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July 1997 #97

Popular Woodworking

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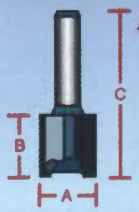

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Used for cutting dadoes, rabbets, circles and other general purpose routing. Can be used in solid wood, plywood, certain plastics and laminated material. Use shortest length (B) for work to be done. For use in hand-held routers only.

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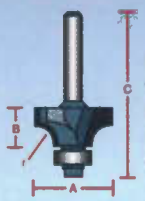
MODEL	CUTTER DIA. A	CUT. LENGTH B	REG. PRICE	SALE PRICE
C1001	1/4"	3/4"	~~5.95~~	4.95
C1002	5/16"	3/4"	~~5.95~~	4.95
C1003	3/8"	3/4"	~~5.95~~	4.95
C1004	1/2"	3/4"	~~7.95~~	6.95
C1005	5/8"	3/4"	~~9.95~~	8.95
C1006	3/4"	3/4"	~~9.95~~	8.95
C1007	1"	3/4"	~~11.95~~	10.95
C1037	23/32"	3/4"	~~11.95~~	10.95

1/2" SHANK

MODEL	DIA. A	LGTH B	REG.	SALE	MODEL	DIA. A	LGTH B	REG.	SALE
C1008	1/4"	3/4"	~~5.95~~	4.95	C1038	23/32"	1-1/8"	~~11.95~~	10.95
C1009	5/16"	3/4"	~~5.95~~	4.95	C1015	3/4"	1-1/8"	~~11.95~~	10.95
C1010	3/8"	3/4"	~~5.95~~	4.95	C1016	3/4"	1-7/8"	~~14.95~~	13.95
C1059	7/16"	1"	~~7.95~~	6.95	C1017	1"	1-1/8"	~~11.95~~	10.95
C1011	1/2"	1-3/16"	~~7.95~~	6.95	C1061	1-3/16"	2"	~~21.95~~	20.95
C1012	1/2"	2"	~~14.95~~	13.95	C1018	1-1/4"	1-3/16"	~~11.95~~	10.95
C1013	5/8"	1-1/8"	~~9.95~~	8.95	C1019	1-3/8"	1-3/16"	~~14.95~~	13.95
C1014	5/8"	2-3/8"	~~14.95~~	13.95	C1021	1-5/8"	1-3/16"	~~17.95~~	16.95
C1060	11/16"	1-1/8"	~~9.95~~	8.95					



ROUNDOVER BITS
with Guide Bearing

Roundover bits are used to make quarter rounds of various radii. Also used to soften edges, especially if making anything a child would use. Everyone needs a drawer full of these. So many uses we can't list them all.

1/4" SHANK

MODEL	CUTTER DIA. A	CUT. LENGTH B	RADIUS r	REG. PRICE	SALE PRICE
C1174	5/8"	3/8"	1/16"	~~$9.95~~	$8.95
C1175	7/8"	3/8"	1/8"	~~$9.95~~	$8.95
C1176	7/8"	3/8"	3/16"	~~$9.95~~	$8.95
C1177	1"	1/2"	1/4"	~~$10.95~~	$9.95
C1178	1-1/8"	1/2"	5/16"	~~$11.95~~	$10.95
C1179	1-1/4"	5/8"	3/8"	~~$13.95~~	$12.95
C1180	1-1/2"	5/8"	1/2"	~~$14.95~~	$13.95

1/2" SHANK

MODEL	CUTTER DIA. A	CUT LENGTH B	RADIUS r	REG. PRICE	SALE PRICE
C1182	3/4"	3/8"	1/8"	~~$9.95~~	$8.95
C1183	7/8"	3/8"	3/16"	~~$9.95~~	$8.95
C1184	1"	1/2"	1/4"	~~$10.95~~	$9.95
C1185	1-1/8"	1/2"	5/16"	~~$11.95~~	$10.95
C1186	1-1/4"	5/8"	3/8"	~~$13.95~~	$12.95
C1187	1-1/2"	3/4"	1/2"	~~$14.95~~	$13.95
C1188	1-3/4"	7/8"	5/8"	~~$17.95~~	$16.95
C1189	2"	1"	3/4"	~~$19.95~~	$17.95
C1190	2-1/4"	1-1/8"	7/8"	~~$29.95~~	$28.95
C1191	2-1/2"	1-1/4"	1"	~~$29.95~~	$28.95
C1192	3"	1-1/2"	1-1/4"	~~$34.95~~	$33.95

CORNER LOCK MITER BIT

Used for making 90° corner joints in wood for 9/16" to 1" material. Instructions for use provided.

MODEL	SHANK	CUTTER DIA. A	CUT. LENGTH B	REG. PRICE	SALE PRICE
C1331	1/2"	3"	1"	~~44.95~~	39.95

GLUE JOINT BITS

This bit is ideal for laminating and jointing stock together for use in table tops, panels and where extra-wide stock is needed. For 3/4" to 1" material.

MODEL	SHANK	CUTTER DIA. A	CUT. LENGTH B	REG. PRICE	SALE PRICE
C1328	1/4"	1"	1-1/4"	~~29.95~~	27.95
C1329	1/2"	1-1/8"	1-1/4"	~~29.95~~	27.95

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Make your dadoes fit better with these straight bits sized for modern plywood. Each set includes: 7/32", 15/32" and 23/32" and wooden box.

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ONLY $19.95

REVERSIBLE STILE & RAIL - ROMAN OGEE
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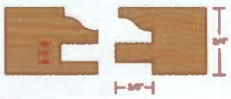

MODEL	SHANK	CUTTER DIA. A	CUTTER LGTH B	REG. PRICE	SALE
C1392	1/2"	1-5/8"	13/16"	~~49.95~~	47.95

REVERSIBLE STILE & RAIL - OGEE
with Guide Bearing

MODEL	SHANK	CUTTER DIA. A	CUTTER LGTH B	REG. PRICE	SALE
C1652	1/2"	1-5/8"	13/16"	~~49.95~~	47.95

REVERSIBLE STILE & RAIL - BEVELED
with Guide Bearing

MODEL	SHANK	CUTTER DIA. A	CUTTER LGTH B	REG. PRICE	SALE
C1653	1/2"	1-5/8"	13/16"	~~49.95~~	47.95

REVERSIBLE STILE & RAIL - CLASSICAL
with Guide Bearing

MODEL	SHANK	CUTTER DIA. A	CUTTER LGTH B	REG. PRICE	SALE
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With this one ALL PURPOSE blade you can RIP & CROSSCUT 1"–2" ROCKHARDS and SOFTWOODS resulting in a **SMOOTH AS SANDED** surface. PLY-VENEERS of OAK and BIRCH will crosscut with NO BOTTOM SPLINTER at moderate feed rates.

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WOODWORKER II	LIST	SALE	10%	20%
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14"X30TX1"	$195	$139	$125	$111
12"X40TX1"	$183	$129	$116	$103
12"X30TX1"	$162	$119	$107	$ 95
10"X40TX1/8" or 3/32"	$156	$119	$107	$ 95
30T 1/8" or 3/32"	$135	$ 99	$ 89	$ 79
9"X40T	$146	$109	$ 98	$ 87
30T	$125	$ 99	$ 89	$ 79
*8-1/4"X40TX 3/32"	$136	$ 99	$ 89	$ 79
8"X40T 3/32"	$136	$ 99	$ 89	$ 79
30T	$115	$ 89	$ 80	$ 71
7-1/4"X30T 3/32"	$112	$ 69	$ 62	$ 55
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OUR $79 - $89 30T & 40T OUTPERFORMED (E-EXCELLENT) 23 other 40T & 50T premium blades both foreign & domestic on Ply, Melamine, MDF and Oak/Rip!

Fine Woodworking Magazine test Oct. 96 page 43

After installing your blade and 5 in. stiffener the vibration in my saw went down another 20%. I ran several pieces of hardwood through the saw, both crosscut and ripping, and was amazed at the smoothness. It was like cutting butter, maybe smoother. I have never had a saw blade that cut this smooth.

Rick Price

CHOPMASTER FOR SLIDING COMPOUNDS & MITER SAWS

New specs, 5° Neg. Pts. & flat, runs out less than .002 for perfect, tight, smooth, splinter-free miter joints.

TAKE EXTRA 10% – 20% OFF COMBO SALE!

NEW SIZES AVAILABLE	LIST	SALE
Delta Sidekick 6-1/2"x40Tx5/8"	$149	$ 89
Sears 8-1/4" & Delta 8-1/4"x60Tx5/8"	$170	$ 99
Hitachi 8-1/2"x60Tx5/8"	$179	$109
DeWalt 8-1/2" & Ryobi 8-1/2"x60Tx5/8"	$179	$109
Delta 9"x80Tx5/8"	$204	$119
Ryobi–Makita & all 10"x80Tx5/8"	$207	$129
DeWalt, Makita, B&D, Hitachi 12"x80Tx1"	$229	$139
Ryobi–Makita 14"x100Tx1"	$266	$179
Hitachi 15"x100Tx1"	$277	$189

For good general purpose cuts use Woodworker II 30T & 40T or Woodworker I. Use small stiffener where possible.

THE ONE BLADE THAT LEAVES A SMOOTH-AS-SANDED SURFACE!

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WOODWORKER I – CROSSCUT — 7 1/4" – 14" For TABLE and RADIAL SAW – 10% to 20%

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12"x60Tx1" or 5/8" 1/8"K	$198	$139
10"x60Tx5/8" 3/32"K	$162	$129
8-1/4"X60T	$150	$109
8"X60T	$150	$109
7-1/4"X60T	$150	$109

OTHER SIZES AVAILABLE – 7 1/4" – 14"

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10" D. 5/8" & 1" Bore	$389	$349	$314	$297
12" D. 1" Bore	$499	$449	$404	$382

(Bore up to 1-1/4" Add $25 — Plus $5.50 S&H)

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Other sizes available

SIZES AVAILABLE	LIST	SALE
7-1/4"x60Tx3/32" K	$149	$129
8"x80Tx1/8" & 3/32" K	$202	$169
9"x80Tx1/8" & 3/32" K	$207	$179
10"x80Tx1/8" & 3/32" K	$207	$159
12"x80Tx1-1/8"K	$212	$181

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Above 1" bore standard.

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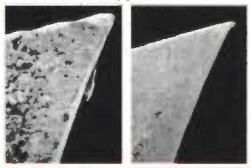

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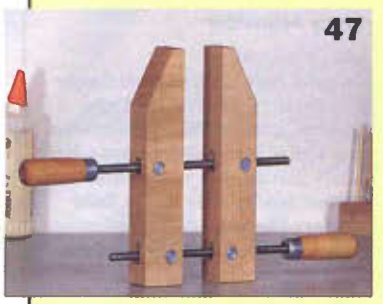

Project File

This special section, exclusive to Popular Woodworking, *features building basics for six projects.*

Columns

Cover photo: Hal Barkan/BKT Photography

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Christopher Schwarz
Managing Editor
Specialties: Article submissions, letters, reader contests
(513) 531-2690 ext. 407

Safety Note

Safety is your responsibility. Manufacturers place safety devices on their equipment for a reason. In many photos you see in *Popular Woodworking*, these have been removed to provide clarity. In some cases we'll use an awkward body position so you can better see what's being demonstrated. Don't copy us. Think about each procedure you're going to perform beforehand. Think ahead. Safety First!

Popular Woodworking®

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OUT ON A LIMB

A $6,000 Box?

THERE ARE SOME aspects of woodworking that raise my grain. One of these is the work and "wisdom" of some woodworkers that show up in the magazines we read.

These guys spend weeks agonizing, fussing and fretting over every project detail, especially the unimportant ones, then charge their customer thousands of dollars. I recently read about such a case involving an admittedly nice, but nonetheless small, box.

This woodworker gushed all over his work in the article. He revealed the box's hidden meaning, how its "special purpose" elevated its "objectness" to a state of being. All described in a language found on greeting cards or in self-published poetry books.

Come on, it's a box!

After the article, several people inquired about his nice little boxes. In the end only one had the vision to appreciate all the agonizing, the hand-wringing and the metaphysical significance that goes into his work. The others were blinded by his $2,000 minimum. But hey, his visionary customer was willing to pay $6,000 because his nice little box was to have a secret compartment. By the box maker's estimate, he'd need some 200 hours to complete the job. (That's five, 40 hour weeks, folks.) Pity the poor box maker. He spent *double* the hours and couldn't bring himself to ask the customer for the extra $6,000 worth of time he spent on the box. He vowed in the future to seek only customers willing to pay for every moment he spent, even the wasted ones, building boxes.

Here's the kicker. The box maker concluded his sermonette justifying his 400 hours work (which he says is worth $12,000) as simply a matter of "responsible stewardship." Then asks, "How will woodworking flourish if we give away our time?" Let me share with you the times required to make various pieces of fine furniture in the 1700s. They're taken from a first-rate book by Jeffrey Greene called "American Furniture of the 18th Century," a time when woodworking really flourished even without power tools. To build a four drawer chest with veneered fronts and cock-bead surrounds—88 hours. A desk with veneered fronts, cock-beaded, and a fancy interior—176 hours. Colonial Joe woodworker could build two desks then go fishing for a week while our box maker's still on his job.

I don't begrudge anyone eating sawdust every dollar he can get. Some craftsmen today get top dollar because the *market* says they're worth it, not because they have the nerve to ask for it. Markets establish prices, not some simple calculation of "labor hours" times "shop billing rate" = "value."

From my corner, anyone who needs 400 hours to build a nice little box is practicing *irresponsible* stewardship. What's worse, when this nonsense appears in print it's given the air of authority. It grossly misleads the expectations of newcomers to the craft. Should they quit their day job because they think they can earn $30 an hour for every hour they work? Ask a banker, or a spouse about that a couple years into a woodworking career.

Further, aren't these overarching descriptions of projects and their bloated prices a put down to those who produce good work at a fair price, or like many, who work wood just for fun? In the end, is the wrong message sent to the buying public that well-crafted woodwork isn't affordable? No, for woodworking to flourish today, we must educate Americans so they understand the value of what comes from a craftsman vs. a dinette city. Here at *Popular Woodworking* we'll practice responsible stewardship by showing you how to get quality work done using the most practical methods possible, and we'll all have some fun along the way. **PW**

Steve Shanesy

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From the Popular Woodworking *Mailbag...*

We welcome your comments about *PW* or anything related to woodworking. We'd also like to see color pictures of what you're building. Send your input to: Infeed/Outfeed, *Popular Woodworking*, 1507 Dana Ave., Cincinnati, OH 45207. Our e-mail address is: popwood@earthlink.net. Letters may be edited for publication. — *Steve Shanesy, editor*, PW

Improving the 'Cute Little Shelf'

I recently built the "Cute Little Shelf" featured in the January 1997 issue (#94). After it was completed, I noticed the spacing between the back and the towel bar seemed less than was shown in the picture, which made it difficult to insert a towel.

So I moved the towel bar down 1/4" and changed the position of the middle radius to 1" instead of 1 1/4". The plans as published produce a very adequate shelf, but the added towel bar spacing makes it easier to insert a towel.

T.R. Bristol
Grants Pass, Oregon

My 'Dream Shop' is Where I Wouldn't Freeze

I was inspired to write you after reading your article about *Popular Woodworking*'s shop (Dream Shop, Dream Team, March 1997, #95). And I though you might want to know that not all your readers have the ability to simply enter his or her workshop and build in a comfortable manner.

Because of my lifestyle as a homesteader, we raise most of our own vegetables and meat. So I have to share my shop space with canned vegetables, pumpkins and carrots. I could partition off part of the cellar, but during the last 20 years I needed to spend the money on acquiring greatly needed tools.

One's definition of a "Dream Shop" varies from person to person. To me, a dream shop would be one that I could enter and not freeze, or one in which I would not have to put up with the dampness. So count your blessings that you do have your dream shop because there are many like myself who have to make do with far less.

Louis P. Foshay
Millville, Pennsylvania

While I've never shared my shop with canned tomatoes, I do count my blessings, thankful for the fabulous shop we have here at Popular Woodworking. *In my years in commercial woodworking, I spent many sweltering days and plenty of cold ones, too, getting the work out. And there were the hard times when the money was short we had to pass on that tool or machine that would have made the next job easier. But hey, no one does it for the money, either as a hobby or as commercial cabinetmaker. You do it for the enjoyment (even when it's blistering) because at the end of the day there's a lot of satisfaction in coaxing beautiful work from a pile of rough lumber.—Steve*

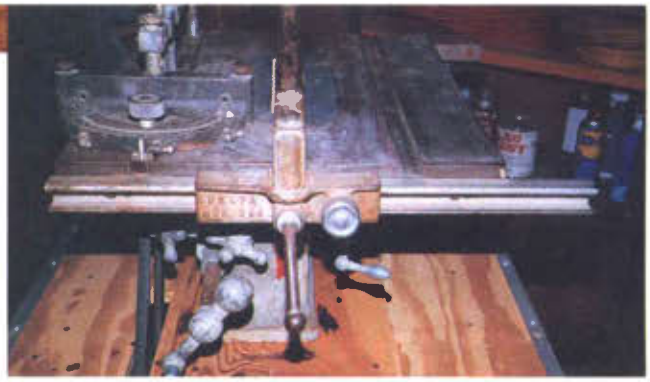

Table Saw Memories

I thought this picture of this old Delta table saw might be interesting to your readers. I can remember my dad using it back in the late 1930s. I acquired it five years ago. I don't use it much, but it is handy on occasion and has great sentimental value.

Delta couldn't tell me what year it was built, but maybe some of your readers might be able to tell.

Frank E. Crawford
Ridgecrest, California

That saw looks like an old timer. My dad has a Delta (circa 1952) that he still uses at age 78. In fact, he obtained parts from Delta just a few years ago to rebuild some that wore out. And speaking of fond memories, I remember when he whipped out a simple "race car" for me (you know, a piece of 3/4" plywood with a fixed 2x4 in the rear for attaching an axle and a pivoting one in the front turned by tugging on a rope). A broom handle nested in a notch at the back. Being pushed by the fastest "dash man" on the track team made for some thrilling moments on a freshly black topped neighborhood street.—Steve

A Jewel of a Box

I enjoyed your jewelry box plans from issue #80. I made a few modifications that worked for me:

- I used Monticello Casing crown molding for the sides. I ripped the 3/8" top off to create a better base for the hinges.
- I made an inside tray from 1/4" poplar and made four blocks for the tray to rest upon.

