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Tool Test: Dado Blades
Best-Buy Blade Gives Super Cuts



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WOODWORKER**

AMERICAN WOODWORKER

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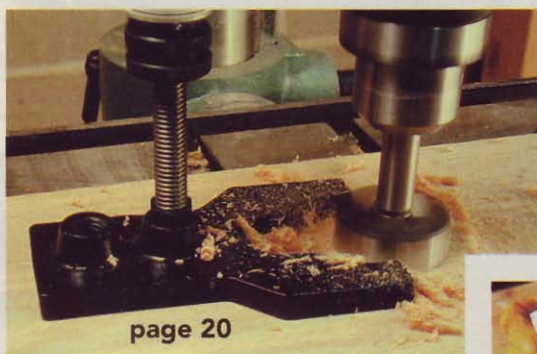
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Question & Answer

Stain Your Shop Floor

Q. I just moved into an old house and will be setting up shop in the basement. The concrete floor is really dark and I would like to lighten it up before I move the machines in. What durable finish can I use?

*Stewart LeLievre
Dickinson, ND*

A. You have several options, but we like *water-based* concrete stain the best. You can get it in a variety of colors, including white. It's easier to work with than an oil-based floor paint and doesn't give off dangerous fumes as does epoxy paint. Concrete stain won't peel or chip off when you move your machines around because it penetrates the surface. Paint forms a film on top.

Before staining, the concrete must be cleaned thoroughly and etched to make it porous. Clean your floor with TSP (trisodium phosphate). If your state bans TSP ask a paint supplier for a substitute. Clean oil or grease stains with a degreaser. Thoroughly rinse away all the residue.



Etching abrades the surface of the concrete and allows the stain to deeply penetrate. Use either muriatic acid or phosphoric acid (your hardware store should have these) as directed on the label.

Acids must be handled with care. Wear full-wrap goggles, rubber gloves and old clothes while cleaning and etching. Dilute the acid by adding it to the water (not the other way around!). Make sure the area is well ventilated.

Triple-rinse the floor by spraying with a garden hose and brushing with a stiff broom; then allow the surface to dry completely before applying the stain.

Mix all the stain you plan to use in a large bucket and spread it with a 1/4-in.-nap roller in 3 ft. by 3-ft. sections. Cut in around the walls with a synthetic brush. Wait 24 hours before using the floor or putting on a second coat.

Source

Valspar Corp., (800) 845-9061
Water-based concrete stain; about \$20 per gallon.

Do Router Speed Controls Actually Work?

Q. I have a single-speed router and want to use a large panel-raising bit in it. I know that I need to slow down the rpm. Will a router speed control work?

*John Kaczrowski
Brockport, NY*

A. Yes. A router speed control will certainly slow your router to a safe speed. And you're right to be concerned about doing so. Your router wasn't designed to handle a large bit spinning at its single high speed. In addition, you may burn your panels because the tips of the bit are turning too fast. When you feed the wood by hand, it's impossible to keep up with the bit.

A speed control is a reasonable solution for occasional use,

but you may run into a problem with your router's warranty if you use the control frequently. The cooling fans in single-speed routers are generally designed to cool only at maximum speed. Slowing the router with a speed control also slows the fan. There's a possibility that the router could overheat and become damaged. Most router manufacturers will not warrantee their tools when used with a speed control.

For heavy-duty and frequent use, replace your large diameter bit with a vertical panel-raising bit (which can be run safely at full speed; see AW #73, June '99, page 39) or buy a big, 3-hp variable-speed router and run your large diameter bit at a slower speed.

Source

MLCS Ltd., (800) 533-9298
Router speed control, # RCS-15; \$30.



Question & Answer

Sawing Aluminum

Q. Can I cut aluminum with my chop saw?

Paul Hemming
Landsdale, PA

A. Yes. Most carbide blades work fine for occasionally cutting aluminum, but we recommend using a special, non-ferrous metal-cutting blade (about \$70) if you cut a lot of aluminum or brass. It's safer to use than a standard blade because the geometry of the teeth makes it less likely to kick back when cutting a soft metal. And it will last longer than a standard blade because the teeth are made of a softer carbide.

No matter which blade you use, feed the saw about one-third slower than you do when cutting wood. Coating the blade with a regular dose of WD-40 (when the saw's not running) prevents the gullets from clogging.



Contamination from a Tack Cloth?

Q. Are oil-based tack cloths compatible with water-borne polyurethane finishes?

Todd D'Allesandra
Wabash, IN

A. Yes. You can wipe off dust with a standard tack cloth without fear of contaminating the surface if you follow two simple directions. One, open up the tack cloth before you use it and form it into a loose bunch. Two, wipe *very gently*. If you press hard you might transfer some of the oil from the tack cloth to the finish. That would be bad, because the next coat of finish may not adhere to the contaminated area.

Rx for Rusty Tools

Q. How do I prevent my edge tools from rusting?

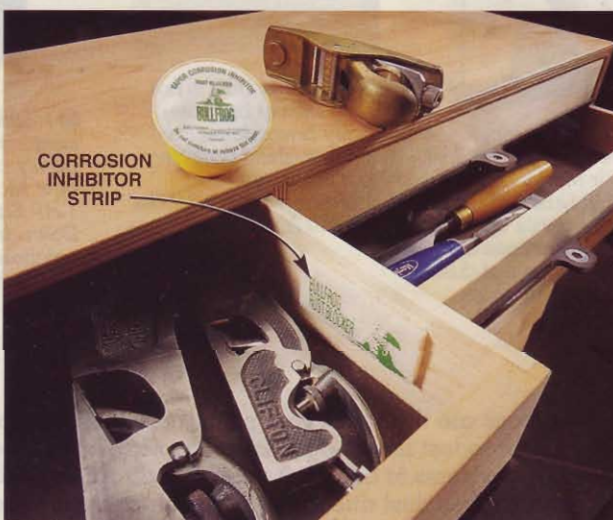
Amy Ballenstad
Shamokin, PA

A. Rust is the curse of all woodworkers, but you've got three weapons at your disposal. First, lower the amount of water vapor in your shop's air with a dehumidifier. Second, isolate your tools in small drawers containing reusable packets of silica gel. These packets absorb moisture in the air and can be renewed by heating in a microwave oven. Third, coat your tools with oil, wax or volatile corrosion inhibitors (VCIs) emitted by strips you can stick in a drawer. You must renew oil and wax coatings often, but the VCI strips do the work for you for up to two years. **AW**

Sources

Dri Bags, (877) 374-2247 or www.dribags.com
10 pack of 3.5-gram silica gel bags; \$4.50.

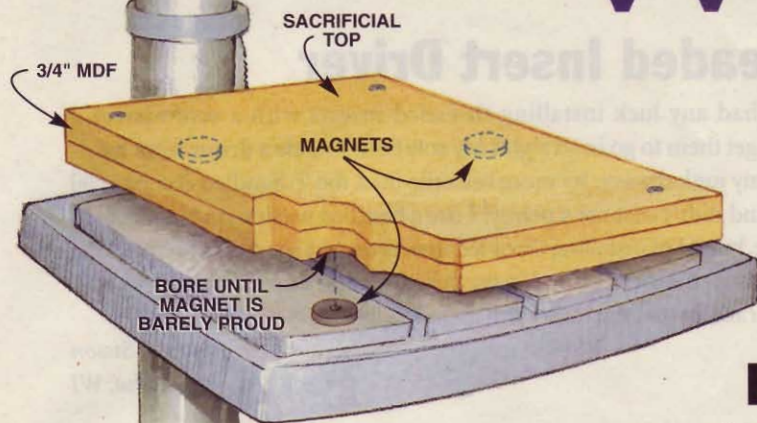
Bull Frog, (800) 854-3146 or
www.bullfroginc.com
6VCI emitting strips, #91016; \$7.



Ask Us

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.

WorkShop Tips



Easy-to-Adjust Backer Board

Nothing is more frustrating than splintering out the bottom of a drilled hole. To avoid that blemish, I move the backer board on my drill press table around a lot so I'll always have a clean spot under the hole. Tired of clamping and re-clamping my backer board to the cast-iron table of the drill press, I replaced those clamps with strong magnets! I glued the magnets to the backer board with epoxy.

My new drill press table has two parts. I hang on to the bottom board (with the magnets in it) and toss away the top board once it looks like Swiss cheese.

*Bruce Anderson
Alamogordo, NM*

Source

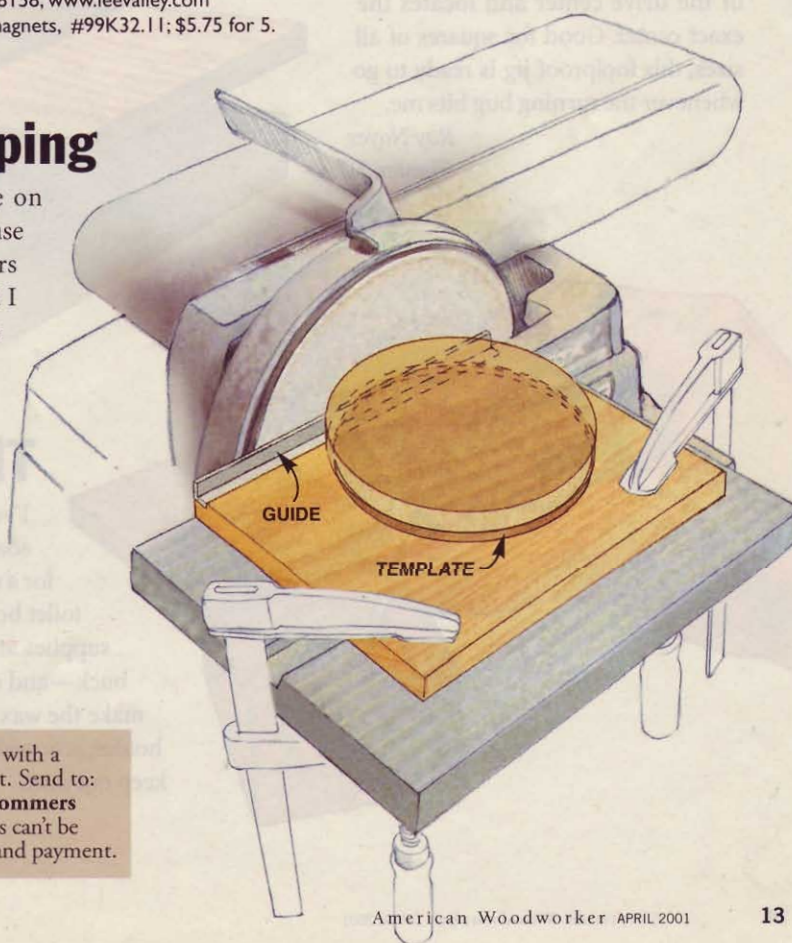
Lee Valley, (800) 871-8158, www.leevalley.com
3/4"-dia. rare-earth magnets, #99K32.11; \$5.75 for 5.

Safer Profile Shaping

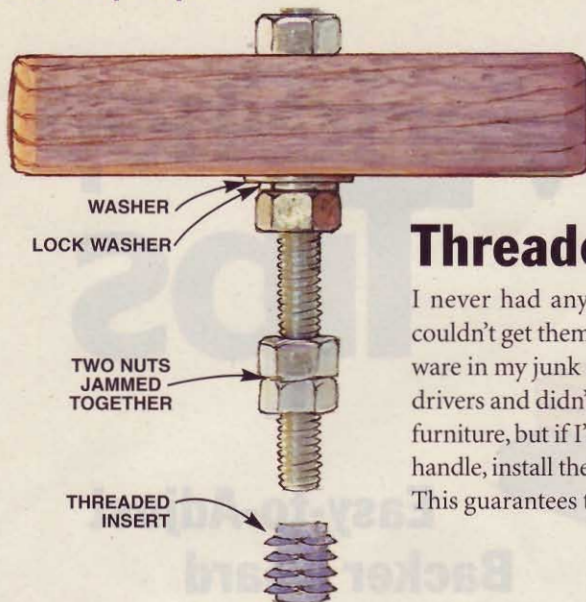
Shaping small parts with a template on a router table always spooks me, so I use a sanding disc instead. Now my fingers aren't close to a whizzing router bit and I don't have to worry about tear-out on the end grain.

I make my template a bit undersized to allow for the thickness of the aluminum guide and its distance from the sanding disc. Then I attach my template to my bandsawn wood parts with double-faced tape.

*Elizabeth Garvey
Garden City, ID*



If you have an original Workshop Tip, send it to us with a sketch or photo. We pay \$200 for each one we print. Send to: **Workshop Tips, American Woodworker, 2915 Commers Drive, Suite 700, Eagan, MN 55121.** Submissions can't be returned and become our property upon acceptance and payment.



Threaded Insert Driver

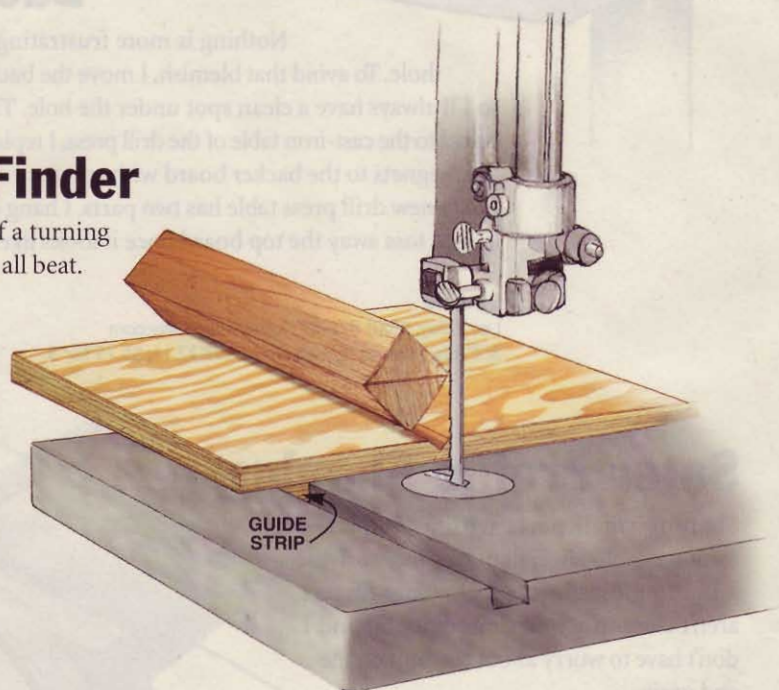
I never had any luck installing threaded inserts with a screwdriver. I couldn't get them to go in straight! My solution? I made a driver from hardware in my junk drawer. It's more versatile than the T-handled commercial drivers and didn't cost me a penny! I use a handled version on big pieces of furniture, but if I'm installing threaded inserts on smaller pieces I remove the handle, install the threaded rod in my drill press and turn the chuck by hand. This guarantees that the insert will go in straight.

*James A. Sisson
Waukesha, WI*

Bandsaw Center Finder

There's a dozen ways to find the center of a turning square but this bandsaw jig has got them all beat. It automatically cuts slots for the spurs of the drive center and locates the exact center. Good for squares of all sizes, this foolproof jig is ready to go whenever the turning bug hits me.

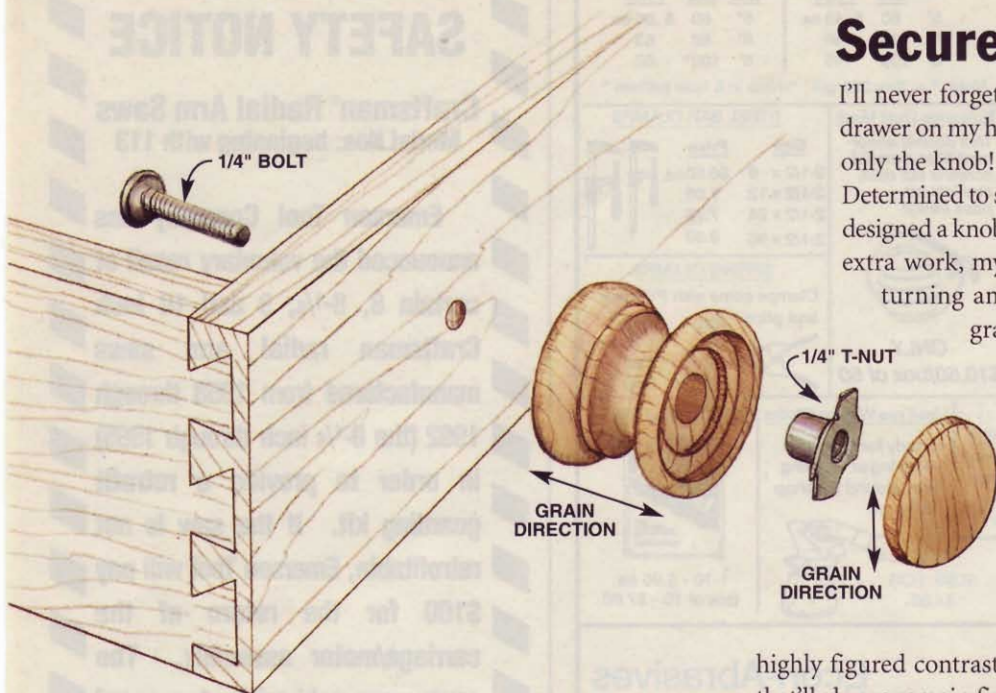
*Roy Noyes
Chester, NH*



The Best Screw Lube

I've tried everything to lubricate long screws; soap, paraffin, you name it. Nothing eases the way for a screw better than the wax ring used for seating toilet bowls. You'll find these rings with the plumbing supplies at any hardware store. They're cheap—about a buck—and one ring will lubricate hundreds of screws. To make the wax easier to store, I drilled a hole into a wooden holder, scooped in some wax, and added a swinging cover to keep out dust.

*Jud Wappne
Redding, CA*



Secure Knobs

I'll never forget the time I tried to yank open a stuck drawer on my homemade dresser and ended up holding only the knob! I'd pulled the knob right off the screw. Determined to solve this problem, I went to my lathe and designed a knob that'll never come off. As a bonus for the extra work, my two-part knob combines the ease of turning an end-grain knob and the beautifully grained top of a face-grain knob.

I removed the spurs from a standard T-nut with a pair of pliers and epoxied it into the base of the knob. I made a face-grain cap for the knob with a plug cutter installed in my drill press, epoxied it into a recess above the T-nut, and turned it smooth. When the cap is made from a highly figured contrasting wood, you've got a beautiful knob that'll always remain firmly attached to your drawer. **AW**

Alf Sharp
Woodbury, TN



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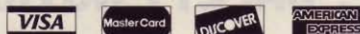


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Product Reviews

Drill Press Hold Down

Yes, we all know you should clamp the wood down when using a drill press. But it's a pain, so sometimes you skip it, only to have wood spinning like a wacky propeller while you flail at the off switch. For 90 bucks the Drill Sargent will take control. It automatically clamps your work down as you drill. It's easy to attach, unlike many clamps, and fits most floor-model drill presses.

The Drill Sargent is simply a cylinder attached to a pressure foot. The pressure foot contacts your material just before the drill bit, and can exert from 30 to 180 pounds of pressure. Even at 30 pounds I found it did a great job of holding my material steady while I bored a 2-in. hole with a Forstner bit. The pressure foot has two positions, one for big bits and another for small. I found myself leaving the foot in the big-bit setting for all my drilling, and it worked fine. The bottom of the foot left no marks, even on soft wood, like pine.

Two inches is the largest bit size the Drill Sargent accepts. I'd like to see a greater diameter capacity.

On some drill presses you'll have to remove the depth-stop assembly to install the Drill Sargent. A depth stop is built into the Drill Sargent and limits your drilling depth to 2-1/2 in. A little more capacity here would



The pressure foot contacts the board before the drill bit, holding it securely in place.



be an improvement, also.

For production work, where even the time it takes to work a toggle clamp is precious, this device could be a godsend.

Drill Sargent
Woodcraft Supply
(800) 225-1153
www.woodcraft.com
\$90.

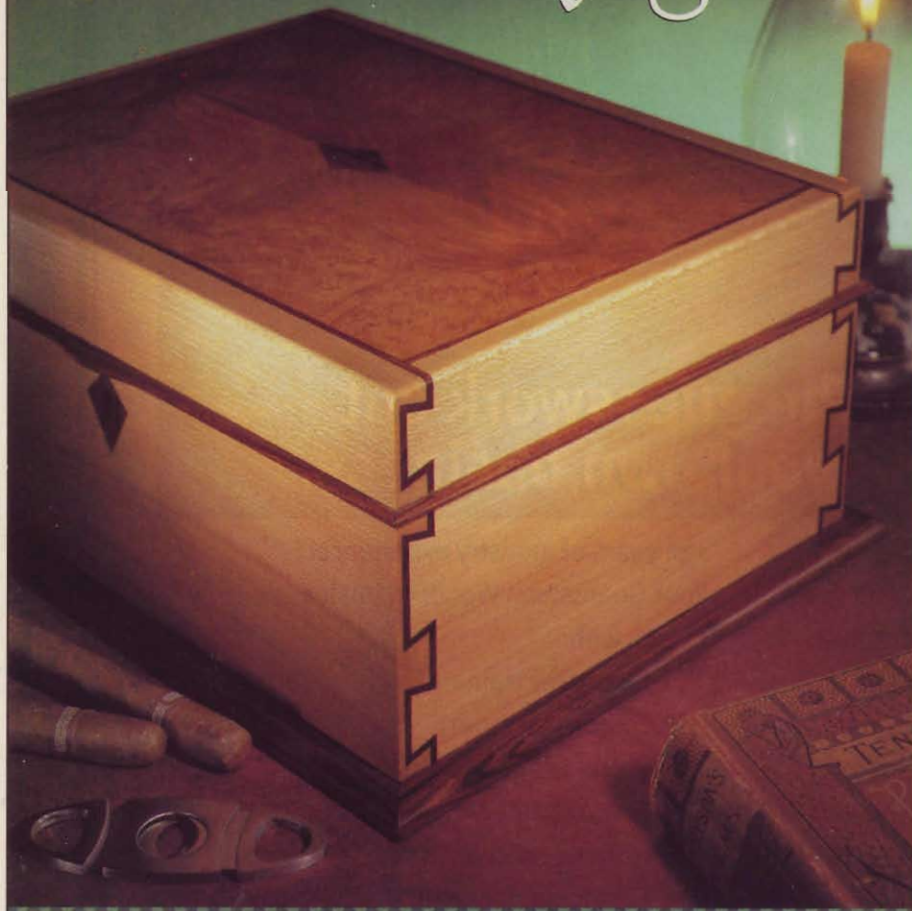
Product Reviews

Brads and Staples from One Gun

Brads are generally best for shooting through solid wood and staples for shooting through sheet stock. Accuset's gun, \$129, satisfies both needs. Switching from brads to staples is easy—all you change is the fasteners. And



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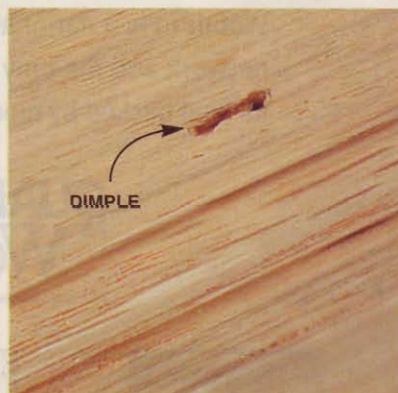
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Accuset even built in a fine safety feature—the gun's nose must be depressed in order for the gun to shoot.

