

3 OUTDOOR PROJECTS You Can Build in a Weekend

AMERICAN[®] WOODWORKER

#94 June 2002

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**The New
Premium
Bar Clamps**

**Moisture
Meter
Review**

**Pay
Less
for Wood!**

Build this wood-drying kiln around an inexpensive household dehumidifier. Then turn firewood, downed trees and green lumber into useful boards.



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Save \$100s with the AW kiln. Built from household components, your kiln will pay for itself with the first two loads you dry.

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Three Projects for Gardeners 69

Showcase your handiwork all summer with one or all of these attractive projects.

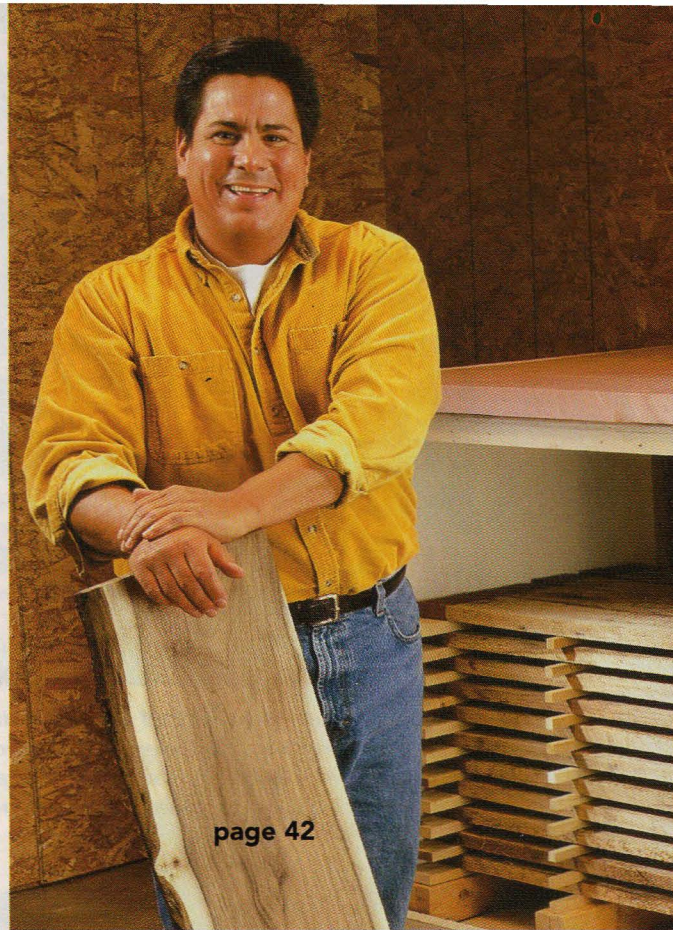
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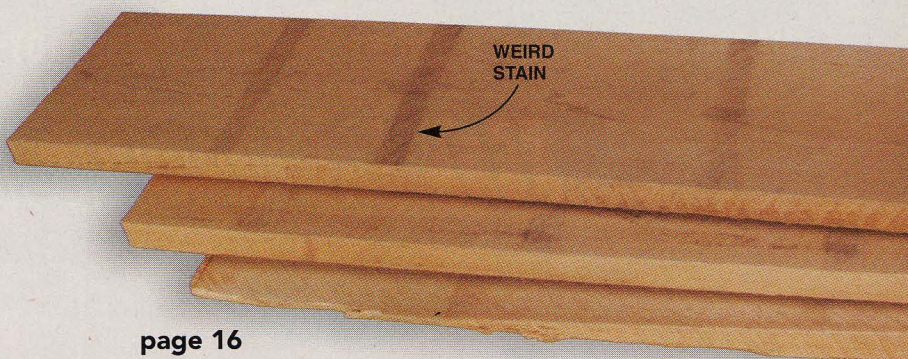
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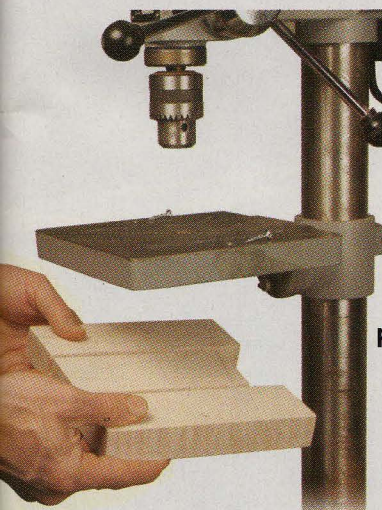
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READER'S SERVICE

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Editor's Letter

How I Came to Love Sanding (Well, Almost)

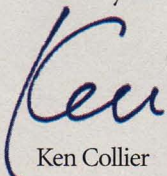
Like just about every woodworker, I hate sanding. I should say I *used* to hate sanding, because two discoveries have made me change my tune.

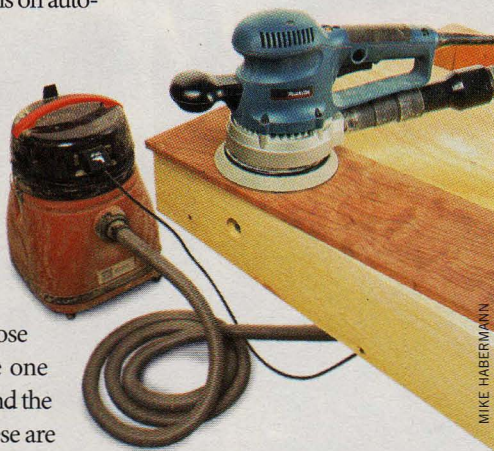
The first is a premium sandpaper. I've been using 3M's Production Fre-Cut Gold, although other manufacturers probably have a similar product. It's a "stearted paper," so it's perfect for sanding finishes, and it's great in power sanders of all kinds. But where I really love it is when I'm sanding by hand. It cuts fast, and seems to last forever.

The second discovery is hooking up a random-orbit sander to a quiet shop vacuum. This rig is so good at capturing dust that you can forget the dust mask. With no dust, sanding becomes a calm, meditative task that is downright pleasant. You can get into a sanding trance that makes it easy to do a thorough job with every grit.

Not every sander is well suited to this setup, nor is every shop vacuum. In my limited testing, it helps if the sander has a circular dust port, so it's easier to connect it to the shop vacuum. It also helps if the dust port exits the tool parallel to the handle, to keep the tool well balanced. The vacuum has to be quiet, it should handle fine sanding dust well, and it's handy if it's "tool actuated," so when you turn the sander on, the vacuum turns on automatically. We've tested a bunch of these vacuums, and there are several very good ones. Our favorite is the Fein Turbo 9-55-13 (see AW #80, June 2000, page 69 for a review of these tools).

This setup isn't perfect. I wish the hose was lighter and smooth enough so it didn't catch on the edge of the workpiece. I wish the hose and sander power cord could be one unit. And it'd be handy if the cord and the hose were the same length. But these are minor quibbles. This rig has changed my life. Give it a try and tell me how you like it.


Ken Collier



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Question & Answer

Prescription Safety Glasses

Q. I hate fumbling with goggles over my prescription glasses, so I've given up. Don't regular glasses protect my eyes well enough in the workshop?

Walter Poling

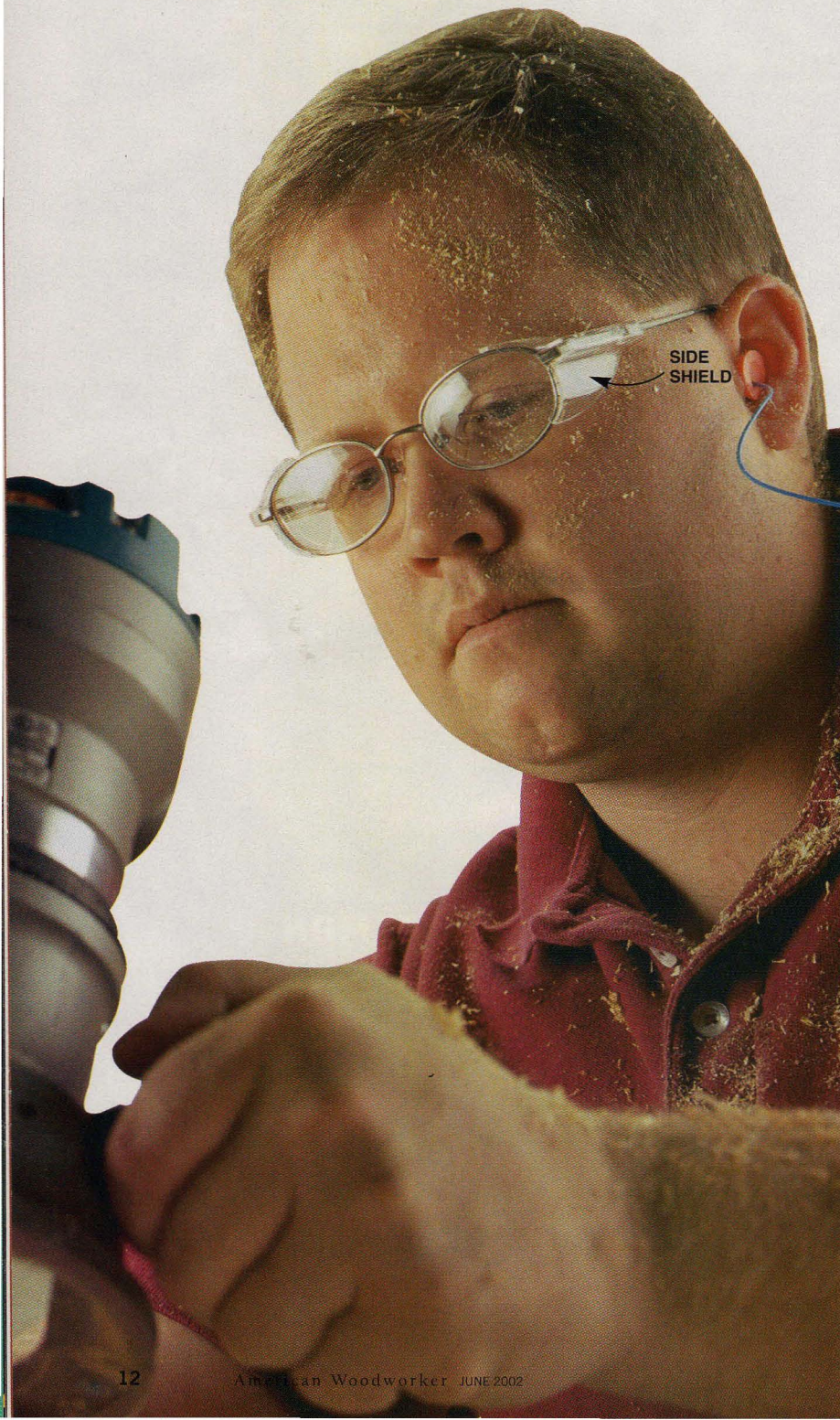
A. No. Normal prescription glasses, even if they have plastic lenses, are no substitute for safety glasses. Bite the bullet and buy a pair of prescription safety glasses with polycarbonate lenses and permanent side shields. They're available wherever you buy your regular glasses. They can be made in any prescription and cost no more than a regular pair of glasses.

Safety glasses are different from regular glasses in three important ways.

- First, the lenses are thicker and have much greater impact resistance. Polycarbonate lenses are by far the strongest.
- Second, the frames are built differently. They won't allow a lens to pop out *toward* your face.
- Third, safety glasses have side shields that wrap around your face like goggles. Side shields not only protect your eyes, they help prevent other accidents, too. They keep distracting dust out of your eyes far better than standard glasses, so you can concentrate on what you're doing. (Safety glasses are available without side shields, but we don't recommend them. There's no reason to go around half-protected.)

You can get safety glasses with side shields that are detachable, so one pair of glasses could serve you both in the shop and on the street. The problem is, detachable side shields are easy to lose or misplace.

If you have a question you'd like answered, send it to us at:
Question & Answer, American Woodworker, 2915 Commers Drive, Suite 700, Eagan, MN 55121. Sorry, but the volume of mail prevents us from answering each question individually.



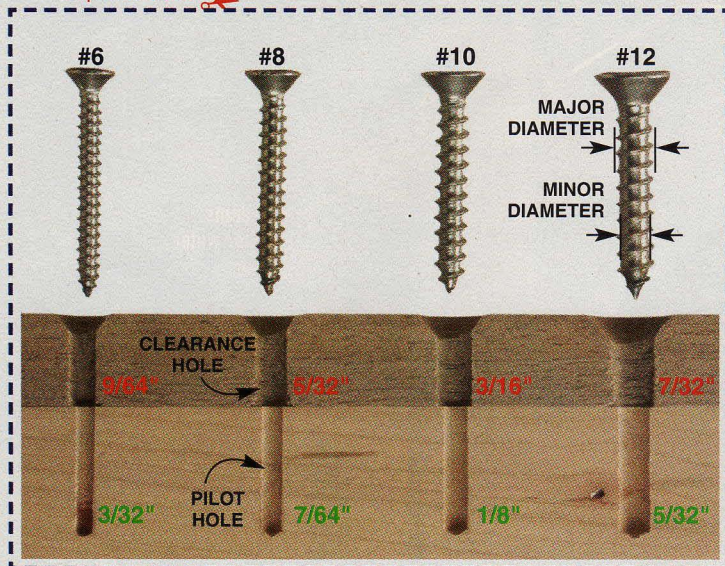
Question & Answer

Why Predrill Screw Holes?

Q. I think predrilling screw holes is a real drag, so I rarely do it. Most screws seem to work fine without all that bother. Why are you always advocating predrilling?

Jeff Hawkinson

Clip and Save 



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A. Call us old fashioned, but when you're working in solid wood, we believe you'll get the most effective and longest-lasting fastening power from screws when you drill correctly sized clearance and pilot holes.

First, drill a pilot hole through both boards. Pilot holes guarantee that your screw won't break off and your wood won't crack. For most hardwoods, the pilot hole should be at least as large as the screw's minor diameter. If the screw has deep threads, or the wood is very hard, the pilot hole should be another 1/64-in. larger than the minor diameter. For softer woods, the pilot hole can be 1/64-in. smaller.

Skipping the pilot hole, or drilling one too small, can create hairline cracks in solid wood and MDF. Visible cracks are obviously bad, but other cracks that are too small to see can eventually widen and cause the joint to fail.

Second, enlarge the pilot hole in the top board to make a clearance hole. This larger hole allows the screw to pull the two boards together. The clearance hole should be at least as large as the major diameter of the screw. Skipping the clearance-hole step often results in a small gap between the two boards you're joining together. Glue won't effectively bridge a gap larger than the thickness of a piece of paper.

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Is Polyurethane Food-Safe?

Q. I'm planning on finishing a set of wooden plates with polyurethane. Is this finish safe for food?

Julia Sosnoski

A. According to finishing expert Bob Flexner, all finishes are food-safe once they have cured. Polyurethane varnish does not present any known hazard. However, no finish is food safe until it has *fully* cured. The rule of thumb for full curing is 30 days at room temperature (65- to 75-degrees F).

The question of food safety in finishes revolves around the metallic driers added to oils and varnishes to speed the curing process. Lead was used as a drier many years ago, but now lead is banned.

There is no evidence that today's driers are unsafe. No case of poisoning from finishes containing these driers has ever been reported. The Food and Drug Administration approves the use of these driers in coatings, and no warnings are required on cans or Material Data Safety Sheets.

Several oil and varnish products are marketed as "food or salad-bowl safe." This implies that other finishes may not be safe, but that's simply not true. Some of these specially labeled products have no driers added to them (and they take quite a long time to dry!), but the rest actually contain the same kinds of driers as other oils and varnishes.

Bob Flexner's "Understanding Wood Finishing" is available from www.amazon.com for \$14, plus shipping.

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Why Does My Wood Have Stripes?

Q. I put a clear finish on a beautiful ash table I made and found faint stripes an inch or two wide going across each board. Any ideas on what caused them and how to get rid of them?

Terry Kennedy

A. Those stripes probably won't come out with sanding, because there's a good chance they run quite deep into the wood. You didn't accidentally put them there, nor did the tree produce them. These stripes were created when your wood was dried under imperfect conditions.

The stripes are, in effect, a chemical shadow from the stickers that separated the boards in a kiln or a stack of air-dried lumber. "Sticker stain" or "sticker shadow" can run

STICKER STAIN

anywhere from 1/32-in. deep to half the board's thickness.

This permanent discoloration is more of a problem in light-colored sapwood than dark heartwood. Your light-colored ash, like most maple and birch, is actually the tree's sapwood. Look carefully at this kind of wood for sticker stain before you buy.

Sticker stain can be hard to spot on the surface of rough lumber, however. Be on the lookout for faint stripes across the width of the boards when you run light-colored woods through a planer. If the stripes persist after a few passes, stop and see if your lumber dealer will replace the boards. If not, your only option may be to hide the stripes with a dark stain.



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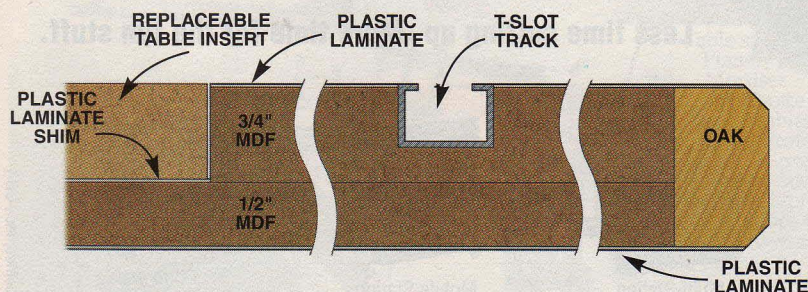
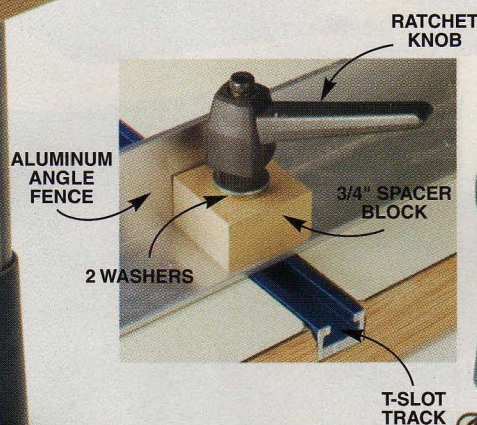
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Workshop Tips

Spacious Drill Press Table

I built this auxiliary drill press table to give me the extra support and room I need when drilling cabinet doors and sides. The core is MDF but particleboard would also work fine. I edged my table with oak to make the edges more durable. The plastic laminate provides a smooth surface to work on and should last a long time. Having plastic laminate on both sides keeps the table stiff and stable. The table insert is replaceable and the fence is quick and simple to adjust. The T-slot tracks make it easy to add other jigs and fixtures. My table measures 18 in. by 35-1/2 in. and has proved to be a good size for most work. I bought all the parts at my local home center and wood-working store for about \$75.

Mark Nagel



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If you have an original Workshop Tip, send it to us with a sketch or photo. We pay \$100 for each one we print. Send to:
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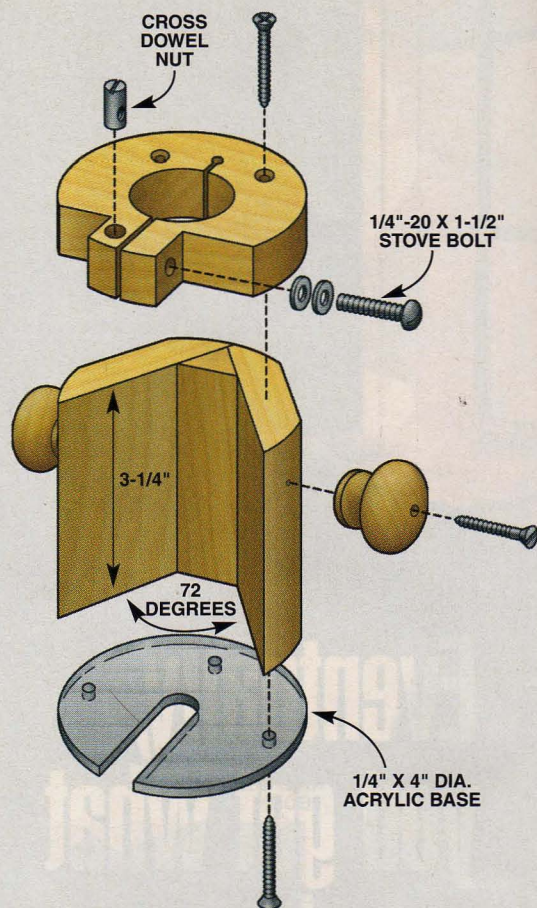
Workshop Tips

Rotary Tool Base

With this shop-made base, I turned my rotary tool into a mini router. My favorite application is trimming wood plugs, but I also use it to cut small grooves and rabbets. The base can be made out of any type of lumber. Measure the diameter of your rotary tool and make the inside dimension of the collar about 1/32-in. bigger. The rotary tool should fit snugly in this opening, even before you tighten the collar screw. If the fit is a little loose, add a couple of layers of masking tape until you get a snug fit.



Robert L. Betterini



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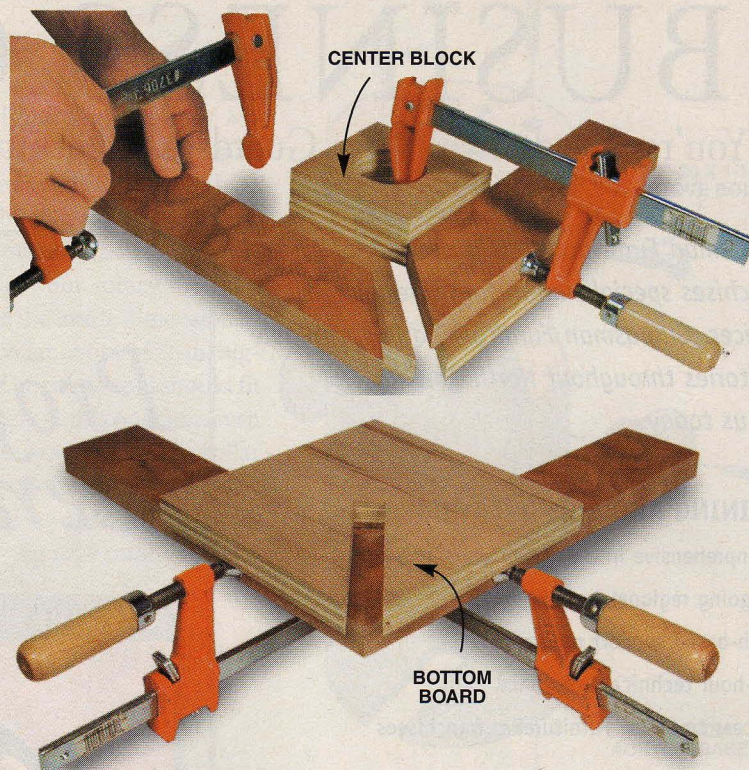
Workshop Tips

Corner Clamp for Better Miters

This shop-made miter clamp has many of the same advantages as the expensive metal ones. It's strong, easy to use, holds project parts both square and flat and allows you to adjust one part at a time. The slot in the bottom lets you examine the back of your miter to make sure it's properly aligned. It also keeps glue from smearing on the miter's back.

It's simple to make this clamp out of some scrap plywood. Make the center 4-in.-square block from two layers of 3/4-in. plywood glued together. Double-check that this block is perfectly square and drill a 2-in. hole in the middle. Make the bottom board 7-in. square, cut the slot with a jigsaw and glue it to the 4-in. block.

David Radtke



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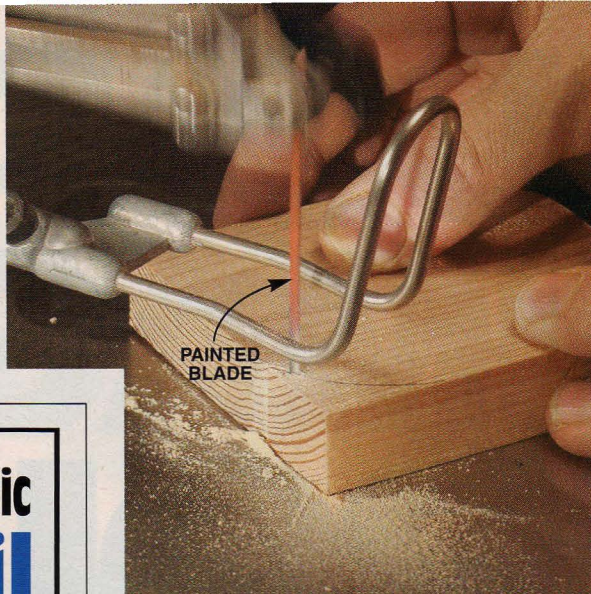
Workshop Tips

More Visible Scrolling

A scrollsaw blade can be tough to see as it goes up and down 1,000 times or more per minute. This can make it hard to follow

your line. An easy solution is to spray paint the blades a bright color.

Patrick Speilman



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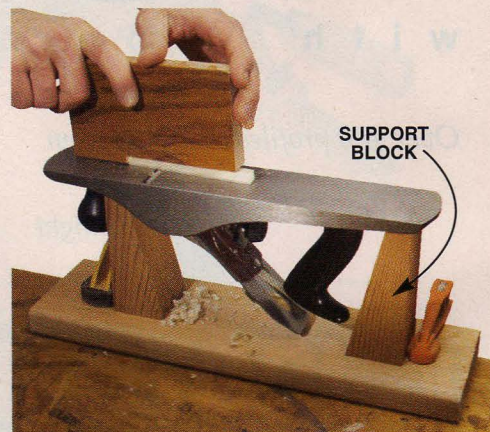
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Plane Stand

Every so often I need to plane down a piece of wood that is too small for my jointer. To handle these small jobs, I devised a stand for my No. 5 Stanley jack plane. The plane rests upside down on two wood blocks that fit up between the ridges on the sides of the plane. This keeps the plane centered and also prevents sideways movement. The front knob pushes against the front wooden block and keeps the plane from moving backwards. With the use of a small push block, I can safely and accurately plane even tiny pieces of wood.

Jim Williams

Drill Press Bottom Board

I used to have trouble clamping to my drill press table because the underside was uneven. I fixed this by fitting a board to the bottom of the table. It was a little challenging to get the fit right because of all the webbing and ridges, but I finally got it. I drilled and countersunk a couple of holes in the metal table and attached the board with wood screws.

Jeff Gorton

INSTALLATION
SCREWS

BOTTOM
BOARD

PLASTIC SPINE

Sharp Edge Protection

To protect the sharp edges of my scrapers and fine handsaws, I use the spine from a plastic page protector. They're available at office supply stores. Two bucks will get you a pack of six. They are easily cut to length with a utility knife.

Randy Lee

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Workshop Tips



Cable-Tie Cord Management

My power tool cords were always in a tangle, so I finally did something about it. All it took was a couple of cable ties; a small standard one and a large resealable one. I drilled a couple of tiny holes in the resealable tie (near its clasp) and inserted the small standard tie. Then I fastened the small tie to my power cord. I use the resealable tie to hold the power cord when it is coiled up. It's a quick and convenient way to keep your power cords neat and orderly, and the ties stay with the cord. Cable ties usually come in bags of 50 or 100. I don't have that many power tools but I've found lots of handy uses for these ties around the house and yard.

Ed True

What do you look for in a biscuit joiner?