It was fun, and I never could have gotten started without your plans.

John Brian O'Hearn
Pittsford, New York

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INFEED/OUTFEED

Five Out of Five Trees Agree: Recycle Your Furniture

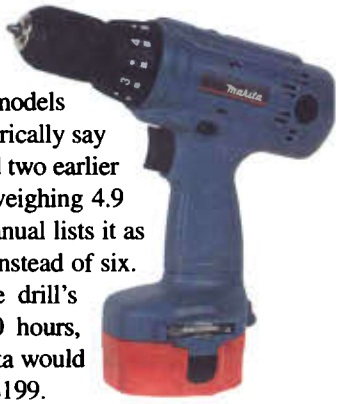
I am a firm believer in never throwing out a piece of wood or a piece of wooden furniture. But I never read anything about recycling old furniture or reshaping it into a new form.

The schoolmaster's desk in the photo was made from an old sewing machine cabinet. The drawer is made from plywood, and the front of the drawer is made from the thread bin. I built up the sides and rear panel. Then I covered the inside and other parts with leather.

I also salvaged a coffee table my daughter brought over to my house to store. I took the table apart and turned it into a nice desk using some old flooring, plywood and a piece of siding.

Everett Y. Plummer
Washington, Indiana

Weighing Your Cordless Drill Choices



Your review of 14.4v cordless drills (March 1997, #95) was a fairly well-balanced assessment of the models available. I own a Makita 6233DWAE and can categorically say it is the best drill/driver they have ever made (I owned two earlier models). I noticed in one chart that you listed it as weighing 4.9 lbs. It doesn't weigh that much. Even the owner's manual lists it as weighing only 4.4 lbs. It also has 18 clutch settings instead of six. And finally, I was told by the sales clerk that the drill's replaceable brushes extend the motor's life to 500 hours, while other motors would last only 100. So the Makita would have been a bargain at $300, and it is a steal at only $199.

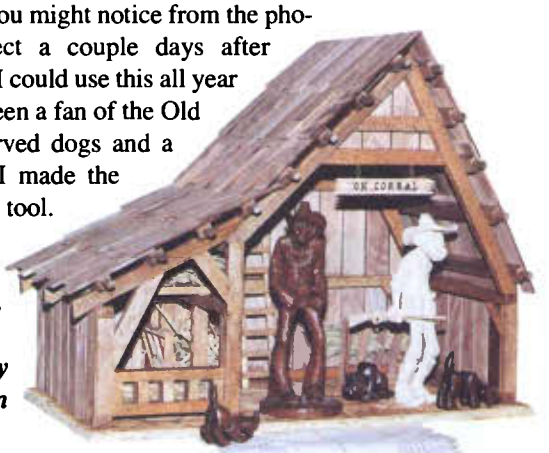
Linda Johnson
Pembroke, New Hampshire

Perhaps you weighed yours with a full battery while ours was half empty (just kidding). We weighed all of the drills in our review on a highly accurate postage meter instead of relying on the manufacturers' data. As to the clutch settings, we listed the number of settings that were marked on the collar of the drill. Makita lists six on the collar, though there are stops in between. By the way, the number of settings isn't terribly important in our opinion because we think it's unlikely that most woodworkers would ever need more than four clutch settings on a drill. ***—David Thiel, tool review editor***

Speaking of Recycling...

I really enjoyed your article on the Christmas Creche in the January 1997 issue (#94). It was a good winter project because I could do most of the work inside the house.

I did make one change that you might notice from the photographs. I finished the project a couple days after Christmas, and I wondered how I could use this all year long. Then it came to me. I've been a fan of the Old West for years. I had some carved dogs and a cowboy I'd been working on. I made the "OK Corral" sign with a Dremel tool. So here's the finished project. I hope you like it. Keep up the good work on the magazine; it's one of the best.



Bob Harvey
Ortonville, Michigan

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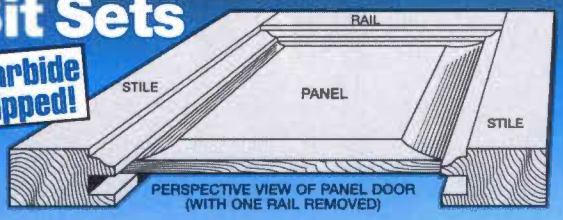

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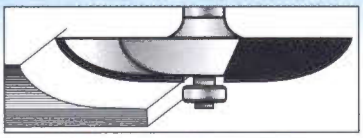

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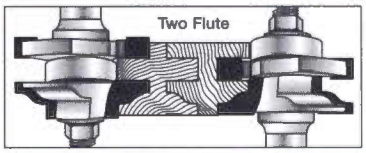

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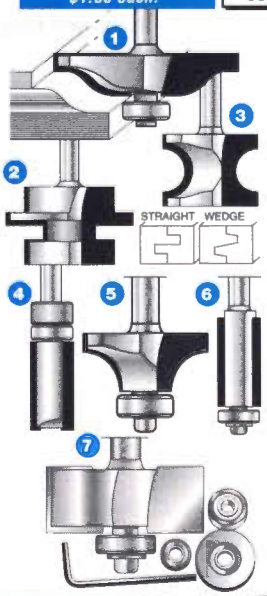

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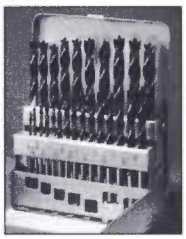

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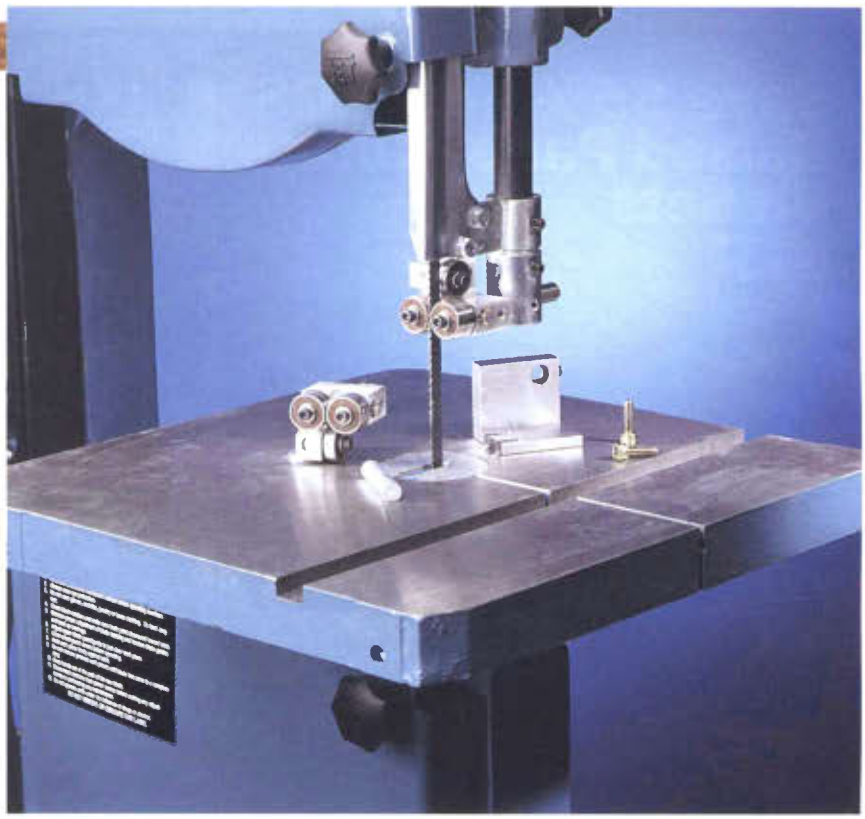
CRIS CUTS

Know Your Band Saw

You'll cut circles around other saws with these tune-up and technique tips.



This band saw is shown equipped with guides made by Carter Products Co. These guides reduce blade friction, increase cutting accuracy and blade life. They don't come cheap, however. Depending on your band saw, the guides can cost between $150 and $170.

THE BAND SAW can cut wood faster and deeper than any other sawing machine. I once observed a band saw at a mill that was one-story high, had a 12" wide blade and was slicing through a 24" fir log like it was balsa. On a home-shop scale, this type of performance can even be accomplished with "small" band saws.

However, the machines you most often find in home shops are especially notable for cuts that require more finesse, such as following a curved line **(photo 1)** or resawing — which is the business of reducing the thickness of a board or to produce a number of thinner boards from a single piece of thicker lumber **(photo 2)**.

Fussy at first

There are no secrets to correctly using a band saw, but it can be persnickety (more so than any other tool) when you neglect to align your blade. So "tuning" your saw is essential. First, with the machine unplugged, raise the blade guard and back off the blade guides and the thrust bearing **(diagram 1)**. Open the wheel covers and lower the upper wheel (or whichever wheel is applicable for a three-wheeled saw) to relieve the tension enough so the mounted blade is easy to remove. Be sure the tires on the wheels are clean; I use a stiff-bristled toothbrush. Incidentally, the tires do wear down. So if you see the crowns on the tires have flattened, it's time to replace them, otherwise your blade won't track properly.

Next, carefully mount the new blade and apply enough tension so the blade will stay put as you hand-turn the wheel. A good trick to keep your blade from falling off the top wheel during installation is to use a spring clamp or two to hold the blade to the top wheel as you increase the tension. While continuing to hand-turn the wheel, adjust the tracking until the blade stays centered on the wheel. Then adjust the tension to the setting suggested by the scale on the machine and, if necessary, fine tune the tracking adjustment. Now close the wheel covers, turn on the tool for 30 seconds and then check your adjustments again.

1 The band saw is notable for cutting curves in thin or thick stock. It saws fast, which often tempts us to rush the cut.

2 Resawing, the business of producing several thin boards from a thick one, is a band saw exclusive. The work can be guided by a fence, but the work will go smoothly only if the blade is in good condition. In general, when resawing, use the widest blade the machine can take.

PRECISELY

B E T T E R

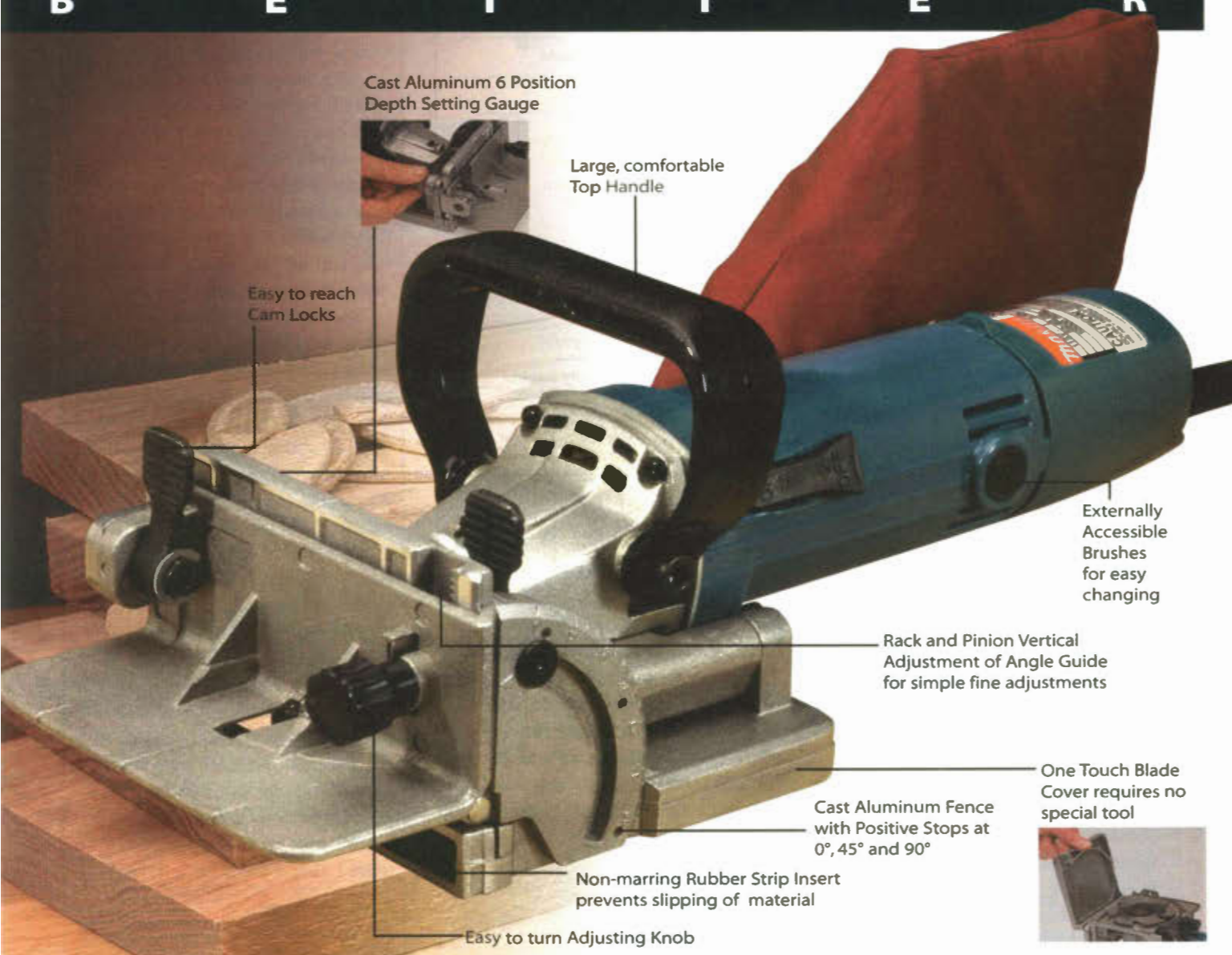


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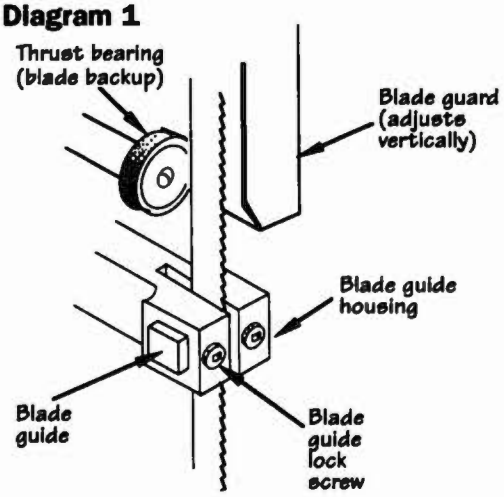
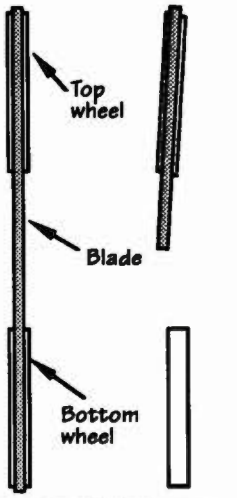
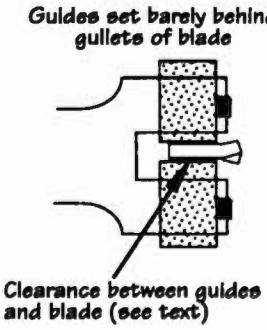
Diagram 1





Blades will not track correctly if top wheel tilts one way or the other

Top View



Tensioning can be arbitrary. Many experienced band saw users consider the tension to be perfect when they can raise the guard to its highest point and can flex the blade about 3/16" with light finger pressure. And different cuts use different tension. I use a bit less tension when doing scroll-saw type work and a bit more when making straight cuts and when resawing.

Finally, adjust the blade guides and the thrust bearing. These should be close to the blade but not touching it when the blade is running free. How much clearance? The "gauge" I use for the blade guides is a still-crisp dollar bill. Locking the thrust bearing about 1/64" away from the back edge is adequate.

Blades

Most common styles of band saw blades are shown here **(diagram 2)**. All these types are available in various widths and lengths that suit most band saws. Widths vary from 1/8" to 3/4" with a various number of teeth per inch. The more teeth, the smoother the cut. Thus, a narrow, fine-toothed blade is ideal for scroll-saw type work; a wide blade with fewer and coarser teeth is best for resawing. There are some exceptions to this, however. I often use a finer blade when sawing thick but soft wood because I want as smooth a cut as possible. In this case, you should feed the wood slowly, allowing the blade to cut at its own pace.

The width of the blade determines the radius it can turn. This is often listed as a specific figure, but the design of the

Diagram 2

REGULAR or "standard" usually supplied with machine. Makes smooth cuts. Good bet for thin materials. In narrow width, does acceptable scroll saw-type cutting.

Good assortment = 1/8" x 14 TPI, 5/16" x 10 TPI

SKIP TOOTH has wider tooth spacing for greater chip clearance to help prevent clogging. Cuts faster than regular blade in thick material and when resawing.

Good choice = 3/8" x 4 TPI

HOOK TOOTH has positive rake angle (teeth angle forward). Cuts aggressively. Good choice for thick wood, hardwoods.

Good choice = 1/2" x 4 TPI

Timber Wolf II & III

Something new in band saw blades

There have been innovations in saw blade design (different tooth styles, methods of hardening, etc.), but the Timber Wolf blades are the first to combine "thin kerf" and "low tension." This is an excellent combination because a thin kerf means smoother cuts, and low tension means your blades last longer.

With many blades, a thin kerf could mean you are going to have a hard time sawing tight turns. Not with these blades. They are heat-treated in the front and back so the middle area is "soft." In essence, they bend or cup around a turn so they can actually saw a smaller radius than a conventional blade.

As a test, I did some sawing without setting the blade guides or thrust bearing. And I raised the guard higher than it should have been. Of course, this is not the way you should work, but I wanted to see what happened. I didn't force the wood through, and I was impressed when the blade kept tracking as it should.

The blades have milled teeth made of Swedish silicone carbonite, a tough material that doesn't heat up as much as conventional steel — so the chance of burn marks is greatly reduced. The blades come with special instructions for a low-tension set-up.

The manufacturer says the blades will last three to four times as long as conventional blades. I wasn't able to verify that, but from what I saw, I could be a believer.

