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#129 July 2007

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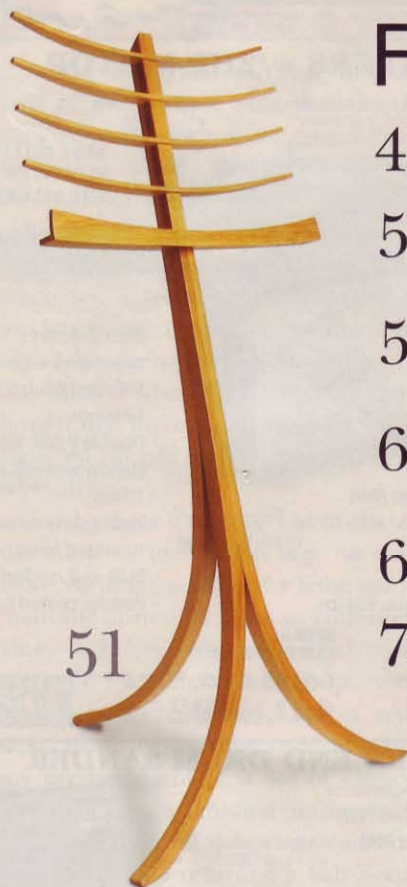
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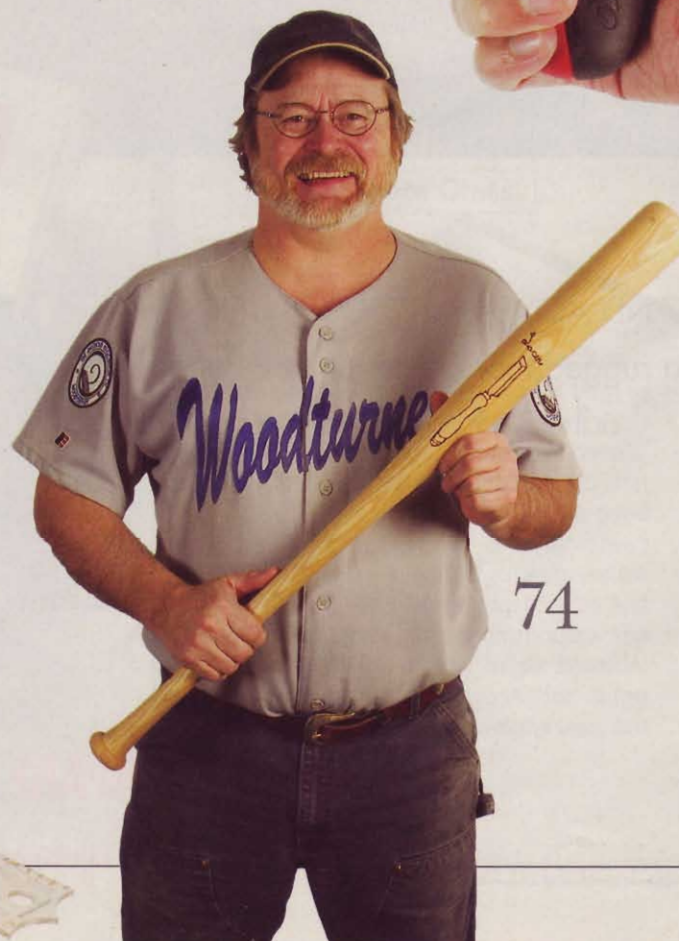
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IT WAS LIKE HIS NEIGHBOR'S SHOVEL WAS **NEVER BROKEN**

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EDITOR'S LETTER

White Oak: A Great American Wood

Deep in the forest where I hiked as a kid and hunted as a teenager was a towering white oak tree. Measuring 4 ft. in diameter, with an expansive crown, it stood proud among a younger generation of slender poplar, aspen and maple trees. For some odd reason, it must have escaped the lumberman's saw decades earlier.

White oaks can live for hundreds of years. One of the most famous, the Wye Oak of Maryland, was estimated to be 460 years old until a storm brought it down in 2002. It measured 32 ft. in circumference and held the record as the nation's largest white oak.

White oak is the perfect choice for a wide variety of applications. Woodworkers admire the beauty of its quartersawn grain. Boat builders take advantage of its strength and rot resistance. The warship USS Constitution, launched in 1797, was nicknamed Old Ironsides because cannon balls bounced off her thick white oak hull. Completely restored in the 1990's, she still sails the Boston Harbor. Although only 15 percent of the ship's wood is original, the keel—18-in. by 30-in. by 160 ft.—is made of the same four white oak timbers laid down over two centuries ago.

That's a hard act to follow, but in this issue you'll find two projects that also make the best of white oak's outstanding properties. The sunburst Patio Table (page 42), tough and rot-resistant, is designed to survive many backyard barbecue battles. The Steam-Bent Music Stand (page 51) takes advantage of white oak's pliability in steam bending. And, of course, white oak's beauty enhances both projects.

Happy July 4th,

Randy Johnson

Randy Johnson
Editor

rjohnson@americanwoodworker.com



Circle No. 15

IS IT REALLY FREE?

Just received your American Woodworker Extra e-newsletter by signing up on your website's homepage. Is it free or will I be billed?

John Anderson

Yes, the e-newsletter is free. Hope you enjoy it!

BROKEN LINK

Let me compliment you on a first-class e-newsletter. I subscribe to several. Your edition is by far the best, but the Quick Tips link will not work. Everything else is fine, mighty fine.

Mike Mullen

You are correct; the Quick Tips link was bad. Lesson learned – "All is virtual in cyberspace but the typos."

GOOD TIMING

I recently received your American Woodworker Extra e-newsletter and wanted to say how much I enjoyed it.

I am just setting up my shop. The air scrubber article, which I received free for signing up for the newsletter, really came in handy.

I subscribe to a number of woodworking magazines. In my opinion, American Woodworker has benefited me the most.

Laird Bevit

SHOCKING NEWS

In May's Question and Answer department, you addressed the variety of 240-volt plugs and receptacles. The article mentioned the circuit breaker "tripping to protect the motor from overheating". Load protection is not the circuit breaker's job. The circuit breaker's only purpose is to protect the con-

ductors from the breaker panel to the receptacles from overheating, not the load applied. Motor (load) protection is or should be provided by thermal overloads in the motor windings or the motor starter.

You offered good information on "Why do plugs vary" in the May issue. However, I thought that one very important piece of information was left out. This is in regards to sizing circuit breakers. Since one of the main purposes of a circuit breaker is to protect structure wiring (in the wall) from an overload condition, this needs to be considered before changing a circuit breaker with one that has a higher amp rating. If a circuit breaker was installed that had a higher amp rating than what the wiring in the wall was designed for, this could potentially lead to the wire overheating and possible fire.

Joe Manner

In the May 2007 Q&A ("Why Do Plugs Vary") you gave some rather poor advice.

The purpose of a circuit breaker or fuse in any electrical wiring is to protect the wiring and not the device plugged in. According to the NEC, it is perfectly legal and acceptable to put smaller current-carrying outlets on circuits with higher current ratings.

Rich Flynn

QUESTION & ANSWER

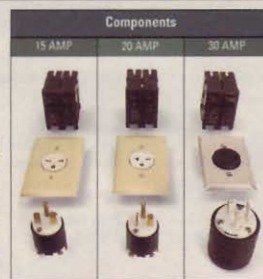
WHY DO PLUGS VARY?

Q I'm confused by the variety of 240-volt plugs and outlets. Does it matter what type I use with my machines?

A Sure does. Each type is designed for a different amp load. To protect your machine's motor, you must match the amp ratings of the motor, plug, outlet and circuit breaker.

Most 240-volt woodworking machines designed for small shops run on 15, 20 or 30-amp circuits. There's a unique plug and outlet configuration for each circuit. Amperage ratings are always printed or stamped on the plugs. If your machine already has a 240-volt plug on it, install the appropriate outlet in your wall and the same size breaker in your fuse box. If your machine doesn't come with a plug, consult the owner's manual and install the appropriate plug, outlet and breaker.

Allowing too many amps to be delivered to a motor may damage or destroy it. You shouldn't plug a motor that's rated at 12 amps into a 30-amp circuit, for example. During a heavy cut, a motor calls for more amperage to



maintain torque. A 15-amp circuit breaker would trip in time to protect the motor from overheating. A 30-amp circuit breaker wouldn't offer the same protection. It would continue to provide amperage well past the motor's rating and lead to excessive heating, a motor's biggest enemy.

10 American Woodworker MAY 2007

In trying to cram 4 lbs. of answer into 2 lbs. of space in "Why Do Plugs Vary?" we may have given some wrong impressions. We did not mean to imply that circuit breakers are designed to act as overload protection for motors. The job of the breaker, as several of you pointed out, is to protect the wiring between the breaker and the outlet. The situation we were trying to address was a fellow eyeing up a 30-amp clothes dryer outlet as a ready-made source for 240-volt power for a new 12-amp jointer.

Ideally, the primary overload protection in large motors (over one HP) should be built into the motor or tool. However, not all motors come so equipped. Short of adding overload protection to the motor, having a circuit wired specifically for the motor's amp rating can add an additional layer of protection for that motor. That's the point we want to stress. If the motor is larger than one HP, the NEC (National Electrical Code) requires overload protection, either built-in or field-installed.

We recommend running a dedicated, properly-sized circuit to the tool (in the above case, a 15-amp circuit). This includes appropriately-sized wire, something we failed to mention in the original answer. It is OK to turn your 30-amp circuit into a 15-amp circuit by changing both the receptacle and the breaker because it uses the heavier gauge #10 wire in the wall. The larger wire gauge is actually a good thing as there will be less voltage drop over a given distance with the larger wire.

A few writers suggested that using an overbuilt circuit is actually desirable

because it allows for future expansion. This is basically true. However, if you use a 30-amp circuit to run a 12-amp tool, and you don't want to rely solely on the tool's built-in overload protection, we recommend wiring overload protection sized to the 12-amp tool as an additional safeguard for the motor.

Another point raised by some of our readers was the fact that we run low-amp tools on high-amp 120-volt circuits all the time. This is true. You can run your 7-amp tool on your 15-amp circuit, but unless the tool has built-in overload protection, there is nothing to protect the motor from burnout, except the user. The applicable code, 2005 NEC 430.32(D)(2), allows 1 HP and smaller motors that are "not permanently connected" to be protected by 120 V 15 or 20 amp breakers or fuses, with or without running overload protection for the specific motor.

WOODRAT "A TERRIFIC TOOL"

Just a note on your review of the WoodRat: I've had a 'Rat for about eight years, and would agree that the tool works in a different way from anything else I have seen. It does take a bit of adjustment to one's way of thinking.

Having said that, I cannot imagine working wood without one. Heaven forbid, but if all my tools were somehow lost, I think after a tablesaw, the WoodRat (and a good router) would be the next tool I would buy. The WoodRat has become central to my workflow. Mortises, tenons, dovetails, finger joints, router table work, you name it, I do it with the "Rat".

Hundreds of articles have been published over the years, describing one miracle jig or another designed to make cleaner, more

accurate joints. The WoodRat replaces virtually all of those jigs by giving you complete control over the relationship between the wood and the router bit, in all directions.

Personally, I enjoy building furniture a lot more than building jigs. The WoodRat lets me do that. It does just about every joint in the book, quickly and accurately (once your brain wraps itself around the whole approach).

Thank you for the article on this relatively unknown but terrific tool.

Jon Herron

DROP US A LETTER

American Woodworker welcomes your letters and e-mails about our articles, website, and all things woodworking. Published letters may be edited for style and length and become the property of American Woodworker. Send e-mails to aweditor@americanwoodworker.com. Send postal mail to AW Mailbox, American Woodworker Magazine, 1285 Corporate Drive, Suite 180, Eagan, MN 55121.

American Woodworker JULY 2007 9

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Shaky Grinder

Q My grinder shakes like crazy. Does this mean that the motor shaft is bent or the bearings are shot?

A Your problem most likely lies with the wheels, not the motor. They're probably out of round and unbalanced, common conditions of new or old wheels.

Truing your wheels perfectly round is a simple matter of routine maintenance. After truing, your grinder should run with little vibration. But if you want your grinder to run even better, and produce a smoother, more even finish on your tools, you can take the extra step of balancing your wheels. This requires purchasing a balancing kit (see Sources below).

Before you true your wheels, try one simple trick to reduce vibration. Unplug the grinder and remove both wheel covers. Loosen the nut on one wheel and rotate the wheel 1/4 turn, without turning the shaft (Photo 1). Tighten the nut, replace the wheel covers, plug in the machine and turn it on. If it vibrates about the same amount, try rotating the wheel another 1/4 turn, and so on. Grinding wheels may be denser, and thus heavier, on one side. This procedure offsets the imbalance of one wheel with the other, but it doesn't always work.

You'll need a pencil and a dresser to true your wheels. Many types of dressers are available, but a T-style diamond dresser is the easiest to use (see Sources, below). A common problem with truing is not removing enough material to make the wheel perfectly round, so it's smart to mark your wheels first (Photo 2). Set your tool rest 90 degrees to the wheel, turn on the grinder and true with the dresser (Photo 3). Wheels wear down unevenly, so it's a good idea to repeat this procedure now and then.

Balance your wheels, if you wish, after truing them (Photo 4). Using a balancing kit is much more effective than rotating the wheels to offset differences in wheel density.

Sources

Woodcraft, (800) 225-1153, www.woodcraft.com Diamond wheel dresser, #124670, \$15.

Lee Valley, (800) 871-8158, www.leevalley.com Oneway balancing system, 1/2" shaft, #66B04.24, \$58, 5/8" shaft, #66B04.25, \$58.



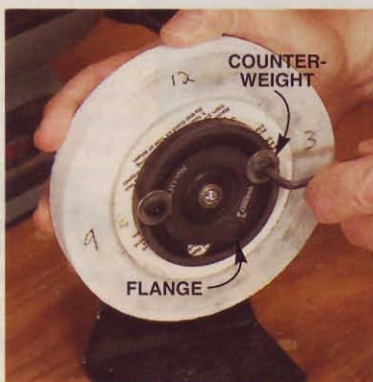
1 To reduce vibration, try rotating one wheel 1/4 turn or more on the shaft. You may find that the wheel runs smoother in one position than another.



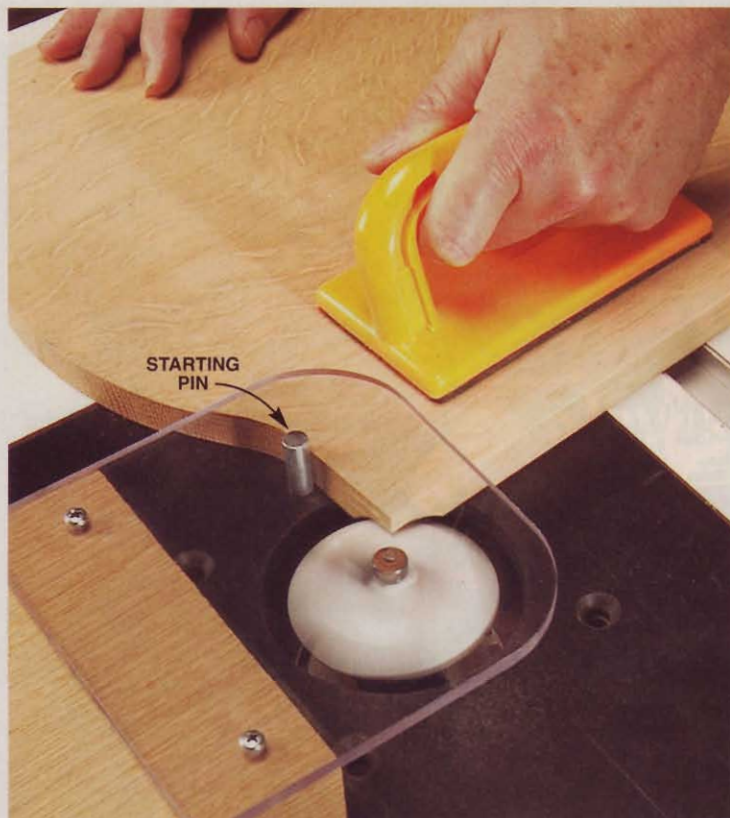
2 Truing your wheel to make it perfectly round is the best way to reduce vibration. Mark the wheel's entire circumference, rotating the wheel by hand.



3 Dress the wheel to remove its high spots. Stop the wheel on occasion and check to see whether any pencil marks remain. Keep dressing until they're all gone.



4 Balance the wheels with a special kit to make your grinder run even smoother. Two new wheel flanges are included. Each flange has moveable counter-weights to offset differences in a wheel's density.



STARTING PIN

Q My router table came with something called a "starting pin." What's it for?

A A starting pin helps prevent kickback when using a bearing-guided bit. It's an important safety feature. Using a fence is the best and safest way to rout, but a fence is impractical on curved or irregular-shaped pieces. That's when you need a starting pin. If your router table doesn't have a starting pin, it's a good idea to install one.

When you begin a cut, use the starting pin as a fulcrum. Press the workpiece against the pin, then slowly rotate and slide it into the router bit until the wood touches the bit's bearing. Feed the workpiece an inch or so against both the starting pin and the bearing. Once you're confidently engaged with the bearing, you can rotate the workpiece away from the starting pin and ride on the bearing only.

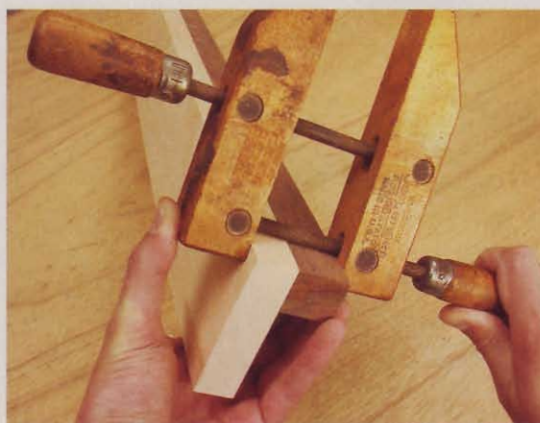
PESKY HANDSCREWS

Q I used handscrews to laminate some boards together, but the joints didn't come out tight. What went wrong?

A Chances are that the clamp's jaws weren't perfectly parallel when you tightened them. If they're not parallel, you don't get sufficient pressure along the jaw's full length. Properly adjusting handscrews can be tricky, but these two steps at right show a clever way to do it.

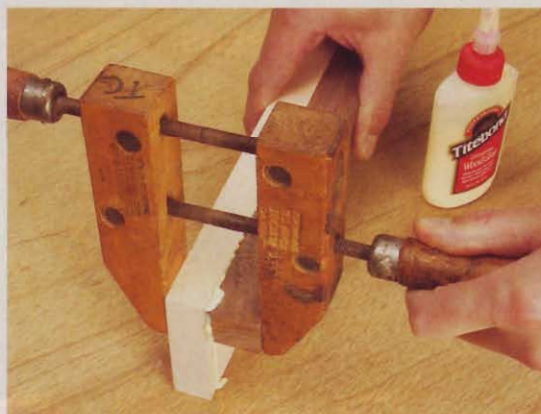
Step 1

Adjust the rear handle first. Make sure the jaws are roughly parallel, then tighten the clamp's end on your workpiece. Unscrew the rear handle 1/2 turn, remove the clamp, then screw the handle 1/2 turn back to where it was.



Step 2

Tighten the front handle. The clamp's jaws are now parallel and apply even pressure front to back. If you need more pressure, tighten both handles an equal amount.



If you have a question you'd like answered, send it to us at Question & Answer, American Woodworker, 1285 Corporate Center Drive, Suite 180, Eagan, MN 55121 or e-mail to qanda@americanwoodworker.com. Sorry, but the volume of mail prevents us from answering each question individually.

edited by Brad Holden

Sliding Drill Press Table

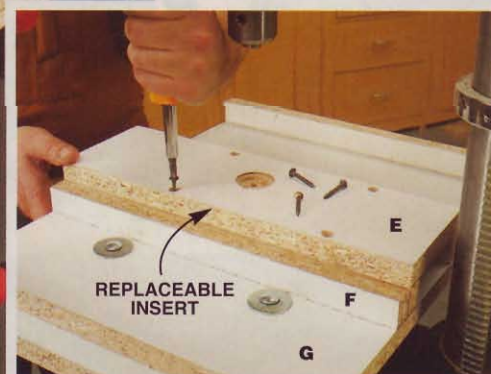
Why doesn't a drill press come with an adjustable fence? My solution is essentially a two-part table. The fence (C) is attached to the top part, which slides on the runners (F) of the bottom part, which is fastened to the drill press table. Setscrews thread through T-nuts mounted inside the side rails (D) to lock the top in position. The bottom holds an insert (E) that can easily be replaced whenever it starts to look like Swiss cheese.

Chris Irwin



CUTTING LIST		Overall Dimensions* 4-7/8" x 14-3/4" x 20-1/16"		
Part	Name	Number	Dimension	
A	Front Rail	1	3/4" x 2-1/2" x 20-1/16"	
B	Table	2	3/4" x 7-3/4" x 14"	
C	Fence	1	3/4" x 2-3/8" x 20-1/16"	
D	Side Rail	2	3/4" x 1-3/4" x 14"	
E	Replaceable Insert	1	3/4" x 4-1/2" x 14"	
F	Runners	6	3/4" x 1" x 14"	
G	Base	1	3/4" x 14" x 18-1/2"	

*Sized for use with 14" drill press



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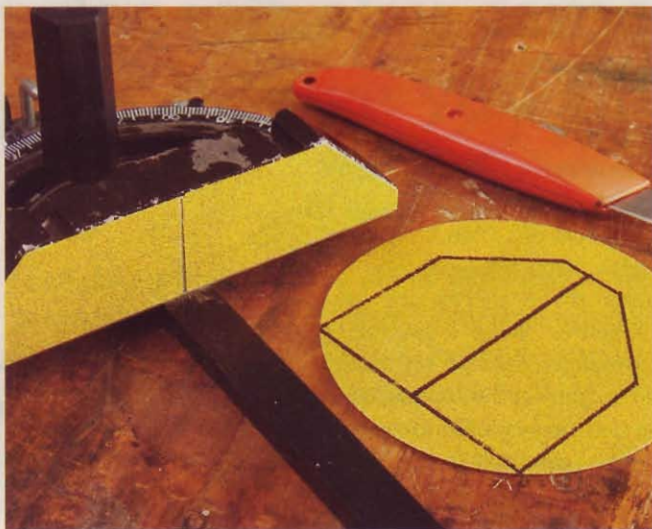
Tips that save money, time or space. Tips for gluing, clamping and assembling. Tips for measuring, machining or finishing. Look around your shop: Send us every tip you have that makes your woodworking successful and fun.

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of a **Festool OF1400EQ Router** (\$405 value), a **Festool C12 Cordless Drill** (\$350
value) or a **Festool CT Midi Dust Extractor** (\$330 value). All other tips that are pub-
lished in our Workshop Tips department will earn the submitter \$100.