"...when I asked a group of professional cabinetmakers what they looked for in a biscuit joiner, their answer was, **'the name Lamello on the side.'**"

CWB - Custom Woodworking Business
Biscuit Joiners Comparison Test, December 2000

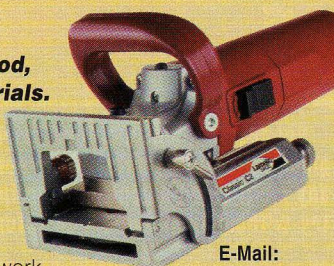
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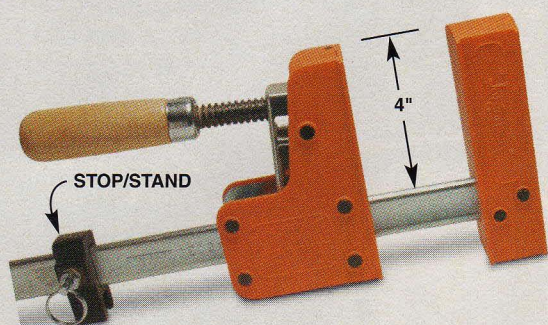
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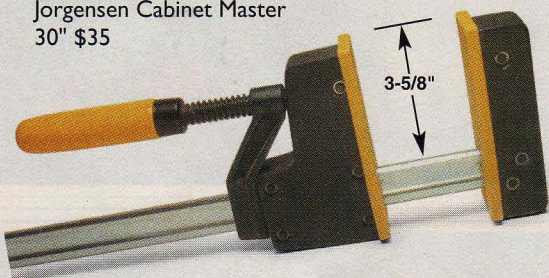
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The Well-Equipped Shop

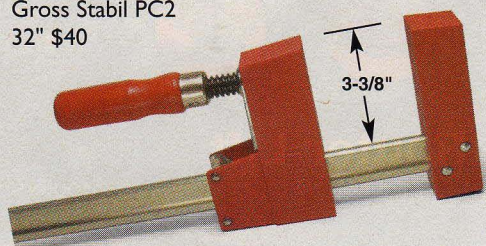
By George Vondriska
and Tim Johnson



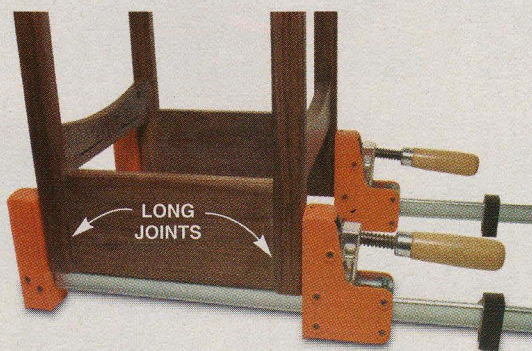
Jorgensen Cabinet Master
30" \$35



Gross Stabil PC2
32" \$40



Bessey K-Body
31" \$39



PARALLEL JAWS apply even clamping pressure on long glue joints.

The Ultimate Bar Clamps

Every tool category has its top dog, the leader of the pack. And in the clamp family, parallel-jaw clamps are the pick of the litter. They're great for frame-and-panel doors, thick tabletops and leg and apron assemblies.

These clamps are expensive (twice as much as pipe clamps and up to 50-percent more than other heavy-duty bar clamps) so we've only got a few of them. But, they're the ones we always reach for first.

Parallel Jaws are Best

Bar clamps distort under pressure. Their jaws rack out of square or the bars bow, so it's tough to keep your glue-ups flat.

Parallel jaws don't rack. Whether you're gluing up a 3/4-in.-thick panel or a 4-in.-wide mortise and tenon, they provide even clamping pressure across the joint (photo, at left).

Parallel-jaw clamps can exert a half-ton of pressure, more than enough for just about any glue-up. They're heavily made, with thick, wide bars that resist bowing.

The Players

Bessey (K-Body), Gross Stabil (PC2) and Jorgensen (Cabinet Master) currently offer parallel-jaw clamps. They've all got:

- Large jaws that distribute clamp pressure over a broad area.
- Non-reactive bars that won't stain the wood.
- Built-in pads so the jaws won't mar your wood or stick to any squeezed-out glue. They don't fall off easily, either.
- Plenty of clamping pressure (1,100 lbs.).
- Capacity to 100 in.! Go for the 30-in. clamps first (\$35 to \$40 each). They're the most useful without getting awkwardly long.

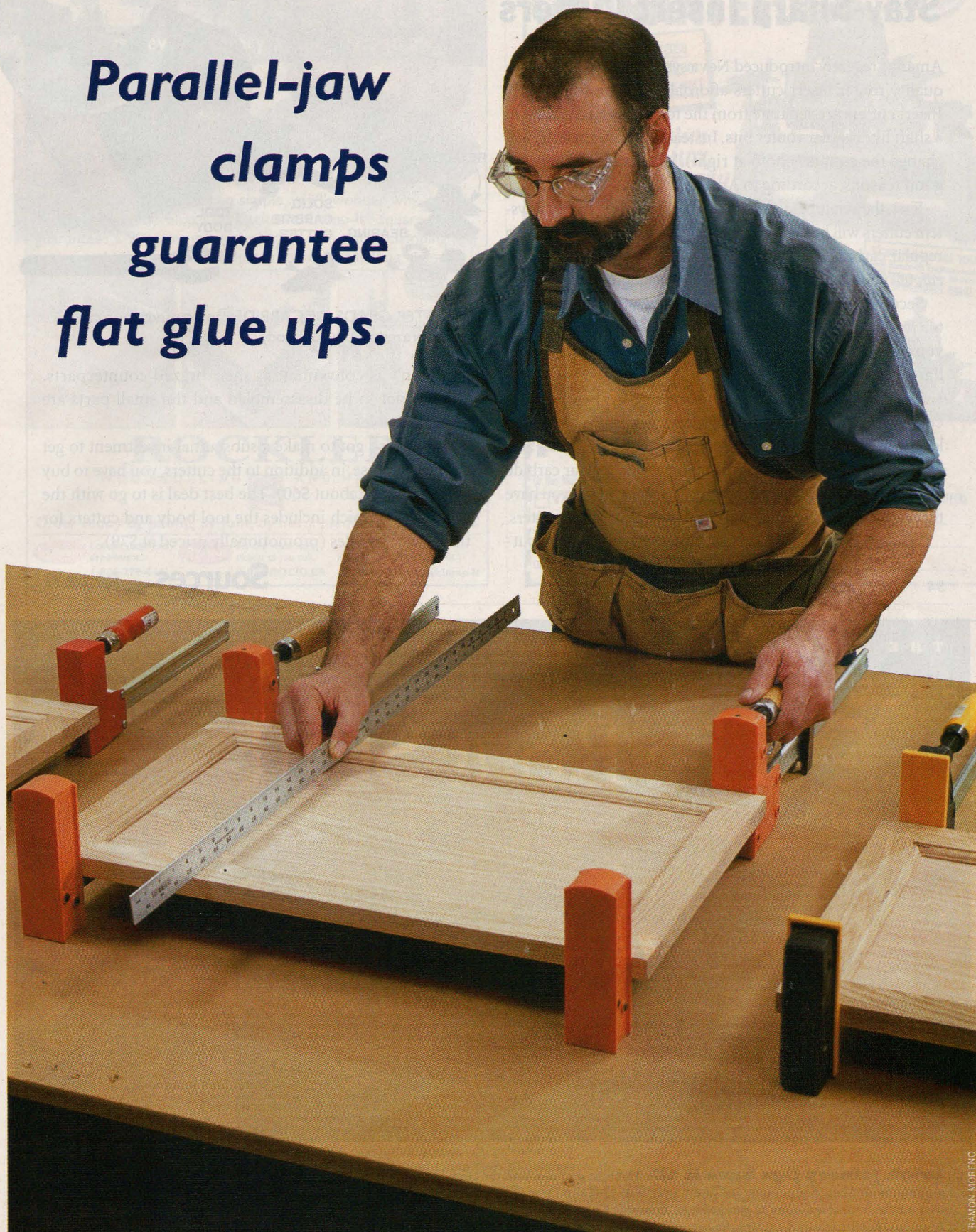
The Very Top Dog

Any of these parallel-jaw clamps will make you very happy, but the Jorgensen Cabinet Masters are the best value. Even though they're the least expensive, they have a couple of noteworthy, unique features. First, they're equipped with a removable stop that also acts as a stand. It keeps the clamp level while allowing the sliding jaw to move freely. Second, their lower jaw can be removed and reversed to apply outward pressure. The Jorgensen's also have the largest jaws (1-7/8 in. x 4 in.) of the group and a thick, robust handle that makes them a pleasure to use.

Sources

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**Parallel-jaw
clamps
guarantee
flat glue ups.**



RAMON MORENO

The Well-Equipped Shop

Stay-Sharp Insert Cutters

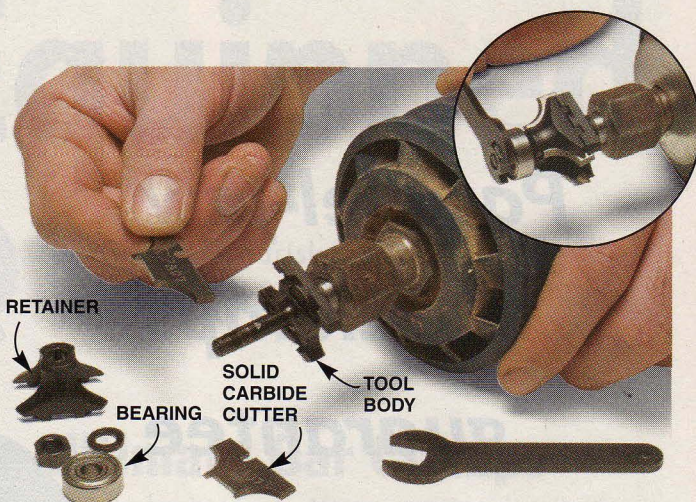
Amana's recently introduced Nova system makes industrial-quality router insert cutters affordable for the small shop. Insert cutters are separate from the tool body, not brazed to a shaft like regular router bits. Instead of changing bits, you change the cutters (photo at right). Why bother? There are good reasons, according to Amana.

First, they claim that the grade of carbide used in Nova system cutters will hold a sharp edge up to five times longer than regular carbide router bits. While we can't test longevity, we can tell you these cutters provide exceptionally smooth cuts.

Second, Amana says this grade of carbide stands up better to the natural abrasiveness of man-made materials. If you rout lots of MDF or solid-surface material, take a good, hard (ha!) look at these cutters.

Third, if you sharpen your bits repeatedly, Nova system cutters are probably cheaper than regular carbide bits in the long run. Each set of cutters (23 profiles are available) costs \$22, which is up to twice as much as a comparable regular carbide bit. But if you figure that it'll cost \$5 to \$10 each time you have that carbide bit sharpened, you'll be better off with the cutters.

When it comes to changing profiles, however, insert cut-



A BETTER GRADE OF CARBIDE can be used when cutters aren't brazed to the tool body.

ters aren't as convenient as their brazed counterparts. They've got to be disassembled and the small parts are easy to fumble.

You've also got to make a substantial investment to get started, because, in addition to the cutters, you have to buy the tool body (about \$60). The best deal is to go with the "starter set," which includes the tool body and cutters for three basic profiles (promotionally priced at \$79).

THE WORLD'S BEST ROUTER JOINERY JIGS BY LEIGH

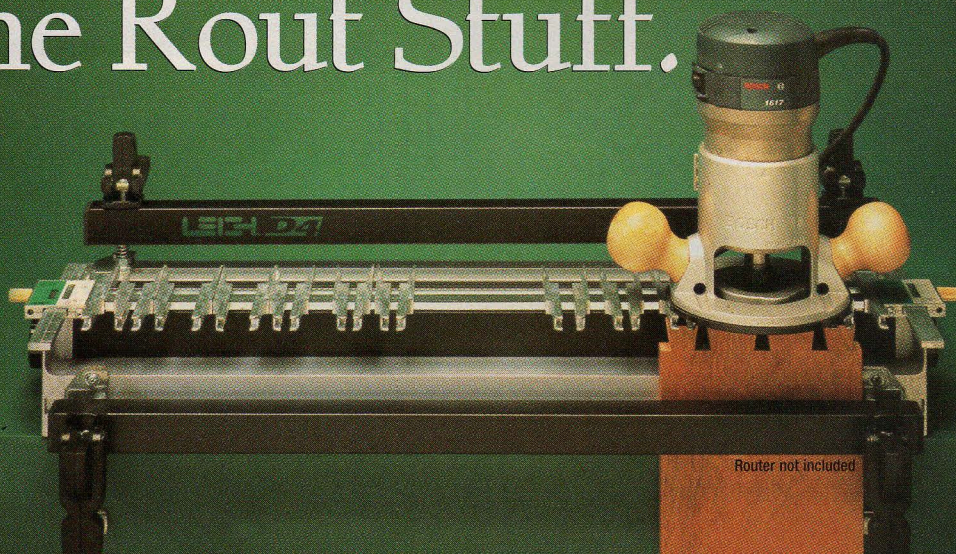
The Rout Stuff.

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- Half-blind dovetails up to 1 1/2" thick
- Sliding dovetails up to 1 1/2" thick
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The Well-Equipped Shop

Water-Based Finish for Outdoor Wood

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Water Seal, claims to be just as durable as oil-based finishes, without all the harmful solvents. Available in both natural (clear) and lightly tinted versions, it meets the more restrictive volatile



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organic compound (VOC) emission standards set to go into effect at the end of 2003.

According to the folks at Thompson's, this new formula can be brushed on a damp surface and offers the convenience of soap-and-water clean-up, but becomes highly water-repellent when it dries. Advanced Wood Protector gives new meaning to the phrase "one-coat application." Thompson's says the treated surface becomes so water-repellent, additional coats just won't stick.

Advanced Wood Protector gives the surface an "eggshell" sheen. It contains additives to prevent mildew and UV absorbers and blockers to keep the wood from turning gray.

Advanced Wood Protector is like a transparent version of exterior latex paint—a durable, environmentally friendly finish that cleans up with soap and water and stands up to the weather.

Sources See page 98

Pivoting Outfeed Support Stand

Roller stands are handy when you need to support long pieces on the table-saw, jointer and planer. But there's one big problem. When the stand is too far from the tool to provide the needed support, the workpiece often sags enough to knock the stand over. Not so with Ridgid's new Flip-Top Portable Support Stand, AC9933, \$30.



Instead of rollers, the Flip-Top stand has a polystyrene top (7-1/2 in. x 21 in.). The top pivots, allowing it to tilt toward the tool and catch sagging material as it comes across. Then it pivots flat to support the workpiece. For stationary support, the top can be locked in the flat position. For versatility, the height of the top is adjustable from 27 to 45 in.

This stand holds up to 250 lbs; a 4x8 sheet of 3/4-in.-thick MDF weighs

about 100 lbs. The stand has a 20-3/4 in. x 25 in. footprint and non-skid feet for stability. It folds flat (3-1/2-in. thick) for storage. Other roller-topped sup-

port stands cost between \$20 and \$50, so at \$30 the Ridgid AC9933 looks like a great buy.

Sources

See page 98

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- ♦ INCRA precision on both sides of the blade with micro adjustability to 0.001"
- ♦ Heavy-duty rail system with 5-point fence lock, plus easy installation

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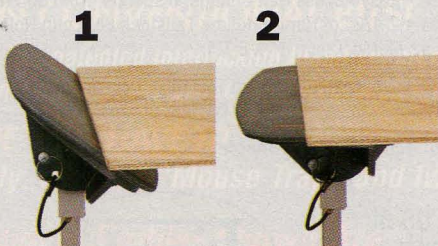
- ♦ Dual carriage, split fence universal woodworking system for the router or shaper table
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The Well-Equipped Shop

Clean Your Drum Sander Safely

Not only can it be scary to clean the sandpaper in a drum sander, it's downright dangerous. With the machine running and the cover off, you have to press a cleaning stick against the sandpaper on the spinning drums. Yikes!

Here's a really good solution. Just feed the Pro-Stik abrasive cleaning pad (\$60) through your machine, as if it was a piece of wood. Like hand-held, stick-style abrasive cleaners, it pulls the dust right off the sandpaper.

You pay more for a pad this size (stick-style cleaners cost only \$10), but it contains almost five times the amount of cleaning material. Besides, the shorter the stick becomes, the more dangerous it is to use. Not so with the pad—you can use it safely right down to its plywood base.

It should last a long time, because each cleaning pass removes such a tiny amount of the pad.

We recommend cleaning your drum sander's paper frequently, especially if you sand lots of resinous wood like pine and cherry. If you allow the paper to get heavily caked with sawdust and resin, you'll never get it clean. Replacing the sandpaper costs \$5 to \$10 per drum, so it makes good economic sense to keep it clean. **AW**

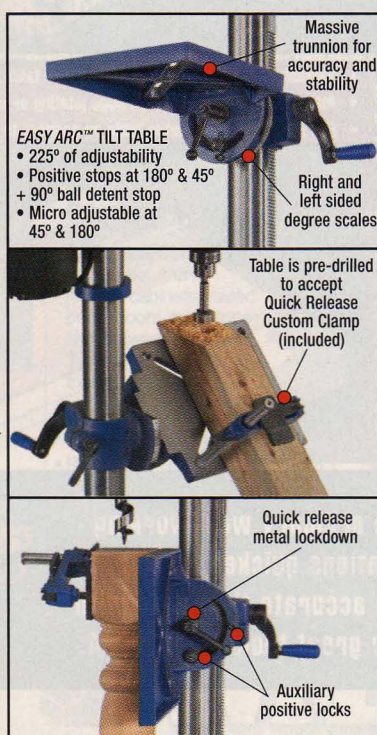


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Part # DP2000



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• 90° ball detent stop
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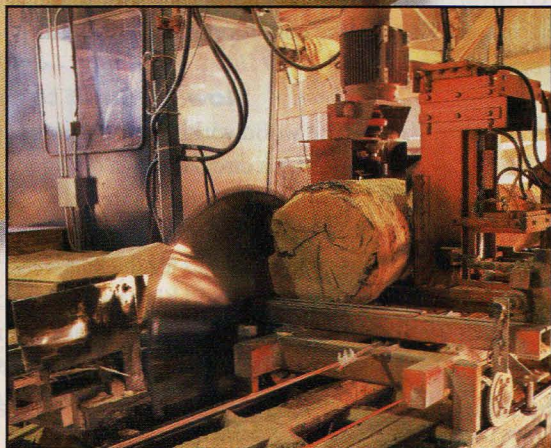
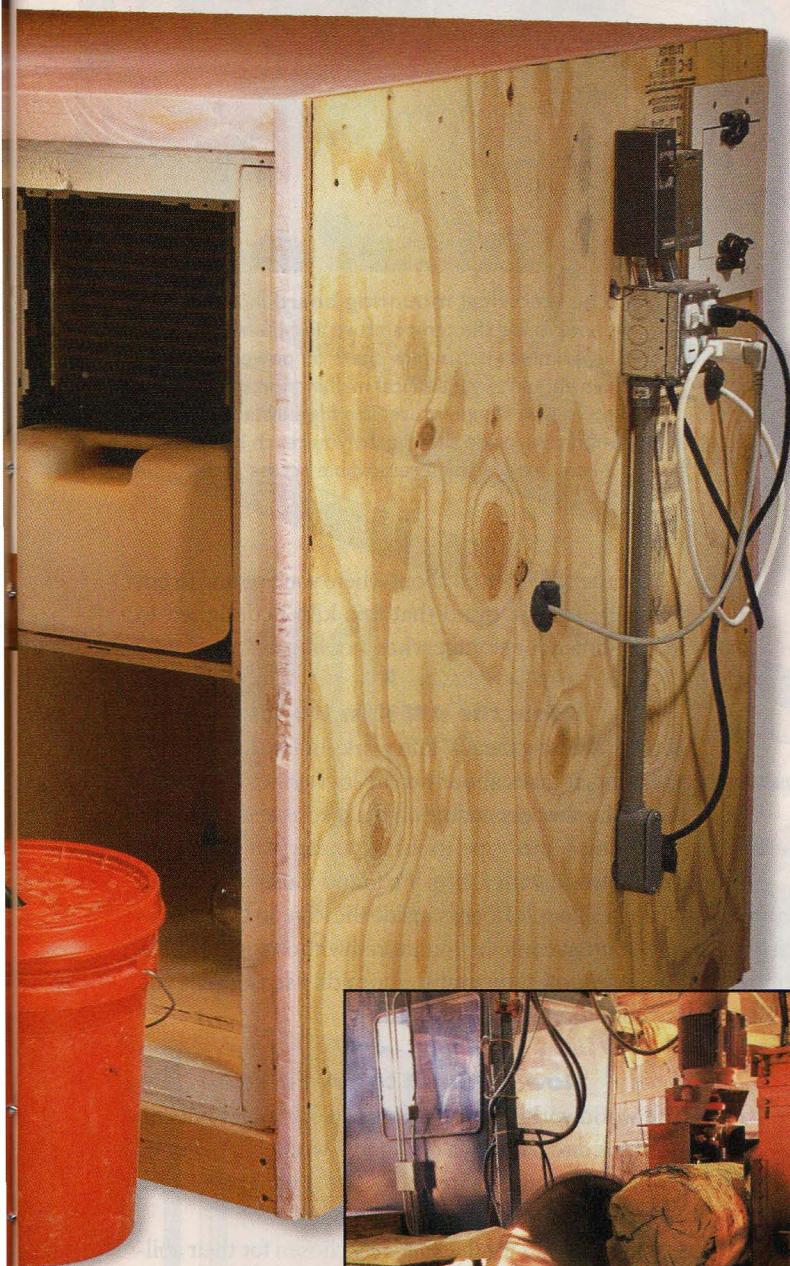
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Our Simple Kiln Beats the High Cost of Wood

EDITOR: KEN COLLIER • ART DIRECTION: PATRICK HUNTER • PHOTOGRAPHY: BILL ZUEHLKE, UNLESS OTHERWISE INDICATED • ILLUSTRATION: FRANK ROHRBACH • CONSULTANT: AL HILDENBRAND, MASTER ELECTRICIAN



Dry Your Own Wood



MIKE HABERMANN

Schmitt Timber, Spring Valley, WI

It's been said that in life there are only two sure things: death and taxes. For us woodworkers there's a third; the cost of wood keeps going up! There's not a lot we can do about death and taxes, but there is an antidote to the high cost of lumber. Build this dehumidification kiln for about \$600 and you can save 50 to 80 percent on the cost of store-bought lumber. The kiln will pay for itself with the first two or three loads of hardwood you dry!

We'll start by showing how the kiln works and then give you detailed instruction on how to build it. After the kiln is built, we'll show you how to prepare green wood for drying and how to operate the kiln to maintain a safe drying rate that guarantees great results.

The AW Kiln

A Simple, Practical Design

There are small commercial dehumidification kiln kits available, but they cost \$2,300 and up and you still have to build the kiln box yourself. Our design is centered around a standard household dehumidifier (around \$180), with controls made from stock electrical components. A household dehumidifier won't last as long as a heavier-duty commercial unit, but we've run about 1,000 bd. ft. through our prototype kiln over the past year and its Sears dehumidifier is still going strong.

The kiln itself is basically a big plywood box that holds the dehumidifier, lights and a fan. The light bulbs supply auxiliary heat to the kiln, and are needed mostly at the beginning of the drying cycle, when the dehumidifier is not running all the

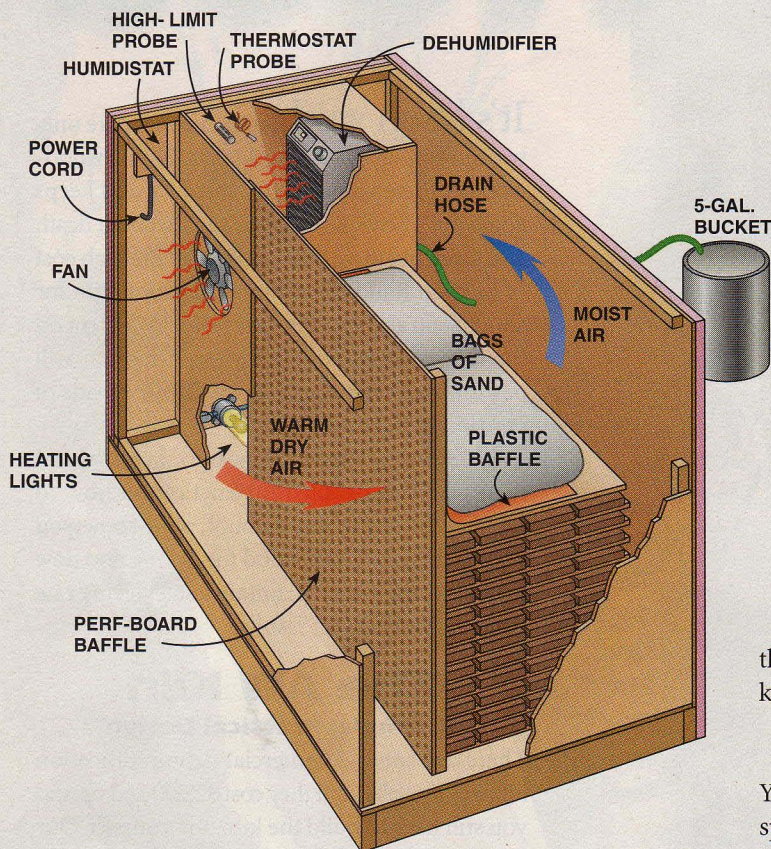
You can buy green lumber from many sawmills at a fraction of the price of kiln-dried lumber from a dealer. With the AW kiln, you can dry green lumber yourself, gently, and to perfect moisture levels.

Note: Guard removed for clarity. (Har, har.)

DRY YOUR OWN WOOD

FIG. A How the Kiln Works

The kiln is simply an insulated box, with the dehumidifier at one end. Water from the dehumidifier is collected in a bucket, where it can be measured to tell you the rate of drying. A fan circulates the warm, drier air through a perf-board baffle, which spreads it out evenly. A second baffle, made of plastic film, keeps the air flowing through the stack rather than over it. Weights keep the boards flat as they dry.



time. We used an attic ventilator fan to circulate the air because it's designed to operate in warm conditions.

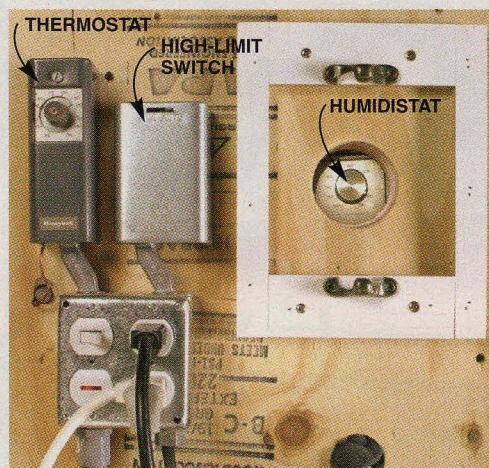
The humidistat and thermostat make it easy to set and control the drying environment inside your kiln. However, if you plan on using your kiln to only dry air-dried lumber or construction-grade pine, you can do without the humidistat and thermostat. The kiln can be run full tilt once the wood has been dried below 20-percent moisture content.

For safety reasons, we've added a high-temperature limit switch to the kiln (see "Kiln Controls" above, right).

Because finding space for a kiln may be a problem, we're offering two sizes. The small kiln can handle 100 bd. ft. of 4-ft.-long lumber. This may seem like an odd size, but most furniture can be made using 4-ft. stock. Plus, 4-ft. boards are easy to handle and 4-ft. logs are small enough for you and a buddy to saw into boards on a 14-in. bandsaw.

Note: To size the kiln to handle 8-ft. boards, simply make the box longer and add a light fixture or two. Everything else stays the same.

Kiln Controls



The electrical mounting board includes controls for the temperature and humidity, and a high-limit switch, which shuts off power to the kiln should any electrical malfunction result in too high a temperature. The humidistat has to be mounted inside the kiln, so you reach it through a hole covered by a removable access panel.

If you're still worried about where you're going to put the kiln, keep in mind that this kiln is designed to knock-down for storage when not in use.

How the AW Kiln Works

You can see how the AW kiln works in Fig. A. Generally speaking, it takes about two to six weeks to dry a full load of lumber, depending on the species and thickness.

Having a pin-type moisture meter is essential to drying wood with a kiln. We found it useful to attach wires to a couple boards inside the kiln, so their moisture content could be monitored without opening the kiln. A remote temperature/humidity sensor tells you the conditions inside the kiln.

How to Build the AW Kiln

The woodworking part of this project is easy; all you need is a circular saw, a drill and a weekend. Begin by gathering all the materials listed on page 54 (see Sources, page 98).

The materials for the kiln were chosen for their ability to withstand high humidity, so don't make substitutions. It's important to use exterior-grade plywood (not chipboard), the proper paint and stainless steel fasteners. However, it's okay to use 3/4-in. plywood if you can't find 5/8 in.