Available from:
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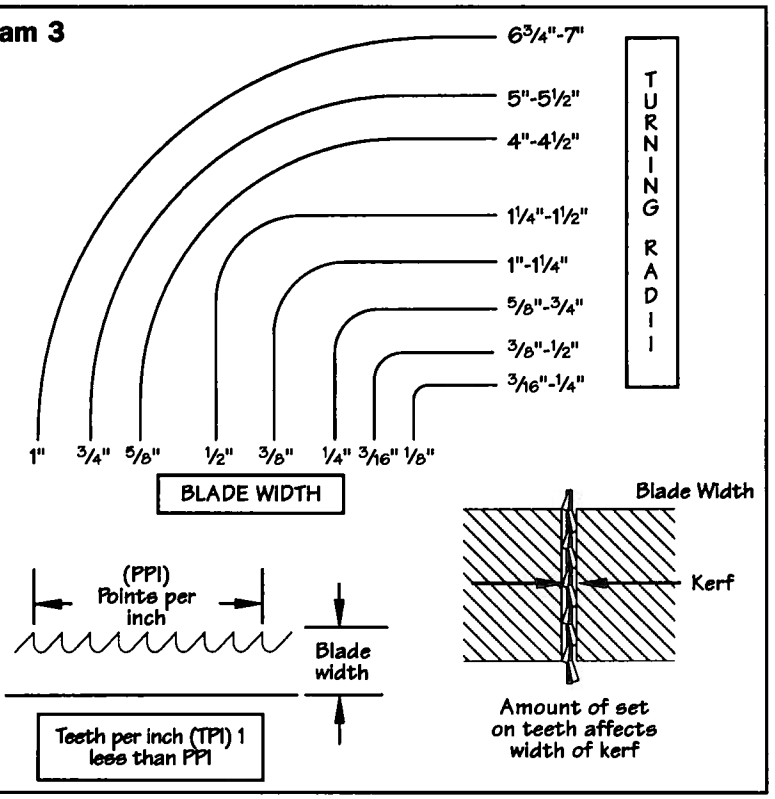
Diagram 3



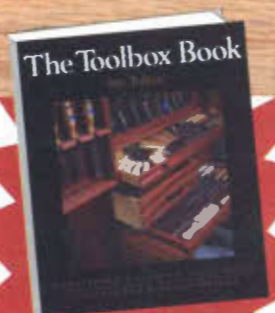
blade is the determining factor, which is why **diagram 3** shows some flexibility. A blade with a heavy set is able to turn tighter than a comparable blade with a very light set simply because the heavy blade makes a wider kerf, which allows more room for turning.

Unfortunately, band saw blades can have a fault called "lead." When you move stock into a blade, you expect the blade to follow the pattern line. When it doesn't (and you've correctly aligned your blade), the problem is likely a blade that is sharper on one edge. As a result, the blade "leads" off toward its sharper side. One solution is to compensate as you feed the stock. Experienced operators will correct a slight lead by backing up the blade with a piece of soft wood and using a fine stone to hone the errant side. It's a negative approach because its purpose is to bring both sides of the blade to equal dullness. However, it extends the life of the blade.

Speaking of extending blade life, there are two ways to keep your blades cutting longer. First, substitute "slippery" blade guides if your saw is equipped with ordinary steel ones. These cool-running guides made from graphite or resin can be found in most tool catalogs, and they greatly reduce the friction between the guides and the blade. Second, lubricate the blade, but not with oil or wax. Instead, use a spray-on kitchen shortening. This will lead to smoother sawing, longer blade life and will cut down on noise.

When you're not working at the band saw, take the tension off the blade. Blades get warm from cutting and can shrink or stretch. If you leave the blade tightened, it can distort or

3 Check to make sure your blade and table slot are parallel by first crosscutting a wide piece of stock. Check the cut with a square. Also, use the cut pieces as a gauge to check that the blade is cutting square to the table.



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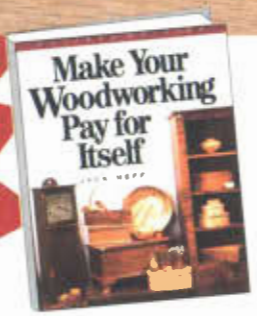

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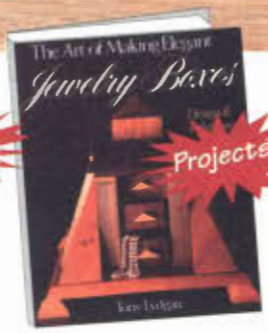

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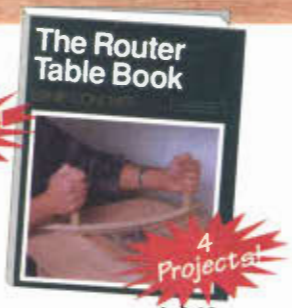

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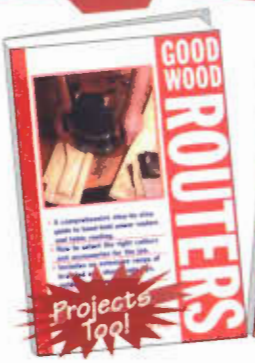

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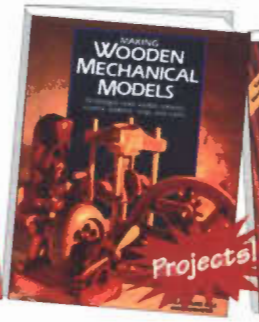

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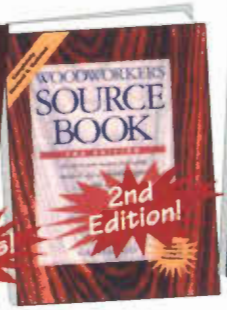

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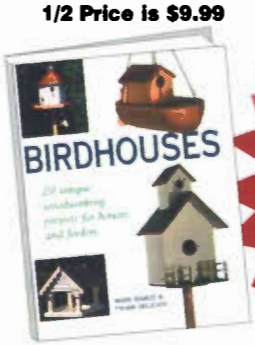

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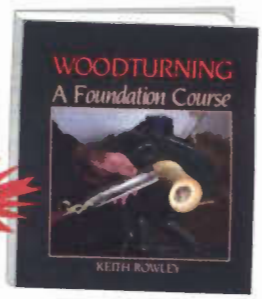

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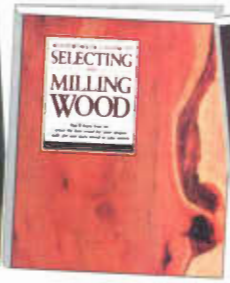

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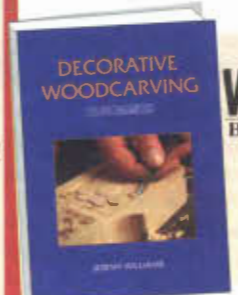

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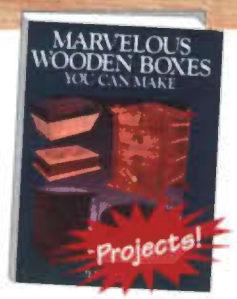

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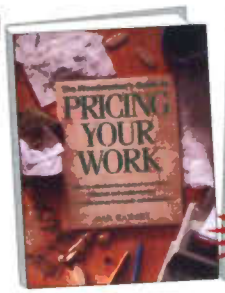

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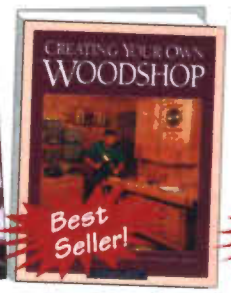

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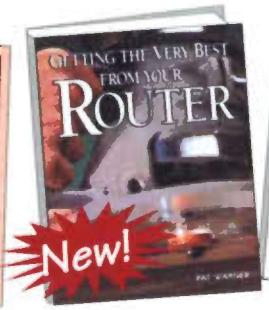

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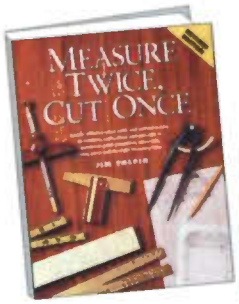

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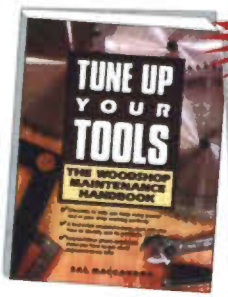

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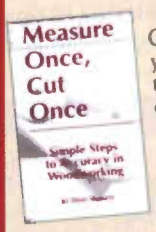

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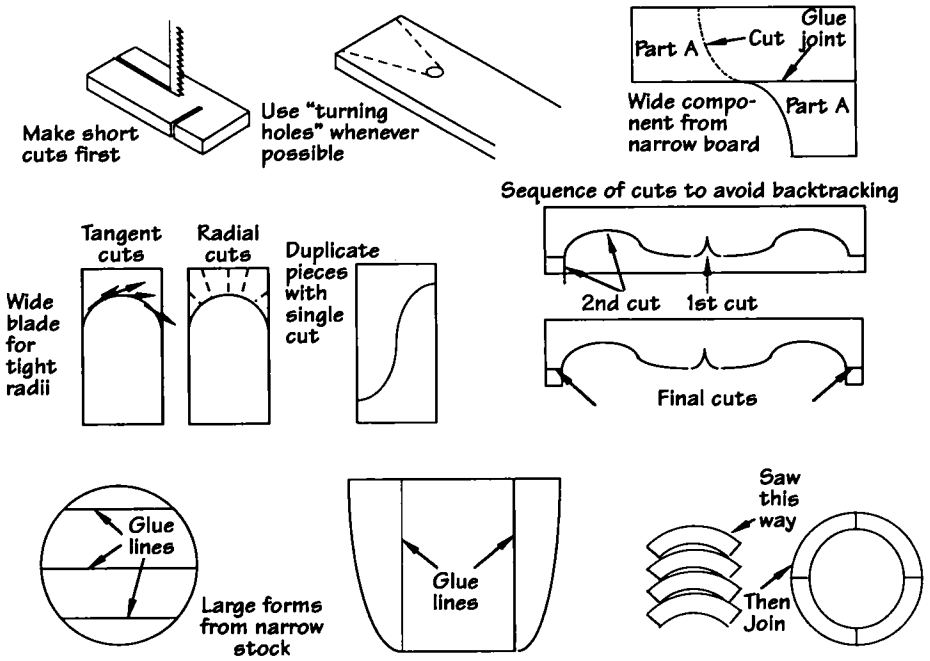
LBU2

flatten the crowns of your tires and strain the tool's bearings and shafts.

To make sure the blade and table slot are parallel, use a miter gauge to cross-cut a wide piece of stock and then check the cut with a square **(photo 3)**. To check the angle between the table and the blade, flip one of the cut pieces and put the two cut ends together. They should mate perfectly. If they don't, adjust the table so the angle between its surface and the side of the blade is 90 degrees.

Diagram 4 CUT TECHNIQUES



When Working

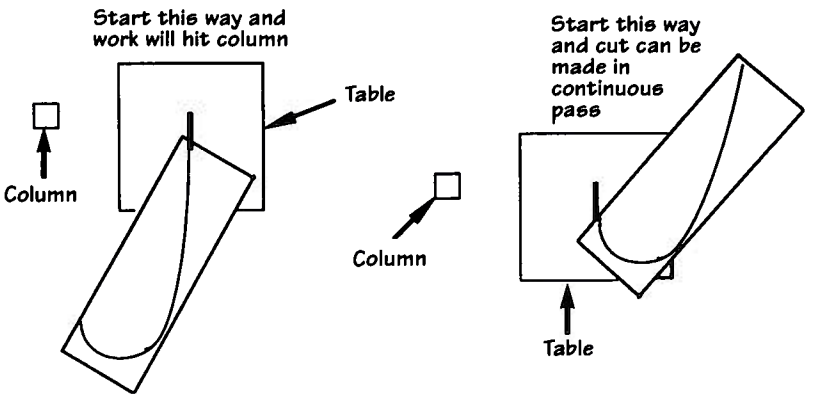
One of the strengths of the band saw — fast cutting — can also be a fault. Not of the machine's, but of the operator's. We all tend to rush our cuts without paying enough attention to wood density, grain structure and the intricacy of the cuts. So it's always necessary to carefully guide the work and let the blade cut at its own pace.

Some thoughts on good cutting techniques are shown in **diagram 4**. Plan your cuts to minimize the amount of backtracking you have to do. To avoid getting "trapped" because of the

Advertiser Index

Diagram 5

AVOIDING TRAPS



4 **Simple ripping can also be done using a fence as a guide. Use a push stick to get work past the blade when there isn't enough room for your hands.**

machine's column, preview the cut before sawing. Determining the best start point **(diagram 5)** helps you avoid complications.

Straight sawing against a fence works well as long as the blade is in good condition **(photo 4)**. I use the simple fence in **diagram 6** for both ripping and resawing. Resawing, in addition to creating many thin boards from a thick one, is also a good way to make identical parts from a single block. First cut the stock to the desired shape. Then slice off the pieces **(photo 5)**.

There are many jigs that can be made for a band saw. One that I really appreciate is the V-block jig shown being used in **photo 6** and that is detailed in **diagram 7**. With this jig you can find the center of stock that is to be mounted in a lathe by making slight intersecting cuts at each end of the material.

No article about band saws would be complete without some mention of

CRIS CUTS

5 Resawing stock that has been cut to profile is the way to produce multiple identical pieces.

6 The V-block jig makes it easy to accurately halve or quarter round or square stock. The sheet metal guide ensures that the work won't rotate as you move it forward.

Diagram 6

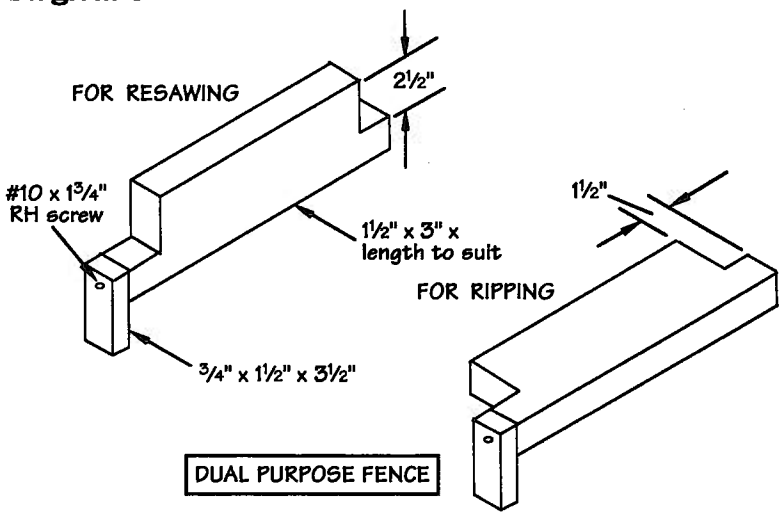


Diagram 7

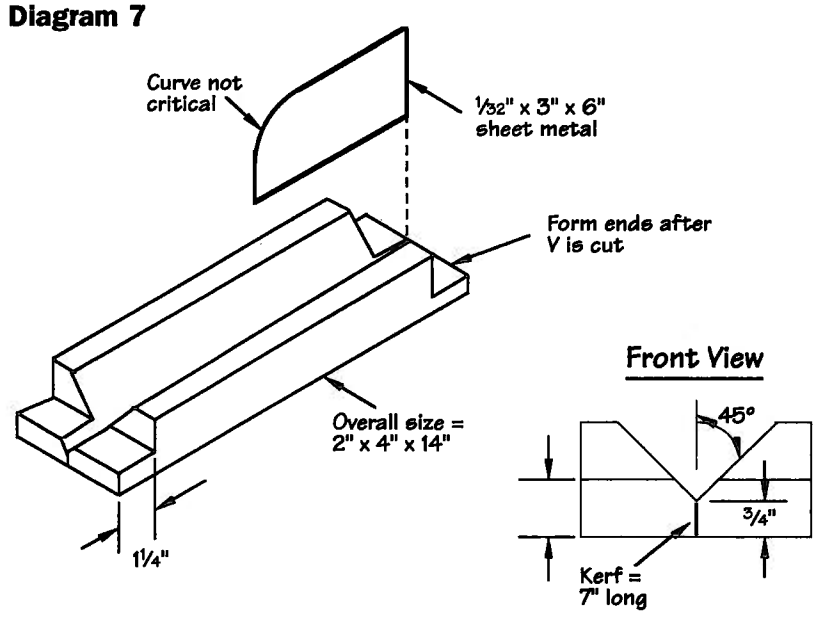
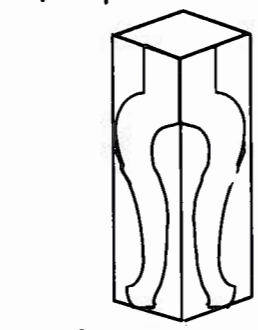
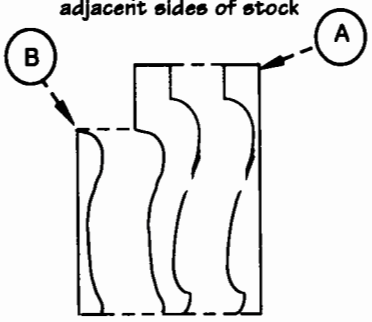


Diagram 8

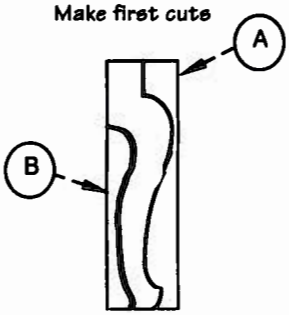
COMPOUND SAWING
(example is a cabriole leg)



Draw pattern on two adjacent sides of stock



Make first cuts



Reassemble parts with tape-flip stock (or a couple dubs of hot-melt glue) 90° and make final cuts

compound sawing. This technique allows you to make a Queen Anne cabriole leg. The first step is to be sure the parent stock is square. Use a cardboard pattern to mark the profile on adjacent sides of the wood **(diagram 8)**. Start sawing by following the profile on one side of the stock. Plan your cuts so there are as few pieces of waste as possible. Next, reattach the waste pieces with tape. Then saw the second side. After this, the waste pieces will fall away to reveal the shape of the leg. Much like a sculptor, this trick allows you to find the envisioned form that was hidden in the wood. **PW**

***R.J. DeCristoforo** has written more than 30 how-to books, including* Jigs, Fixtures and Shop Accessories *(McGraw-Hill).*

NEW PRODUCTS

Popular Woodworking **wants to provide readers with accurate, useful information on the newest tools available, so we've tested many of the products presented here in the *Popular Woodworking* workshop. Taking into consideration cost, design and benefit, we've added our comments about each of the tools tested to help you make decisions about your future purchases.**

"It's a great accessory for scroll sawing, chip carving, marquetry, intarsia, transferring and enlarging patterns, and also helps when scaling furniture from pictures." — PW

Artograph DesignMaster Projector

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Available at art supply stores.
Features:
- **Carbonless transfer of patterns to wood while offering reduction (70%) or enlargement (400%) options**
- **Original pattern can be opaque, color or three-dimensional**
- **Projects horizontally and vertically**
- **Company offers a number of similar products ranging from $75 on up**

For more information, circle #175 on the Resource Directory Coupon.

