment of the tables. If the alignment checks out okay, you're probably not feeding the stock properly.

Continued



PORTABLE PLANERS

Compared to the versatility of the tablesaw and jointer, the planer is a one-trick pony. Its only purpose in life is to machine opposite faces of stock parallel with each other and to a desired thickness. Of course, even a pony has to learn its one trick well before you put it through its paces—and the same goes for a planer.

Planers come in many sizes and shapes, but all of them share similar components that need tuning from time to time. We will cover the basic adjustments here. Since your machine may vary somewhat from those shown in our illustrations, you may have to spend time getting familiar with the locations of its adjustment points. Your owner's manual should help, if you have one.

The four steps to planer-adjustment success

For a planer to do its job properly, the table must be parallel with the cutterhead knives along their length, the feed rollers must press the stock firmly against the table, and the knives must be set to exactly the same height. Here's how to get everything in sync.

1 Align the table with the cutterhead

Begin by unplugging your planer and cleaning any rust or debris



from its table. (Lower the table or raise the head assembly so you can get your hands in there.)

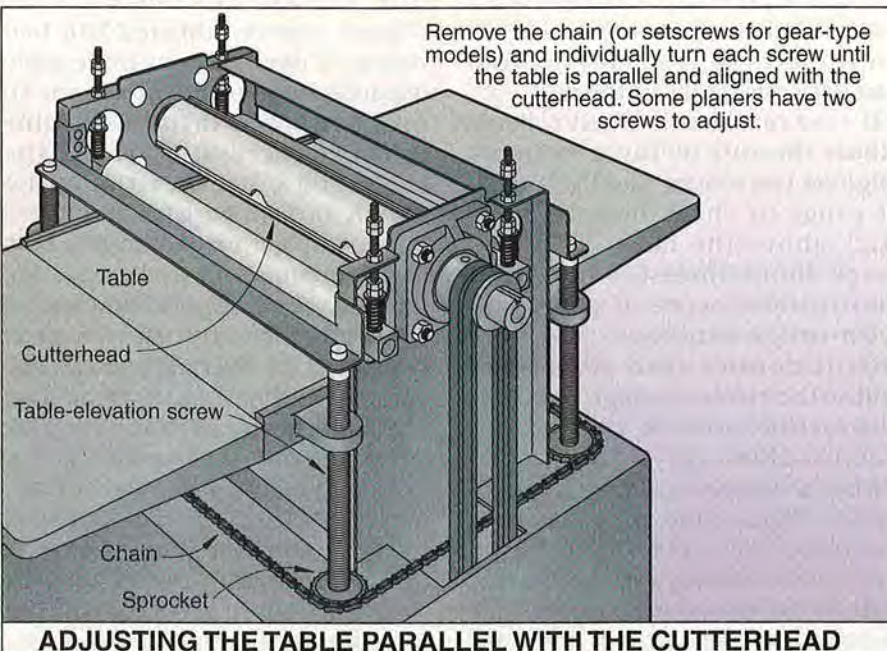
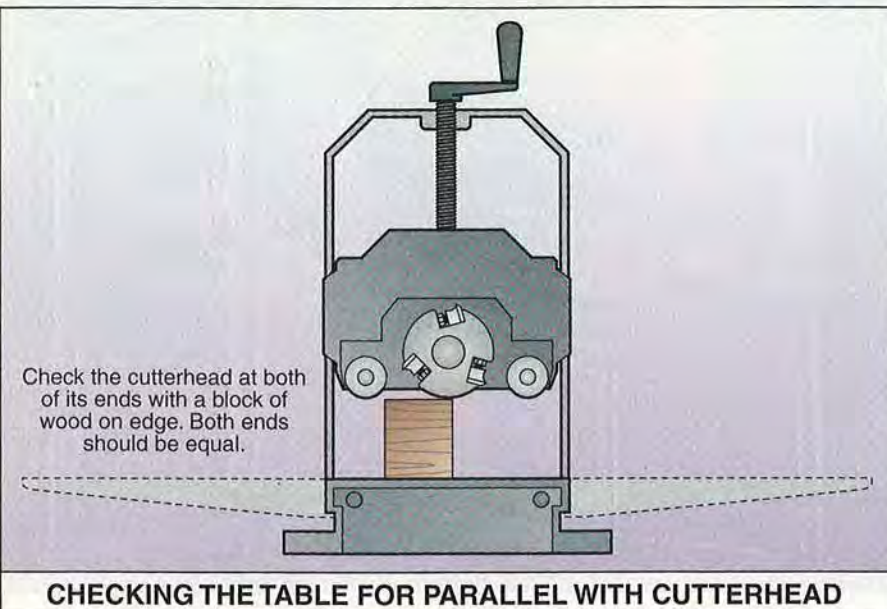
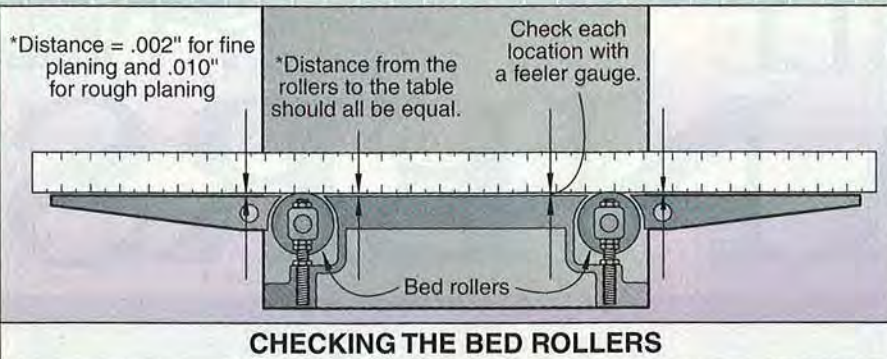
If your machine has bed rollers, adjust these first. Lay a straight-edge on the rollers, and use a feeler gauge to check how far they stick above the table. This distance should measure .002" for most planing work. If you work with rough-cut stock, and find that it doesn't feed smoothly, adjust the rollers as high as .010" above the table. If the rollers need adjusting, check your owner's manual to learn how to do it. With some planers, you make the adjustment with shims. And with others you change the rollers' elevations with screws, as shown *next page top*.

After you've adjusted the bed rollers, if any, find out if the table is parallel with the cutterhead. To produce stock that is the same thickness across its width, the table and cutterhead must be within .005" of parallel.

The simplest way to do this is to insert a piece of stock on edge between the table and one end of the cutterhead, as shown *next page middle*. Then, adjust the elevation until the cutterhead just touches the stock. Slide the stock along the table and under the cutterhead to the other end of the cutterhead. If the table is parallel to the cutterhead, the stock will not jam into the cutterhead or separate from it, showing daylight as you move it.

Continued

PORTABLE PLANERS



If the table isn't parallel, again check your owner's manual. Most planers have two or four table- or head-elevation screws that pass through the table or head, as shown in the photo on the *previous page* and in the drawing *bottom*. These interconnect with gears or chains so they all turn in unison. To adjust this style of table or head, disconnect the screws from each other either by loosening setscrews that hold the gears to the screws, or by removing the chain that runs around sprockets under the table.

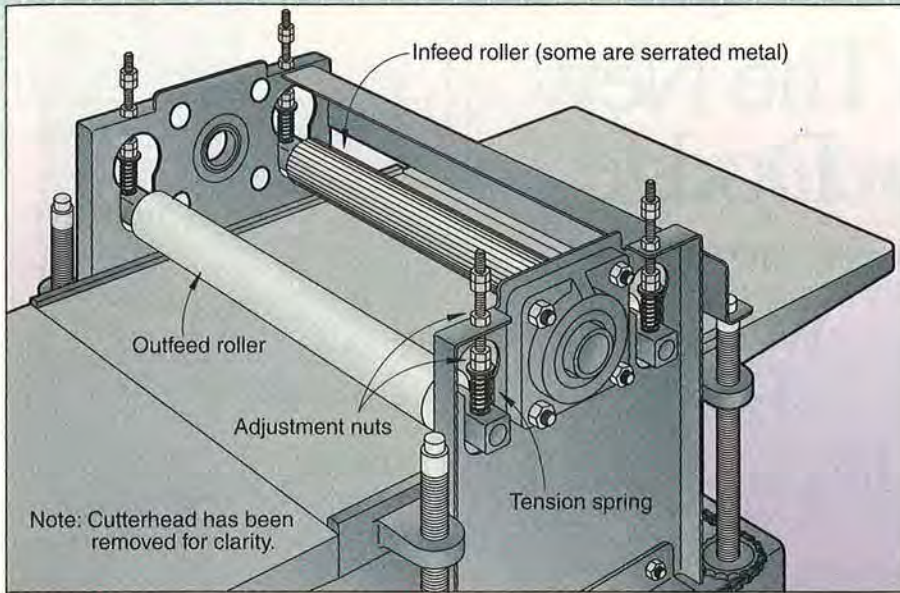
Now, individually turn the screws until your piece of stock contacts both ends of the cutterhead without binding. Then, retighten the setscrews or reinstall the chain.