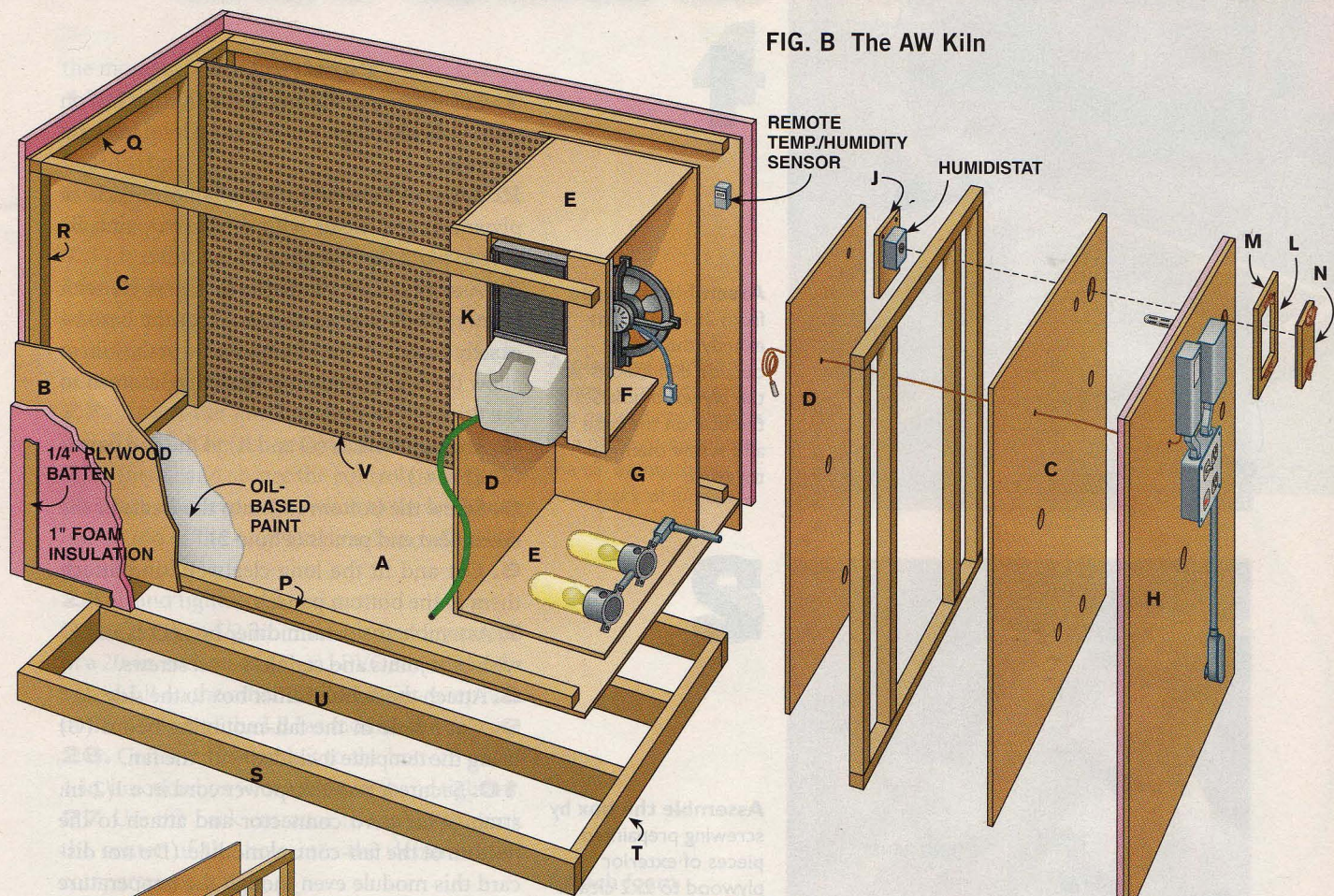


FIG. B The AW Kiln

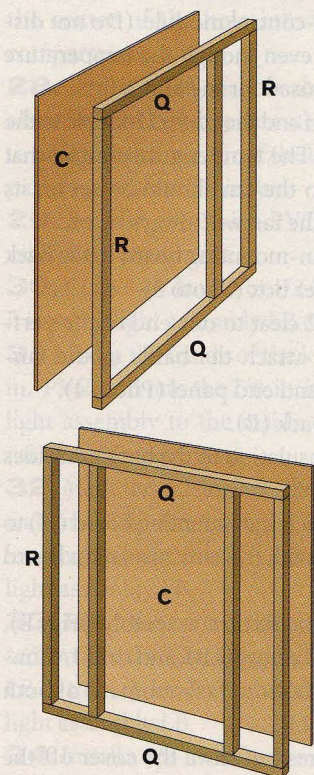


FIG. C End Panels

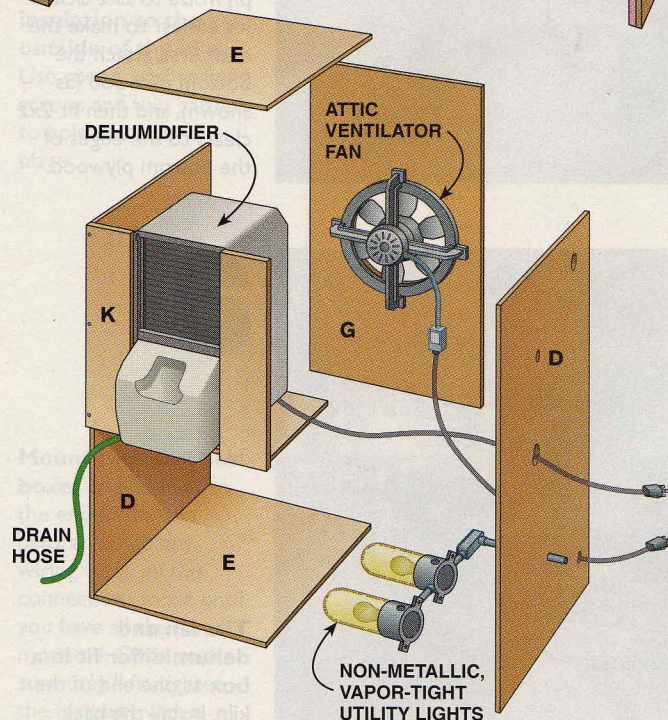


FIG. D Dehumidifier Box

Build It...

1

Construction

1. Cut all parts according to the Cutting List on page 49. Leave cleats (P and R) a bit long and trim to fit later.

2. Paint all interior surfaces (smooth side of plywood) and cleats with oil-based paint. Be sure to paint the end grain of the cleats.

3. Assemble the 2x4 base (S, T and U) with screws (Photo 1). It's essential that the base be exactly flush with the plywood sides of the kiln to allow the foam insulation to run right down to the floor.

4. Attach the cleats (Q and R) to the end panels (C) (Fig. C).

5. Screw the bottom (A) into the cleats of the assembled end panels (Photo 2).

6. Cut and fit the long cleats (P) and attach them to the bottom panel.

7. Assemble the dehumidifier box (D, E and F) with butt joints and stainless steel screws.

8. Attach the dehumidifier box to the side.

9. Cut a hole in the fan-mounting board (G) using the template included with the fan.

10. Secure a portable power cord in a 1/2-in. strain-relief-cord connector and attach to the bottom of the fan-control module. (Do not discard this module even though the temperature sensor in it is not used for the kiln.)

11. Attach the fan and the control module to the mounting board. The temperature control that comes attached to the fan should be set on its lowest setting so the fan will always be on.

12. Attach the fan-mounting board to the back of the dehumidifier box (Photo 3).

13. Attach a 2x2 cleat to one end of the perf-board baffle and attach the baffle to the fan-mounting board and end panel (Photo 4).

14. Attach the back (B).

15. Add foam insulation to the back and sides of the kiln (Photo 5).

16. Attach the electrical mounting board (H) to create a sandwich with the 1-in. insulation board (Fig. B).

17. Build the light-fixture assembly (Fig. E), including the PVC elbow (LB), and drill 1/8-in.-weep holes in the bottom (as mounted) of both the lights and the LB.

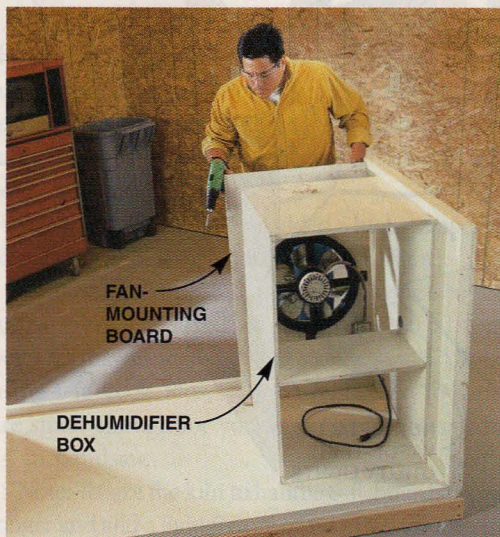
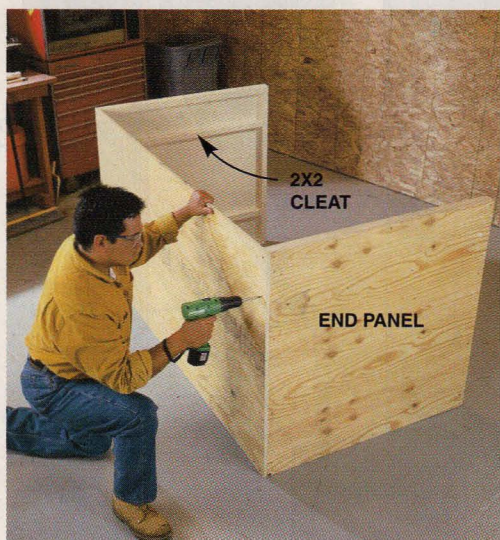
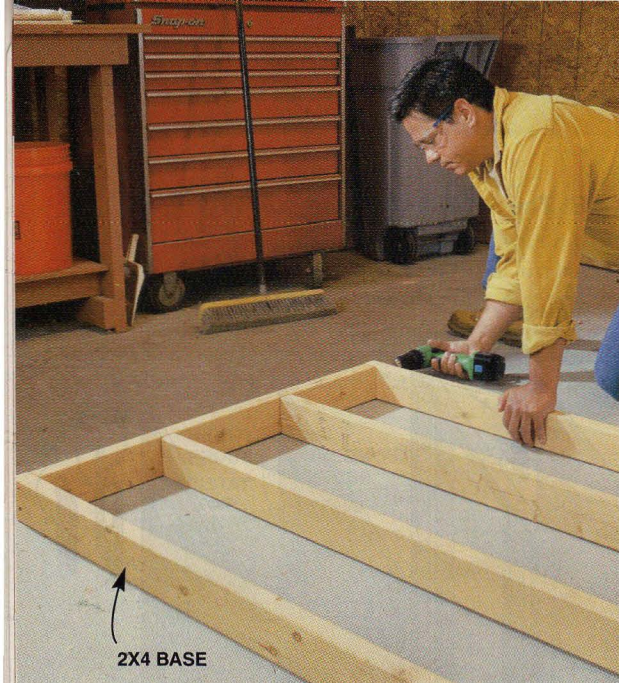
18. Run the wires but leave the cover off the conduit LB and let an additional 4 ft. of wire extend out of it. Set this assembly to the side for

2

Assemble the box by screwing pre-painted pieces of exterior plywood to 2x2 cleats. It's easiest to make the ends first, attach the bottom plywood (as shown), and then fit 2x2 cleats to the edges of the bottom plywood.

3

The fan and dehumidifier fit in a box at one end of the kiln. Install the back after mounting the fan to the plywood.



DRY YOUR OWN WOOD

the moment.

19. Drill a hole for the high-temperature-limit sensor and mount it to the electrical mounting board (Fig. F).

20. Set the shut-off limit at 140-degrees F (Fig. E, Detail 2).

21. Install a 1/2-in.-offset nipple between the left hole in the bottom of the high-temperature-limit switch and the right hole on the top of the 4-in.-square junction box. Hand tighten the locknuts on the offset nipple.

22. Attach the junction box to the kiln and install a #10-32 green ground screw.

23. Install and secure the control body of the remote-bulb thermostat switch to the left knock out on top of the 4-in. junction box with a 1/2-in.-offset nipple.

24. Hand tighten the locknut.

25. Cement a 1/2-in.-male adapter on one end of a 20-in. section of 1/2-in.-PVC conduit and a 1/2-in. LB on the other. Drill a 1/8-in.-weep hole in the bottom of the LB (as mounted).

26. Connect the conduit to the bottom of the 4-in. junction box with a locknut (hand tighten).

27. Use the back entrance in the LB to mark the center of the hole into the dehumidifier compartment.

28. Drill a 1-1/8-in. hole about 1-in. deep (to allow for the LB hub to recess) and then continue to drill into the interior of the dehumidifier compartment with a 7/8-in. bit.

29. Remove the 20-in.-PVC section and set it aside for the moment.

30. Cut a 6-in. length of 1/2-in. PVC and insert it into the light assembly LB (without cement).

31. From the inside of the kiln, insert the 1/2-in.-PVC stub into the 7/8-in. hole and attach the light assembly to the inside wall of the dehumidifier compartment.

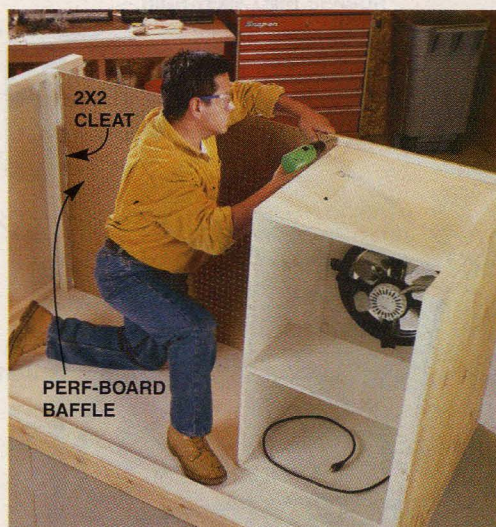
32. Mark the 1/2-in. PVC flush with the outside wall of the kiln, remove the 1/2-in. PVC, cut to length. Reinsert the PVC and cement it to the light assembly LB.

33. Insert the male adapter on the 20-in.-PVC section into the 4-in. junction box and cement the LB to the 1/2-in.-PVC stub that connects to the light assembly LB.

34. Install a 1/2-in. locknut on the threads of the male adapter and hand tighten.

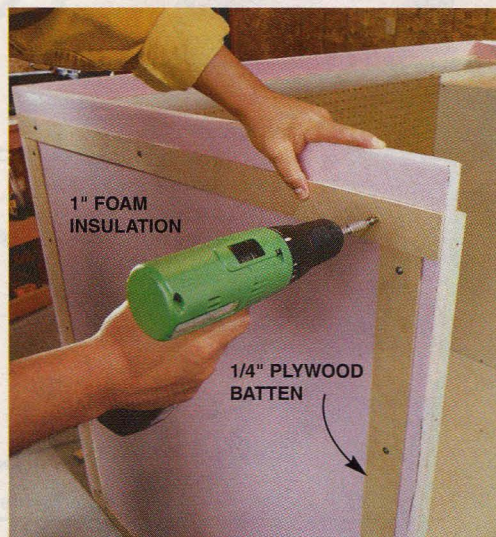
35. Secure the 20-in.-PVC section onto the

4



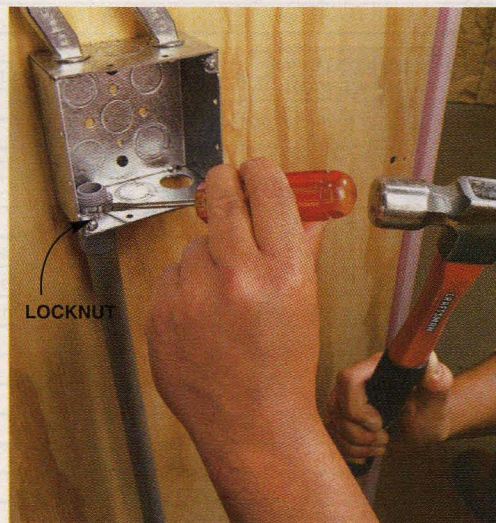
A piece of perfor-board screwed along the back of the kiln acts as a baffle to distribute the air evenly through your stack of lumber.

5



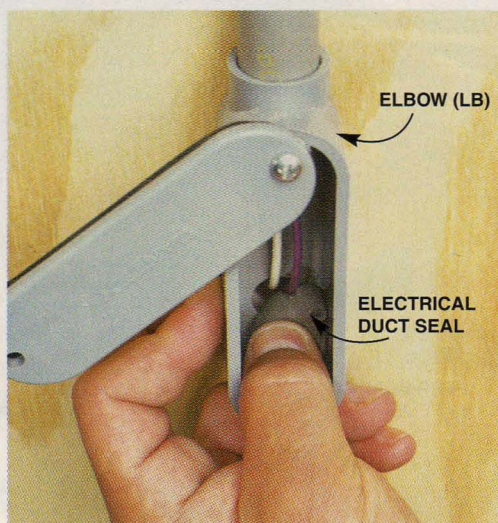
Attach foam insulation to the outside of the kiln. Use round washer-head screws and thin battens to hold the foam in place.

6



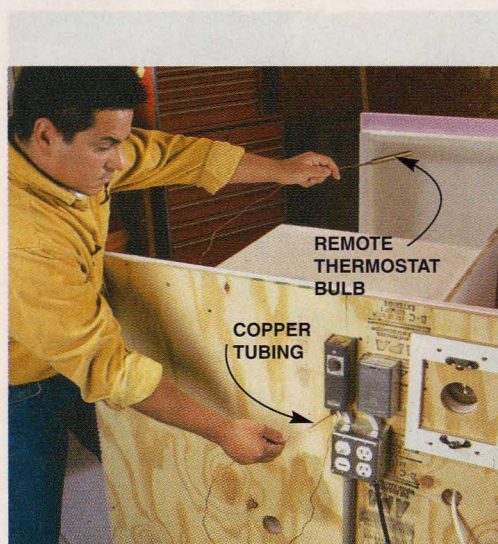
Mount the electrical boxes and conduit to the end of the kiln before you do any wiring. Keep all the connections loose until you have all the parts mounted. Once you're sure they'll fit, tighten the locknuts with a hammer and screwdriver.

DRY YOUR OWN WOOD



7

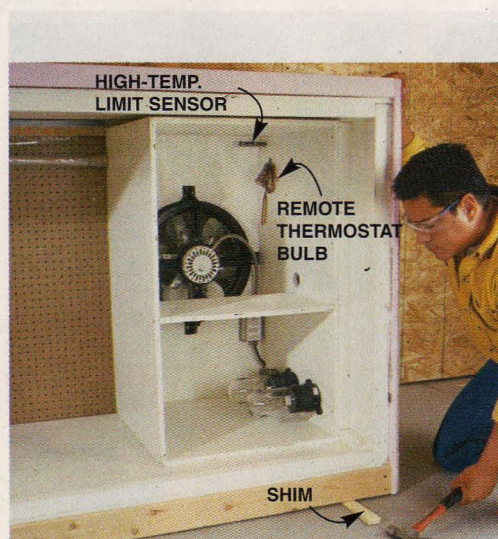
Seal any gaps, especially where wires enter the kiln. The air in the kiln is hot and moist, and wherever it escapes, condensation is likely to occur.



8

Insert the remote thermostat bulb into the kiln, and make a small door on the outside of the kiln that allows access to the controls and the humidistat.

Caution: Do not kink the copper tubing.



9

Use shims to fill the gaps from an uneven floor. It's important for the kiln base to be well supported. A twist in the base will mean a twist in your wood.

electrical mounting board with a 1/2-in.-PVC strap, as shown (Fig. E).

36. Finish tightening all of the locknuts (Photo 6).

37. Thread the 4 ft. of purple and white wire through the LBs and PVC to the 4-in. junction box.

38. Work electrical duct seal into both LBs, being careful not to plug the weep holes (Photo 7).

39. Finish running wires and making connections in the junction box, temperature switch and high-temperature-limit switch.

40. Drill holes for the dehumidifier cord, the humidistat port and cord, the thermostat bulb and the fan cord (Fig. F).

41. Hang the humidistat on the mounting board (J) and hang the assembly inside the kiln (Fig. A).

42. The wireless temperature/humidity sensor can be mounted just below the humidistat.

43. Use scrap plywood to build a frame around the humidistat port. Cut a plywood panel to fit inside the frame and add self-stick weather strip to the backside of the panel. Use window-sash locks to keep the panel shut tight.

44. Uncoil the remote temperature-sensing bulb for the thermostat and carefully thread it through the hole and into the dehumidifier box (Photo 8). Warning: Don't let the copper coil kink. The coil is a liquid-filled tube, so a kink could cause a leak and ruin your thermostat.

45. At this point, you should plug in all components and give the kiln a test run. Caution: The fan is unguarded, so keep your fingers away!

46. Attach the back (B) and top (A) and add the foam. Leave the 2-in. foam loose on the top, because you may need to prop it up or remove it for temperature control.

47. Use window air-conditioner foam (available at home centers and hardware stores) to plug all the holes where wires come through the electrical panel.

48. Now, set the kiln in place (Photo 9).

FIG. E Wiring

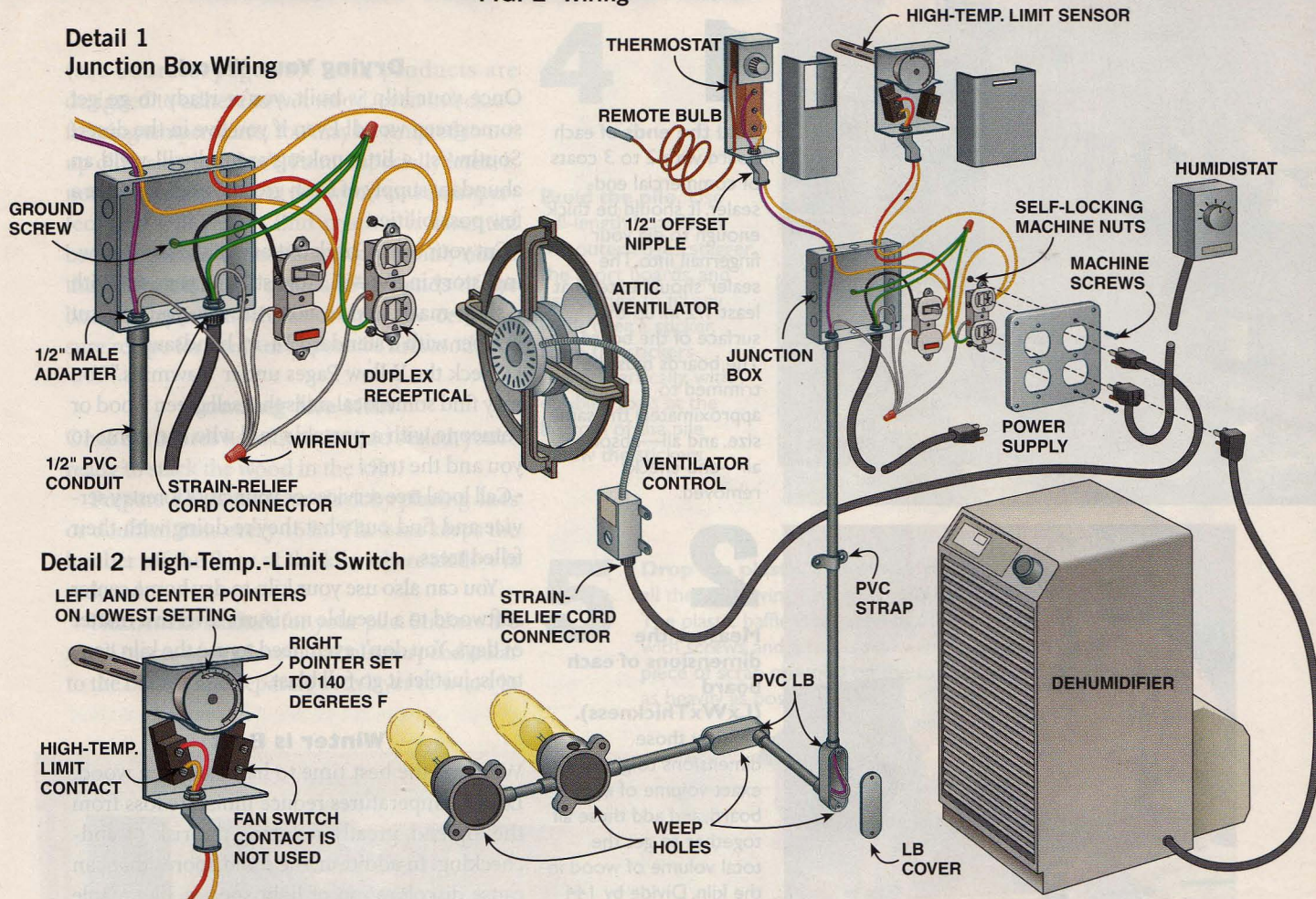
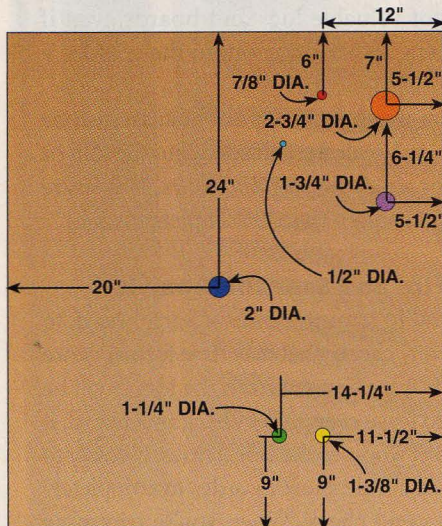


FIG. F Electrical Mounting Board



■ High-limit probe ■ Conduit elbow (LB)
■ Dehumidifier cord ■ Humidistat port
■ Humidistat cord ■ Remote thermostat bulb ■ Fan cord

Note: Hole locations are given as guidelines. Only the high-limit sensor needs to be placed exactly.

Cutting List

Overall Dimensions: 47"H x 80"W x 43-3/4"D

Part	Name	Qty.	Dimensions	Material
A	Top and bottom	2	40" x 78"	5/8" BC Fir Ply
B	Front and back	2	41-1/4" x 78"	
C	Ends	2	40" x 40"	
D	Dehumid. box sides	2	24" x 40"	
E	Dehumid. box top & bottom	2	21-1/2" x 24"	
F	Dehumid. shelf	1	21-1/2" x 14"	
G	Fan mounting board	1	24" x 40"	
H	Electrical mounting board	1	41-1/4" x 47"	
J	Humidistat mounting board	1	6" x 8"	
K	Dehumidifier flange	2	5-1/4" x 22-1/2"	
L	Humidistat access frame	2	1" x 10"	
M	Humidistat access frame	2	2" x 6"	
N	Humidistat access cover	1	6" x 6"	
P	Cleats	4	74" (rough)	2x2 Stock
Q	Cleats	5	40"	
R	Cleats	7	39" (rough)	
S	Base	2	78"	Floor Base 2x4 Stock
T	Base	2	38-1/4"	
U	Base	2	75"	
V	Baffle	1	40" x 50-3/4"	1/4-in. Perf-Board

Cut foam and 1/4" battens to fit kiln.

Load It...

1

Seal the ends of each board with 2 to 3 coats of commercial end-sealer. It should be thick enough to dig your fingernail into. The sealer should extend at least 1/2 in. up the surface of the board. The boards must be trimmed to approximately the same size, and all—absolutely all—end-checks removed.

END SEALER

2

Measure the dimensions of each board (LxWxThickness).

Multiply those dimensions to give the exact volume of each board, and add these all together to get the total volume of wood in the kiln. Divide by 144 to convert this to bd. ft. If you know the exact volume of wood in the kiln, you'll be able to determine how much water can safely be extracted in a day.

3

Hammer a pair of 3/4-in. brads into boards that will be on the bottom, middle and top of the pile. The brads should go halfway into the boards, in the middle of the face, and parallel to the grain. Attach wire leads to the brads, and you can measure the moisture content of the boards from outside the kiln.