This nailer is easy to handle and works great with 5/8-in. to 1-1/4-in., 18-gauge brads and 1/2-in. to 1-in. 1/4-in. crown staples. The downside is the mark left by the plunger when you're shooting brads (see photo, below). Accuset says this problem is unavoidable because the plunger is wide enough to handle staples, so it's a little too wide for brads. You can reduce the mark by holding the gun at a bit of an angle when you shoot brads.

2-in-1 Tool
Accuset
(888) 222-8144
www.accuset.com
\$129.



The 2-in-1 Tool can leave a larger dimple than a dedicated nailer because the driver is wide enough for staples.



With Grizzly's new 5-in-One Quick Change Set you get a drill/driver, detail sander, reciprocating saw, power carver and 4-in. angle grinder. A locking lever makes all five heads interchangeable with one base. The entire kit sells for \$150.

Grizzly's new line of cordless tools includes 12-, 14- and 18-volt drills, reciprocating saws, circular saws, jig saws and a unique 5-in-1 tool set (see below).

Grizzly
(800) 523-4777
www.grizzly.com.

Product Reviews

Big Package, Small Price

Grizzly Industrial has long been known for its stationary tools. They've recently entered the portable tool market as well. Here's an example: an 18-volt cordless drill and circular saw package for only \$140. You get a drill with five clutch settings and a 3/8-in. keyless Jacobs chuck. The saw takes a 5-1/2-in. blade (a 24-tooth carbide is included), and cuts up to 1-5/8 in. thick. The battery is a Panasonic NiCd and the charger has a one-hour quick charge.



High Performance Router from Fein

This powerful new 3 1/4 horsepower plunge router will cut production time and give you a superior finish. Thanks to an advanced electronic feedback circuit, this state-of-the-art router operates at a consistent torque and speed for extremely smooth operation and a cleaner edge. It's lightweight for greater control, has a wider range of speeds, and includes soft start, dust collection port, and QC spindle. The new FEIN RT-1800 is designed for the cabinetmaker, solid surface fabricator and serious hobbyist. Call **1-800 441-9878** for more information and a dealer near you, or visit us on the web at www.feinus.com.

Finishing is just the beginning

Fein Power Tools, Inc. 1030 Alcon Street
Pittsburgh, PA 15220 1-800 441-9878



Product Reviews

Bandsaw Tension Crank

It's not on par with world hunger, I'll grant you, but one of my pet peeves is the tensioning knob on my old 14-in. Delta bandsaw. It's hard for me to get my big mitts around it, so it takes forever for me to re-tension a blade, especially a big 1/2-in. or 3/4-in. blade.

The \$25 Quick Crank solves the problem neatly. It consists of the speedy crank and a replacement (long) threaded rod, which take about 15 minutes to install. It fits most 14-in. bandsaws. **AW**

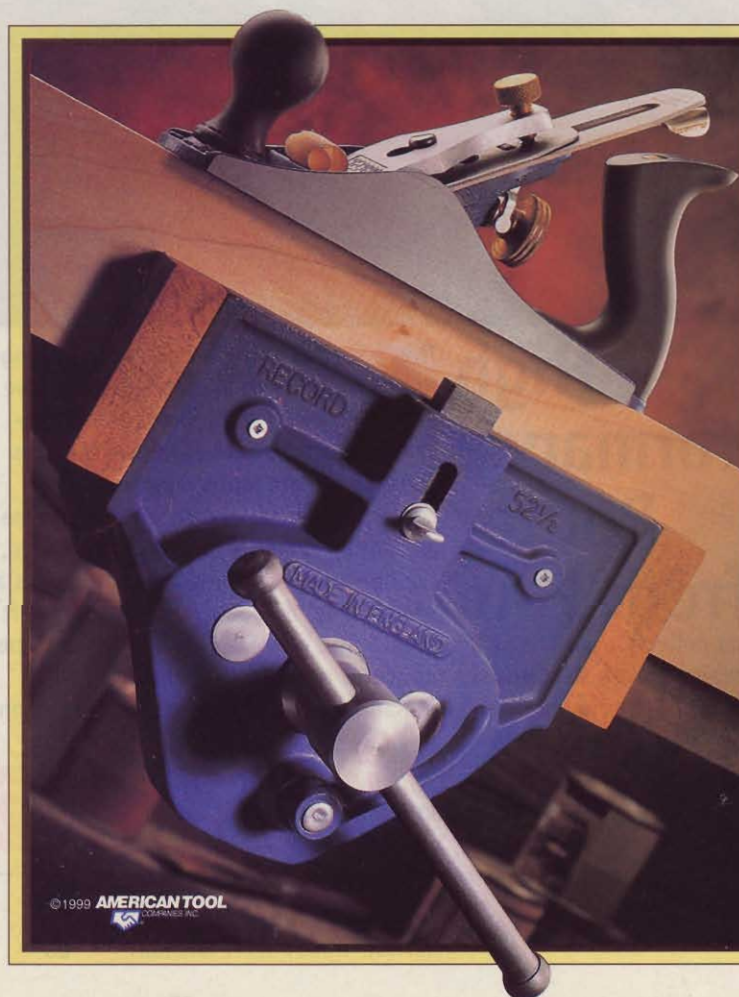
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Small Shop Tips

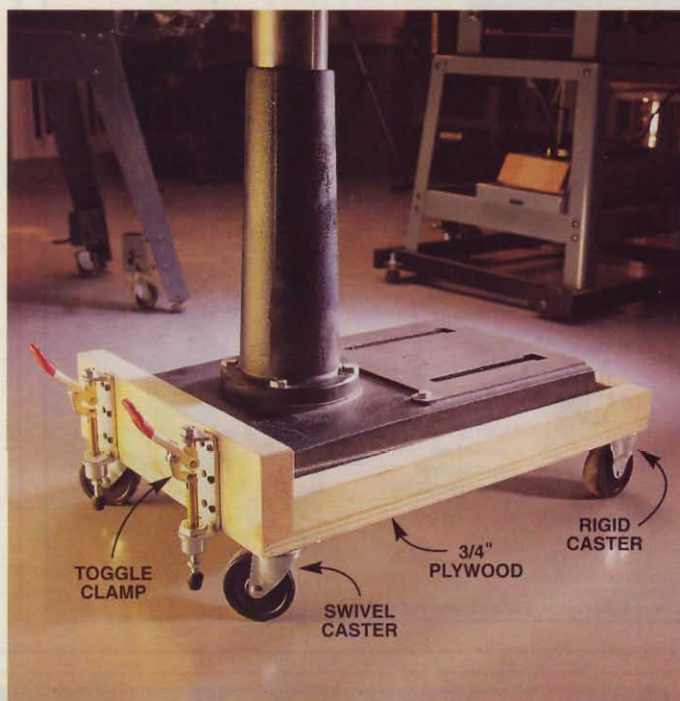
Tool Trolley with Brakes

Mobile tool bases are a must in my small shop. Here's how I built one for my drill press:

I screwed together a shallow box (3/4-in. plywood bottom and 2x2 sides), added heavy-duty casters (\$3 each at a hardware store or home center) and two adjustable vertical-style toggle clamps (\$17 each from Woodcraft Supply, 800-225-1153). For easy steering, use swiveling casters on one end and rigid casters on the other.

Now I roll my drill press into position and push down the clamp levers to lock it in place.

Jean Bartholome
Sax, MN



MIKE KRIVIT

Sheet-Stock Dolly

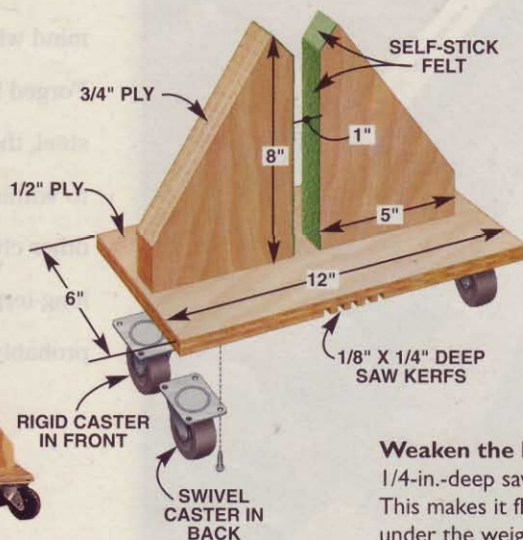
Moving sheets of plywood around in my cramped shop was a real hassle until I made this little sheet-stock dolly. The weight of the plywood makes the base sag, which in turn makes the vertical supports pinch the plywood, securing it to the dolly. A little self-stick felt on the inside of the supports protects the veneer. Buy inexpensive casters, two swivel and two fixed, to attach to the bottom. Once the sheet

stock is in place, you can roll it to where you need it. You can even let go of it because the dolly offers plenty of support and it won't tip over. Try this and your back will thank you!

Rudy Giadrosich
Stockbridge, GA



BILL ZUEHLKE



Weaken the base by cutting a few 1/4-in.-deep saw kerfs across the bottom. This makes it flexible enough to bend under the weight of a sheet of plywood.

ART DIRECTION: VERN JOHNSON

Small Shop Tips

Jacked-Up Outfeed Roller

You can adjust this outfeed roller in seconds to support boards coming off your stationary power tools of any height. If you bolt the roller to a sturdy sawhorse, it won't tip over.

Here's what you need to build it:

- A sawhorse.
- A heavy-duty scissors jack (\$17 plus shipping from Northern, 800-533-5545, or an auto parts store).
- A bracketed roller (\$14 from Tools on Sale, 800-328-0457). Buy the longest roller available if you want to support wide boards and plywood.

It's easy to crank the jack up and down with the jack's standard handle, but to do it faster, chuck a screw hook in a portable drill, put the hook in the jack's drive hole, and run the drill to raise or lower the jack.

*Parkis Kennedy
Bristol, VA*



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Durability

An advertisement for Fisch Precision Tools. It features five playing cards fanned out on a wooden background. Each card displays a different tool: a hand plane on the Ace of Spades, a hand saw on the Ace of Clubs, a set of drill bits in a case on the Ace of Diamonds, a large drill bit on the King of Diamonds, and a lathe on the King of Spades. The cards are labeled with their respective ranks and suits. In the center, below the cards, is the text 'Call For The Dealer Nearest You'. Below that is the Fisch logo, which consists of the word 'Fisch' in a stylized font inside a yellow oval, with 'World Class Woodworking Tooling and Machinery' written around it. In the bottom left corner, it says 'Established 1988'. In the bottom right corner, it says 'Dealers Welcome!'.

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The 3-D sander's compact design fits comfortably in your palm for one-hand operation. Turn the dial to adjust sanding speeds of 800 to 2600 rpm.

SEARS

THE GOOD LIFE
AT A GREAT PRICE
GUARANTEEDSM

Small Shop Tips

Knock-Apart Utility Table

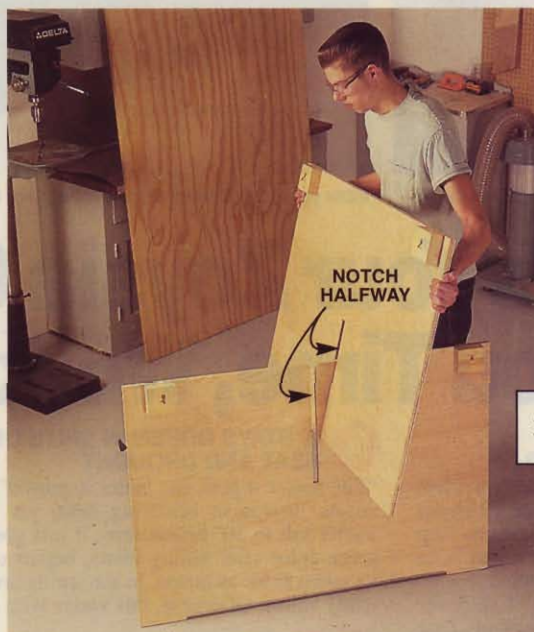
I couldn't do without this knock-down stand for my benchtop tools and accessories. It's made from 3/4-in. plywood (two 36-in. high x 48-in.-wide base boards and a 48-in. x 48-in. tabletop). Cut 3/4-in.-wide slots halfway into each base piece using a bandsaw or saber saw. Slide the parts together and check that the bottom sits level on the floor. Add leveling feet, if necessary.

Add blocks of wood to the top corners of each base piece. Secure the top

with screws run through pocket holes in each block.

You can design a table to suit your needs; just be sure the base is wide enough to be stable. **AW**

*Jerome Curran
Brookfield, IL*



ASSEMBLE THE BASE



SCREW DOWN THE TOP

BILL ZUEHLKE

If you have an original Small Shop Tip, send it to us with a sketch or photo. We pay \$200 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.

Raised-Panel Doors

By George Vondriska



Anatomy of a Door

A door frame is made of rails and stiles. Rails are horizontal, stiles are vertical (like stilts). Rails typically butt into stiles.

The frame surrounds a wood piece with its edges shaped to fit into the rails and stiles. This piece is the raised panel.

This story is a compilation of the techniques I've taught for years in my cabinetmaking classes. I've tried plenty of other techniques for making frame-and-panel doors, and many of them work just fine, but the ones presented here are surefire. I guarantee that even if you've never made a door before, you can follow these steps and get perfect results. We'll cover router bit selection, jigs to make machining easier, start-to-finish setup steps and some tips to help you avoid the most common mistakes.

Parts of a Door

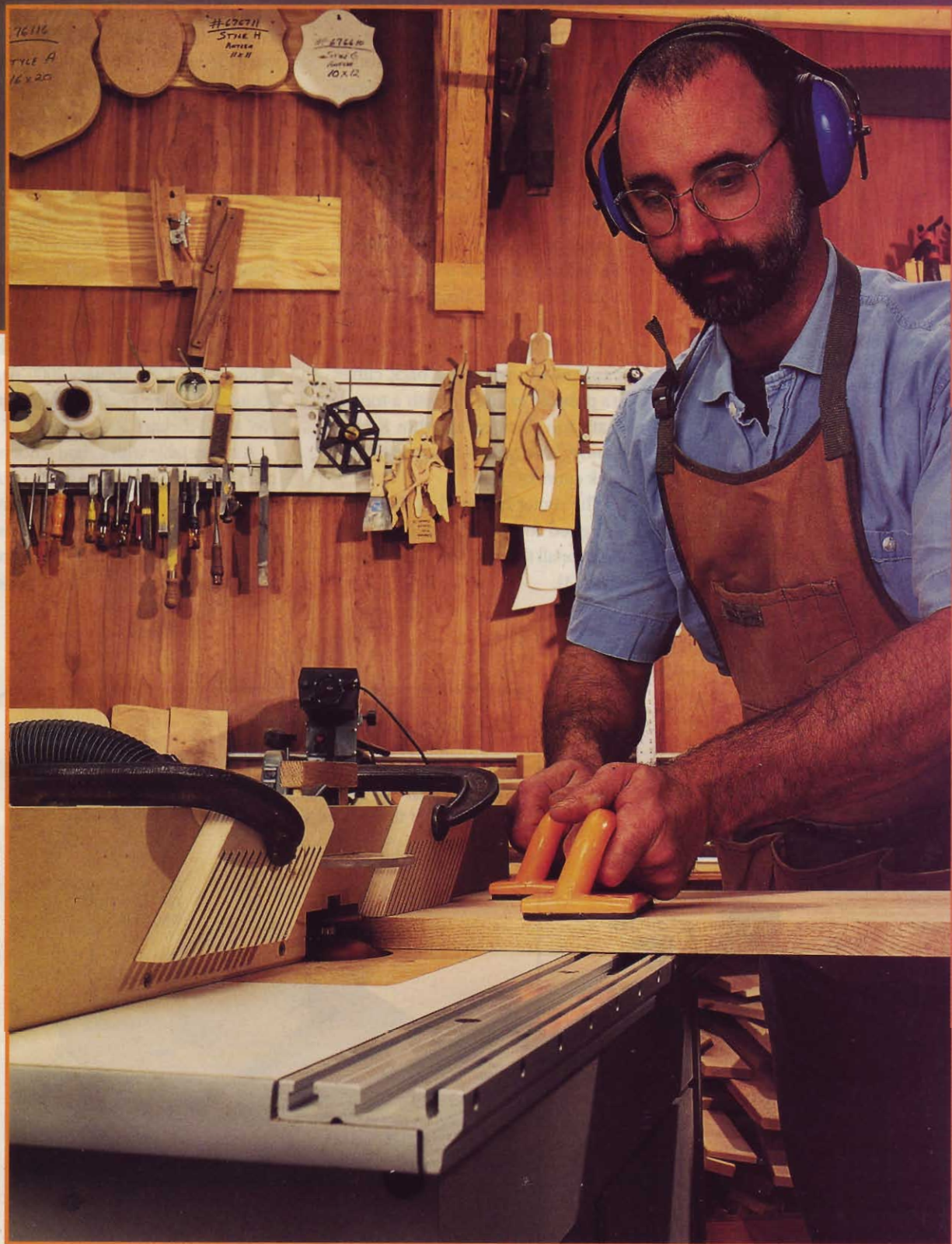
The frame of a door is made up of the rails and the stiles (see Anatomy of a Door, at left). The frame surrounds the panel. In its simplest form, a door panel can be made from 1/4-in. plywood. A panel made from thicker solid wood with an edge shaped to fit into the rails and stiles is called a raised panel.

Router Bit Selection

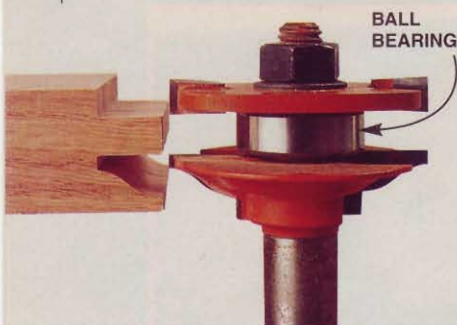
I recommend *two-piece matched bit sets* for machining the rails and stiles, and *back cutting bits* for making the panel. In addition, I only use cutters with 1/2-in. shanks. Compared to those with 1/4-in. shanks, 1/2-in.-shanked bits chatter less under cutting pressure, resulting in a smoother finish.

Two-piece matched sets consist of one cutter that's used to machine the end grain of the rails (Photo A, page 34) and another cutter that's used to machine the long grain of all the parts (Photo B, page 34). This contrasts with reversible cutters, which have one arbor and removable cutters. Many people call these bits rail-and-stile cutters, but because of the functions they perform, I prefer to call the router bits end-grain cutters and long-grain cutters.

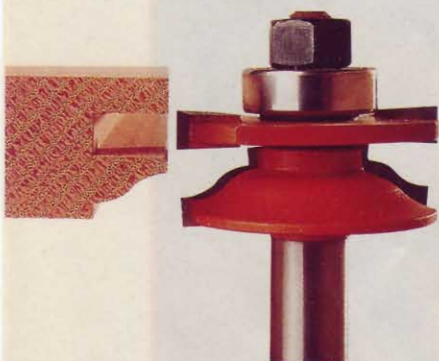
Perfect results, the very first time.



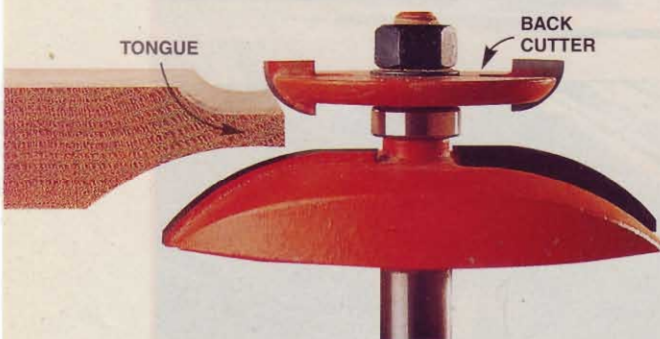
The Bits



A The end-grain cutter is used on the rails to produce a tongue. Use a permanent marker to label this bit with a "1," because you'll use it first.