To enter: E-mail your original tips with photos to toolgiveaway@americanwoodworker.com or
mail them to Workshop Tips Tool Giveaway, American Woodworker Magazine, 1285 Corporate Drive
Center, Suite 180, Eagan, MN 55121. Submissions must be received by July 31, 2007. Winners will
be announced in the October 2007 issue of American Woodworker Magazine. Submissions cannot
be returned and become our property upon acceptance and payment.





NO-SLIP MITER GAUGE FACE

Trimming miters used to drive me crazy, because I couldn't hold the piece I was trimming securely enough against the miter gauge. The piece would always slide away from the blade during the cut. I solved the problem by covering the miter gauge face with 120-grit PSA (pressure sensitive adhesive backed) sandpaper. One 5-in. disc will cover most gauges. I clean the face with denatured alcohol, to assure good adhesion. Then I simply cut the disc to fit the face and press on the pieces.

Rich Petrushka

SAVE THE STRAW!

A can of lubricant is very useful around the shop, and so is the little red straw...if you can find it after the first use! I figured out that the straw fits in the groove in the top of the can, and you can still put the lid on. No more lost straws!

Brian Roesch

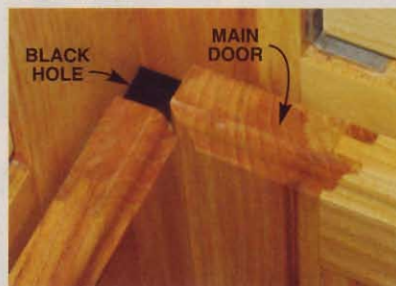


ZAP THE GAP

I hated the black hole that appeared when I installed corner bifold doors in my kitchen cabinets. To get rid of this annoying gap, I decided to make the main door (the one with the hinges) 3/4-in. wider, so it would extend behind the second door. This alteration required cutting a pair of 3/4-in.-deep notches in the main door in order for the hinges to work properly (these notches are only visible when the doors are open). I also had to measure from the inside edge of each notch to drill the bifold hinge cup holes.

Ed Wood

BEFORE



AFTER



ED WOOD

TOGGLE CLAMP SANDING BLOCK



I made this quick-release sanding block from four pieces of 1/2-in.-thick birch plywood. The top three pieces are glued together. Wrap a quarter sheet of sandpaper around the bottom piece and slip on the top assembly. The toggle clamp (www.rockler.com #20787, \$9) locks the top assembly to the bottom.

All four pieces measure 2-1/2-in. wide by 7-in. long. The toggle clamp mounts on the bottom piece. The second piece has a hole just large enough for the toggle clamp's base to fit through. This leaves a lip for the toggle to clamp onto. The third piece has a clearance hole for the entire clamp. The fourth piece is the same as the third, and builds up the block so the clamp sits inside. I glued on pieces of cork to cushion the sanding surface and fortify the toggle clamp's grip.

Mark Thiel

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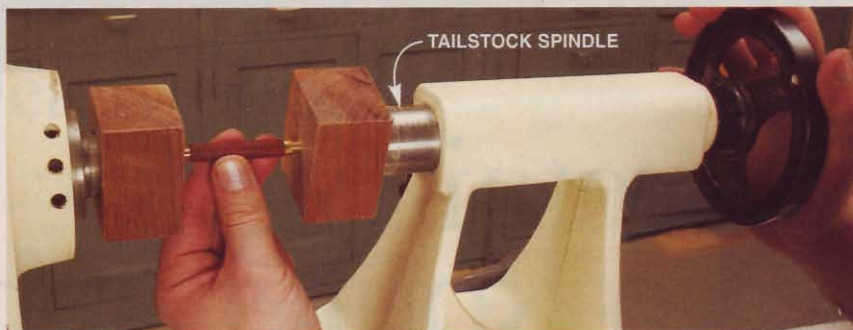
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Jim Vasi



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by George Vondriska

Dovetail Jig for a Router Table

The new Route-R-Joint from Woodline USA, \$179, is a unique dovetailing jig. Instead of handling a router on top of the jig, you invert the jig on top of your router table. The Route-R-Joint can cut half-blind and through dovetails, along with heart shaped and other unique corner joints. And there's an incredible lifetime warranty on the templates, even if you plow into them with a router bit. Wow!

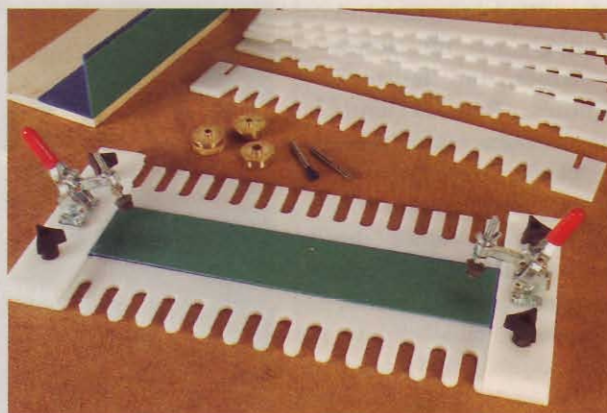
I like the stability provided by inverted routing. A hand-held router on a jig can tip and ruin your work. There's little chance of tipping with the Route-R-Joint.

The Route-R-Joint excels at providing lots of different corner joints in one package, for a pretty reasonable price. Setting up the joint is a little bit fussier on the Route-R-Joint than on conventional half-blind dovetail jigs, but it didn't take me too long to get used to it. The owner's manual for the jig is OK, but the DVD that's included does a better job of explaining assembly and use of the Route-R-Joint.

Standard equipment with the jig includes the required guide bushings, one dovetail and one straight bit, and templates for through and half-blind dovetails and heart shaped joints. Twelve additional template shapes are available, \$18 per set.

The jig depends on Porter Cable-style guide bushings mounted in the router table, so your table insert has to be capable of accepting them. The guide bushings are included with the jig.

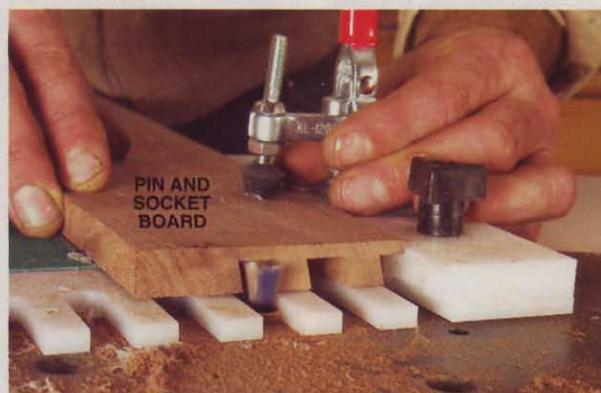
Source
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Route-R-Joint, \$179,
Additional templates,
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The kit



Cutting tails



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EDITOR: RANDY JOHNSON • ART DIRECTION AND PHOTOGRAPHY: VERN JOHNSON, UNLESS NOTED.



Amazing Cut Quality

The new Freud Fusion table saw blade, \$99, provides a crosscut or rip cut, that's as smooth as a baby's... well, you know.

Forty-tooth alternate top bevel (ATB) table saw blades like the Fusion aren't new, but the Freud blade provides a really outstanding performance. Regardless of whether you're cutting solid wood, veneered plywood or even melamine, there's no need to swap out blades each time you change operations. The Fusion provides crisp corners on the top and bottom of the material, and a silky-smooth edge.

Source

Freud Tools, (800) 334-4107, www.freudtools.com, Freud Fusion, #F410, \$99.



Perfect Circles With Your Router

Need a way to cut perfect circles? I'm pretty impressed with the new jig from Circle Cutters, Inc., \$49.99. It's a simple device that uses your router to cut a nearly infinite variety of diameters. It allows you to cut circles from 6-in.

to 48-1/16 in. diameter, in 1/16-in. increments. That adds up to 674 circles!

Made from 1/4-in.-thick acrylic, the Circle Cutter is a sturdy router accessory that's based on a simple pivot system.

Just drill a 1/16-in. hole in your blank, then use the drill bit as a pivot point by inserting it through the jig and into your piece. The pivot holes in

the jig are labeled with dimensions, so there's no need to measure. There are two scales on the jig. One is used with a 1/2-in. bit, the other with a 7/16-in. bit.

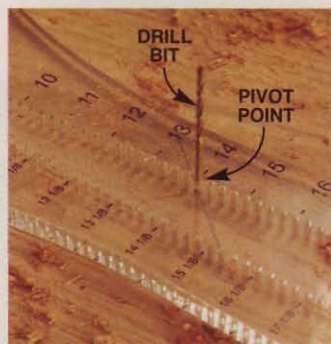
The Circle Cutter comes with a plate to help you get your router perfectly centered on the jig. That's important, as poor centering would

affect the accuracy of the built-in scale. The jig is pre-drilled with a handful of holes to match a variety of router bases.

The Circle Cutter is available directly from the manufacturer.

Source

Circle Cutters, Inc. (219) 306-1909, www.circlecuttersinc.com Circle Cutter, \$49.99.



RAMON MORENO

Nicely Priced Moisture Meter

Unknown moisture content in solid wood can sure mess up a project. A moisture meter is an inexpensive insurance policy that allows you to confirm the precise moisture content of your material before making the first cut. The mini-Ligno E/D from Lignomat, \$125, offers a lot of bang for the buck.

The E/D has an easy-to-read digital display, preferable to the analog display found on some meters. The measuring range is an ample 6% to 45%. Two sets of pins are included with lengths of 3/16-in. and 7/16-in., plenty long enough to get an average moisture content reading on 1-1/4-in. thick material.

The E/D has two correction settings for wood species. A chart is included indicating which setting to use, depending on what species you're testing. A temperature correction chart is also included in case you test the wood above or below 70 degrees Fahrenheit.

Source

Lignomat, (800) 227-2105, www.lignomat.com mini-Ligno E/D, #ED-0, \$125.

Stainless Steel Sanding Discs

When I first looked at the Microplane stainless steel sanding discs I thought, "There's no way that can work. It'll just tear up the wood." But now that I've logged lots of hours of sanding with this product, I'm a believer.

According to the manufacturer this product will remove wood five times faster than a conventional abrasive, while outlasting it seven times. This helps justify the cost - about \$5 per disc, which would buy about three discs of conventional high-quality abrasive. So, is it worth the investment? Yes. Although I wasn't able to quantify the manufacturer's claim about the discs cutting wood faster, I would have gone through numerous changes of regular sandpaper in the same length of time that I used a single Microplane disc.

The discs are available in 40-, 80-, and 120-grit. On red oak and pine I found the surface left behind by the 120-grit disc slightly rougher than a conventional abrasive. The discs come in 5-in. hook-and-loop, and attach to any standard 5-in. hook-and-loop sanding base. The discs will work with sanders that have through-the-base dust collection. Microplane discs are designed for raw wood only, not finished surfaces.

Source
Microplane
(800) 555-2767, www.microplane.com
Stainless Steel Sanding Discs,
\$9.95 for 2 discs.



RAMON MORENO



RAMON MORENO

All-Inclusive Slot Cutter Set

CMT's slot cutter set, \$160, provides a complete slot cutting package. With four arbors, seven cutters, seven bearings, and a handful of shims, this set can create slots with different depths and widths, tongue and groove joints, lock rabbets, and more.

The four arbors allow you to stack the cutters in a variety of configurations. Mount a single cutter and bearing for conventional slot cutting or, using the longer arbor, stack up a number of cutters for making a very wide slot. Using a countersunk bolt the cutters can be mounted at the end of the arbor to allow undercutting, as you would with a lock rabbet joint.

The cutter set includes one 1/16-in., one 1/8-in., one 5/32-in., one 3/16-in., and three 1/4-in. cutters.

The four bearings range in size from 3/4-in. to 1-1/4-in diameter and can be used to create slots from 5/16-in. to 9/16-in. deep.

Source
CMT USA,
(888) 268-2487, www.cmtusa.com
Slot Cutter Set, #823001, \$160

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Jointer/Planer Combo Machine

Students often ask me if they should buy a jointer or planer first. Here's an opportunity to get both in one tool. Grizzly's new G0633 12-in. Jointer/Planer Combination machine, \$1,795, does dual duty with one cutter head. At first blush the price tag may seem high, but the economics are good when you combine the prices of a stationary induction-motor planer and jointer.

One big advantage to jointer/planer combos is that you get an exceptionally wide jointer, which is very useful for face-jointing wide boards. When using the jointer you can take full advantage of the 12-in. wide cutter head.

Switching from jointing to planing requires removing the jointer fence and flipping the jointer tables up out of the way which, according to Grizzly, is an easy conversion that takes only about 30 seconds.

Along with the 12-in. wide, three-knife cutterhead, this machine offers a jointer fence that's 39-3/8-in. long and a generous 5-7/8-in. tall. The jointer table is 59-1/2-in. long. The planer table is 23-1/3-in. long. The jointer table is shorter than that found on most 8-in. jointers, but the fence length is comparable. Planer thickness capacity is 8-in. The machine is driven by a 5-hp 220-volt motor. If you prefer a carbide insert spiral cutterhead, have a look at Grizzly's G0634, \$2,295. It's the same machine, except for the cutterhead.

Source

Grizzly International, (800) 523-4777, www.grizzly.com Jointer/Planer Combination, #G0633, \$1,795, Jointer/Planer Combination w/carbide insert spiral cutterhead, #G0634, \$2,295.



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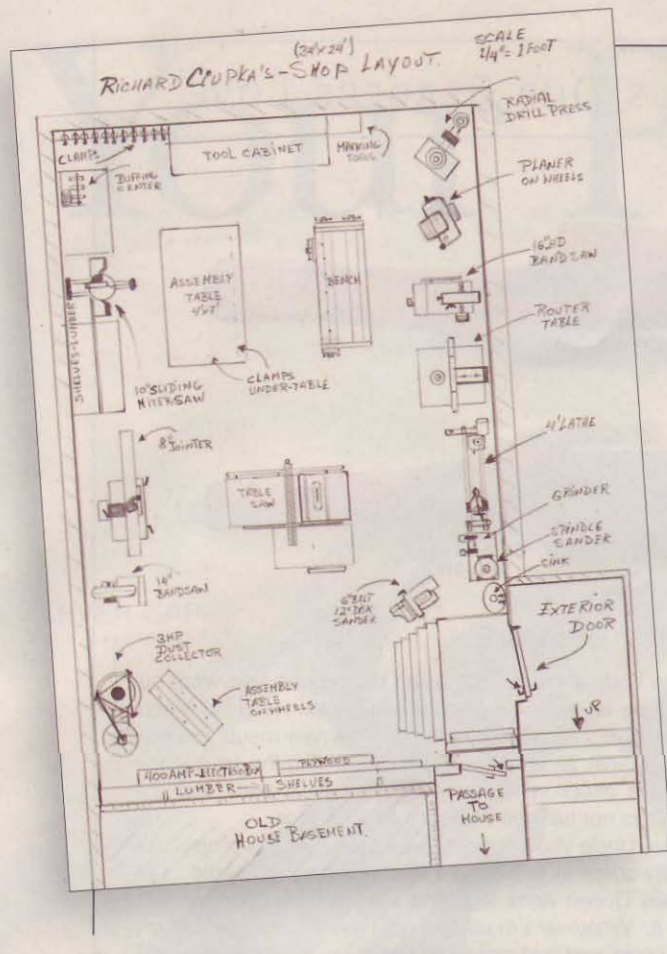
Woodworking Sixteen Feet Under

Although I now live in Quebec, Canada, I developed my love for woodworking many years ago as a teenager living in Paris. Eleven years ago I finally decided to build my dream workshop. But according to the city by-laws, my yard wasn't large enough for the 24'x34' shop I had planned. One day while I was lobbying at the city offices, a clerk jokingly said "Well, there are fewer restrictions when you build underground."

I came back home thinking this was nonsense. I wanted my shop to overlook a beautiful lawn, with plenty of windows to let in the sunshine. So I announced to my young kids (4 and 8 years old) that we would be moving to a wonderful new, larger home in the suburbs. My enthusiastic presentation flopped. Both kids started crying in despair. They were so emotionally attached to the only home they'd known that my heart couldn't take it...

So here I am, many dollars later, in the same house. My shop is con-





structed of pre-formed concrete slabs and it's totally underground: Three quarters is submerged under my lawn; the remaining part extends beneath my solarium. A passage door allows entering from my house and a 4-ft.-wide exterior door provides outside access. The ceiling rises to 15-ft. at this end of the shop. Much of the wiring and all the dust collection ductwork runs underneath the shop's 12-in.-thick hollow floor. A dedicated 400-amp electrical panel provides power.

Although my friends call it my "bunker shop", it feels more like a marvelous cavern to me. It's my sanctuary, a quiet place for meditation and retreat. I can also work all night, using all of my machines, without waking anybody up anywhere. I just love it.

Richard Ciupka

Tell us about your shop!

Send us photos of your shop, a layout drawing and a description of what makes your shop interesting. Tell us what you make in it and what makes your shop important to you. If "My Shop" features your shop, you'll receive \$100.

E-mail your entry to myshop@americanwoodworker.com with digital photos attached. Or mail your description with prints or digital photos on a disc to **My Shop, American Woodworker, 1285 Corporate Center Drive, Suite 180, Eagan, MN 55121**. Please include your phone number. Submissions cannot be returned and become our property on acceptance and payment. We may edit submissions and use them in all print and electronic media.

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Circle No. 175



UNCLE VITO'S SPOKESHAVE

My Uncle Vito was a man of few words. I didn't know much more about him than that he had come from a family of woodworkers and had worked in his father's shop, the woodworking industry, and for himself. He was incredibly skilled. Even now I feel like a woodworking dunce compared to him.

When my uncle died 25 years ago, I inherited his tools, which included a wooden spokeshave. It's not much to look at—and weighs next to nothing. The blade is adjusted with a hammer. You tap one tang or another to make thicker shavings, or turn the tool over and tap the blade to make thinner cuts.

The body is maple, but when the original sole wore out my uncle let in a new piece of white oak. He glued it end-grain down, which is very unusual. This new mouth has only recently split, as you'd expect from running the grain in the opposite direction from the spokeshave's body, but the crack has not harmed the tool's performance.

I use Uncle Vito's spokeshave on nearly every project. It's equally adept at removing a lot of material or a little. I've shaped Queen Anne legs and shaved chair back spindles with it. Whatever I'm using it on, I never fail to think of my kind uncle, and that makes it special.

Albert DiBartolomeo



JEFF OPETT

LIVING THE LEGEND

Old tools usually don't appeal to me. I prefer furniture making to tool refurbishing, after all. But when I decided my home workshop needed a radial arm saw, I didn't have much choice but to reach back in time.

I found some new 12 in. saws that met my quality standards, but they were expensive and took up too much space. I found some new smaller saws, too, but I think their lower quality makes them useless for precision work.

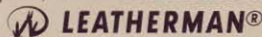
I researched the Internet for a better option. The consensus was overwhelming: Buy a used DeWalt. Its quality and accuracy are legendary. I soon picked up a pristine 9 in. model for \$200 right in my hometown. It was made in 1962 (the year before I was born).

I also purchased "How to Master the Radial Arm Saw," a great book written almost fifty years ago by Wally Kunkel, better known as "Mr. Sawdust." It's available on the internet at www.mrsawdust.com for \$30. This book is invaluable in learning how to fine-tune a DeWalt saw. Based on how my saw performs, Wally's tune-up is definitely worth the time and effort. The legend is really true.

Jeff Opett



Are you a Tool Nut, too? You'll get the new Leatherman Charge AL aerospace aluminum multi-tool if we publish your story. Send your tale to toolnut@americanwoodworker.com, or mail it to American Woodworker, 1285 Corporate Center Drive, Suite 180, Eagan, MN 55121. Please include digital photos of your tool if possible. For more on the Charge AL, visit www.leatherman.com



by Bill Szydlo

Lithium-Ion For The Woodworker

Lithium-Ion (LI) batteries made quite a stir a few years back when they made their debut in the cordless tool market. Now that the dust has settled we thought it was time to take a look at what's on the market and ask which LI tools fit best in a woodshop?

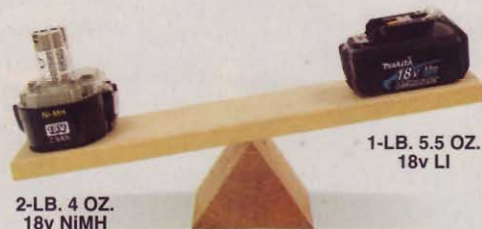
First a brief review: The LI battery was originally developed for the consumer electronic market; specifically cell phones, laptops, and other small electronic devices. Compared to nickel based batteries (NiCad or NiMH), LI's strongest assets are compact size and low weight. LI battery technology is one of the major reasons why cell phones have shrunk and laptops have lost weight (unlike me).

Electronics typically demand a slow but steady power drain. By

contrast, power tools can demand heavy power draws that heat up the battery. LI batteries are especially sensitive to heat damage. Manufacturers have worked hard to overcome this hurdle and by all accounts, they have succeeded.

LITHIUM-ION'S ADVANTAGES

Less Weight - An 18-volt LI battery weighs approximately 40% less than a NiCad or NiMH of the same voltage (Photo 1). This is largely due to the fact that a single LI cell holds 3.6-volts while a



1 Lower weight is the number one advantage Lithium-Ion (LI) batteries have over NiCad or NiMH batteries. By delivering the same volts in a lighter package, LI tools can be made really big (36-volts), or really small (3.6-volts).



EDITOR: DAVE MUNKITTRICK • ART DIRECTION AND PHOTOGRAPHY: VERN JOHNSON

NiCad or NiMH cell holds only 1.2-volts. The more powerful LI cell makes it possible to build the tiny 3.6-volt drill/drivers and the giant 36-volt tools. Tools on both the large and small end of the scale, which were impossible with nickel based batteries, are now a reality.

Fewer Dead Batteries - Another nice feature of an LI battery is its ability to hold a charge when not in use. While a NiCad battery will lose 25% of its charge after a month on the shelf, an LI battery will only lose 2% of its charge. I don't get in my shop as often as I like (who does?). When I do, there's nothing worse than reaching for my cordless drill only to find the battery drained. That scenario is a lot less likely with an LI tool.

LITHIUM ION'S DOWNSIDE

Higher Cost - The LI breakthrough into the cordless tool market has come at a price. Not only are the raw materials for LI cells more expensive, but the need for charge-, discharge- and heat-monitoring technology to protect the batteries from overheating adds to the cost as well (Photo 3 and 4). In short, it's hard to produce an inexpensive LI tool. Manufacturers I spoke to expect costs to decrease as LI takes hold among consumers.

BUYING ADVICE

VOLTAGE

It's important to remember that an 18-volt NiCad has the same power and run time as an 18-volt LI battery. What LI gives you is a lighter package. Some manufacturers use larger LI cells to increase run time at the same voltage (Photo 5). For example, Makita offers two sizes in their 18-volt LI battery and Bosch offers two sizes in their 36-volt LI battery packs. They both have the same voltage (power), but the larger pack will provide twice the amp/hours (run time).