(With some portable planers, like the Delta on the *previous page*, you adjust the head, not the table. You loosen a pair of nuts and turn bushings that raise or lower the head, then retighten the nuts. We removed the side covers of this machine to reveal its inner workings.)

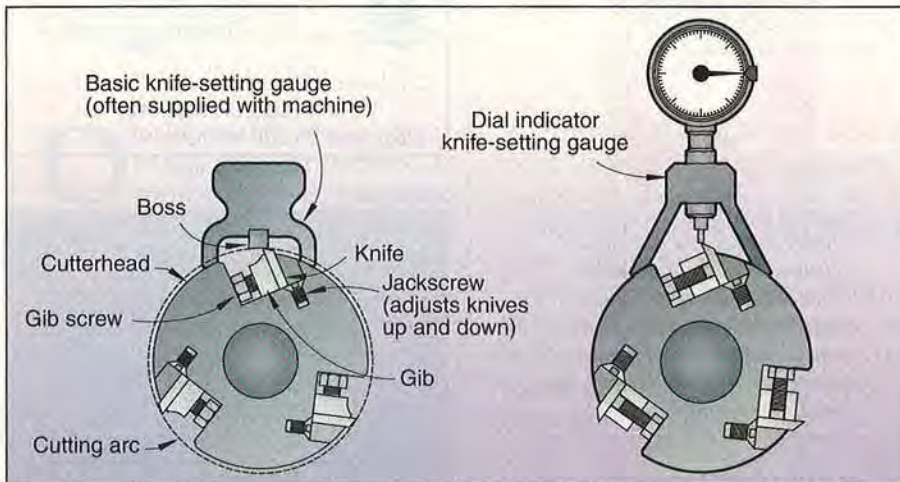
2 Adjust the feed rollers

Feed rollers, made of rubber or serrated metal, run the stock between the cutterhead and the table at a consistent rate. If your planer leaves marks on the wood, feeds erratically, or stalls, the rollers may be exerting too much pressure. Too little roller pressure, or rollers coated with pitch and gum, contributes to a jerky feed rate—and also can cause kickbacks.

Most planer rollers are spring-loaded, like the ones *left*, so they can follow uneven stock. If you suspect that your machine's rollers are applying too much or too little pressure, check your owner's manual to learn how to adjust their springs. Adjustment



ADJUSTING THE FEED ROLLERS



SETTING THE KNIVES

systems vary from manufacturer to manufacturer.

Clean off dirty metal rollers with solvent and a wire brush. Wipe rubber rollers with a rag dampened in mineral spirits. Go lightly. Too much solvent can damage rubber rollers.

3 Set the knives

A planer can't produce smooth, ripple-free surfaces unless its knives are razor sharp and set a uniform distance above the cutterhead. As with jointers, a planer's

knives are held in place by gibs and are raised and lowered in most cases with springs or jackscrews. You can adjust them with the basic knife-setting gauge that may have come with your machine, or with a dial indicator knife-setting gauge.

Begin by loosening and removing the knives. Clean the gibs and slots in the cutterhead with solvent to remove any wood residue. Reinstall a sharpened knife in each slot, but tighten its gibs or jackscrews only part way; you

should be able to move the knives with slight pressure.

(Some portable planers have fixed-position knives that you don't have to adjust. You simply bolt new knives into holders that automatically locate the knife at the proper height.)

The basic knife-setting gauge works well for setting the knives in a planer because the knives must be set parallel to the head. Set the gauge over a knife at each gib bolt, as shown in the drawing *middle left*. A small boss on the gauge contacts the edge of the knife and helps prevent the knife from creeping upward. Tighten the gib bolts in increments, starting with the outside bolts and moving toward the center.

If a knife creeps up slightly as you tighten it, tap it back into place with a block of hardwood. If a knife is a little low, lift it with the jackscrews.

A dial indicator knife-setting gauge works in much the same way as the basic gauge, but it shows you exactly how well you set the knives. Attempting to set all three knives to the exact same height may take an hour or more. So, consider the job well done if you come to within .001". As with a jointer, don't overtighten the knife bolts.

4 Reset the depth gauge

Now, give everything a final once-over, including a quick spin of the head by hand to make sure the knives don't collide with other parts. Finally, plug in the machine, turn it on, run a piece of stock through it, measure the stock's thickness, and use this dimension to reset the planer's built-in depth gauge. 🌲

Written by Jim Hufnagel
with Bob McFarlin and Dave Henderson
Illustrations: Kim Downing
Photographs: Wm. Hopkins

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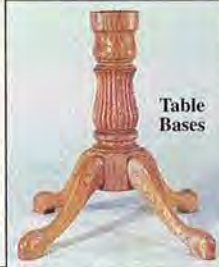


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Safety Man Mike Gililand tells you how to deal with this sawing danger

Mike Gililand is a lifelong woodworker and an engineer with 25 years' experience designing and working with woodworking power tools to make them safer. A resident of Missouri, he owns and operates a safety-consulting firm.



Send your safety-related question, stated simply, with a SASE to: *The Safety Man*, WOOD® Magazine, 1912 Grand Ave., Des Moines, IA 50309-3379. Not all questions will be published, but each will receive a reply.



For this photograph, Victor Baker re-created what happened when his radial-arm saw kicked back a 2x2x18" piece of pine. It penetrated a fiberglass garage door and flew 15' into the driveway.

Of the many reader questions that I received in response to my first safety column ("What your owner's manual can do for you," *WOOD* magazine, October 1995), one from woodworker Victor Baker of Jefferson, Ohio, really caught my attention. Vic's photo above vividly depicts what can happen (ouch!) when you try to rip wood incorrectly on a radial-arm saw.

Vic had a binding or misalignment problem, both causes of kickback. To avoid them, be sure the blade—a sharp one—is parallel to the fence before you rip. Check the alignment often (radial-arm saws become misaligned more easily than tablesaws). Here are some other guidelines:

- Always stand at the infeed side and out of line with the workpiece (as Vic luckily did). Keep your hands there, too.
- Never reach around the blade to pull at the board.
- Use a pushstick to feed and a feather board to steady the work.

- For radial-arm saws, set the nose (infeed side) of the guard to just clear the work. Also set the antikickback fingers and spreader at the outfeed side.

Along the same line, William Belz, Jr., from Cheektowaga, New York, wondered what is the best thing to do if the wood you're ripping does start to bind. In this case, "best" may be a relative term, but here's what I do if it happens during the cut: Hold the workpiece firmly in place—don't let it move—and turn off the saw. When the blade stops, remove the wood and correct the problem. Trying to retrieve a bound board with the saw blade moving only worsens the situation. And remember to always check the blade-to-fence alignment after repositioning the fence. It takes just a few seconds to correct for potential binding.

Remember, too, that a binding board might kick back. If you believe it's inevitable, *get out of the way!* One great woodworking

tragedy is the sacrifice of personal safety for the sake of a piece of wood. No matter what the board costs, it's replaceable. Your fingers (or worse) are not.

Safe thin-strip ripping

For ripping, owner's manuals tell you to keep the wider portion of the board between the blade and the fence. That's to encourage you to push that part of the board. Pushing on the part outside the blade can result in kickback (look at Vic's photo if you doubt how serious that can be). But this requires always readjusting the rip fence. Rushville, Maryland, reader Kent Drew wants to know a safe way to make repeated narrow rips without readjusting the fence.

There are several ways, Kent. And you can make a number of fixtures to help you, but they mostly require removing the blade guard. Here is one method I like that retains the blade guard for added safety.