WIRE LEADS

1/4" PLYWOOD DEPTH STOP

BRAD

Drying Your Wood

Once your kiln is built, you're ready to go get some green wood! Even if you live in the desert Southwest, a little poking around will yield an abundant supply of fresh green wood. Here are a few possibilities:

- Cut your own. Check out our "Bandsaw Resawing" story in AW #81, August 2000, page 46. With a shop-made sled to hold the log, you can cut lumber with a standard 14-in. bandsaw.
- Check the Yellow Pages under "Sawmills." You may find some local mills that sell green wood or someone with a portable mill who can come to you and the tree.
- Call local tree services or your city's forestry service and find out what they're doing with their felled trees.

You can also use your kiln to dry home center softwood to a useable moisture level in a matter of days. You don't even need to use the kiln controls; just let it go full blast.

Winter is Best

Winter is the best time to harvest green wood. Lower temperatures reduce moisture loss from the log end, greatly reducing the risk of end-checking. In addition, the mold spores that can cause discoloration of light species, like maple and pine, are dormant. It's still a good idea to seal the ends of valuable logs and boards even if they're going to be sitting out in the cold for a while.

In warm weather, freshly cut boards must be trimmed, end-sealed and loaded into the kiln or stacked for air-drying within hours. Make sure you budget enough time to complete the job!

Trim and Seal the Boards

It's *essential* to trim the ends of each board, to eliminate any checks that may have formed since the boards were first cut from the log. Don't be tempted to leave even a tiny check in a board; it will only get worse as the wood dries. It's okay to cut a board a little short in order to completely remove an end check. When you're trimming the ends, try to make boards of uniform length, (4-ft. for our basic kiln).

The freshly cut ends are then sealed with end sealer (Photo 1). We like Dura-Seal, an oil-based end sealer, or Anchor Seal, a water-based sealer

DRY YOUR OWN WOOD

(see Sources, page 98). Both products are designed to adhere to wet wood, even in below-freezing temperatures. You may be tempted to use up old paint, but don't. Paint, especially latex, is not designed to go over wet wood and an imperfect seal will result. End coating is essential because boards lose moisture very rapidly out of the end grain. This results in the ends of the boards drying much faster than the center, a sure recipe for a pile of expensive firewood.

Loading the Kiln

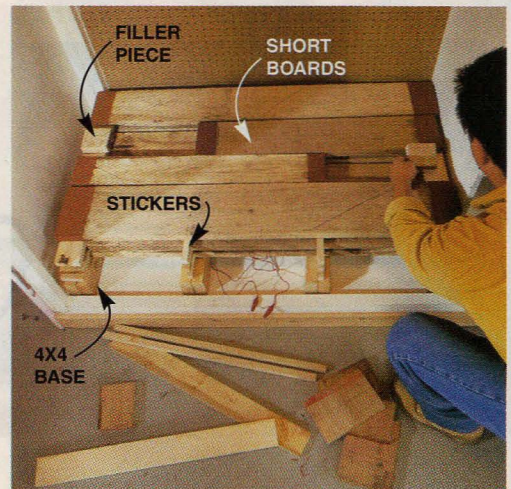
Once the boards have been cut and sealed, you're ready to stack the wood in the kiln.

Prepare a base for your stack by placing 4x4s or doubled 2x4s every 16 in. The base keeps the lumber off the floor of the kiln where airflow is reduced.

Next, make stickers for your pile. Stickers are small pieces of dry wood that run perpendicular to the boards and separate each layer of wood in

4

Build the pile. Use full-length boards on the outer edges, stagger the short boards, and use offcuts to fill any voids over a sticker. Keep the stickers aligned vertically, with doubled 2x4s at the bottom of the pile below the stickers.



5

Drop the plastic baffle over the pile. The plastic baffle keeps all the air moving *through* the pile rather than over the top of it. The plastic baffle is secured to the top of the perf-board baffle with screws and a strip of 2-in.-wide, 1/4-in. plywood. Place a piece of scrap plywood on the top of the pile, then weight the top as heavily as possible.

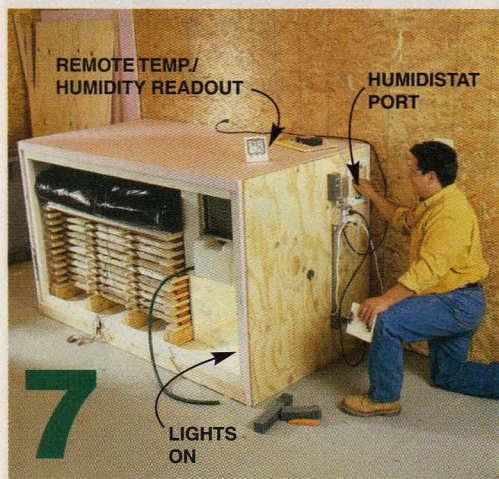


DRY YOUR OWN WOOD



6

All loaded and ready to go! We weighted the top of our pile with sandbags wrapped in black plastic garbage bags.



7

Give it a test before you screw on the front.

- Turn up the thermostat until the lights go on. Use fresh bulbs for each load.
- Turn down the humidistat until the dehumidifier goes on.
- Plug in the fan and make sure air is flowing through the stack.
- Check the remote temperature/humidity sensor; it should register a temperature rise.



8

Attach the front, fishing the remote probe wires through holes in the front. Screw on the insulation and you're ready to start drying.

the stack. Cut lumbers yard pine into 3/4 x 3/4-in. stickers for the middle of the stack. Use 1x2s at the ends of the boards. The wider stickers on the ends accommodate slight variations in board length and slow the rapid moisture loss at the board ends.

Measure each board that gets loaded into the kiln and write it down (Photo 2, page 50). In order to effectively use the safe drying rate (SDR) table on page 55 you'll need to know exactly how many bd. ft. of lumber is in the kiln.

As you stack the boards, keep all the edges in the same plane. Try for a perfect shoe-box shape. This helps create even airflow throughout the stack. Leave a 6-in. gap between the front of the pile and the front of the kiln for a cold-air return.

Set a pair of 3/4-in. brads into the middle of the front board in the first layer of wood (Photo 3, page 50). Wires attached to the brads act as remote sensors for monitoring the wood as it dries, without having to open up the kiln. As you build the stack, add sensors to a board in the middle and top layer.

As you build the stack, keep all the stickers in perfect vertical alignment. Always use full-length boards on the outside of the stack. Short boards are placed in the middle. Stagger the short ends so the voids aren't all on one end of the pile (Photo 4, page 51).

Once you've loaded all the wood, lay stickers across the top and cover the pile with a plywood lid. Pull a plastic sheet or baffle down from the top of the perf-board baffle and lay it over the plywood (Photo 5, page 51). Add weight to the top of the pile. We used bags of sand wrapped in heavy-duty garbage bags. Don't be afraid to pile it on. The weight locks the boards in place and minimizes warping and twisting as the wood dries (Photo 6, above left).

Before you seal up the kiln, give it a test (Photo 7, above left). If everything's working, attach the front (Photo 8, at left) and you're ready to start drying your wood!

Operating the Kiln

Take initial readings from all three remote sensors and write them down on a chart (Photo 1 page 53). Refer to the SDR chart on page 55 for initial

Run It...

temperature and humidity settings. The initial settings are derived from long-established dry kiln schedules. These guidelines will get you off on the right foot.

After the first 8 to 12 hours of operation, measure the water in the collection bucket (Photo 2, below right) and compare your findings with the SDR chart on page 55. Adjust the humidistat up or down to keep the drying rate just below the SDR for that species. When the amount of water collected in a day begins to fall off, you can safely lower the humidistat setting about 5 percent. Keep measuring and lowering the humidity based on the amount of water collected. Keep an eye on the temperature. It will gradually rise as the dehumidifier runs more frequently. If the temperature gets up over 120 degrees F, prop up a corner of the 2-in.-foam insulation to let the excess heat escape.

Once the MC drops below 20 percent, the humidistat will probably be set as low as it can go and the dehumidifier will be running constantly. At this point there's nothing more to do except measure the water extracted and take moisture content (MC) readings. Once the MC reaches the lower teens, little or no water will be coming out of the kiln. This doesn't mean the drying has stopped. The little water that's left in the wood is hard to extract, especially at the relatively low temperatures at which this kiln operates. At this point, you need to rely on your moisture meter to tell you when the wood is sufficiently dry.

A Typical Example

Say you have 100 bd. ft. of 4/4 hard maple in the kiln. Check the chart on page 55 for the initial temperature and humidity settings (190-degrees F and 81 percent). Let the kiln run for about 12 hours, then measure the water collected in the bucket.

Next, determine the amount of water you can safely extract from your wood per hour by consulting the SDR chart. The SDR for hard maple is .0074 pints per hour per bd. ft. Because you have 100 bd. ft. in the kiln, your load can safely produce .74 pints of water an hour. If you measure the extracted water after the first 12 hours of operation, you would multiply .74 by 12 to get 8.88 pints of water (call it 8-3/4 pints) that can safely

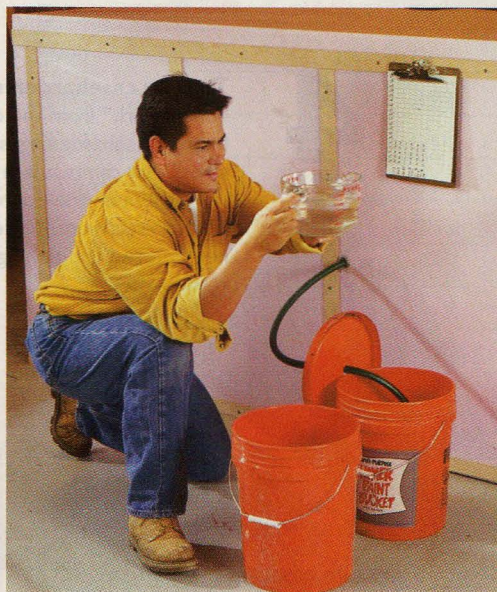
1

Take an initial moisture content (MC) reading with a pin-type moisture meter. Record the results on a chart, along with the date and time.



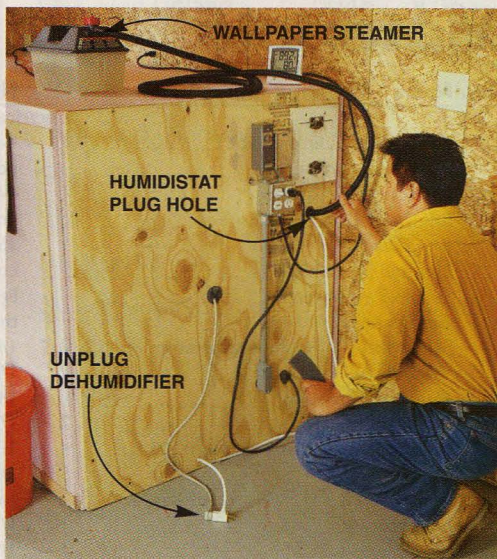
2

Measure the water that comes out of the dehumidifier after 8 to 12 hours. Figure out the water loss per bd. ft. per hour and compare it with the safe drying rate (SDR) given on page 55. Adjust the humidistat to stay at or below the SDR. Continue measuring the water and adjusting the humidistat until the wood is below 20-percent MC.



3

After the wood is dry, condition it to remove drying stresses. Unplug the dehumidifier, set the thermostat to 125 degrees F and use a rented wallpaper steamer to raise the relative humidity in the kiln to 85 to 90 percent.



DRY YOUR OWN WOOD

be removed from your load of hard maple in a 12-hour period. If you measured 8 pints from the kiln, you're safe; don't touch that dial! If you're a bit over, say 10 pints in a 12-hour period, turn the humidistat up 5 percent.

Remember, never exceed the safe drying rate. The SDR is based on 24-hour periods. If you accidentally exceed the rate for a short time, don't fret, the rates do have a cushion built in. But don't take that as an invitation to push the kiln to operate faster. The time you save pushing the SDR is not worth the risk you take ruining your load of wood.

The SDR is *not* meant to be taken as an average. In other words, you can't make up for going over the rate one day by going under the rate the next because the damage has already occurred.

Take measurements frequently at first, until the kiln settles in. Measure the water at least once a day and lower the humidistat to maintain the SDR until the moisture content readings drop below 20 percent. Remember, most drying defects occur as the wood goes from the dead green state to about 30-percent moisture content.

Continue monitoring the kiln every

few days until you achieve moisture meter readings of 7 to 8 percent. At that point your wood is dry. But don't be overly anxious to see your wood just yet. Unplug the kiln and let it cool down for a few days. Even though your wood is dry, it's important to leave it in a weighted stack until it cools down or you run the risk of the boards warping. Once cool, the wood should be "conditioned" to relieve some of the casehardening that occurs as wood dries (see Conditioning, page 55).

4

Test for casehardening by cutting a "tuning fork" from the center of one board. Casehardening is a form of drying stress that can result in cupping or warping when the boards are cut. If your boards are severely casehardened, they'll need more conditioning and more time to settle.



REMOVE MIDDLE THIRD



NO CASE-HARDENING



SLIGHT CASE-HARDENING



SEVERE CASE-HARDENING

Materials

Qty. Name

Kiln Box:

7	5/8-in. 4x8 BC fir plywood
1	1/4-in. 4x8 perf-board
1	1/4-in. ply (for battens)
5	8-ft. 2x4s
8	8-ft. 2x2s
1	2-in. 4x8 polystyrene
3	1-in. 4x8 polystyrene
1	Garden hose
1	Self-stick 1/2-in. foam weatherstrip
1	Window AC foam
2	150-watt light bulbs
2	Barn lights
3	Boxes of stainless steel screws: 100 8 x 1-1/2-in.
1	Box of 100 8 x 1-1/2-in. round washer head screws
	End grain sealer

Qty. Name

Electrical:

1	4-in. sq. x 2-1/8-in. deep metal junction box with 1/2-in. knockouts
1	4-in. sq. 1/2-in. raised cover that can hold 2 standard duplex receptacles
1	15-amp, 125-volt duplex outlet
1	combination single-pole switch and pilot light (pilot light requires a neutral for the light to work while the switch is on)
2	14/3 portable cord (S, SJ or SJT typ.)
2	1/2-in. portable cord clamp that fits the 14/3 cord
2	1/2-in. offset nipples
4	1/2-in. locknuts
5 ft.	1/2-in. rigid non-metallic conduit (schedule 40 or 80 PVC)
1	1/2-in. two-pole PVC strap
1	1/2-in. PVC male adapter

Qty. Name

2	1/2-in. PVC service elbow (LB)
1	#10-32 ground screw
8	Wirenuts
1	Remote bulb thermostat
1	Fan/high-temp.-limit switch
1	Humidistat
1	Attic exhaust fan with control and switch
1	Small dehumidifier
1	Wireless thermometer/ hygrometer
1	Pack of PK-10 jumper leads
1	lb. pug of electrical duct seal
14 ga.	THHN solid wire

Conditioning

No matter how wood is dried, it will have some degree of casehardening. Casehardening is a drying stress created in the early stages of drying. As the outer surface of the board dries, it tries to shrink, but the still-wet inner core prevents it. This sets up a stress in the wood. Case-hardened wood will pinch the saw when ripped and cup when resawn, because the wood moves when the stress is relieved.

Conditioning uses steam to quickly add moisture to the outer surface of the boards. Now the outer surface tries to swell but the dry core again prevents it. The net effect is that the stress of conditioning counteracts the stress of casehardening. Seems crazy doesn't it?

To condition your boards, rent or buy a wallpaper steamer and run the hose into the kiln (Photo 3, page 53). With the fan and lights on, run the steamer until the humidity

climbs into the upper 80s and the temperature reaches about 125 degrees F. After one hour you can turn off the steamer and the lights, if you're conditioning a low-density wood like basswood. For higher density woods like oak or maple, or for thicker stock, condition the wood a few hours longer before shutting down the heat and steam. Keep the fan running and let the kiln cool down for three days.

Open the kiln and remove a sample board to check for casehardening. Cut a tuning-fork shape out of the middle of a board (Photo 4, page 54). If the tines don't touch, there is minimal casehardening, so you can safely unload the wood and stack it with stickers in your shop or storage area. If they do touch, seal the kiln back up and condition the load again. **AW**

Sources See page 98

Oops!

BUTTERNUT

RED OAK



Butternut and oak sure look alike when they're in the rough! We accidentally loaded a few oak boards in with our butternut load. Butternut is a low-density wood and can be dried quickly, so the red oak suffered the consequences of being dried too fast. Talk about a casehardening problem. Plus, there were a number of surface checks in the oak. Well, lesson learned—don't mix species in the kiln unless they share similar safe drying rates.

Learn more about wood drying from Professor Gene Wengert,
at The Drying Forum at www.woodweb.com

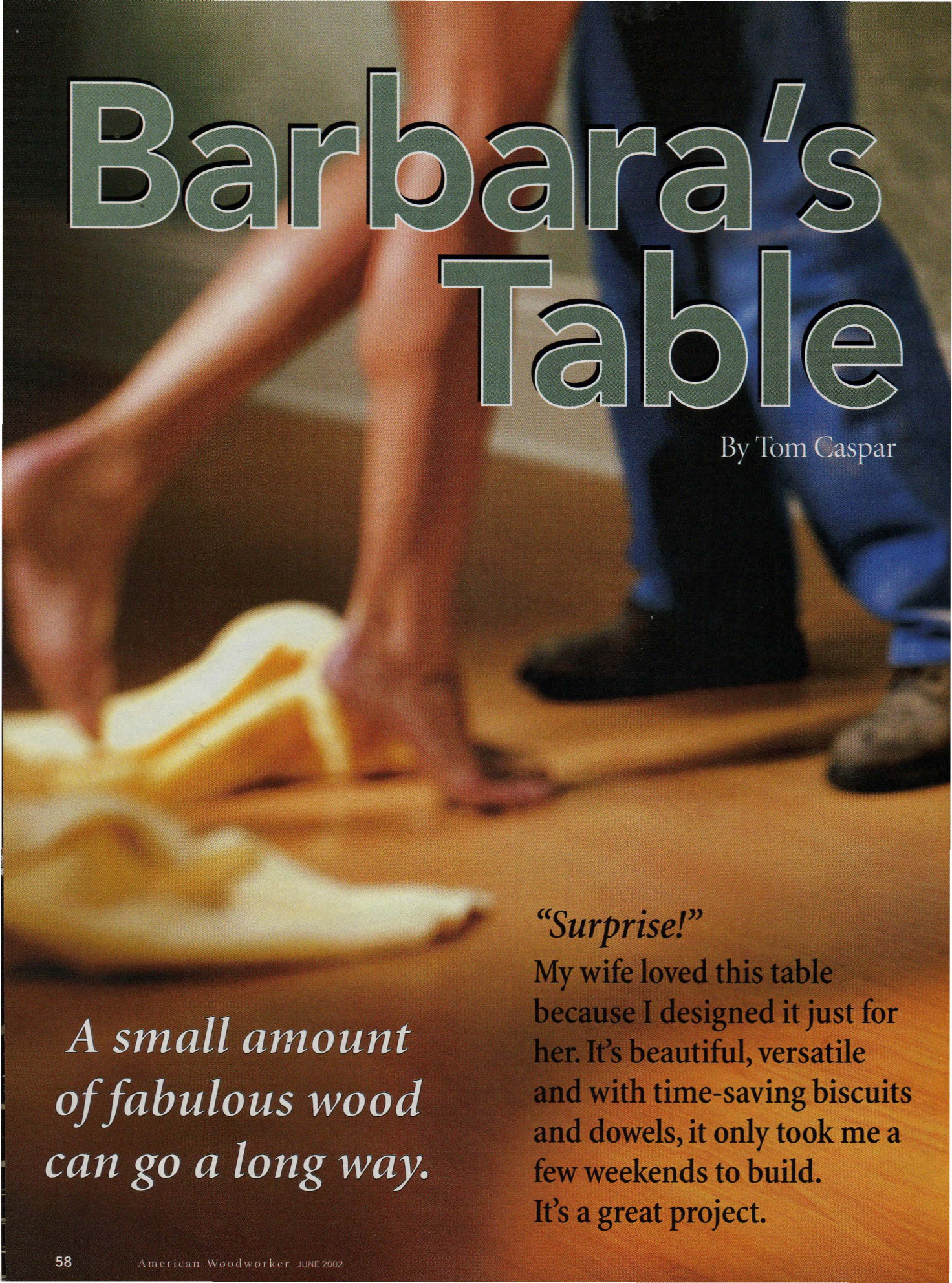
SAFE DRYING RATES (in pints per hour per bd. ft.) for common species, 4/4 stock

Initial Temp. = 90-degrees F

Species	4/4 SDR*	Initial Relative Humidity*
Ash, Black	.0068	81%
Ash, White or Green	.0060	81%
Aspen, Cottonwood, Poplar	.0114	83%
Atlantic White Cedar	.0074	84%
Basswood	.0083	55%
Beech	.0061	89%
Birch, White	.0052	82%
Birch, Yellow	.0060	81%
Cherry, Black	.0071	81%
Elm, Rock	.0043	85%
Elm, White, American	.0100	80%
Fir, Balsam	.0143	77%
Hemlock, Eastern	.0165	84%
Hickory	.0078	86%
Larch, Eastern	.0208	82%
Maple, Hard	.0061	81%
Maple, Soft	.0074	81%
Oak, Red Southern	.0023	90%
Oak, Red Upland	.0046	87%
Oak, White	.0031	87%
Pine, Eastern White	.0088	76%
Pine, Red (Norway)	.0133	84%
Spruce, Black	.0165	83%
Spruce, Red	.0160	83%
Spruce, White	.0150	83%
Sweetgum (red gum)	.0053	81%
Tupelo (black gum)	.0110	77%
Walnut	.0088	80%

* for 6/4 stock, multiply SDR by .6
for 8/4 stock, multiply by .4

add 5 percent to relative humidity for 8/4 stock



Barbara's Table

By Tom Caspar

*A small amount
of fabulous wood
can go a long way.*

“Surprise!”

My wife loved this table because I designed it just for her. It's beautiful, versatile and with time-saving biscuits and dowels, it only took me a few weekends to build. It's a great project.



Barbara's Table

Materials and Tools

Very little lumber is needed for this table. Twelve or so board feet, the equivalent of three or four average-size boards, will do.

Best of all, you can use 3/4-in. pre-planed boards from a home center or lumberyard, so you don't have to own a planer. This table appears to be made from more than one thickness of lumber, but it's not. We've glued the legs together and cut rabbets on the top and shelves to fool the eye.

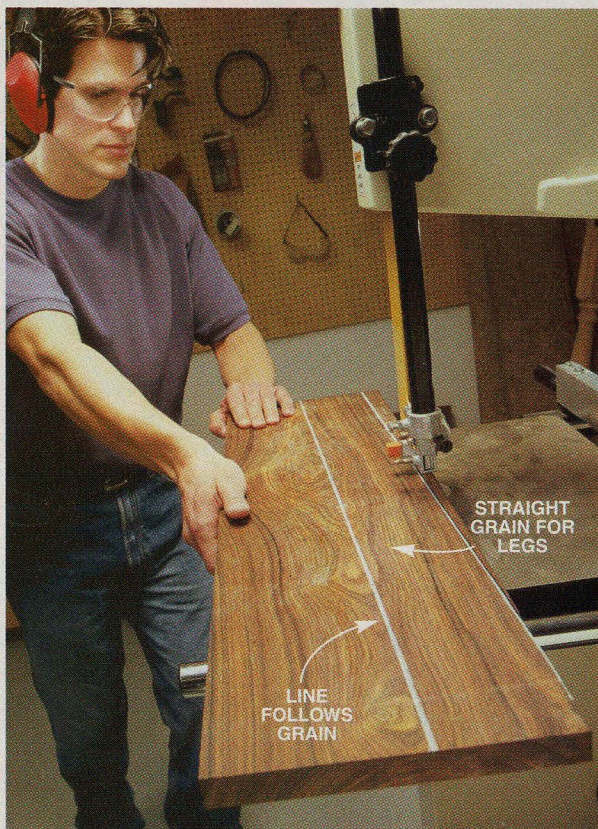
Any hardwood will do, but this project is a great excuse to buy something special. We splurged on cocobolo (see Sidebar, pages 66 and 67). It's really expensive (about \$15/bd. ft.), but most of the table parts are short, so if you choose a pricey wood, you can use it very efficiently. The joinery is nearly foolproof and easy to follow, so it's unlikely you'll make any costly mistakes.

For tools, you'll need a tablesaw, drill press, jigsaw and a router with a biscuit-slot cutting bit (see Sources, page 98). However, a biscuit joiner, router table and bandsaw can really speed things up.

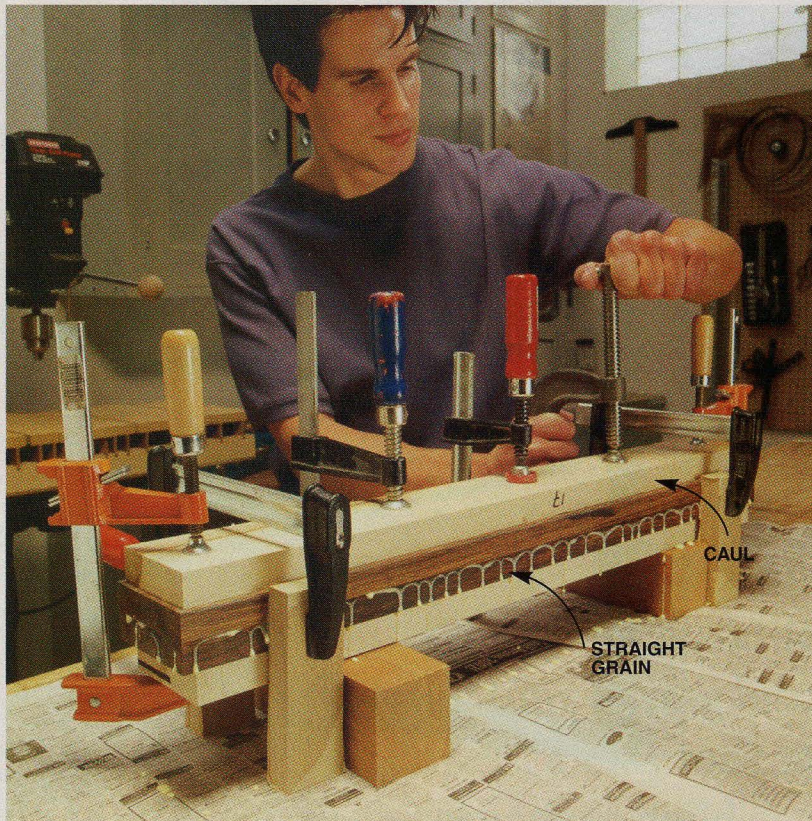
You'll also need a 3/4-in. Forstner bit to cut some flat-bottomed holes, 3/8-in., 3/16-in. and 1/8-in. round-over bits for your router and some very inexpensive hardware that you'll have to order from a catalog (see Sources, page 98).

Cut Up Your Boards

The legs are the first priority when cutting up your wood. Each leg is laminated from two pieces (Fig. A, page 61). The secret to making legs that don't look like they're glued up is to find straight grain. Look for



1 Cut out the legs first. The best looking legs come from the side of a board where the grain runs straight. Your cut doesn't have to be parallel to the edge of the board, however. Following the grain is more important.



2 Glue up the legs. Straight grain along the edge of the boards will make the glue line invisible. Place flat cauls made from 2x4s above and below the leg blanks. Cauls spread out the pressure and prevent the legs from getting dented.

Barbara's Table

parts of your boards that have straight grain on the surface and on the edge as well.