COMMON SIZES

COMPACT: 3.6- 10.8-VOLT DRILLS AND DRIVERS

Here's where LI batteries shine. These drills are amazingly small, yet powerful. The smallest 3.6-volt drivers (Photo 6) are a good choice for jobs like applying drawer slides and cabinet hardware. They are so



2 Good news for the weekend woodworker: LI batteries only lose 2% of their charge sitting idle for a month. A NiCad battery, on the other hand, loses 25% of its charge.



3 Microelectronics control charge/discharge rates to protect LI batteries from overheating. The electronics act invisibly to the user yet are capable of shutting down a hot battery until it cools. Some models include fuel gauges that show the charge level on your battery.



4 Fans, vents and micro-electronics in LI chargers optimize charge rates. They get the battery back in action as quickly as possible without damage from overheating.



5 Bosch and Makita offer a choice between large and compact battery packs. The difference is in the cell's physical size, not the voltage or power. The larger battery pack has up to twice the run time or amp/hours of the smaller. Either pack can be run in the same tool.

6 LI technology makes single cell, 3.6-volt drivers possible. These super compact drills work great for light duty jobs like applying hardware or drawer slides. Only the Hitachi comes with a removeable battery and a spare.



small and light your hand will never tire. Their low RPMs will keep you from stripping out those teeny hardware screws. However, the 3.6-volt drills lack the power and speed one would want to drive larger wood screws. For that task, the Bosch 10.8-volt drivers are outstanding (Photo 7). They are bigger than the 3.6-volt drivers, but still very compact. I was blown away by the power packed in these two tools.

MID-RANGE: 12- 20-VOLT TOOLS

This is where the best balance of power and weight is found. These drills have the power to hang a cabinet with 4-in. screws. At the same time, you don't feel like you're lifting a dumbbell every time you pick one up. My favorite in this category was the Makita 18-volt Compact LXI (Photo 8).

HIGH VOLT: 24- 36-VOLT TOOLS

Here at the high end of the LI tool spectrum we find the big, workhorse tools. These tools are primarily designed for the rigors of on-site construction work. For my money, the best tools in this category for



7 The Bosch 10.8-volt Pocket Driver is a stand out among the low-voltage crowd. It's small enough to fit into a tight spot, but powerful enough to drive #10 screws into solid oak. Its single speed is too slow for drilling most holes, however.



8 The Makita 18-volt Compact LXI has the best combination of power and size. If you want one drill for the shop that can do everything, this is the one. It has a high speed setting for drilling and a low speed setting for driving screws.



9 It's liberating to use a jigsaw without a cord. A cordless jigsaw like the 36-volt DeWalt, is a great woodshop tool. LI technology provides the needed power in a manageable size.

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the wood shop are the jigsaws. Both the DeWalt (Photo 9) and the Ridgid jigsaws performed well. It was a real treat to cut arcs and curves on a board without having to constantly reposition an electrical cord.

RECOMMENDATIONS

Each voltage category has an outstanding tool or two for the woodworker. In the low-volt compacts, I really liked Bosch's two 10.8-volt drills: The Pocket Driver and the I-Driver.

In the Mid-Range, my pick is the Makita 18-volt Compact LXT Lithium-Ion 1/2" Cordless drill driver. You can't beat the combination of price, power and size.

In the High-Volt range, the two jigsaws by Ridgid and Dewalt are a real improvement over the corded variety. Both tools performed well and would make a great addition to any woodshop. You'd expect a longer run time with the higher volt DeWalt, but the price on the Ridgid is hard to beat.

COMPACT

3.6-Volts	4 - Volts	7.2-Volts	10.8-Volts
Black & Decker SmartDriver Compact Screwdriver, \$45	Milwaukee Stick Driver (Future Possibility)	Makita TD020DSEW Cordless Screw Driver Kit, \$120**	Bosch PS10-2 Lithion™ I-Driver™ Kit, \$150
Hitachi DB3DL Screwdriver Kit \$80 (two batteries and charger)			Bosch PS20-2, 1/4" Lithion™ Pocket Driver, \$130
Panasonic Drill & Driver, EY7410, \$220			Skil, EVO Cordless Lithium Ion Drill/Driver, w/ Bag, \$80
Skil I-XO, \$45			
Triton Cordless Screwdriver, \$40			

MID-RANGE

12-Volts	14.4 - Volts	18-Volts	20-Volts
Metabo, Drill/Driver BSZ12, \$180 Plus: 625486000 12-Volt Lithium Ion Battery, \$90	Black & Decker, Super Compact Drill, Model #SC1400, \$130 (built in battery)	Hitachi, DS18DL 1/2" Drill/Driver Kit, \$280	Craftsman, 1/2-in. drill/driver, Sears item #00928169000 Mfr. model #28169, \$270
	Metabo, Drill/Driver, BSZ14.4, \$190 Plus: 14-Volt Lithium Ion Battery, \$100	Makita, BDF452HW (Sumo) LXT Compact Series 1/2-inch Drill-Driver Kit, \$210	
	Panasonic, Drill/Driver Kit, EY7440LN2S, \$360	Makita, LXT 1/2" Drill-Driver Kit, BDF451, \$310	
		Metabo BSZ18 Drill/Driver Plus - 625484000 18 volt Lithium Ion Battery, \$120	
		Milwaukee, V18™ 1/2 in. Hammer-Drill, 0824-24, \$290	

HIGH VOLTAGE

24-Volts	28 - Volts	36-Volts
Ridgid Max Select/Jigsaw, R883, \$119 (battery and charger not included)	Milwaukee, V28 Lithium 1/2-inch Cordless Hammer Drill/Driver Kit, 0724-24, \$330	Bosch Lithion™ Brute Tough™ Drill/Driver Kit, 38636-01, \$360
Ridgid 24-volt Li-Ion battery, charger and tool bag, \$199		*Dewalt Heavy-Duty 36V Cordless Jig Saw Kit DC308K, \$400

Note: All prices are approximate street prices. Kits typically include 2-batteries, a charger and a carrying case. Because of all the factors that go into any buying decision, it is important to check out the details of any sale including shipping costs.

* Metabo drills are sold with a NiCad battery. The Li-Ion battery must be purchased separately. The batteries are compatible with any "Cool Air" series drill of the same voltage.
 ** Kit includes 1-battery
 † Battery and charger sold separately. Ridgid Max Select line can use both their 18-volt NiCad Max Select battery pack or 24-volt XLI battery pack.

A Natural Progression to...



A Call for Entries!

Woodworker's Showcase

Here is your chance to share your best work with fellow woodworkers across the country and around the world.

As woodworkers, we love to build things, but we also love to share our work and the ideas behind them. American Woodworker Magazine is debuting a new department called "Woodworker's Showcase." We're looking for projects that range from practical, everyday pieces to one-of-a-kind artistic masterpieces.

Here's how to submit your work! We ask that the piece you submit be made primarily of wood by your own two hands. Only high quality photos will be selected for publication so make sure you put some time and effort into your photograph. Check out our web page (www.americanwoodworker.com/phototips) for tips on taking good photographs. Digital photographs are preferred but slides and color negatives are also acceptable. If you want your slides or negatives back, you must include a stamped, self-addressed envelope with your submission.

Send your pictures along with a description of the piece that includes the wood(s), joinery and finish that you used. It seems like every piece has a story behind it – please feel free to share yours. We look forward to hearing from you.

Send entries to: Showcase@AmericanWoodworker.com or mail to: American Woodworker Magazine, 1285 Corporate Center Drive, Suite 180, Eagan, MN 55121.



Cherry Cabinet

by Dave Munkittrick
River Falls, WI

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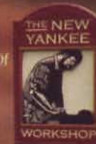
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Patio Table

Tired of outdoor tables made of metal or plastic? This table has the richness and warmth that only wood can provide.

It's built to stand up to the weather, so it's perfect for a patio, porch or sunroom. The 44-in. top features a stunning sunburst radial design and seats four comfortably. The sturdy base construction makes for a rock-solid table. There's a center hole for an umbrella canopy and plenty of room beneath for the counterweight.

I built my table out of rot-resistant white oak with splines and grooves in the tabletop and dowel joints in the legs. I chose epoxy for strong, weatherproof joints.

I simplified the tabletop's complex construction by using an MDF pattern board that doubles as

a machining and clamping jig. The pattern board is used along with a simple trammel to accurately machine the fussy curved joints on the pie shaped slats and to cut the outer ring and the center hub. I'll show you how to make cam clamps that lock the top's parts in position for routing and gluing.

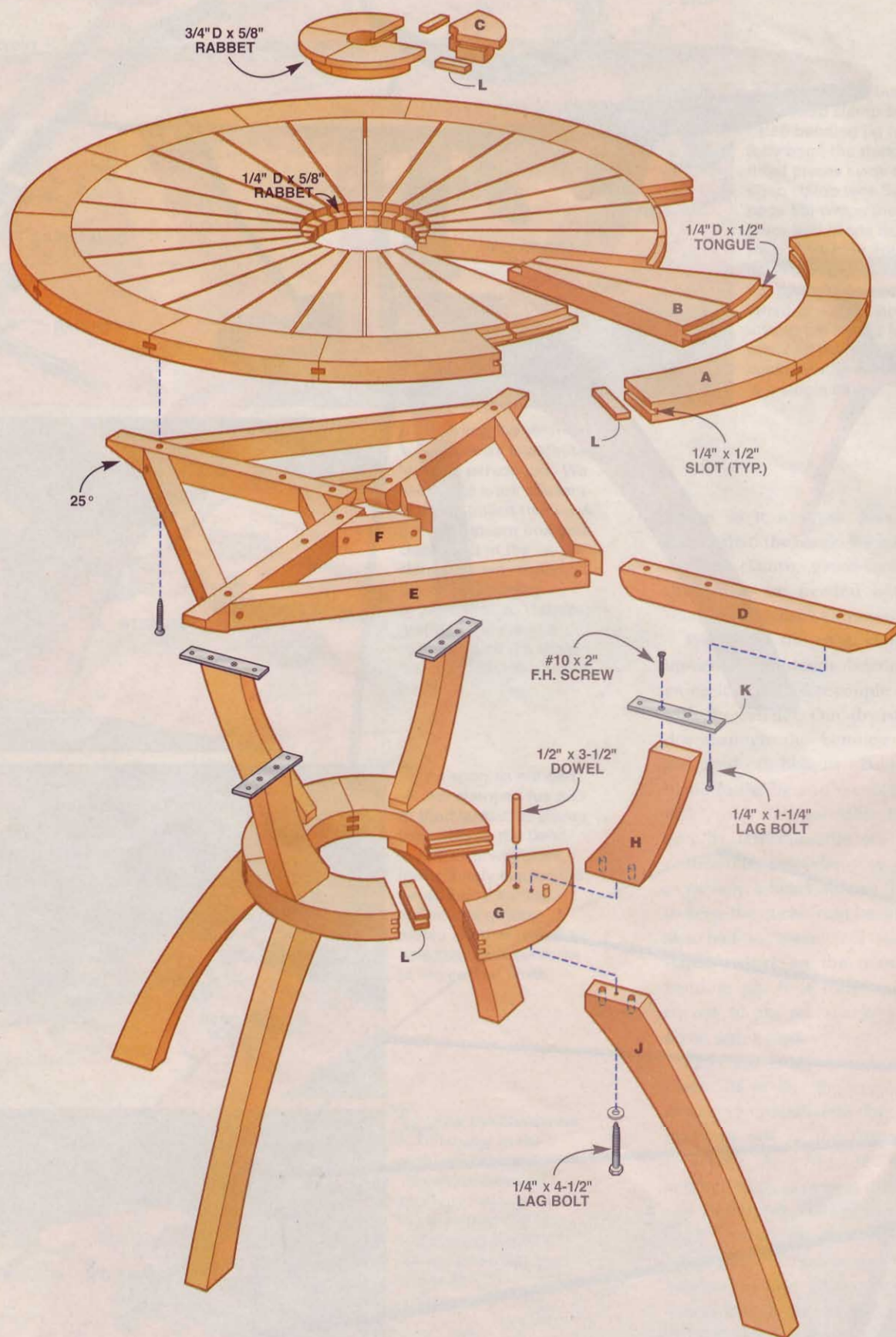
The base may appear challenging to build, but I'll also show you a system, using a pair of ordinary handscrews, to make the job go smoothly.

by David Radtke





FIGURE A EXPLODED VIEW



EDITOR: DAVE MUNKITTRICK • ART DIRECTION AND PHOTOGRAPHY: VERN JOHNSON • ILLUSTRATION: FRANK ROHRBACH

MAKE THE PATTERN BOARD

The best way to deal with the geometry and joinery of the tabletop is to draw it out on a 4x4-ft. piece of 3/4-in. sheet stock (Fig. B, page 46) I call it a pattern board.

BUILD THE OUTER RING

1. Measure the length (long point to long point) of a section of the outermost ring on the pattern board. Our measurement came to 11-13/16 in. but check yours since it may vary.

2. Cut the outer ring segments (A) to length on a sled (Photo 1; Fig. C, page 46).

3. Dry fit the segments on the pattern board to make sure all the miters are tight. You may have to adjust the angle of the last miter. If you do, mark the joint so it can be reassembled correctly.

4. Add backer blocks to support the inside edge of the outer ring (Photo 2).

5. Cut the cam locks on the drill press using a 2-1/2-in.-dia. hole saw and a table that slopes 10 degrees (Photo 3).

6. Screw the cam locks onto the pattern board so the short radius is just shy of the spacer. The sacrificial spacers keep the cam locks from being cut as the ring is routed out in the following steps.

7. Cut the slots in the mitered ends of each outer ring segment on your router table. Cut splines (L) to fit the grooves from scrap oak.

8. Glue up the outer ring (Photo 4).

ROUT THE OUTER RING

9. Screw a 1-in. thick pivot block on the center of the pattern board.

10. Chuck a 1/4-in. upcut spiral bit in your router and attach it to the trammel (Fig. D, page 46).

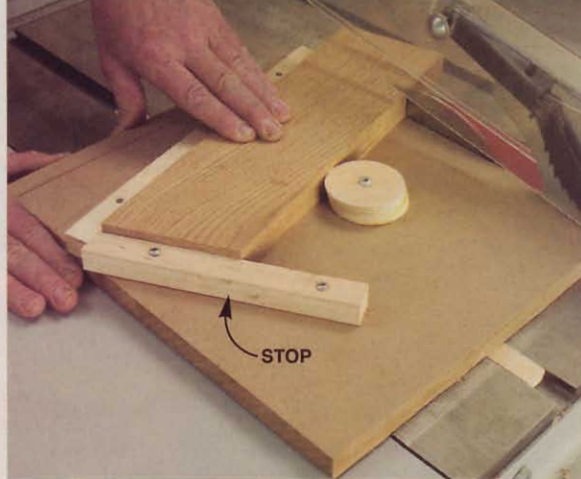
11. Set the bit to cut 3/16-in. deep. Hook the trammel on the pivot block using the 22-1/8-in. hole.

12. Turn the router on and plunge the bit into the ring. Swing the trammel slowly around (Photo 5). Drop the carriage another 3/16-in. and make a second pass. Repeat until there's about 1/4-in. of material at the bottom of the ring. Important: Don't cut all the way through the ring. You need enough material so the cam clamps can continue to hold the ring in place.

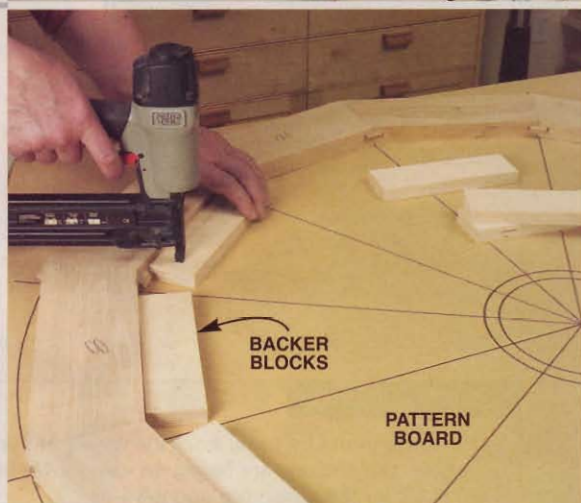
13. Move to the shorter pivot point and cut the inside edge of the ring in the same manner as the outer edge.

14. Remove the ring from the pattern board. Use a jigsaw to remove the remaining

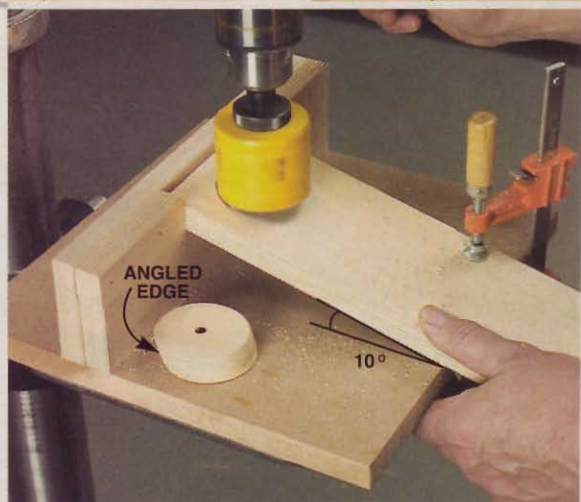
1 The table is built from the outside in. Start by mitering the outer ring segments with a sled. Cut one end of each segment without the stop in place. Add the stop and miter the opposite end. A shop made cam lock holds the piece in place.



2 Dry-fit the ring segments on a pattern board that has a full-size drawing of the top. Pin backer blocks behind each segment.



3 Make eccentric cam locks on the drill press using a 2-1/2-in. hole-saw and a support. The angled edges of the disc act like a cam lock when screwed to a board.



4 Glue and clamp the outer ring with slow-set epoxy and cam locks. Glue sacrificial spacer blocks to the ring so the cam locks won't get cut by the router in the next step. Tape under the splined joints prevents the ring from adhering to the pattern board.

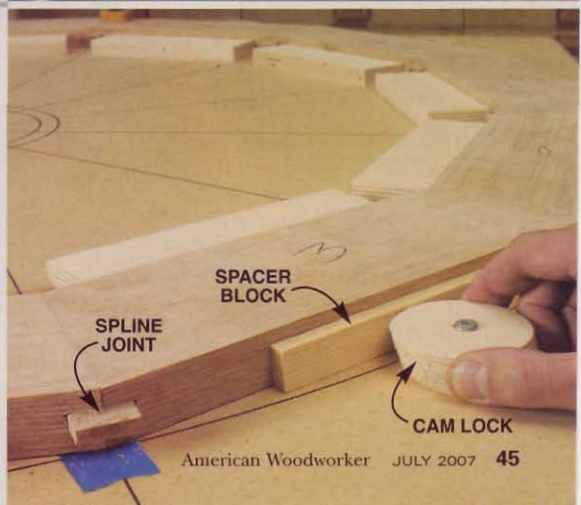
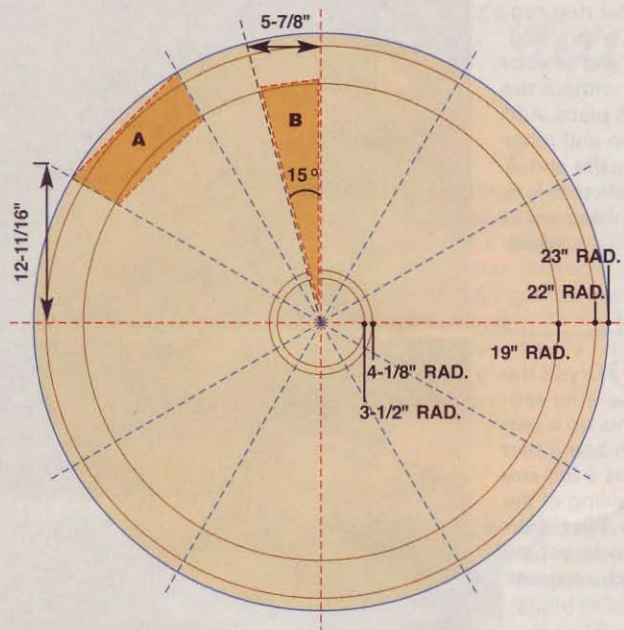


FIGURE B PATTERN BOARD



Use a trammel to draw circles with the following radii: 3-1/2-in., 4-1/8-in. This marks the radius of the hub and the depth of the rabbet on the underside. Swing arcs at 19 in. and 22-in. to mark the outer ring. Swing one more mark at 23-in. to establish the long points for your mitered outer ring sections. Section the whole circle into four equal quadrants (red lines) using a straight edge and a square. Use the square to make a mark 12-11/16-in. up from the 9:00 mark on the 22-in. ring. Make another mark below the line. Repeat at the 12:00 position. Then use a straight edge to draw the blue lines. From the 12:00 position on the 22-in radius, use a square to measure out 5-7/8-in. and create the black line.

FIGURE D TRAMMEL

Drill holes in the trammel from the center of the router bit hole. Dimensions are based on using a 1/4-in. spiral bit for the outer ring and a 3/4-in. straight bit for the tongues and rabbets.

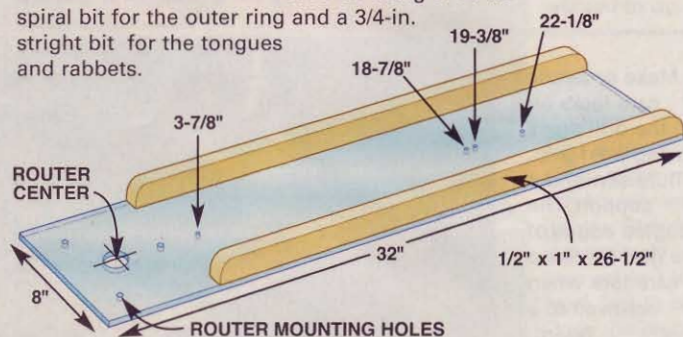
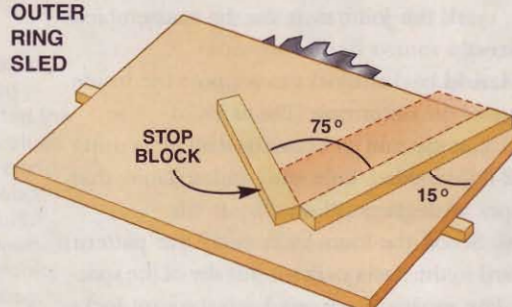


FIGURE C TABLESAW SLEDS

OUTER RING SLED



SLAT TAPER SLED

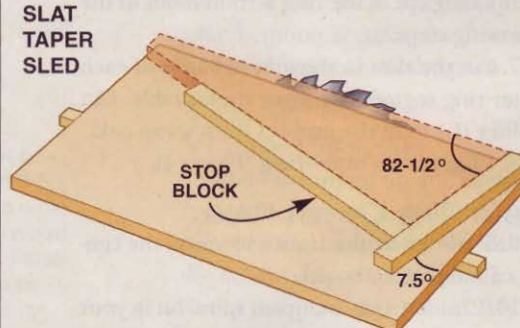
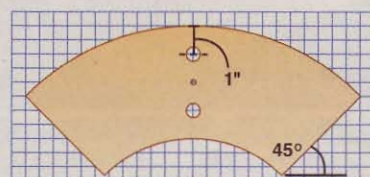
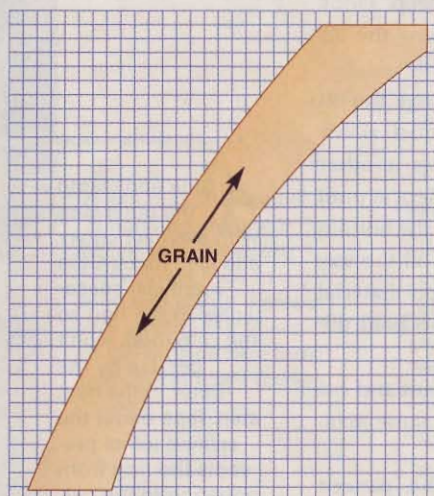


FIGURE E BASE PARTS (1/2-IN. GRID)

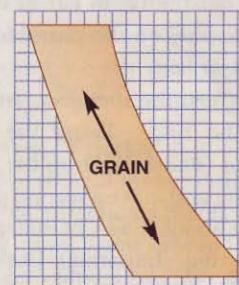


LOWER RING SEGMENT

Center one leg in each section of the base ring and drill through holes for dowels and a screw on the drill press. Countersink the 5/32-in. hole from both sides so a #8 screw will seat flush or slightly below the surface.