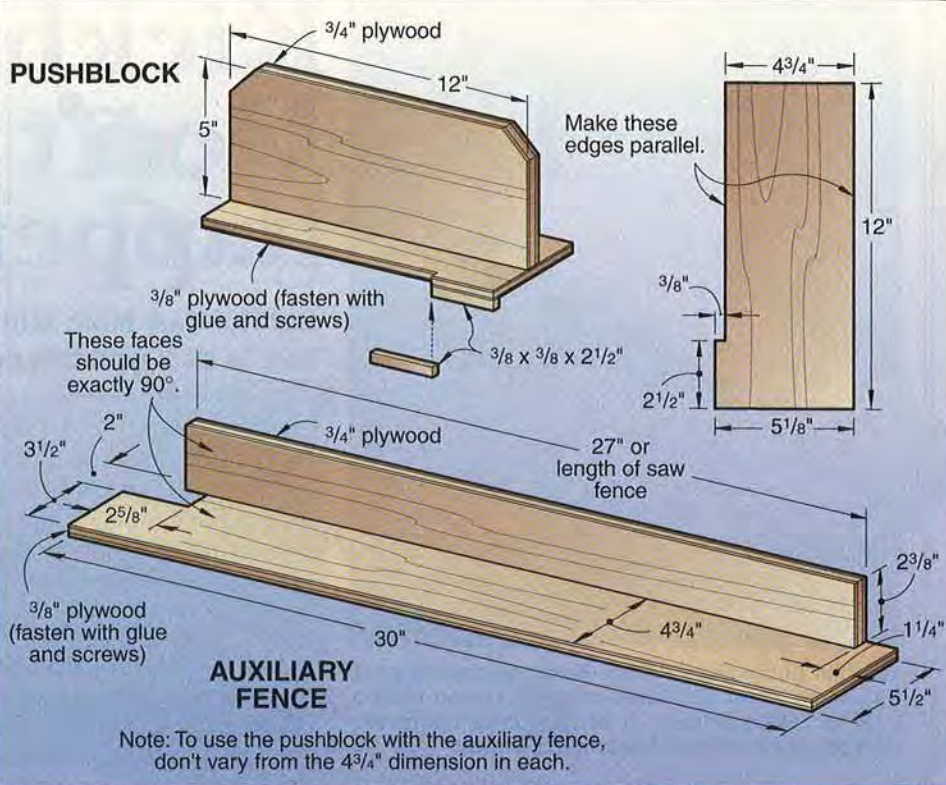
Continued on page 84

WHERE SAFETY BEGINS

Continued from page 83



Clamp the auxiliary fence (shown in drawing *below right*) to the saw's rip fence with C-clamps. Use the pushblock (see Pushblock drawing *right*), resting on the flat part of the auxiliary fence, to do the feeding. With a pushstick in your free hand, guide the board carefully without applying pressure against the blade. Of course, follow all other safety instructions on ripping, too, including using the blade guard and standing out of the line of a possible kickback. Also, use only unwarped, knot-free wood to avoid splintering and binding. And as a rule of thumb, I recommend starting with a board that is less than six rips wide. Stability is harder to maintain with a board wider than that. 🌲



Drawings: Roxanne LeMoine Photographs: Victor Baker; Ann Gililand

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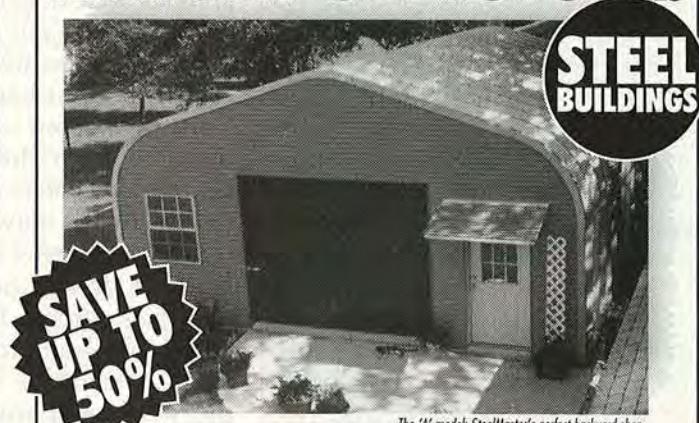
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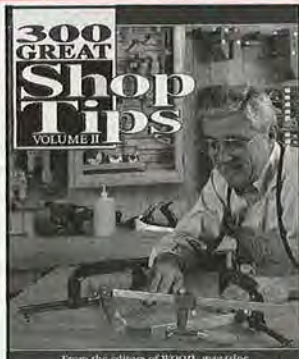
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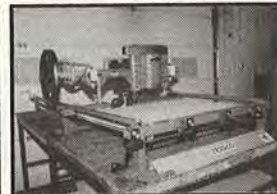
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ELECTRIC RECIPROCATING TOOL—Cordless tool for hobbyists, model and prototype makers. It saws, files, sands, shapes in applications unsuited to rotary tools—on flat surfaces, in the middle of the workpiece, in corners. Comes with accessories, including proprietary tools. Accepts needle files with round handles and blades with 1/4" flat shanks. **KD ENGINEERING, INC.** \$1.00. Circle No. 125.

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15

Wax cleans, protects, and polishes

In the past, I've tried dozens of products to polish and rust-proof the tops of my cast-iron machinery tables. All of them have shortcomings, so I was eager to see what Renaissance Wax could do.

I quickly found that this white paste wax spreads easily with a soft cloth. It takes minimal effort to buff out by hand and leaves a crystal-clear finish. Despite the humidity in my shop, I detected no rust or fingerprints over the course of about six weeks.



The manufacturer also says that Renaissance Wax can be used on furniture, so I applied some to a finished wood tabletop. The solvent in the wax picked up traces of dirt and grime even though the piece was clean and well maintained. Then, I buffed it to an even, mirror-like sheen.

To test the protective properties of this product, I waxed a piece of unfinished oak and poured a soft drink on it. After 30 minutes, I wiped the liquid off. The soft drink did not penetrate the wood, and I didn't see any discoloring.

—Tested by Bob McFarlin

PRODUCT SCORECARD	
Renaissance Wax	
Performance	★★★★★
Price	about \$19 for 8 ounces
Value	★★★★☆
Cutlery Specialties, 22 Morris Lane, Great Neck, NY 11024. Call 516/829-5899.	

Big convenience from small clamps

How many times have you struggled to clamp something that was just too small or fragile for conventional clamps? Well, put away the rubber bands and clothespins. Your struggles are over.

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bigger cousins, the regular Quick-Grip Bar Clamps, the Micro clamps have a pistol-grip handle and quick-release trigger.

Despite their small size, these clamps exert lots of pressure—more than enough for small projects. Although the small size doesn't translate into a small price, I think these clamps will prove essential for hobbyists and model makers.

—Tested by Bob McFarlin



PRODUCT SCORECARD	
Quick-Grip Micro Bar Clamp	
Performance	★★★★★
Price	about \$10
Value	★★★★☆
American Tool Co., 8400 Lake View Parkway, Suite 800, Kenosha, WI 53142. Call 414/947-2440.	

Jet's new cabinet saw has left-tilt blade



I recently had the opportunity to go to Jet headquarters near Seattle to test a preproduction sample of its new tablesaw above. The Jet XACTASAW Left, like its predecessor the XACTASAW Right, closely matches the Delta Unisaw in construction and performance. Unlike those two saws, the XACTASAW Left has a left-tilting blade. Not surprisingly, Jet positions this saw to compete against the only other left-tilting cabinet saw on the market, the Powermatic Model 66.

The XACTASAW Left comes with a 50" XACTA fence that closely resembles the 50" Biesemeyer fence on the Model 66. A similarly equipped Model 66 with a 3-hp motor costs \$300 to \$400 more.

In my tests, the XACTASAW Left performed flawlessly. Its fit and finish are excellent. I rank it about equal to the Model 66 except for its motor. The Model 66 comes with a high-quality, U.S.-made Baldor motor that starts more smoothly than the Taiwanese motor on the XACTASAW.

—Tested by Bob McFarlin

PRODUCT SCORECARD	
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Value	★★★★★
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Continued on page 100

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Model 350



Better Homes and Gardens
WOOD Magazine (Nov. 95)

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- 6614 1/2" Drill
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- 6656 Router Table & motor
- 666 Router Table only
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- 7519 3 hp Router
- 7536 2 hp Router
- 7537 2 hp D-Handle RTR
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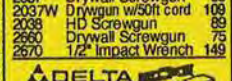
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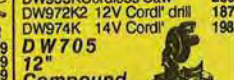
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Continued from page 98

Reciprocating saws offer something for everyone

I've tried many makes and models of reciprocating saws. But when it came time to buy one for myself, I purchased one of the smallest, the Porter-Cable model 9647 Tiger Cub. Although its 4.8-amp motor doesn't match the muscle of saws in the 10-amp range, I've used it to cut everything from 4x4s to 4" cast-iron drain pipes.

The Tiger Cub's top speed, 2,600 strokes per minute, matches that of the big saws. But it sometimes doesn't cut as fast because it doesn't have the power to maintain top speed under heavy pressure. The slim profile of the Tiger Cub helps you reach tight spots, but the greater weight and two-handed operation of the bigger saws give them more stability during the cut.

Although the Tiger Cub has enough brawn for the average homeowner, it's not the ideal saw for everyone. If you remodel professionally, or plan on doing a lot of demolition, then you're better off with a full-sized reciprocating saw such as the new Porter-Cable model 9737 Tiger Saw.

The first thing I noticed about this 9.6-amp saw is that it weighs

nine pounds, putting it squarely in the heavyweight arena. What really interested me, though, are the Quick-Change system for replacing blades, and the dual-action cutting modes—orbital and straight reciprocating.