"This drill feels good in your hand and performs well. At this price it's a great value — add the flashlight and two batteries, and it's a steal." — PW

Hitachi Drill & Flashlight Kit

Contact: Hitachi (800) 362-7297
Retail Price: Model FDS 10DVA Drill & Flashlight Kit - $89
Available in catalogs and stores.

Features:
- **9.6v drill with carrying case, two batteries and one-hour charge**
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Three New Famowood® Products

Contact: Eclectic Products Inc. (800) 349-4667
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Features:
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For more information, circle #177 on the Resource Directory Coupon.

"Titebond's is the best polyurethane glue we've tried. It takes five hours to cure, but the good adhesion, strength and waterproofing are worth the wait." — PW

Titebond® Polyurethane Glue

Contact: Franklin International
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Features:

- Professional strength waterproof glue offers excellent bonding strength in wood-to-wood applications, as well as bonding metal, ceramic, plastic and other porous/non-porous materials
- Thicker formula provides no-drip glue line
- Will not become brittle with age, and will not expand or contract in the glue joint

For more information, circle #178 on the Resource Directory Coupon.

"If you're buying a bench top drill press, spend a couple dollars more and gain an oscillating spindle sander. Craftsman understands the space and pocketbook limitations of the home hobbyist woodworker." — PW

Craftsman Multi-Function Drill Press

Contact: Sears (800) 377-7414
Retail Price: $160

Available through Sears stores and catalogs.

Features:

- Model 21331 functions as both five-speed drill press and oscillating spindle sander
- 6¼" x 6½" cast iron table includes spacer inserts, vacuum attachment and accessory storage
- ⅓ hp induction motor
- 4¼" throat depth with 2" spindle travel during drilling, and ½" sanding stroke in oscillating mode

For more information, circle #179 on the Resource Directory Coupon.

Wilton Pivot Jaw Woodworking Vise

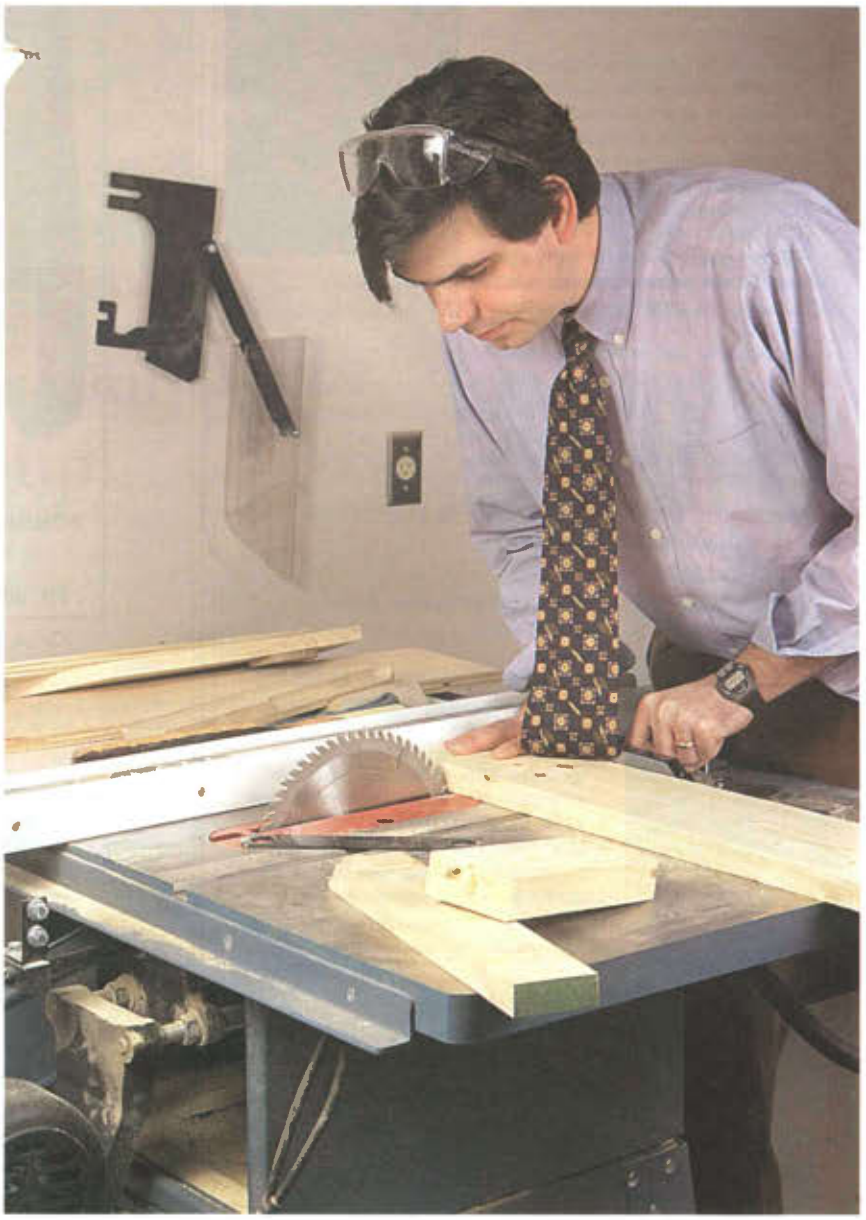
Contact: Wilton Corp. (847) 934-6000
Retail Price: Vise - $120; Jaw inserts - $17
Available direct from Wilton or through catalogs.

Features:

- Front jaw pivots 12° to hold odd-shaped parts
- Pivoting jaw also moves up to act as a full-length bench dog and can be removed for wider clamping
- 4" x 7" jaw, with max. opening of 10"
- Maple jaw inserts protect work from marring, while strong magnets hold inserts in place without slipping

For more information, circle #180 on the Resource Directory Coupon.

21 Table Saw Safety Rules



How many blatant safety problems can you spot in the photo? We count at least eight.

SOMETIMES we get to the point in life when we think that our table saw — our constant companion in the woodshop — is almost human. What's worse, we also begin to think it's obedient. In truth the table saw, like most tools, is more like a classroom bully that is just waiting for you to let your guard down. Two seconds later, you're two fingers short.

So to make sure you still have the required digits to wear that wedding ring, I've compiled a list of 21 table saw safety rules. This list isn't just for the beginning table saw user, some seasoned craftsmen are likely to find a few rules they've forgotten over the years.

Table Saw Safety Quiz

1 In a pinch, you can remove the saw's guard and use a push stick, feather board or holding jig to make a cut.
True False

2 While your table saw is spinning down, using a piece of scrap to stop the blade isn't unsafe as much as it is bad for the motor.
True False

3 Your saw's blade should be raised about 1/8" to 1/4" higher than the material you're cutting.
True False

4 While ripping lumber on the table saw, stand directly behind the blade to keep your stock from getting pinched between the rip fence and blade.
True False

5 When crosscutting multiple pieces of the same length, the rip fence is the best way to gauge the length of those cuts.
True False

6 Never attempt freehand cuts on the table saw.
True False

7 Lightweight gloves are acceptable while cutting rough stock.
True False

8 Using the miter gauge to rip a small piece of square lumber is OK.
True False

9 To help prevent kickbacks while ripping, carefully reach over the running blade to pull the stock through.
True False

10 When ripping long stock, use the buddy system. Have a friend at the other end of the table pull the board through as you push.
True False

Answers: 1. True; 2. False; 3. True; 4. False; 5. False; 6. True; 7. False; 8. True; 9. False; 10. False

Rule 1 Saw Guards Aren't Modern Art

• A safety guard that hangs on a nail in your shop wall is no guarantee that your homeowners' insurance policy will cover you in an accident. In addition to using it, make sure your guard is perfectly aligned and that the anti-kickback fingers or pawl are in good condition. If you have to remove the guard for a special cut, replace it immediately after the cut.

Rule 2 A Clean Machine is Not a Mean Machine

• If pitch has built up on your insert plate, table top or internal gears, clean it and lubricate the gears with white lithium grease, which acts as a plating agent and keeps pitch build-up to a minimum. Check your belts, belt guards and electric cords every few months. If your table is aluminum, clean it with fine-gauge steel wool. Then apply a coat of hard carnauba paste wax.

If the table saw is cast iron, clean badly rusted or pitted tables with extremely fine abrasive finishing paper. Then wipe it clean and wax. Adjust the rip fence according to the manufacturer's recommendations.

Rule 3 Admire the Cut of Your Clothes, Not of Your Fingers

• Proper clothing is essential. In general, wear snug-fitting clothing that is comfortable. Gloves might protect your hands from splinters, but you will lose the sensitivity you need. If you have long hair, wear a baseball cap or hair net. Remove any jewelry or fashion accessories (silk ties, you gentlemen woodworkers) that might get in the way. If you wear a long sleeve shirt, roll the sleeves way up.

Rule 4 A Low Profile

• With few exceptions, the saw blade teeth should be raised no more than 1/8" to 1/4" above the workpiece.

Rule 5 Kickbacks are Bad in Both Politics and Woodworking

• Don't stand directly behind or in line with the saw blade. Pieces are sometimes accidentally thrown back when they get pinched between the blade and the rip fence.

Rule 6 Reaching Across the Dinner Table is Rude; Reaching Across the Table Saw is Dangerous

• Never reach over the blade to hold down or pick up the piece you're cutting. Attach finger boards (sometimes called feather boards) to your rip fence to help hold a long piece.

Rule 7 We Don't Mean to be Pushy, But...

• According to the textbooks, if your cut has less than 5" between the blade and the rip fence, use a push stick. See the Project File section in this issue for two common designs.

TOOL TALK

Rule8

It's a One-Way Street • Never pull a workpiece back through a moving blade. You could get a nasty kickback. Turn off the saw or keep going forward.

Rule9

They're Bad for Each Other • Avoid using the rip fence with the miter gauge unless you also use a clearance block. Clamp a clearance block to the rip fence when you need to make multiple cuts to length with the same set-up.

Rule10

Make Sure Your Rabbets Can Go Outside • When making a two-pass rabbet, make sure the scrap piece is on the outside of the blade to avoid the scrap becoming a "hidden arrow," shooting back at great speed.

Rule11

Don't Be a Switch-Hitter • Unless the board is square, don't rip with the miter gauge or crosscut with the rip fence.

Rule12

Save It for the Band Saw • Cut only straight lines with your table saw and use the rip fence or miter gauge to guide you.

Rule13

Backwards Is Bad • Make sure your table saw's blade has the teeth pointing toward the operator. If the teeth are facing the wrong way, the blade will bind the work. Also make sure your blade is sharp, properly set and free of pitch.

Rule14

Stick It to Those Scraps • Use a push stick (never your fingers) to knock short scraps away from the blade.

Rule15

No Daring Rescues, Please • If the wood binds in the saw, don't try to free it while the saw is running. Turn the saw off and hold the wood firmly in place until the blade has stopped spinning.

Rule16

Bad Vibes? Turn It Off • If your saw starts to make strange vibrations or sounds, turn it off and crank the blade down all the way. Unplug the saw, then find and fix the problem before using the machine again.

Rule17

Old Wood Is Not Like Old Money • When possible, use well-seasoned wood that is free of twists, warps, winds or knots. Avoid cutting previously used lumber. If the blade hits a nail, it could come shooting out like a bullet.

Rule18

Naps Save Lives • If you feel yourself getting tired, do yourself a favor and clock out.

Rule19

Become Powerless • Always disconnect the power supply before changing blades. Keep it disconnected when there are children around.

Rule20

No Back-Seat Sawyers • Never allow anyone behind you while making a cut.

Rule21

Rip 'n' Roll, Baby • Finally, use a roller stand on the outfeed side of the table to support long stock.

So the next time you're getting tired, or ripping a long piece of narrow pine without a push stick, remember this sobering thought: A 10" sawblade travels at about 115 miles per hour. And anything going that fast deserves a little respect. **PW**

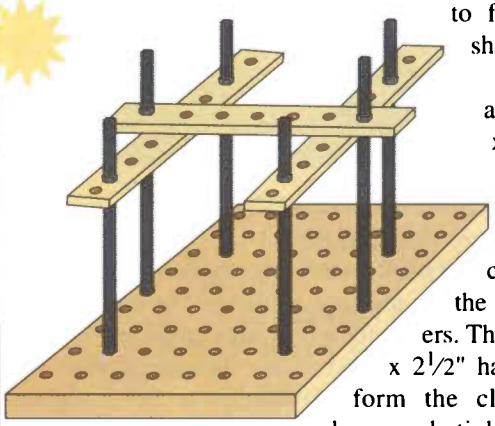
__Don Kinnaman__ is a retired woodworking teacher who taught the craft for 40 years.

Tricks of the Trade shares readers' ideas for making woodworking tasks easier and safer. Send your original, unpublished ideas to Tricks of the Trade, *Popular Woodworking*, 1507 Dana Ave., Cincinnati, OH 45207. If needed, please illustrate with a color photo or diagram. We pay $35 for each trick published; the best tip wins Ryobi's new Detail Biscuit Joiner, which uses miniature biscuits that fit where standard biscuits won't.

WINNER

Universal Box Clamping Jig

Most of my woodworking is building boxes. I wanted a quick and easy way to glue tops and bottoms without using clamps all around the edges, and then having to align the top and bottom at the same time. I came up with a hand screw-type clamping jig that can be adjusted to fit any size or shape box.

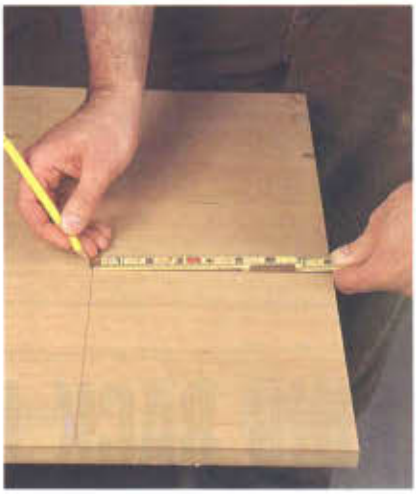


Start by cutting and gluing 1¼" x ¾" strips to the bottom of the plywood base to allow clearance for the nuts and washers. Three pieces of 1" x 2½" hardwood pieces form the clamps held in place and tightened by six lengths of threaded rod. Half-inch diameter holes are drilled in the plywood base as shown. I start tightening with the short clamp first, then tighten the longer clamps. This prevents bowing.

Mario Muratore
Murrieta, California

Tricks Worth Repeating

We see many tricks that aren't "fresh" but are well worth repeating every so often. It helps remind us that what we know shouldn't be taken for granted, and it gives novice woodworkers a trick they'll use for the rest of their lives.



One such trick from the *Pop Wood* staff is a replacement for a combination square. When you don't need an absolutely accurate line drawn on a piece (say for a shooting/nailing line or layout line) all you need is a wooden folding rule, a pencil and your two hands. Lay the rule on your piece the proper distance in, then hold the rule in your left hand with your index finger against the edge of the piece. With your pencil against the tip of the rule, slide both hands the length of the piece, using your left hand as a guide against the piece's edge. Your line will be within a 1/64" to either side of accurate. You'll never have to look for your combination square again.

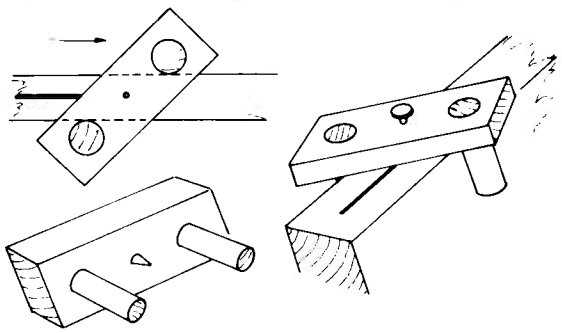
Slick-Fitting Connections

The plastic fittings, nozzles and extension tubes on shop vacuums can be really tough to get apart sometimes. To help minimize "separation anxiety," yet maintain a good snug fit, I use car wax. After wiping clean the areas that make contact, apply a good coat of paste car wax, then buff well. The wax film enables the pieces to mate smoothly, yet doesn't attract dirt like oily lubricants. I repeat the procedure from time to time as needed.

R.B. Himes
Vienna, Ohio

Middling Jig

This is another trick that's so useful it's been turned into commercially available jigs. Simple is still the best.



There are many times we require a line exactly in the center on the edge of a board, as when marking dowel positions. This simple shop-made tool will scratch a center line on the edge of any board within its capacity. It consists of two pieces of dowel rod projecting from a piece of wood and a nail with its point projecting midway between them. In use, you twist the tool over the wood so the dowels bear tightly against it and move it along while pressing down to make the nail point scratch. If you make the space between the dowels 1½", you can draw center lines on wood from about ½" up to 1¼" thick. A pencil can be substituted for the nail, and a larger jig can be mounted to a router for making accurately centered mortises.

Percy W. Blandford
Warwickshire, England

Two Shorts Make a Long

And yet another oft-repeated trick.

Ever need a 36" clamp, but you only own a pair of 24" clamps? Put the two together to make a temporary 48" clamp. This math works for any sized clamps and, except for the possibility of some minor bowing across the length, makes an economical solution to never having enough clamps.