LOWER LEG



UPPER LEG

stock from the ring. Don't try to flush-cut the edges but leave a slight tab.

15. Remove the tabs with a flush trim bit (Photo 6).

16. Rout a centered groove all the way around the inside edge of the ring.

MAKE THE TAPERED SLATS

17. Cut the table slats (B) to length.

18. Cut the tapered edges on the slats with the slat taper sled (Fig. C).

19. Secure a slat on the pattern board for routing (Photo 7).

20. Set the trammel on the pivot point through the 19-3/8-in. hole.

21. Swing the trammel to make the first cut. Then flip the slat over and make the second cut to complete the tongue. Check the tongue's fit in the ring's groove and make any necessary adjustments. Then rout tongues on all the slats.

22. Shape the tongue with a sander to match the arc of the shoulder.

23. Cut the rabbet for the half lap joint on the narrow end of the slat with the trammel set in the 3-3/4-in. hole. Make sure the slat is face-up for this step.

24. Dry-assemble the slats in the outer ring and measure the exact diameter of the center hub.

MAKE THE CENTER HUB

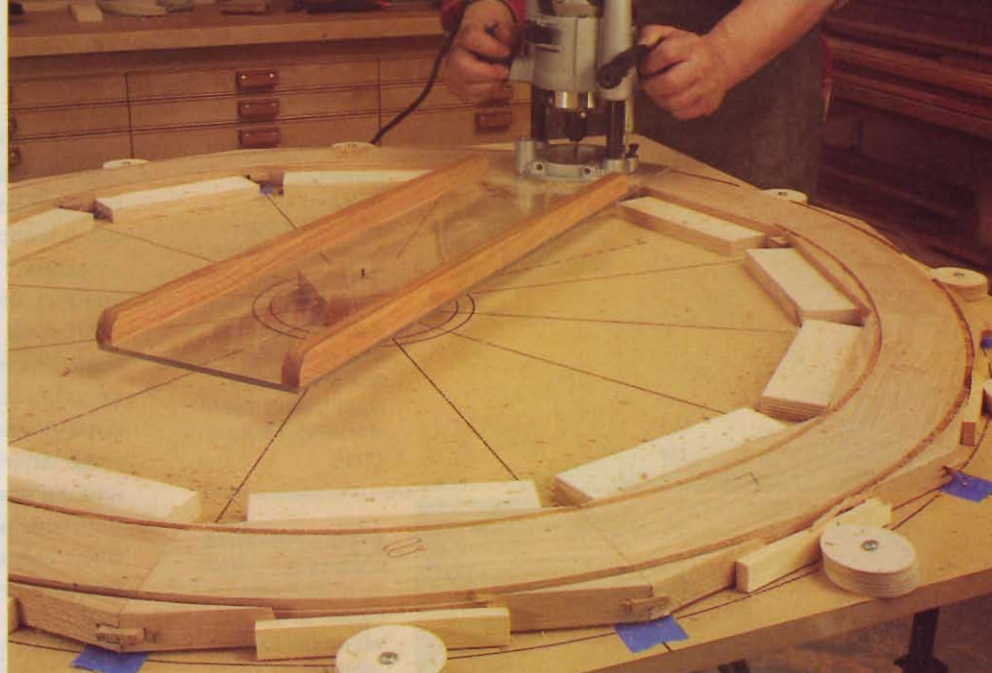
25. Cut and miter the four hub sections. Rout slots for splines and epoxy the hub blank together.

26. Draw a circle that matches the hub diameter you measured in Step #24. Cut the circle on the bandsaw and sand smooth.

27. Rabbet the underside of the hub (Photo 8) so the hub nestles into the recess created by the slat rabbets. Don't cut the hole in the center of the hub yet.

GLUE THE TOP ASSEMBLY

28. Chamfer all the top edges of the slats, outer ring and hub with a sanding block. The chamfer creates a detail that's visually pleasing while it disguises any areas where a joint may be less than perfect.

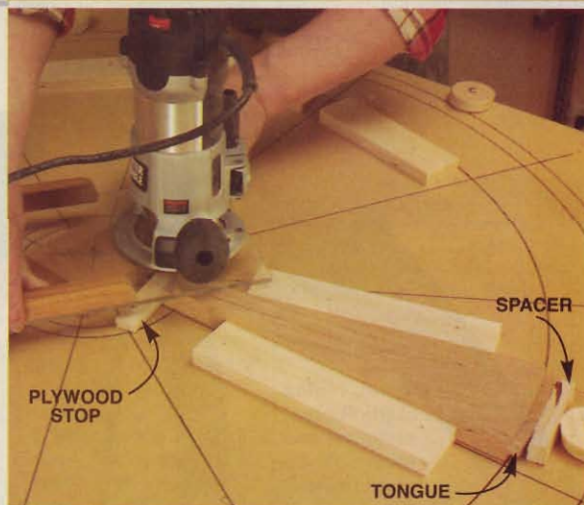


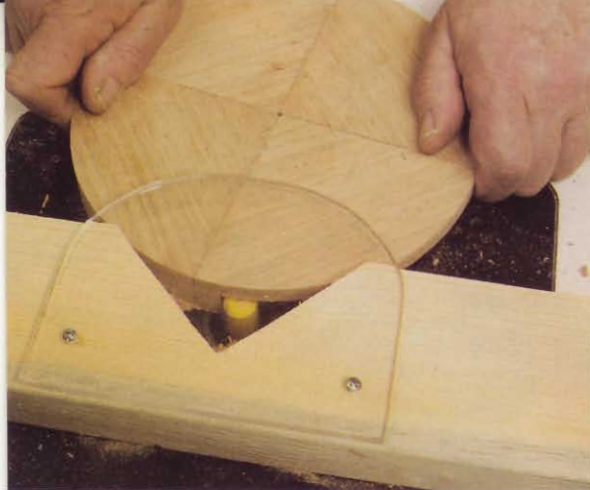
5 Plunge-rout the outer ring using a trammel and a 1/4" spiral bit. Make several shallow passes but leave about 1/4-in. at the bottom of the cut or you'll lose the clamping pressure from the cam locks. Swing the router counterclockwise to cut the outer edge and clockwise for the inner edge.

6 Flush trim the tabs left after jigsawing the remaining waste from the edges of the ring.

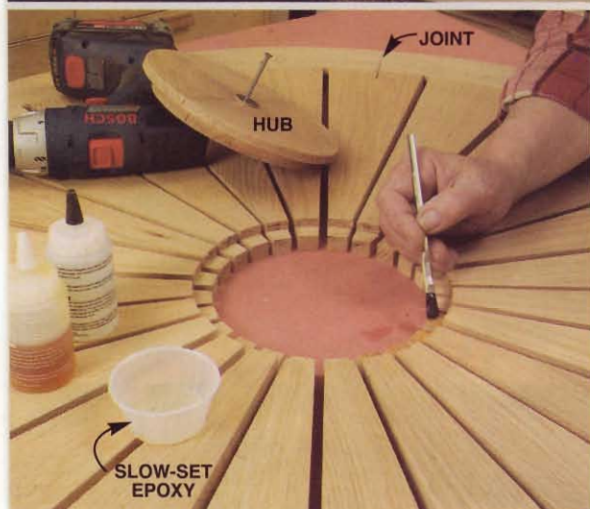


7 Use the trammel to rout a tongue on the wide end of each slat and a rabbet on each narrow end. Position the slat with the narrow end 3-1/2-in. from the pivot point. Secure the slat with plywood stops, a sacrificial spacer and a cam lock.





8 Rabbet the center hub to fit the rabbeted slats. Clamp a notched, 6-in.-wide board to your router table. To cut the rabbet, contact the infeed side of the notch and rotate the hub into the "V". Spin the disc until the rabbet is complete.



9 Glue the slats into the outer ring. Align the center of every other slat with a joint on the outer ring. Eyeball the gaps between slats. Glue in the center hub and drive a screw through the middle to act as a clamp.

29. Mix about 4-oz. of slow set epoxy (see Sources, page 49). Glue the slats to the outer ring first. Be sure to wet both the slot and outer tenon before inserting. Scoop up any squeeze-out that is hard to get at with a Q-tip and then wipe the area with acetone.

30. Coat the rabbets on the slats and the hub with epoxy. Carefully position the hub in the rabbets. Then clamp it in position with a screw (Photo 9).

31. After the epoxy has thoroughly cured add the struts and braces (D, E and F) to the underside of top (Fig. A).

32. Use a hole saw to drill a 2-1/4-in. hole through the center of the hub.

BUILD THE LOWER RING

33. Make a hardboard pattern of a base ring segment (Fig. E, page 46). Use the pattern to trace four pieces onto the stock.

34. Cut the miters on a miter saw and band-saw the curves. Place the four sections together and check the fit.

35. Rout a pair of 1/4-in. slots in each miter. Epoxy the ring together with splines.

36. Once the epoxy has set, sand the inside of the ring with a sanding drum and the outer edge with a belt sander. Label the top and bottom of the ring.

37. Lay out the leg positions on the ring and drill holes for dowels and screws on the drill press (Fig. E).

ASSEMBLE THE BASE

38. Make patterns for the upper and lower legs (Fig.E). Rough-cut the legs with your bandsaw then attach a pattern and rout with a pattern bit.

39. Clamp a pair of handscrews on the lower ring along the leg layout lines. Slip an upper leg snugly between the handscrews. Use an 1/8-in. bit to drill a pilot hole into the upper leg, using the 5/32-in. hole in the ring as a guide.

40. Lock the leg in place with a #8 x 3-in. screw.

41. Drill two 1/2-in.-dia x 1-in.-deep dowel holes into the upper



leg (Photo 10).

42. Remove the upper leg but keep the handscrews in place. Insert the lower leg, secure with a screw and drill the dowel holes. Repeat the process for each set of legs.

43. Cut your dowels 1/8-in. shy of the total depth of the hole. Sand a slight flat on one edge to give the excess epoxy an escape route.

TIP: If your dowel stock is a little tight, try spinning the dowel in a drill as you sand lightly with 80-grit paper to narrow the diameter.

44. Dry fit a lower leg on the ring with dowels.

45. Drill a 1/4-in. pilot hole all the way through the ring and the lower leg for the lag bolt (Photo 11).

46. Remove the lower leg and repeat the process for the upper leg using a 3/16-in. bit. Do not drill all the way through.

47. Use a Forstner bit to drill a 3/4-in. dia. counter bore in the lower leg that's deep enough to hide the lag screw head and washer.

48. Mix the epoxy and fasten one pair of lower and upper legs to the ring. Be sure to wet each hole and dowel. Drive a lag screw from the lower leg through the ring and into the upper leg until it draws tight. Repeat for all the legs and let the epoxy fully cure.

FINAL ASSEMBLY

49. Cut tabletop fastener plates from 1/8-in. thick steel. Prime and paint the fasteners with a rustproof paint like Rusto-leum.

50. Attach the steel brackets (K) to the tops of the upper legs, then flip the leg assembly upside down and drill pilot holes for the lag bolts. Attach the top with lag bolts and washers.

51. Mount the tabletop to the base (Photo 12).

52. Apply your favorite outdoor oil finish and set the table for company!

David Radtke is a custom cabinetmaker, home design consultant and restoration specialist in Minneapolis, Minnesota. He enjoys archery, bowmaking, woodturning, and cycling whenever he's not standing behind a tablesaw or sitting in front of the drawing board.

Sources:

Wall Lumber 800-633-4062, www.walllumber.com white oak lumber, 5/4 white oak, \$??/bd.ft., 8/4 white oak, \$??/bd.ft., Rockler 800-279-4441 www.rockler.com T-88 Structural epoxy #20647 \$19.99

10 Drill dowel holes into the legs using the holes in the ring as a guide. A screw in the middle hole and a pair of handscrews holds each leg in place. Drill holes in one upper leg and one lower leg at each location.



11 Drill a shank hole for a lag screw through the small hole in the ring and through the lower leg. The leg is temporarily held in place with dowels and no glue.



12 Attach the top with lag bolts and washers. The lag bolts allow you to easily remove the top for winter storage.



CUTTING LIST			OVERALL DIMENSIONS: 29-3/4"H x 44" DIAMETER	
Part	Name	Qty.	Dimensions ThxWxL	Notes
A	Ring Segment	12	1" x 4" x 11-15/16"	Long Point to Long Point
B	Top Slat	24	1" x 4-3/4" x 15-7/8"	
C	Hub Segment	4	1" x 4-1/2" x 8-1/2"	
D	Strut	4	1-5/8" x 1-5/8" x 18-1/2"	
E	Outer Brace	4	1" x 1-5/8" x 21-7/8"	Long Point to Long Point
F	Inner Brace	4	1" x 1-5/8" x 5"	Long Point to Long Point
G	Lower Ring Segment	4	1-5/8" x 5-1/4" x 12"	See Template
H	Upper Leg	4	1-5/8" x 4" x 11-1/2"	See Template
J	Lower Leg	4	1-5/8" x 4" x 22"	See Template
K	Steel Bracket	4	1/8" x 1-1/2" x 6"	Cut and drill (See drawing)
L	Spline	24	1/4" x 5" x 1"	

Steam Bent Music Stand

by Seth Keller

Bending wood with steam always intrigued me, but I never tried it. The process seemed mysterious, complicated and maybe even dangerous. But one day a beat-up old music stand motivated me to give steam bending a try. My first two or three attempts weren't successful, but I learned with each failure and became more confident with each attempt.

One thing I can tell you is that steam bending is as much art as it is science. So many variables affect the way each piece of wood bends, the outcome can be difficult to predict. I've found that the best way to achieve consistent results is to control as many variables as you can.

First, use the right wood. White oak, the species I chose, is one of the best. Straight grain is a must and each piece should be as defect-free as possible. Many experts recommend using green wood, but once I refined my technique, I had good luck bending my kiln-dried white oak boards.



"steam bending is as much

1 After many years together, my flimsy music stand and I experienced the ultimate falling out. Rather than buying another utilitarian stand, I got the crazy notion to design and build one that would, somehow, visually represent the music I play.



2 I drew full size sketches to find inspiration. I wanted the stand to echo the blues music I love, so I decided to bend the wood, just like those soulful blue notes. This seemed the perfect opportunity to try steam bending, something I'd always wanted to do.



3 I built a steam box to experiment. I quickly learned to wear gloves: Steamed wood is extremely hot. I also learned you have to work fast to bend it. Once the piece is removed, its flexibility lasts less than a minute.



4 My first attempts at bending steamed pieces were disasters. Every time I tried to bend and clamp a piece over a form, the fibers on the outside face tore apart. What was I doing wrong?



A bending jig and a pair of drying forms are crucial for success. Their curves must be smooth and consistent. The jig and forms I used for this project came from the scraps of 3/4"-thick exterior grade plywood that were left after I built my steam box. I laminated two pieces of plywood to make some of the curved parts; others are just one piece thick.

Once the wood comes out of the steam box, it begins to lose its flexibility in a minute or less, so you need to work fast. It's best to engage a friend's help and choreograph all of the steps by making dry runs.

This music stand requires only five board feet of lumber, but I recommend buying at least four times as much, so you can practice and refine your bending techniques. I resawed 8/4 stock to make all the parts.

TAILOR YOUR DESIGN

While dreaming up and designing my stand (Photos 1 and 2), I made some critical decisions. To simplify the construction, I decided the stand would be non-adjustable. Then I decided it would be used when I was seated. Finally, I adjusted its backward pitch to suit my playing posture. The bending jig and drying forms can be easily modified if you want to make aesthetic changes.

MY BIG BREAK

At first, most of my bending experiments failed (Photos 3 and 4). The turning point came when I discovered Lee Valley Tools' Veritas strap clamp and instruction booklet on steam bending (see Sources, page 56). The booklet shows how to make bending jigs and drying forms to use with the strap clamp. These tools, along with my steam box and kettle, made all the difference (Photo 5).

art as it is science™

BEND THE LEG BLANKS

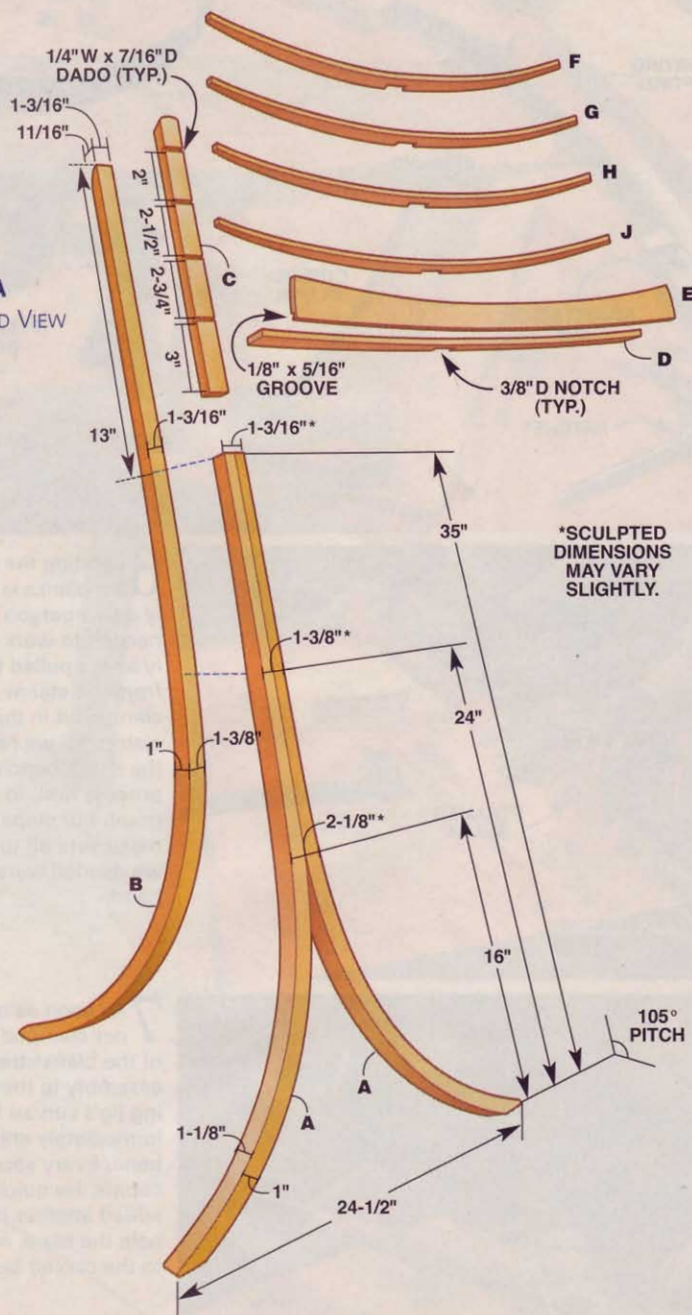
I started by sawing a bunch of leg blanks (Fig. A, right, Parts A and B, and Cutting List, page 57). I planned to use some of them for test-bending and I wanted to have more than three bent blanks to choose from for the base. I'd already built a steam box (see "Simple Steam Box" on page 58), so next I built a bending jig for the leg blanks and a pair of drying forms (Figs. B and C, page 57). I cut the curved profiles on the bandsaw and used my disc sander to smooth the curves. Then I screwed and glued the curved block and stop to the base.

After experimenting with different lengths of time, I settled on steaming each leg blank for one hour. To maintain the recommended 200-degree temperature in the steam box, I had to refill the kettle 2-3 times per one-hour cycle.

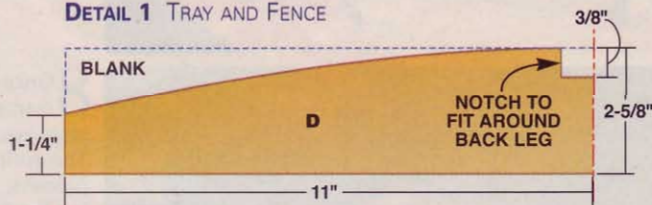
Once the blank was removed from the steam box, I learned that every second counted. The faster it was bent and clamped onto the jig, the better it conformed. Taking one minute longer made a huge difference in the amount of springback (the tendency to straighten out) when the blank was removed from the jig.