Compared to the blade clamps found on most other reciprocating saws (and the Tiger Cub), which require an easy-to-lose Allen wrench, the Tiger Saw's Quick-Change system was a joy to use. To install a blade you simply give a half-turn to a spring-loaded collar located at the top of the reciprocating shaft. Then, drop in the blade and let go of the collar. The process takes just a second or two. To release the blade, you turn the collar counterclockwise about a quarter-turn. In my tests, the collar held blades securely and released them without a problem.

I was surprised that the orbital motion didn't deliver a big increase in the cutting speed. It took me about four seconds to cut through a 2x4 with the saw in the orbital mode, compared with five seconds in the straight-reciprocating mode. (The Tiger Cub, which does not have reciprocating

action, severed the 2x4 in seven seconds.) So the orbital motion will only save you a few minutes over the course of a big job.

One final point of comparison: For time-consuming cuts in metal, I prefer the Tiger Cub's sliding on/off switch and dial-type variable-speed switch. The Tiger Saw's trigger-type switch controls both the on/off function and the variable speed. This requires that you pay careful attention to your finger pressure when making cuts in metal which require slow blade speeds. On quick-cutting tasks, the all-in-one switch on the Tiger Saw proves more convenient.

—Tested by Bill Krier

PRODUCT SCORECARD

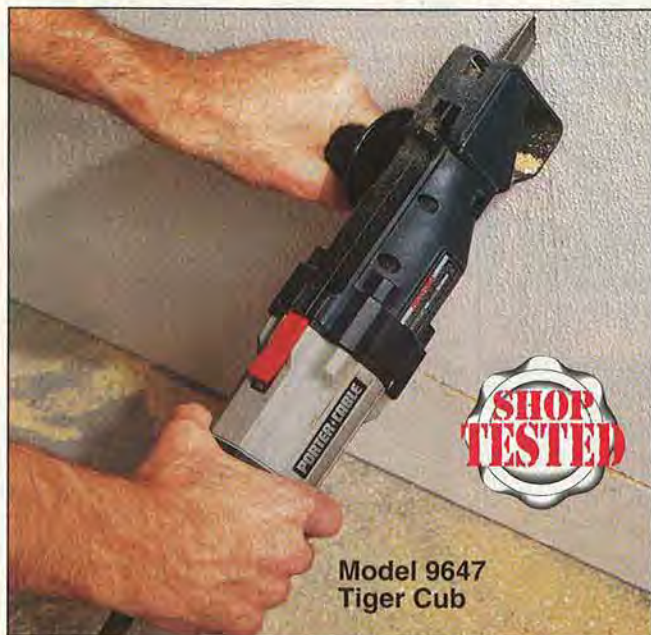
Porter-Cable model 9647 Tiger Cub reciprocating saw kit

Performance	★ ★ ★ ★ ★
Price	\$125
Value	★ ★ ★ ★ ★

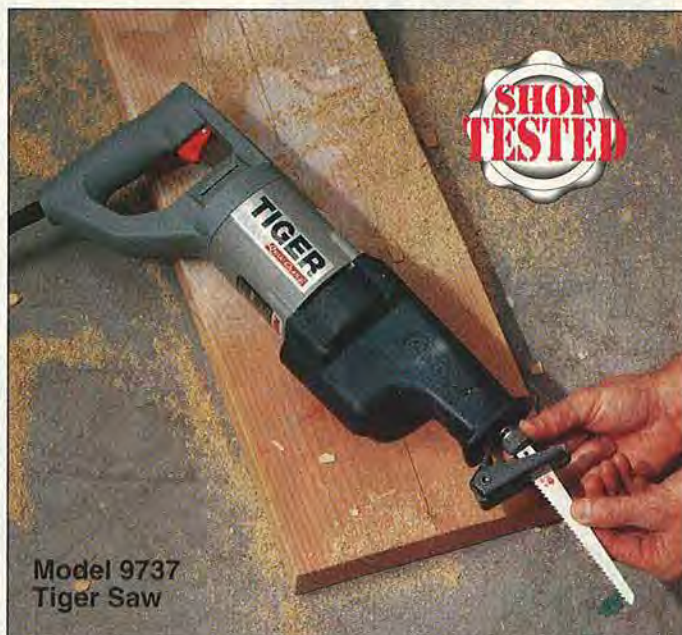
Porter-Cable model 9737 Tiger Saw reciprocating saw kit

Performance	★ ★ ★ ★ ☆
Price	\$170
Value	★ ★ ★ ★ ☆

Porter-Cable, P.O. Box 2468, Jackson, TN 38302-2468. Call 800/487-8665.



Model 9647
Tiger Cub



Model 9737
Tiger Saw

Continued on page 102

Z-SERIES

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1X42	.81 ea	3X27	.96 ea
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2 1/2X16	.85 ea	4X24	1.10 ea
3X18	.86 ea	4X36	1.35 ea
3X21	.90 ea	6X48	3.50 ea
3X23 3/4	.93 ea	6x89	6.24 ea

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PRODUCTS THAT PERFORM

Continued from page 100

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The green template contains 45° corners that measure 1/2, 3/4, 1, 1 1/4, 1 1/2, 1 3/4, and 2" across. The small yellow template gives you convex radii of 1/2, 3/4, 1, 1 1/4, 1 1/2, 1 3/4, and 2", and the large yellow template offers 3, 4, 5, and 6" radii. For concave corners, the blue template provides you with 1/2, 3/4, 1, 1 1/4, 1 1/2, 1 3/4, and 2" radii.

To use these polycarbonate templates, you simply lay the section of the template with the desired profile on the corner of your workpiece, and then follow the curve or angle with your pencil. Locating lugs molded into the bottom side of the templates make positioning foolproof.

—Tested by Dave Henderson



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DELTA TOOLS	Model	Description	List	Sale
31-895	6"	Belt/Gr. Disc Sander	441	349
23-700	Wet/Dry	Grinder	206	159
23-710	New	Sand. Grinder	217	169
23-680	6"	Bench Grinder 1/4 HP	80	69
11-850	8"	Drill Press	176	128
31-050	1"	Belt Sander 2.0 amp	95	78
31-460	4"	Belt/Disc Sander	198	135
40-560	16"	2 speed Scroll Saw	230	165
11-890	12"	Bench Drill Press	255	184
11-090	32"	Radial Bench Drill Press	405	315
43-505	1/2"	Bench Router/Shaper	399	299
22-640	12"	Bench Top Planer	346	269
36-220	10"	Compound Mitre Saw	294	208
28-185	Bench	Band Saw	213	175
28-190	NEW 12"	Band Saw	487	395
40-640	20"	Bench Scroll Saw	466	295
37-070	NEW 6"	v/spd Bench Joiner	351	255
14-650	Hollow Chisel	Mortiser	380	265
46-700	12"	Wood Lathe	575	479
33-990	10"	Radial Arm Saw	881	779
33-055	6-1/4"	Sawback comp w/lags	846	665
36-905	30"	Unifencer	346	245
36-906	30"	Delta Unifencer	444	319
36-755	10"	Tilling Arbor Saw	546	429
17-900	16-1/2"	Floor Drill Press	490	415
33-060	"Sidekick"	Miter Saw	451	399
37-190	6"	Belt/Disc Joiner	603	489
36-275	6-1/4"	Deluxer	358	268
36-210	10"	Compound Mitre Saw	344	249
36-040	8-1/4"	Compound Mitre Saw	190	135
36-070	10"	Mitre Saw	127	165
34-555	Sliding	Table	487	325
22-675	NEW	DC380 15" Planer	546	415
37-154	6"	Joiner DJ-15	546	415
34-444	Contractors	Table Saw	546	415
34-445	34-1/4"	Saw w/30" Unifencer	859	639
28-283	14"	Band Saw 3/4 HP motor	546	415
28-280V14"	Band Saw	1 HP motor	798	579
28-275	14"	Band Saw 3/4 HP	546	415
36-250	NEW 10"	Slide Compound Saw	825	499
36-230	NEW 12"	Compound Mitre Saw	480	345
31-780	NEW	Oscillating Spindle Sander	253	188