B The long-grain cutter is used on all the parts to make the groove that receives the rail tongue and the panel. Label this bit "2," because it's the second cut.



C Panel raisers with back cutters produce a tongue that fits perfectly on the panel every time.

The big advantage with matched sets is that all the frame parts are machined face down on the router table. With reversible bits, on the other hand, one part is machined face down and the other face up. This can lead to rails and stiles not lining up very well, due to inconsistent material thickness.

When it comes to panel raising, I swear by back-cutting panel raisers. These bits shape the panel front and back at the same time, giving you a perfectly fitting tongue *every* time (Photo C, below left). When using panel raisers without a back cutter, it's possible to end up with a tongue that's too thick or too thin for the groove. That cannot happen with the back cutters.

The router bits used in this story, designed for 3/4-in. material, cost \$200 for all three cutters (see Sources, page 43).

Routers and Tables

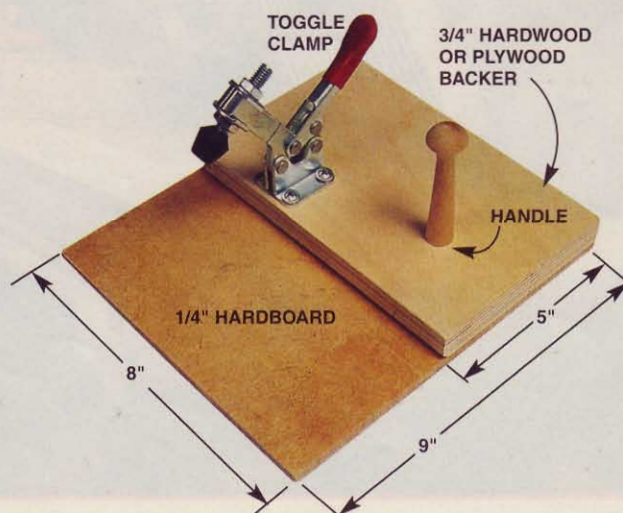
A 1-1/2 hp or larger router is sufficient for the end-grain and long-grain cutters. Typically, these bits are about 1-3/8 in. diameter, and can be run at up to 24,000 rpm.

The panel-raiser bit is another story. You need a large router, at least 2 hp, and you *must* slow down the rpm. These big boys shouldn't exceed 10,000 rpm. All of these bits require a router with a 1/2-in. collet. If you're router shopping, check out two recent American Woodworker Tool Tests: 3-hp Routers, AW #78, February 2000, page 75, and Mid-Size Fixed-Base Routers, AW #85, February 2001, page 70.

A router table with a rigid fence is a must for frame-and-panel doors. You'll appreciate a fence that offers dust collection, because these bits make a mess! And don't forget to wear hearing protection whenever you're using a router.

A Sled for Safety

Build this simple sled for machining the end-grain cuts. It makes it easier and safer to cut the rails and at the same time supports the back edge of the rails to prevent blowout.

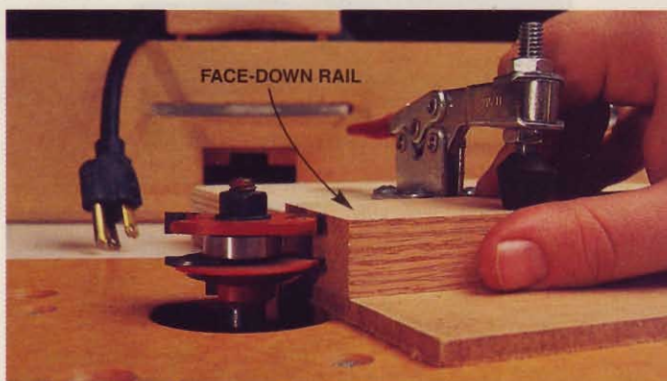


Make End-Grain Cuts First

Begin by routing the end grain of the rails. Here's a trick to help you remember to make the rails before the stiles: "R" comes before "S" in the alphabet! Only the rails get the end-grain cut.

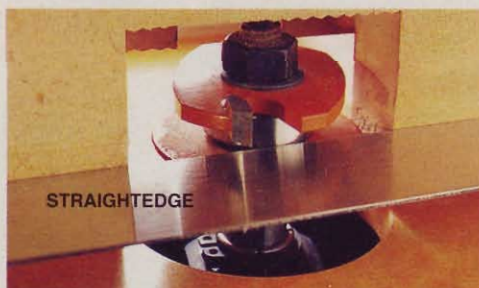
1

Set the height of the end-grain cutter with a test piece in the sled. Set it by eye, shooting for the profile shown in Photo A, page 34. Note that the top of the cutter is even with the top of the wood. This is a good starting point. You can fine-tune the height after making your test cuts.



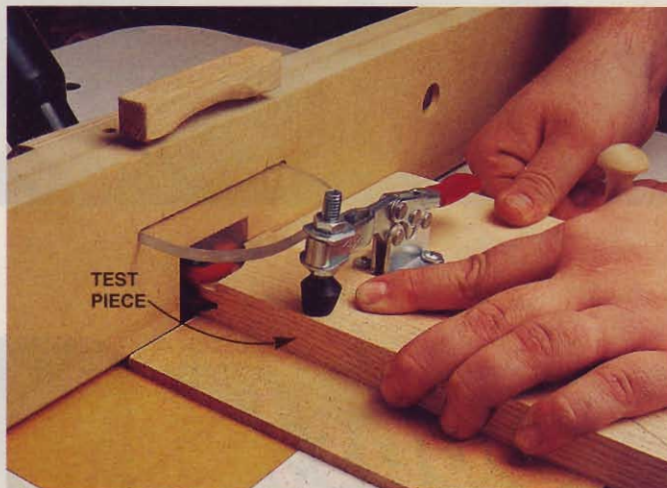
2

Position the fence so it is flush with the ball bearing on the bit. Bridge a straightedge across the fence opening so the straightedge touches both the ball bearing and the fence face.



3

Cut a test piece. Don't cut all the way through the test piece and into the sled backer until the bit height is correct (see Photo 4). When you set the bit height for the next project use the profile cut into the backer as a gauge for the bit.



Time-Tested Tips

Thanks to the piles of kindling I've produced, I can pass along these tips.

- Make your first frame-and-panel door from inexpensive, easy-to-handle wood like poplar. Save the correctly machined parts as set-up reminders and gauge blocks for your next door.
- Make some just-in-case pieces as you make your frame parts. I most often goof up the rails, so I like to have one or two extra.
- Check the door for square while the glue is wet. It's easy to assume the frame automatically comes together square. It doesn't!
- Prefinish the panel before assembling the door.

Raised-Panel Doors

Make End-Grain Cuts

SHOULDER APPROX. 3/16"



LIP APPROX. 3/32"



MARK THE
BACK

4

Check your work. The height of the router bit determines the depth of the shoulder and the thickness of the lip. The lip should be about half as thick as the depth of the shoulder. Don't move on to cutting your frame pieces until this setting is correct.

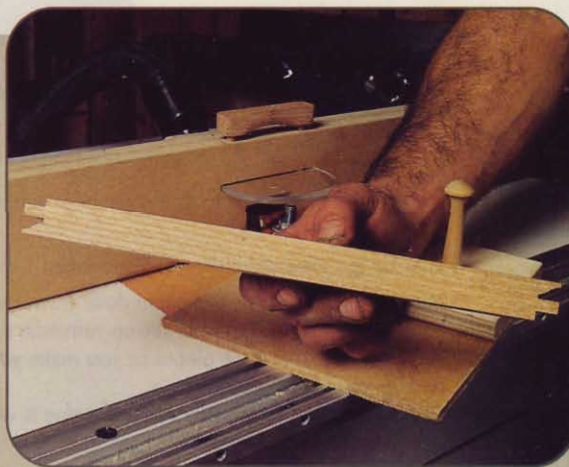
5

Rout all the rails, always keeping the back of the boards up. A mark on the back of the frame parts will help you keep track. Rotate the rail to machine the opposite end. Use consistent pressure on the sled so the end-grain cuts are uniform.

Oops!

Well, here's a good-for-nothing rail! I managed to flip it over between cuts, so the end-grain cuts don't line up.

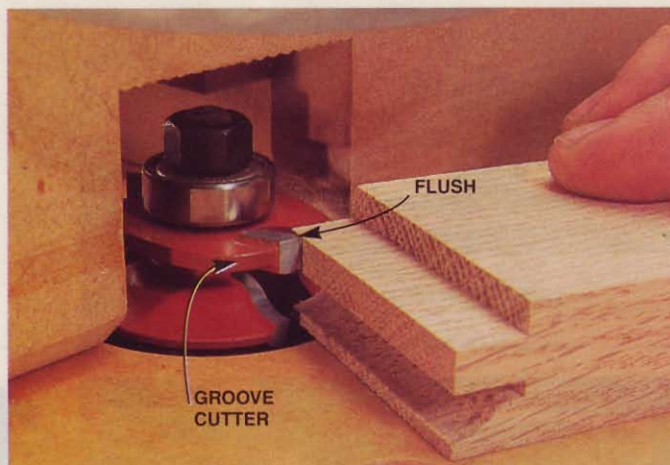
You can avoid this mistake by taking the time to mark the backs of all your parts before heading to the router table. All the routing is done with the back sides up, so you should always be able to see your marks.



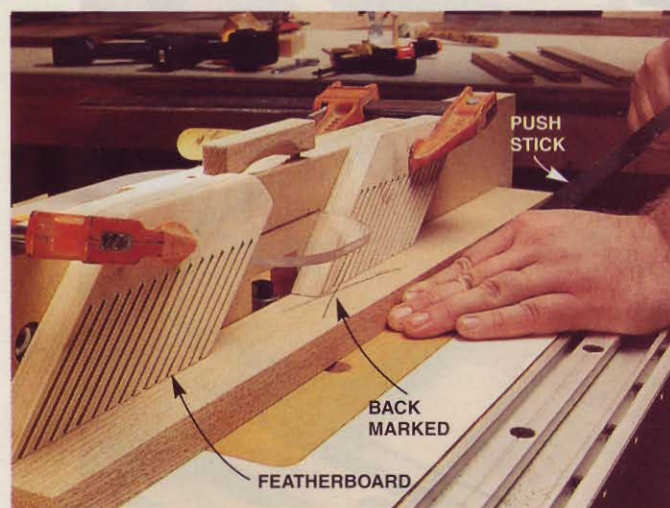
Next, Make Long-Grain Cuts

After all the rails are done, you're ready to make the long-grain cut. The inside edges of the rails and stiles receive this profile.

- 6** **Set the height** of the long-grain cutter using one of your correctly machined rails. The top of the groove cutter should line up with the top of the tongue. Be sure your router is unplugged for setup operations.



- 7** **Cut a test piece.** Use featherboards on the fence to help hold your piece down, and a push stick to move it through. Again, machine the parts with the back side facing up.

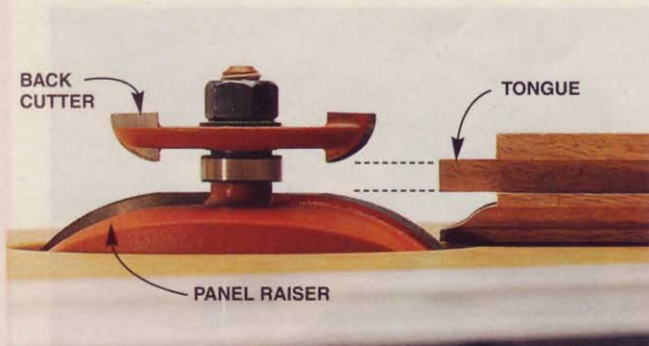


- 8** **Check your work** by fitting a rail to the test piece. The faces of the two should be flush, or nearly so. Even with the most careful setup, there may be a slight difference in the faces from piece to piece; just enough to catch on your fingernail. This comes from inconsistent hold-down pressure on the rail cut. If the difference is close, let it fly. A little work with a finish sander after assembly will smooth out the imperfection. If there's more than a slight difference, however, adjust the long-grain cutter up or down and make another test cut. When the fit is good, machine all the frame parts with their backs up.

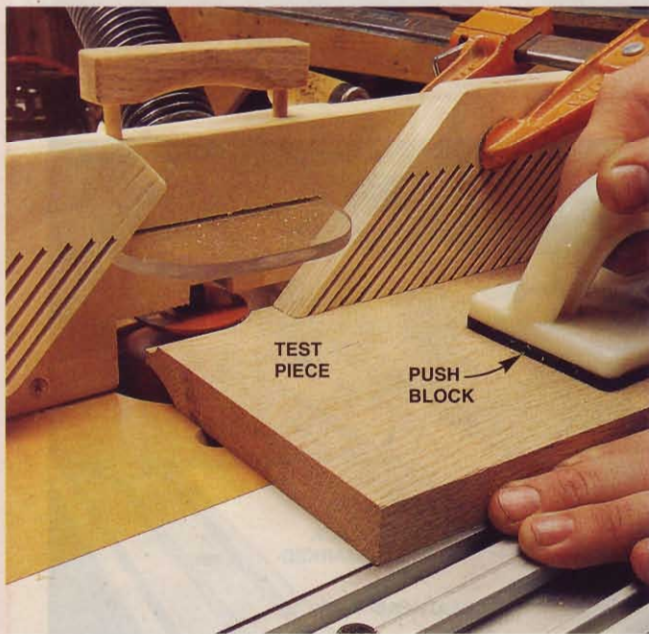


Now Make the Raised Panels

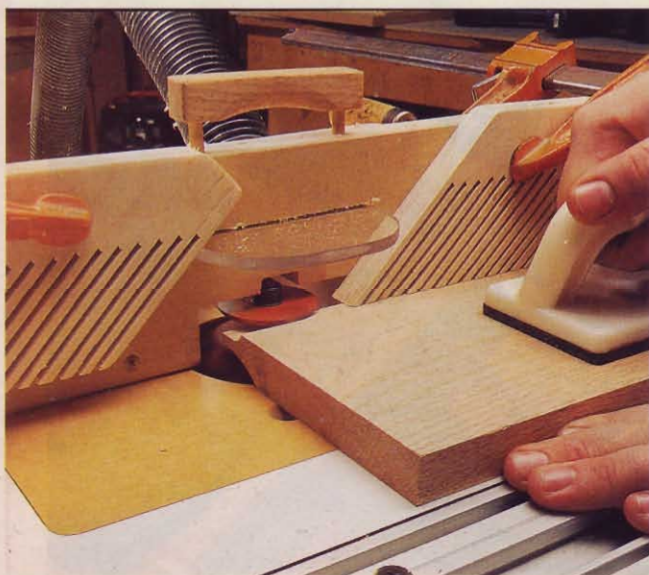
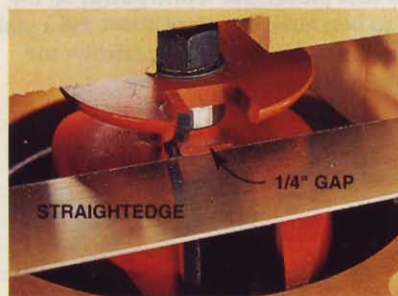
With the frame parts complete, it's panel time. Cut the panels to size (see pages 42 and 43), then set up the panel cutter.



9 Align the tongue of a correctly machined rail with the gap in the panel-raising bit. Line up the tongue with the bottom of the back cutter and the top of the panel raiser.



10 Make a shallow first cut on a test piece. The panels must be cut in two passes for the safest and smoothest cut. For this first pass, position the fence so the bit bearing is 1/4-in. behind it (see below).

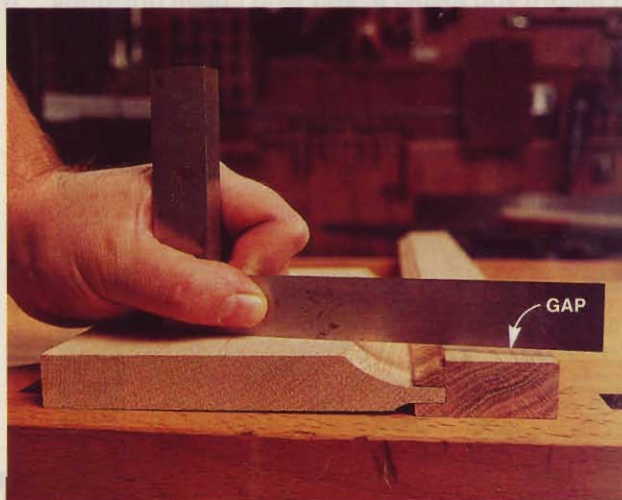


11 Make the second and final cut on your test piece with the bit bearing set flush with the fence.



12 Check your test piece by placing a straightedge across it and a correctly machined stile. The straightedge should touch both pieces. If there's a gap, as shown here, adjust the height of the panel raiser. In this case, the panel raiser is too high above the router table. Make adjustments and test cuts as needed, always cutting in two passes.

This is a fussy adjustment, but you'll find it much easier to sand the doors if the frame and panels are even.



13 Now raise the panels. Cut them all in two passes, just as you did the test piece. Cut the end grain first, then the long grain. This helps eliminate tear-out at the corners.

"Back-cutting" panel bits are the way to go. They guarantee that the panel tongue is exactly the right thickness.



Assembly

Before assembling the door, sand and finish the panel, including all the edges. As the panel contracts, it will shrink away from the stiles. If you finish it before you install it, you won't have unsightly

stripes of unfinished panel showing when the panel shrinks. If dry fitting the door reveals that the panel is a little small and rattles in the frame, make the anti-rattle snakes shown on page 41.



GLUE
BRUSH

RAIL AND
STILE ENDS
ARE FLUSH

WAX
PAPER

14

Assemble the door in this sequence.

1. Place the first stile on the clamps.
2. Brush glue on one rail and slip it into the stile, being careful to keep the outside edges flush.
3. Slip the panel into the groove. *Do not glue in the panel.* It needs to float independently of the frame.
4. Glue and install the second rail.
5. Brush glue on the rail ends and install the second stile.



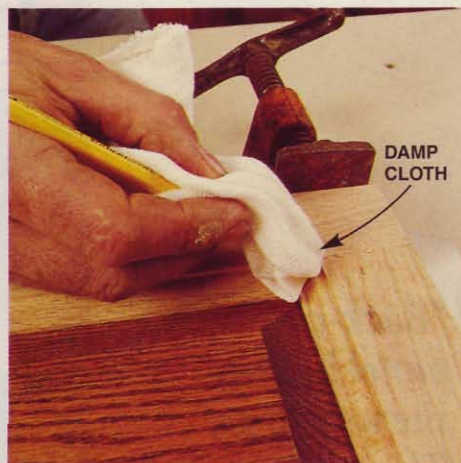
NO GLUE HERE

Carefully brush glue onto the rail ends. Keeping glue away from the groove and panel prevents it from squeezing out all over.



15

Tighten the clamps gently, holding the frame down to the clamp bar. If your glue-up table is flat, then your door should end up flat. I don't use clamp pads, which reminds me not to over-tighten the clamps (which will bow the door). Stop tightening as soon as you see the joint squeeze shut. It takes very little pressure.



DAMP
CLOTH

16

Clean out any glue in the corners using the tip of a pencil inside a damp rag. Dry glue inside these tight corners is very hard to clean up.

17

Measure each diagonal. When the measurements are the same, the door is square. You can draw an out-of-whack door square by angling the clamps slightly so they're not quite parallel to the rails and retightening them. Measure again after adjusting the clamps.



18

Check for flatness by setting a straightedge across the frame and panel. If the door isn't flat, loosen the clamps and push the frame down to the clamps as in Photo 15. Remember: Don't use too much clamp pressure.



Tip

Make Anti-Rattle Snakes

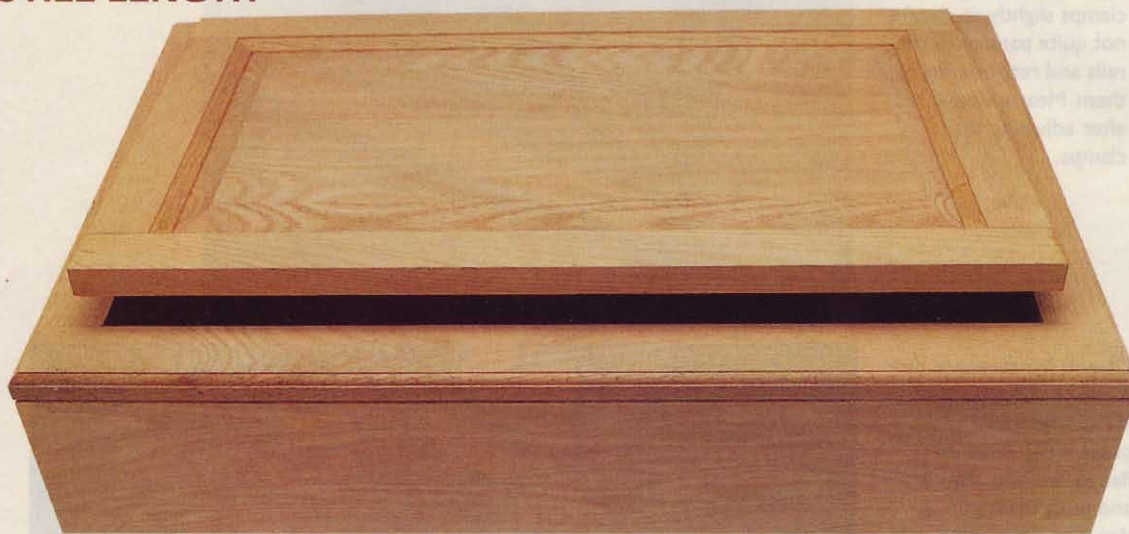
If your door is slightly undersize, it can rattle in the frame. You can prevent this with anti-rattle snakes. Make them by squeezing a fine bead of silicone caulk, 1/8-in. diameter, onto waxed paper. Let the caulk dry, peel it off and cut it into 1 in. lengths. Put the snake segments into the grooves as you assemble the door. The silicone prevents rattling and provides a cushion, allowing the panel to expand when it needs to.