I discovered I couldn't work fast enough to successfully bend the leg blanks by myself, so I enlisted a partner. While the first blank was steaming, I fastened the bending jig to my workbench and set up the strap

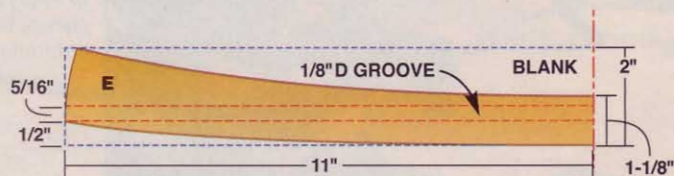
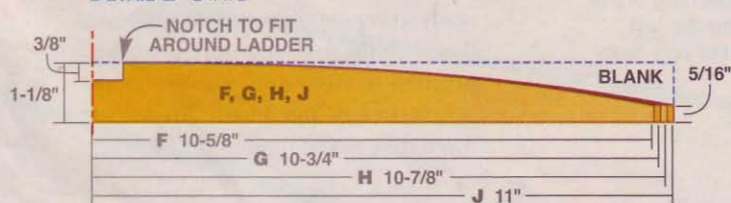
FIGURE A
EXPLODED VIEW

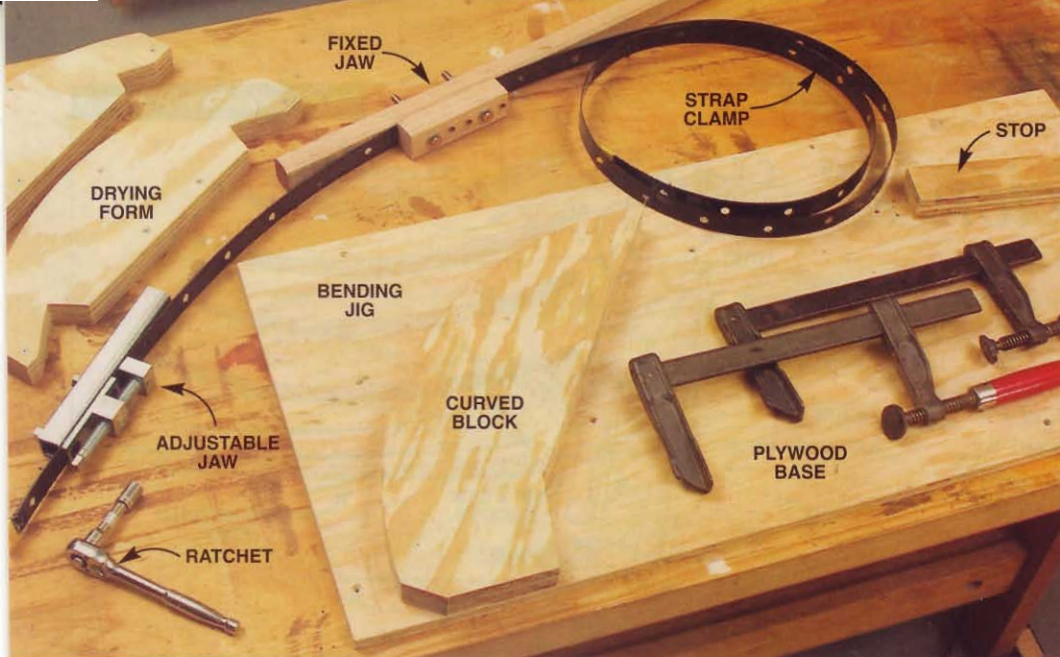


DETAIL 1 TRAY AND FENCE



DETAIL 2 STAYS





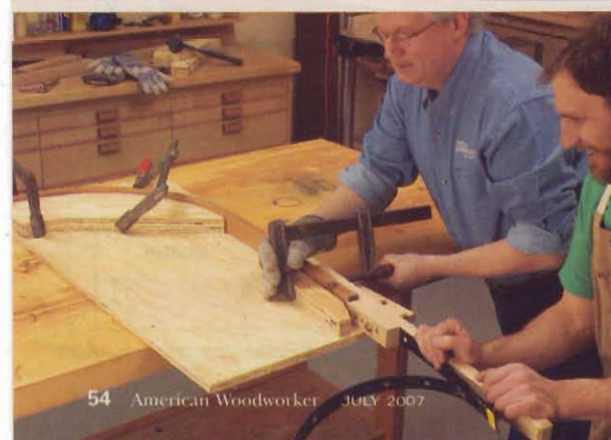
5 I discovered that I needed a strap clamp and a dedicated bending jig to successfully bend the thick, kiln-dried pieces I was using. The strap clamp (see Sources, page 56) wraps the steamed piece and keeps its fibers from stretching and tearing apart as it's bent. The bending jig must be securely fastened to a work surface. I also made drying forms that matched the bending jig, so I could bend three leg blanks in a single day.



6 Bending the steamed leg blanks is definitely a two-person job. We needed to work efficiently as we pulled the blank from the steam box and clamped it in the strap clamp. So we rehearsed the entire bending process first, to choreograph our steps and make sure all the tools we needed were close at hand.



7 As soon as my partner clamped his end of the blank/strap clamp assembly to the bending jig's curved block, I immediately started the bend. Every second counts. He quickly added another clamp to help the blank conform to the curved block.



8 Once the blank was clamped to the stop, we could relax. The entire bending process, from removing the steaming blank to applying the last clamp, takes less than a minute.

clamp so it was less than 1/4-in. longer than the blank. We made sure we had clamps, gloves and everything else we needed before we removed the blank (Photo 6).

Pre-setting the strap clamp paid immediate dividends, because tightening it only took a couple of twists with the ratchet. Our dry-run do-si-dos through the bending process also paid off, because clamping the blank to the jig and completing the bend took only seconds (Photos 7 and 8). Occasionally, we had to reduce the strap's clamping pressure as we bent a blank around the form, to keep the curve from buckling. We also had to make sure the blank stayed seated on the base of the bending jig. If it rode up on the curved block, we whacked it back down with a mallet.

After an hour, we took the bent blank off of the jig, removed the strap and immediately clamped the blank to one of the drying forms (Photo 9). As we'd started steaming another blank as soon as the first one was bent and clamped, we were ready to repeat the bending process. When all three blanks were bent, we headed to the golf course: The blanks had to stay in the forms for three days to stabilize.

TURN THE BLANKS INTO LEGS

I squared up the three blanks I'd chosen to use for legs in two steps. First I jointed one edge (Photo 10). Then I planed the opposite edge. I left both front leg blanks 1/16" over-size in width. I milled the back leg blank to its final width.

Next, I returned to the jointer to create flat gluing surfaces on the top portion of each blank (Photo 11). After jointing, the top ends measured about 11/16-in.-thick. The last step was to get rid of the black stains left by the metal strap clamp. I used a hand-held scraper.

BUILD THE BASE

When I glued the front two legs together, I aligned the terminus points of their jointed faces (Photo 12). I removed all the squeezed-out glue before it dried. Then I marked and trimmed the feet (Photo 13). I trimmed the front leg assembly to its final height and then hand-planed it to final thickness, making sure to create a flat gluing surface for the back leg.

To determine the stand's tilt, I clamped the back leg so it extended 13-in. above the front leg assembly (Photo 14). After cutting the back foot, I glued the back leg to the front assembly, taking care that it remained centered. I used a level to make sure it was plumb.

After the glue had dried, I shaped the base by planing, scraping and sanding. My belt sander was particularly effective! I aimed for uniformly smooth arcs and curves.

INSTALL THE LADDER AND TRAY

After milling the ladder (C) to size and length, I used my dado set to cut the 1/4-in.-wide dados that accommodate the stays. The distance between dados decreases from bottom to top, so the spaces between the stays are graduated.

9 After an hour in the bending jig, I transferred the bent leg blank to a drying form. This way I could immediately reuse the bending jig. After transferring the second blank to another drying form, I left the third blank on the bending jig.



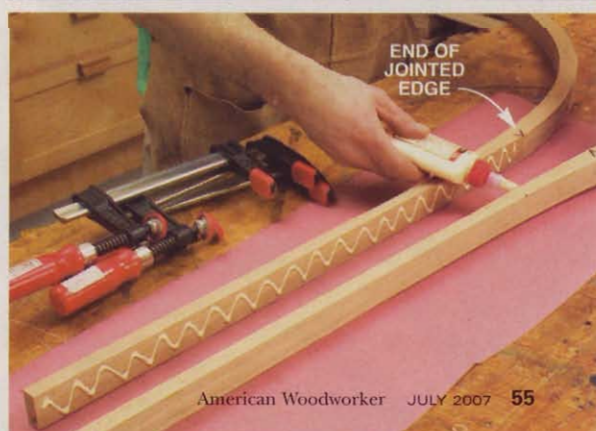
10 I discovered that the bent leg blanks had to be edge jointed, because they were always slightly twisted. To joint a perpendicular edge, I had to swivel the bent blank as I made the cut, while keeping its outside face flush against the fence.



11 I created a flat gluing surface on each leg blank by jointing the top portion of its outside face, above the bend. I made the same number of passes on each blank, so their remaining thicknesses matched. Because of the bend, each pass lengthened the jointed surface.



12 Before I glued the two front legs together, I marked the points where their jointed surfaces ended. I aligned these marks when I clamped the legs, so they would splay equally.

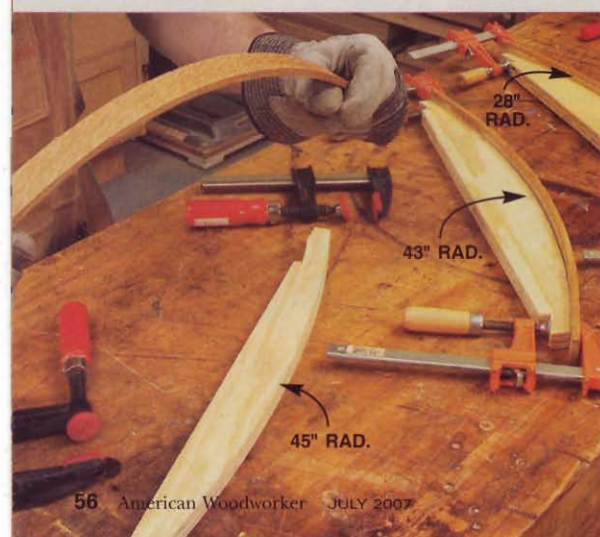




13 To mark the front assembly's feet for trimming, I turned my bench into a T-square. The last thing I wanted was a leaning stand! I positioned the assembly so the legs' splay was the correct width at the bottom edge. Then I aligned the shaft with a perpendicular strip of masking tape.



14 Establishing the stand's backward tilt was another head-scratcher. My solution was to clamp the back leg in position and allow it to fall behind the table. When the tilt angle was correct, I marked the back leg for trimming.



15 To get the graduated arcs I wanted, I had to bend each horizontal stay on its own form. I discovered that quickly overbending each stay before clamping it to the form minimized springback.

Next I notched the tray blank (D) to fit around the back leg (Fig. A, Detail 1) and dadoed the fence blank (E) to accommodate the tray. I shaped both pieces by bandsawing and sanding and then glued them together.

To install the tray assembly, I let it rest on top of the the front legs as I slid it around the back leg. Then I glued on the ladder, with the tray assembly sandwiched—but not glued—in between. After the glue had dried, I removed the tray assembly to finish shaping the top of the stand.

BEND THE STAYS

I milled a boatload of stay blanks (F-J) so I'd have enough to experiment. I used the slots in the ladder to gauge their thickness—I wanted a snug fit. They required only about 15 minutes in the steam box, not nearly as long as the leg blanks. They didn't require the strap clamp for bending, either. I managed to waste a bunch of them at first, by trying several times to bend them all together on the same form.

Finally, I gave in and made four bending forms, one for each stay (Photo 15). Here are their radii: 24-in., 28-in., 43-in. and 45-in. I still steamed the blanks together to save time, but I removed each one separately and clamped it on its own form. I learned that I only had to leave these blanks on the forms overnight.

FINAL ASSEMBLY

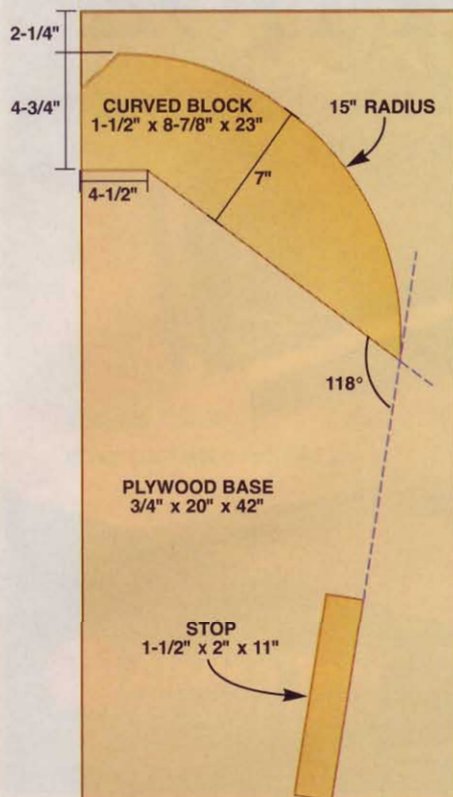
Using my tablesaw's crosscut sled, I notched each bent stay blank to fit the ladder. After trimming each blank to length, I shaped its back edge (Photo 16 and Fig A, Detail 2).

Then I sanded the stays and softened their sharp edges. After gluing in the tray assembly, I installed all the stays at once (Photo 17). For the finish, I sprayed on three coats of lacquer from an aerosol can. It was much easier than wiping or brushing. For a super-smooth finish, I sanded lightly with 280-grit sandpaper before spraying the final coat.

Sources:

Lee Valley, (800) 267-8735, www.leevalley.com
Veritas Steam-Bending Instruction Booklet, #05F15.01, Free
Veritas Strap Clamp for 1-1/4" Material, #05F10.01, \$63.00.

FIGURE B BENDING JIG



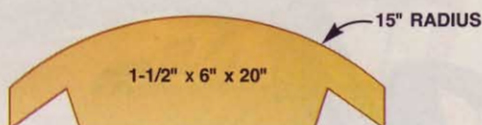
16 I decided to lighten the appearance of the stays, because their rectangular shape made the stand look top-heavy. Shaping their backs and graduating their lengths did the trick.



17 Keeping the stays in the same plane was vital, so my sheet music would lay flat. To make them coplanar, I had to fully seat all their slip joints in the ladder. Clamping with a flat board did the trick. Now my music soars, but my sheet music stays put!



FIGURE C DRYING FORM



CUTTING LIST			OVERALL DIMENSIONS: 24"D x 24-1/2"W x 48-1/2"H		
Part	Name	Qty.	Blank Dimension	Jig/Form Final Dimension	Radius
A	Front Leg	2	1" x 1-1/2" x 54"	1" x 1-1/8" x cut to length	15"
B	Back Leg	1	1" x 1-1/2" x 54"	1" x 1-3/8" x cut to length	15"
C	Ladder	1	5/8" x 1-1/4" x 13"	5/8" x 1-3/16" x 13"	
D	Tray	1	5/16" x 2-5/8" x 22"	5/16" x 2-5/8" x 22"*	
E	Fence	1	5/16" x 2" x 22"	5/16" x 2" x 22"	
F	Top Stay	1	1/4" x 1-1/8" x 22"	1/4" x 1-1/8" x 21-1/4" **	24"
G	Second Stay	1	1/4" x 1-1/8" x 22"	1/4" x 1-1/8" x 21-1/2" **	28"
H	Third Stay	1	1/4" x 1-1/8" x 22"	1/4" x 1-1/8" x 21-3/4" **	43"
J	Bottom Stay	1	1/4" x 1-1/8" x 22"	1/4" x 1-1/8" x 22" **	45"

*Tray tapers to 1-1/4" wide, see Fig. A, Detail 1

**Stays all taper to 5/16" wide, see Fig. A, Detail 2

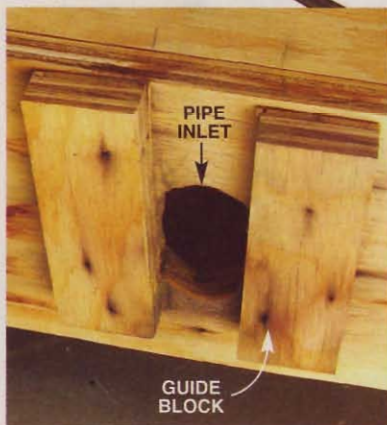
"Learning to bend wood with steam takes practice, just like playing an instrument."



Simple Steam Box

BUILD A BOX AND ADD A STEAM KETTLE:
YOU'RE READY TO BEND WOOD.

by Seth Keller



Steam passes from the kettle to the box through a pipe inserted into the kettle's spout. The kettle must be refilled now and then during the steaming process; two guide blocks help position the pipe when you re-insert it in the hole.

EDITOR: TOM CASPAR • ART DIRECTION AND PHOTOGRAPHY: VERN JOHNSON

Building a steam box for bending wood only requires exterior-grade plywood, waterproof glue and an electric tea kettle.

I bought my kettle from Lee Valley (see Source, below). It came with an aluminum pipe to direct steam into the box. Any electric kettle with a cylindrical spout for inserting a pipe or attaching a hose will do. Most kettles, such as this one, don't have a large capacity. You'll need to refill the kettle three or four times per hour for a box this size.

Tongue and groove joints help seal the box's sides (photo, below right).

Form the tongue by milling a 3/16-in. deep by 3/8-in. wide rabbet along the box's sides. Use #8 screws, 1-1/2-in. long, and a waterproof glue, such as Titebond III, to assemble the box.

After the glue sets, drill or cut a hole for the kettle's pipe. The pipe enters at an angle, so make the hole oblong (photo, below left). Attach guide blocks to help direct the pipe into the hole after you refill the kettle. Drill two 1/4 in. holes at one end of the box to allow condensation to drain. Drill more 1/4-in. holes for dowels to support your bending stock. Drill a tight-fitting hole for a meat thermometer near one door. The thermometer isn't

essential, but it allows you to check the box's temperature. It should remain above 200 degrees throughout the steaming cycle.

Attach 2x4 legs to elevate the box above the kettle. One end should be higher to ensure that condensation flows to the drain holes. To accommodate the Lee Valley kettle, I propped one end of the box on a block 9 in. high and the other end on a block 8-1/2 in. high. Then I attached the legs.

Add two-piece doors to the ends. One piece is a cap; the other is a plug. Steam will cause the plug to swell, so make it 1/8-in. smaller than the opening. I used large brass hinges to hang the doors. Add screen door hooks to keep the doors shut as you steam away.



Cutting List

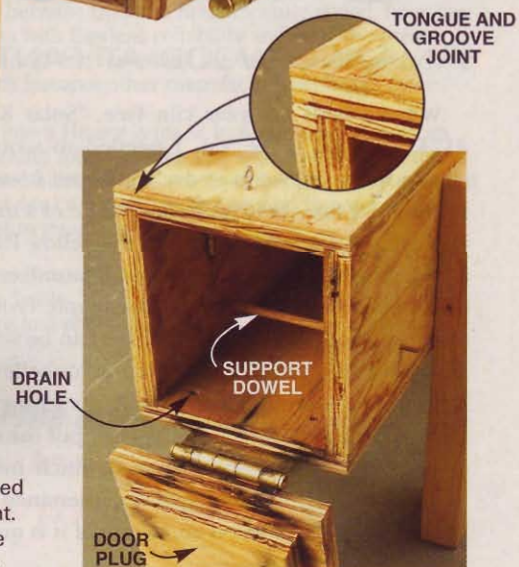
Overall size (without legs): 7" x 8" x 56"

Part	Qty.	Th x W x L
Side	2	3/4" x 6-1/2" x 56"
Top, bottom	2	3/4" x 7" x 56"
Door	2	3/4" x 7" x 8"
Door plug	2	3/4" x 5-1/2" x 6"
Leg	4	2x4 x 15"
Guide block	2	3/4" x 1-3/4 x 5-1/2"

Source

Lee Valley, (800) 871-8158,
www.leevalley.com Kettle and pipe,
#05F14.02, \$37.50.

Constructing the box is very easy. Screwed and glued tongue and groove joints keep the box's seams tight. Support dowels allow steam to circulate around the wood. A plug on the door helps seal the box's ends.





Finding Great Wood

AMAZING WOOD AT FANTASTIC PRICES HARVESTED CLOSE TO HOME.

When I built my solar kiln (see, "Solar Kiln", AW Issue #124, Oct. '06, page 55), I needed to scour up a steady source for green wood to dry. Turns out it wasn't as hard as I thought. I live about an hour outside of a major metropolitan area and a little digging in the Yellow Pages turned up a wealth of green wood sources. I found everything from ordinary basswood to spectacular maple crotches, to enormous walnut trunks (some of these can be seen in the original solar kiln article). All were at unbelievable prices. I began my search in the Yellow Pages with calls to custom sawyers with portable sawmills. They put me on to a couple of good sources for green wood, which included private tree services and municipal maintenance departments. They have a ton of wood and some of it is quite amazing.

Finding green wood may take a little digging, but you'll find your sources will grow naturally. My first contact quickly blossomed into several other contacts. Before I knew it, I was reluctantly turning down offers for wood because I simply had no place to store it.

CUSTOM SAWYERS

I visited a small custom sawmill, Dan's Wood Service, located in western Wisconsin. I was looking for an easy-to-dry wood for the a test run in my solar kiln. Dan offered me some clear basswood for seventy cents per bd. ft. That's about a third of the cost my local lumberyard charges for kiln-dried wood. I took a friend along for help with the stacking.

When we got to Dan's place I was surprised to learn that

1 I was looking for some green wood for my kiln but never dreamed the wood I ordered would be cut on the spot. Dan is a custom sawyer who specializes in small orders. He has a small woodlot where he harvests trees like this basswood. His portable sawmill can travel to you and your tree wherever you are.



2 Dan cut the felled tree into 8-1/2 ft. lengths for the sawmill. He left a large shoot growing from the stump. A basswood shoot will grow to become a mature tree that can be re-harvested in another 10-20 years.

my wood was a standing tree in his woodlot! Dan harvested it in no time (Photo 1). The tree trunks were then cut to length (Photo 2) and transported to the nearby sawmill on the property (Photo 3). Sizeable tree trunks are really heavy and present the most difficult material-handling dilemma for folks like you and me. Fortunately, most custom sawyers like Dan are set up to bring their mill to your tree so there's no need for skid loaders, huge trucks and big cranes.

The bandsaw mill made quick work of our tree (Photo 4). An in-line rip saw took care of the bark edges (Photo 5). Soon we had the wood stacked in the trailer and were on our way back to the kiln (Photo 6). Believe it or not—from tree to trailer took less than two hours. I was amazed.

TREE SERVICE BONEYARDS

We checked out a local tree service's boneyard to see what was available. Tree services and municipalities are no longer allowed to burn their trees or take them to landfills. Commercial mills aren't interested in trees from populated areas where human activity leads to buried nails in tree trunks that ruin a sawyer's day. So where do all those trees go? They go to the boneyard, where most are chopped into mulch. It's kinda like an animal shelter for trees. If no one comes to take them away, well...it's the chipper.

Boneyards toss out an amazing amount of wood every day (Photo 7). A little poking around yielded spectacular finds including maple, oak and walnut (Photo 8). The service was reluctant to let us bring a mill onto their property for liability reasons. However, they were amenable to dropping the logs off at my shop where a mill could be brought in later. Now my biggest problem is finding a place to store all this wood. I better start building some furniture!

continued on next page



3 A skid loader picks up and carries the heavy logs to a portable sawmill set up on the property. For off-site work, Dan brings the sawmill right to the tree.



4 The basswood logs are cut into boards on a bandsaw mill. I found several sawyers with portable mills like this in the Yellow Pages.



5 A rip saw removes the bark edge leaving two straight edges. This makes stacking for drying a lot easier because you don't have the uneven bark edge to deal with. You can use your own bandsaw to remove a bark edge, too.



6 My buddy and I load the boards onto my trailer. The basswood went from tree to trailer in less than two hours. Green wood can deteriorate rapidly so we wasted little time getting back home in order to stack the wood for drying.



7 The following week we stopped at a local tree service boneyard where a constant stream of trucks brought in a ton of brush and branches and more than a few prize logs. I wished I could have cut them up on the spot to see what kind of great wood was getting tossed out.