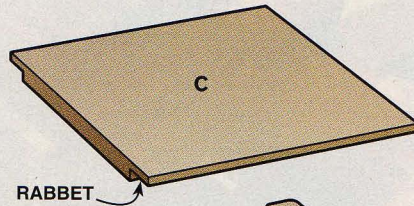
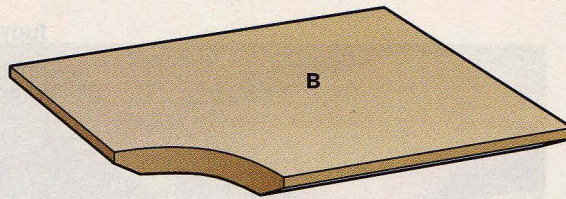
Important Tip: Add an extra leg to your cutting list, but don't use the expensive stuff. Make the leg from any scrap of lumber. Use it to set up your machines in the steps to follow. The set-ups aren't difficult, but it's better to make test cuts in something you can afford to toss!

1. Draw the legs (A) on your boards (see Cutting List, page 67). These pieces can be either one or two legs wide, depending on how wide the straight-grained section is on your board.
2. Arrange each leg so its edge is parallel to the grain of the wood. Don't worry if the rectangle you draw isn't parallel to the actual edge of the board. Simply joint or bandsaw the edge of the board to follow your line (Photo 1), and cut out the leg.

Make the Legs

1. Glue up each leg (Photo 2). Clamp across the boards first so they don't move around.
2. Scrape off the glue and rip the legs 1/8-in. wider than their final width. Then flip each leg around and rip to the final size. They're already the right thickness, so simply cut them to length. (Note that the legs are rectangular in section, not square, with a wide side and a narrow side.)

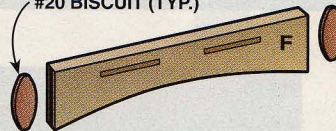
Stand up the legs and mark the top ends to identify the front, back and sides of each one (see AW #92, February, 2002, Tips for Marking and Measuring, page 78 for a foolproof method).



RABBET

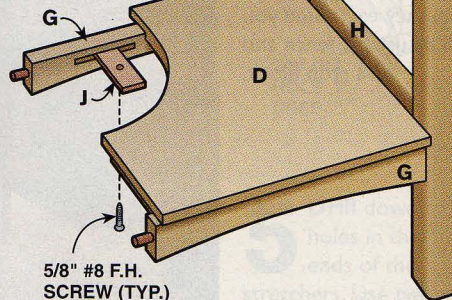
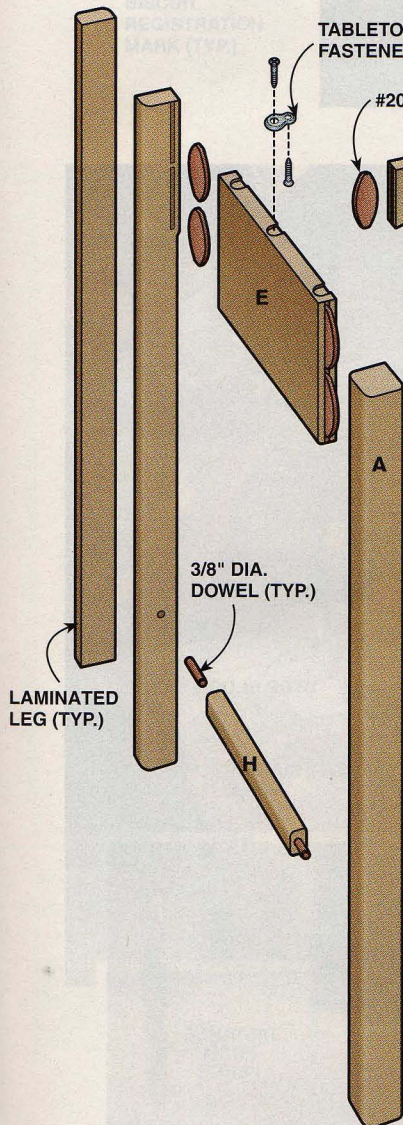
TABLETOP FASTENER

#20 BISCUIT (TYP.)



3/8" DIA. DOWEL (TYP.)

LAMINATED LEG (TYP.)



5/8" #8 F.H. SCREW (TYP.)

*Build this
stylish table
completely from
3/4-in. boards.*

Barbara's Table

Make the Rails and Stretchers

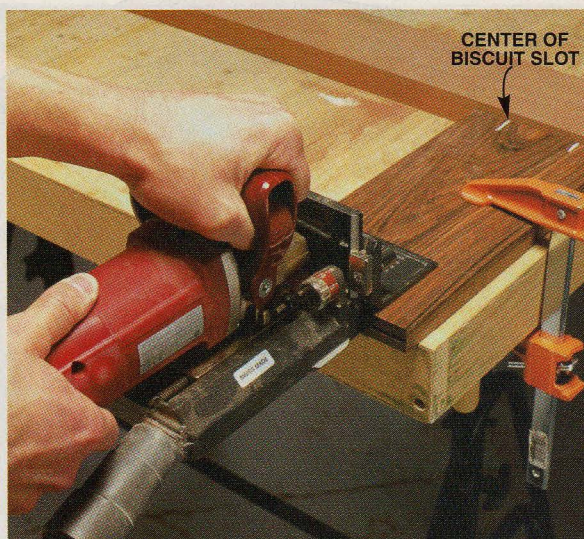
1. Mill the rails (E and F) and the stretchers (G and H) to final size. Make an extra stretcher (H) for testing the machine set-up later. Rip the stretchers to 5/8-in. thickness on your tablesaw.
2. Mark the top and outside face of all the rails and stretchers.

Make the Biscuit Joints

1. Mark the centers of the biscuit slots on the rails wide (E) and legs (Fig. B, page 63). Note: these registration marks go on the *inside* face of the rails and legs, not the outside face.
2. Cut two slots in the end of each rail (Photo 3). Cut two slots in the legs.
3. Mark the narrow rails (F) for a single biscuit joint and cut the slots.
4. Mark the legs for the corresponding slots to the rails (F). Reset the fence on your biscuit joiner so the slots will be precisely centered on the wide (1-1/2 in.) side of the leg. Use your test leg to find the center, then cut slots in the real legs.

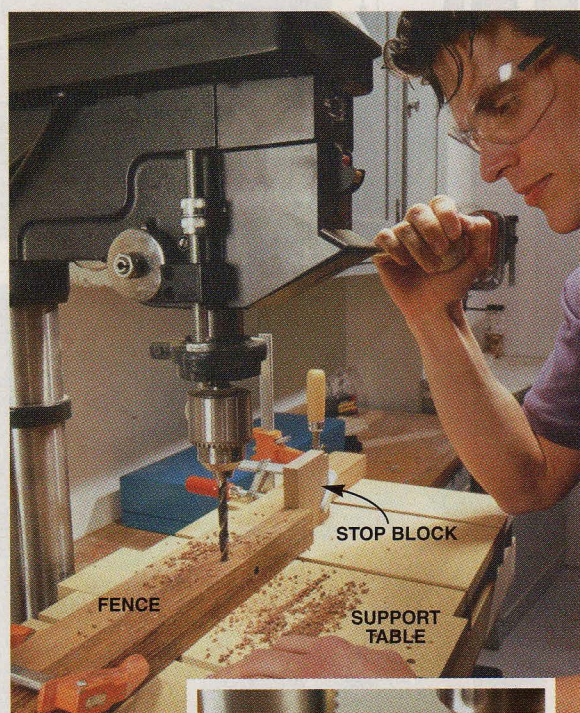
Drill Dowel Holes in the Legs

1. Attach an auxiliary table (about 24-in. long) to your drill press to balance the legs on. Any piece of flat plywood will do, but we used a handy, shop-made table that's easy to clamp a fence to (AW#86, April 2001, page 111).
2. Put a 3/8-in. bit in your chuck. Set the fence so the holes it makes are precisely centered on the narrow (1-3/8 in.) side of the leg. Use the test leg for this setup (see Drilling Tip, at right).
3. Mark the position of the hole for the narrow stretcher (H, Fig. B, at left). Drill all four legs (Photo 4).



3 Cut two biscuit slots side-by-side into the rails and legs. Biscuit joinery is incredibly fast and plenty strong for a table this size.

4 Drill dowel holes in the legs. When they're precisely centered, all you need is one setup for both left and right holes. Support the leg with a large auxiliary table. Ensure accuracy each time you drill by using a fence and a stop block.



Drilling Tip

Center the drill bit on the legs by making some test holes. Drill into a scrap of wood milled to the same dimensions as your actual leg. First, drill a hole in the approximate center with one side of the leg up against the fence. Then flip the test leg around and drill a neighboring hole from the other side. If the holes are offset, nudge the fence. Drill another pair of holes. Continue until the holes are exactly in line with each other.

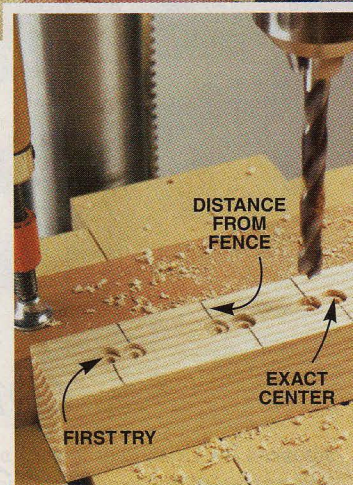
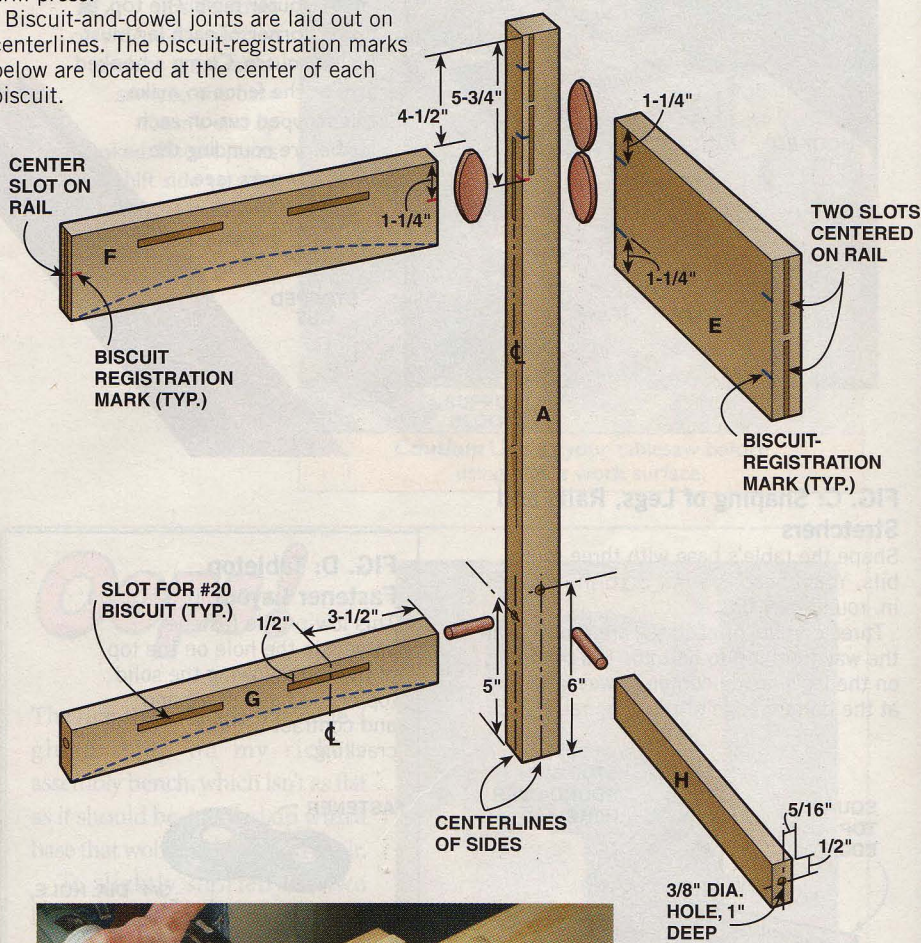


FIG. B: Biscuit and Dowel Layout

This joinery is fast and easy to do. At a minimum, you'll need a router and a small drill press.

Biscuit-and-dowel joints are laid out on centerlines. The biscuit-registration marks below are located at the center of each biscuit.

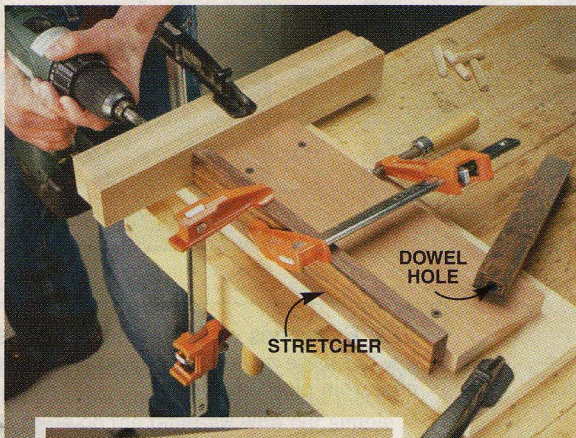


Drill Dowel Holes in the Stretchers

1. Build a jig for drilling the holes by hand (see Doweling Jig, below).
2. Position the jig's guide block, and clamp it in place (see Measuring Tip, below left).
3. Test the accuracy of your jig by drilling a hole in the test stretcher. Then drill holes in all of the stretchers (G and H, Photo 5). The top side of every stretcher must face down on the jig.
4. Glue fluted dowels in the stretchers (see Sources, page 98). After the glue is dry, cut the dowels 1/16-in. shorter than the holes in the legs.

Cut Fastener Holes and Slots

1. Drill shallow holes into the tops of the wide rails (E) with a

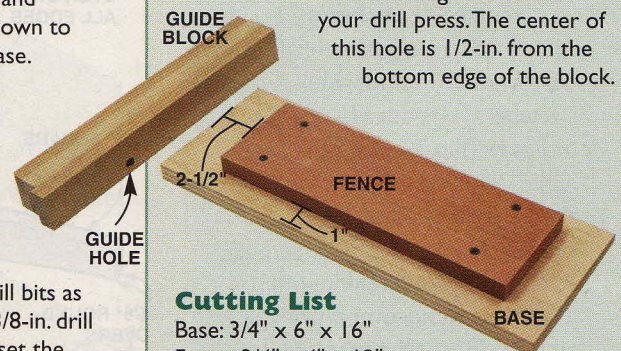


- 5 Drill dowel holes in the ends of the stretchers. Use two clamps to firmly hold the stretchers in place—one across the fence and another down to the jig's base.

Doweling Jig

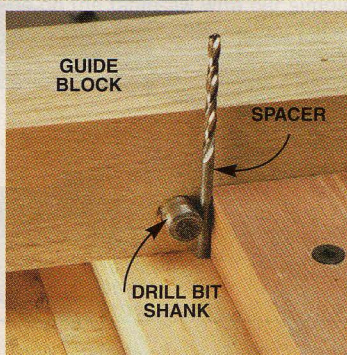
Build this simple three-piece jig to drill dowel holes in the ends of the table's stretchers. Screw the fence to the base.

Make sure the guide block is square, then drill the guide hole on your drill press. The center of this hole is 1/2-in. from the bottom edge of the block.



Cutting List

Base: 3/4" x 6" x 16"
Fence: 3/4" x 4" x 12"
Guide Block: 3 pieces of 3/4" x 1-3/4" x 12" hardwood, glued together.



Measuring Tip

Position the guide block on the doweling jig using two drill bits as measuring tools. First, put a 3/8-in. drill bit into the guide hole. Then set the distance between the hole and fence with a 1/8-in. bit. Clamp down the guide block to the jig's base.

Barbara's Table

Forstner bit (Fig. D, at right). Open up the holes with a chisel so the figure-eight-shaped fasteners can swivel (see Sources, page 98).

2. Cut slots on the inside of the narrow rails (F) and wide stretchers (G) with a biscuit joiner (Fig. B, page 63). The slots are the same depth as needed for a #20 biscuit.

3. Rip the cleats (J) from a piece of 3/4-in. hardwood (Fig. A, page 61). These cleats must be thin enough to freely slide in and out of the biscuit slots. Drill and countersink holes in the middle of each cleat.

Shape the Legs

1. Set up your router table with a 3/8-in.-radius round-over bit (see Sources, page 98). Set the fence right in line with the bearing of the bit.
2. The top inside corner of each leg must be left square (Fig. C, at right). This calls for a stopped cut on the router table (Photo 6). Check your setup with your test leg. Then make stopped cuts on all four real legs.
3. Round over the other three corners of each leg, all the way from top to bottom. Round over the lower outside edge of the wide rails (E) with the same bit.

Shape the Rails and Stretchers

1. Cut out the arches in the narrow rails (F) and wide stretchers (G) with a bandsaw or jigsaw (Fig. E). Smooth the arches with a file or coarse sandpaper and a narrow sanding block.
2. Set up the router table with a 3/16-in. round-over bit. Shape all four sides of the narrow stretchers.

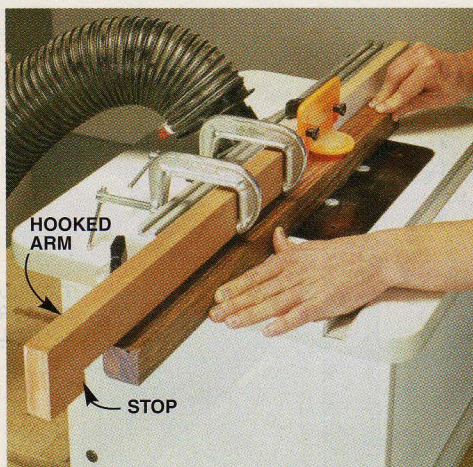
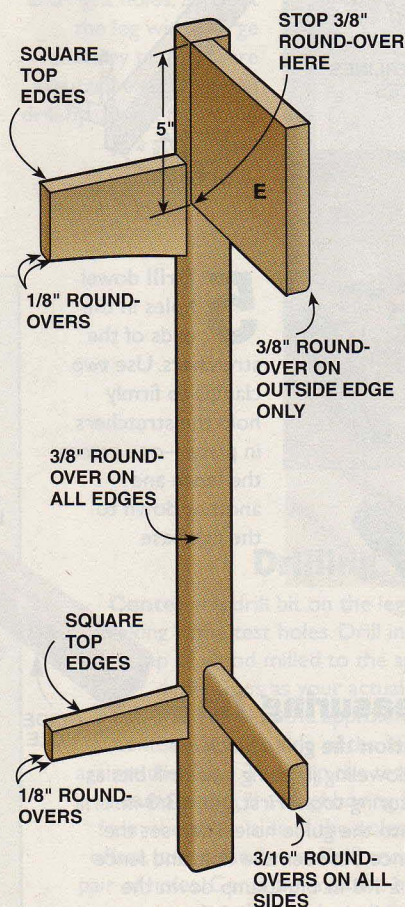


FIG. C: Shaping of Legs, Rails and Stretchers

Shape the table's base with three router bits. You'll need 3/8-in., 3/16-in. and 1/8-in. round-over bits.

Three corners of each leg are rounded all the way from top to bottom. The rounding on the leg's inside corner, however, stops at the bottom edge of the wide rail (E).



6 Round over the corners of the legs on a router table. The top, inside corner of each leg must be left square. Clamp a hooked arm to the fence to make this stopped cut on each leg before rounding the other corners (see below).



FIG. D: Tabletop Fastener Layout

This low-profile fastener swivels in the hole on the top of the rail, allowing the solid top of the table to expand and contract without cracking.

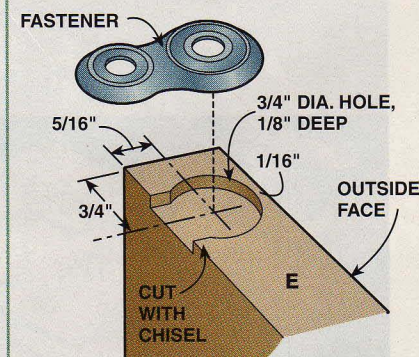
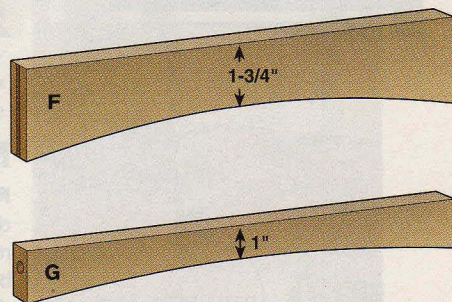


FIG. E: Arches of Rails and Stretchers

Lay out these arches by bending a yardstick or other thin piece of wood.



Barbara's Table

- 7** Glue the base together upside down on a dead-flat surface (such as your table-saw), so the base doesn't end up crooked. Biscuit joints can shift side to side. Level the rails with 4-1/2-in.-wide support blocks.



Caution: Unplug your tablesaw before using it as a work surface.

- Set up the router table with a 1/8-in. round-over bit. Shape the lower edges of the narrow rails (F) and wide stretchers (G). You can also use coarse sandpaper, a file or a spokeshave instead of a router bit.
- Sand all the legs, rails and stretchers.

Assemble the Base

- Glue the sides first. Insert the narrow stretcher (H) square to the legs. Use a handscrew or an adjustable wrench to twist the stretcher into position, if needed. Make sure the wide rail (E) is even with the tops of the legs.
- Make two blocks 4-1/2-in. wide by 14-in. long to ensure the narrow rails (F) are level and parallel. Then glue the two sides together (Photo 7).

Make the Top and Shelves

- Glue up the top and shelves, cut them to size, and smooth the top surfaces with a sander or a plane and scraper.
- Knock together a basic holding jig for the tablesaw (see Sliding Tablesaw Jig, page 66).
- Tilt your tablesaw blade to 20 degrees. Draw a bevel on the edge of your top (Fig. F, below left) and clamp the top in the jig. Adjust the fence to cut the entire bevel in one pass. Saw bevels on the bottom face of the top (B, Photo 8). Sand the bevels smooth.
- Tilt the saw blade back to square and make 3/8-in.-deep relief cuts on the front and back edges of the upper shelf (C) and all four sides of the lower shelf (D). Clamp each shelf to the sliding jig and remove the rest of the waste (Photo 9).

Oops!

The first time I made this table, I glued it up on my rickety assembly bench, which isn't as flat as it should be. I ended up with a base that wobbled like a bad chair.

To slightly shorten the two long legs, I taped some very coarse sandpaper to the top of my tablesaw and shoved the table back and forth. Cutting the legs is pretty risky, so this is a time-consuming but foolproof way to make the base level.

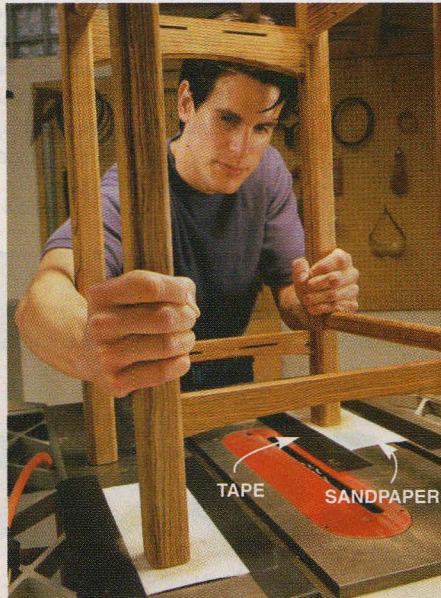
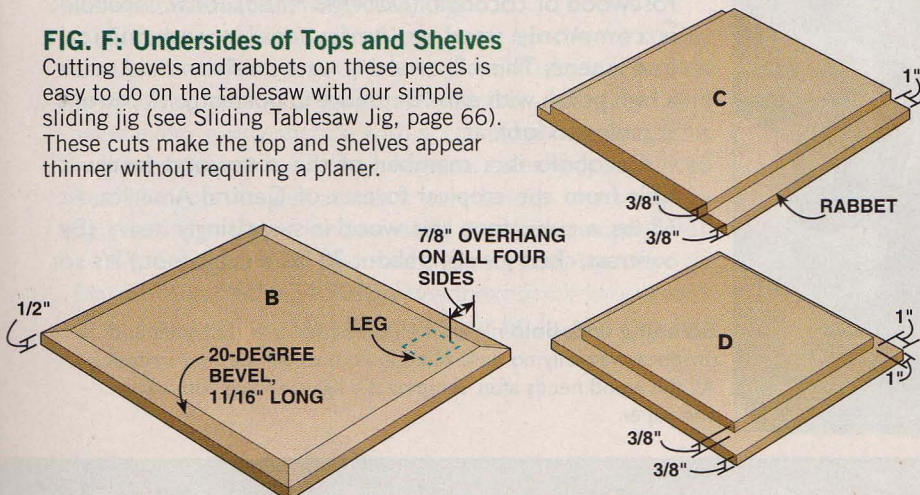


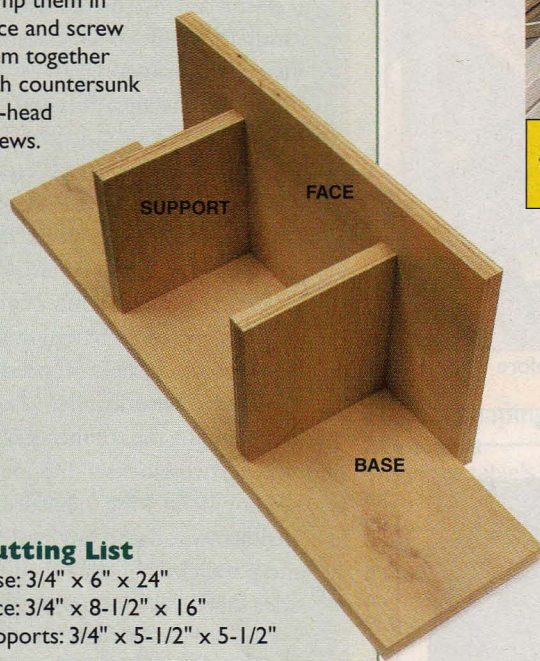
FIG. F: Undersides of Tops and Shelves

Cutting bevels and rabbets on these pieces is easy to do on the tablesaw with our simple sliding jig (see Sliding Tablesaw Jig, page 66). These cuts make the top and shelves appear thinner without requiring a planer.



Sliding Tablesaw Jig

Hold small panels on edge for cutting bevels and rabbets on the tablesaw with this simple jig. Make the parts from plywood or MDF, clamp them in place and screw them together with countersunk flat-head screws.

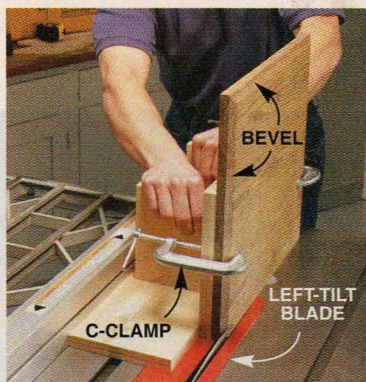


Cutting List

Base: 3/4" x 6" x 24"

Face: 3/4" x 8-1/2" x 16"

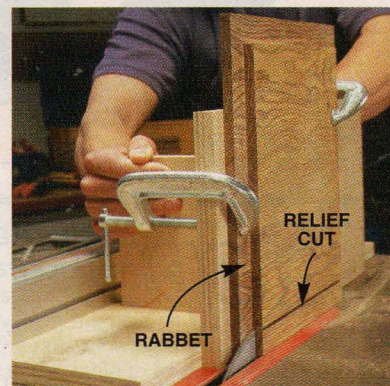
Supports: 3/4" x 5-1/2" x 5-1/2"



The blade guard must be removed for this cut. Make sure the C-clamp is fully tightened. **Be careful.**

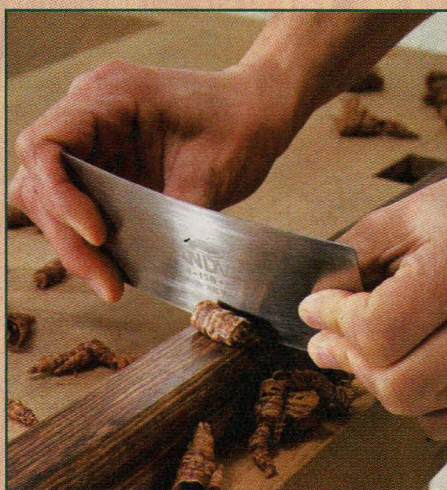
8 Cut bevels on the underside of the top with a sliding jig (at left). If your saw tilts to the right, move your fence to the left side of the blade. This jig keeps your hands out of harm's way and holds the workpiece so securely that you'll only have very shallow saw marks to clean up. Use a 3-in. C-clamp to hold the workpiece.