Figuring Out Part Sizes

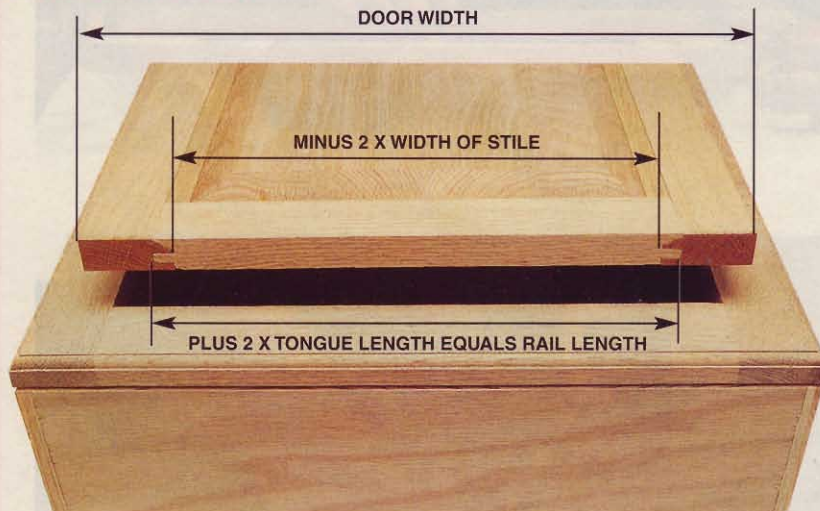
The foundation of a perfect door is calculating the sizes of your rails, stiles and panels correctly before you do any cutting. Here's how to figure them out. As you're cutting out the stock, choose material with straight grain for the frame parts. When routed they'll chip less than wild-grained parts (and look better, too!).

STILE LENGTH

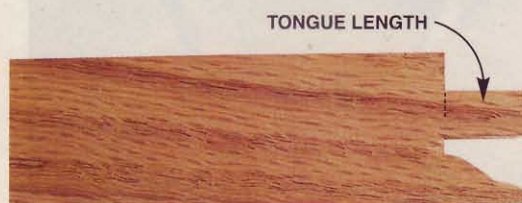


Stile length is easy: it equals the height of the door. I cut stiles first, just because they're easy.

RAIL LENGTH

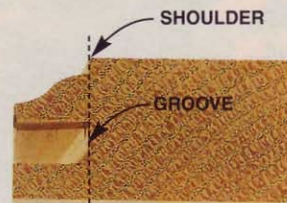
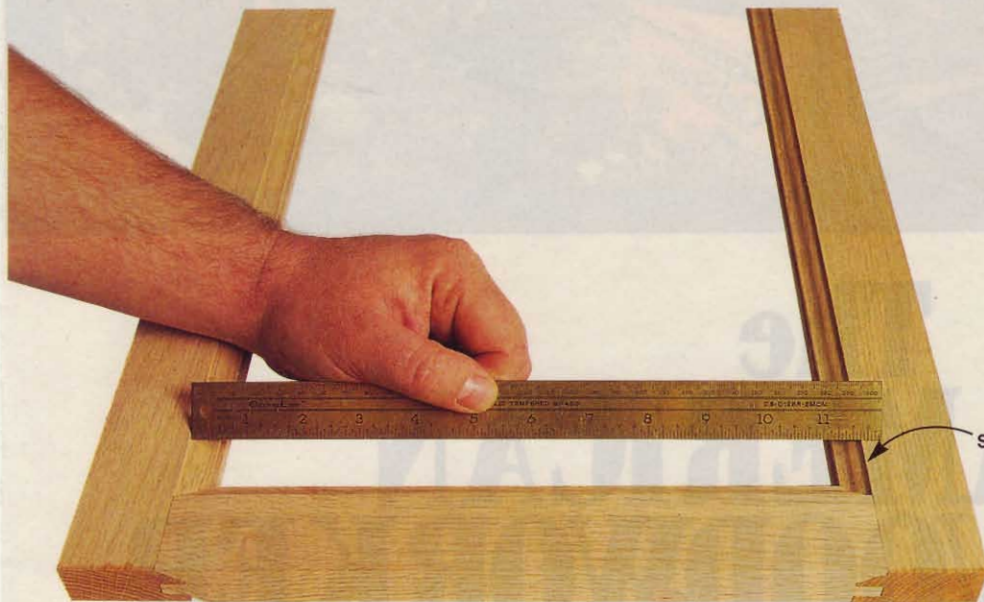


Rail length is the door width minus two times the stile width plus two times the tongue length.



Measure the tongue after you've done a test cut, and use this number to calculate rail lengths. Once you figure it out for your cutters, it's always the same.

PANEL SIZE



Shoulder and groove are aligned with most cutters.

Dry fit the frame to measure for its panel. On most end-grain cutters and long-grain cutters, the groove for the panel lines up with a shoulder on the front of the door, so you can simply measure between the shoulders (see photo). Subtract 1/8 in. from both height and width to allow the frame and panel to expand. (If your cutter makes a shoulder and groove that don't line up, you'll have to poke a ruler into the grooves to measure.)

Tip

Narrow Frame Pieces

Make narrow rails and stiles (anything less than 2-in. wide), by cutting them to finished length from a board wide enough to make both parts. Do all the routing; then rip to finished width. **AW**



Sources

Matched Set Rail-and-Stile Cutters

Amana Tool, (800) 445-0077
CMT, USA, (888) CMT BITS
Eagle America, (800) 872-2511
Freud, (800) 472-7307
Jesada, (800) 531-5559
Katana/MLCS, (800) 533-9298
The Woodworker's Choice, (800) 892-4866
Whiteside, (800) 225-3982.

Back-Cutting Panel Raisers

Amana Tools, (800) 445-0077
CMT, (888) CMT BITS
Eagle America, (800) 872-2511
Freud, (800) 472-7307
Katana/MLCS, (800) 533-9298
Woodline Arizona, (800) 472-6950
Woodtek, (800) 645-9292
Woodworker's Choice, (800) 892-4866.

Toggle clamp; \$14

3-in. peg; \$2/bag of 10

Push block; \$16

Woodworker's Supply
(800) 645-9292.

Build this eye-catching
trellis in your shop
and assemble it
outside just
like a kit.

Showcase VICTORIAN TRELLIS

EDITORS: TOM CASPAR, ART ROOZE • ART DIRECTION: VERNY JOHNSON, BOB UNCAR • ASSEMBLY PHOTOS: BILL ZUEHLKE • ILLUSTRATION: EUGENE THOMPSON

1 Assemble the side lattice panels from cedar boards and clamp them to the legs. Drill pilot holes through the side panel, then fasten with 3-in. stainless steel decking screws.

Use stainless steel screws in cedar. Coated and galvanized screws may leave black stains.



2 Build the seat units from 2x4s and 1x6s. Use spacers to maintain an even 1/4-in. gap between the seat boards. Leave the front apron off for now.



3 Bolt the seat units to the trellis sides. You can easily get a socket wrench on the lag bolts with the front apron out of the way.



Have you ever wanted to make an elaborate outdoor project without actually having to work outside? Our trellis is just the ticket: a summer delight you can build indoors.

Measuring 7 ft. wide by 9 ft. high, this spacious trellis is assembled in three sections. It can easily be built by one person, carried to the site and set in place. You don't have to dig post holes because the two seats make the trellis rigid enough to stand on its own.

Materials

We built our trellis of standard-size cedar lumber available at home centers. The backs of the seat sections are cut to size from factory-made diagonal cedar lattice sheets. When it came to the arches, we opted for the simplicity of cutting them from 3/4-in. AC exterior plywood rather than building them from solid wood. We painted the entire structure white to blend the cedar and plywood. White also contrasts nicely with the green of climbing vines. Materials for our trellis cost about \$320.

You could use other materials to save some money and work. First, you could save about \$100 by building the entire trellis from pressure-treated solid wood.

Victorian Trellis

Pressure-treated wood may not hold paint as well as cedar, however. Second, you could substitute white vinyl diagonal lattice sheets to avoid the hassle of painting cedar ones. Vinyl usually costs less than cedar sheets and is available at home centers.

Our trellis sits without anchors on a level, 8 x 10-ft. patio paver base. However, if you don't have a firm, level base on which to set your trellis, you may wish to extend the leg bottoms and anchor them in the soil with cement footings. If you do this, extend the leg bottoms and the footings to a point below the frost line in your area to prevent frost from pushing the structure out of level.

Get Going

Use the Shopping List on page 51 to round up all the supplies you need at a home center; then follow Photos 1 through 11 to build this graceful addition to your yard.

Tips for Building the Trellis

- If you plan to put your trellis on a patio that isn't level, add an inch or two to the legs. Then trim them to fit the terrain, just as you would trim the legs of a wobbly chair.
- Drill pilot holes to avoid splitting the wood. It's possible to run screws into a soft wood like cedar without pre-drilling, but cracks often form later.
- Assemble the larger pieces on a flat, level surface. This helps ensure that the assembled pieces end up square and accurately aligned.



4

Add the top plate, cleats and lattice. Rout an ogee shape on the ends of the top plate before you attach it (see page 50, Fig. A, Detail 4).



5

Cut saw kerfs in all the side rails that curve above the seats. Save straight-grained, knot-free wood for these pieces so they won't break when they're bent.

CAUTION: The saw guard and splitter must be removed for this operation.



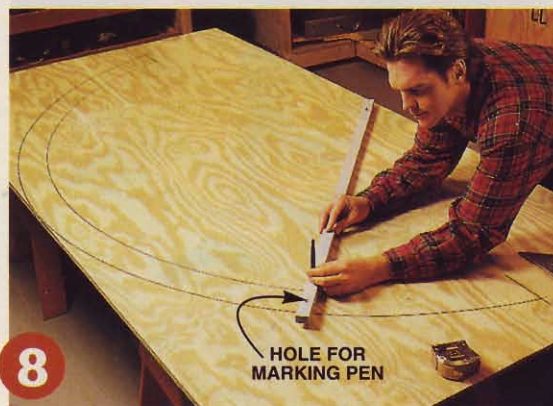
6

Fill the saw kerfs with a two-part epoxy wood filler (see Sources, page 51). Then bend the side rails while the epoxy is flexible and insert them into the seat units. Let the epoxy dry with the rail in place.



7

Mark the lattice for cutting and remove the hardened side rail. Cut the lattice with a handsaw and reinstall the side rail. Nail the side rail in place and remove the easily sanded excess filler with 80-grit sandpaper.



8

Lay out the arches with a homemade compass. Cut them from two sheets of exterior plywood (see Fig. B, page 51). Then glue and screw the pieces together to make three sets of double-layer arches.

Smooth the edges with a belt sander. Then gang the three arches together and mark the locations of the arch bars (see Fig. A and Photo 10).

Oops!

We built our prototype trellis a few years ago. The roses look terrific but paint is peeling around the base of the legs and black spots are appearing around many screw heads. Rats!



Peeling Paint

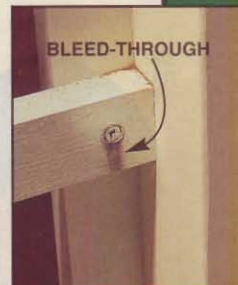
The problem: Paint doesn't stick to damp wood. The ends of our legs soaked up rainwater like sponges, so the paint eventually peeled off.

The fix: We raised our trellis off the pavers and let the legs dry out. Then we filled the cracks with epoxy wood filler (see Sources, page 51). We thinned some epoxy glue with acetone and brushed it on the bottom of the legs to seal them. Polyurethane glue thinned with mineral spirits would work as well.

Paint Bleed-Through

The problem: The coated screws we used haven't rusted, but a chemical reaction has discolored the wood around them. Coated screws are fine for pressure-treated lumber, but they can stain cedar and redwood.

The fix: We replaced the coated screws with stainless steel screws. Then we repainted the trellis with Kilz stain-killing primer and applied two top coats of white paint.



9 Place the arches on the arch bases, set on sawhorses. Hold the arches upright and accurately spaced using a clamped-in-place jig (Fig. C). Then drive 3-in. screws through the arch bases and into the arch ends.



10 Mount the arch bars with 3-in. screws. Keep the arches accurately spaced and the overhang of the arch bars uniform by using the spacing jig. Now you've gone as far as you can in the shop. It's time to take the trellis outside.



11 Set the assembled arch in place out in your yard, centered on the top plates. Shift the seat units until the arch bases line up with the top plates, then screw them together.

If You Want a Natural Look...

You don't have to paint the trellis. If you prefer the look of natural wood, build the arches and curved side rails from cedar or treated lumber. Make each arch from two layers of curved pieces that are 3/4-in. thick and about 2-ft. long. Overlap the pieces in each layer for strength.

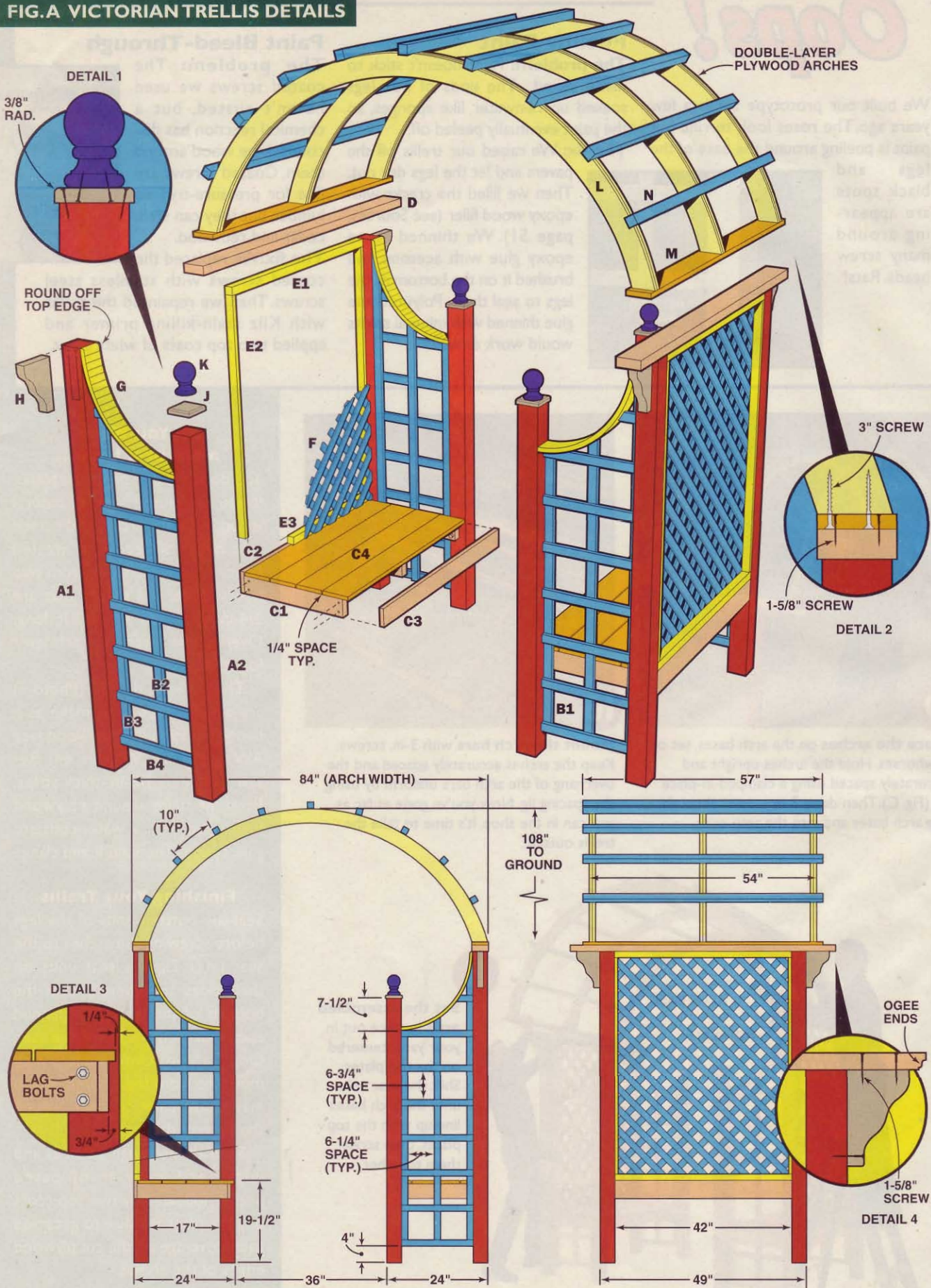
The curved side rails (Photo 7) are a little trickier to make as a bent lamination of solid wood (see AW #72, April '99, page 64). Resaw 2x4s into 1/8-in.-thick strips. Bend the strips around a plywood form, glue with a water-resistant glue, such as Titebond II, and clamp.

Finishing Your Trellis

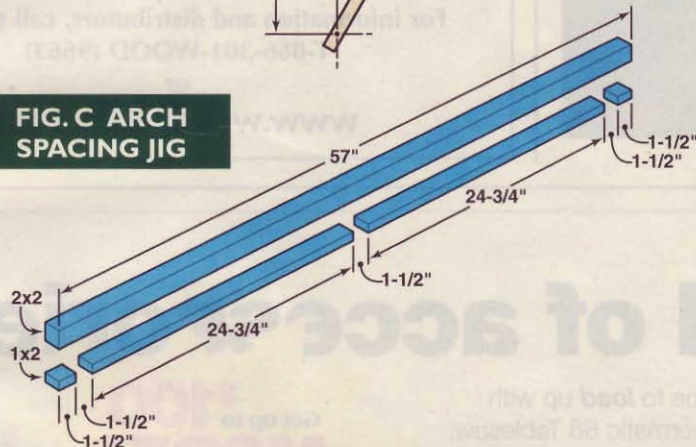
Seal the bottom ends of the legs before screwing the arches to the seat units. Tip the seat units on their sides and liberally coat the bottom of the legs with thinned epoxy or polyurethane glue (see Oops!, above). Unsealed legs wick moisture from the ground, which may cause paint to peel around the base of the legs.

Sand all the rough surfaces and edges, and apply an oil-based primer, followed by two top coats of latex paint. Be sure to get good paint coverage on the cut plywood edges of the arches.

FIG. A VICTORIAN TRELLIS DETAILS



Note: The ends of the half-length arch are different shapes! The ends that butt together are square, but the other ends are angled. Draw a layout line in the middle of a full-length arch before cutting it out, then transfer the line to one end of the half-length arch. **AW**



Stainless steel screws
McFeely's, (800) 443-7937

Epoxy wood filler
Klingspor, (800) 228-0000
Wood Epox, #AB10000, \$50.

Finial balls
Available at home centers or from
Boston Turning Works, 42 Plympton St.,
Boston, MA 02118, (617) 482-9085. Send
\$1 for a catalog.

For more information on cedar, consult the Western Red Cedar Lumber Association at www.wrcla.org.

This is a new and improved version of a popular story from our sister publication, *The Family Handyman*.

ITEM	QUANTITY
4x4 x 12' cedar posts	4
2x6 x 8' cedar	2
2x4 x 8' cedar	2
2x2 x 8' cedar	7
1x6 x 8' cedar	6
1x4 x 8' cedar	18
3/8" x 4' x 8' premade cedar lattice	2
3/4" x 4' x 8' AC exterior plywood	2
3" cedar finial post balls	4
No. 6 x 1-1/4" stainless steel screws	1 box
No. 8 x 1-5/8" stainless steel screws	1 box
No. 10 x 3" stainless steel decking screws	1 box
3/8" x 3-1/2" lag bolts and washers	10
Water-resistant glue	1 bottle
Epoxy wood filler	A & B qts
Primer	1 gal.
Paint	1 gal.

American Woodworker APRIL 2001

Stacking Dado Blades

Great results from a low-priced set.