8 We found some amazing trees destined to get chipped into mulch. A little bargaining can land you some fantastic deals on some fantastic wood. It just takes a little poking around to get the ball rolling. We had Dan saw up some of the logs we found here.

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Urban

HARVEST GREAT WOOD

I live right in the heart of the city. By accident, I found great wood right under my nose, in the midst of a bustling metropolis. My first adventure as an urban lumberjack began with a phone call from a friend telling me that an old red oak in his backyard was struck by lightning and was bound for the chipper.



ALL PHOTOS THIS SECTION: COURTESY OF SETH KELLER

2 Let the fun begin! Getting the log up the ramp and onto the sawmill was a bit of work, but once in place, sawing the log into planks was pretty simple. It's about 10 minutes per slice, though.

Lumber

IN THE HEART OF THE CITY.

"Do you want it?" he asked. "I'll be right over", was my reply. I borrowed a Logosol portable sawmill from a friend and headed over to my buddy's backyard.

Once word got out that I could turn doomed trees into useful lumber, I had more offers for free wood than I could handle.

by Seth Keller



1 A friend called me about a red oak tree he had to take down. The main trunk was nine feet tall, weighed over 1500 lbs. and was about to hit the ground when I arrived with a portable sawmill.



3 This log was over 26 inches wide! Each cut was like opening a present: I never knew what to expect, but I was never disappointed. It was particularly fun to see quartersawn pieces emerge from the log.

For more on portable sawmills, see "Backyard Sawmills," AW Issue #112, January 2006, page 70.

For help on being an urban lumberjack, checkout this book: *Harvesting Urban Timber*, www.harvestingurbantimber.com, \$24.



4 Within a week of sawing my first tree, I got a call about a downed birch. This tree had some amazing figure, especially near the base. Every tree I cut is a treasure. I never lose that sense of wonder as a beautiful plank is cut loose from a tree that would otherwise be destined for the chipper.

Sources:

Logosol Portable Chainsaw Mill, (877) 564-6765, www.logosol.com, M7 Woodworker's Mill, \$2,400 (chainsaw not included)
Wood-Mizer Portable Bandsaw Mill, (800) 553-0182, www.woodmizer.com

Troubleshoot

PRACTICAL SOLUTIONS TO 6 COMMON PROBLEMS

When a plane is working right, it can produce a silky-smooth surface that absolutely glistens. When it doesn't work, you get an ugly surface covered with blemishes. The problem can be your sharpening, your technique, or the plane itself. Quite often, it's the plane.

A handplane can be a mysterious tool. These troubleshooting tips should go a long way to clearing up how a plane works and how to tune it up. Most Stanley, Record and similar types of planes certainly require a tune-up. You'll probably encounter every problem addressed here. Premium planes, such as a Lie-Nielsen, Veritas or Clifton, usually don't need much tuning at all.

PLANE TALK

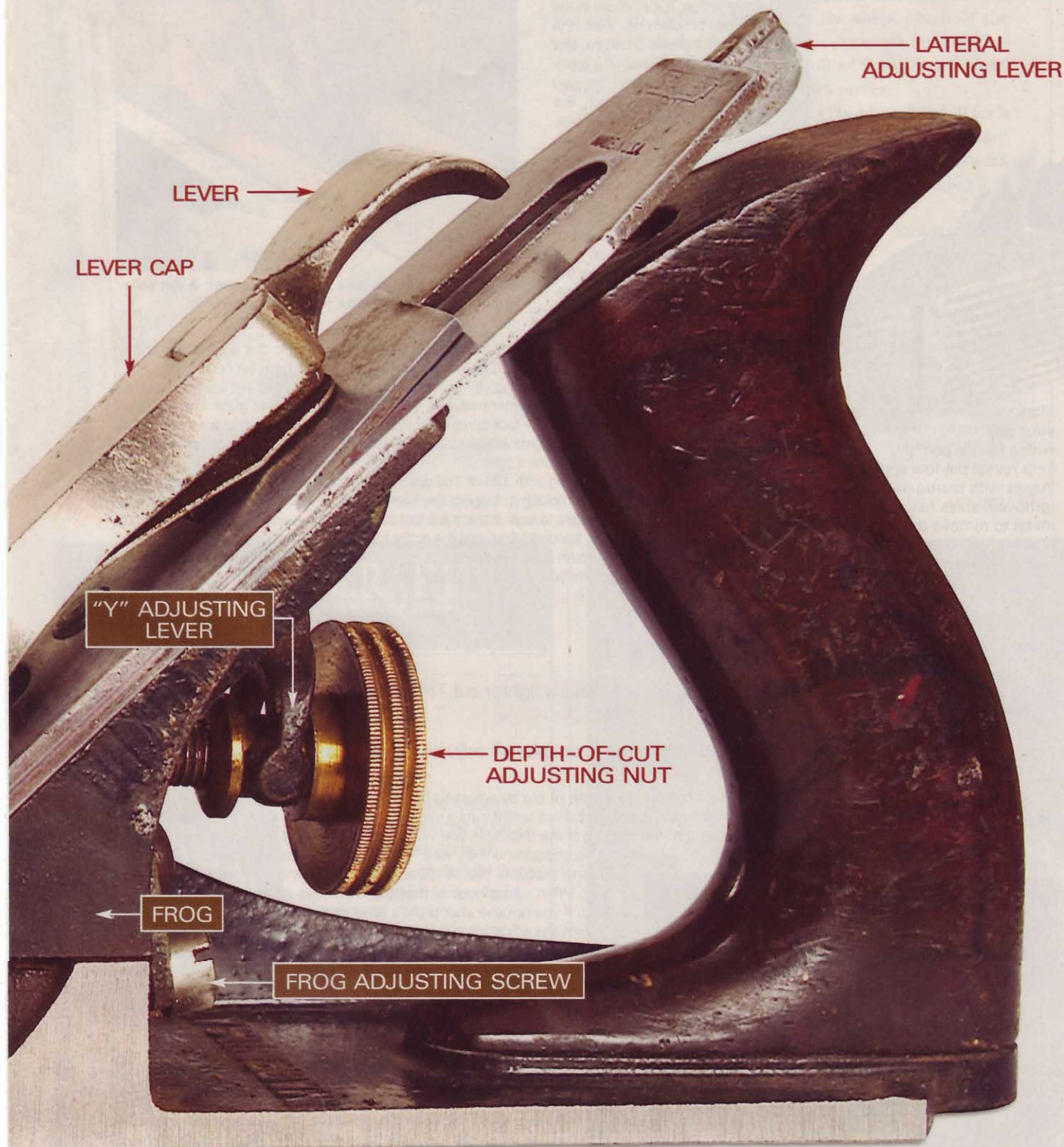
Before launching into troubleshooting, let's identify a plane's basic parts. I cut open one of my No. 3 Stanley planes to give you a better look at how the parts fit together. We'll start at the bottom and work our way up.

- The **sole** is the full length of the plane's bottom.
- The **frog** holds the blade assembly at a 45-degree angle to the sole.
- The **frog adjusting screw** moves the frog forwards or backwards.
- Moving the frog effectively opens or closes the plane's **mouth**, the gap in front of the **blade**.
- The uppermost part of the blade assembly is the **lever cap**.
- The middle part of the blade assembly is the **chip breaker**. It's screwed to the blade.
- Pushing down on the **lever** clamps the blade assembly to the frog.
- This clamping pressure is regulated by the **lever cap adjusting screw**.
- Turning the **depth-of-cut adjusting nut** rocks the **"Y" adjusting lever**, which slides the blade and chip breaker up or down the frog.
- Pushing the **lateral adjusting lever** side-to-side levels the blade with the sole.



Your Plane

by Tom Caspar



PROBLEM

Your plane cuts at the beginning or end of a board, but not in the middle.

CAUSE

The plane's sole may not be flat.

SOLUTION

Rule out some simpler causes first. Test the board's flatness with a long straightedge. If it's hollow in the middle, the problem is with the board, not your plane. Similarly, test the flatness of your bench. If it's hollow, the board will bend as you plane. Time to flatten the bench. But if your board and bench are just fine, and this mysterious behavior persists, chances are the sole of your plane isn't flat.

A plane's sole must be extremely flat for the blade to remove continuous, thin shavings the full length of the board, your ultimate goal. Test your sole by placing the plane on a very flat surface, such as a table-saw's cast iron wing.

Try to slide a thin strip of paper underneath it at various places. If it slips under at any point, the sole isn't flat enough. It needs lapping (a machinist's term for flattening).

The easiest way to lap is using self-adhesive sandpaper on a rigid, flat surface, such as a table-saw's cast iron wing, a jointer bed, or a long piece of 1/4-in. plate glass. (You can also use regular sandpaper and a low-tack spray adhesive.) You may have to remove a lot of metal, so it helps to have a variety of grits available, from 80 to 220. The surface and paper should be at least twice as long as the plane's sole.

Retract the blade and start lapping with 120 or 150-grit paper (photo, above). If the sole is convex, grip the plane as shown to avoid rocking it. Inspect the bottom after a few strokes (photo, left). The newly sanded areas should be easy to see. If there are lots of low spots, switch to coarser paper.

Whichever grit you start with, keep sanding until the entire bottom is scratched with sanding marks. The area right in front of the mouth is very important; it must be flat to prevent tearout. Don't worry about the sole's extreme ends, though, or old scratches from previous use. Once the sole is flat, work up to 220 grit or more to polish it.



Flatten your plane's sole using sandpaper. A flat sole enables a plane to make long, thin shavings.



Mark your sole with a felt-tip pen to help reveal the low spots. Planes with corrugated (grooved) soles have less metal to remove than planes with smooth-bottomed soles, so they're easier to flatten.

PROBLEM

You retract the blade to take a lighter cut. The plane works fine for a while, then suddenly stops cutting.

CAUSE

There's backlash (play) in the plane's adjustment mechanism.

SOLUTION

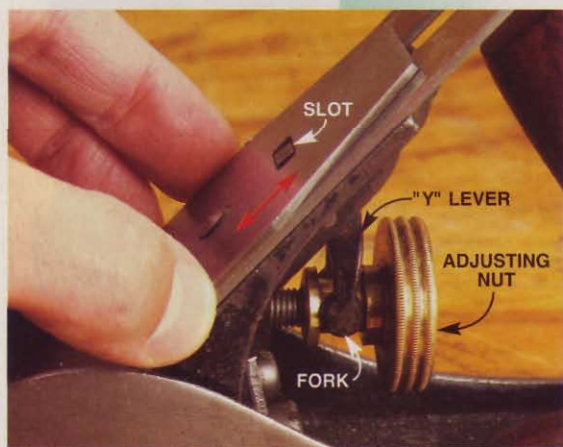
Always set a blade's final depth of cut by adjusting the blade downwards, deeper into the wood. If your blade cuts too deep, back it out until it cuts a very thin shaving or not at all. Then advance the blade bit by bit until the shaving is the thickness you want. If you overshoot, start over again.

To understand the "why" behind this procedure, let's back up to the original problem. You've retracted the blade, and eventually it stops cutting. What's happened is that the blade has slowly crept back up the frog. If you remove your plane's lever cap, you can see how this works.

Turn the adjusting nut clockwise to advance the blade, then counter-clockwise two turns to retract it. Hold the blade with your fingers and push it up the frog (photo, left). It will move by at least 1/32 in. That's why the blade stopped cutting.

Now turn the adjusting nut clockwise again, two full turns, to advance the blade. Try moving the blade up the frog with your fingers again. It shouldn't budge.

Backlash is the problem. ("Backlash" is the play between mechanical parts.) In a plane, there's often significant play in two places. First, there's play between the adjusting nut and the "Y" adjusting lever's fork. Second, there's play between the top of the "Y" lever and the slot in the chip breaker. Some planes have more play than others, but there must be some play in any plane or the parts won't move. It's usually impractical to alter the plane to remove backlash, so the best strategy is to learn to live with it.



PROBLEM

Your plane suddenly stops cutting. When you take it apart, you find shavings wedged between the blade and chip breaker.

CAUSE

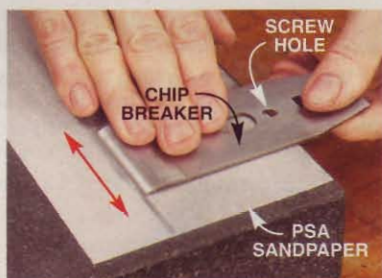
There's a gap between the blade and chip breaker.

SOLUTION

First, lap the chip breaker's bevel, located under the breaker's leading edge (photo, below left). The angle of this bevel is important. It must be steep enough so that the bevel's point, not its heel, touches the blade. With most chip breakers, if you keep the screw hole aligned with the sandpaper's edge, the bevel's angle will be just fine. Keep lapping until you feel a wire edge develop along the chip breaker's entire width, just as in sharpening a blade.

The second step is to round the top of the chip breaker. You can use a file if the chip breaker is quite blunt, but sandpaper usually works well enough. Use a rolling motion to create a rounded edge, ending up at about 45 degrees (middle photo). Keep sanding until the wire edge you formed earlier is gone, then alternately sand both the bevel and the top until the chip breaker is sharp.

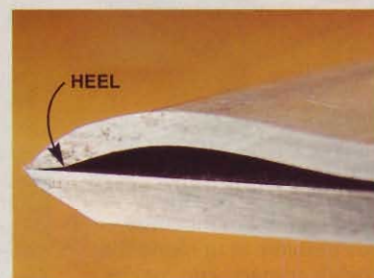
When you're done, hold the chip breaker firmly against the blade, as if it the two were clamped together by the lever cap (right photo). Sight from behind the chip breaker. There should be a slight gap at the heel, but no light showing between the chip breaker and blade.



To eliminate gaps between the chip breaker and blade, begin by lapping the bevel underneath the chip breaker's leading edge. Keep the chip breaker's screw hole aligned with the sandpaper's edge to form the bevel at the correct angle.



Round the top of the chip breaker to create a sharp edge. Lift the cap iron up as you drag it across the sandpaper.



Squeeze the blade and chip breaker together to inspect for gaps. No light should be visible between them. In addition, the chip breaker's heel shouldn't be touching the blade.

PROBLEM

Your blade chatters. It feels like it's bouncing up and down as it cuts.

CAUSE

Your blade may not be clamped down tight enough, or your frog may not be flat.

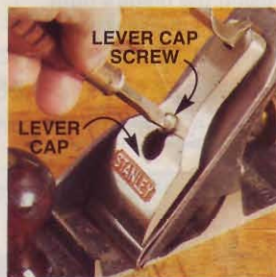
SOLUTION

Try simple fixes first. Your blade may be dull, or set too deep, or your chip breaker may have slipped over the blade's edge, so it's trying to do the cutting. If you rule out these causes, try the following:

First, increase the clamping pressure on the blade. This is controlled by the lever cap adjusting screw (photo, left). This screw isn't something you fiddle with every time you plane, though. Adjusting it is a matter of finding the sweet spot that puts lots of pressure on the blade, but not too much. If you overtighten the screw, applying too much pressure, you won't be able to turn the large brass wheel that controls the depth-of-cut.

To find the sweet spot, loosen the lever cap and tighten the screw 1/8 turn. Re-tighten the lever cap. Turn the brass adjusting nut to move the blade up and down the frog. If it moves very freely, loosen the lever cap again and tighten the lever cap screw another 1/8 turn. Re-fasten the lever cap. Repeat this procedure until the adjusting nut is somewhat hard to turn with two fingers, but not too hard. Once you've found the best setting for the screw, leave it there. You should rarely have to re-adjust it.

A second cause of blade chatter may be a frog that's not flat (photo, right). To check your frog, unscrew it from the plane's body and remove the lever cap screw. Lap the frog on sandpaper. You won't be able to lap the entire surface because the Y lever sticks out the top, but that's OK. Flattening the first two to three inches' worth is good enough.



Your blade will chatter if the lever cap doesn't provide enough pressure to clamp the blade tight to the frog. Adjust the lever cap screw to provide more pressure, if needed.

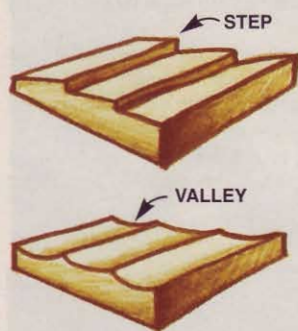


Your blade will also chatter if your frog's top surface isn't flat. Flatten the frog with sandpaper adhered to a flat surface.

PROBLEM

CAUSE

SOLUTION



Shallow steps are caused by a plane blade that's not set perfectly level. One corner is digging in. A commonly used method to minimize this problem is to round the blade's corners, and maybe its entire profile. This produces a surface with extremely shallow valleys, which are leveled by scraping or sanding.

Round a smoothing plane blade to avoid making steps on a board's surface. The corners of this blade are rounded off, and the area in between is cambered (that is, very slightly curved), or left straight.

Your smoothing plane leaves tracks on a board's surface.

The blade isn't level, or its corners are too square.

First, make sure the tracks you see aren't ridges caused by a nick in the blade. If the tracks look like shallow steps (drawing, left), one side of the blade is cutting deeper than the other. Raking light or chalk used flat-side down clearly reveals these tracks.

You'll have more success avoiding track marks and leveling your blade if you round it (photo, bottom of page). This prevents the corners from digging in. Rounding a smoothing blade's profile one way or another is an old tradition. Here's how I go about it. First, I round over the blade's corners on the grinder. I do the rest of the rounding work when I hone, by rocking the honing jig to one side or the other on the pull stroke (photo, above right). This creates a cambered edge and a transition to the rounded corner.

If you're new to planes, I recommend you camber the blade's full width. The amount of curvature to aim for is very small. To check it, I hold the blade upright and lay the fat side of a small square on the blade's edge. The blade's center should be higher than the edges by about the thickness of one or two pieces of paper.

If you're more experienced with a smoothing plane, it's better to leave the majority of the edge straight across, and only camber the outer edges; that is, round 1/8 to 1/4 in. of each side. This will create a flatter surface than the previous method, but the blade will be more difficult to level.

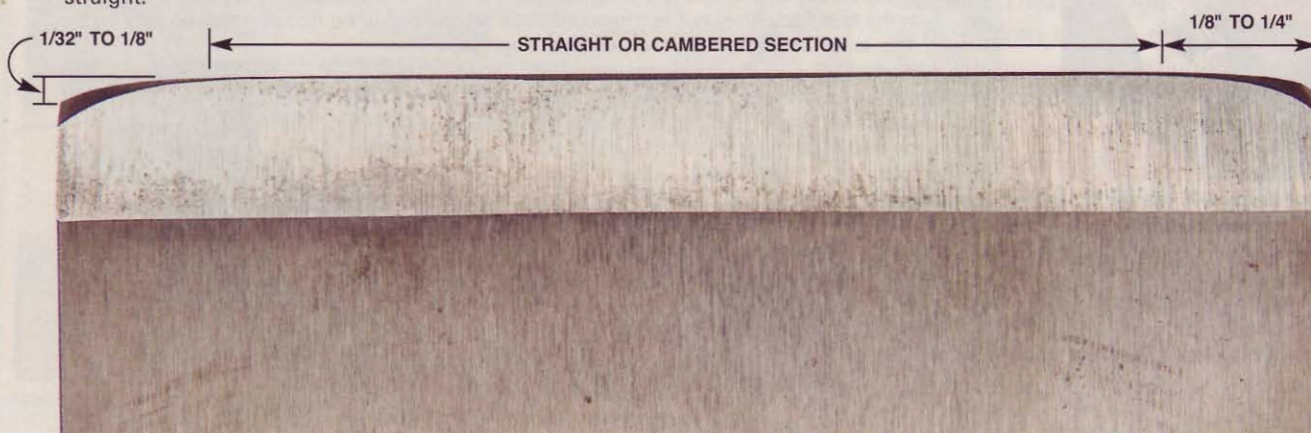
To level your blade, make a narrow shaving using the outer 1/2 in. of the blade's left side. Make another shaving using the right side (photo, below). Compare the thickness of the two shavings. Adjust the lateral lever until the shavings are equally thick. Back off the blade, re-adjust its depth of cut, and you're good to go.



Round a blade's profile by rolling the jig sideways as you hone. Favor the right side, then the left side on alternate pull strokes to produce a curved profile.



Level your blade by comparing shavings made with each side. Hang the plane off the edge of a board and make a narrow shaving using only the blade's left side. Turn the plane around and make another narrow shaving using the blade's right side. Adjust the lateral lever until these shavings are equally thick.



PROBLEM

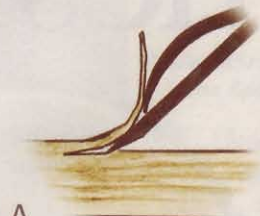
CAUSE

SOLUTION

You get tearout, even though the blade is sharp.

The chip breaker is set too far back, or the plane's mouth is too large.

Preventing Tearout



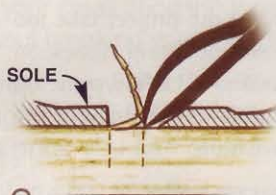
A

When the chip breaker is set back more than 1/32 in. from the blade's edge, fibers may break out ahead of the blade, causing tearout.



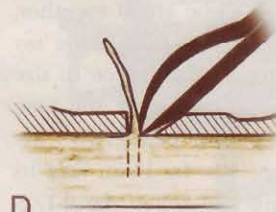
B

Moving the chip breaker closer to the blade's end forces a shaving to rise at a steeper angle. This reduces tearout.



C

When the plane's mouth is wide open, with a large gap in front of the blade, fibers may split out between the blade and the sole.



D

Closing the plane's mouth by moving the frog forward allows the plane's sole to push down on the fibers, which helps prevent tearout.

First, adjust the chip breaker closer to the end of the blade (photo, top right). Second, move the frog forward to close the plane's mouth (photo, middle right).

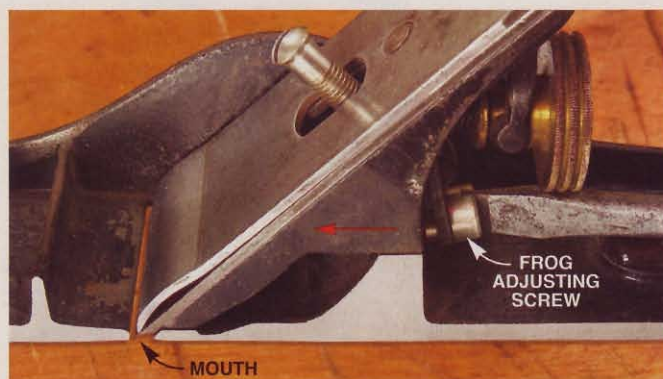
In general, the finer the shaving you're trying to cut, the closer the chip breaker should be to the blade's edge. A 1/32 in. setback is ideal for most hardwoods, but when you get tearout, try moving the chip breaker to within 1/64 in. or less of the blade's end. This will make the plane harder to push, however. (In soft woods, like pine, where tearout isn't an issue, you can adjust the chip breaker up to 1/16 in. back from the blade to make the plane easier to push.)