MILWAUKEE TOOLS	Model	Description	List	Sale
6527	NEW	SawZall with case	343	179
6528	above	SawZall w/wired cord	339	185
6540	12V	Drill w/keys chuck	82	380
6541	9.6V	Drill Kit with 2 batteries	315	159
0246-1	3/8"	Drill 4.5 amp magnium	236	132
0234-1	1/2"	Drill 4.5A mag 0-850 rpm	255	129
0235-1	1/2"	Drill w/keys chuck	255	129
0244-1	1/2"	Drill 4.5A mag 0-800 rpm	255	129
0222-1	3/8"	Drill 3.5 amp 0-1000 rpm	213	119
0228-1	3/8"	Drill 3.5 amp 0-1000 rpm	207	118
0375-1	3/8"	close quarter Drill	255	148
0379-1	1/2"	close quarter Drill	288	165
6546-1	cds	SawZall 200 & 400 rpm	150	86
6547-1	6546-1	w/dts 1/4" chuck & cs	185	105
5399	12"	Whit's Hammer Drill Kit	356	194
5907	Original	SawZall with case	278	145
5397-1	3/8"	v/spd Hammer Drill Kit	275	145
5371-1	1/2"	v/spd Hammer Drill Kit	360	194
3107-1	1/2"	v/spd right angle Drill Kit	311	234
3300-1	1/2"	v/spd right angle Drill	378	199
5680	Router	2 HP w/ 1/4" & 1/2" collets	367	165
6078	7/8"	13 amp Grinder	295	159
6142	4-1/2"	Grinder w/cs & acc.	224	125
6365	7-1/4"	Circular Saw 13 amp	229	125
6368	6365 w/blade, bldg, & cse		259	142
6256	Top Handle	Jig Saw	278	149
6490	10"	Mitre Saw	496	265
6491	6490 w/ carbide blade & bag	594	329	
6494	10"	Compound Mitre Saw	585	315
0431-1	12V	Drill w/ 2 batteries	441	229
6266-6	NEW	Top Handle Jig Saw	315	165
6496	NEW 10"	Slide Compound Saw	825	499

FREUD CARBIDE TIPPED SAW BLADES	Item	Description	Teeth	List	Sale
LJ72M010	Gen Pur. A.T.B.10"		40	69	42
LJ82M010	Cut-off 10"		60	93	47
LJ84M011	Comb 10"		50	79	42
LJ87M010	Super Cut-off 10"		80	115	59
LM72M010	Ripping 10"		24	69	38
LJ73M010	Cut off 10"		60	84	45
LJ78M010	Thin Kerf 10"		24	72	44
LJ88M010	Thin Kerf 10"		60	88	49
LJ98M010	Ultimate 10"		80	128	68
LJ10M010	Compid Mitre 10"		80	88	54
FA10	Quiet Blade 10"		40	95	49
F810	Quiet Blade 10"		80	135	74
TK303	7-1/4" Finishing		40	38	25
TK906	10" Combo		50	53	32
SD308	8" Dado	Carbide		230	119
SD506	8" carbide w/case & shims			292	145
SD508	8" carbide w/case & shims			344	168
F10	2-1/8" x 3/4" Biscuit	1000 qty	43	29	
F20	2-3/4" x 1" Biscuit	1000 qty	45	29	
FA	Assorted Biscuits	1000 qty	45	29	
FB100	16 piece Forstner Bit Set			338	194
94-100	5 pc. Router Bit Door System			320	169
BF3	NEW Router Table			495	289
FD200E3	1/4 HP v/spd Plunge Router			4010	205
JS100	Biscuit Joiner w/case			334	168
JS102	Biscuit Joiner w/case & cs			355	179

\$50.00 REBATE
 TR215 8-1/2" Slide Compound Mitre Saw
 Price after rebate **\$319.00** !

WAP VACUUMS	Model	Description	List	Sale
766RD	10 gallon	turbo vacuum	845	465
766RDF	D'Drywaller"	10 gal turbo vacuum		
766RDF-DAS	Above vac w/ auto start	915	549	
				589

MAKITA TOOLS	Model	Description	List	Sale
6172DWE	3/8"	v/spd Drill Kit w/ 2 batt	222	148
5080DW	3-3/8"	Saw Kit 9.6 volt	280	169
DA391D	3/8	angle Drill 9.6V		166
DA391DW	3/8"	angle Drill Kit 9.6V	341	179
ML900	Incandescent	Flashlight 9.6V		37

NEW CORDLESS DRILLS	Model	Description	List	Sale
6095DWE	9.6 volt	Drill Kit w/2 batt		125
6095DWLE2	6095DWE	w/flashlight		138
6095D	6095DW	Drill only & cse	Special	79
632007-4	9.6 volt	Battery		47
632002-4	7.2 volt	Battery		39

SUPER CORDLESS SPECIALS	Model	Description	List	Sale
6037DW	7.2 vds	Drill Kit. Variable speed & clutch. Complete with battery, charger, & case.		99
T220DW	9.6 volt	Stapler Kit. Complete with battery, charger, & case.		99

NEW CORDLESS DRILLS	Model	Description	List	Sale
9900B	3"x2 1/2"	Belt Sander w/bag	347	179
9924DB	3"x2 1/4"	Belt Sander w/bag	360	189
4301BV	Orb. var. spd	Jig Saw 3.5A	292	155
JR3000V	1/2" spd	Recip Saw w/case	264	135
9820-2	Blade Sharpener		433	215
N1900B	3-1/4"	Planer with case	283	129
1912B	4-3/8"	Planer		352
N9514B	4"	Disc Grinder 4.6 amp		118
B04552	1/4	sheet Pad Sander w/bag	101	55
DA3000R3/8"	Angle Drill		355	175
2708W	8-1/4"	Table Saw		637
6405	3/8"	Drill Rev. 0-2100 rpm		115
6510LVR	3/8"	Drill Rev. 0-1050 rpm		188
6013BR	1/2"	Drill Rev. 6 amp		270
9401	4" x 2 1/4"	Belt Sander w/bag	458	219
5007NB	7-1/4"	Circular Saw 13 amp	242	124
5007NBK	5007NB	Saw w/ plastic case	250	125
LS1011	10"	Slide Compound Saw		995
LS1211	10"	Slide Cmpd Saw		1620
3901	Plate	Joiner Kit		376
3612C	NEW 3 HP	Plunge Router	482	259

SENCO AIR NAILERS	Model	Description	List	Sale
SFN1+	Finishing	Nailer 1" x 2" w/ cs	448	345
SN325	Nailer	1-7/8" - 3-1/4"		665
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
SN60	Framing	"Full HD 2" - 3-1/2"		708
SN65	15%	more power than SN60709		479
SFN40	Finish	Nailer 1-1/4" - 2-1/2"		569

BOSTITCH AIR NAILERS	Model	Description	List	Sale
N805-1	Stick	Nailer		339
N80C-1	Coil	Nailer		339
RN45	Coil	Roof Nailer 3/4" - 1-3/4	845	369
N60FN	Finishing	Nailer		537
BT35-2	Brad	Tacker 5/8" - 1-3/8"		254
BT35-2K	BT35-2	w/ cse, oil, & brads	279	165
CWC100	1 HP	Pancake Compressor		440
MIIFS	Flooring	Stapler 15 gauge		902
325SX-1	325SX-1	with case & oil		269

SKIL TOOLS	Model	Description	List	Sale
2735-04	12 volt	cordless Drill Kit		260
2736-04	2735-04	with keyless chuck		269
77	Famous	7-1/4" Worm Drive Saw		144
77M	NEW 7 1/2"	Mag Worm Saw - 2 lbs lighter than Model 77.		165

PANASONIC CORDLESS	Model	Description	List	Sale
EY618CRK	9.6V	Drill Kit w/ 2 batteries, 1 hour charger, & case		307
EY618E0K	9.6 volt	Drill with 15 min. charger, case & Ironman battery		315
EY6100CRK	12 volt	Drill Kit w/ 2 batteries, 1 hour charger, & case		379
EY6100CQK	Same as EY6100CRK	but has 15 minute charger		409
EY6100EQK	12V Drill Kit w/ 2 Ironman batteries, 15 min. charger, & case			379
EY6101SOK	12 volt 1/2" Drill w/ 15 min. charger, diagnostic battery, & case			438

PASLODE IMPULSE GUNS	Model	Description	List	Sale
IM250	Trimpline	Finish Nailer Kit		1130
IM325	Impulse	Framing Nailer Kit		1130
CT325SS	Cds	Framing Nailer Kit		1120

CLAYTON OSCILLATING SPINDLE SANDERS	Model	Description	List	Sale
140	Portable	sandr w 4-1/2" spindle		625
146	Portable	sandr w 9" spindle		685
100	Floor	mount sdr 4-1/2" spindle		765
106	Floor	mount sander 9" spindle		845

SIoux TOOLS	Model	Description	List	Sale
8030	3/8"	var/spd Drill		263
8000	3/8"	var/spd close grt Drill		211
690	5"	Air Random Orbit Sander		228

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- DW995K 1/2" Drill Kit Sale 229
- DW997K 1/2" Drill/Hammer Drill Kit Sale 249
- DW936K Saw Kit Sale 249



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DEWALT TOOLS	Model	Description	List	Sale
DW364	1-1/4"	Circ. Saw w/brake	294	158
DW610	7-1/2"	Hand Router	266	152
DW411	1/4	sheet Palm Sander		89
DW100	3/8"	Drill, 4 amp, 0-2500 rpm	118	68
DW682KB	Biscuit			

FINISHING TOUCHES

Waltzing on walnut

Longwood Gardens, near Philadelphia, rates as one of the largest and finest horticultural displays in the world. It also features a most unusual floor in its conservatory ballroom. According to Bob Chenoweth in his book *Black Walnut* (Sagamore Press, Champaign, Illinois, 800/327-5557), the floor is made of black walnut salvaged from—of all things—surplus World War I gunstock blanks! The triangular-shaped blanks were split lengthwise, then laid in a parquet pattern.