Patrick Curran
Durham, North Carolina

Hi-Tech Lettering Stencils

The custom toy truck shown was built for a customer and intended as a family heirloom. The customer needed her son's name on it for posterity. Rather than chip carve the name, to save expense I decided to wood burn the lettering, but finding the appropriate size and style lettering for the truck proved impossible.

That night in bed it struck me that my computer has a gazillion lettering styles, and any size could be tried until just the right combination was found. It worked like a charm. I found the size and style I wanted, printed out the name and used carbon paper to transfer the letters to the truck. Then I burned the name in.

The project was complete, and I had added another trick to my bag that I'll use over and over again.

James A. Leach
Virginia Beach, Virginia

American White Ash

(Fraxinus americana)

Other Common Names: Canadian Ash and White Ash

Growing Regions: Canada and United States

Characteristics of Tree: A small- to medium-sized tree, about 50 to 60 feet in height, with a trunk approximately 2' 6" in diameter.

Characteristics of Wood: A coarse but usually straight-grained wood with almost white sapwood and pale-brown heartwood. The end wood shows abrupt change in pore size between early and late wood, with the pores of the late wood being large and arranged in a clearly defined ring. Overall, a strong, tough wood.

Workability: Can be worked well with hand and machine tools. Moderate blunting effect on cutting edges. It glues well.

Common Uses: Sports equipment and tool handles, boatbuilding, joinery, plywood and decorative veneer.

Availability: Abundant

Wood Movement: The timber dries rapidly with little degrade; only small movement in service.

Finishing Characteristics: It stains and finishes well.

Special Features: Good steam-bending and shock-resistant properties.

Midwest Price: Lumber surfaced on two sides, 4/4, costs about $2.26 a board foot. **PW**

Practical Cabinets

If space is tight and so is your wallet, these cabinets let you store more.

WHEN THE STORAGE SPACE IN YOUR SHOP, garage or basement runs out, these utility cabinets are an affordable solution. Medium density fiberboard (MDF), a plastic laminate countertop and some hardware make this project a $250 alternative to purchased cabinets.

This project also is a lesson in basic cabinet construction techniques you can be use to build cabinets throughout the house. Just choose the type of cabinet you need and adjust the dimensions to fit your space. Change the MDF to a better-grade material, and you're ready to build a complete set of kitchen cabinets.

As you prepare to make your cuts from the Schedule of Materials, notice the efficient use of materials. Standard cabinet sizes allow for very little waste. The 24" cabinet depth yields two pieces from the width of the standard 4' x 8' sheet of ¾" MDF (which is most often actually 49" x 97" to allow for kerf). The standard 36" cabinet width yields two pieces in the length and about two feet of falloff, which works great for shelves or doors.

STEP 1 One Visit to the Table Saw • This project starts at the table saw, and because you've already reviewed the Schedule of Materials, you've no doubt noticed a number of dimensions that repeat throughout the schedule. Plan your cuts so that most of the settings that are identical can be done at the same time. This way you don't end up with one cabinet that's 24" deep and another one that's *almost* 24" deep.

Once the pieces are cut to width and length, ½" x ¾" rabbets are cut into the top and bottom edges of all the base cabinet sides, on the top edge of the wall cabinet sides, and on both ends of each base front. A ½" x ¼" rabbet is cut

WOOD´WORDS (wood´wurds) n.

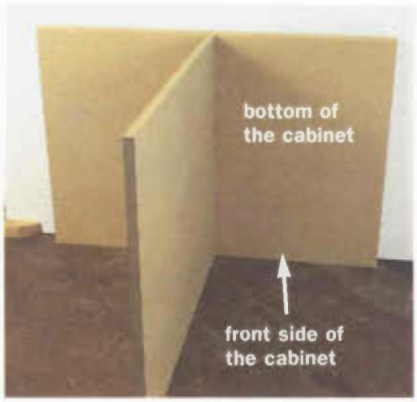
French cleat: A cleat commonly used to hang something heavy to a wall that consists of two pieces of wood whose edges meet at an interlocking 45 degree angle. One piece of wood is attached to the wall, the other to the back of the item to be hung.

kerf: The amount of wood removed by the thickness of the saw's blade.

hand screw: A clamp made of two blocks of wood and two metal screws that's handy for holding panels upright for screwing. (See our Project File section for details on making your own hand screw.)

1 ONE-STOP CUTTING • Given a reliable Schedule of Materials, an entire project can be cut out at one time. This saves a lot of time going back and forth from the saw, and it also improves uniformity in the cabinetry. Similar-sized pieces can all be cut at the same time. Each cabinet can be marked and stacked together so that all the pieces are ready to be assembled. Shown above is the entire utility cabinet project just off the table saw and ready to move to assembly.

2 MAKE THE BASE • All the bases are assembled similarly and are designed to be separate from the cabinet. Rabbets are used to limit the amount of MDF "end grain" shown in the front and to strengthen the joint. Levelers mounted in blocks are then glued and screwed into place in the corners of the bases. The loose bases can be leveled to the floor without having to move the cabinets for each adjustment. When the bases are level, the cabinets are attached and then fastened to the wall.



3 CENTER PARTITION • First the bottom is marked for the center partition and a shooting or nailing line is struck on the underside. The cabinet is assembled face down so the back rabbet can be flushed up with the center partition. I align from the back because it's easier to plane any unevenness from the front, rather than trying to plane inside a rabbet. The partition is held vertically with a hand screw and then glued. Then use nails, staples or screws to attach the pieces.

for the 1/4" backs on the back edge of each side, bottom and top rear stretcher.

The wall cabinet is rabbeted 1/2" x 1" on the back edge of the sides and top. This allows space for the combined thickness of the 1/4" back and the 3/4" French cleat that hangs the cabinet on the wall.

A dado set works best to cut the rabbets. Always work from the remaining 1/4" stub shoulder of the rabbet so that the overall dimensions of the cabinet are determined by what is left, not what was removed.

STEP 2 Build the Bases • All the bases can be constructed at one time, with the cleats being first fastened to the fronts and backs to form L-shaped pieces. These are then fastened between the two ends. The cleats provide rigidity and squareness to the bases while also offering a plate to screw through to attach the bases to the cabinet bottoms.

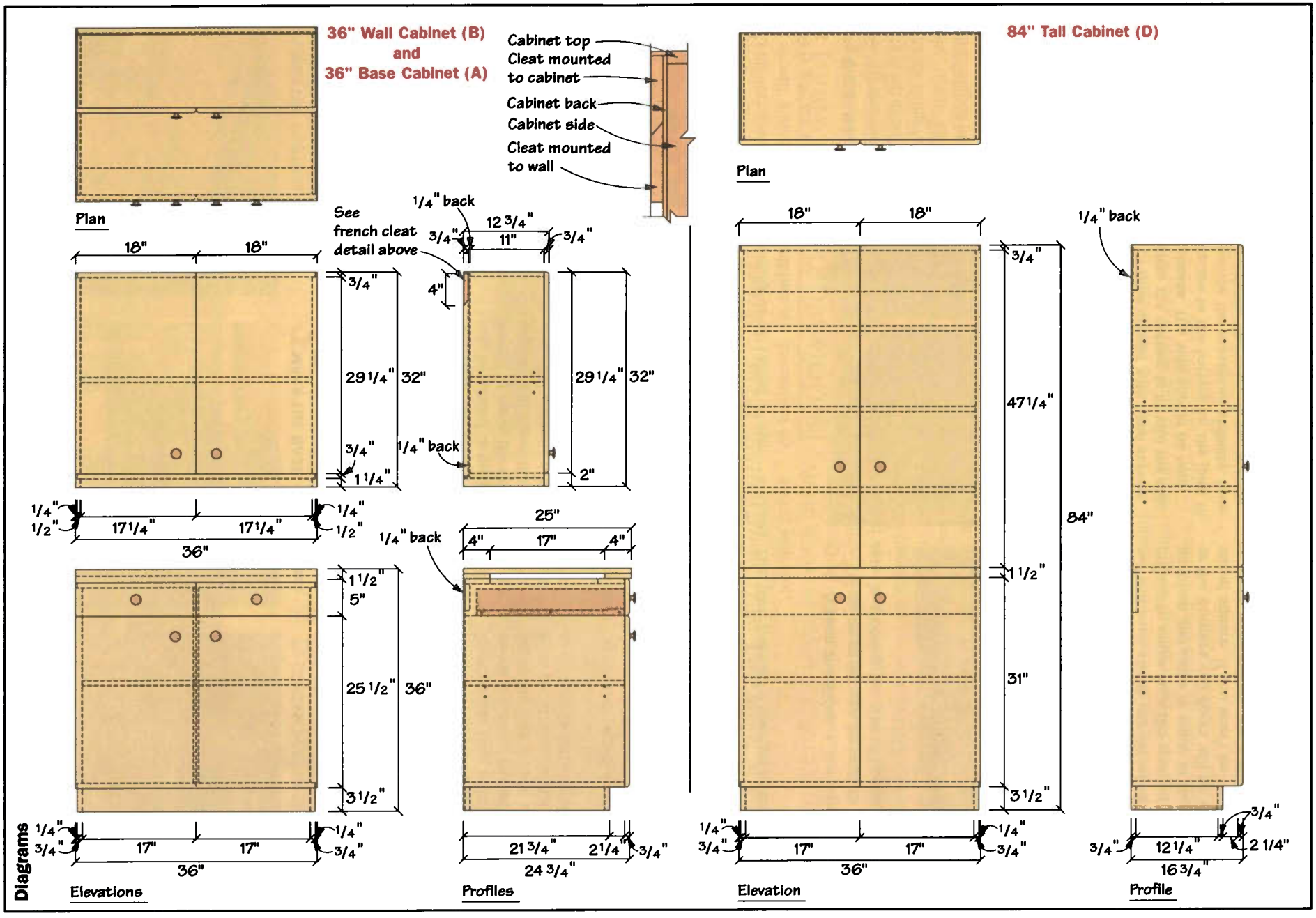
Whatever type of leveler you opt to use, the time and minor expense is worth the effort. Notice in the photo above that my floor slopes dramatically toward a drain under the left cabinet. Levelers saved the day. They also are important to achieve door and drawer fitting.

STEP 3 Begin Building • Construction is identical in all the cabinets with very minor differences. The photos show the construction of the 36" base cabinet. The only cabinet with a center partition is the 36" base cabinet, though the knee space uses a short partition to hang drawer slides. That partition can be screwed to the top stretchers during step five.

4 FIT THE SIDES • The sides are held upright with hand screws while the bottom is fit into the side rabbets. The side should be held square to the bottom for the joint to provide the maximum stability. Glue and fasten the sides to the bottom by nailing up through the bottom into the sides. This way no fasteners show on the finished side surface.

STEP 4 Attach the Sides • The sides are glued and nailed up through the bottoms on all the cabinets. In choosing the type of fastener to use, you'll

5 WATCH THE SPACING • The top stretchers and back cleats are attached next. It is critical to make sure the spacing between the partition and sides is equal at top and bottom, or the drawers and doors will be sloppy, tight or out of square. If you won't be tacking the back in place immediately, it's a good idea to clamp a square corner brace into the cabinet while the glue dries to assure a square cabinet and sturdy joints.


36" Wall Cabinet (B)
and
36" Base Cabinet (A)
Cabinet top
Cleat mounted
to cabinet
Cabinet back
Cabinet side
Cleat mounted
to wall
84" Tall Cabinet (D)
Plan
Plan
See
french cleat
detail above
1/4" back
18"
18"
3/4"
29 1/4"
32"
3/4"
1 1/4"
1/4"
1/2"
17 1/4"
17 1/4"
36"
12 3/4"
11"
4"
2"
25"
4"
17"
1 1/2"
5"
25 1/2"
3/4"
17"
21 3/4"
21/4
24 3/4"
47 1/4"
31"
84"
12 1/4"
2 1/4"
16 3/4"
Diagrams
Elevations
Profiles
Elevation
Profile

6 DRILL SHELF HOLES • Templates for drilling shelf pin holes make the process a lot easier and more accurate. I usually allow 1" spacing between shelf hole heights, and depending on the cabinet size, allow for three or five locations for each shelf. The spacer block inserted over the drill bit keeps me from drilling through the cabinet side. If you're drilling both sides of a partition (like the 36" base cabinet) make sure you offset the holes about 1/2" on either side so the shelf pins won't interfere with one another.

7 EASY EUROPEAN-STYLE HINGES • Concealed hinges are actually very easy to install and offer unparalleled adjustment options. They are installed using a drill press and a 35mm diameter boring bit (available for about $30). The hinges and mounting plates are available for full overlay doors, half overlay doors, inset doors, or a special plate allows them to be used with face frame cabinets. For our hinges, the bit is set to drill 3/16" from the door edge and four inches in from the top and bottom door edges to give us a full overlay cabinet door.

Schedule of Materials: 36" Base Cabinet (A)

No.	Item	Dimensions T W L	Material
2	Sides*	3/4" x 24" x 31"	MDF
1	Bottom*	3/4" x 24" x 35 1/2"	MDF
2	Top stretchers*	3/4" x 4" x 35 1/2"	MDF
1	Partition	3/4" x 23 3/4" x 29 1/2"	MDF
2	Back cleats	3/4" x 6" x 16 7/8"	MDF
2	Shelves	3/4" x 16 11/16" x 23 1/2"	MDF
2	Doors	3/4" x 17 15/16" x 25 13/16"	MDF
2	Drawer fronts	3/4" x 5" x 17 15/16"	MDF
1	Back	1/4" x 35 1/2" x 30 1/2"	MDF

Schedule of Materials: 36" Wall Cabinet (B)

No.	Item	Dimensions T W L	Material
2	Sides*	3/4" x 12" x 32"	MDF
1	Top*	3/4" x 12" x 35 1/2"	MDF
1	Bottom*	3/4" x 12" x 34 1/2"	MDF
2	Shelves	3/4" x 10 3/4" x 34 5/16"	MDF
1	Bottom fascia	3/4" x 2" x 36"	MDF
2	Doors	3/4" x 17 15/16" x 29 15/16"	MDF
1	Back	1/4" x 30 1/2" x 35 1/2"	MDF
1	Hanging cleat	3/4" x 9" x 35 1/2"	Plywood

Schedule of Materials: 16" Base Cabinet (C)

No.	Item	Dimensions T W L	Material
2	Sides*	3/4" x 24" x 31"	MDF
1	Bottom*	3/4" x 15 1/2" x 24"	MDF
2	Top stretchers*	3/4" x 4" x 15 1/2"	MDF
1	Back cleat	3/4" x 6" x 14 1/2"	MDF
2	Shelves	3/4" x 14 5/16" x 23 1/2 "	MDF
1	Door	3/4" x 16" x 30 7/8"	MDF
1	Back	1/4" x 15 1/2" x 30 1/2"	MDF

Hinges and slides available through
The Woodworkers Store - (800) 279-4441

*Piece requires rabbet cuts.

Schedule of Materials: 84" Tall Cabinet (D)

No.	Item	Dimensions T W L	Material
2	Sides*	3/4" x 16" x 81 1/2"	MDF
2	Top & bottom*	3/4" x 16" x 35 1/2"	MDF
1	Fixed shelf	3/4" x 15 3/4" x 34 1/2"	MDF
2	Back cleats	3/4" x 6" x 34 1/2"	MDF
4	Shelves	3/4" x 15 1/2" x 34 5/16"	MDF
2	Upper doors	3/4" x 17 15/16" x 48 7/8"	MDF
2	Lower doors	3/4" x 17 15/16" x 30 7/8"	MDF
1	Center fascia	3/4" x 1 1/2" x 36"	MDF
1	Back	1/4" x 35 1/2" x 81"	MDF

Schedule of Materials: Knee Space

No.	Item	Dimensions T W L	Material
2	Sides*	3/4" x 4 1/2" x 23 1/2"	MDF
1	Partition	3/4" x 4 1/2" x 22 3/4"	MDF
2	Stretchers*	3/4" x 5" x 36"	MDF
1	Back cleat	3/4" x 3 3/4" x 35"	MDF
2	Drawer fronts	3/4" x 5" x 17 15/16"	MDF

Schedule of Materials: Drawers

No.	Item	Dimensions T W L	Material
8	Sides	1/2" x 3 3/4" x 21"	Birch ply
4	Fronts	1/2" x 3 3/4" x 15 1/4"	Birch ply
4	Backs	1/2" x 3 1/4" x 15 1/4"	Birch ply
4	Bottoms	1/4" x 15 3/8" x 21 3/4"	Birch ply

Schedule of Materials: Bases (letters refer to cabinet type)

No.	Item	Dimensions T W L	Material
4	Sides (A & C)	3/4" x 3 1/2" x 21"	MDF
2	Fronts (A & D)*	3/4" x 3 1/2" x 35 1/2"	MDF
2	Backs (A & D)	3/4" x 3 1/2" x 34"	MDF
4	Cleats (A & D)	3/4" x 3 1/2" x 34"	MDF
1	Front (C)*	3/4" x 3 1/2" x 15 1/2"	MDF
1	Back (C)	3/4" x 3 1/2" x 14"	MDF
2	Cleats (C)	3/4" x 3 1/2" x 14"	MDF
2	Sides (D)	3/4" x 3 1/2" x 12 1/2"	MDF

Box Drawers

The drawers are simple box construction using the same type of rabbet joint as used on the cabinets. A 1/2" x 3/8" rabbet is cut into the front and back edge of each drawer side, then a 1/4" x 1/4" groove is run 1/4" up from the bottom edge of each drawer side and front.

The drawers are simply nailed together aligning the grooves and holding the drawer back flush to the top of the groove. The drawers' bottoms are cut to fit into the grooves and tacked in place through the drawer back.

I used enamel-coated undermount drawer slides that were rated to hold 75 pounds, which attach and adjust fairly well and provide a smooth-running drawer with a positive closing motion. To attach the knobs, drill and countersink a hole in the MDF drawer front and attach the knob. Then drill holes in the drawer box front, align the drawer front to the cabinet and doors and attach with screws.