To move the frog, remove the lever cap, blade and chip breaker. Slightly loosen the two bolts that hold the frog to the sole. Reinstall the blade assembly and adjust the blade until it barely sticks out of the plane's sole. Turn the frog adjusting screw with a long screwdriver to close the plane's mouth. Once you have created the desired opening, remove the blade assembly and tighten the bolts that secure the frog. Tighten each one a little bit at a time, like a car's lug nuts.

Moving the frog may skew it, however. On most planes, you can only eyeball the frog to make sure its front end remains parallel to the plane's mouth. Frogs on Stanley planes manufactured in the Sweetheart Era, roughly 1920 to 1935, are self-aligning, so skewing isn't a problem (bottom photo).



To reduce tearout, adjust the chip breaker closer to the blade's edge. A projection of 1/32 in. is normal for most hardwoods, but to beat tearout you may have to go down to 1/64 in. or less.



To further reduce tearout, move the frog forward by turning the frog adjusting screw. This closes the plane's mouth. Normally, the mouth should be about 1/16-in. wide. You can reduce it down to 1/64 in.

TIP

Rub your plane's sole with a few squiggles of paraffin or canning wax every ten strokes or so. This helps your plane glide much more smoothly.



If you move the frog forward, you must double-check that it hasn't wiggled side-to-side and become skewed. Many older Stanley planes have an alignment tab to prevent skewing, which is an excellent feature.

Lindsey Dill's Fabulous Frames

AN INGENUOUS YOUNG WOODWORKER
DISCOVERS THE FUN OF JIG-MAKING.

by Lindsey Dill
and Tom Bockman



Lindsey Dill shows some of the frames that she made in her woodworking class at Prescott High School in Prescott, Arizona.

Last fall, Mr. Bockman, my shop teacher, presented plans for several woodworking projects to my class and asked us each to choose one to build. The one I liked best was called "Fab Frames", which appeared in the October, 2006 issue of *American Woodworker Magazine* (#124). The frames were covered with routed flutes that looked awesome. The story said making variations was easy and that you could make lots of frames at the same time. Plus, they didn't have to be mitered. That sounded great!

MR. BOCKMAN'S CHALLENGE

Following the step-by-step directions in the story made the project take too long for our one-hour shop classes. So Mr. Bockman asked if I could come up with changes that would simplify the project and save time.

MY RESPONSE

I knew right away the first change I would make. The original directions called for using a form to rout the frame blanks, so they'd all be the same size. The form was made out of several pieces that had to be glued together, which I thought was silly. I made my form by cutting a single piece to size and then routing out the center (see middle right photo, page 72). My form measures 9-in. by 11-in. and its center opening is 4-1/2-in. by 6-1/2-in., perfect for 5x7 photos. After I've routed each frame and removed it from the form, I rout a rabbet around the inside opening, for the photo.

EDITOR: TIM JOHNSON • ART DIRECTION: VERN JOHNSON • PHOTOGRAPHY: SARA GARDNER

Lindsey's jigs
make it easy to
create frames
with straight,
curved or wavy
patterns.

I thought of my second change after following the directions to rout the flutes in a frame blank. The directions called for using the router table and a fence to do this job. The fence had to be precisely set up to rout the first flutes and then had to be adjusted several times to rout the remaining flutes. Boring! And after completing a few frames, I was frustrated, because I could only rout flutes in straight lines.

MY FIRST JIG

After discovering that I could make wavy flutes with a template and a hand-held router, I designed a jig with rows of evenly spaced holes to index the template. (see "My First Jig", page 72). Cutouts securely hold the frame blank vertically and horizontally. I use straight bits or core box bits to create the flutes.

MY SECOND JIG IS MORE VERSATILE

What if I could move the frame as easily as I could now move the template? Then I could now rout flutes diagonally across the frames. I tried drilling the jig's indexing holes in a circle around the cutouts, but I couldn't get the spacing right. So instead of spinning the template, I decided to spin the frame. By this time I was tired of drilling holes, so I figured out how to get rid of them, too. My second jig has a rotating circular insert and a T-square fence (see "My Second Jig", page 72). This time the routing templates attach to the fence and the fence clamps to the jig.

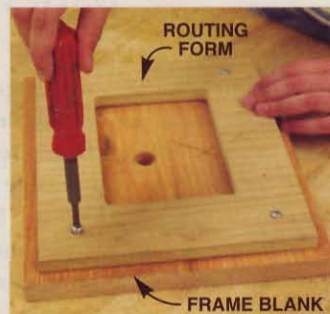
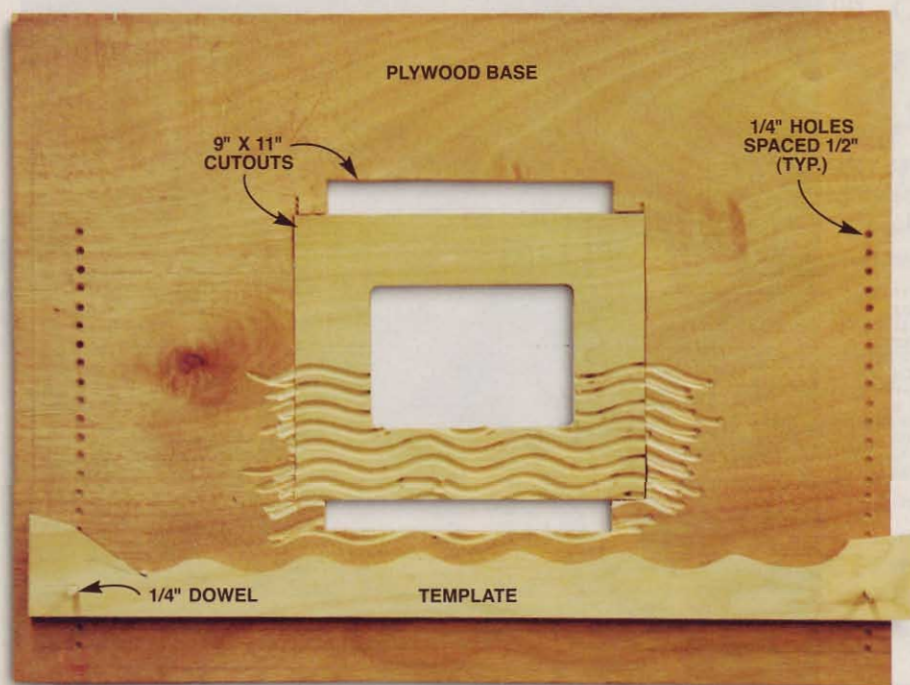


“Lindsey’s problem-solving and imaginative solutions have made her fabulous frames a popular student project choice.”

—Tom Bockman
Prescott High School
woodworking instructor

My First Jig

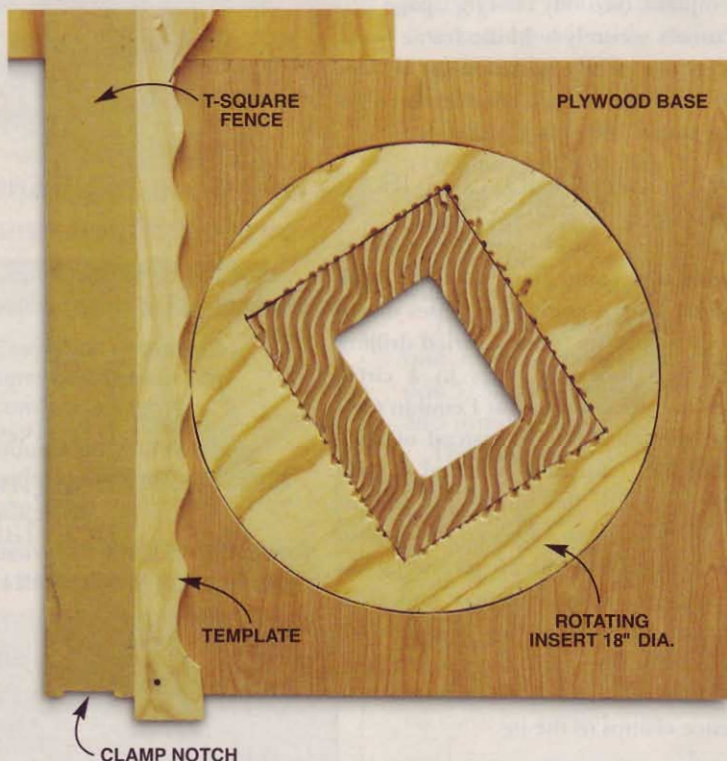
My first jig allows routing flutes horizontally and vertically. I can rout straight, curved, V-shaped or wavy flutes, depending on the shape of the template. I like making the rows slightly asymmetrical, so I follow the template with the corner of a square-based laminate trimmer.



To fit in my jigs, the frames all have to be the same size. I attach oversize blanks to a precisely-sized form. After marking and rough-sawing the frame's center cutout, I rout each blank to match the form.

My Second Jig

My second jig is more versatile. The T-square fence clamps at any point, so I can vary the flutes' spacing. All of my templates fit, so the flutes follow any pattern, and the frame rotates, so I can rout flutes across it at any angle.



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QUALITY WOODWORKING TOOLS • SUPPLIES • ADVICE

Turn A Classic Wooden Bat

LEARN HOW TO BEAT THE CHATTER



The crack of a baseball against a wooden bat is a wonderful sound seldom heard today. Too often it's been replaced by the metallic "clink" of an aluminum bat. Baseball has its roots in balls, gloves and shoes made from animal hides, and bats made from trees. It seems an odd place for high tech equipment to intrude. Making a wooden bat returns you and your kids to the sound and feel of real, old-time baseball.

The Right Wood

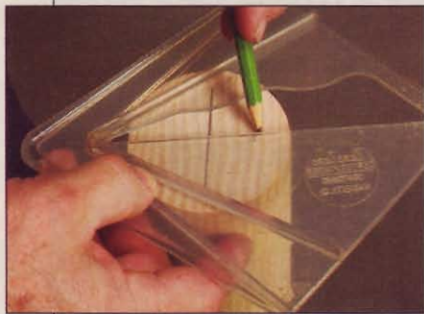
Almost every common wood has been used for bats at one time or another. However, a few species dominate the history of the sport. Traditionally northern ash has been the wood of choice, but currently—at least in the pros—it is a neck-and-neck race with hard maple. A few bats are still made of hickory and beech.

For this project, I suggest buying a blank of ash or maple that has been graded for bats (see

FIG. A

Note: These numbers are only guidelines. Because of the ever changing and sometimes localized nature of bat regulations, it's best to check with your local league officials for specific bat dimension limits.

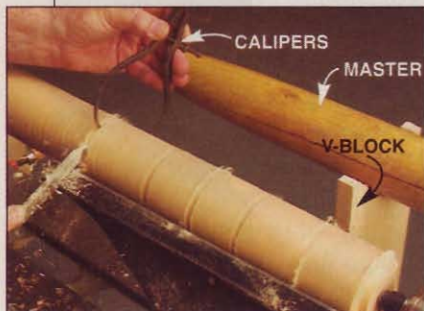




1 If you're starting with a purchased round blank, mark the center on both ends with a plastic center finder. On a square blank use a ruler across the diagonals to find the centers.



2 True the cylinder's entire length with a spindle-roughing gouge. This step is necessary because the blank may be warped, or your center marks aren't perfect. Take light cuts. You don't want to remove too much stock.



3 Size the bat with calipers and a parting tool. Transfer diameters from a drawing or an existing bat (called a master) onto the blank. Lightly push the calipers into the work as you reduce the diameter with the parting tool until the calipers just slip over the cut.



4 Use a spindle-roughing gouge to "connect the dots." The goal is to join and blend the different guide diameters to create a smooth cylinder that tapers towards the handle.



5 Take light cuts and create level transitions as you approach the final shape of the barrel. Work from the large diameter to the small to minimize tearout.

"Sources", p.78). The reason is not only superior performance, but also safety. A bat made from a graded bat blank is less likely to break in use.

Bat blanks are graded differently from regular furniture grade lumber. First, only straight-grained wood from slow-growing trees of moderate size make the grade. The blank must have tight, evenly spaced growth rings and be free of flaws like knots. The best blanks are often split from the log rather than sawn in order to follow the grain perfectly. Extra care is taken in the drying of bat blanks to create an even distribution of moisture throughout the entire thickness.

Tools And Supplies

To make a full-size baseball bat you will need a lathe that can handle lengths up to 36-in. between centers. For Little League bats a lathe with shorter capacity will work just fine. It is best to have a live center at the tailstock end, and drive with either a spur or cup drive. If you are duplicating a bat, you will need to fabricate a simple V-block system to hold the master bat (the one being duplicated) directly behind your blank (Photo 3).

The bat can be turned with three tools: a spindle-roughing gouge (1-1/4-in. to 1-3/4-in.), a parting tool (1/4-in. wide) and a spindle/detail gouge (3/8-in. or 1/2-in.). If you are comfortable using a skew, a large one (1-in. to 1-1/2-in.) can be added as an option for smoothing the shape and rounding the end of the barrel.

Complete your supplies with a pair of locking outside calipers. Make sure the caliper's points are fully rounded smooth. Sharp points can catch when used to size your bat. Round the points with a file and smooth with sandpaper. A pair of dividers is helpful—although optional—for sizing the knob's width. A plastic center finder is helpful in locating centers on round bat blanks (see "Sources").

Prepare the Blank

Determine the type of the bat you intend to turn: Major League, softball or Little League. This can be based on an old favorite you'd like to duplicate or from scratch using a drawing based on regulations dimension (see Fig. A, p.74). The blank should be 1 to 2 inches longer than the finished bat to allow for waste at both ends.

Mark the centers on the blank (Photo 1) and mount it on the lathe. I place the barrel end of the bat at the tailstock. Then I true the cylinder to the axis of the lathe (Photo 2).

Shape the Barrel

Shape the widest part of the bat, called the barrel, first. You want to preserve the thick diameter on the blank as long as possible to avoid chatter from vibration. Start by making guide diameters on the first third of the blank with calipers and a parting tool (Photo 3). Set the calipers about 1/8-in. wider than the desired diameter to allow for final shaping and sanding. If you're duplicating a bat, place the master directly behind the mounted blank.

Next is a process of connecting the guide diameters with the spindle-roughing gouge (Photo 4). Shoot for smooth transitions between the guide diameters (Photo 5).

Go ahead and roll over the end of the barrel at this time (Photo 6).

Shape the Handle

Mark and shape the middle third of the bat in the same way you shaped the barrel. When you reach the last third of the bat, remove some of the waste material towards the knob end first to give you some working room. Spindle work is best done from larger to smaller diameters because it produces the least amount of tearout. As you reduce the diameter of the bat, you will experience chatter. This usually shows up as spiral marks on the surface of the wood (Photo 7). To reduce chatter, use a sharp tool and keep it firmly planted on the tool rest. Take light cuts. Avoid pushing hard or you're bound to get chatter from the flexing blank. Even with all these tactics, you will need added support as the handle narrows. The traditional method is to support the narrow area with your hand (Photo 8). Another option is to employ a steady rest (Photo 9). I use a steady rest when I get to about the middle of the blank.

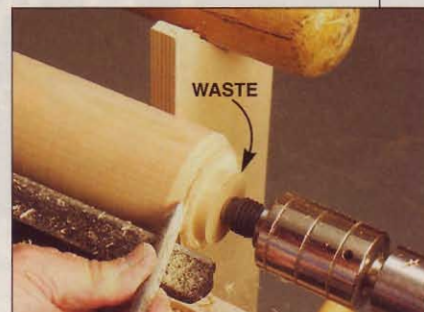
Continue the process of cutting and connecting the guide diameters working from the large diameters on either end towards the narrowest point on the handle (Photo 10).

Shape the Knob

As you approach the end of the bat, go ahead and lay out the knob area. Establish the knob's width and diameter (Photo 11). Then reduce the diameter on the knob's right side, blending into the handle. Leave a 1/2-in. to 1-in. length of waste material past the end of the knob.

After the handle area is completed, finish off the knob by rolling away the corners with the spindle/detail gouge (Photo 12).

6 Roll over the end of the barrel with a detail/spindle gouge. Shoot for a smooth, gradual curve like the master has. Leave about a 1/2-in. by 2-in. diameter waste area near your live center for now.



7 Spiraling or chatter is a big challenge for the bat maker. Spiraling results from the wood flexing, or the tool bouncing or a combination of both. As the bat gets thinner, the problem becomes more pronounced.



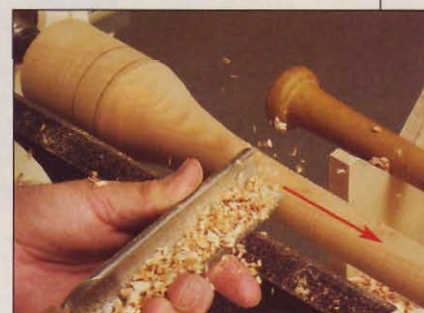
8 Support the work with your hand to reduce spiraling. This is a safe and common practice. Make sure there is little gap between the tool rest and the wood. Keep your hand pressure on the back of the blank.



9 A steady rest is an alternative to the hand-support method. It virtually eliminates chatter and spiraling because the work is supported on three sides at once. A steady rest requires a smooth area for the wheels to run upon.



10 Work the area to the right of the knob. Cut from the large diameter towards the small diameter (also known as cutting downhill). This produces the smoothest cut with the least tearout.





11 Establish the width of the knob with a pair of dividers. I keep the wood on either side of the knob as fat as possible until the handle area is almost complete. This helps reduce spiraling from a flexing blank.



12 Roll the knob using the spindle/detail gouge. Start at the widest portion of the knob and ride the bevel of the gouge down to the handle or waste block. The open or U-shaped portion of the gouge faces the direction of the cut.



13 Sand your bat with the tool rest, steady rest, and master bat removed. Start with 100 grit followed by 120, 150 and 180 grit paper.



LABEL GOES HERE

14 Add a customized look to your bat by burning in your own brand. The brand is always placed on the face grain portion of the bat (see inset) to give the hitter a point of reference for positioning the bat.



15 Apply a finish to give a richer look to the bat as well as some protection against moisture.

Finishing Touches

Sand the entire piece, working through the different grits up to 180 (Photo 13). Turn the waste material on both ends down to slightly larger than your lathe centers. Remove the bat, cut the waste off with a handsaw (such as a small Japanese saw), and finish sanding the ends of your bat by hand or a disc on the lathe.

Most bats have brands to indicate how the bat should be held. Always swing the bat with the label up to reduce the chances of breakage.

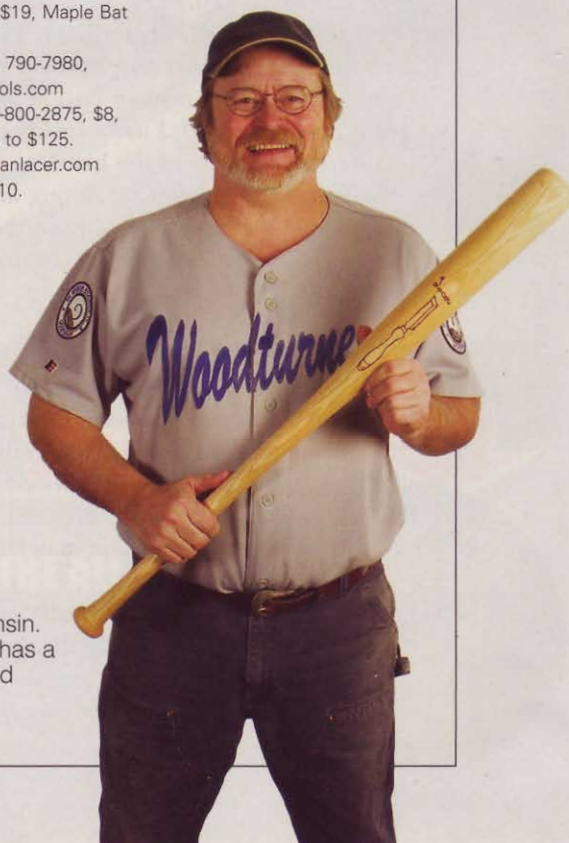
The goal is to hit the ball on the radial grain, or what some woodworkers call the edge grain—rather than the tangential or face grain. So, put your brand on the grain that looks like chevrons rather than the edges of plywood. Use a woodburning tool to put whatever name or symbol you wish to use as your brand (Photo 14).

I recommend finishing your bat (Photo 15). A finish gives the bat a nicer look as it brings out the grain. Plus it offers some protection from moisture. All types of finishes have been used for bats, including shellac, lacquer, varnish (water-based or oil-based). For this bat I am using a wipe-on poly; three coats is sufficient. Some players prefer the handle area to be free of finish—for better gripping and applying pine tar.

Now, it's time to hit the field!

Sources

Ambrosch International, (888) 641-5966, www.ambrosch.net
 Ash Bat blanks, \$7-\$19, Maple Bat Blanks, \$18-\$25.
 Cutting Edge, (800) 790-7980, www.cuttingedgetools.com
 Center finder, #400-800-2875, \$8,
 Woodburners, \$55 to \$125.
 Alan Lacer, www.alanlacer.com
 Spindle steady, \$110.



Alan Lacer is a woodturner living and playing ball in western Wisconsin. His web site (www.alanlacer.com) has a variety of articles, videos, tools, and his teaching schedule.

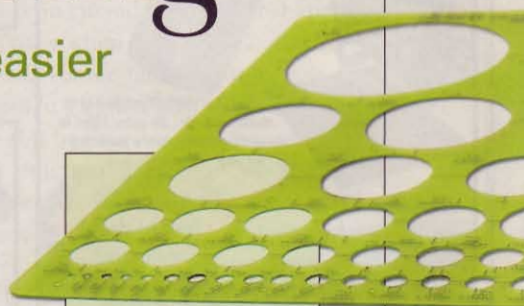
Tips for Marking and Measuring

13 methods to make layout easier



WRITE WITH CHALK

Lay out "cut here" marks on rough lumber with chalk. Chalk marks are easy to read, even on the scruffiest surface. Unlike ink, pencil or crayon, chalk marks are easy to erase if you change your mind. (I often do!) Just scrub the marks with a stiff wire or bristle brush.



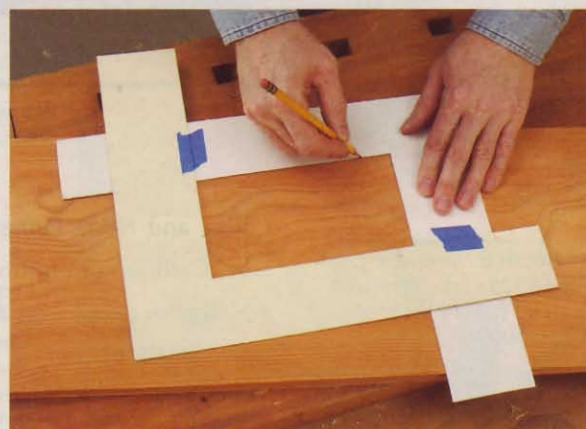
CIRCLE TEMPLATE

Setting a compass to draw small arcs or circles can be a royal pain, so I cheat and use a plastic template instead. You can generally find one at an office supply store.