Register touts top trees in USA

According to the 1996-97 National Register of Big Trees, Florida has more champion trees (146) than any other state. California, though, has the biggest of the big trees—the 275'-tall giant sequoia nicknamed General Sherman. The champion-of-champions hardwood tree, a 129' sycamore with a girth of nearly 50', belongs to Ohio. Only four states have no big-tree champions—Delaware, Massachusetts, North Dakota, and Wyoming. All in all, the Register lists the champions of some 840 different species

and where they're found, as well as the 154 species that remain championless.

Published by American Forests, America's oldest conservation organization, and sponsored by the Davey Tree Expert Co., headquartered in Kent, Ohio, the National Register of Big Trees has listed the nation's largest specimens for 56 years. To find out how you can become a serious big-tree hunter, write for a free brochure to: American Forests, P.O. Box 2000, Washington, DC 20013. For a copy of the 1996-97 Register, enclose \$7.95 (U.S.).

Your fair share

On the average, each American annually uses the equivalent of a 100'-tall, 18"-diameter tree for wood and paper products, the Southern Forest Products Association calculates. However, nearly 5 million trees are planted in the United States every day, which works out to five trees a year for every citizen. In fact, annual growth of U.S. forests has exceeded harvest by 33 percent for decades.



Rod Seitz stepped up from refrigerator magnets to designing and crafting scrollsawn fretwork clocks that combine contrasting woods, such as this one in oak and walnut.

A fretwork revival?

Fretwork, the art of making intricately sawn cutouts in wood, was in its heyday at the turn of the century. Or was it? The article on Minnesota scrollsaw craftsman Carl Weckhorst ("Fretwork Masterpieces") in the January 1996 issue of *WOOD* magazine sparked hundreds of fretwork-fan letters to Carl, and many to the *WOOD* offices. Maybe it's the 21st century that will truly mark fretwork's popularity zenith!

Brenda Seitz, of Decorah, Iowa, wrote to tell us about her husband Rod's scrollsawing endeavors. Seems that a number of years ago he bartered for a used scrollsaw, then retreated to the basement and began piling up sawdust. "I accumulated more refrigerator magnets than I could ever give away," wrote Brenda. Today, Rod, helped by his father-in-law, Allen Monroe, has built a lively business around his scrollsawing. But it's clocks, not refrigerator magnets, that Rod produces these days. "I now have a bare refrigerator, but walls full of beautiful clocks," Brenda penned.

Rod does reproductions, and also designs his own patterns. For information, send a SASE to Old World Clocks, 2481 River Rd., Decorah, IA 52101. ♣



In a durability test, the competitor's hammer lasted 60 seconds. If you happen to need one for longer than that, buy a Stanley hammer.

This picture tells the story better than any words can. In our overstrike tests, the Stanley hammer outlasted the competitor's brand by a 4 to 1 ratio.*

You see, after years of research (and a whole lot of sleepless nights) our engineering department concluded that jacketed, solid-core fiberglass is more durable than the compression-

molded variety some of our competitors use to make their hammers.

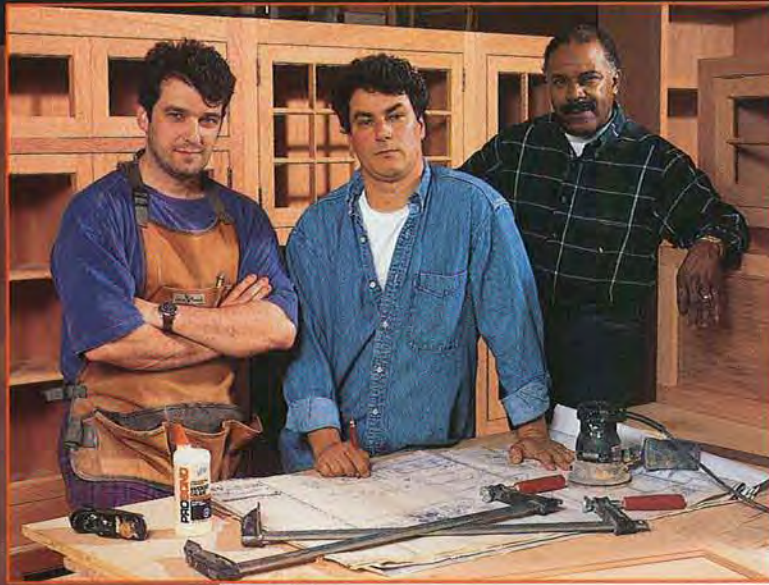
That's the Stanley philosophy. Don't quit working until your product is perfect. You'll find this kind of dogged determination across the board at Stanley. In everything we make. Like a garage door insulated to reduce noise. Or a closet organizer made

with steel planks instead of wire so it doesn't wrinkle your clothes.

It's innovative thinking like this that's kept us ahead of the competition for more than 150 years. At Stanley we're not happy simply churning out products. We're only happy when our products are better than anyone else's.

STANLEY
helps you do things right.

THESE ARE THE BRAINS BEHIND NEW PROBOND WOOD GLUE.



What happens when you listen to wood-working professionals?

A new wood glue that meets their every expectation.

Introducing ProBond™ Professional Strength Wood Glue.

The features that woodworkers want and need are formulated into ProBond Wood

Glue. Extensive field testing among professionals has confirmed ProBond's outstanding performance. In fact, among those expressing a preference, ProBond was rated higher in overall quality than the leading brand.

Ease of Use Combined with Firm, Snug Bonding. A glue with strong wet tack. It sets in just 15 to 25 minutes. With minimal clamping. After curing, **the bond is actually stronger than the wood itself.**

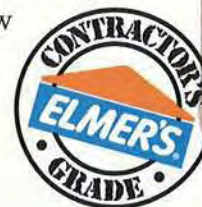
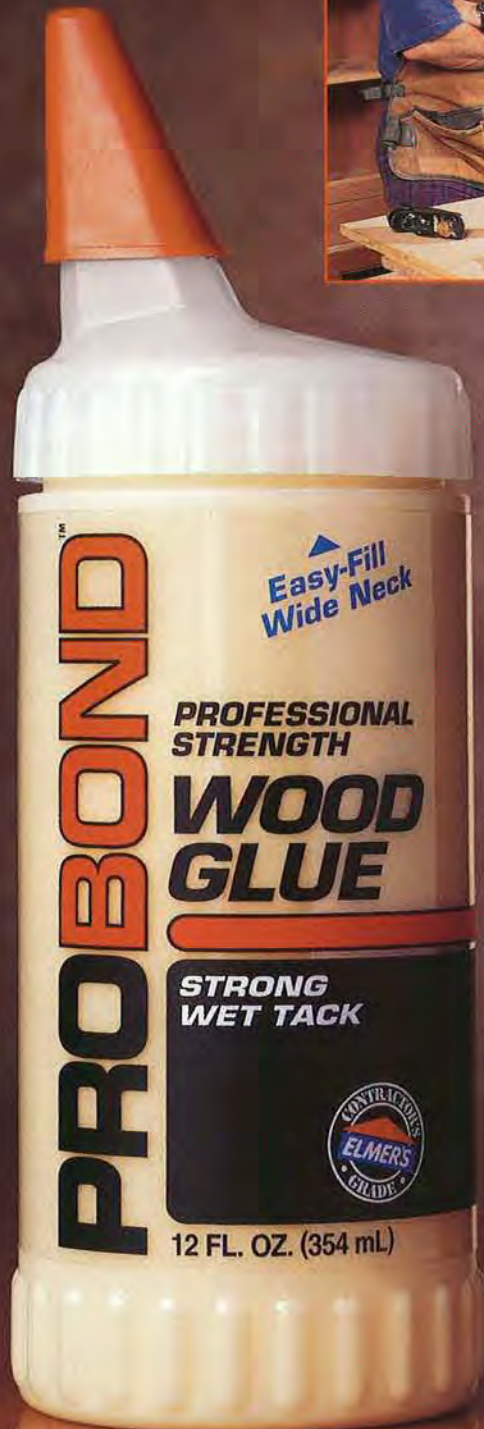
It pours easily. It's sandable and paintable. Plus it's resistant to heat and moisture.