By Dave Munkittrick

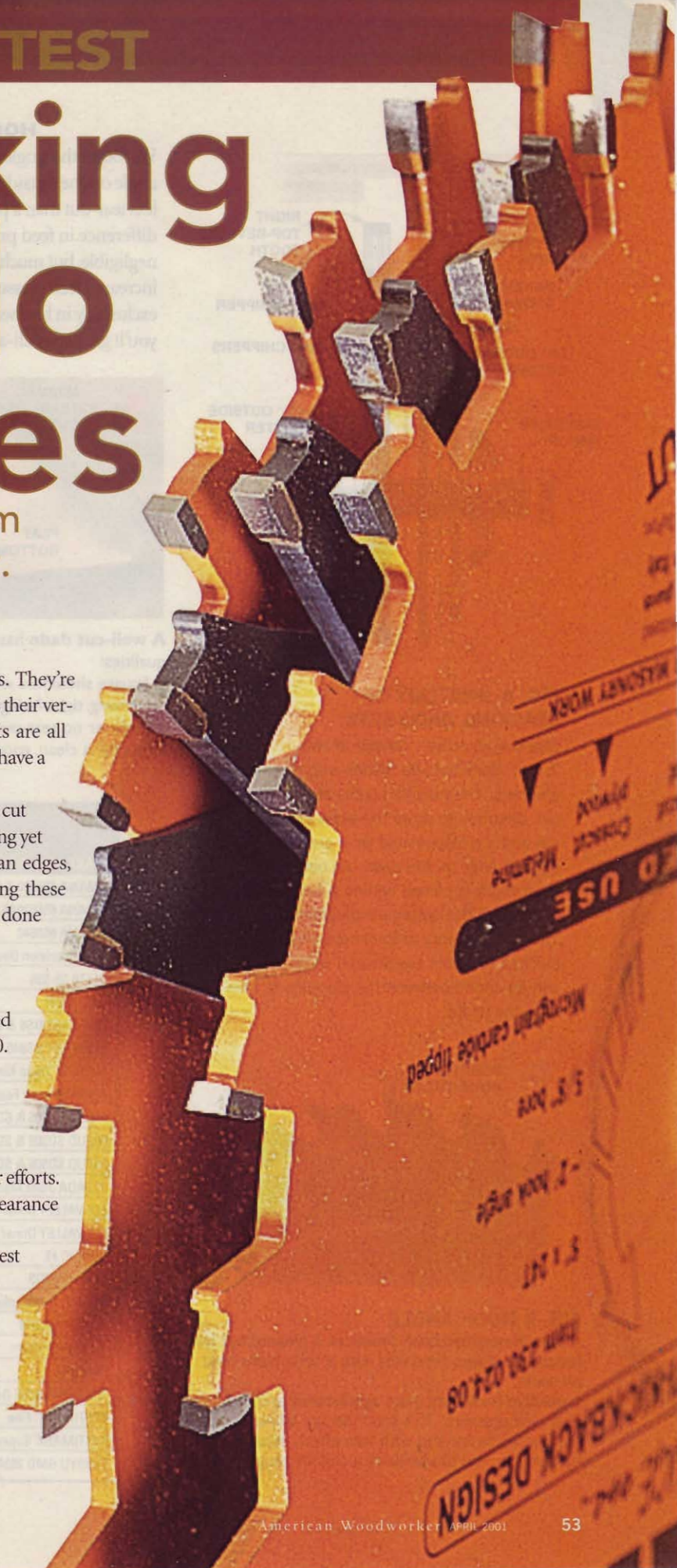
Just try to imagine woodworking without dados. They're everywhere! And the real beauty of dado blade sets is their versatility: rabbets, bridle joints, tenons and box joints are all stock-in-trade. That's why every woodworker should have a great dado blade set.

A dado is simply a square-bottomed groove, usually cut across the grain, into which a board is fit to form a strong yet simple joint. A good dado set cuts dados with clean edges, square shoulders and flat bottoms (Photo 1). Cutting these grooves in wood seems like a simple job, but if it's not done well, the results are disastrous (Photo 2).

THE TEST

We looked at 6-in. and 8-in. stacking carbide-tipped dado sets (Fig. A) that ranged in price from \$50 to \$500. We cut hundreds of dados in oak plywood, melamine and solid maple for this test. Plowing grooves with the grain is a test any dado set can pass. The acid test is cutting cross-grain dados in veneered sheet stock without tear-out, and that's where we concentrated our efforts. All the cuts were made without the benefit of a zero-clearance throat plate.

Wobble-type dado blades were not included in this test because we found their performance to be far inferior to the stacking types with little or no cost benefit. Wobble dado blades have adjustable hubs that increase or decrease the amount of runout or "wobble" in the blade to vary the width of the dado. Included in the wobble-type group are the hybrids that combine the adjustability of a wobble blade with two outside cutters and a single chipper.





Stacking Dado Blades

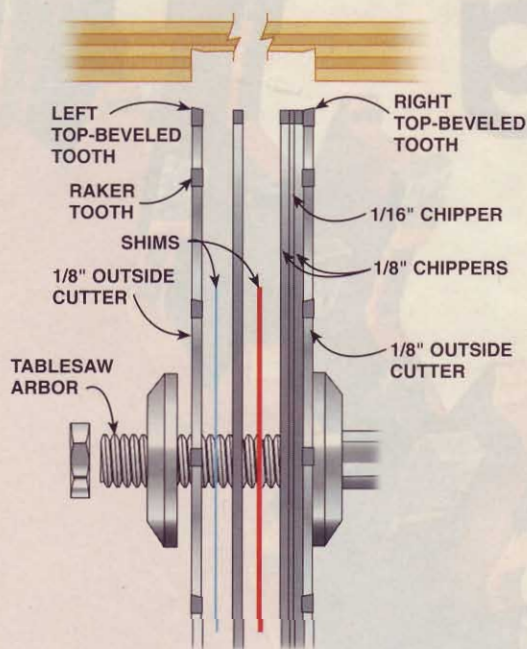


FIG. A ANATOMY OF STACKING DADO SETS

Stacking dado sets consist of two 1/8-in.-thick outside blades with three to six chippers. The outside blades are beveled in one direction to score the wood ahead of the cut and are responsible for a clean (or ragged) edge on the dado. An occasional raker tooth is placed behind a beveled tooth to create a flat-bottomed shoulder cut. The chippers vary in thickness and are stacked to create the desired width. Shims can be added between the chippers to fine-tune the width.

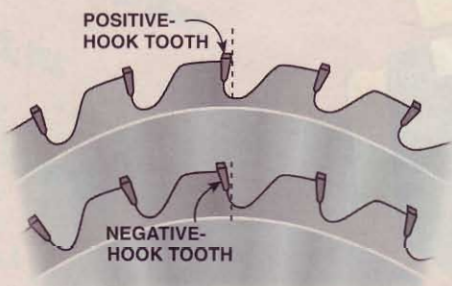


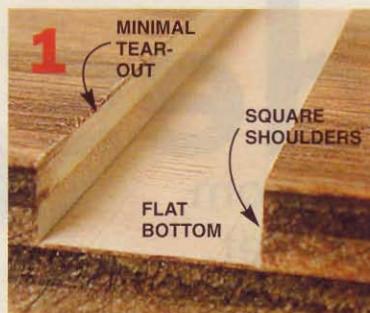
FIG. B HOOK ANGLE

A zero to negative hook produces a cleaner cut but requires a slower feed rate with a little more feed pressure.

A positive hook cuts more aggressively and requires less feed pressure. This tooth design allows you to cut dados faster and with less effort, especially in hardwoods. The downside is a slightly rougher cut.

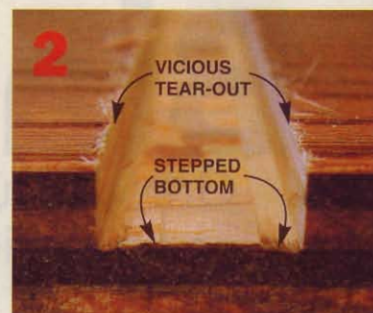
HOOK ANGLE: THE KEY FEATURE

We found the single most important factor in the quality of cut was the hook angle on the outside cutters (Fig. B). A negative-hook blade produces much less tear-out than a positive-hook blade, but requires more feed pressure. The difference in feed pressure when cutting 3/8-in.-deep dados in plywood is negligible, but much more noticeable when cutting them in solid maple. The increased feed pressure necessitates a slightly slower feed rate. Unless you work exclusively in hardwood or run a production shop where speed really counts, you'll get better all-around results with a zero- or negative-hook dado set.



A well-cut dado has two essential qualities:

1. Square shoulders with flat bottoms for strong, tight-fitting joints.
2. Little or no tear-out along the edges for a clean, good-looking joint.



Uneven bottoms and severe tear-out are the hallmarks of really cheap stacking sets (they retail for around \$50) and the wobble-type dado blades. If you value your sheet stock, stay away from these blades.

MAKE AND MODEL	DIA. IN INCHES	PRICE (\$)	OUTSIDE CUTTERS	
			HOOK	
AMANA 656030 & 658030	6 & 8	130 & 160	Negative	
AMANA 658030AK	8	175	Positive	
AMANA 658040	8	225	Negative	
CMT Precision Dado	8	190	Negative	
DELTA 35-535	6 & 8	80 & 90	Positive	
DML 73000	8	215	Positive	
EVERLAST DS6 & DS8	6 & 8	155 & 165	Positive	
EVERLAST DS840	8	215	Negative	
FORREST Dado King	6 & 8	250 & 260	Negative	
FORREST Easy Feed	8	200 & 220	Positive	
FREUD SD206 & SD208	6 & 8	75 & 90	Negative	
FREUD SD306 & SD308	6 & 8	110 & 120	Positive	
FREUD SD506 & SD508	6 & 8	160 & 180	Negative	
JESADA Joint Master	6 & 8	140 & 180	Negative	
LEE VALLEY Dimar 8-46TN	8	160	Negative	
LEE VALLEY Dimar 618CL & 824CL	6 & 8	130 & 150	Positive	
NORDIC #3	6 & 8	220	Positive	
NORDIC #3DS	6 & 8	230	Positive	
NORDIC C-Melamine	8	530	Negative	
OLDHAM #5818	8	100 & 115	Positive	
OLDHAM #5824	8	170	Negative	
PROMAX	8	50	Positive	
RIDGE CARBIDE Dado Master	6 & 8	160 & 170	Negative	
SYSTIMATIC Fine	6 & 8	150 & 155	Positive	
SYSTIMATIC Super-Fine	8	260	Positive	
TENRYU GMD 20340	8	260	Zero	

3



DEEP SCORING CUTS

Deep scoring cuts made by the outside cutters are undesirable when used for exposed joinery (box joints, bridle joints, etc.).

4



SHALLOW SCORING CUTS

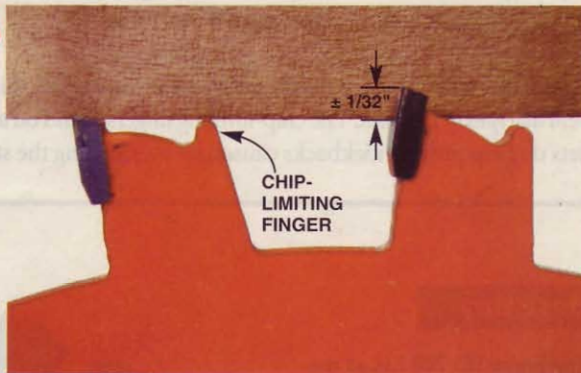
Shallow scoring dado sets with negative-hook teeth are best because of their versatility. They do a great job cutting dados and won't spoil the look of exposed joinery.

PRODUCTION VS. SMALL-SHOP BLADES

There's a real price difference between blades designed for heavy-duty use in a production shop and those made for occasional use in a one-person shop. Blades that cost more than \$100 tend to have a higher tooth count. The benefit is increased durability and cleaner cuts at higher feed rates. Production shops need blades that last long and cut fast. But, if you're not running dados all day long five days a week, this won't be important. Most of us will get a lifetime of use from a good dado set with only one or two sharpenings, and a slower feed rate is really of little consequence.

Some of the more expensive sets also include an extra 1/32-in. chipper that can be stacked with three 1/8-in. chippers to create dados for undersized plywood. Other extras that come in handy are well-made storage cases and shim sets.

5



CHIP-LIMITING FINGER

Chip-limiting fingers in front of each tooth limit blade bite to about 1/32-in., reducing the chance of a kickback caused by overfeeding stock.

ANTI-KICKBACK	# OF TEETH	CHIPPERS		SHIM SET	STORAGE CASE	DEEP SCORING CUT	COMMENTS	SOURCE
		WIDTHS	# OF TEETH					
N	18 & 24	(1) 1/4, (2) 1/8, (1) 1/16	2	N	Y	N	Excellent instructions.	(800) 445-0077
Y	24	(1) 1/4, (2) 1/8, (1) 1/16	2	N	Y	Y	Excellent instructions.	(800) 445-0077
N	46	(1) 1/4, (2) 1/8, (1) 1/16	2	N	Y	N	Excellent instructions.	(800) 445-0077
Y	24	(4) 1/8, (1) 3/32, (1) 1/16	4	Y	Y	N	Teflon coating; color-coded shims.	(888) 268-2487
Y	24	(4) 1/8, (1) 1/16	2	Y	N	Y	Thin-kerf outside cutters; cardboard shims.	(800) 438-2486
N	24	(1) 1/4, (2) 1/8, (1) 1/16	2	N	Y	Y	Minimal instructions.	(800) 242-7003
N	18 & 24	(1) 1/4, (2) 1/8, (1) 1/16	2	N	Y	Y	No instructions.	(800) 387-5278
N	40	(1) 1/4, (2) 1/8, (1) 1/16	2	N	Y	Y	No instructions.	(800) 387-5278
N	24	(4) 1/8, (1) 1/16, (1) 1/32	4	Y	Y	N	Excellent instructions; color-coded shims.	(800) 733-7111
N	24	(4) 1/8, (1) 1/16	2	Y	Y	N	Excellent instructions; color-coded shims.	(800) 733-7111
Y	12	(4) 1/8, (1) 1/16	2	Y	N	N	Instructions; metal shims.	(800) 334-4107
Y	24	(4) 1/8, (1) 1/16	2	Y	Y	N	Instructions; metal shims.	(800) 334-4107
Y	24	(4) 1/8, (1) 1/16, (1) 1/32	4	Y	Y	N	Instructions; metal shims.	(800) 334-4107
Y	20 & 24	(4) 1/8, (1) 1/16, (1) 1/32	4	Y	Y	N	Instructions; color-coded shims.	(800) 531-5559
N	46	(1) 1/4, (2) 1/8, (1) 1/16	2	N	Y	N	No instructions.	(800) 871-8158
Y	18 & 24	(1) 1/4, (2) 1/8, (1) 1/16	2	N	Y	N	No instructions.	(800) 871-8158
N	16	(1) 1/4, (2) 1/8, (1) 1/16	2	N	Y	Y	No instructions.	(800) 345-3535
N	22	(1) 1/4, (2) 1/8, (1) 1/16	2	N	Y	Y	No instructions.	(800) 345-3535
N	58	(1) 1/4, (2) 1/8, (1) 1/16	2	N	Y	Y	Deep scoring cuts.	(800) 345-3535
N	18	(4) 1/8, (1) 1/16	2	N	N	N	Magnetic shims; uneven bottoms.	(800) 828-9000
N	24	(4) 1/8, (1) 1/16, (1) 1/32	4	Y	Y	Y	Free sharpening coupon.	(800) 828-9000
Y	24	(4) 1/8, (1) 1/16	2	Y	N	Y	Ragged cuts with very uneven bottoms.	(888) 288-2487
N	16 & 24	(4) 1/8, (1) 1/16, (1) 1/32	4	Y	Y	N	Instructions; plastic shims.	(800) 443-0992
N	16 & 22	(4) 1/8, (1) 1/16	2	Y	Y	Y	Magnetic shims.	(800) 426-0035
N	42	(4) 1/8, (1) 1/16	6	Y	Y	N	Magnetic shims.	(800) 426-0035
N	40	(1) 1/4, (2) 1/8, (1) 1/16	2	N	Y	N	Instructions.	(800) 951-7297



Stacking Dado Blades

OTHER FEATURES TO CONSIDER

What's best, a 6-in. or 8-in. dado set?

An 8-in. set is no problem for a 3-hp cabinet saw but a 1-1/2-hp contractor saw usually struggles cutting a 2-in.-deep dado in solid wood. Certainly anyone with a portable tablesaw should only look at the 6-in. dado sets. If there's any doubt, go with the 6 in. You'll lose an inch of depth capacity, but you'll save some money up front and your saw's motor will thank you. This is one case when smaller may be better. After all, how often do you cut 2-in. deep dados?

Scoring cuts

Deep scoring cuts left by the outside cutters can be a real eyesore when the joinery is exposed (box and bridle joints, for example). Look for a dado set with shallow scoring cuts (see the chart and Photos 3 and 4).

Anti-kickback

Anti-kickback is a bit of a misnomer because blades with this feature *won't prevent all types of kickback*. The chip-limiting fingers found on anti-kickback dado sets do help prevent kickbacks caused by overfeeding the stock (Photo 5).

Best Buy

The Freud SD 208 has all the important features:

- ✓ minus 5-degree hook angle
- ✓ steel shims
- ✓ 5 chippers (4-1/8 in. and 1-1/16 in.)
- ✓ anti-kickback feature
- ✓ same quality carbide used in Freud's more expensive models
- ✓ shallow scoring cuts
- ✓ a great price; \$90.



FREUD SD208

Editors' Choices

All of these blades cut beautifully, even with faster feed rates, and include:

- ✓ anti-kickback design
- ✓ an extra 3/32-in. chipper
- ✓ 24-tooth outside cutters
- ✓ shim sets
- ✓ shallow scoring cuts.



CMT PRECISION DADO



JESADA JOINT MASTER



FREUD SD508

OUR RECOMMENDATIONS

When it comes to cutting high-quality dados, speed kills. Simply slowing down your feed rate makes a tremendous difference in the amount of tear-out. The dado sets with negative-hook teeth performed especially well when crosscutting dados in oak-veneered plywood and melamine. The only real drawback to this type of blade is an increase in feed pressure that becomes more noticeable when cutting solid wood. If you feel you need the more aggressive cut that a positive-rake angle offers, we recommend SystiMatic's Super-Fine, the Forrest Easy Feed and the Everlast DS6 and DS8.

Judged by the quality of cut, there was a large group of top performers:

Amana 658030 and 8040
CMT Precision Dado
Everlast DS840
Forrest Dado King
Freud SD508
Freud SD208
Jesada Joint Master
Lee Valley Dimar 8-46TN
Nordic Melamine Blade
Northwoods Dado Master

The prices of these blades range from \$90 to \$500 and all performed beautifully. The more expensive sets have more teeth so the blades stay sharp longer while giving you great cuts at a faster feed rate.

BEST BUY

I wish all our choices for shop gear were this crystal clear. For great performance at a great price no blade comes close to Freud's SD208. You don't get the extras like a 3/32-in. chipper or a well-made carrying case, but for the money, you simply can't go wrong with this set. With a slow feed rate, the Freud SD 208 cut cross-grain dados in veneered plywood almost as well as the most expensive blades.

EDITORS' CHOICES

With such a large group of top performers we looked to other features, like an anti-kickback design, shallow scoring cuts, an extra 3/32-in. chipper and shim sets to arrive at our Editors' Choices. Three blade sets were firsts among equals: the CMT, the Freud SD508 and the Jesada. **AW**

By David Radtke

EDITOR: TOM CASPAR • ART DIRECTION: PATRICK HUNTER AND MARCIA WILLISTON PHOTOGRAPHY: BILL ZUEHLKE • ILLUSTRATION: EUGENE THOMPSON

Floor-to-Ceiling Bookcase

Create a classic look with ready-made moldings.

If you're bursting at the seams with books and collectibles to display, here's a bookcase that maximizes space, fits any room, and uses lumberyard moldings.

A Flexible Design

We designed this bookshelf without a back or base unit to make it easier to fit into any room. You can build around vents and outlets by simply shifting a standard (the upright piece supporting a shelf). This only affects the length of the shelves, which is not difficult to change in the Cutting List, page 61.

Without a base or back, will the bookshelf be sturdy? Sure, because hidden steel pins made from lag bolts go

right into the floor and hold the standards rigid (Photo 8).

Are your floors and walls out of square? Not a problem. We've engineered this project to work even if your room is a bit out of kilter. The moldings are applied individually to each standard and cover any gaps resulting from uneven floors or walls.

Easy Molding

A large built-in requires a lot of molding, so we've chosen a mixture of classic shapes that you can buy through a lumberyard or home center. We special-ordered the maple moldings for our bookcase, but if you build yours from oak or pine, molding to match is readily available. We'll show

text continued on page 62

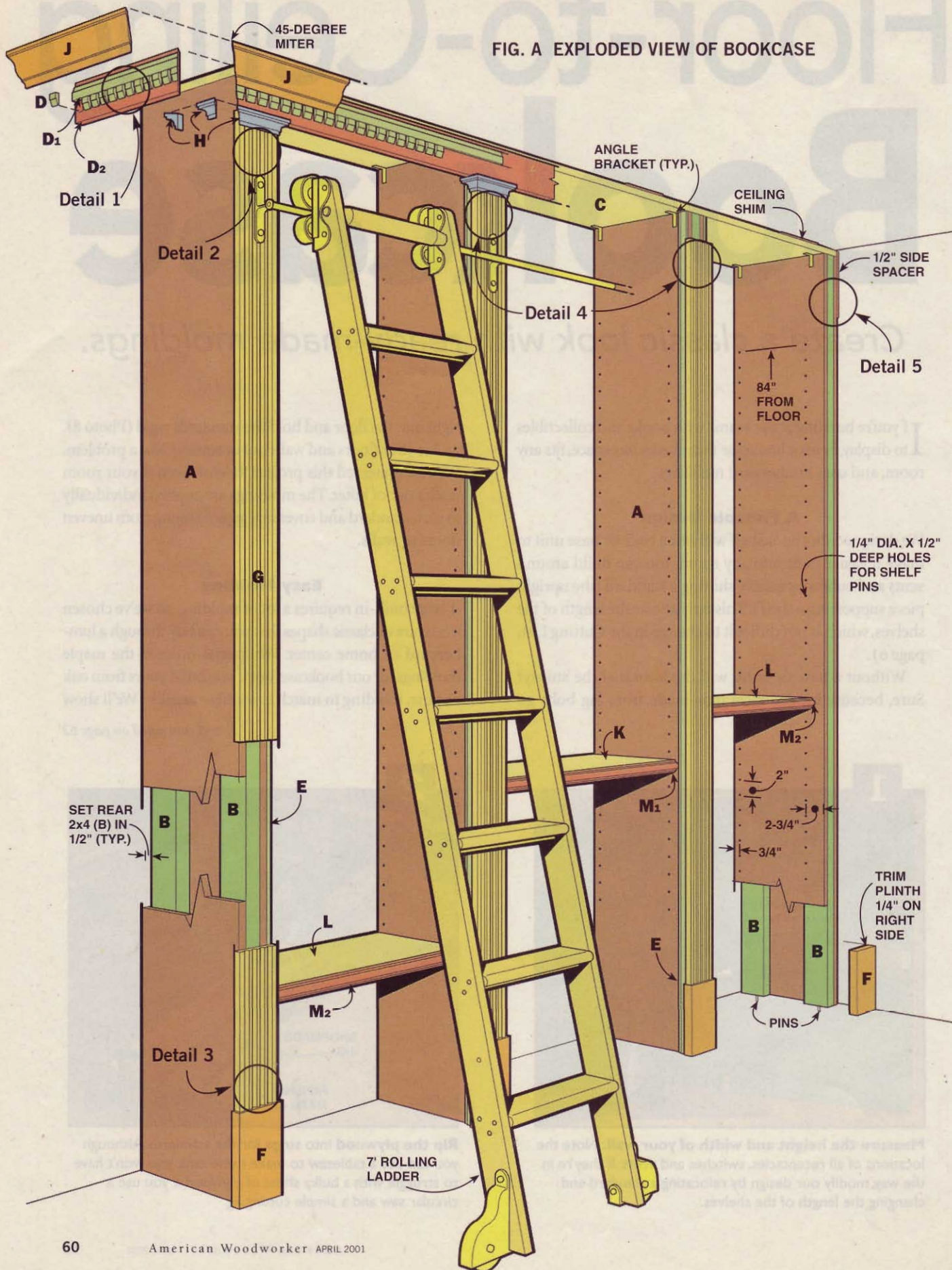


Measure the height and width of your wall. Note the locations of all receptacles, switches and vents. If they're in the way, modify our design by relocating a standard and changing the length of the shelves.