9 Cut rabbets on the undersides of the shelves with the same jig as shown in Photo 8. It's much faster than setting up a dado set. First make relief cuts with the shelf lying flat on the tablesaw. Then stand the shelf on end and rip off the waste.



The blade guard must be removed for this cut. **Be careful.**

Cocobolo



Have you ever admired the beautiful wood used on old woodworking tools? You were either looking at rosewood or cocobolo (*Dalbergia retusa*). Today, cocobolo is commonly used on knife handles and musical instruments. This oily wood is water resistant and takes a high polish with ease. But more importantly, it's flat-out stunning to look at.

Cocobolo is a member of the rosewood family. It hails from the tropical forests of Central America. At 68 lbs. a cubic foot, this wood is surprisingly heavy. (By contrast, cherry weighs about 38 lbs. a cubic foot.) It's so

Scraping cocobolo makes it gleam. Scraping is fast, quiet and produces virtually no dust. (Cocobolo dust can be very irritating.) All the wood needs after scraping is a light sanding with extra-fine paper.

10

Slide thin hardwood cleats into slots on the stretchers. Screw the cleats to the shelf. These shop-made fasteners clamp the shelf tight to the stretchers while allowing the shelf to shrink and swell with the seasons.



Sources See page 98

CUTTING LIST

Overall Dimensions: 16" L 14" D 27" H

Part	Name	Qty.	Th" x W" x L"
A	Legs	4*	1-3/8 x 1-1/2 x 26-1/4
B	Top	1	3/4 x 14 x 16
C	Upper shelf	1	3/4 x 11-7/8 x 11-1/2
D	Lower shelf	1	3/4 x 11-3/4 x 10-1/2
E	Wide rails	2	3/4 x 5 x 9-1/4
F	Narrow rails	2	3/4 x 2-1/2 x 11-1/2
G	Wide stretchers	2	5/8 x 1-3/8 x 11-1/2
H	Narrow stretchers	2	5/8 x 1 x 9-1/4
J	Cleats	8	1/8 x 3/4 x 3

* Glue up legs from two pieces 3/4 x 1-5/8 x 27 for one leg, two pieces 3/4 x 3-1/2 x 27 for two legs.

Barbara's Table

Finish and Assembly

1. Finish the top and shelves separately from the base.
2. Install the tabletop fasteners on the wide rails (Fig. A, page 61). Turn the base upside down and center it on the top. Fasten the base to the top.
3. Leaving the base upside down, temporarily clamp the lower shelf (D) to the wide stretchers (G). Slide each cleat (J) into the slots on the stretchers (Photo 10). Leave a 1/16-in. space between the end of the cleat and the bottom of the slot so the shelf can expand. Fasten the cleats to the shelf with short screws. The cleats are thin enough to bend as you screw them down. This tension clamps the shelf tight to the stretcher.
4. Install the upper shelf (C) the same way. **AW**

strong, small pieces can carry quite a load.

Despite its extreme hardness, cocobolo isn't difficult to work, as long as your blades are clean and sharp. It won't dull your machine tools any more than other dense woods, such as hard maple, but pitch buildup can be a problem.

Watch out for fine, fragrant cocobolo dust. It just might make your nose run or even make you break out in a rash. Wear a dust mask or respirator and be vigilant in dust collection, especially when sanding.

Gluing cocobolo is a problem. Some boards are so oily that glue won't stick properly to them. Make it a general practice to put on an organic respirator and gloves, and wipe every gluing surface with acetone before gluing. This removes the top layer of oil. Acetone dries very rapidly, so you'll be good to glue in only a few minutes. Use an epoxy specially formulated for oily wood (see Sources, page 98).

We bought our cocobolo from Tropical Exotic Hardwoods, (760) 434-3030, www.anexotichardwood.com. 2- to 6-in.-wide boards sell for \$15 per bd. ft., plus shipping.

Cocobolo is highly prized for its rich palette of colors, ranging from yellow-orange to intense red to pitch black. Bright when freshly cut, cocobolo darkens to a deep red after a year or so.

This exotic wood is very heavy, very strong and very expensive (about \$12 to \$25 a bd. ft.).



Three Projects for Gardeners

Thrill the garden lover in your family with one (or more!) of these easy-to-make projects.

Before you set aside your push sticks and dust mask for the season, make something to enjoy all summer. Each one of these projects takes only about a day to build, once you've got all the materials. They're designed for outdoor use—made from rot-resistant woods and assembled with weatherproof glue and rust-resistant fasteners. Protected with a finish or not, they'll enhance your garden or deck for years to come.



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page 78

By Tim Johnson

Nine-Pot Plant Stand



This sturdy little stand is perfect for your deck or patio. It's got room for your favorite plants and it doesn't take up a lot of space. When the weather gets cold, you can easily bring it, and a bit of summertime, indoors.

There's no complicated joinery, just glue and screws. The legs simply chase each other around the base, like a pinwheel. The arms follow suit, but they're offset, so your plants have plenty of room to grow.

Once you make templates for the legs and arms and the jig for routing the discs, you'll have the stand together in no time. For tools, you'll need a tablesaw, jigsaw, router and a drill, plus clamps and a file or rasp. If you use construction-grade lumber, you won't need a planer or jointer. Rip the 1-1/2-in.-square column from a straight, clear 2x4 and use 1x stock for everything else. We went whole-hog, making ours out of mahogany. We spent about \$100 for rough stock and milled it ourselves.

How to Build It

1. Mill all the parts to thickness. Cut the column (A), legs (B) and arms (E) to their finished dimensions.
2. Make templates for the leg and arm profiles (Fig. C).
3. Rough out the legs and arms with a jigsaw or bandsaw, about 1/8-in. oversize. Smooth the profiles with a rasp and sandpaper, a sanding drum mounted in your drill press, or an oscillating spindle sander.
4. Position each leg on the column and drill pilot holes for the screws (Photo 1). Be sure to mark the legs so they'll go back on the same column face during final assembly.
5. Round over the edges of the legs, except for portions that support the discs or go against the column (Fig. A). On the column, stop the round-overs 1-in. away from the joints.
6. Fasten the legs to the column with weatherproof glue and stainless steel screws.
7. Attach the column support block (C).
8. Glue the triangular-shaped arm blocks (D), cut from your leftover column stock, to the column (Photo 2). If a stuck-on block keeps sliding down the column, pull it off, remove the excess glue and stick it back on. Before gluing on the second pair, plane the first pair flush.
9. Attach the arms, following the same procedure you used for fastening the legs (Steps 4 through 6). Make sure the arms wrap around the column in the same direction as the legs, otherwise the discs won't be properly staggered.
10. Make a jig to rout the discs (Part F, Fig. A and Photo 3), cut them to rough size and rout them (Fig. B). Then round over the edges.



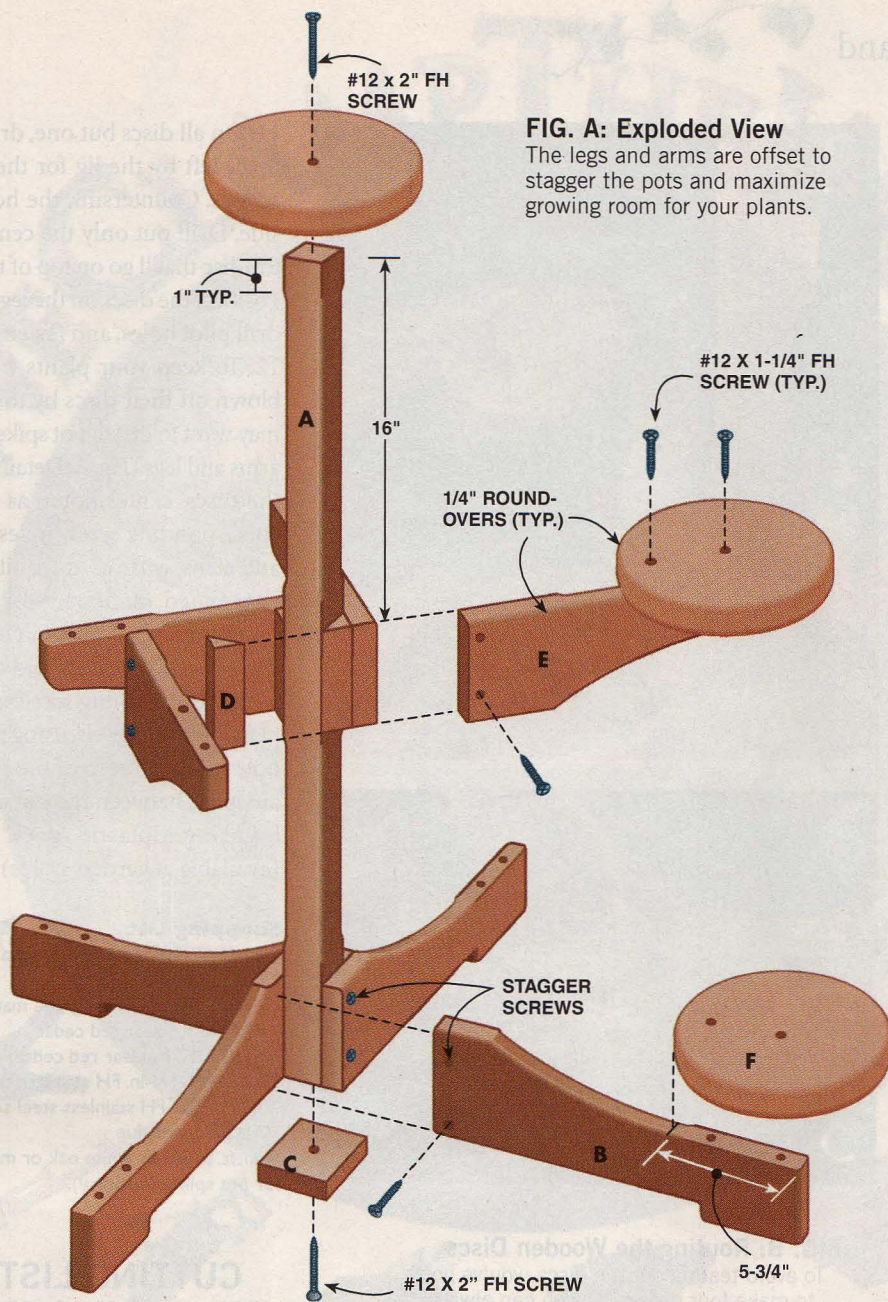
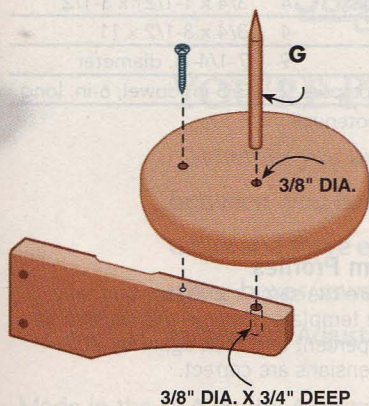


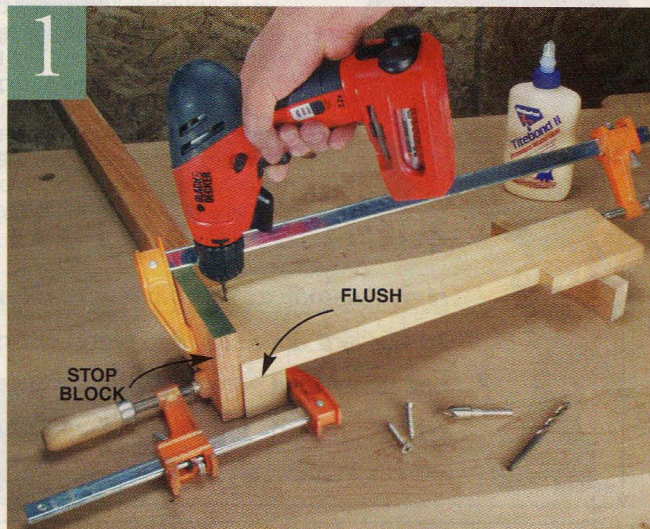
FIG. A: Exploded View

The legs and arms are offset to stagger the pots and maximize growing room for your plants.

**Detail 1:
Optional Pot Spike**



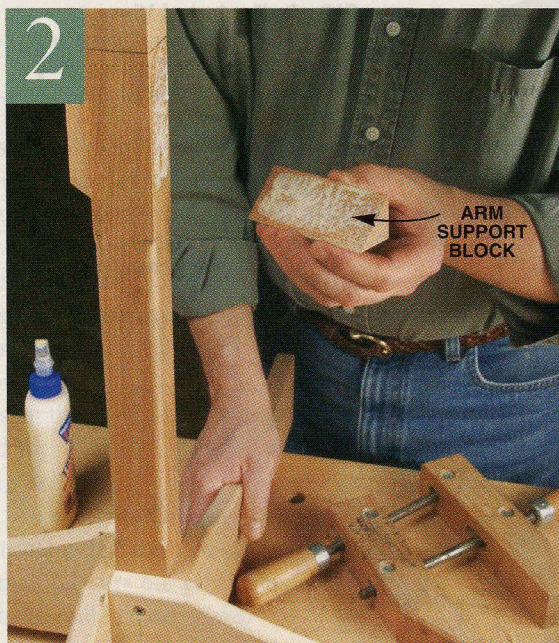
A STOP BLOCK ENSURES PERFECT ALIGNMENT when you mount the legs. First, clamp the stop block to the column. Then, clamp the leg to the stop block, making sure the bottoms of the leg and column are flush. After drilling pilot holes, countersink and drill out the leg holes so the screws will slip through and fit flush.



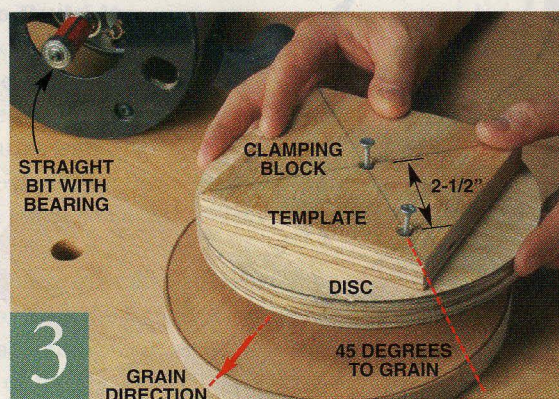
Nine-Pot Plant Stand

GLUE THE ARM SUPPORT BLOCKS to the column, two at a time.

Keep them properly aligned by going easy on the glue and using finger pressure to initially set the joint. Wait until the blocks are firmly attached before clamping. Once installed, these four triangular blocks create a mount for the arms that's offset from the legs.



ROUT PERFECT DISCS EASILY with a simply made two-piece jig. The block allows you to clamp the assembly to your workbench. The template lets you rout the round shape. Orient the screws at a 45-degree angle to the disc's grain. Then the disc will be fully supported across the grain when it's mounted.



11. On all discs but one, drill out both holes left by the jig for the mounting screws. Countersink the holes on one side. Drill out only the center hole on the disc that'll go on top of the column. Position the discs on the legs and arms, drill pilot holes, and fasten them.

12. To keep your plants from getting blown off their discs by the wind, you may want to install pot spikes (G) in the arms and legs (Fig. A, Detail 1). Drill out the discs' center holes, as well as the corresponding screw holes in the legs and arms, with a 3/8-in. bit. Then glue sharpened mahogany or white oak dowels into the arms and legs. Slip the discs over the dowels and fasten them with the remaining screws. Stake your plants on the dowels, using the drainage hole in the bottom of the pot. Provide air space between the pot and the disc by using a plastic "deck protector" (available at garden stores).

Shopping List

6 lin. ft. of rough-sawn, 2-in.-square leg stock
12 bd. ft. of 4/4 stock
Optional construction-grade materials:
1 2x4x6 ft., clear red cedar
1 1x12x12 ft., clear red cedar
32 #12 x 1-1/4-in. FH stainless steel screws
2 #12 x 2-in. FH stainless steel screws
Weatherproof glue
5 lin. ft. of 3/8-in. white oak or mahogany dowel rod, for pot spikes (optional).

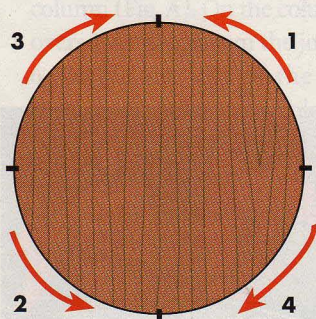


FIG. B: Routing the Wooden Discs

To avoid tearing out the discs, you've got to make four passes, so you can always rout "downhill," following the grain. Make the counterclockwise passes (Steps 1 and 2) first. The two clockwise passes (Steps 3 and 4) require extra care, because you're advancing the router in the same direction as the spinning bit. Keep a firm grip, as the router has a tendency to jump or skip ahead when the bit contacts the wood.

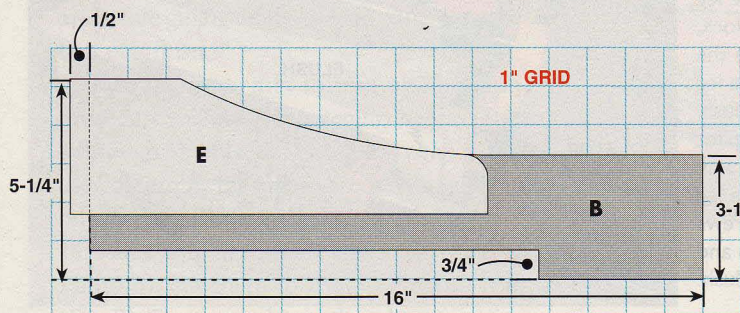


FIG. C: Leg and Arm Profiles

The legs and arms share the same curve, so you really only have to make one template. Enlarge this pattern at a copy center by 250 percent and then again by 202 percent, until the dimensions are correct.

CUTTING LIST

Overall Dimensions: 33-1/2 x 33-1/2 x 36

Part	Description	Qty.	Dimensions
A	Column	1	1-1/2 x 1-1/2 x 34-1/2
B	Legs	4	3/4 x 5-1/4 x 16
C	Column Block	1	3/4 x 2 x 2
D	Arm Blocks	4	3/4 x 1-1/2* x 3-1/2
E	Arms	4	3/4 x 3-1/2 x 11
F	Discs	9	7-1/4-in. diameter
G	Optional/pot spikes	9	3/8-in. dowel, 6-in. long

*Width of hypotenuse

Vine Trellis



Make any climbing plant happy with this 6-ft. tall, free-standing trellis. We used dadoes, glue and screws to fasten the slats because trellises take a beating each year when you tear off the old vines. We built our trellis from cypress, one of the longest-lasting outdoor woods. Ours was recycled from old water tanks and cost about \$175 (see Sources, page 98). White oak, at \$60, would also be a good choice.

Marking the legs for the dadoes can be confusing, but if you follow our marking procedures (Photos 1 through 4, page 75), you can't mess up. Even with our easy-to-make jigs, routing 68 dadoes is noisy, dusty and tedious (Fig. B and Photo 5). But once they're done, the dadoes make assembly foolproof. There's only one angle to remember: Everything slopes 6 degrees.

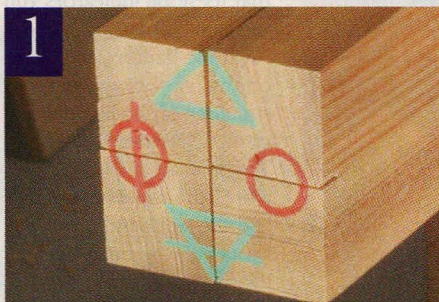
You'll need an angled template, made with the miter gauge on your tablesaw, to make the dadoing jigs. You'll also need a router with a straight bit to cut the dadoes, and a drill with a slotted tip for all the screws. We used a jointer and planer to mill our parts to thickness, but they could also be ripped to size on a tablesaw. The slats are thin, so be sure to use a push stick.

How to Build It

1. Mill the legs (A) to thickness and cut them to length.
2. Mark the leg dadoes (Photos 1 through 4). The sides of the trellis are tapered, so the dadoes are angled.
3. Cut an 84-degree angled template, about 10-in. long and at least 4-in. wide. Use it to set the fence angle on the dadoing jigs (Fig. B).
4. Dado the legs (Photo 5). One jig will slope the right direction for the 3/16-in. deep dadoes on one side of each leg. The mirror-image jig will be correct for the other side.
5. Mill slat material to thickness and rip it into lengths, slightly oversize in width. Then plane (or rip) the slats to fit the leg dadoes.
6. Cut the bottom and top slats (B through E) for all four sides to length, with a 6-degree bevel on both ends. You can cut the slats to length in pairs because opposite sides of the trellis are the same.
7. Frame the front and back faces of the trellis (Photo 6). Align the beveled ends of the slats with the edges of the legs and drill pilot holes. Then drill out the holes in the slats so the screws slip through. Apply glue and assemble.
8. Cut the internal slats (F) to fit, and fasten them, following the procedures in Steps 6 and 7.

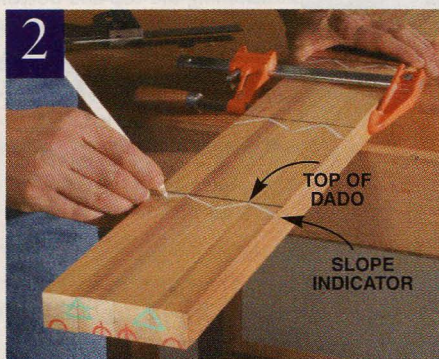


Following this sequence guarantees a successful layout.

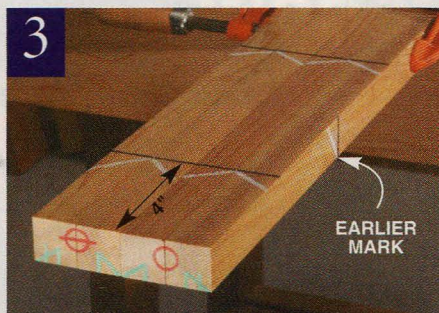


1 MARK THE BOTTOMS OF THE LEGS.

Bundle the legs together and mark the front and back faces as one pair and the two side faces as the other.



2 MARK THE FIRST PAIR OF FACES. The dados on the front and back faces match, so they can be marked at the same time. Arrange the legs with the triangles at the top. After aligning the ends, draw reference lines every 8 in. to mark the dados. Then go back and mark the slope, which runs outward from the center of each pair.

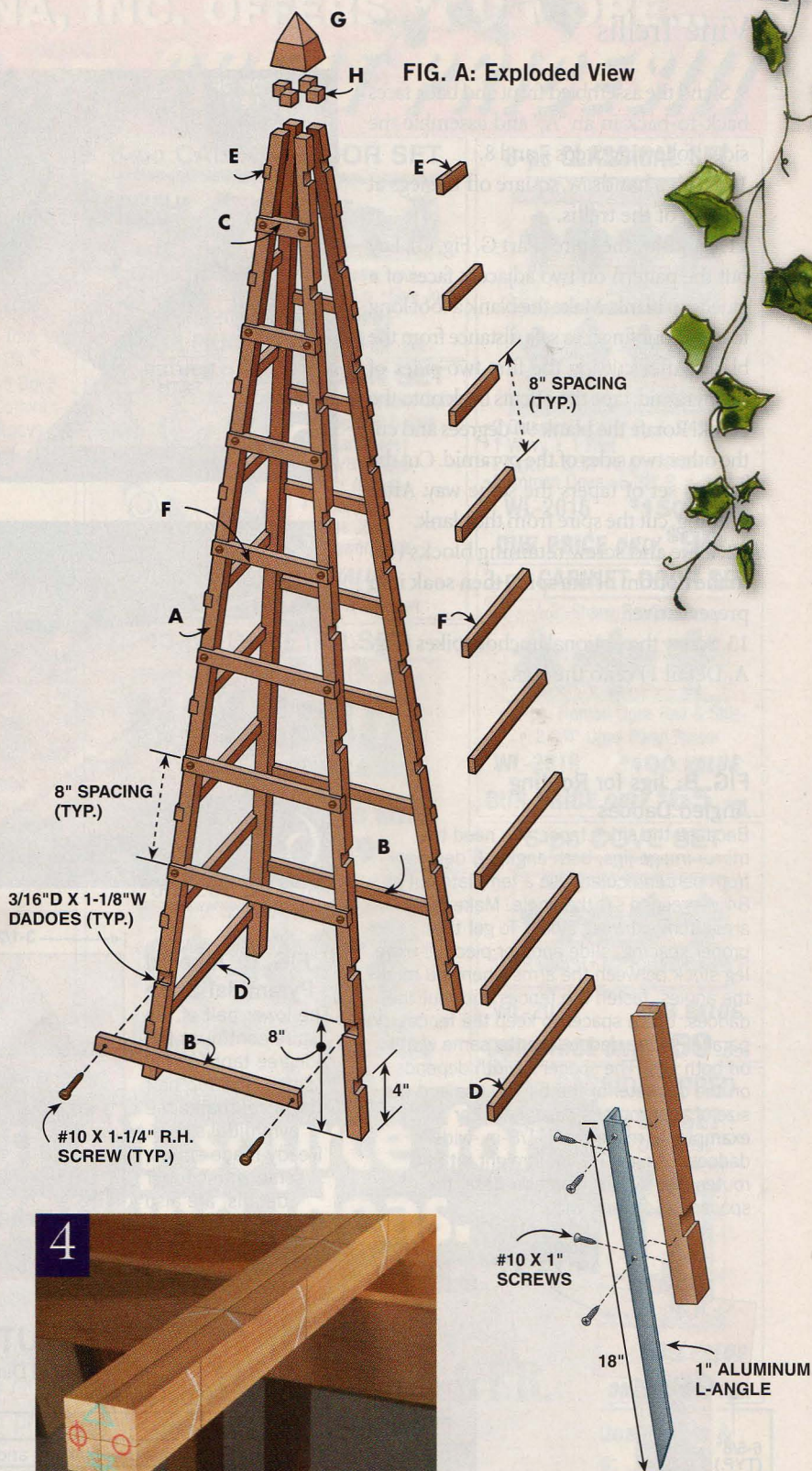


3 MARK THE SECOND PAIR OF FACES. Rearrange the legs with the circles at the top, and align the ends. Then mark the dados, using the same 8-in. spacing. This time, however, start 4 in. from the bottom. As you can see from the mark on the right, these dados are offset from the other pair of faces.



4 YOUR BUNDLE SHOULD LOOK LIKE THIS. Check to see that each leg has its two outside faces marked, that the marks are staggered, and that the slope of the dados is clearly indicated.

FIG. A: Exploded View



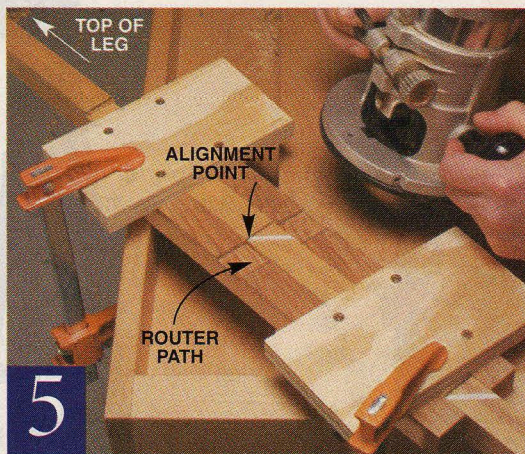
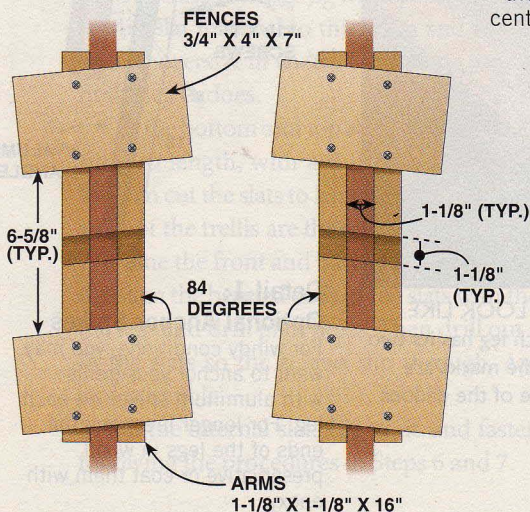
Detail 1: Optional Anchor Spikes

For windy conditions, you may want to anchor your trellis with aluminum spikes on each leg. For longer life, soak the ends of the legs in wood preservative or coat them with epoxy.