SHOP-MADE STRAIGHTEDGE

Every shop should have a long wooden straightedge. It's got a hundred and one uses, but I primarily use mine for checking jointed and sawn edges, and for guiding my router.

This 4-ft. one is pretty fancy, I admit, but there are good reasons for going to the extra trouble. Most of it is pine, so it's lightweight. It's laminated from strips, so it will stay straight for years. I added a hardwood strip to the bottom to prevent dings. The holes are for hanging this beautiful tool on my wall.



FRAME YOUR WOOD

When I lay out door panels, drawer fronts or other highly visible parts, I want to see what they'll look like before I cut. I make a window from two L-shaped pieces of cardboard taped together to find the perfect grain pattern. It's easy to re-adjust for different sized parts.

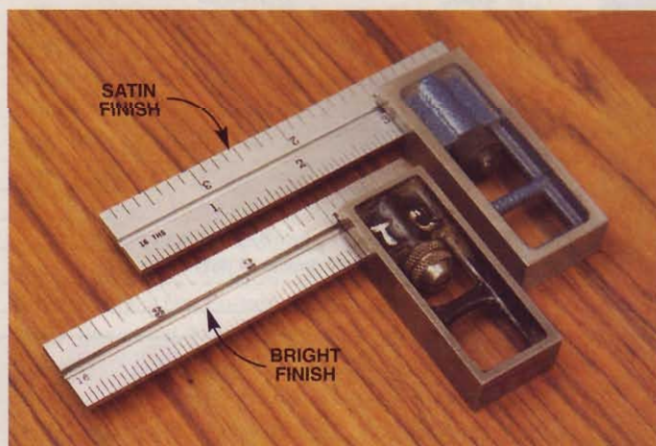
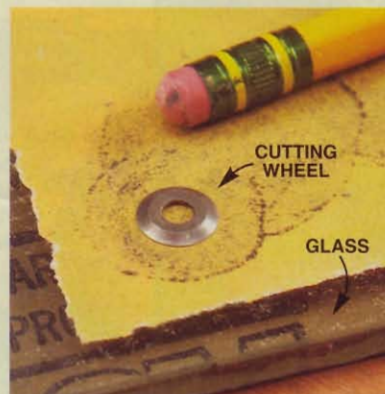
MAKE CRISPER GAUGE LINES



I love a wheel-type marking gauge for laying out tenons and dovetails. Its round cutting wheel must be super-sharp to make fine lines across the grain. Sharpening this tiny object looks nearly impossible, but it's really quite easy. First, unscrew the cutter from the gauge. Place a piece of 320-grit or finer sandpaper on a flat surface, such as 1/4-in. thick glass. Place the cutter on the sandpaper, flat side down, and push it around in circles. This is hard to do with your finger, but it's a cinch when you use the eraser end of a pencil. Don't mess with the cutter's bevel side. Install the cutter in the gauge and make a line across the grain. It should be as crisp as one made by a razor-sharp knife or chisel.

Source:

Lee Valley, (800) 871-8158, www.leevalley.com Veritas wheel marking gauge, 05N33.21, \$27.50.



SATIN RULES ARE EASIER TO READ

If you're thinking about buying a precision rule or square, check its luster first. Tools with a satin or matte finish are much easier to read under all light conditions, especially their teeny-tiny 1/64-in. divisions. Glare is a big problem with brightly-finished rules. The light must be just right to easily read them.

Source:

Woodcraft Supply, (800) 225-1153, www.woodcraft.com 4" satin-finish double square, 04P56, \$35.



MARK WITH A CHISEL

A sharp chisel makes an excellent marking knife because it has a single bevel. Double-beveled knives have to be held just so in order for one bevel to snug up against a square. A chisel has to be handled the right way, though. Pull the chisel towards you, with the handle leaning away. If the handle leans toward you, you'll get a ragged line.

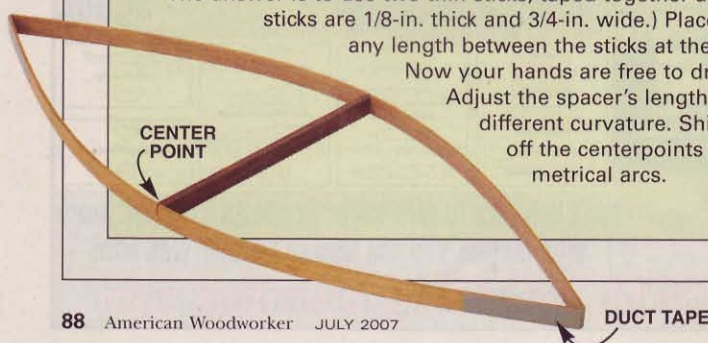
BENT-STICK ARCS

Bending a thin stick is a quick way to lay out an arc. Trouble is, it takes two hands to bend the stick. How are you going to draw a line around it?

The answer is to use two thin sticks, taped together at the ends. (My sticks are 1/8-in. thick and 3/4-in. wide.) Place a spacer of any length between the sticks at their centerpoints.

Now your hands are free to draw the arc.

Adjust the spacer's length to make arcs of different curvature. Shifting the spacer off the centerpoints creates asymmetrical arcs.



USE A PEN ON DARK WOOD

Use a blue ballpoint pen to mark dark woods, such as walnut. Its ink is far easier to read than a pencil line.

No-MATH SAW SETUP

So, you've got a big, square hunk of wood that you want to turn on the lathe. You figure sawing off the corners first will save a lot of work. How do you correctly position the saw's fence?

It's simple. Unplug the saw and tilt the blade 45 degrees. On a left-tilt saw, move the fence well to the right, away from the blade. On a right-tilt saw, remove the fence and put it on the left side of the blade.

Next, lean the blank against the blade. Move the fence to touch the blank's opposite corner (Photo, above right). Plug in the saw, place the blank flat on the table and rip each corner (Photo, below right).

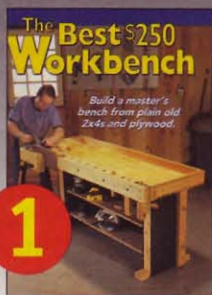


FLATTEN YOUR MARKING GAUGE

A marking gauge is a very precise tool to lay out mortises. To work well, the tool's head must be flat. The brass wear strips on many new gauges are proud of the wood (presumably because the wood has dried and shrunk since the tool was manufactured), and should be leveled.

To do the leveling, I use a 1/4-in. glass lapping plate and sandpaper affixed with a spray adhesive. This gauge needs a lot of work, as you can see from the shiny high spots, so I started with 150-grit paper and continued up to 320-grit.

FREE Project Plans!



1



2



3



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GRINDER ANGLE FINDER

The quickest way to set the angle on a grinder's tool rest is to use a shop-made block. Draw a line 1/4-in. from the block's edge. Saw, file or sand two angles on the block that intersect with the line, one at 25 degrees and one at 30 degrees.

I use the 25-degree end to grind general-purpose chisels, which I hone at 30 degrees. I use the 30-degree end to grind most plane irons, which I hone at 35 degrees.



STAND YOUR RULE ON EDGE

I'm an old fan of folding rules. Unlike tape measures, they don't have a hook at one end that may require you to start at the one-inch mark for an accurate measure. Boy, have I made some embarrassing mistakes that way! There's a trick to using folding rules accurately, though. For precise marking, stand the rule on edge rather than laying it flat. This places the division lines right on the wood.

I really like this new-style rule, which is made from plastic. The joints are cleverly constructed so that every division line runs down to the wood, even at the joints. On old-style wooden rules, the metal fittings at each joint prevent many division lines from running to the rule's edge.

Source:

Grizzly, (800) 523-4777, www.grizzly.com 6' folding rule, H3695, \$20.

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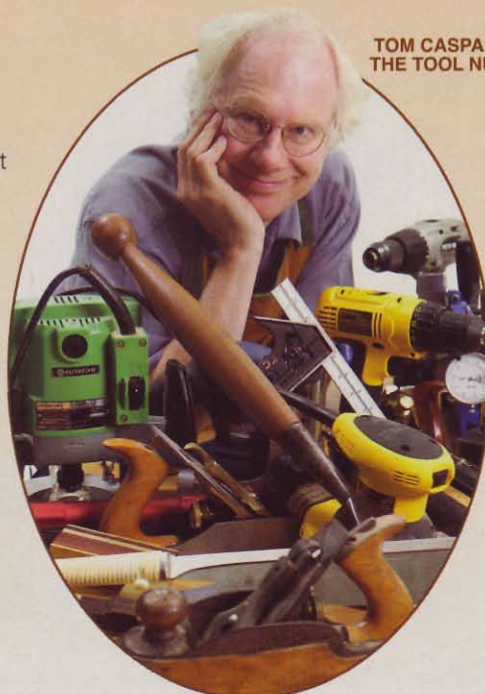
Calling all Tool Nuts!

I really don't need five cordless drills, seven routers or 24 antique hand planes, but I can't help it. I'm a tool nut. **Are you?**

Have you ever bought an old woodworking machine just because it looked cool? Tried a new tool and said, "Wow! This just changed my life!" Used a big, industrial machine and wondered how in the world you could sneak it into your shop?

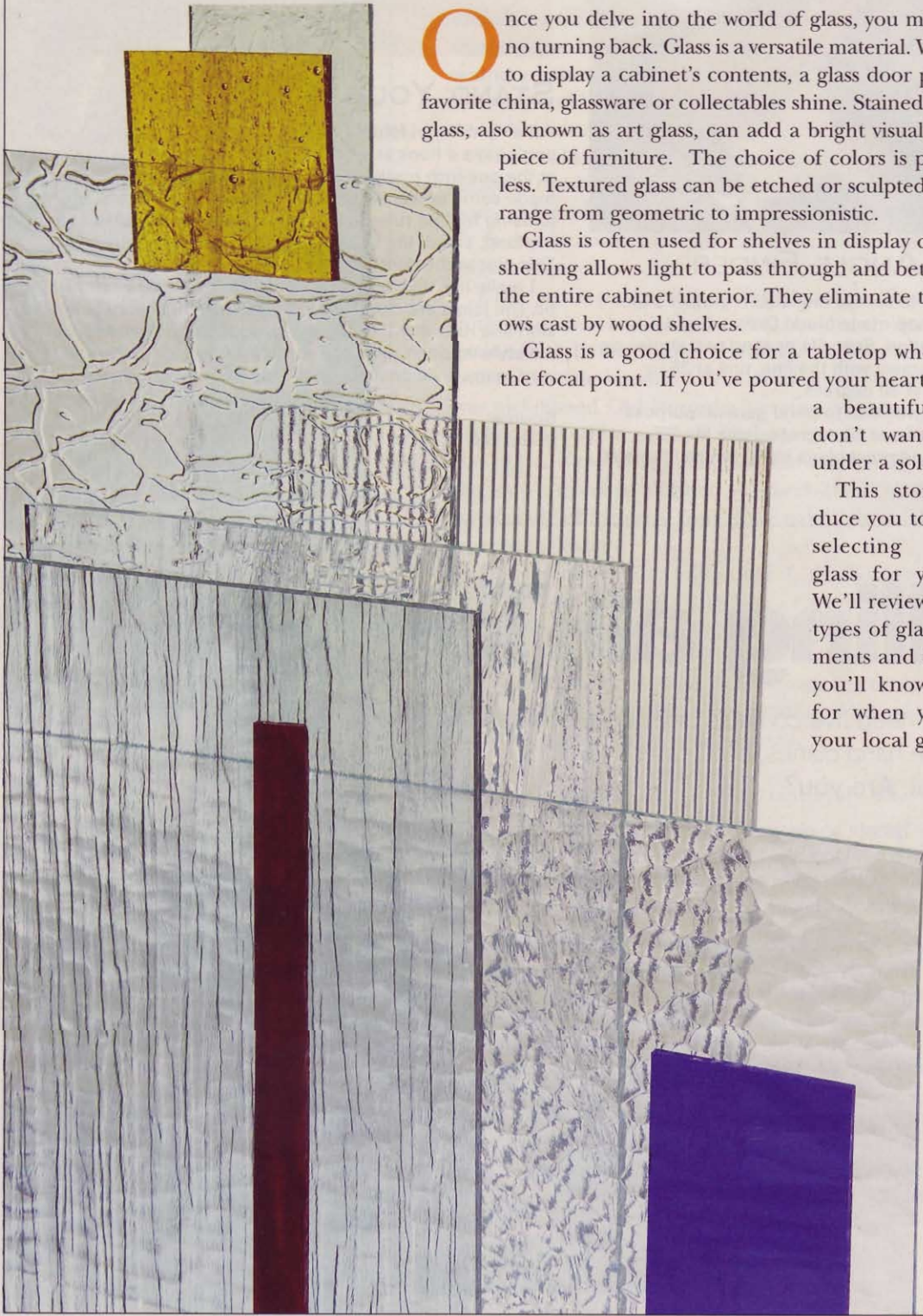
We'd like to hear your stories. So e-mail or send us a letter about a tool or machine that really gets you excited. We'll send you a new Leatherman Charge AL multi-tool if we publish your story. Please include a photograph, too. We'd prefer a digital image, but a slide or print is OK. Visit our Web site, www.americanwoodworker.com/tool-nut for some examples of what we've got in mind.

E-mail your entry to toolnut@americanwoodworker.com or write to us at The Tool Nut, American Woodworker Magazine, 1285 Corporate Center Drive, Suite 180, Eagan, MN 55121.



**TOM CASPAR,
THE TOOL NUT**

Glass For Woodworking



Once you delve into the world of glass, you may find there's no turning back. Glass is a versatile material. When you want to display a cabinet's contents, a glass door panel lets your favorite china, glassware or collectables shine. Stained or textured glass, also known as art glass, can add a bright visual element on a piece of furniture. The choice of colors is practically endless. Textured glass can be etched or sculpted. The patterns range from geometric to impressionistic.

Glass is often used for shelves in display cabinets. Glass shelving allows light to pass through and better illuminate the entire cabinet interior. They eliminate the hard shadows cast by wood shelves.

Glass is a good choice for a tabletop when the base is the focal point. If you've poured your heart and soul into a beautiful base, you don't want to bury it under a solid wood top.

This story will introduce you to the basics of selecting and buying glass for your projects. We'll review the different types of glass, edge treatments and thicknesses so you'll know what to ask for when you walk into your local glass supplier.

PLATE GLASS VS. TEMPERED GLASS

Plate Glass

We're most familiar with this type of glass. Plate glass is available at hardware stores and home centers in thicknesses from 3/32-in. to 1/4-in. It is commonly used for windows, glass doors, door panels, tabletops and shelving.

Art glass is often 1/8-in. plate glass. Textures or patterns are added by running the molten glass under an imprinted roller. The texture or pattern is on one side so the glass can still be cut in your shop.

Tempered Glass

Tempered glass can take a hit. It has twice the impact resistance of plate glass. However, this is true only on the face of the glass. Tempered glass is actually more prone to shattering when struck on its edge. That's why tempered glass is not recommended for shelving even though it can carry four times the weight of plate glass. Use tempered glass for large doors, or doors below counter height that are susceptible to impact. Tempered glass can be used for frameless glass doors, as long as they are fully inset, so the edge is protected when the door is closed.

Tempered glass costs twice as much as plate glass. It must be special ordered from a glass supplier and cut to size before the tempering process. Tempered glass cannot be cut so it's best to have the glass in hand before you build. Art glass cannot be tempered because of the trapped air bubbles from the manufacturing process.



Plate glass shatters into razor sharp shards when it breaks.



When tempered glass does break it crumbles into cubes.

CHOOSE THE RIGHT PLATE GLASS THICKNESS

1/8-in. Plate Glass

Plate glass that is 1/8-in. thick, also called "double strength" glass, is the thinnest plate glass you should ever use in cabinet doors. Its use should be restricted to door panels under 3 square feet. 1/8-in. glass is easy to cut yourself and readily available at most hardware stores and home centers. Most colored or textured glass is 1/8-in. thick.

Because it is relatively fragile, 1/8 in. glass must always be used inside a frame. Plate glass thinner than 1/8-in. is often referred to as "single strength" glass and is too fragile to be used in furniture. Its most common use is in picture frames.

3/16-in. Plate Glass

Plate glass that is 3/16-in. thick is readily available from hardware stores or home centers. Glass this thick can be tricky to cut so it's best to leave it to the pros.

When it comes to glass door panels, weight is a major consideration. That makes 3/16-in.-thick plate glass a good choice for large (over 3 square feet) door panels. Even so, large glass panels are heavy. It's often necessary to add an extra hinge to accommodate the additional weight. You might consider 1/8-inch tempered glass for large framed door panels. It weighs less, but also costs twice as much.

CHOOSE AN EDGE TREATMENT

Cut glass has sharp, rough edges that need some kind of treatment if it is going to be left exposed. Two common edge treatments available at most hardware stores are the pencil grind and the flat grind. Both grinds can be polished to a high gloss or left with a satin look. Specialized glass suppliers offer more decorative edge treatments, such as bevels, ogees, and other molding shapes. Some of these shapes can only be done on glass thicker than 1/4 inch.

Sources

Glass Source for Woodworkers, 800-588-7435,

www.theglasssource.net

Outwater Plastics Industries, Inc., 800-631-8375,

www.outwater.com

Ed Hoy, www.edhoy.com

Spectrum Glass, 425-483-6699, www.spectrumglass.com

Wissmach Glass Company, 304-337-8800,

www.wissmachglass.com

Kokomo Opalescent Glass, 765-457-8136, www.kog.com

Your Local Yellow Pages, under Glass, stained and leaded.

(Outwater and Think Glass sell directly to the public.

Other sources will refer you to someone in your local area where you can purchase their products).



1/4-in. Plate Glass

Plate glass that is 1/4-in. thick is also readily available. It is most often used for full glass doors, shelving, table or desktops. A 1/4-in. thick glass shelf can support 5 pounds per square foot over a 30-in. span. That's about 15-lbs. for a standard, 11-in.-deep upper cabinet – enough for most display applications. It's always best to consult your local glass supplier to help size your glass shelves appropriately.

3/8-in. or 1/2-in. Plate Glass

The best choice for large glass tabletops is 3/8-in. or 1/2-in. plate glass, especially if it is only supported at a few points. Make sure your base can handle the load. At over 6 lbs. per sq. ft., this is heavy stuff!

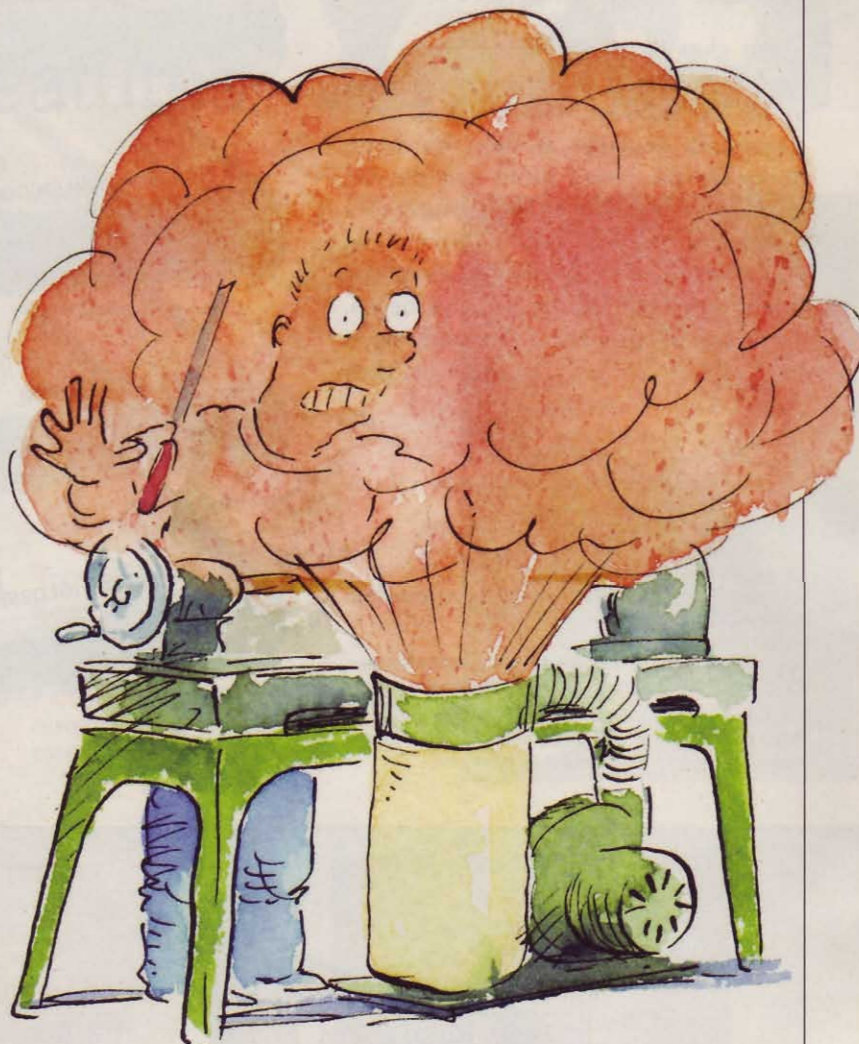
The exposed edges on tabletops require some kind of treatment. There is a much broader range of edge treatment profiles available on glass this thick.

RED DUST STORM

After reading about the health hazards of microscopic dust particles, I decided to retrofit my old dust collector with a canister filter. This was its second upgrade: I'd already wired my collector to automatically start whenever I turned on one of my stationary machines. I removed the collector's top bag to get a precise measurement of the metal ring the canister would fit on. Then I phoned the dealer, confirmed that the canister would fit perfectly on my old collector and placed my order.

Two or three days later, I went out to the shop to turn some legs on the lathe. As usual, starting the lathe automatically turned on the dust collector. Yikes! I'd forgotten to reattach the bag! In seconds my shop was enveloped in a dense cloud of red dust, all of the sanding residue from my previous project, a set of cherry kitchen cabinets. Holding my breath, I groped to shut off the power and ran for the door. I returned a half hour later to find everything covered by a thick layer of red dust. Even after a thorough cleaning, I'm sure I'll be finding red dust for years to come.

Dan Hundrup



POWER STRUGGLE

Nothing happened when I pushed the green "start" button on my brand new 220v jointer. I knew the power was on, because my tablesaw worked when it was plugged into the same outlet. When I opened the unplugged jointer's back panel, I saw that the wiring didn't match the diagram in the manual. So I called the help-line for assistance. The person on the other end had me change the wires to match the diagram, but my jointer still wouldn't start. He said he would have a technical expert call me the following day.

The expert had an "updated" wiring diagram, but it only matched the way the jointer was originally wired. We were about to give up when he asked, "Did you happen to rotate the red "stop" button a quarter turn to re-activate the magnetic switch?" Aaugh! One reason I'd purchased this jointer was its two-step safe-start mechanism. I wished rotating my red face a quarter turn would re-activate my brain.

David Magoolaghan



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