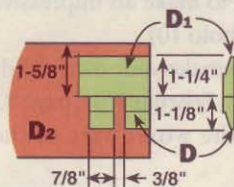
Rip the plywood into strips for the standards. Although you can use a tablesaw to make these cuts, you won't have to struggle with a bulky sheet of plywood if you use a circular saw and a simple cutting jig.

FIG. A EXPLODED VIEW OF BOOKCASE

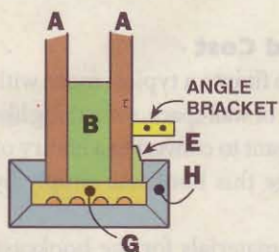


CROSS SECTIONS

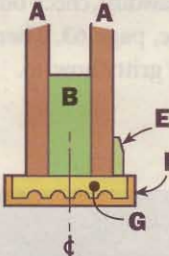
Detail 1



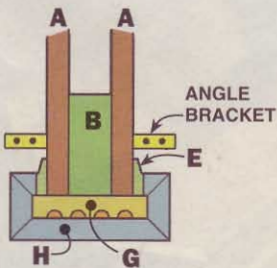
Detail 2



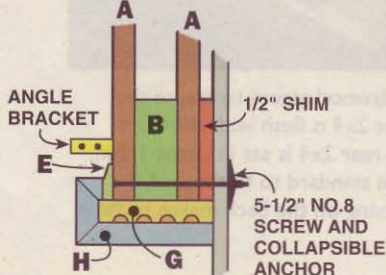
Detail 3



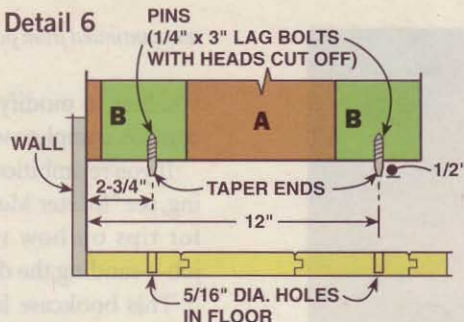
Detail 4



Detail 5



Detail 6



Detail 7

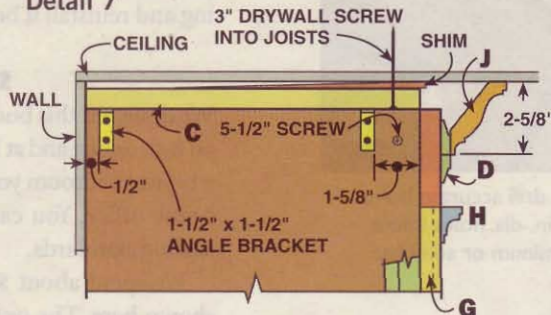
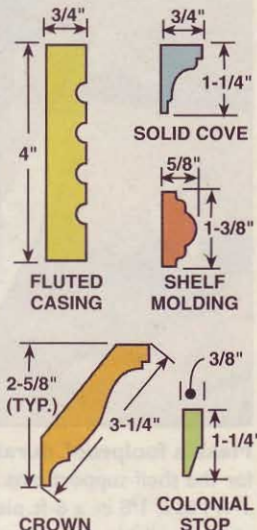


FIG. B CASINGS AND MOLDINGS



SHOPPING LIST

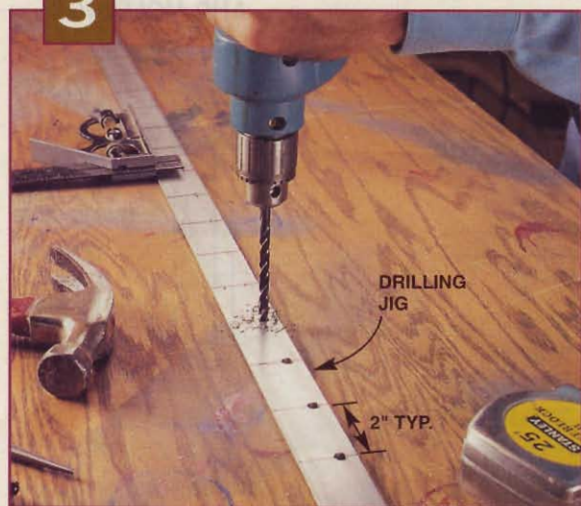
Item	Quantity	Item	Quantity
3/4" x 4' x 8' plywood	5	1-1/4" x 1/8" x 6' bar stock	1
2x4 x 8' pine	8	1-1/2" x 1-1/2" angle brackets w/ screws	12
1x2 x 10' pine, for braces	1	yellow glue	1 qt.
1x4 x 10' board, same as molding	1	3/4" x 17-gauge nails	1 pkg.
3/8" x 1-1/4" x 10' colonial stop	2	1-1/4" x 17-gauge brads	1 pkg.
3/8" x 1-1/4" x 8' colonial stop	6	4d, 6d and 8d finish nails	1 lb. each
1-1/16" x 4-1/2" x 8" plinth blocks	4	Minwax wood conditioner	2 qts.
3/4" x 4" x 7' fluted casing	4	Minwax No. 245 pecan stain	2 qts.
5/8" x 1-3/8" x 8' shelf molding	7	Minwax satin polyurethane	2 qts.
1-1/4" x 8' cove molding	1	Colored putty stick	1
3-1/4" x 10' crown molding	1	1/4" x 3" lag bolts	8
1/4" peg-style shelf brackets	84	Collapsible anchors	4

CUTTING LIST

Overall Dimensions: 8' H x 8' L x 14-3/4" D

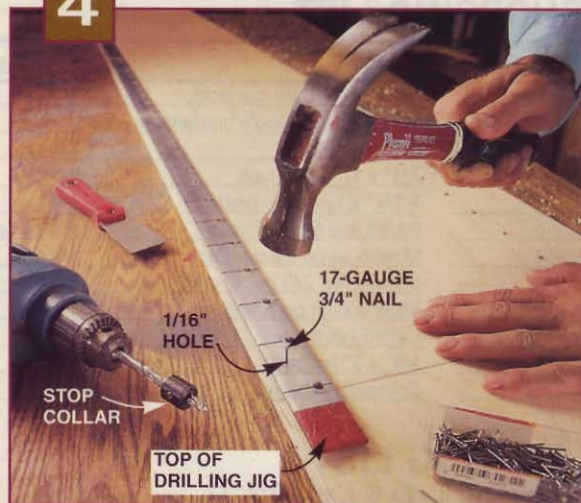
Part	Qty.	Name	Material	Dimensions	Comments
A	8	Face	Plywood	3/4 x 13-3/4 x 96	Trim length is 1-in. less than the distance from floor to ceiling.
B	8	Brace	2x4	2 x 4 x 96	Same as above.
C	1	Top	Plywood	3/4 x 13-3/4 x 96	Trim length to fit.
D	a.n.	Dentils	Colonial stop	3/8 x 1-1/4 x 7/8	Rip 10-ft. long, 1-1/4-in. wide molding to 1-1/8-in. Then cut dentils to length.
D1	2	Filler strip	Colonial stop	3/8 x 1-1/4	Cut 10-ft.-long piece to fit.
D2	2	Backer boards		3/4 x 3-1/2	Cut 10-ft.-long piece to fit.
E	6	Molding	Colonial stop	3/8 x 1-1/4	Cut 8-ft.-long pieces to fit.
F	4	Plinth blocks		1-1/16 x 4-1/2 x 8	
G	4	Casing	Fluted casing	3/4 x 4	Cut 7-ft. pieces to fit.
H	a.n.	Cove	Cove molding	3/4 x 1-1/4	Cut from 8-ft. length.
J	2	Crown	Crown molding	2-5/8 tall	Cut from 10-ft. length.
K	7	Middle shelves	Plywood	3/4 x 11-3/8 x 32	Trim length is 3/16-in. less than distance between standards.
L	14	Outer shelves	Plywood	3/4 x 11-3/8 x 26	Same as above.
M1	7	Shelf molding	Shelf molding	5/8 x 1-3/8 x 32	Same as above.
M2	14	Shelf molding	Shelf molding	5/8 x 1-3/8 x 26	Same as above.

3



Make a foolproof, durable jig to drill accurate holes for the shelf-support pins. Drill 1/4-in.-dia. holes into a 1-1/4 in. x 1/8 in. x 6-ft. piece of aluminum or steel bar stock (available at hardware stores).

4



Nail the jig to the plywood through four small holes drilled along the jig's length. Identify the top of the jig with paint or tape, then align the top hole with a line 84 in. from the plywood's bottom (see Fig. A). Drill 1/4-in. holes 1/2-in. deep through each of the jig holes using a stop collar to limit the hole's depth. Remember, the end standards don't require holes.

Tip

Selecting Lumber

Look for straight 2x4s for the standards. If you can't find any, cut up the best ones you can find into 2-ft. lengths and sandwich these shorter pieces between the plywood pieces. You don't need a continuous 2x4 for strength.

text continued from page 59

you how to modify one molding to make an impressive cornice, complete with dentils (Photo 10).

If you're ambitious and want to make your own molding, see "Router Molding" AW #85, February '01, page 82 for tips on how to minimize the worst part of the job—sanding the darn stuff.

This bookcase blends right into your room reusing your existing baseboard molding. Simply cut your molding and reinstall it between the standards.

Size and Cost

We designed this bookcase to fit into a typical room with an 8-ft. ceiling and at least 8 ft. of wall space, something like a typical bedroom you may want to convert to a library or home office. You can enlarge this bookcase simply by adding standards.

We spent about \$600 on materials for the bookcase shown here. The optional ladder and hardware cost an additional \$700 to \$1,200, depending on how fancy it is (see Sources, page 66). Before you make sawdust, check out our advice on Planning Your Bookcase, page 63. Then follow Photos 1 through 15 for the nitty gritty how-to.

5



Glue 2x4s between the plywood pieces to create the standards. Be sure the front 2x4 is flush with the front edge of the panels and the rear 2x4 is set in about 1/2 in. After assembling, scribe the standard to fit the wall, if necessary. The 1/2-in. overhang on the back makes scribing much easier.

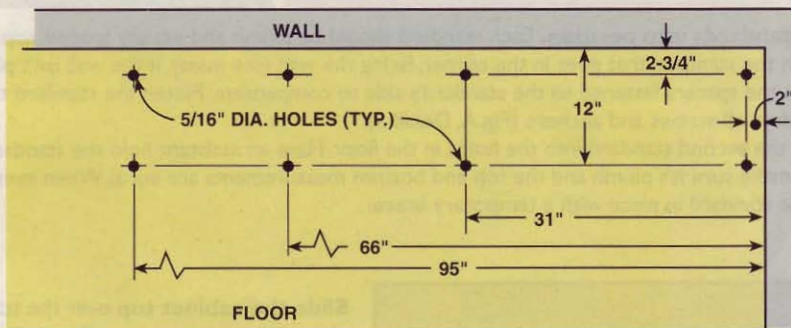


Install a pair of pins to hold the bottom of the standard into holes you'll drill in the floor (Fig. A, Detail 6). Make the pins from 3-in. lag screws. Use a wrench to turn them until the threads are all inside the bottoms of the 2x4s. Then cut off the heads of the screws with a hacksaw and file a slight taper on the bottom of the protruding pin.

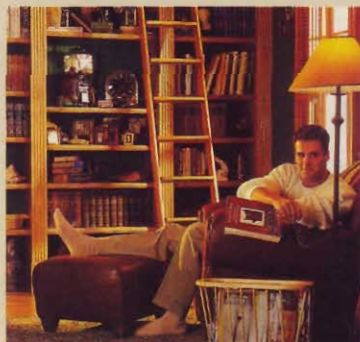


Mark the floor locations for the pins on masking tape (Fig. C). Use a framing square as a guide to ensure that the holes are perpendicular to the wall. Be sure to remove the baseboard before you measure and drill the holes.

FIG. C
LOCATIONS
OF FLOOR
PINS
(TOP VIEW)



Planning Your Bookcase



This built-in bookcase is easy to enlarge, work around windows, or change in any way to suit your room. Before you buy your lumber, carefully measure your selected site. Take into consideration the height, width and any obstructions unique to your room.

The center section of our bookcase is 6 in. wider than the two outer sections. This establishes a focal point, and the two side sections provide symmetry. Keep in mind that you can move the standards closer together or add a standard or two to fit a longer wall.

If you move the standards to accommodate outlets or air vents, note that the standards should never be farther than 36 in. apart. This is the maximum distance for sag-free shelves and safe installation of the rolling-ladder hardware.

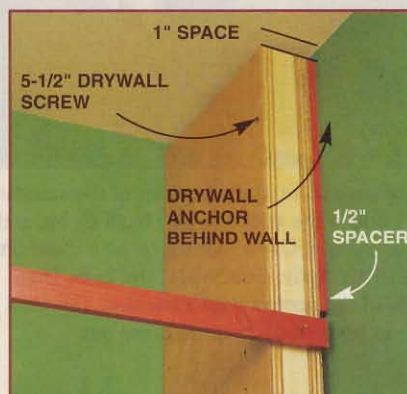
Use a level to check for irregularities like a sloping floor or an uneven wall. If they're not too far off, the standards won't need altering. But if your walls and floor are way out of whack, you'll be able to scribe the standards on the backside and bottom, and then cut along your scribe for a perfect fit.

Our bookcase was built onto a wood floor. If you have carpeting, you'll need to pull back the carpet and pad and reinstall them later around the base of the bookcase. And yes, the ladder will roll on carpeting.

8



Receptacles and floor vents are the bane of most built-ins, but not this one. Just locate the standards so they miss the obstacles.



Tip the standards into position. Each standard should be plumb and equally spaced, top and bottom.

Start with the standard that goes in the corner, facing the wall (see inset). If the wall isn't plumb, nail shims onto the spacers fastened to the standard's side to compensate. Fasten the standard to the wall with long drywall screws and anchors (Fig. A, Detail 5).

Next, tip the second standard into the holes in the floor. Have an assistant hold the standard in place while you make sure it's plumb and the top and bottom measurements are equal. When everything's lined up, lock the standard in place with a temporary brace.

9



Slide the cabinet top over the standards and secure it in place with angle brackets (Fig. A). Shim the gaps between the top and the ceiling. Screw the top to the ceiling joists in three locations using two screws at each location.

Note: You may have to use a stud finder to locate the ceiling joists, or install blocks between joists in the attic.

Prefinish all the parts in your shop to keep the mess and smells under control.

10



Make dentil molding from Colonial-style stop molding (Fig. B). You could start from scratch, but this is much easier: First, glue and nail a long piece of molding (the filler strip) to a backer board. Then cut individual dentils from a long strip of molding and glue them onto the backer board with a small dab of glue (Fig. A, Detail 1). Use a scrap piece of molding as a spacer.

Oops!

My dentil molding needs some dental work! I glued one of the dentils in crooked, and it spoiled the whole look of the molding.

To remove the offending piece, I warmed it up slightly with a heat gun to loosen the glue. (Both white and yellow glues soften up and let go when they're warmed.) Then I pried off the dentil with a thin putty knife. Presto! I'm back in business with a new tooth.



11



Miter the end of the dentil assembly. Leave a full dentil at the miter, then cut the assembly to length. Nail it to the front of the standards with 6d finish nails. Maintain a consistent distance from the top of the dentils to the ceiling. This space must match the height of your crown molding (Fig. A, Detail 7).

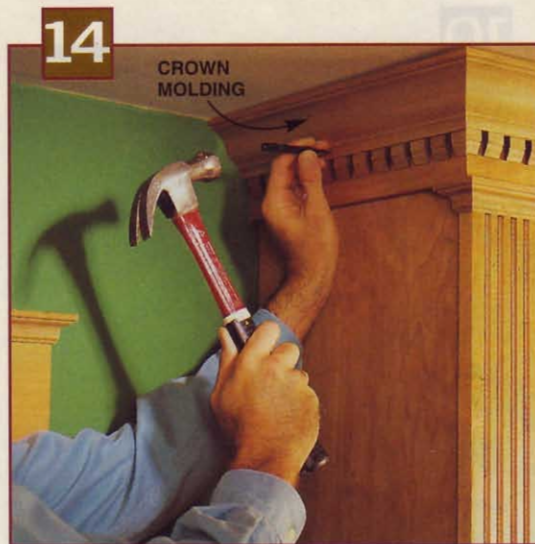
12



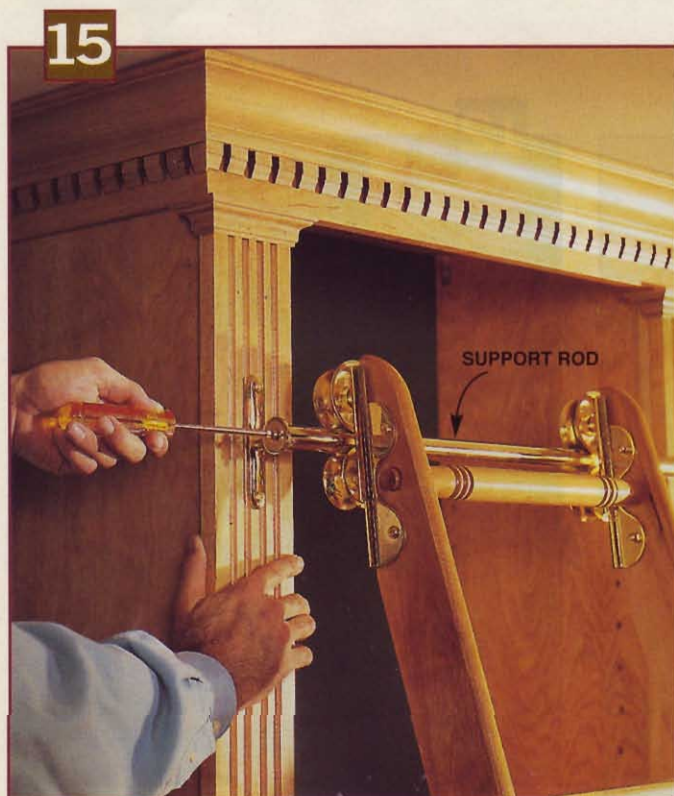
Nail molding to the front of the standards with 6d finish nails (Fig. A, Detail 3). Nail the plinth blocks at the bottom first. (Because the plinth blocks are wider than the fluted casing, you'll need to rip 1/4 in. from the width of the block that's against the wall.) Nail the Colonial stop molding even with the fronts of the standards; then apply the fluted casing.



13 Glue mitered cove molding to the tops of the fluted casing. The cove molding should wrap around to meet the Colonial stop molding (Fig. A, Details 2, 4 and 5).



14 Nail the crown molding onto the dentil assembly. Miter each end at the outside corner and butt the other ends against the wall. Use 4d finish nails every 12 in. and drive them below the surface of the wood with a nail set.



15 Optional: Install the rolling ladder hardware to the face of the cabinet according to the manufacturer's instructions (see Sources, at right).

Caution: The ladder is a safety hazard for small children. Adult supervision is advised.

Finishing

Finish the standards, molding and shelves before installation. This keeps spills and obnoxious fumes out of your living space. After the bookcase is completely installed, you can touch up any cut ends with stain and fill nail holes with colored putty.

For a blotch-free, even color on this birch, we applied Minwax Wood Conditioner before staining. Then we used Minwax No. 245 pecan stain to blend the maple and birch pieces. Finally, we applied a polyurethane varnish for durability. **AW**

Sources

Rolling ladder and hardware are available from Putnam Ladder, 32 Howard St., New York, NY 10013; (212) 226-5147, www.putnamrollingladder.com. Specify the length of rod (ours is 8 ft.) and the height of the finished ladder (ours is 7 ft.). Available in a wide variety of hardwoods. Rolling ladder kits are also sold by ALACO Ladder, 5167 G St., Chino, CA 91710, (888) 310-7040, www.alacoladder.com.

Fluted casing (4 in.) and plinth blocks (4-1/2 in.) are available in a wide variety of hardwoods from Woodharbor Doors & Cabinetry, 3277 Ninth St., Mason City, IA 50401, (641) 423-0444, www.woodharbor.com. Call to order or to find a dealer near you.

This is a new and improved version of a popular story from our sister publication, The Family Handyman.

Test Tool Test Tool Test To



1. Wear gloves, necktie,
or loose clothing.
2. Clamp workpiece or brace
against column to prevent
rotation.
3. Use recommended speed for
drill accessory, and workpiece
material.

Floor Model Drill Presses

It isn't necessary to spend top dollar to get a very good machine.