9. Stand the assembled front and back faces back-to-back in an "A," and assemble the sides, following Steps 7 and 8.
10. With a handsaw, square off the legs at the top of the trellis.
11. Bandsaw the spire (Part G, Fig. C). Lay out the pattern on two adjacent faces of a glued-up blank. Make the blank a foot long to keep your fingers a safe distance from the blade. After cutting the first two sides of the pyramid, tape the offcuts back onto the blank. Rotate the blank 90 degrees and cut the other two sides of the pyramid. Cut the second set of tapers the same way. After sanding, cut the spire from the blank.
12. Glue and screw retaining blocks (H) to the bottom of the spire, then soak it in preservative.
13. Screw the optional anchor spikes (Fig. A, Detail 1) onto the legs.

FIG. B: Jigs for Routing Angled Dadoes

Because the sides taper, you need two mirror-image jigs, both angled 6 degrees from perpendicular. Use a template cut at 84 degrees to set the angle. Make the arms from extra leg stock. To get the proper spacing, slide another piece of extra leg stock between the arms when you mark the angles, fasten the fences and rout the dadoes. Use a spacer to keep the fences parallel so the dadoes are the same width on both jigs. The spacer's width depends on the diameter of the bit you use and the size of your router's baseplate. For example, to make the 1-1/8-in.-wide dadoes, using a 1/2-in. straight bit in a router with a 6-in. diameter base, the spacer is 6-5/8-in. wide.



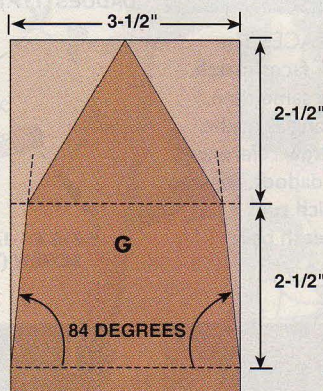
CUT ANGLED DADOES IN THE LEGS. Slide the leg in, top end first, making sure that its slope indicators run the same direction as the jig. Align the dado reference line on the leg with the top inside shoulder of the jig's dado, clamp and rout. Remember: The reference line always marks the top of the dado and the slope indicator should always be in the router's path.



ASSEMBLE ONE FACE AT A TIME. Frame each face by fastening the top and bottom slats to a pair of legs. Then mark, cut and install the middle slats.

FIG. C: Tapered Pyramidal Spire

The lower half of the spire continues the 6-degree taper of the sides. The top half accentuates the pyramidal shape. Ready-made spires, some with copper details, are also available at home centers and garden stores.



Shopping List

- 35 lin. ft. (five 7-ft. lengths) of 1-1/2 x 1-1/2 stock
- 8 bd. ft. of 4/4 stock
- 68 #10 x 1-1/4-in. RH brass screws (for the slats)
- 4 #8 x 1-3/4-in. FH stainless steel screws (for the spire)
- 16 #10 x 1-in. FH stainless steel screws (for the optional aluminum spikes)
- Weatherproof glue
- 8 lin. ft. of 1-in. aluminum L-angle (optional).

Sources

See page 98

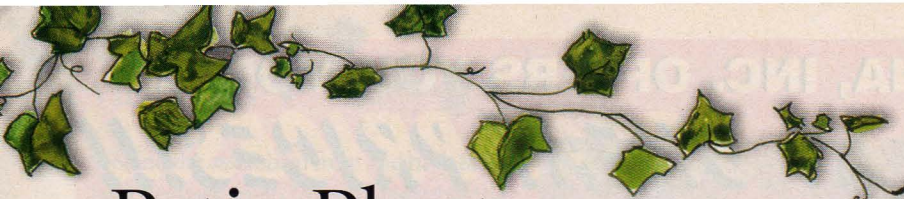
CUTTING LIST

Overall Dimensions: 19 x 19 x 76

Part	Description	Qty.	Dimensions
A	Legs	4	1-1/8 x 1-1/8 x 72
B	Bottom slats, front and back	2	5/8 x 1-1/8 x 17-9/16*
C	Top slats, front and back	2	5/8 x 1-1/8 x 5-1/2*
D	Bottom slats, sides	2	5/8 x 1-1/8 x 18-1/2*
E	Top slats, sides	2	5/8 x 1-1/8 x 4-9/16*
F	Internal slats	26	5/8 x 1-1/8; cut to length*
G	Spire	1	3-1/2 x 3-1/2 x 5
H	Retaining blocks	4	1-1/8 x 1-1/8 x 1-1/4

* Ends cut at 84-degree angle; length is measured from long (lower) side.





Patio Planter



If you can build a box, you can build this planter. It's much sturdier than most commercial versions, so it should last for many years. It's also the perfect opportunity for you to try your hand at shingling!

The opening accommodates a 30-in. drop-in plastic window-box planter. They're available at any garden store in several lengths. You could easily alter the design to fit a different-size box, or to accommodate individual pots. A square version of this planter would also look great.

All the materials you need lie waiting at a full-service lumberyard. You don't have to be choosy about the CDX exterior-grade plywood, but it pays to look through the cedar stock for straight, knot-free boards. If you invest in a bundle of top-grade red cedar shingles (about \$45), you'll easily have enough to cover two planters. Lower grade bundles cost half as much, but have lots of knotty pieces that you won't use. Our total cost, including the plastic planter and top-grade shingles, was about \$95.

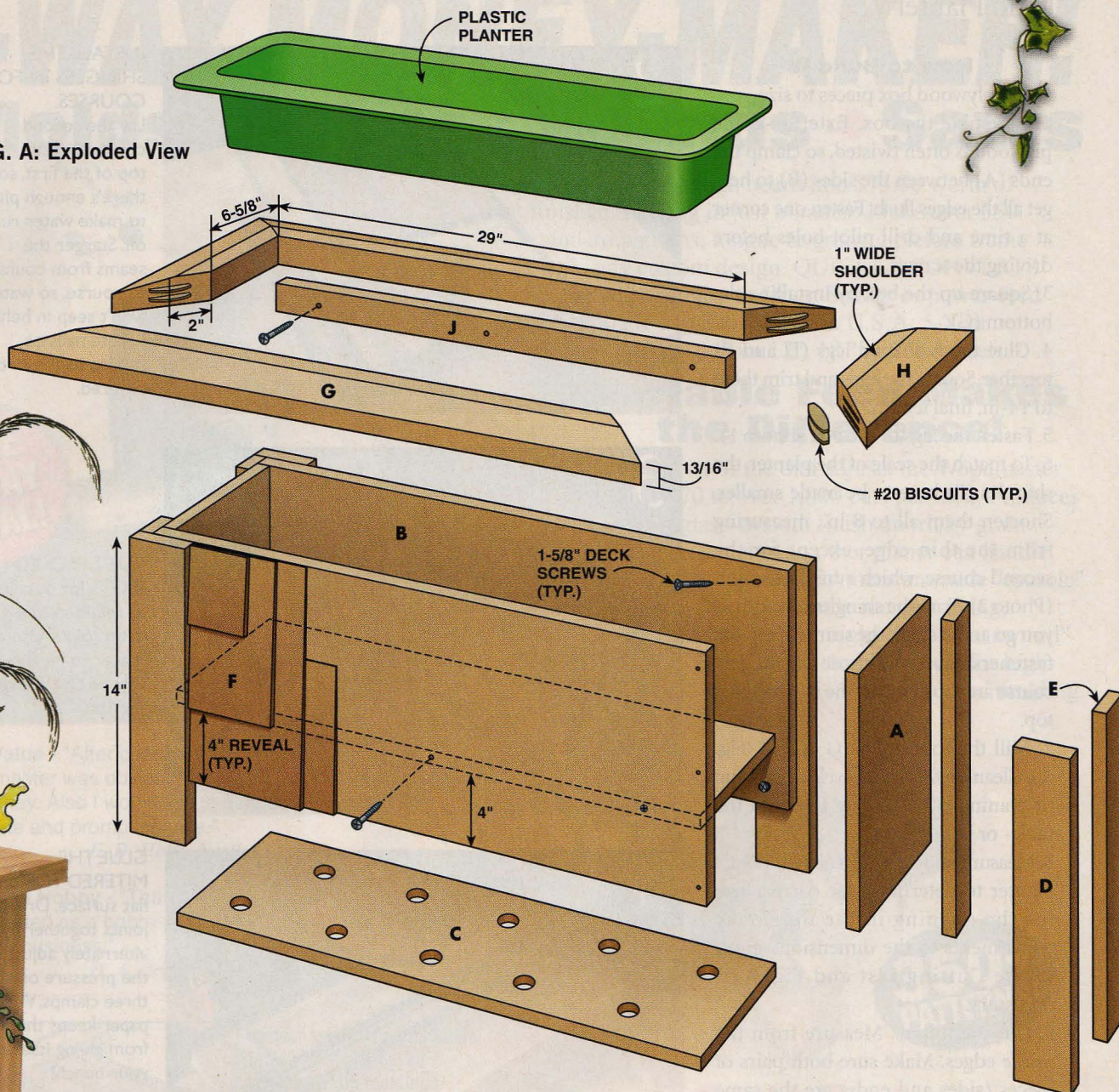
We cleaned up the 2x6 stock and 5/4 decking with a jointer and planer and cut all the pieces to size on a tablesaw. We used a bandsaw to cut the wide bevels on the top pieces, and a biscuit cutter and biscuits to reinforce the top's miter joints.

However, you can make a simpler version of this planter without having a shop full of tools. Except for the wide bevels, all of the cuts can be made with a circular saw and a 10-in. miter saw. Just make the top out of thinner stock

and leave it flat (substitute 7/8-in.-thick cedar siding, the stuff with one rough and one smooth side, for the top and the legs). You don't have to use biscuits in the miters. Keep the pieces aligned by pin-nailing the corners and let the weatherproof glue hold the joint. A drill, hammer and clamps complete the gotta-have tool list.



FIG. A: Exploded View



FASTEN THE LEGS with the box upside-down. Keep the legs flush with the top of the box, and the planter will sit square. Apply glue and hold the leg with a clamp so it doesn't slip when you drive the screw. Flip the assembly over and install another screw near the top. Remove the clamp and move on to the next leg.

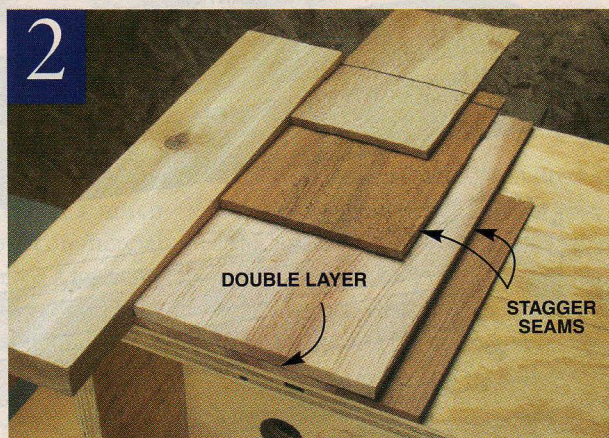
How to Build It

1. Cut plywood box pieces to size.
2. Assemble the box. Exterior-grade plywood is often twisted, so clamp the ends (A) between the sides (B) to help get all the edges flush. Fasten one corner at a time and drill pilot holes before driving the screws.
3. Square up the box by installing the bottom (C).
4. Glue the L-shaped legs (D and E) together. Square the ends and trim them to 14-in. final length.
5. Fasten the legs to the box (Photo 1).
6. To match the scale of the planter, the shingles (F) have to be made smaller. Shorten them all to 8 in., measuring from the thin edge, except for the second course, which runs full length (Photo 2). Trim the shingles to width as you go and stagger the seams. Keep the fasteners covered—those on the last course are protected by the overhanging top.
7. Mill the top pieces (G and H, Fig. A). Clean up the wide bevels by sanding or planing, after cutting them on the table- or bandsaw.
8. Measure under the rim of your plastic planter to determine the correct size for the opening in the top. Make adjustments to the dimensions given in the Cutting List and Fig. A, if necessary.
9. Cut the miters. Measure from the *inside* edges. Make sure both pairs of pieces (sides and ends) are the same length.
10. Reinforce the miter joints with #20 biscuits (Photo 3).
11. Glue up the top (Photo 4).
12. Add cleats (J) and install the top.

AW

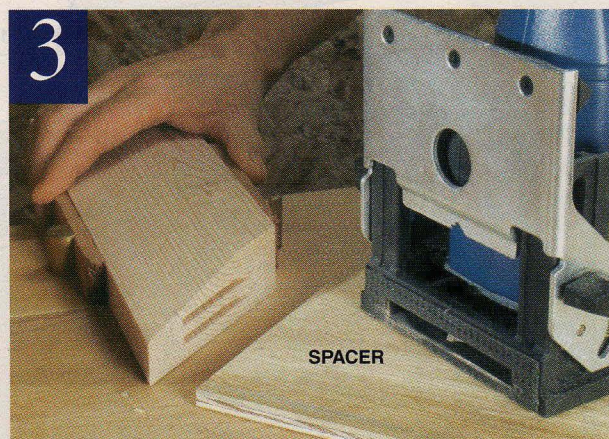
Shopping List

One 6-in. x 30-in. plastic window-box planter
 One half-sheet (4x4) 3/4-in.-exterior-grade ply
 One bundle of 16-in. #1 red cedar shingles
 12 lin. ft. of 2x6 red cedar
 8 lin. ft. of 6-in.-wide 5/4 red cedar decking
 One box #6 x 1-5/8-in. deck screws
 Weatherproof glue.

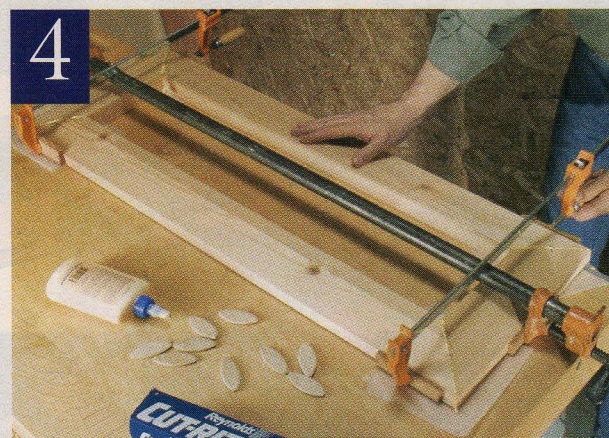


INSTALL THE SHINGLES IN FOUR COURSES.

Lay the second course directly on top of the first, so there's enough pitch to make water run off. Stagger the seams from course to course, so water won't seep in behind. Locate nails or staples so they'll be covered.



CUT STACKED SLOTS for biscuits, to reinforce the miter joints. Use a spacer to lift the second slot above the first.



GLUE THE MITERED TOP on a flat surface. Draw the joints together by alternately adjusting the pressure on the three clamps. Waxed paper keeps the top from gluing itself to your bench!

CUTTING LIST

Overall Dimensions: 13-1/8 x 35-1/2 x 15-3/8

Part	Description	Qty.	Dimensions
A	Box ends	2	3/4 x 8 x 11-3/4
B	Box sides	2	3/4 x 11-3/4 x 30-1/2
C	Box bottom	1	3/4 x 8 x 29-1/8
D	Leg sides	4	7/8 x 3 x 15*
E	Leg ends	4	7/8 x 1-1/8 x 15*
F	Shingles	many	Cut to fit
G	Top sides	2	1-3/8 x 3-1/4 x 38* #
H	Top ends	2	1-3/8 x 3-1/4 x 15* +
J	Top cleats	2	11/16 x 1-1/4 x 28

*Oversize rough length

Cut to 29-in. between miters

+ Cut to 6-5/8-in. between miters

It's the low-cost, low-tech way to dry lumber. Here's how to do it right.

Weight on top reduces warp and holds down the roof.

Roof protects against rain and direct sunlight. This one is chipboard covered with tarpaper.

Commercial end-sealer prevents end checks.

Stickers of straight, dry wood, in perfect vertical alignment.

Offcuts fill gaps left by short boards.

Foundation of 12-in. concrete blocks and 4x6 landscape timbers.

Landscape fabric covered with gravel to keep area free of vegetation.

Air-Drying Lumber

Box-piling the lumber (see page 84) keeps it straight as it dries.

Open location exposed to the prevailing winds.

Want a truly cheap and easy way to dry lumber? Consider air drying. It's the most economical method for removing water from wood, and when done properly, you'll end up with perfect lumber.

Although air-drying is inexpensive and easy, be aware of these drawbacks:

It's slow. Depending on the species and your climate, it can take from 2 to 12 months to bring 4/4 lumber from green to air-dry (12- to 20-percent moisture content, depending on your location).

Air-dry isn't dry enough for indoor use. If you're planning to use the lumber for outdoor projects, air-drying outdoors is fine. But if you plan to use the lumber for interior projects, you'll have to re-stack it indoors and let it dry down to 6- to 8-percent moisture content.

Loss of material. When you air-dry lumber, it's not unusual to lose up to 10 percent or more to drying defects. Lumber defects occur when drying is too rapid, which leads to surface checks and end splits or when drying is too slow, which results in sticker stains and discoloration from fungal growth. Because air-drying is at the mercy of the weather, drying rates are difficult to control.

There's not much you can do about the slowness or the final moisture content, but you can ensure that your lumber has the fewest possible drying defects. It's all in how you stack the pile. Here's how to do it right:

Put Your Pile in the Open

Locate the stack in an open area exposed to the prevailing winds. Avoid shady spots or low areas where moisture can collect on the ground.

Keep the area around the stack clean and free of vegetation. Debris from off-cuts or broken stickers and sawdust are breeding grounds for insects that can migrate to your stack. Control vegetation around an outdoor pile by laying down landscape cloth and covering it with gravel.

Prepare a Good Foundation

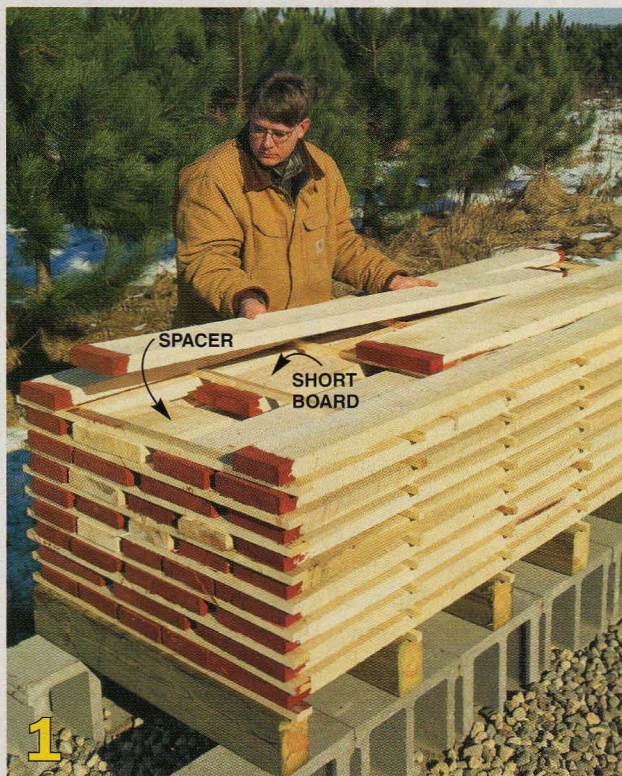
For outdoor drying, the foundation should be at least 18-in. high. We used 12-in. cement blocks and 4x6 landscape timbers to keep the bottom of the pile up off the moist ground and to encourage airflow through the bottom of the stack. Level the cement blocks to create a flat foundation. A dip in the foundation will telegraph through your whole stack resulting in less-than-flat boards. Place the timbers on 16-in. centers.

Prepare the Boards for Stacking

First, trim the ends of the boards so they are a uniform length. Be especially careful to remove any existing checks, because they'll only increase during the drying process.

Then, "butter" the ends with a commercial end-sealer (see Sources, page 98). The money you spend on end-sealer will be more than paid

Air-Drying Lumber



Box-piled lumber yields the most high-quality boards.

The pile should have:

- Straight sides and ends
- Full-length boards on the outside of the pile
- Short boards staggered through the inside of the pile
- Offcuts used as spacers to bridge the gaps caused by short boards.



A slanted roof helps the pile shed water. You can do this in a number of ways; here we are using stickers on the top that vary in height to slant the roof to one end of the pile.

Learn more about wood drying from Professor Gene Wengert, at The Drying Forum at www.woodweb.com

back in better quality lumber. Make sure the coating is thick enough to indent with your fingernail.

You may find some variance in the thickness of your green stock. Sort your wood so that all the boards in a layer are within 1/16-in. of the same thickness.

Use Good-Quality Stickers

Stickers create gaps between the layers of wood. These gaps allow air to flow freely through the stack. Make your stickers from dried wood. They should be straight-grained and strong, so they can be used over and over again. Standard stickers should be surfaced to a uniform 3/4 in. x 3/4 in. Use 2- to 3-in.-wide stickers at the ends of the stack. The extra width helps slow the rapid loss of moisture at the ends of the boards and makes the stack more stable. Stickers should be slightly longer than the overall width of the stack. It is essential that each sticker be placed directly in line with the one below. This creates a vertical column that transfers all the weight of the stack to the foundation.

Box-Pile the Stack

“Box-piling” is the best way to build your drying stack (Photo 1). In box-piling, full-length boards are used on the outside edges, and shorter boards are placed in the interior of the stack. Fill the voids at the ends of the pile with offcuts from trimming.

Put a Lid on It

If your stack is outside, it needs a roof to keep out damaging direct sunlight and rain. You don’t need anything fancy, although it’s good to have a slight slope in the roof for water run-off (Photo 2.) We used chipboard covered with tarpaper. It’s best if the roof overhangs the pile by 6 in. or more.

Weight the Stack

Weight (rocks, cement blocks, sandbags) will lock the boards in place, helping to prevent warp and twist as they dry. Plus, it keeps the roof from blowing away.

Control the Wind

To help minimize the effects of the weather, it’s best to have a tarp that can be dropped down the sides of the pile. This offers protection on hot windy days when the drying rate can be too rapid. This is important with hard-to-dry, check-prone woods like oak and hickory, especially when the green wood is above 30 percent moisture content.

After you’ve done all you can to protect the quality of your air-dried lumber, it’s up to nature. **AW**

Sources

See page 98

Moisture Meters

By Dave Munkittrick



Think of a moisture meter as cheap insurance. Spend \$70 and you'll never have to wonder whether that lumber you bought is too wet or too dry. You can tell if the "kiln-dried" pine you bought from the home center was dried to 9-percent moisture content (about what you need for indoor projects) or 19-percent (what most construction-grade pine is kiln dried to). Knowing the moisture content (MC) of your wood helps you determine when the wood is stable enough to use.

MOISTURE METERS

Pin vs. Pinless Meters

How They Work

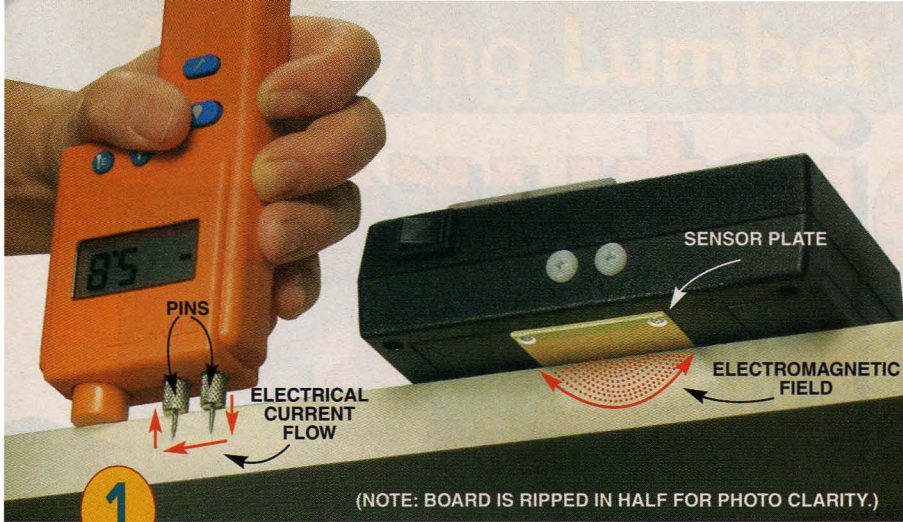
There are two types of meters on the market, pin and pinless. Both types of meters measure the effect of moisture on an electric current (pin type) or an electromagnetic field (pinless) to determine the moisture content (MC) of the wood (Photo 1). The beauty of a pinless meter is that it can quickly scan an entire board without putting holes in the wood. You can even take it to the lumberyard to test the wood before you buy; try that with a pin meter! One concern about pinless meters is that the sensor pad must be in good contact with the wood for accurate readings. Very rough or warped stock may leave too many air pockets under the sensor pad. I've found a few swipes with a block plane creates a nice flat spot to take your readings.

Pin meters can take readings in wood no matter what the shape, size or degree of roughness. All that's required is that the two pins make contact with the wood. Pin meters also allow you to use remote probes (Photo 2). Nails or probes can be driven to the center of thick lumber for core readings that are out of reach for pinless meters. If you dry your own wood, the probes can be left in a sample board in the stack to monitor the wood as it dries. Plus, pin meters can take readings on the edge of a board stacked for drying (Photo 3).

Species and Temperature Correction

Temperature and wood density affect the readings given by moisture meters. All meters are calibrated to read the MC of Douglas fir at about 68 degrees F. (The Timber Check is the only exception; it is calibrated for red oak). That means if you're using a meter on something other than Douglas fir and the temperature is above or below 68 degrees F, you'll need to make adjustments to the meter reading. Manufacturers include charts that adjust for species and temperature variations. More expensive meters have built-in species correction and a couple have built-in temperature correction as well (see chart pages 88 and 89). Just set the meter to the desired species and the meter automatically corrects the readings. This is a huge benefit when you have a lot of wood to test.

Pin meters are more sensitive to temperature variations than pinless meters. That's

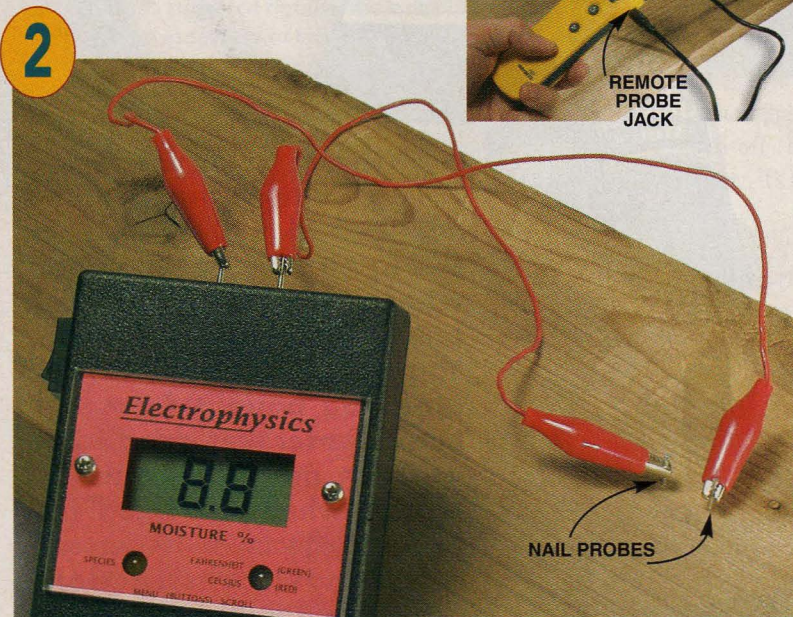


Pin and pinless meters measure moisture differently.

Pin meters have a pair of nail-like probes that are inserted into the wood. An electric current is sent between the two pins. Because water is a good conductor of electricity and wood is a poor conductor, the meter can tell how much water is in the wood by how much current travels between the pins.