8 TEMPLATE FOR HINGE PLATE • The hinge mounting plate is easily attached to the cabinet side by again using a template. You can buy a template for about $5, or you can just make your own with a couple pieces of scrap. A center line on your template then lines up with center lines marked on the cabinet, and pilot holes are drilled. When marking the plate locations on the cabinet, make sure your measurements are taken from only one edge of the doors and transferred to the cabinet from only the edge where the door will fit flush with the cabinet.

need to consider what tools are available to you, and how worried you are about the fastener being visible. I had the luxury of using a pneumatic fastener, but a plain old 2" nail works just as well.

STEP 5 Add the Stretchers • The top stretchers are attached next with the rabbeted back stretcher aligning with the side rabbets. On the tall cabinet there is no top stretcher, but rather a full top. It attaches just as the bottom did. Also on the tall cabinet there is a center fixed shelf that is attached between the sides. This can also be glued and fastened in place at this time.

The back cleats should then be fastened in place on all the cabinets. While the cleats' primary function are to attach the cabinets to the wall, they also help square up the cabinet before the back is installed.

The wall cabinet's construction is a little different. The bottom is cleated or biscuited to the sides 2" up from the bottom edge to leave space for an undermount fluorescent light fixture. The top attaches to the sides just as in the other cabinets, but there is no back cleat as the cabinet uses a French cleat to hang on the wall. The bottom fascia is then attached to the front of the cabinet. A similar fascia is attached to the front of the tall cabinet, flush to the top of the fixed shelf.

STEP 6 Locate the Shelves • Shelf holes are next drilled in all of the cabinets. A piece of 1/4" masonite makes a handy template to make this step easier. Shelf locations are up to your individual needs, but as a general rule, every 10" to 12" is adequate spacing.

STEP 7 Boring the Europeans • I opted for concealed European-style hinges because they're very forgiving when it comes to adjustment; they're also not visible from the outside, leaving a clean line on the cabinets. The only expense necessary beyond the cost of the hinges themselves is a 35mm Forstner bit the appropriate size for the hinge cup. Once you've used these hinges you'll be looking for projects to use them again.

STEP 8 Attach the Hinge Plate • The doors mount to the interior sides with a plate. The beauty of these hinges is their adjustability. With the turn of a screw, you can adjust them up and down, in and out, and side to side. It takes a few minutes to figure out which adjusting screw to turn, but you'll easily get the hang of it.

With the doors hung, the last construction step is the drawers. Most woodworkers have a particular way they like to make drawers, so I'll let you decide how to make yours. The Schedule of Materials provides cutting sizes for the drawer fronts and for the style of drawers that I used. The sidebar on box drawers explains the construction in detail.

MDF doesn't really require any finish at all, but I chose a simple clear finish purely to protect the cabinets from moisture. I think the MDF finished up nicely with a couple of coats, giving them a parchment look. If you'd like your cabinets to be more attractive, paint is always an option.

The top was a 96" kitchen top purchased at the local building supply store. If you prefer something simpler (and cheaper), a piece of 3/4" MDF with a sheet of 1/4" masonite attached to the top provides a durable and replaceable work surface.

Leveling and setting the base cabinets is reasonably self-explanatory, but the French cleat used on the wall cabinet is a little special. The cleat is formed by simply setting the table saw blade to a 45 degree angle and splitting the 9" piece to 4" and 5" pieces. One piece is screwed to the back of the cabinet, while the other is screwed to the wall. The two pieces interlock when the cabinet is slid into place. **PW**

—Steve Shanesy, David Thiel, PW staff

Bread Box

Plastic bags and preservatives might have undermined the need for a bread box, but it remains a handy place to store one of the few food items we consume every day.

STEP ONE: Prepare the stock to the sizes given in the Schedule of Materials.

STEP TWO: Cut the angles on the box sides as shown in the diagram.

STEP THREE: Cut 1/8" x 1/8" tenons on the short ends of the box sides and the ends of the back as shown in the diagram. Now make the mating grooves on the inside of the front and rear of the sides.

STEP FOUR: To house the bottom, cut a 1/4" groove 3/16" deep that's 1/4" up from the bottom edge of the box.

STEP FIVE: Dry-fit the pieces before gluing them together.

STEP SIX: Cut the angles on the top and lid parts as given in the diagram then rout the round edge profile. Now mortise the mating edges of the top and lid for the hinges. When done, nail the top in place allowing equal overhang on the back and sides. Next glue the angled lid pieces together **(see photo below)**.

STEP SEVEN: To complete the lid, glue the walnut "lid lift" in place. Next install the hinges. You'll note that a small portion of the side tenon projects up, preventing the lid from closing completely. Cut it off. Also cut small notches in the back edge of the walnut where it meets the sides so the lid can close completely.

STEP EIGHT: Prepare the moulding that fits around the base. Since it's small, rout the profile on the edge of a wider board, then rip off the moulding using the table saw, rout another profile, rip off, etc. Miter and fit the ends of the moulding. Use hot melt glue to apply.

STEP NINE: Use the pattern in the PullOut™ Plans for drilling the holes for the heart pattern. The ventilation helps prevent mold (the green stuff, not the decorative trim). We weren't sure if holes were necessary on bread boxes, so we posed the question on the "rec.woodworking" site on the Internet. In a nutshell, if you buy bread in a plastic bag, it doesn't matter. If you're a bread afficionado, you probably have your own opinion on ventilation and don't need advice from a (wood) butcher!

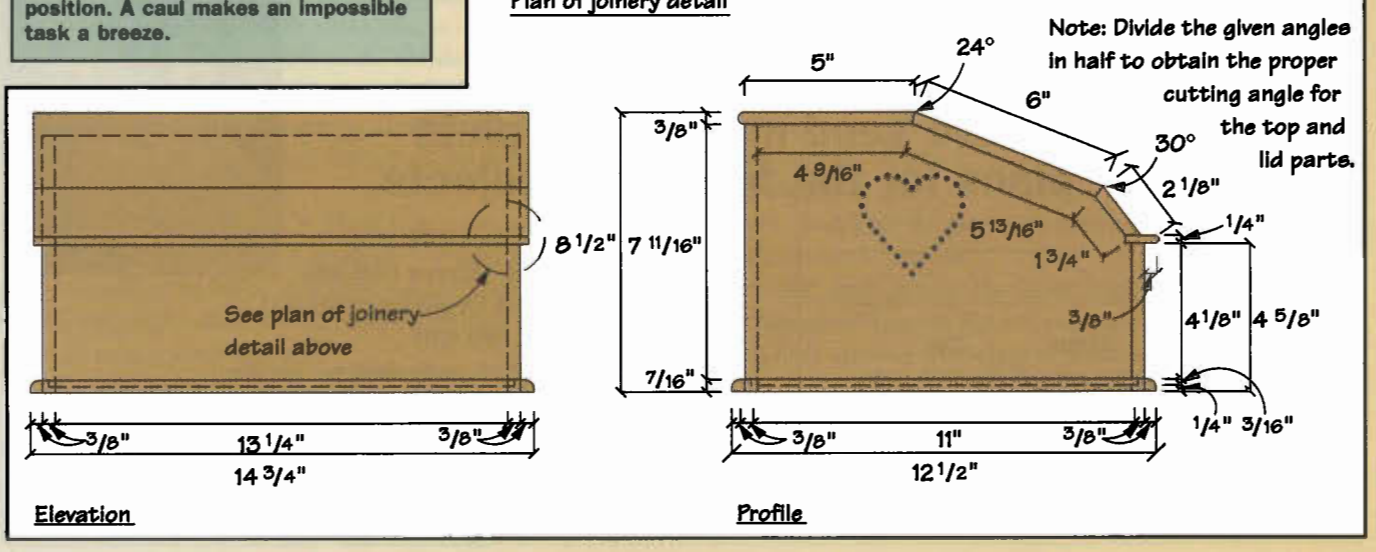
STEP ELEVEN: To finish, use lacquer, but any film finish, like varnish, shellac or polyurethane would suit. I finished only the outside of the box but finished both sides of the lid.

—Steve Shanesy, PW staff

Take the hassle out of gluing pieces at an angle like the bread box lid by making simple clamping cauls. The caul brings the pressure in line with the joint. Make the plywood caul by tracing the shape of the angled section then cutting it out. Put a "hook" on the caul that pulls the part into position. A caul makes an impossible task a breeze.

Schedule of Materials: Bread Box

No.	Item	Dimensions T W L	Material
2	Sides	3/8" x 8 1/8" x 11 3/8"	Red Oak
1	Front	3/8" x 4 5/8" x 14"	Red Oak
1	Back	3/8" x 8 1/8" x 13 1/2"	Red Oak
1	Bottom	1/4" x 11 5/16" x 13 5/8"	Red Oak Ply
1	Top	3/8" x 5 1/4" x 14 1/2"	Red Oak
1	Lid piece	3/8" x 6 1/4" x 14 1/2"	Red Oak
1	Lid piece	3/8" x 1 3/4" x 14 1/2"	Red Oak
1	Lid lift	1/4" x 1" x 14 1/2"	Walnut
Moulding		60" of 7/16" x 3/8"	Red Oak



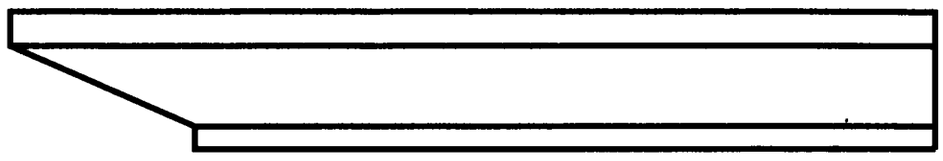
PullOut™ Plans #97

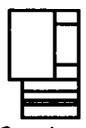
Popular Woodworking

Carefully open staples to remove plans, then bend them closed again.

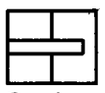
INSIDE

Arts and Crafts Clock

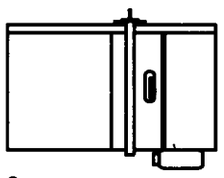




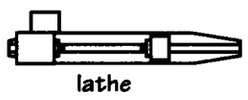
Stationary sander



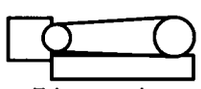
Band saw



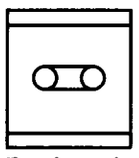
Contractors saw



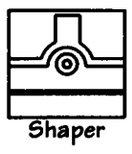
lathe



Edge sander

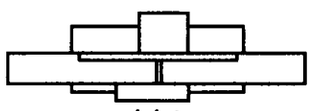


Panel sander

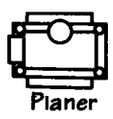


Shaper

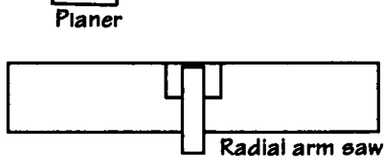
Cabinetmakers saw



Jointer



Planer

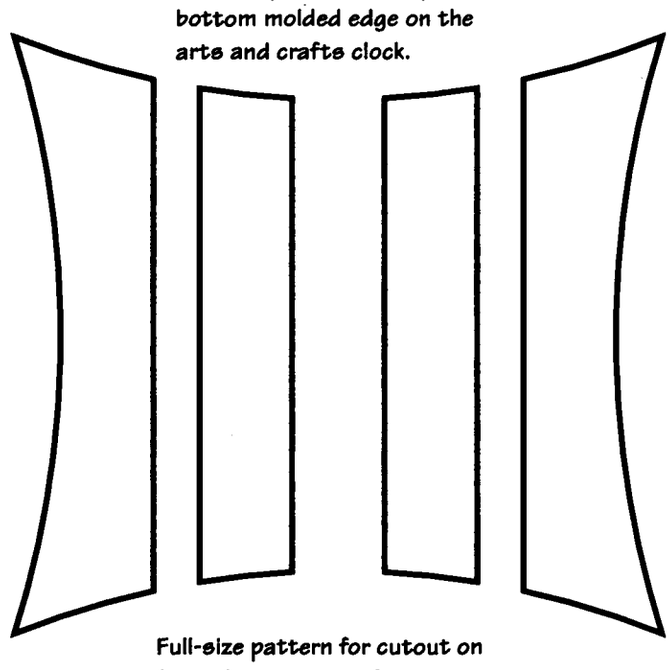


Radial arm saw

Dust Collection

1/4" scale icons for placement in a dust collection design. Hint: Use some graph paper with a 1/4" grid. This will make the job easier.

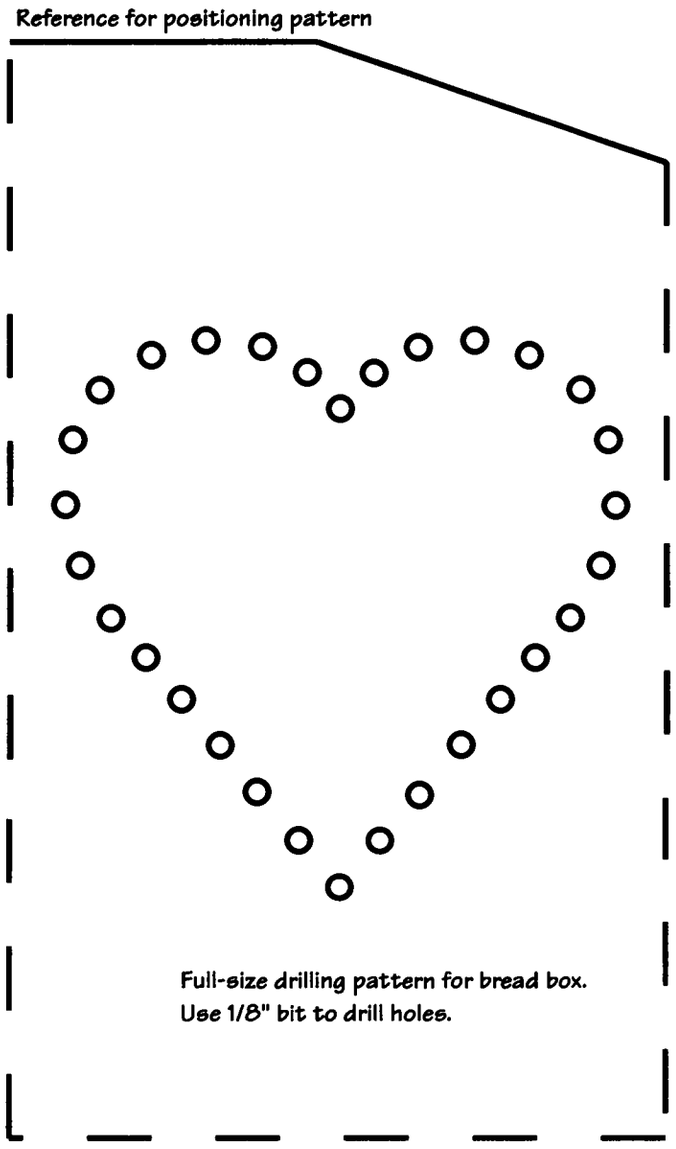
Full-size pattern for top and bottom molded edge on the arts and crafts clock.



Full-size pattern for cutout on face of arts and crafts clock

Bread Box

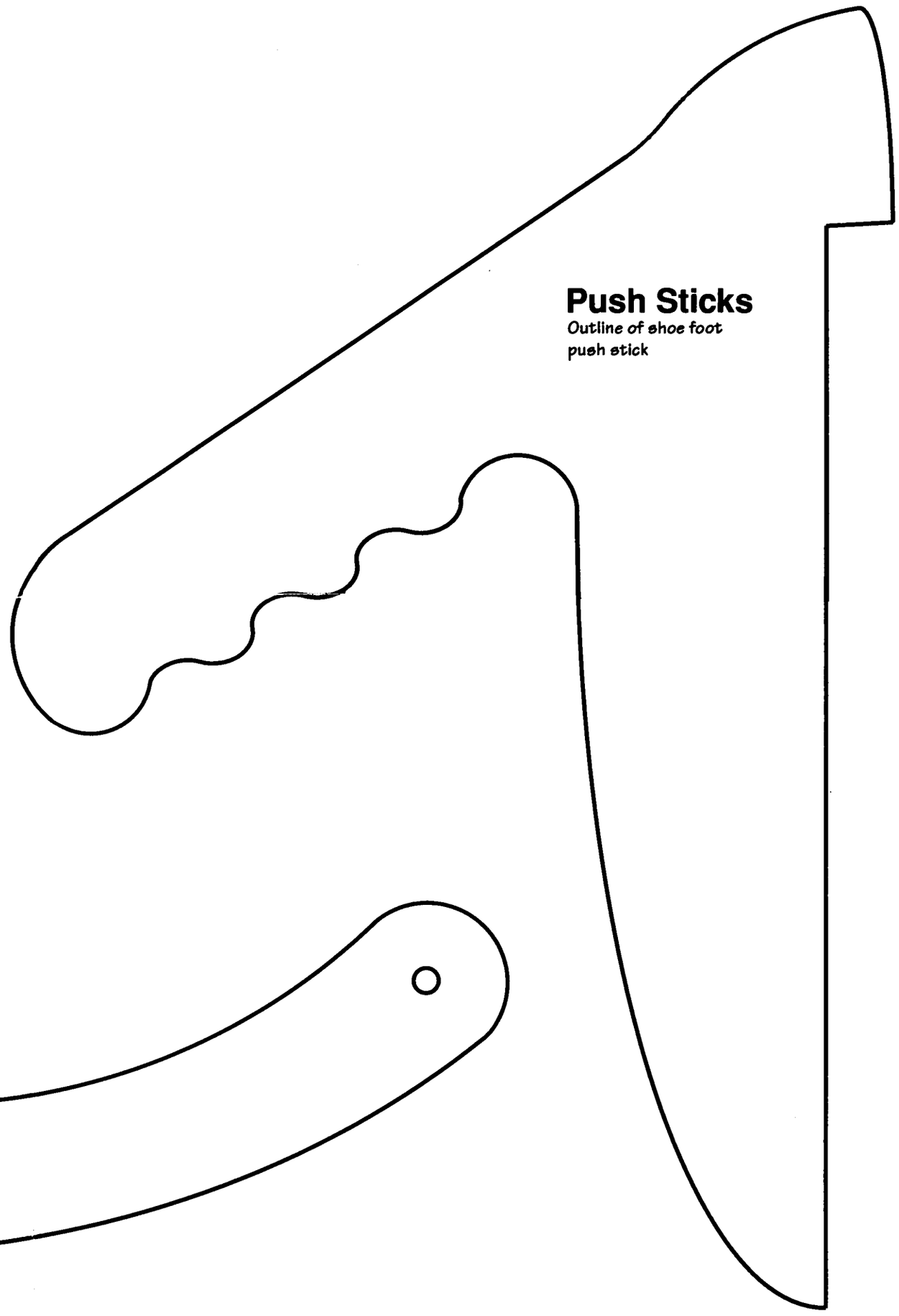
Reference for positioning pattern



Full-size drilling pattern for bread box. Use 1/8" bit to drill holes.