Consistent, accurate holes. That's why drill presses have been fixtures in woodworking shops for over a century. Although it isn't the first stationary tool you should buy for your workshop, a drill press is right up there among the basic tools for woodworking. We tested 28 moderately priced (under \$450) 13-in. to 17-in. machines.

The Basics

The "size" of a drill press is actually two times its throat depth (the distance between the column and the center of the chuck). A 13-in. drill press, for example, has a throat capacity of 6-1/2 in. Although we found a 6-1/2-in. throat adequate for most operations, we prefer the extra capacity of the larger machines. However, it's not necessary to buy anything bigger than a 17-in. model. Twenty-inch machines, the next step up, weigh almost twice as much and take up a lot more space.

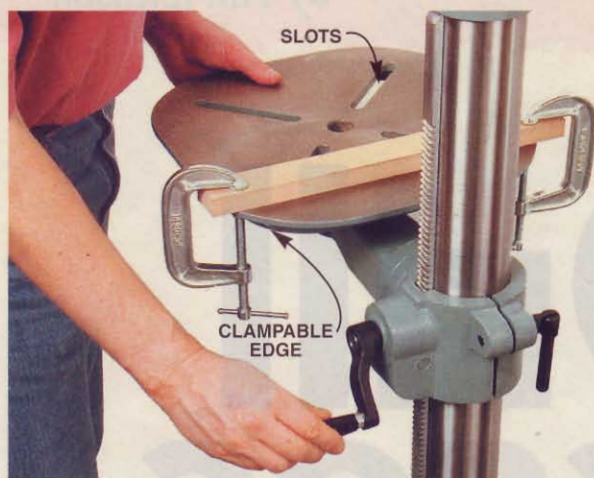
Quill stroke measures how deep a hole you can drill. The quill holds the spindle and travels up and down when you work the operator's lever (Fig. A). Most of these machines have adequate strokes, about 3-1/4-in. long. However, just as with throat depth, additional stroke capacity makes a drill press more versatile.

Other Considerations

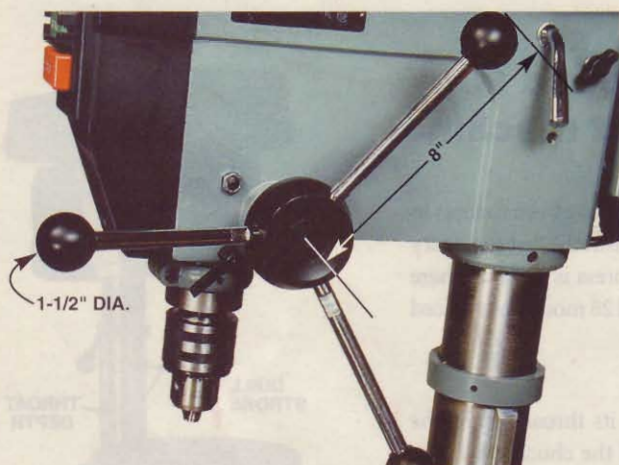
Bigger numbers aren't always better. For woodworking, having 12 or 16 speeds is overkill, especially when a single slow speed works for almost everything. To have numerous speeds, these drill presses require three pulleys and two belts. We prefer a simpler design with fewer speeds. Unfortunately, only one machine in this test, the Jet JDP 14JE, is made this way. Its five speeds cover a wide range, yet require only two pulleys and one belt. Coincidentally, this machine is the smoothest running and most quiet of them all.



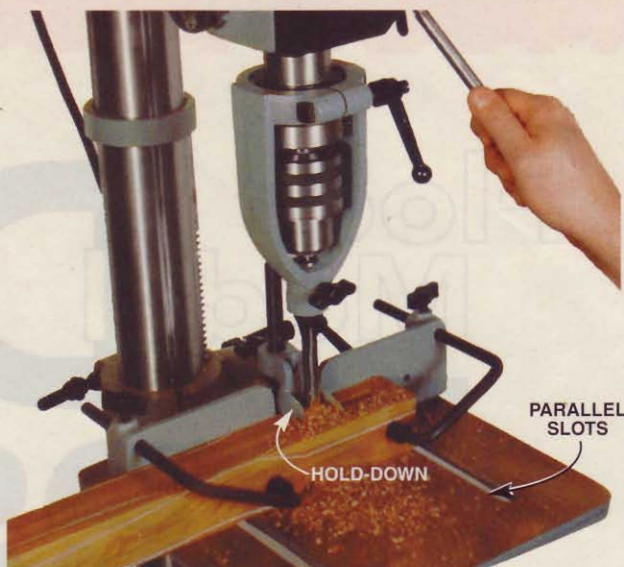
Features We Like



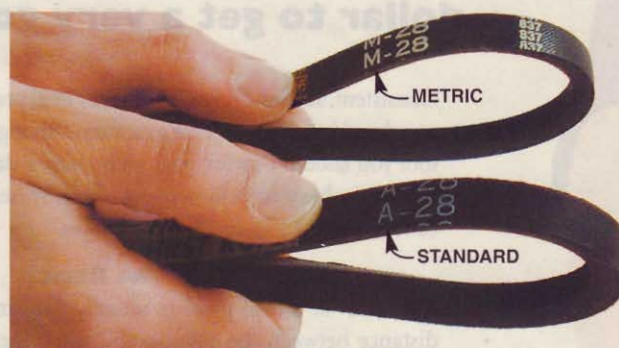
A WIDE, FLAT RIM makes it easier to add fences and fixtures to the table. Slots through the top allow fastening from underneath. Every machine employs a crank-operated rack-and-pinion system for raising and lowering.



THE BEST OPERATOR'S LEVER has big, round grips and long, stout rods for good mechanical advantage. The grips are smooth so they're comfortable to hold onto as you work the lever. The rods are threaded so they can be removed if they get in the way.



MORTISING ATTACHMENTS offered by Delta and Ridgid are the best because of their superior hold-downs. The Delta 14-070 is the *only* drill press we tested that allows easy, unrestricted front-to-back adjustment of the mortising fence, because its slots are parallel.



WIDE BELTS DON'T SLIP; narrow belts do. Wide belts have more surface area to stay in contact with the pulleys, so they transfer power from the motor more effectively. Replacement belts are not as widely available in metric sizes.

Changing speeds should be easy; just reposition the belts on the pulleys and go. But on too many machines, getting the belts off is difficult, or nearly impossible, because the belt tensioning mechanisms don't have enough travel. Pick a machine that gives you some slack (see Chart, pages 72 and 73).

These machines come with motors rated from 1/2 to 1-1/2 hp. A 1/2-hp motor is adequate for most drill press operations; 3/4 hp is more than enough. Some motors are totally enclosed and fan cooled (TEFC). TEFC motors keep dust out of the windings, which protects against overheating. This isn't such a big concern in a drill press because the motor is mounted above and away from the action.

What to Expect

Drill presses are designed for metal work, but woodworkers have adopted them, even though woodworking doesn't normally require a machinist's precision. To make drill presses that are attractively priced for woodworkers, manufacturers trade a bit of accuracy for affordability. The drill presses we tested aren't as precise as a machinist's tool, but they're fine for woodworking. And some of them are downright cheap!

Two compromises make these modest prices possible. First, all of the machines have a small amount of side play between the quill and the head, and there's nothing you can do about it. Side play is a nuisance, but it has little effect on most boring operations if you



SWITCHES DESIGNED FOR SAFETY, like these from Jet, are large, obvious and front-mounted. "On" switches are protected so they can't be pushed accidentally. "Off" switches stand proud so they're easy to hit in an emergency.



PADDLE STYLE ON-OFF SWITCHES are the easiest to operate—you can even shut the machine down with your shoulder in an emergency. A well-placed chuck key holder (this one is on a Ridgid) is a "\$1,000" improvement that costs the manufacturer next to nothing!

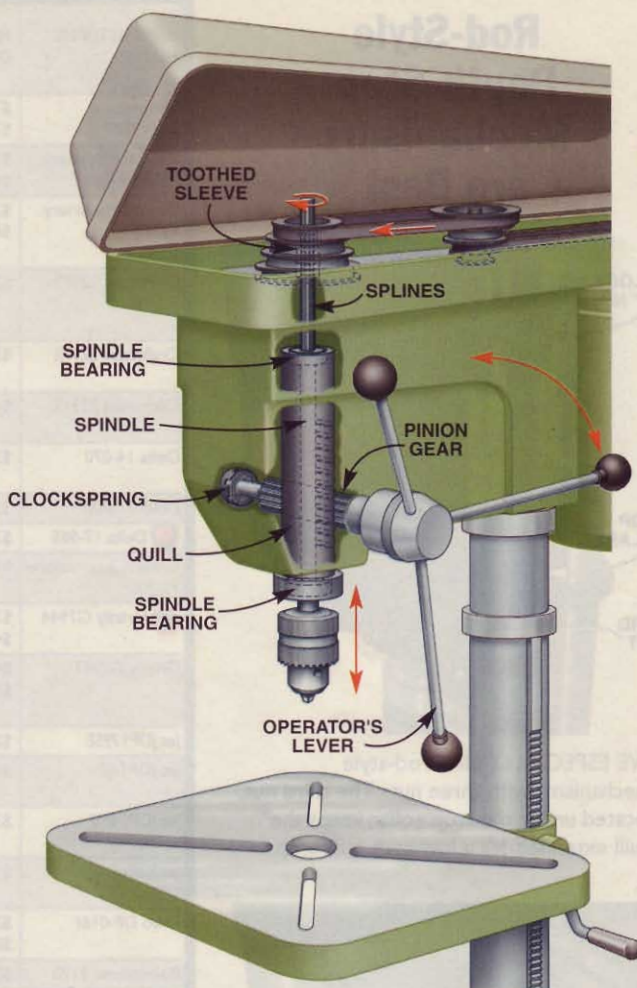


FIG. A. HOW A DRILL PRESS WORKS

The heart of a drill press is its spindle. Belts transfer the motor's power and rotation to it through a toothed sleeve inside the spindle pulley. These teeth engage long splines on the shaft of the spindle. The spindle rotates inside the quill, a hollow steel cylinder that moves up and down inside the machined head. This movement is regulated by a pinion gear on the shaft of the operator's lever and teeth cut into the back of the quill. A tensioned clock spring assists the return stroke and holds the quill in position against the head.

use sharp bits and proper feed rates. However, it may cause chatter when you use a sanding drum, or a big bit without a center pilot, like a rosette cutter. Higher-quality machines have an adjustable split-head design that allows you to eliminate side play. However, they're more expensive—\$600 and up.

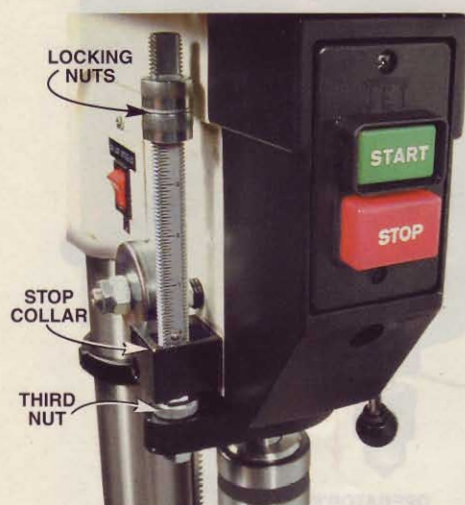
Another compromise is the chucks; they're not great. The biggest annoyance is that they don't always grip bits, especially big ones, securely; sometimes they slip. The easiest ways to compensate are to use the chuck key in all three holes when you install a bit and to use a less aggressive feed rate when you drill. The chucks also allow a small amount of wobble at the business end of the bit, but not enough to get hung up about. If you have a bug about precision,

you'll have to spend more money, either for a better chuck (about \$80) or a better machine.

Limitations

When you use sanding drums in these machines, the lateral pressure you exert can amplify any vibration allowed by the side play between the quill and the head. This combination of pressure and vibration may cause the tapered joint between the chuck and arbor to break loose. If it does, the tapered parts will probably be damaged. When you use your drill press for sanding, go easy. Keep the quill housed in the head and raise the table up to meet the drum. The same factors, lateral pressure and vibration, combine to make milling operations difficult, as well.

Rod-Style Depth-Stop Mechanisms are Best



WE ESPECIALLY LIKE rod-style mechanisms with three nuts. The third nut, located under the stop collar, keeps the quill extended. It's a low-tech quill stop.



RING-STYLE DEPTH STOPS are common, but we find them more difficult to use, and more likely to slip.

MANUFACTURER/ MODEL	FINAL COST	THROAT DEPTH	QUILL STROKE	EASY SPEED CHANGE	MOTOR	OPERATOR'S LEVER	
						LEVERAGE	GRIP COMFORT
Bridgewood BV1758F	\$375 (includes \$75 shipping)	8-1/2"	3-1/4"	Yes	3/4 hp; 12A	Good	Good
Central Machinery 38144	\$206 (includes \$6 handling)	6-5/8"	3-1/8"	Yes	3/4 hp; 8A	Fair	Good
Central Machinery 43389	\$291 (includes \$6 handling)	8-3/8"	3-1/4"	No	1 hp; 12A	Fair	Good
Craftsman 22913	\$350 Street Price	6-1/2"	3-1/4"	Yes!	2/3 hp; 5.9A	Fair	Fair
Craftsman 22915	\$300 Street Price	7-1/2"	3-1/4"	Yes	1 hp; 8A	Good	Good
Craftsman 22917	\$430 Street Price	8-1/2"	3-1/4"	Yes	1-1/2 hp; 12A	Good	Good
Delta 14-070	\$350 Street Price	7-1/4"	3-1/4"	Yes	1/2 hp; 8A	Excellent	Fair
Delta 17-900	\$300 Street Price	8-1/4"	3-1/4"	No	3/4 hp; 10A	Excellent	Good
Delta 17-965	\$350 Street Price	8-1/4"	4-7/8"	Yes	3/4 hp; 10A	Excellent	Excellent
General International 75-200	\$450 Street Price	8-1/2"	3-1/4"	Yes	TEFC; 3/4 hp; 12A	Excellent	Fair
Grizzly G7944	\$248 (Includes \$48 shipping)	7"	3-1/4"	Yes	TEFC; 3/4 hp; 9A	Good	Excellent
Grizzly G7947	\$443 (Includes \$68 shipping)	8-1/2"	4-3/4"	No	TEFC; 1 hp; 10A	Excellent	Excellent
Jet JDP17FSE	\$330 Street Price	8-1/8"	3-1/4"	No	3/4 hp; 8A	Good	Good
Jet JDP14JF	\$350 Street Price	7-1/8"	3-1/4"	Yes	1/2 hp; 8A	Good	Good
Jet JDP14MF	\$370 Street Price	7"	3-3/8"	Yes	TEFC; 3/4 hp; 9A	Good	Good
Jet JDP17MF	\$400 Street Price	8-1/8"	4-3/8"	No	TEFC; 3/4 hp; 9A	Good	Good
Lobo DP-016F	\$369 (includes \$89 shipping)	6-1/2"	3"	Yes	1 hp; 16A	Fair	Fair
Powermatic 1170	\$390 Street Price	8-1/2"	3-1/8"	Yes	1 hp; 11A	Excellent	Fair
Ridgid DPI500	\$300 Street Price	7-5/8"	3-1/4"	Yes	1/2 hp; 8A	Excellent	Excellent
SECO SK13FDP	\$250 Street Price	6-1/2"	3"	Yes	3/4 hp; 12.5A	Fair	Fair
SECO SK17FDP	\$305 Street Price	8-1/2"	3-1/4"	No	1 hp; 16A	Excellent	Fair
Star S4017	\$330 (Includes \$75 shipping)	6-1/2"	3"	Yes	3/4 hp; 12.5A	Fair	Fair
Tradesman 8080S	\$200 Street Price	6-5/8"	3-1/4"	Yes	1/2 hp; 6A	Fair	Poor
Tradesman 8106S	\$290 Street Price	8-1/2"	3-1/4"	Yes	1-1/2 hp; 11.5A	Good	Good
Transpower DPI6	\$270 (Includes \$75 shipping)	6-5/8"	3-1/8"	No	3/4 hp; 12.5A	Fair	Fair
Transpower DPI7	\$300 (Includes \$75 shipping)	8-3/8"	3-1/8"	Yes	1 hp; 16A	Excellent	Fair
Wood Tek CH18NF	\$409 (Includes \$30 shipping)	8-3/8"	3-1/8"	No	TEFC; 3/4 hp; 11A	Excellent	Fair
Yorkcraft YC19FDP	\$335 (Includes \$75 shipping)	7"	3-1/4"	No	TEFC; 3/4 hp; 12A	Fair	Good

FEATURES WE LIKE

A Comfortable Operator's Lever

More than anything else, how the quill advance lever feels in your hand shapes your perception of the machine. We prefer the traditional threaded-rod design to a single three-arm casting. For good leverage, the lever should be at least 3/8-in. thick and 8-in. long.

A few machines have ergonomically formed, soft-plastic grips. They're a big improvement over the smallish, serrated, hard-

plastic balls that are most common. But the most comfortable grips of all are the plastic balls found on the Delta 17-965. They're larger than any of the others, and they're smooth.

Wide Belts

Wide belts work better! Machines with narrow belts require more finesse to use, especially with bigger bits, because the belts slip on the pulleys more easily. When this happens you have to stop drilling and add more tension to the belts.

WIDE BELTS	WORK TABLE			ROD-STYLE DEPTH STOP	MORTISING ATTACHMENT	ON/OFF SWITCHES		COMMENTS and CONTACT
	FLAT-RIMMED	SQUARE	WET OR DRY			FRONT MOUNTED	SWITCH STYLE	
Yes	No	No	Dry	No	Yes	No	Push Buttons	Work light; big table. (800) 235-2100.
No	No	No	Dry	No	Yes	Yes	Toggle	Cast operator's lever w/ formed grip. (800) 423-2567.
Yes	Yes	No	Wet	No	Yes	Yes	Toggle	Work light; cast operator's lever w/ formed grip; wide base; big table; very reasonably priced. (800) 423-2567.
NA	Yes	Yes	Wet	Yes; 3 nuts	Yes	Yes	Toggle	Variable speed mechanism; work light; cast operator's lever w/ padded grip; chuck key holder; extended maintenance contract is available. (800) 377-7414.
No	Yes	Yes	Wet	Yes; 3 nuts	Yes	Yes	Toggle	Work light; chuck key holder; extended maintenance contract is available. (800) 377-7414.
Yes	Yes	Yes	Wet	Yes; 3 nuts	Yes	Yes	Toggle	Work light; chuck key holder; big table; extended maintenance contract is available. (800) 377-7414.
Yes	Yes	Yes	Dry	No	Yes	Yes	Toggle	Wide base; parallel slots in table; grips have coarse serrations. (800) 438-2486.
Yes	Yes	Yes	Dry	No	Yes	Yes	Toggle	Wide base; grips have coarse serrations. (800) 438-2486.
Yes	Yes	Yes	Dry	Yes	Yes	Yes	Push Buttons	Wide base; big table; quill lock. (800) 438-2486.
Yes	No	Yes	Dry	Yes	Yes	Yes	Toggle	Work light, exposed bulb; wide base. (514) 326-1161.
No	Yes	Yes	Wet	No	Yes	Yes	Paddle	Work light; soft-plastic grips. (800) 523-4777.
Yes	Yes	Yes	Wet	No	Yes	Yes	Paddle	Work light; soft-plastic grips; wide base; big table; tall—belt changing may be difficult for persons of small stature; depth stop is hard to lock. (800) 523-4777.
Yes	No	No	Dry	No	Yes	Yes	Push Buttons	Chuck key holder. (800) 274-6848.
Yes	No	No	Dry	Yes; 3 nuts	Yes	Yes	Push buttons	Work light, exposed bulb; wide base; 1/2" chuck; must remove depth-stop collar to install mortising attachment. (800) 274-6848.
Yes	No	No	Dry	Yes; 3 nuts	Yes	Yes	Push buttons	Work light, exposed bulb; wide base; must remove depth-stop collar to install mortising attachment. (800) 274-6848.
Yes	No	No	Dry	Yes; 3 nuts	Yes	Yes	Push buttons	Mortising attachment included; must remove depth-stop collar to install; work light; wide base. (800) 274-6848.
No	No	No	Dry	No	Yes	No	Rocker	Work light, exposed bulb; chuck can't grip 1/16" bit. (800) 786-LOBO.
No	No	Yes	Dry	Yes	Yes	Yes	Toggle	Work light, exposed bulb; wide base. (800) 248-0144.
No	Yes	Yes	Wet, but slotted	No	Yes	Yes	Paddle	Work light; soft-plastic grips; chuck key holder; American-made motor. (800) 4-RIDGID.
No	No	No	Dry	No	No	No	Rocker	Work light, exposed bulb; chuck can't grip 1/16" bit. (626) 334-6668.
No	No	No	Dry	No	No	No	Rocker	Big table; chuck can't grip 1/16" bit. (626) 334-6668.
No	No	No	Dry	No	No	No	Rocker	Work light, exposed bulb; chuck can't grip 1/16" bit. (626) 965-0621.
No	No	Yes	Dry	Yes	Yes	Yes	Toggle	Chuck key holder; undersized table; good value, but hard to find; sold through Ace Hardware stores. (800) 243-5114.
Yes	Yes	Yes	Wet	Yes; 3 nuts	Yes	Yes	Toggle	Chuck key holder; big table; excellent value, but hard to find; sold through Ace Hardware stores. (800) 243-5114.
No	No	No	Dry	No	No	No	Rocker	Chuck can't grip 1/16" bit. (800) 654-7702.
No	Yes	Yes	Wet	No	No	No	Rocker	Work light, exposed bulb; chuck can't grip 1/16" bit. (800) 654-7702.
Yes	Yes	Yes	Wet	No	Yes	Yes	Toggle	Mortising attachment included. (800) 645-9292.
No	No	No	Dry	Yes	Yes	Yes	Toggle	Work light; soft-plastic grips; chuck can't grip 1/16" bit; must remove depth stop to install mortising attachment. (800) 235-2100.