New Bottle Works Great. ProBond's revolutionary bottle helps get the job done fast. The size and shape fit your hand perfectly. The offset spout delivers the right amount of glue right where you want it. Every time. Even in tight corners.

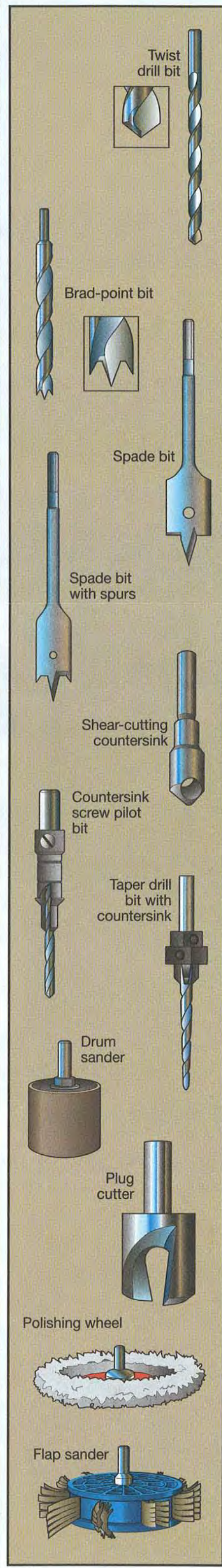
We even designed the cap and wide-neck bottle to be easy to open and easy to fill.

ProBond Wood Filler is as Professional as Our Glue. ProBond Professional Strength Wood Filler has a totally unique solvent formula. Dries fast. Won't crumble. Resists shrinking and cracking. It's easy to sand. It's stainable and available in colors that match most popular woods.

So next time you need wood glue or wood filler, step up to new ProBond.



WOOD[®] MAGAZINE'S GUIDE TO DRILL BITS AND ACCESSORIES



DRILL PRESS SPEED CHART

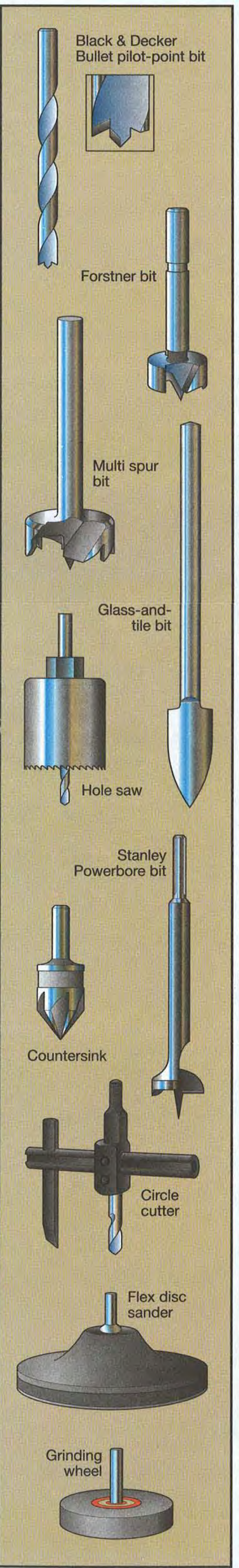
Recommended operating speeds (RPM)

Accessory	Softwood (Pine)	Hardwood (Hard Maple)	Acrylic	Brass	Aluminum	Steel	Shop Notes
Twist drill bits*							
1/16" - 3/16"	3000	3000	2500	3000	3000	3000	Lubricate drill with oil when cutting steel 1/8" or thicker. Use center punch on all holes to prevent drill from wandering.
1/4" - 3/8"	3000	1500	2000	1200	2500	1000	
1/2" - 5/8"	1500	750	1500	750	1500	600	
13/16" - 1"	750	500	NR	400	1000	350	
Black & Decker Bullet pilot-point bits*							
1/8" - 3/16"	3000	3000	3000	2000	1500	3000	Good all-around bit. These cut more quickly than Brad points and twist drills.
1/4" - 3/8"	3000	3000	2400	1500	1000	2000	
1/2"	3000	1500	1600	1500	750	1200	
Brad-point bits*							
1/8"	1800	1200	1500	NR	NR	NR	Raise 1/4" and smaller bits often to clear shavings and prevent heat build-up.
1/4"	1800	1000	1500	NR	NR	NR	
3/8"	1800	750	1500	NR	NR	NR	
1/2"	1800	750	1000	NR	NR	NR	
5/8"	1400	500	750	NR	NR	NR	
3/4"	1200	250	500	NR	NR	NR	
Forstner bits							
1/4" - 3/8"	2400	700	NR	NR	NR	NR	Raise 1/4"-3/8" bits often to clear shavings and prevent heat build-up. Make several shallow passes with larger bits; allow bit to cool between passes.
1/2" - 5/8"	2400	500	250	NR	NR	NR	
3/4" - 1"	1500	500	250	NR	NR	NR	
1 1/8" - 1 1/4"	1000	250	250	NR	NR	NR	
1 3/8" - 2"	500	250	NR	NR	NR	NR	
Glass-and-tile bits (Listed speeds are for glass and tile—not softwood.)							
1/8"	750	NR	NR	NR	NR	NR	Wear safety goggles. Use drill press only. Do not apply excessive pressure. Lubricate with water while drilling. Reduce quill pressure when bit tip emerges from back side.
3/16"	600	NR	NR	NR	NR	NR	
1/4"	500	NR	NR	NR	NR	NR	
5/16"	400	NR	NR	NR	NR	NR	
3/8"	350	NR	NR	NR	NR	NR	
1/2"	200	NR	NR	NR	NR	NR	
Hole saws*							
1" - 1 1/2"	500	350	NR	250	250	NR	Do not use with brass or aluminum thicker than 1/8". Avoid dense hardwoods such as hard maple.
1 3/8" - 2"	500	250	NR	150	250	NR	
2 1/8" - 2 1/2"	250-500	NR	NR	150	250	NR	
Multi spur bits*							
2 1/8" - 4"	250	250	NR	NR	NR	NR	Smaller sizes also available; use Forstner speeds.
Spade bits*							
1/4" - 1/2"	2000	1500	NR	NR	NR	NR	Clamp work to table to improve quality of hole.
5/8" - 1"	1750	1500	NR	NR	NR	NR	
1 1/8" - 1 1/2"	1500	1000	NR	NR	NR	NR	
Spade bits with spurs							
3/8" - 1"	2000	1800	500	NR	NR	NR	Best bit for acrylic. Clamp work securely.
Stanley Powerbore bits*							
3/8" - 1/2"	1800	500	NR	NR	NR	NR	Ideal for deep holes and end-grain drilling.
3/4" - 1"	1800	750	NR	NR	NR	NR	
Circle cutters*							
1 1/2" - 3"	500	250	250	NR	NR	NR	Drill one side, flip material over, place center bit in its hole, and resume cut.
3 1/4" - 8"	250	250	250	NR	NR	NR	
Shear-cutting countersinks							
1/4" - 3/8"	1000	1000	700	700-1000	700-1000	NR	Cuts cleaner than traditional countersinks.
Countersinks							
2-flute	1400	1400	NR	NR	NR	NR	Raise and lower frequently for quicker cutting.
5-flute	1000	750	NR	250	250	NR	
Countersink screw pilot bits							
All sizes	1500	1000	500	500	NR	NR	Clear twist drill often.
Taper drill bits with countersinks							
All sizes	500	250	250	NR	NR	NR	Clear bit often to prevent heat build-up.
Plug cutters							
All sizes	1000	500	NR	NR	NR	NR	Cut to full depth so bit chamfers plug.
Drum sanders							
Hard rubber	750	1500	750	NR	NR	NR	Avoid load-up and overheating.
Soft sleeveless	500	750	750	NR	NR	NR	
3" pneumatic	1750	1750	1750	NR	NR	NR	
5" flex discs	750	500	500	NR	NR	NR	Adhesive-backed discs work best.
Polishing wheels							
1500	1500	1500	1500	2000	NR	NR	Use light pressure.
Flap sanders							
2000	2000	2000	2000	2000	2400	NR	Hold work firmly.
Grinding wheels							
NR	NR	NR	NR	NR	NR	3000	Use 6" or smaller wheel.

NR Not recommended *Back material to prevent chip-out. Always wear a face shield for optimum protection.

Notes

- Recommendations are based on visual and tactile tests under shop conditions. Drilling faster than recommended can cause overheating. Speeds slower than those recommended may cause poor-quality holes.
- All testing done on face grain. Reduce speed when drilling into end grain.
- Speeds based on new bits from the factory.