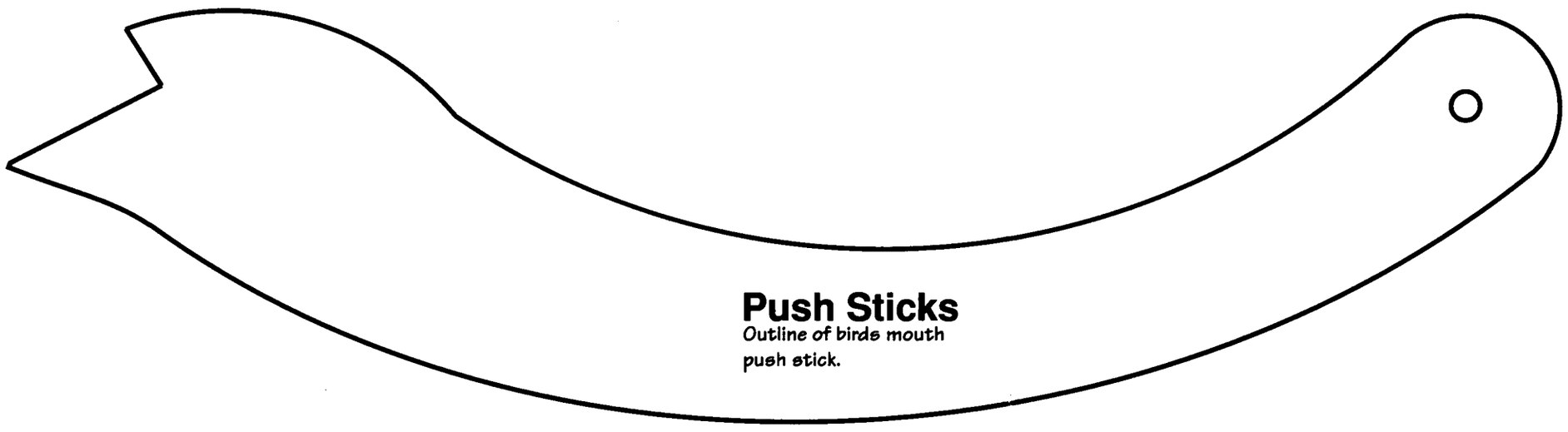
Push Sticks

Outline of shoe foot push stick



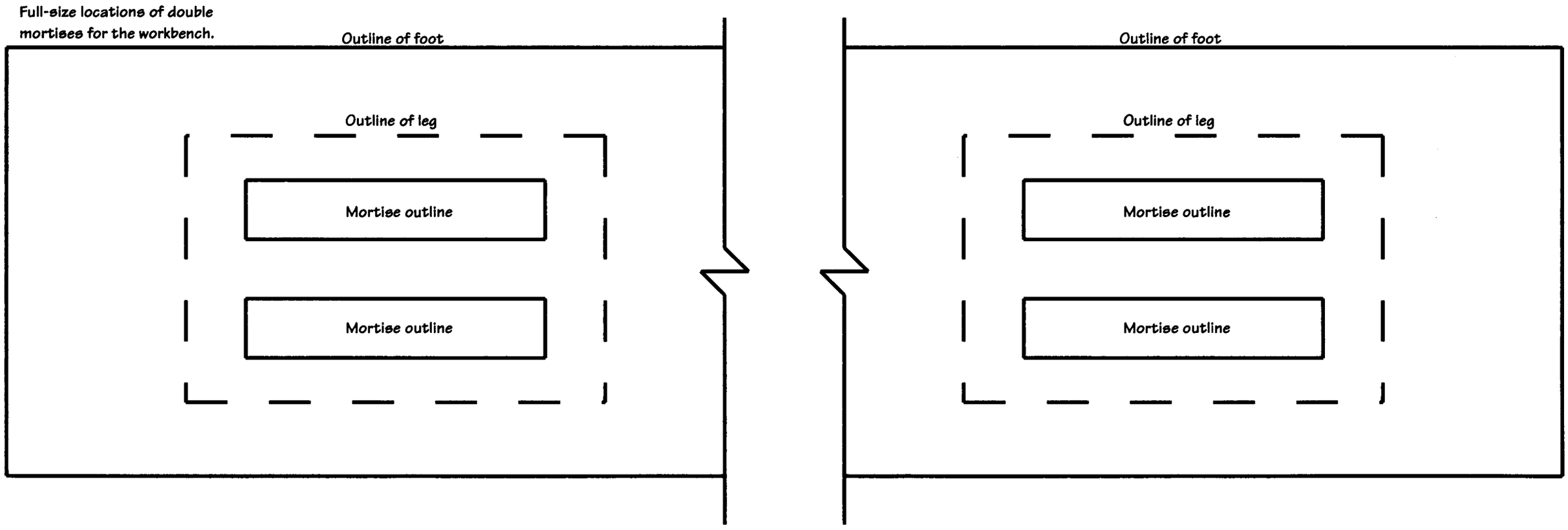
Push Sticks

Outline of birds mouth push stick.



Bullet Proof Bench

Full-size locations of double mortises for the workbench.



Bullet Proof Bench

Full-size diagram of mortise locations for the workbench

Shoulder area

Outside line of leg

Inside line of leg

Outline of mortise and tenon

Line of end stretcher

Outline of mortise and tenon

Shoulder

Line of end stretcher

Line of front and back stretcher

Shoulder

Shoulder area

Location of nut holes on front and back stretchers

Outline of bolt hole locations

1" hole

1/2" hole

bolt hole locations

Plan view of dowel location in top of leg

3/4" hole

Outline of mortise and tenon

Outline of mortise and tenon

Line of front and back stretcher

Line of leg

Outline of foot

Shoulder

Outline of double mortise and tenon

Shoulder

Outline of double mortise and tenon

Arts & Crafts Mantle Clock

You might not be ready to build your own sideboard, but you can start your Craftsman collection with this simple clock. The only tough part of the project is finding a great piece of quarter-sawn white oak (1" x 6" x 96").

STEP ONE: Cut the pieces according to the Schedule of Materials. Resaw and book match the front for an impressive appearance. Taper the front to an 8" width at the top.

STEP TWO: Crosscut a four degree angle on the top and bottom edges of both sides, parallel to one another.

STEP THREE: Cut the dial hole and pendulum slots in the front (see PullOut™ Plans for a full-size pattern). Use a chamfer bit to cut the angle profile in the dial hole.

STEP FOUR: To cut the top and bottom chamfer details (including the 1/8" bead), use your table saw. Start by making a 1/8" deep cut 1" in on the ends and front edges. Then cut the bevel by running the pieces on edge (use a zero-clearance throat plate) with the blade set to 23 degrees. Set the blade height to intersect with the bead cut and set the fence to leave the 3/16" flat shown in the diagram.

STEP FIVE: To inset the front 1/4" back from the sides, lay it on a 1/4" piece of masonite as a spacer; then glue the two sides to the face. The fall off pieces from the front taper make perfect clamping cauls to exert equal pressure on the sides.

STEP SIX: Pilot drill, then nail the bottom and top to the sides, leaving a 1/16" setback. Set the nails.

STEP SEVEN: Cut, chamfer then glue the applied "through-tenons" as located on the diagrams. Cut, chamfer and glue the fake square pegs to cover the nail holes.

STEP EIGHT: Rout a 1/4" x 3/8" deep rabbet in the clock's back edges. Then fit the back into the rabbet.

STEP NINE: Cut the dial support block and glue the clock face to the block, centered and 2 1/2" down from the top of the block. Apply two coats of clear finish to the block and face, which is typically paper.

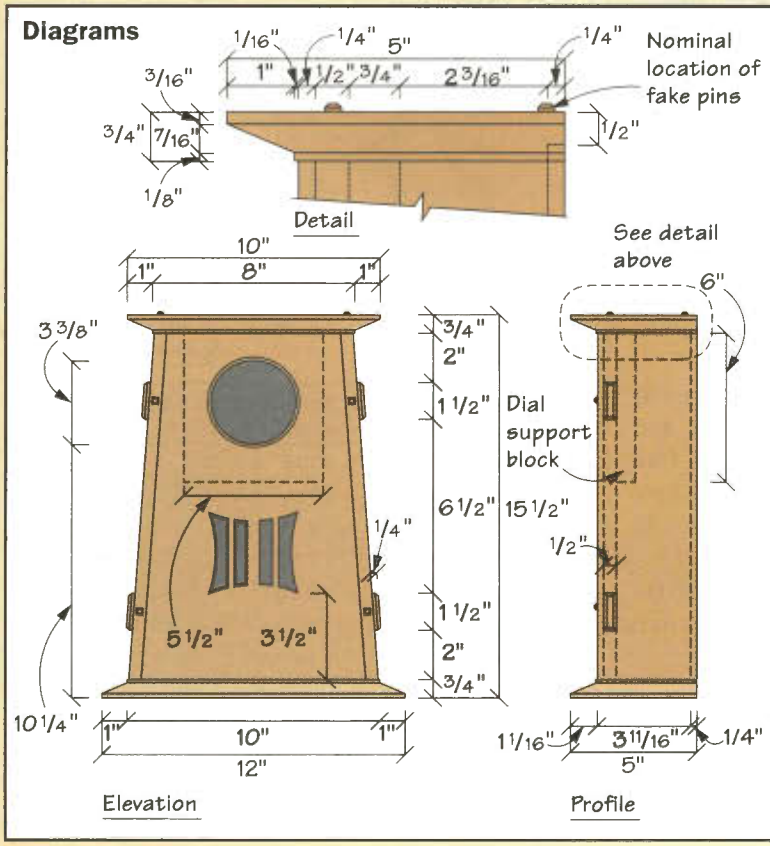
STEP TEN: Drill a hole in the center of the clock face for attaching the hands to the clock mechanism and attach the movement to the back of the support block.

STEP ELEVEN: To finish, first apply warm brown stain glaze to the clock case. Then apply a few coats of clear finish.

STEP TWELVE: Screw the dial support block to the inside of the face. Shorten and attach the pendulum, then pilot drill the back and attach using #4 x 3/4" brass screws.

— David Thiel, PW *staff*

Diagrams



Schedule of Materials: Craftsman Mantle Clock

No.	Item	Dimensions T W L	Material
1	Front	1/2" x 9" x 14"	White Oak
1	Bottom	3/4" x 5" x 12"	White Oak
1	Top	3/4" x 5" x 10"	White Oak
2	Sides	1/2" x 3 15/16" x 14 1/8"	White Oak
1	Back	1/4" x 9 7/8" x 14 9/16"	Oak Plywd
1	Dial support	3/4" x 5 1/2" x 6"	Pine
4	Fake tenons	1/4" x 1/2" x 1 1/2"	White Oak
8	Fake pins	1/8" x 1/4" x 1/4"	White Oak

Woodcraft Supply — (800) 225-1153 • Dial face, part #124895 - $1.99 • Mechanism, part #124898 - $9.99

Pocket Cigar Keeper

Cigar afficionados enjoy a good cigar a lot more when it's not bent or broken. This sturdy cigar keeper protects two 6¼" x 50 ring (1/64" = 1 ring size) cigars and shows the world a bit of style.

The box construction is simple. A block is cut in half, the center hollowed and then the halves are glued back together. But start by choosing your wood for the most attractive grain pattern.

STEP ONE: Saw the stock in half to the sizes given. Then, the slot for the lid is made by cutting a 3/16" x 3/8" deep rabbet on the inside top edge of each side.

STEP TWO: The lid moves in a sliding dovetail, so set up your router table with a 9 degree dovetail bit to cut one side of a ¼" high dovetail on the lip formed earlier by the rabbet cut.

STEP THREE: Now cut out the inside space for the cigars. First make a template using ¼" plywood with a ¾" x 1½" solid strip screwed to the underside. A hole cut in the ¼" plywood will guide your router using a template guide attached to your router base. Taking your template guide into account, make the template hole to remove material from each side to form a 7/16" x 1¾" x 7" long pocket. Note that one end of the pocket will be open-ended, the result of the earlier rabbet cut.

STEP FOUR: Clamp the side to the template. Use multiple passes of increasing depths with a ½" fluting bit to form the interior curved edge of each box half.

STEP FIVE: To remove the remaining material, use a second template guide that is ½" larger in diameter than the first, or make a second template that's similar to the first (but with a ½" smaller opening), and a straight bit.

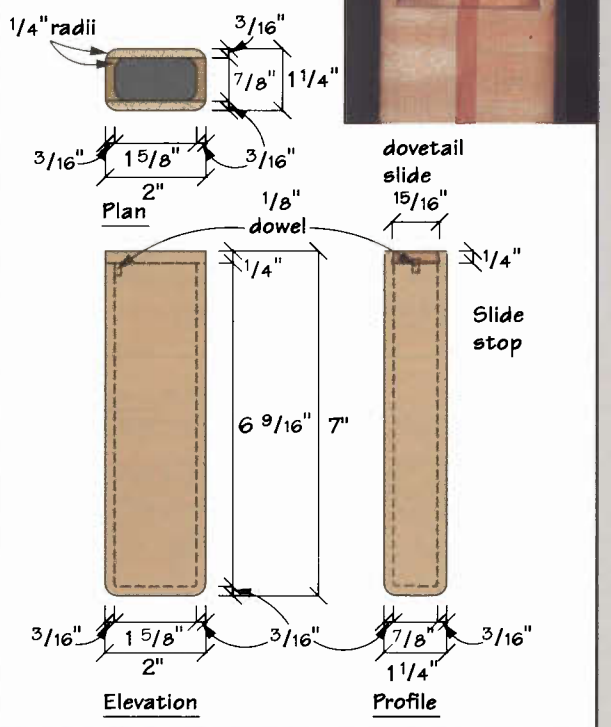
STEP SIX: Glue the sides together.

STEP SEVEN: Sand the sides and bottom flush and square. Then use a ¼" roundover bit to shape all the edges of the box, except the top.

STEP EIGHT: Cut the lid material in a long strip. Then run the edges with the dovetail bit to form the lid. Test the fit and sand as necessary. Then cut the lid to length and finish sand the entire box with the lid in place.

STEP NINE: Finish the box to seal and protect the wood. Use a finish that won't impart any odor to the stored cigars.

Diagrams



Schedule of Materials: Pocket Cigar Keeper

No.	Item	Dimensions T W L	Material
2	Sides	5/8" x 2 1/16" x 7 1/16"	Optional
1	Lid	1/4" x 1 1/16" x 2 1/16"	Maple
1	Lid pin	1/8" x 1/2"	Dowel

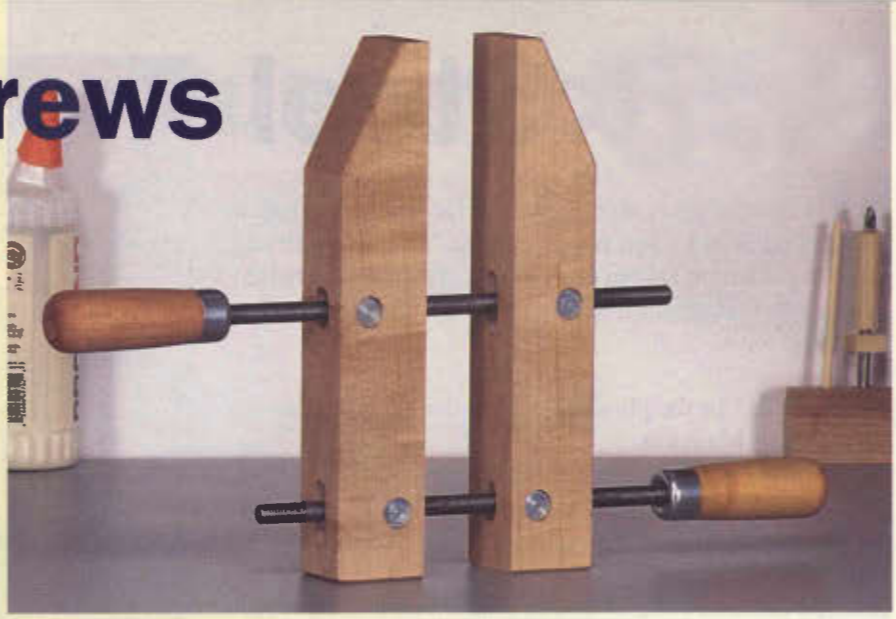
STEP TEN: Install the small dowel to prevent the lid from falling out. Drill an 1/8" hole about 1/8" deep on the underside of the lid. The hole is set in as far as the side of the keeper is thick and is centered front to back.

STEP ELEVEN: With the lid on the box, but open most of the way, glue the dowel into the hole using angled tweezers or needle-nose pliers.

Your keeper is complete. If you'd like to make one with an accent stripe as shown in the photo, simply adjust the thickness of the sides and the depth of the cuts for the interior.

— David Thiel, PW staff

Hand Screws



When purchasing hand screws, you can save more than 50 percent by making the wooden part of the clamp yourself from shop scraps. Kits for clamps in a variety of sizes are available at many hardware stores and through mail order.

The clamp I built has jaws that open 6". Different sized clamps will have different sized wooden blocks, commonly called chops. But the way you build them is the same.

STEP ONE: Cut the chops to the size indicated by your hardware kit from a suitable hardwood, such as maple, walnut or oak. Make sure the long sides are flat and square to each other.

STEP TWO: Mark the locations for the holes on all four sides of each chop. Depending on the kit and the size of clamp you're making, you might have to purchase an odd-sized bit for the holes. (My kit called for a bit that was 37/64". I used a bit that was 1/64" smaller, 9/16", and a little easier to find.)