A Clamp-Friendly Table

Drill press tables, especially round ones, aren't great for woodworking. For most operations you'll want to add a fence or an auxiliary surface, so the best tables are ones that will be easy to clamp to. Rectangular tables with a wide, flat rim running around the perimeter are clearly superior. Bigger tables are better than small ones. We like "dry" tables because they're slotted and easy to keep

clean. "Wet" tables, designed for metalwork, have T-slots instead of slots and troughs around the edges. These crevices fill up with wood shavings.

A Rod-Style Depth Stop

To set drilling depth, we prefer a rod with stop nuts to a ring with a thumbscrew. Stop nuts are easier to set and once they're locked together, they won't slip.

How to Avoid Falling Chucks

A common complaint with drill presses is that the chuck falls out. Failure usually occurs because the parts weren't properly cleaned before they were first installed. For a good joint, the mating surfaces must be spotless—any grease, oil (including oil from your fingers) or dust particles that remain can cause this tapered joint to fail. Once it fails, and the tapered fit is compromised, the joint is likely to fail again.



KEEP THE CHUCK FITTING TIGHTLY by installing it properly the first time. Before their initial assembly, clean the inside of the spindle, the arbor and the inside of the chuck with a solvent that won't leave an oily residue (such as lacquer thinner or naphtha). Then slip the arbor into the spindle. Retract the chuck's jaws and slide the chuck onto the arbor. Set the joint with a single tap on the bottom of the chuck with a rubber or plastic mallet. Don't use a steel hammer.

Mortising Attachments

Drill presses aren't really designed to exert the amount of force mortising requires, especially with large (1/2-in.) mortising sets. But for occasional use, and mortises no larger than 3/8 in., the attachments are adequate. Installation is time-consuming and often tedious. On some machines you have to remove several parts before you can mount the attachment (see Chart Comments, page 73). When you use your drill press for mortising, put a



Delta 17-965
16-1/2 in. \$350.

PROS

This machine was outstanding. It has plenty of power and a long, 4-7/8-in. quill stroke. It runs quietly, with minimal vibration, and is a joy to operate. The quill advance mechanism operates smoothly, and the smooth, round grips on the operator's levers are the most comfortable of any we tested. The quick action depth-stop nut (right) is unique and works great. There's a genuine quill lock (it presses the quill against the head) that locks quickly and positively.



The table raises and lowers smoothly and we like the large base. We also like Delta's mortising attachment (17-935; \$40), which is available as an accessory and installs easily on this machine. A work light is also available (25-869; \$20).

CONS

We have a couple of minor gripes. The 17-965 has an open motor and a plastic hood.

support between the base and the bottom of the table, to keep it from flexing. If you plan to cut lots of mortises, get a mortising machine.

Switches

The best on-off switches have safety built in. They make it difficult to turn the machine on accidentally and easy to turn off in an emergency. For durability, we like industrial-style push buttons. For convenience, we like paddle-style switches.

Best Buy



Central Machinery 38144
13 in., \$206*

PROS

Although Central Machinery tools haven't fared well in previous American Woodworker tests, this one performed admirably, appears to be well made and is available *delivered* for \$206 (there's a \$6 handling charge). You can try it out for 30 days and return it for a full refund, if you're not satisfied. If bottom dollar is your top consideration, give this machine a try.

CONS

The 38144 comes with a round table, an open motor, a ring-style depth stop and narrow belts. The unusual, cast operator's lever takes some getting used to.

* Price includes shipping in the 48 contiguous states.

Best Buy



Grizzly G7944
14 in., \$248*

PROS

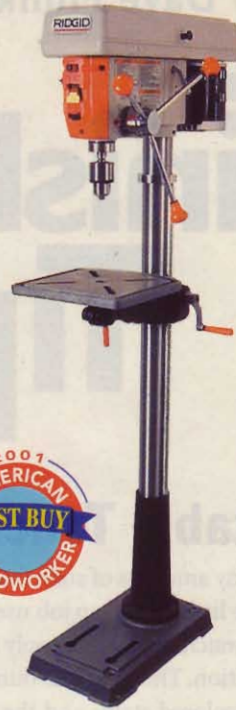
This machine feels better to operate than other small-throat-capacity machines because it's built big (taller and heavier) and it delivers good power. Its operator's levers have long rods with comfortable grips. We like the paddle style on-off switch, although it isn't recessed. Grizzly is known for its reliable customer service.

CONS

The G7944 has narrow belts and a ring-style depth stop. There's noticeable side play between the quill and the head.

* Price includes shipping in the 48 contiguous states.

Best Buy



Ridgid DP 1500
15 in., \$300

PROS

This machine is likable because it's user-friendly. It has long operator's levers with comfortable grips, a recessed paddle-style on-off switch, a built-in work light, a decent table and a chuck key holder. A good mortising attachment is available (AC 60005, \$25), but only by special order. It runs quietly and smoothly. What's more, Home Depot backs it by offering the original purchaser a lifetime warranty.

CONS

The DP 1500 has narrow belts, a ring-style depth stop and an open motor. Other similarly priced machines have deeper throat capacity.

Work Light

Many machines come with built-in work lights, which you'd think would be a great feature. Unfortunately, they're all mounted behind the bit and cast its shadow in exactly the wrong spot. Big bits create big shadows! On some machines, the bulb protrudes and may get broken. We think a better solution is to buy an after-market gooseneck work light with a magnetic base (\$20).

Recommendations

It's a buyer's market, so be choosy. Competition has driven prices down—we don't see any reason to spend more than \$350. Look for package deals, free trial periods and attractive warranties. And watch out for shipping costs. Be sure to consider the *total* cost of getting a drill press into your shop. **AW**

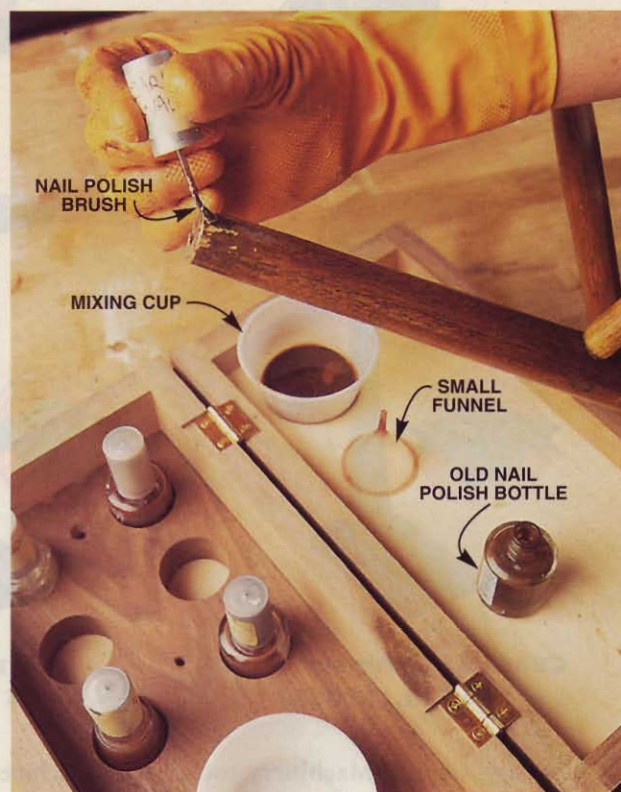
Finishing Tips

Portable Touch-Up Kit

Mixing tiny amounts of stain from big cans and cleaning brushes all for one little touch-up job used to drive me crazy.

While watching my wife apply fingernail polish, I had a moment of inspiration. The clear 1/2-ounce bottles are perfect for storing different-colored stains and the self-storing brushes never need cleaning! I rinsed out some old bottles and brushes with lacquer thinner and filled them with my most-used stains. I keep a little plastic cup in my kit for mixing custom colors.

*Charles Eggleston
Gary, IN*



A True Black

Ebonizing wood isn't as easy as it seems. Black dyes usually leave a bluish or greenish cast, oil stains look washed out and paint obscures the grain. But a good India ink, which is really a very finely ground pigment, does the job. It's available as a fast-drying waterborne liquid at art supply stores (Black Cat Waterborne India Ink, Dick Blick Art Materials, 800-933-2542, www.dick-blick.com, #Z1101-2006; \$7 per pint).

As with any waterborne finish, raise the grain before you apply the ink. Dampen the wood with water, let it dry and sand lightly to cut down the swelled fibers; then brush on the ink. Once dry, it's compatible under any finish.

*George Riemann
Ann Arbor, MI*



Glue Before You Strip

When restoring old beat up antiques the typical sequence is to strip, repair and then refinish. I like to change the order a bit and re-glue the loose joints and do repairs first. That way I don't have to worry about glue squeeze out—it's taken care of when I strip. Also, any new wood used in repairs gets worked up like the old wood, which helps it blend in better. After stripping, all I have to do is sand and refinish.

*Sean Daly
Providence, RI*



Varnishing Hang Up

I always felt the need for a second pair of hands when it came to varnishing shelves or doors.

A good solution is to hang them up. A series of eyehooks screwed into the floor joists turned my shop ceiling into a helping hand. Two hooks screwed into both ends of each shelf allow them to be suspended in mid-air where I can varnish all the sides with ease. A length of bailing wire with loops twisted on the ends is hooked on the bottom pair of hooks to steady the shelf while finishing.

David Banister
Tallahassee, FL

AW

If you have an original Finishing Tip, send it to us with a sketch or photo. We pay \$200 for each one we print. Send to: **Finishing Tips, American Woodworker, 2915 Commers Drive, Suite 700, Eagan, MN 55121.** Submissions can't be returned and become our property upon acceptance and payment.

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Item # 1701

3-Year Index

This is a three-year index for American Woodworker. It includes articles from issue # 64, February '98, through #84, December '00.

Entries are listed by subject, then issue number and page. For example, "bandsaw fences, extra-large, 72:108" appeared in issue 72 on page 108.

A 5-year index is available on our Web site at www.americanwoodworker.com.

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Product Development Casebook

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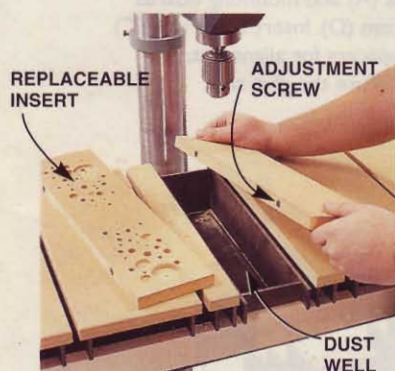
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Drill Press Table

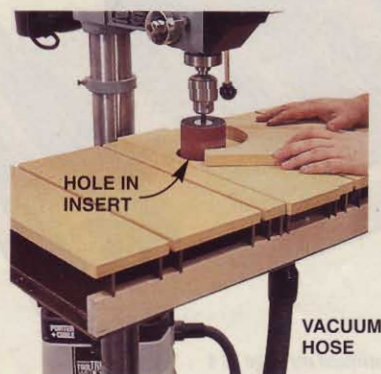


Clamping a fence to this shop-made table is a cinch. Slide standard clamps into slots to fasten a fence or workpiece anywhere you want. There's no need to buy aluminum track or dedicated clamps.



Drill dozens of holes into your insert! With our simple system, you'll always have a fresh surface to drill into. Move the insert in and out, flip it end for end, or turn it over; there's plenty of room for lots of holes.

Ensure a tight fit for your insert by countersinking a pair of flat-head adjustment screws into one side.



Remove the dust from a sanding drum through a vacuum hose inserted into the table's dust well. Adjust the height of the drum in the dust well to take advantage of the entire surface of your sanding drum.

Make extra inserts with different-diameter holes to match each one of your sanding drums.

Standard drill press tables may be fine for metalworking, but they sure are frustrating to use in a woodshop. Attaching a fence with woodworking clamps is a pain in the neck; finding a clean backer board can be a real challenge; and building a contraption for your sanding drum makes you wonder, isn't there a better drill press table out there somewhere?

Sure there is, if you don't mind spending some serious money. You could shell out \$100 and order a drill press table from a catalog. Ouch! Next add another \$30 of accessories dedicated to only that table. Ouch again!

We've kicked around lots of ideas in the AW workshop and designed a top-notch drill press table you can make in a few hours for far less money. The materials are simple and probably already in your shop. You don't need to buy any fancy metal hardware, clamps or knobs. Joinery is equally easy, but you will need a dado blade for your tablesaw.

If you have an original Shop Solution, send it to us with a sketch or photo. We pay \$200 for each one we print. Send to: **Shop Solutions, American Woodworker, 2915 Commers Drive, Suite 700, Eagan, MN 55121.** Submissions can't be returned and become our property upon acceptance and payment.

Shop Solutions

Materials

Any hardwood will work for the table's rails. Choose medium-density fiberboard (MDF) and tempered hardboard for the top and bottom. You'll need about a half sheet of each. These engineered materials are generally flatter and less likely to warp than plywood. MDF won't splinter or puff up around a drilled hole, so it's a perfect backer material for drilling holes that go all the way through a workpiece.

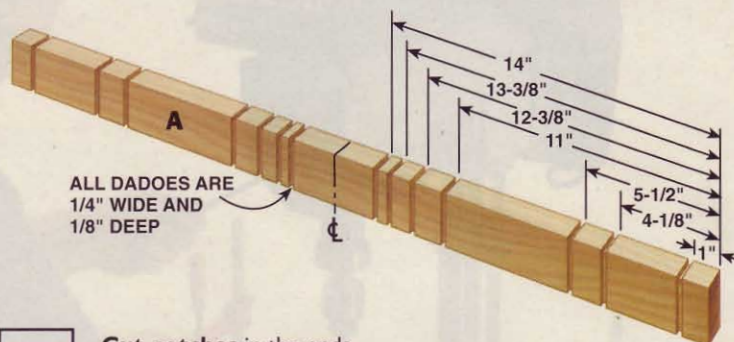
After you build the table, set aside some MDF to make more inserts in the future. Different brands of MDF may vary slightly in thickness, so it's best to use the exact same stuff to make sure the inserts are precisely flush with the table's top.

Construction

Build a flat drill press table by working on a flat surface, such as a door or the top of your tablesaw. Use cauls or cinder-block weights when gluing. You don't need much force, but it must be equally applied to all areas.

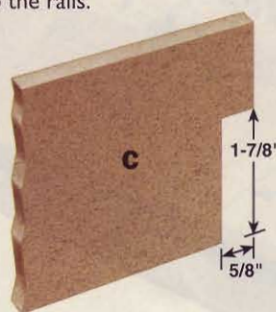
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Cut dadoes in the rails (A). The fit between the dadoes and your hardboard should be fairly loose. A too-tight fit will make the table difficult to assemble.

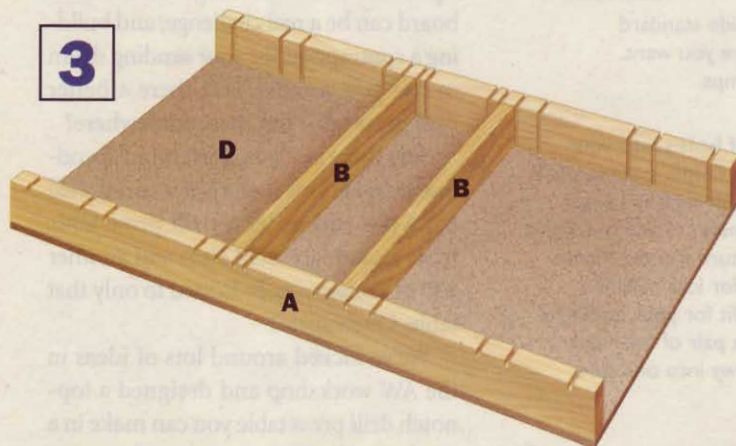


2

Cut notches in the ends of all the ribs (C). Test their fit into the rails.



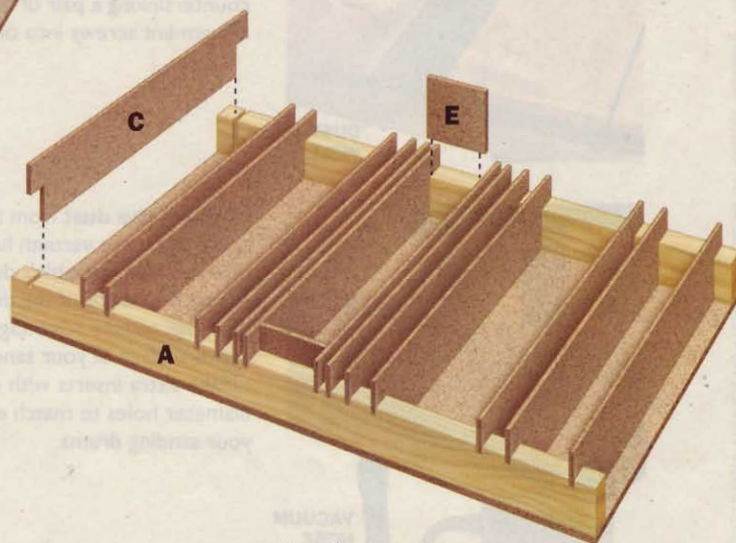
3



Glue the rails (A) and mounting boards (B) to the bottom (D). Insert some ribs (C) as temporary spacers for alignment, but remove them before the glue sets.

4

Glue the ribs (C) in place. Apply glue to the dado and the bottom of each rib. To make it easy, you only have to glue and clamp a few ribs at a time. Finally, glue the plugs (E) to the rails (A) to enclose the dust well.



continued on page 114

Shop Solutions

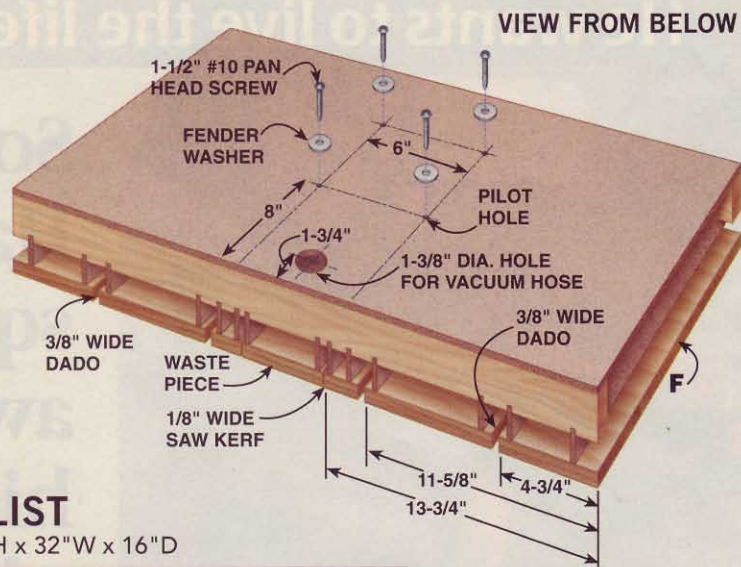
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Glue the top (F) to the ribs. Note: Don't apply glue to the two middle ribs that support the center waste piece!

Once the glue is set, turn the table over, as shown here, and cut four slots for the clamps. Cut away the waste piece where the insert goes. Then drill a hole for your vacuum hose and pilot holes into the mounting boards (B) for attaching the table to your drill press.

AW

Thanks to AW senior editor Tom Caspar for this Shop Solution.



CUTTING LIST

Overall Dimensions: 4-1/4"H x 32"W x 16"D

Part	Name	Qty.	Material	Dimensions	Notes
A	Rail	2	4/4 Hardwood	3/4 x 2 x 32	Cut 1/8"-deep dados
B	Mounting Board	2	4/4 Hardwood	3/4 x 2 x 14-1/2	
C	Rib	14	Hardboard	1/4 x 3-1/4 x 16	Notch corners 5/8" x 1-7/8"
D	Bottom	1	Hardboard	1/4 x 16 x 32	1-3/8" hole for vacuum hose
E	Plug	2	Hardboard	1/4 x 3-1/4 x 3-9/16	
F	Top	1	MDF	3/4 x 16 x 32	Crosscut after gluing
G	Insert	6	MDF	3/4 x 4-1/2 x 17	

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"Bubbling Tonsu" by Aaron Levine

Quilted Big-Leaf Maple

Quilted big-leaf maple is a real gem of the forest. Its spectacular figure has a three-dimensional look that seems to shift like the facets of a jewel as it's moved. Quilted figure appears in several tree species, but by far the most spectacular displays are found in the big-leaf maples of the Pacific Northwest.

Because it's a rare find, quilted big-leaf maple is in short supply and is very expensive. To save money, woodworkers will often resaw the stock to use as veneer, door panels, jewelry box or humidior lids and as accents in furniture. Instrument makers favor quilted big-leaf maple for acoustic guitar backs and sides, electric guitar tops and harps.

Quilted figure has a lot of end grain that is prone to tear-out, so it can be a real challenge to scrape, sand and finish. But the end result is always worth the extra effort.

We bought this quilted big-leaf maple from Northwest Timber in Oregon. They try to keep a good supply on hand and sell it in random lengths and widths. The lumber is graded according to the intensity of the figure. At the very top is Musical Grade followed by AAAAA down to AAA. The wood is available in thicknesses from 4/4 to 12/4 and prices range from \$12/bd. ft. to \$25/bd. ft., depending on the grade.

Source

Northwest Timber
P.O. Box 1010
Jefferson, OR 97352
(541) 327-1000
www.nwtimber.com

Note: Quilted figure varies from tree to tree and from board to board. Expect variations in color, shape and size of the blisters in each quilted pattern. **AW**

Musical Grade billet of quilted big-leaf maple with a natural oil finish.

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