4 DRILLING RULES TO LIVE BY

1 KEEP YOUR SPEED UNDER CONTROL
To prolong the life of your drill bits, always follow the speed limits posted in the chart at left. If you go too fast, the cutting edges of a bit may turn blue, a sure sign that the steel has lost its "temper" or hardness. Once this happens, the cutting edges will dull quickly, leading to poor-quality holes, a slow feed rate, and burned stock.
If a demanding task requires that you push a bit to high temperatures (say you have to drill many holes in a hard material in rapid succession), try to keep the bit cool by immersing it in water between holes. Remember, if water sizzles when it touches a bit, you're running the bit too fast. When drilling metals, use a lubricating oil.

2 IT MAKES SENSE TO BUY HIGH-QUALITY BITS
If you plan to use a bit often and want it to last a long time, spend the extra money for a high-quality bit or set of bits. The best bits come with sharp cutting edges that slice through wood quickly and leave smooth surfaces. They are made from high-quality steels that stay cooler and hold an edge longer. For better heat absorption they often have more steel mass near the cutting edge.
With that said, there's no denying that many of the bits being imported from the Far East are incredibly inexpensive. It may make sense for you to purchase these when you need a special bit(s) that may see limited use in your shop.

3 AVOID GRAIN TEAROUT ON THE EXIT END OF A HOLE
Some bits, such as Brad-points, Forstners, and certain spade bits, have spurs or cutting rims on their outside edges that help prevent grain tearout as the bit exits its hole. That's because the spurs or cutting rims score the outside diameter of the hole just before other cutting edges remove the bulk of the waste material. But even with these bits, there's no guarantee against tearout. And with other bits, particularly twist bits and traditional spade bits, you can count on grain tearout.
You can do two things to avoid this problem. First, back your workpiece with a solid piece of scrap positioned on the exit end of the cut as shown at left. Use clamps or firm hand pressure to hold the scrap tightly against the workpiece. The scrap will support the workpiece grain against the exiting force of the bit.
If you can't back the workpiece, try the trick at left. With bits that have a centerpoint, drill the hole just deep enough so only the very tip of the centerpoint exits the hole. Then, flip the workpiece over, precisely center the bit over the exit point, and finish the hole by drilling into what used to be the exit side.

4 FOLLOW A FEW BASIC MAINTENANCE PROCEDURES
By forming a few good habits, you can greatly extend the life of your drill bits. First, place only the solid shank end of a bit into a drill chuck. The jaws of the chuck will damage the bit's cutting edges if the two make contact. You can also protect the cutting edges by storing the bits upright in a manufactured metal index, or a wooden one of your own making. And, to keep your bits from rusting, clean them from time to time with a cloth, and rub on a light coating of oil or wax.

THESE PROPERTIES DIRECTLY AFFECT PERFORMANCE

STEELS

When you're out shopping for drill bits, you'll find three basic types of materials to choose from. From low- to high-priced they are:

Alloy steels: Any package that does not claim to contain high-speed steel or cobalt bits probably holds bits made from one of many types of alloy steels. These relatively inexpensive steels are commonly used in spade bits, auger bits, and large Forstners where high temperatures are not typically generated. Twist drills, Brad-points, or small Forstners bits made of an alloy steel may serve your needs for occasional work in softwoods or plastics only. In denser materials such as hardwoods, alloy-steel twist or Brad-point bits will quickly overheat and dull.

High-speed steels: Bits made from one of the common grades of high-speed steel, such as M1, M2, M7, M50 or M52, hold up well to higher temperatures compared to bits made of an alloy steel. Any of these grades of high-speed steel are a good all-around choice for bits used in woodworking or occasional metal drilling.

Cobalt high-speed steel: This M42 grade of premium high-speed steel contains 8 percent cobalt. It performs exceptionally well in tough metals such as stainless steel or titanium alloys. Its extra cost is not justified for strictly woodworking tasks, but if you drill a lot of metal, these long-lasting bits will pay for themselves.
In our shop test, these bits perform best when you use a coolant such as water or oil, and apply steady, but not excessive, pressure. If you allow the bit to spin in contact with stainless steel, the surface of the stainless steel will work-harden. Because cobalt high-speed steel is hard but brittle, it may break if you try to slightly increase the size of a hole in stainless steel. For example, if you need to drill a 1/2" hole in 1/4"-thick stainless steel, drill a 1/8" pilot hole and switch directly to a 1/2" bit. Do not attempt to go from a 1/8" to a 1/4" to a 3/8" to a 1/2" bit.

COATINGS

The following coatings have little or no advantage for woodworking applications, but they do make sense if you occasionally drill metals. These coatings are typically found on bits made of high-speed steel:

Black oxide: This coating acts as a heat-resistant lubricant when drilling through metal. It helps prevent the welding of metal chips to the drill bit, and the welding of the bit to the metal workpiece. The lubrication effect also helps chip removal.

Titanium nitride: An extremely hard and thin (.0001") coating that reduces friction significantly better than black oxide. Appropriate for drilling metals under 35C Rockwell hardness (for harder metals use cobalt bits).

POINTS

The tip of a drill bit can tell you a lot about the bit's quality and how long it will perform well. Look for sharp, finely ground points. And, the grinding angle on the point has a big effect on how the bit performs in various materials. Here are three common point grinds:

- 90°:** This sharp angle makes for aggressive cutting in wood and other relatively soft materials.
- 118°:** This is a good, middle-of-the-road grind for general-purpose use in woods and metals.
- 135°:** This point does not cut aggressively, so it holds up well in hard materials such as metals. To prevent "walking," these bits often have a "split" point to give more bite during initial contact.

- ### MANUFACTURERS
- Black & Decker**
800/762-6672
 - CONVALCO**
(premium Forstner bits)
860/793-1855
 - Creco**
503/982-0100
 - Freud**
(high-speed steel and carbide-tipped Forstner bits)
800/472-7307
 - Insty-Bit, Inc.**
(quick-change Brad-point and countersinking pilot bits with hexagon-shaped shanks)
612/381-1060
 - Irwin**
(American Tool Companies)
800/866-5740
 - Vermont American**
704/735-7464
 - W.L. Fuller**
(premium tapered pilot bits with countersinks)
401/467-2900
 - Wolcraft**
708/773-4777
- ### CATALOG SOURCES
- Garrett Wade**
800/221-2942
 - Grizzly Imports**
West of the Mississippi
800/541-5537
East of the Mississippi
800/523-4777
 - Harbor Freight**
800/423-2567
 - MLCS**
800/533-9298
 - McFeely's**
800/443-7937
 - Woodcraft**
800/225-1153

5 DRILLING TIPS THAT WILL HELP YOU IN A PINCH

1 Make this simple jig for perpendicular holes in stock too big for your drill press
Some projects call for you to drill holes perpendicular to a surface. But, what do you do if the piece is too large for your drill press table, and you don't own a guide for your portable drill?
TIP: Join two blocks of wood at a 90° angle. By holding your drill bit in the corner of this jig, you can accurately bore perpendicular holes with many sizes of twist and Brad-point bits.

2 Here's how to center a bit in an existing hole
Enlarging a hole in wood or other material requires a lot of guess work to start the bit in the exact center.
TIP: Insert a scrap of dowel the diameter of the existing hole and slightly recessed from the surface—about 1/16". Fit a drill bit the same size as the hole into the recess and rap the end of the shank just hard enough to mark the dowel center. Use this mark to start drilling the larger hole.

3 Bull's-eye alignment for large-diameter holes
Centering a Forstner bit on a workpiece can be difficult because the shape of the cutting head prevents you from seeing its point and your layout lines.
TIP: Drill a 1/16" guide hole at the centerpoint of each hole. Ease the tip of the bit into the guide hole and take care to keep it in place as you turn on the drill press.

4 Leveling your drill press table with a wire
Squaring up a drill press table can prove tedious.
TIP: Instead of using a square, try a coat hanger. Cut a wire about 6" long, and bend right angles in it as shown. Don't worry if the angles aren't exactly 90°. Chuck one end into the drill. Raise the table so it touches the wire. Rotate the drill chuck 180° by hand so you can detect any high or low spots.

5 Taper a spade bit to drill snug-fitting holes for wood plugs and candles
It's hard to get wood plugs to fit snugly into the holes you drill for them. Also, when boring holes for tapered candles, a standard spade bit will not produce a snug fit. The holes will be either too large at the bottom or too small for the base to be inserted properly.
TIP: Grind a slight taper on the cutting edges of some spade bits. With these tapered bits, plugs will fit into their holes like a cork into a bottle. Just a few strokes of a file or a pass or two over a grinder will suffice. Make sure both sides have identical tapers. For candles, modify a spade bit of the appropriate size—1 1/4" matches standard tapered candles. Scribe lines on the bit so it tapers from a 1 1/4" diameter to 3/4" as shown at left.