A pinless meter has a sensor plate that's held against the surface of the wood. The plate projects an electrical field into the wood. The meter can sense changes in the field caused by moisture and wood. The meter then converts the change to a moisture content reading.

A moisture meter is an ounce of prevention that's worth much more than a single cracked tabletop!



External probes extend the reach of your meter. External probes driven to the center of a board allow you to get a core reading in stock that's too thick for the pins built into the meter. The probes can also be left in a stack of green wood where readings can be taken to monitor the wood as it dries. Some meters have built-in jacks for aftermarket probes, but a pair of nails and alligator clips are an effective, low-cost alternative for all pin-type meters.

why pin meters always come with temperature correction charts. Some manufacturers include corrections for pinless meters should you need a very precise reading.

Pinless meters, on the other hand, are more sensitive to differences in density, or “specific gravity” of different species than pin meters. That’s why pin meters with built-in species correction can get away with grouping species into a handful of settings while pinless meters generally require you to set the specific gravity of each species into the meter.

Should I Buy a Pin or Pinless Meter?

That’s the first question everyone asks when looking to buy a moisture meter. The question is best answered by identifying what you want a meter for and comparing that need to the advantages unique to each type of meter.

If you tend to buy surfaced stock and can’t bear the thought of poking holes in expensive lumber, then a pinless meter is probably your best bet.

If you buy rough stock, dry your own wood, use wood thicker than 2 in. or have a weakness for piles of rough lumber discovered in some old barn, a pin meter is for you.

Taking readings from the edges of boards in a stack is a task better suited to pin meters. Most pinless meters have sensing plates that are too big to read the edge of a 4/4 board.



Important Features

Pin Length

A rule of thumb states that the average MC of a board can be found at a depth equal to 1/5 to 1/4 the thickness of the board. For example, 5/16-in. pins are long enough to get an average MC reading on a 1-1/2-in.-thick board and 1/2-in. pins will work for 2-in. stock. Remember, however, that this rule works only when the board has an even moisture gradient where the surface is drier than the core.

It’s tempting to think that a pin meter measures the MC of the wood at the ends of the pins. In reality, the uninsulated pins measure the wettest layer of

wood they come in contact with. Wood that’s been stored in a shed or shop can have a higher MC on the surface than the core. In this case, the reading only reflects the MC of the wetter outer surface, regardless of how deep the pins penetrate. To get an accurate core reading with uninsulated pins you can crosscut the board and take a reading of the core on the freshly exposed end grain.

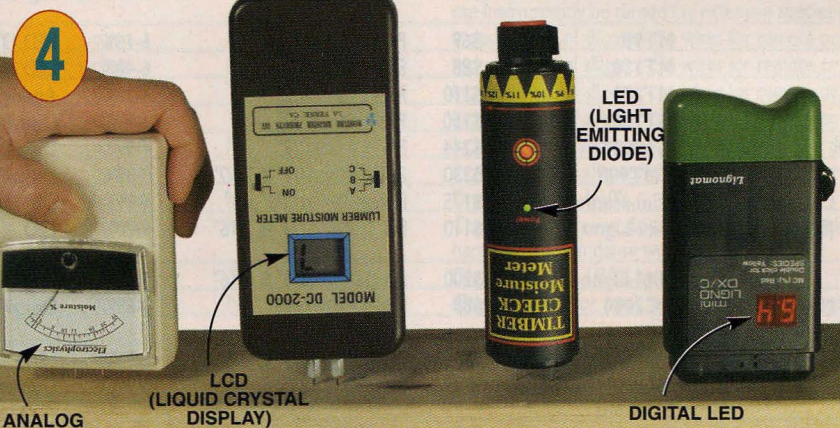
Insulated pins only measure the MC of the wood at the tips of the pins. They come with the external probe accessory that’s available with some meters (see the chart, pages 88 and 89).

Minimum Sample Size

Pinless meters have a minimum sample size that’s dictated by the size of the sensor plate. The entire plate must be touching the wood you’re testing. So, a meter with a 2 in. x 2 in. sensor pad can’t be used on a board that’s only 1-1/2-in. wide. This precludes using most pinless meters to scan the edges of 4/4 boards stacked in a pile.

Moisture Content Range

A range of 7 to 20 percent is all you need to check air-dried or kiln-dried wood. You can pay extra for a meter with a range that exceeds 30 percent, but keep in mind that accurate readings higher than 30 percent are impossible because there is just too much water in the wood. People who dry their own wood use the higher readings to get a



Four types of displays are available on moisture meters. We liked the digital LED and LCD displays the best. Analog displays are the hardest to read. LCD models show the moisture content value on a little screen. This type of display is easy to read in full sun but hard to read in dim light. LED models turn on when the right moisture setting is dialed in on the meter. With a digital LED, the numbers themselves light up. A digital LED is easy to read in the dim light of a storage shed, but difficult to see in full sun.

MOISTURE METERS

relative sense of how wet the wood is to start and how fast it's drying. Turners and carvers who work with green wood may benefit from a meter with an extended range.

At the low end of the MC scale, pin meters are accurate down to 7 percent and pinless, down to 5 percent. Readings below these levels are unreliable because there is just too little water in the wood.

Displays

Both types of meters come in one of four types of displays (Photo 4): analog, LED (light emitting diode), digital LED and digital LCD (liquid crystal display). We like the digital LED and digital LCD best. Analog displays are inconvenient.

A "hold" feature on the display is nice to have. Sometimes readings have to be taken in an awkward position or in poor light where it's difficult to read the display. Being able to hold the reading until you can actually see the display can be quite handy.

Some of the more expensive meters give MC readings with a resolution of 1/10 percent. The less expensive meters generally read out larger increments. But, that may be all you need for a go/no-go decision on your wood.

Built-In Species and Temperature Correction

We think that built-in species correction is a feature you can live without unless you typically need to take readings on a large quantity of wood. A chart can be a bit of a hassle, but it's no big deal if you're dealing with just a few boards. Even with built-in correction, you may have to use a chart to find the right setting.

Carrying Cases

Sensor pads and pins need protection when they're being carried around. That's why we liked Delmhorst's tool-box type of carrying case best. It also gives you a place to store charts and manuals that need to travel with your meter. Second best are the ballistic nylon pouches on the Wagner MMC210 and 220. Electrophysics and Moisture Register do not come with carrying cases.

Recommendations

The good news is that all of these meters will do a great job for you. But for most of us, there's no need to spend more than \$90 for a pin meter or \$140 for a pinless. Meters in this price range can tell you all you need to know about the moisture content of wood that's been kiln or air-dried. That's why all of our picks are Best Buys.

Our Best Buys are simply the least expensive pin and pinless meters. If you want built-in convenience features that the low-cost meters don't offer, check the chart for features and prices that best suit your needs. If you dry your own wood, you may want to spend a little more for a meter that reads above 30-percent MC.

Best Buy, Pin Meters

Electrophysics MT90; \$69

This no-nonsense meter is simplicity itself. Insert the pins and turn the dial until the LED turns from red to green. At that point the dial points to the moisture content of your wood. This meter is not limited to 1-percent increments but is capable of fractional readings like 6-1/2 percent. The meter comes with complete, full-size charts and a pair of alligator-clip leads to use with external nail probes. Our only complaint is the lack of a carrying case that can hold the meter, manual and charts.



Brand	Model	Price	Pin or Pinless	Pin Length or Sensor Pad Size	Range	Display
Comprotech (613) 256-5437	Timber Check	\$65	Pin	9/16 (2)	6-25%	LED (3)
Delmhorst (800) 222-0638	Accuscan	\$295	Pinless	2-1/2"x3-1/2"	6-40%	Analog
	J-LITE	\$135	Pin (1)	5/16" (2)	6-30%	LED
	J-4	\$190	Pin (1)	5/16" & 1/2" (2)	6-30%	Analog
	J-2000	\$260	Pin (1)	5/16" (2)	6-40%	Digital LCD
Electrophysics (800) 244-9908	CT33	\$155	Pinless	2"x2"	0-30%	Analog
	CT100	\$198	Pinless	2"x1-1/2"	0-30%	Digital LCD
	CT808	\$266	Pinless	2"x2"	0-99%	Digital LCD
	MT90	\$69	Pin	1/2"	6-16%	LED (3)
	MT110	\$88	Pin	1/2"	6-40%	LED
	MT270	\$110	Pin	1/2"	4-30%	Analog
	MT700	\$150	Pin	1/2"	4-80%	Digital LCD
	MT808	\$244	Pin	1/2"	4-99%	Digital LCD
	CMT908	\$330	Both	1/2" & 2"x2"	0-99%	Digital LCD
Lignomat (800) 227-2105	Mini-scanner L	\$175	Pinless	1-3/4" x 3"	4-99%	Digital LCD
	Mini-Ligno Original	\$110	Pin	1/4" & 7/16"	6-20%	LED
	Mini-Ligno DX/C	\$200	Pin (1)	1/4" & 7/16"	5-65%	Digital LED
Moisture Register (909) 392-5833	DC2000	\$88	Pin	5/16" (2)	5-65%	Digital LCD
Protimeter (800) 321-4878	Mini BLD2000	\$235	Pin (1)	3/8" (2)	6-90%	LED
	Timbermaster BLD5601	\$348	Pin (1)	3/8" (2)	6-99%	Digital LCD
Tramex (303) 972-7926	Wood Encounter	\$339	Pinless	2-1/2"x4-1/4"	3-35%	Digital LCD (3)
	Compact	\$169	Pin (1)	5/16"	7-42%	Analog
	Professional	\$247	Pin (1)	5/16"	6-44%	Digital LCD (3)
Wagner (800) 944-7078	L606	\$260	Pinless	1-1/2"x2-1/2"	5-30%	Analog
	L609	\$140	Pinless	7/8"x2-1/2"	4-22%	LED
	MMC205	\$180	Pinless	1-1/2"x2-1/2"	5-20%	Digital LCD
	MMC210	\$260	Pinless	1-1/2"x2-1/2"	5-30%	Digital LCD (3)
	MMC220	\$290	Pinless	1-1/2"x2-1/2"	5-30%	Digital LCD (3)



Moisture Register DC2000; \$88

For those who want a little more than a bare-bones meter, the DC 2000 offers the most features for the least money. For \$88 you get a meter with built-in species correction and the largest MC range (6 percent to 65 percent) of any meter under \$150. Wood species are grouped into three different categories, A, B and C. If you really want precise readings, the DC2000 also comes with species correction charts. The Moisture Register also features an easy-to-read digital LCD display. Unfortunately, a carrying case is \$20 extra.

Timber Check; \$65

Rugged and simple are the operative words for this meter. It can tell you all you really need to know about air-dried or kiln-dried wood. It's the only meter out there that's calibrated to read red oak instead of Douglas fir.

The Timber Check works when you insert the pins and turn the knob on the base until



the LED light goes on. Each click of the knob represents 1-percent intervals from 6 percent to 12 percent and 4-percent intervals from 14 percent to 25 percent. The readings are printed clearly on the body of the meter.

Best Buy, Pinless Meters

Wagner L-609; \$140

Easy to use and compact, the L-609 has been in the Wagner stable for many years. What we really liked about this meter, besides the price, is that it comes with an extensive species correction chart with over 170 species, including tropical exotics. If you can't find your wood on this list, then you've really got a rare specimen. We also liked the fact that the sensing pad is small enough to allow for readings on the edge of 4/4 boards. **AW**



Temp. Correction	Species Correction	Auto Shut-Off	Carrying Case	Comments	(1)-external probe accessory available (2)-spare pair included (3)-display has hold feature	(4)-charts provided for precise measurements in extreme temps. = Best Buy
chart	chart	N	cardboard tube	Only meter calibrated to read red oak without chart corrections.		
n/a	chart	Y	tool box	New on the market; available 05/02.		
chart	chart	Y	tool box	Pins are easy to change; 3-year warranty.		
chart	chart	Y	tool box	Handy temp. correction slide rule; easy-change pins.		
built in	built in	Y	tool box	Display reads to 1/10%; stores and averages 100 readings; easy-change pins.		
n/a (4)	chart	N	bubble pack	Correction charts for readings taken in wood less than 1-in. thick; exposed power switch can inadvertently be turned on; extensive species charts.		
n/a (4)	built-in	N	bubble pack	Correction charts for readings taken in wood less than 1-in. thick; go/no-go alarm; exposed power switch can inadvertently be turned on; extensive species charts.		
n/a (4)	built-in	N	bubble pack	Built-in thickness correction from 1 in. down to 1/4 in.; go/no-go alarm; exposed power switch can inadvertently be turned on; extensive species charts.		
chart	chart	N	bubble pack	Includes a set of alligator-clip wires for remote or deep sensing using nail probes; extensive species charts.		
chart	chart	N	bubble pack	Includes a set of alligator-clip wires for remote or deep sensing using nail probes; extensive species charts.		
chart	chart	Y	bubble pack	Includes a set of alligator-clip wires for remote or deep sensing using nail probes; extensive species charts.		
chart	chart	Y	bubble pack	Includes a set of alligator-clip wires for remote or deep sensing using nail probes; extensive species charts.		
built in	built-in	N	bubble pack	Includes a set of alligator-clip wires for remote or deep sensing using nail probes; 1/10% readings below 10%.		
chart	built-in	N	bubble pack	Includes a set of alligator-clip wires for remote or deep sensing using nail probes; extensive species charts.		
n/a	built-in	Y	pouch	Display reads to 1/10%.		
chart	built-in	Y	pouch	Contoured pin cover slips on base for comfortable 1-handed operation; power switch between pins hard to engage in dense wood.		
chart	built-in	Y	pouch	Display reads to 1/10% below 10%.		
chart	built-in	N	bubble pack	Chart included for more accurate species corrections.		
chart	chart	Y	pouch	Includes external probe that plugs into meter.		
built-in	built-in	Y	pouch	Uses a temp. probe for auto. temperature calibration.		
chart	built-in	Y	pouch	Built-in thermometer measures ambient temp. in degrees C; corrections chart on meter.		
chart	chart	Y	pouch	Species and temp. chart on back of meter.		
chart	chart	Y	pouch	Species-correction charts feature European woods, plus basic North American species; 1/10 % readings.		
n/a	chart	Y	tool box	Extensive species chart.		
n/a	chart	Y	pouch	Extensive species chart.		
n/a	built-in	Y	pouch	Extensive charts; specific gravity settings from .30 to .70.		
n/a	built-in	Y	pouch	Extensive charts; specific gravity settings from .30 to .70; ballistic nylon pouch.		
n/a	built-in	Y	pouch	Meter can be set for the specific gravity of different species for .20 to 1.0; ballistic nylon pouch.		

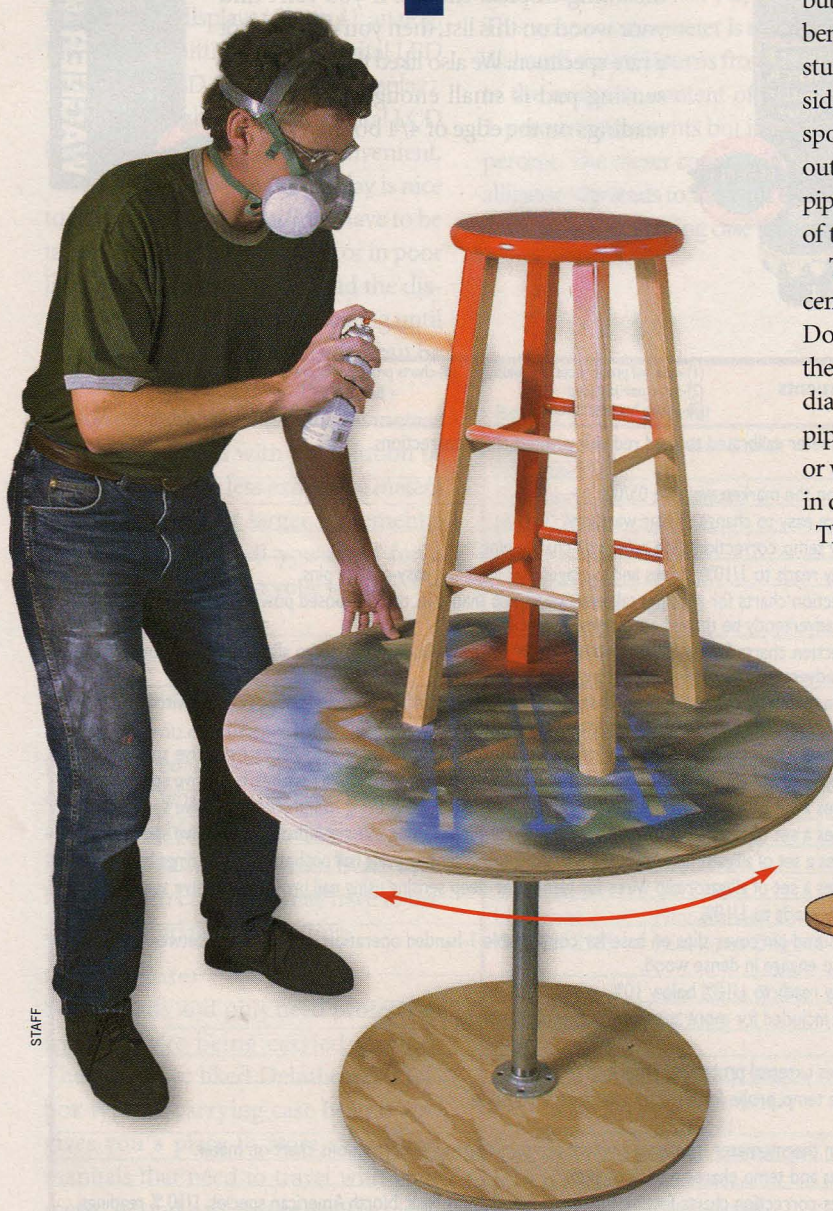
Small Shop Tips

Storable, Portable Turntable

If you do a lot of spray painting and finishing, but don't have room for a permanent finishing bench, give this turntable a spin. It's surprisingly sturdy and because it rotates, you can get to all sides of your project while standing in one spot. It's lightweight, so it can easily be taken outside. When you're done, just unscrew the pipes from the flanges and store all the parts out of the way in the corner of your shop.

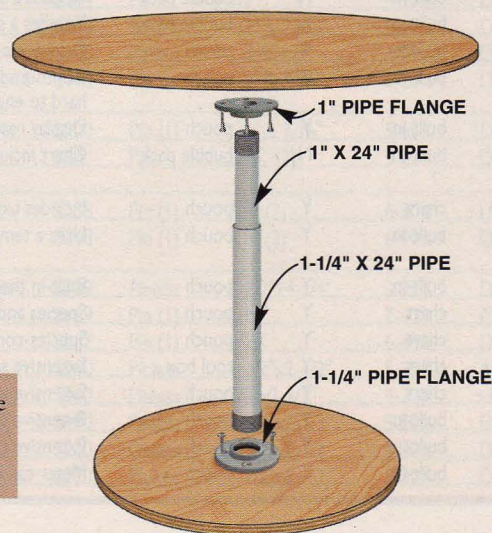
The pipe parts are available at most home centers, hardware stores and plumbing shops. Don't try to use pipes with diameters other than 1 in. and 1-1/4 in. These are the only pipe diameters that telescope together well. Other pipe diameters either won't fit together at all or will be too loose. The plywood top is 36-in. in diameter and the base is 24-in. in diameter. The total cost of the turntable, including the plywood, is around \$40.

Michael Dresdner



STAFF

If you have an original Small Shop Tip, send it to us with a sketch or photo. We pay \$100 for each one we print. Send to: **Small Shop Tips, American Woodworker, 2915 Commers Drive, Suite 700, Eagan, MN 55121.** Submissions can't be returned and become our property upon acceptance and payment.



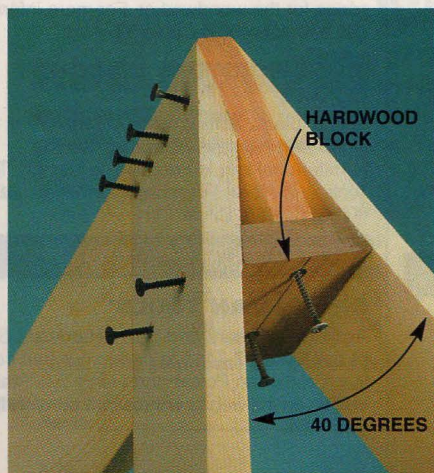
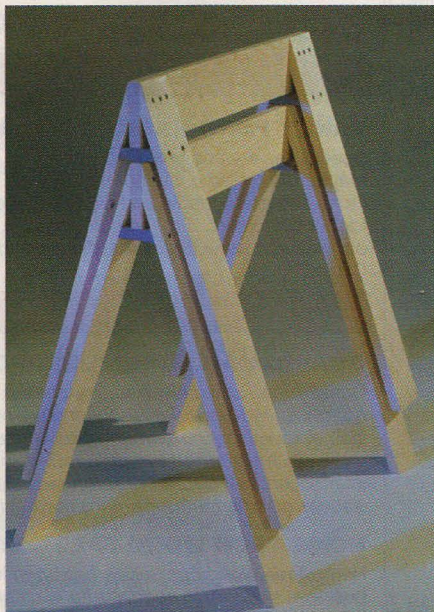
Small Shop Tips

Stackable Sawhorses

I built these lightweight, stackable sawhorses from 3/4-in.-thick lumber, a handful of screws and several squirts of glue. The glue and screws make the horses very strong. A hardwood block for the base of the triangle ensures joint strength, but to make them even stronger, you could also nail triangular pieces of plywood over the ends. The legs are 28-1/2 in. long by 3-in. wide with a 20-degree miter cut at the top. The horizontal board is 26 in. by 4 in. The pair of horses cost me about \$20 to build.

Jeff Gorton

AW



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Great Wood!

Large rays are evenly distributed throughout the wood to create the stunning yet uniform pattern unique to lacewood.



LACEWOOD CABINET BY ROSS PETERSON
PHOTO BY MIKE KEEFE, POPULAR FRONT STUDIOS

Lacewood

Whenever you're looking for some wood with "wow" appeal, consider lacewood. Large rays create the intricate, lace-like pattern. The lustrous ray tissue reflects light and contrasts beautifully with the dull, red-colored wood it's woven into. The net result is a truly showy piece of wood.

The pinkish-brown color and delicate patterns in lacewood have been compared to rich-colored lizard skin or hand-hammered copper. It's so powerful that a large piece of furniture made entirely from lacewood might be too much of a good thing. It's best appreciated in moderation as an accent wood, such as the paneling in the cabinet shown above. Lacewood is a popular choice for smaller projects like jewelry boxes or turnings.

True lacewood, *Cardwellia sublimis*, grows in Australia and is very hard to come by. Most of the "Australian" lacewood sold in North America is actually from Brazil (see photo at left). Lacewood retails for \$7 to \$15 per bd. ft. with highly figured boards fetching even higher prices.

Lacewood is a moderately low-density wood with an average specific gravity of .44 (cherry is .47). It machines well, although the large rays are delicate and tend to chip or crumble when planed. Slow feed rates, sharp knives and wetting the wood surface before planing help reduce tear-out. Sanding works best for smoothing the surface.

We got our lacewood at Eisenbrand Exotic Hardwoods. They sell lacewood for \$14 per bd. ft. in either 4/4 or 8/4 stock. The minimum order is \$35. **M**

Sources

See page 98

Know of some Great Wood?
We'd love to hear about it.
Write Dave Munkittrick at
dave_munkittrick@readersdigest.com.

Oops!

Edited by **Tim Johnson**

Measure Once, Cut Twice?

Most of my woodworking efforts go toward remodeling my house. Recently I needed to trim down a pair of hollow-core doors to fit a double-door closet. The opening was 4-in. narrower than the doors. After ripping down each door, I reinstalled the solid edges and mounted the hinges and knobs. I hung the doors and ceremoniously closed them for the first time, only to discover a gaping 4-in. gap. What a weeb! I'd made *each* door 4 in. narrower.

David Wayne

David, I've got the simplest fix in the world. Just leave the doors open! TJ



Plate Geometry

I planned to surprise my wife with a custom-made rack for our new dinner plates. So she wouldn't notice anything missing, I took a plate from our old set to use for sizing. I built the rack, perfectly sized for all 16 plates, and installed it under the cabinet next to the sink. I was my wife's hero until she tried to put our new plates away. I'd

assumed dinner plates were all the same size. Of course, our new plates are bigger than the old ones—none of them fit in the rack.

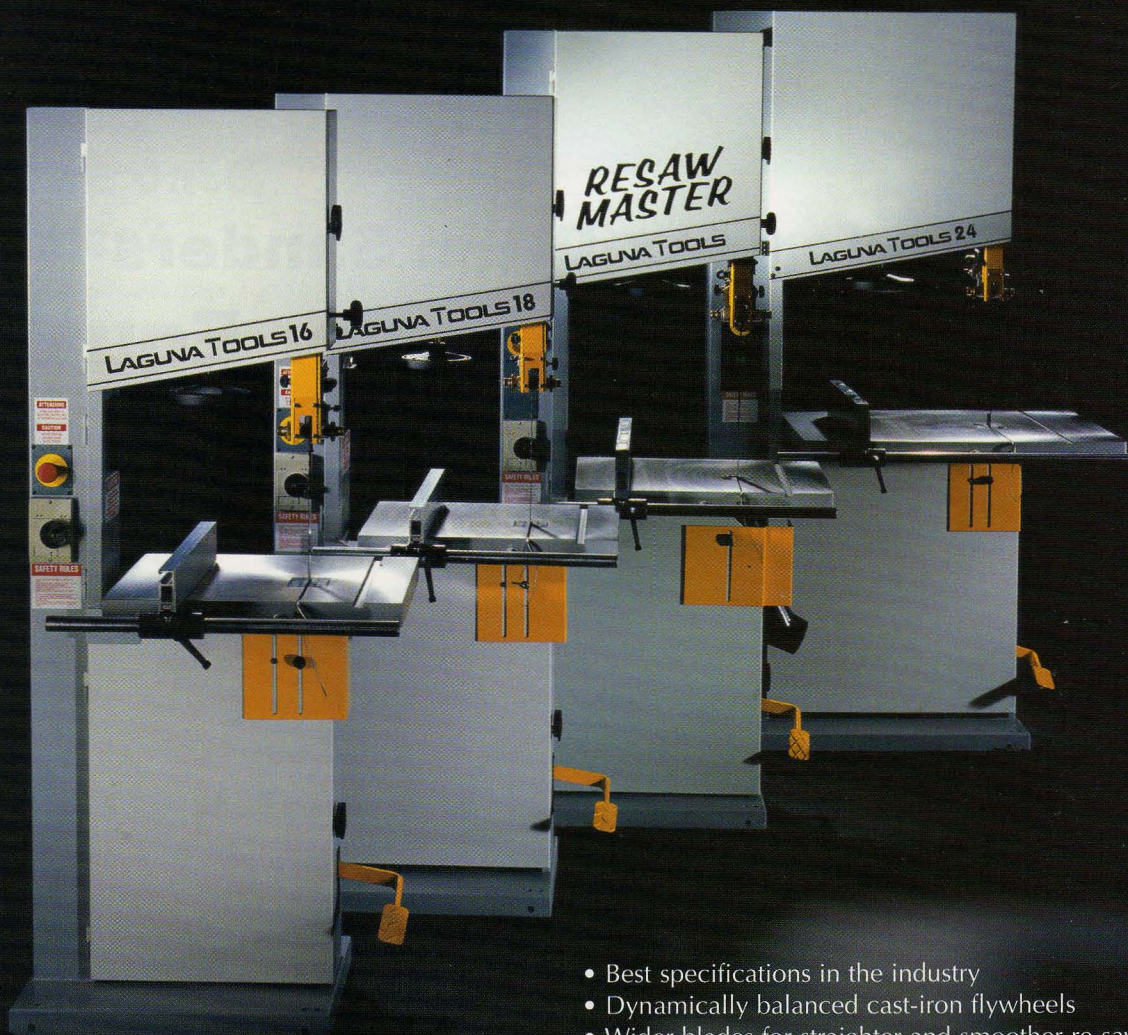
Todd Gilchrist

Todd, did you happen to buy new salad plates, too? TJ

AW

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