STEP THREE: First bore the holes in the sides of each chop that hold the metal nuts. Then drill the holes for the threaded spindles in the top and bottom. These holes are angled and intersect with the holes drilled in the sides. Some instruction books recommend you drill these angled holes while rocking the chop back and forth against a fence on your drill press to clean out the waste. Instead, angle the drill press table, then clamp the chop to the table. Chain drill several holes of ascending depths; clean out the hole with a chisel.

STEP FOUR: Clean up your sloped holes with a rat tail file.

STEP FIVE: Cut the angled top on each chop with a band saw.

STEP SIX: Bevel all the outside edges of the chops using a sander or a router. Don't bevel the inside edges that make up the clamp's jaws.

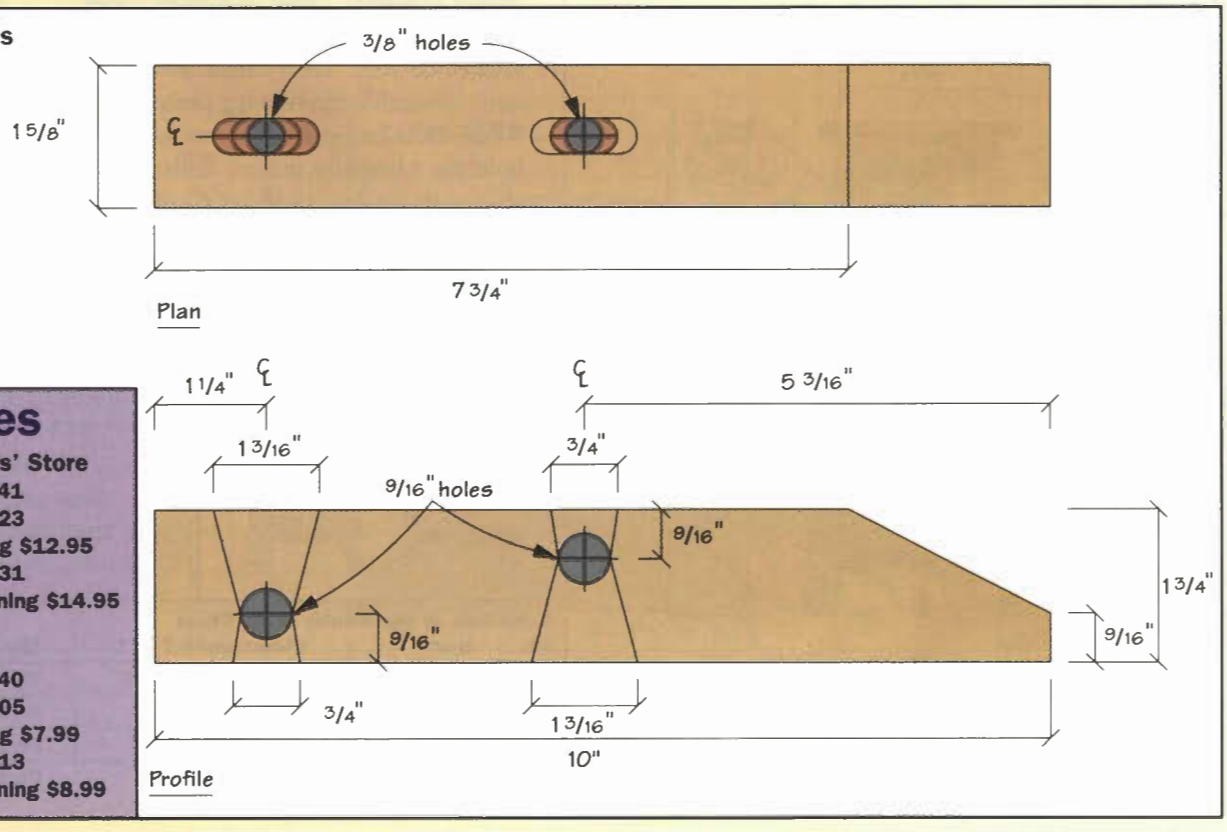
STEP SEVEN: Apply an oil finish on the chops; allow to dry.

STEP EIGHT: Assemble the hand screws by inserting the end nuts into the holes in each chop and then threading the two spindles through those nuts.

STEP NINE: Attach the handles by tapping each one onto the end of a spindle. Drill a hole through the ferrule, handle and spindle. Insert the supplied rivet into the hole and peen it for a secure hold.

—Christopher Schwarz, PW staff

Diagrams



Sources

Woodworkers' Store
1-800-279-4441
product #42523
6" jaw opening $12.95
product #42531
8½" jaw opening $14.95

Leichtung
1-800-321-6840
product #71605
6" jaw opening $7.99
product #71613
8½" jaw opening $8.99

Shop Stool

This stool is the perfect accessory for your work bench and takes just a few hours to build. You can make this stool at the height shown or as low as you like. The height of this one is perfect for sitting at the scroll saw and other benchtop tools.

STEP ONE: Cut the plywood and poplar according to the Schedule of Materials.

STEP TWO: Lay out the pattern for the two leg pieces. They are 14" wide at the bottom and 9½" wide at the top. Before cutting the two tapered legs, adjust a dado set to the thickness of the plywood and cut half-lap or egg crate joints in the legs **(see drawing below right of the legs before assembly)**. When done, cut the leg tapers.

STEP THREE: Using the same dado setup, cut two ⅛" deep channels in the seat that intersect at the center. With a bandsaw or jigsaw, cut the seat into a circular shape. Then use a ⅜" roundover bit in your router on the top edge of the seat.

STEP FOUR: To make the footrest braces, cut two pieces of scrap plywood into 6" squares. Then cut both pieces corner to corner, creating four triangles.

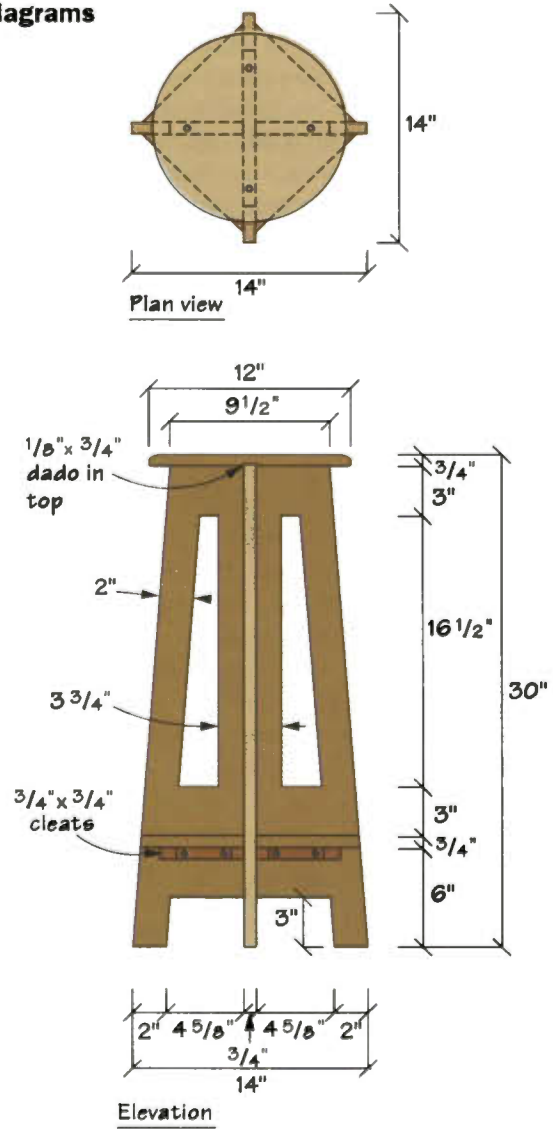
STEP FIVE: On the leg pieces, cut out the bottom edges to create the feet. Then make the elongated triangular cut outs. Assemble the two leg pieces.

STEP SIX: Lay out the location for the poplar cleats that hold the triangular braces. Taller people will be comfortable with the braces about 6" off the floor. Shorter folks will like the braces higher. If you raise the braces, you might have to make them a little smaller. Attach the cleats to the legs with 1¼" screws. Then screw the braces to the cleats.

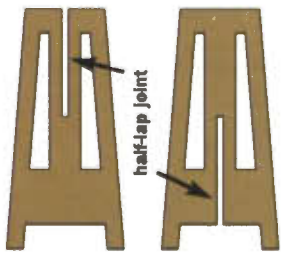
STEP SEVEN: Attach the seat to the base assembly with four screws. Finish your stool as desired.

—Jim Stuard, PW staff

Diagrams



Legs before assembly



Schedule of Materials: Shop Stool

No.	Item	Dimensions T W L	Material
2	Legs	¾" x 14" x 29⅜"	Plywood
4	Braces	¾" x 6" x 6"	Plywood
1	Top	¾" x 12" x 12"	Plywood
8	Cleats	¾" x ¾" x 5"	Poplar

Table Saw Pushsticks

One inexpensive safety item that should never be out of reach from your table saw is a pushstick.

Though not every woodworker will agree on design (we didn't completely agree in the *PW* shop), two designs can be promoted as better than most.

The very recognizable "bird mouth" pushstick **(diagram)** is frequently offered as a pattern or as an actual pushstick by many saw manufacturers. The basic design works well to keep your hands above and behind the blade during most operations. The angle of the mouth is cut a little more than 90 degrees to allow easy seating against the materials being cut. It's most useful when cutting longer, narrower strips, say 2" wide x 48" or longer. With little concern of the workpiece being lifted by the blade's rotation or binding, front end pressure isn't essential.

For wider, shorter pieces of material, the second "shoe" design **(diagram)** offers reliable rear support, a sturdy handle for maintaining good control and grip, and an extended shoe area which supplies downward pressure against the front of the piece to protect against lifting.

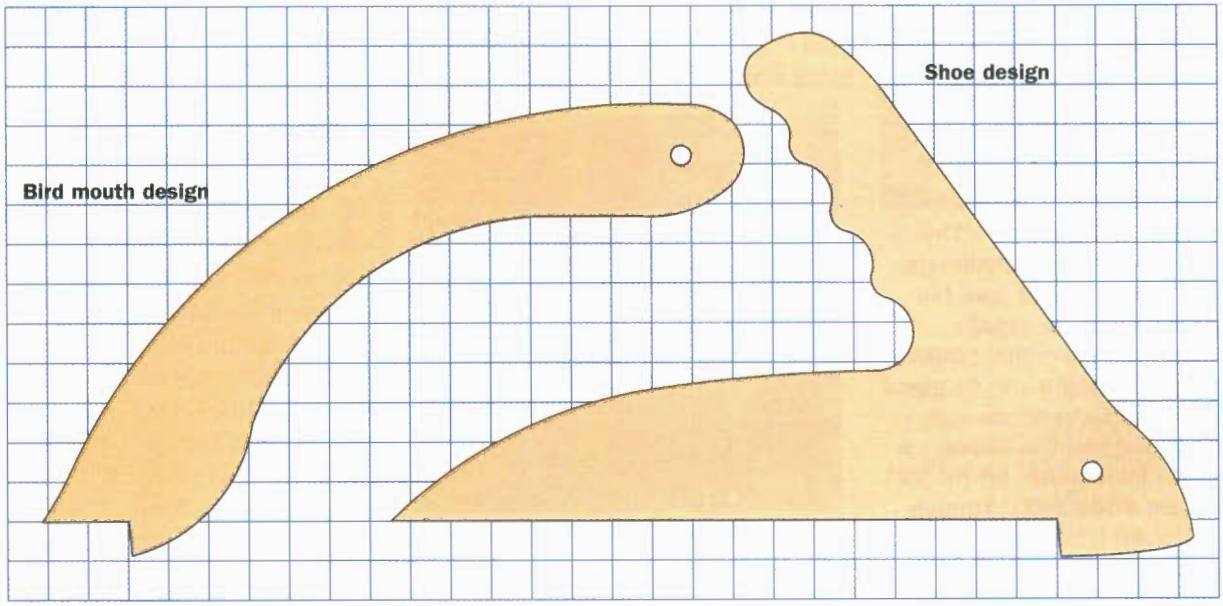
Both designs should be made from sturdy 1/2" or 3/4" material. We recommend a five to seven ply plywood material instead of solid wood.

Once you have the basic design, individual preferences come into play, so you may want to fine tune to meet your needs (and grip). We rounded over all of the edges (except for those that contact the wood) for comfort when gripping. Another feature we wouldn't do away with is the hole in the handle. If your pushstick is hanging next to your saw where it belongs, you won't have an excuse not to use it.

While you're making one, make two or three of the same design. It's a tool, not furniture, and it may get cut up during some applications — and better the stick than your hand. Plus, it never hurts to always have a spare laying around.

—David Thiel, PW staff

Diagram
Enlarge 200%



JFK's Humidor—Almost

Build a $574,000 classic — for only about $300.

THE AUCTION of some of Jackie Kennedy Onassis' belongings after her death drew lots of attention throughout the world, but when I heard John F. Kennedy's cigar humidor had been sold for $574,000, I was amazed. Being a cigar smoker myself, I was curious to see this remarkable piece of craftsmanship from Alfred Dunhill of London. When I finally saw it, my feelings were mixed. It was a good sized humidor, but it wasn't spectacular. Heck, I figured I could make one just like it for a fraction of that cost — and I did. By the way, if you're not a cigar smoker, this is a darned attractive jewelry box, and the historical significance is still fun.

I was only able to find photos of the exterior of the box, so I had to extrapolate the dimensions from Sotheby's auction brochure. The original 12" x 12" x 21½" dimensions seemed a little larger than I needed, or wanted, so the sizes offered here are for a ⅞ths scale reproduction, which still holds 140 fifty-ring cigars up to 8" in length.

1 MAIL-ORDER MESSIAH • The corner joinery was a challenge. With ⅜" sides, a biscuit was too big, as was a spline. Dovetails wouldn't match the original (unless they were blind), and a simple glued miter joint wasn't strong enough. My CMT catalog had the answer: a locking miter joint router bit for ⅜" material (item #655-502). Though pricey at $59.40 [(800) 531-5559], it was worth the expense. It takes some time to set up, but once set, it's a terrific joint for this and other small box applications. The first side is run on edge as shown above, with the mating side run flat.

Like the original, I started with a beautifully figured piece of black walnut.

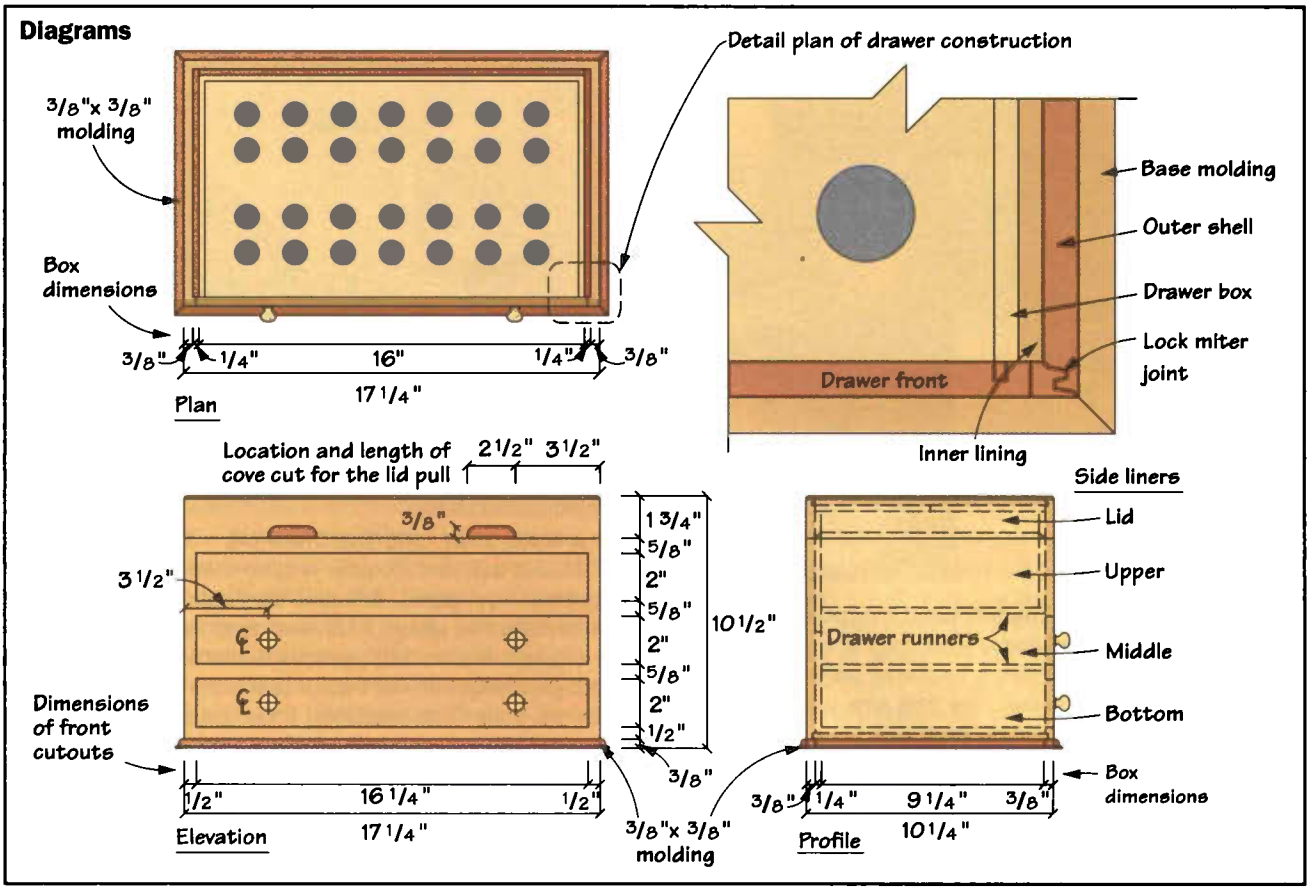
Finding a piece 11" wide is difficult, so I chose to resaw and book match my 6" wide piece of four-quarter stock, giving me a net ⅜" thick board. The rest was joinery.

The drawers were cut from the front piece (see diagram), which was then glued back together. The sizes provided for the sides, front and back in the Schedule of Materials allow for a ⅛" saw kerf when the top is cut from the assembled box. The front height also allows for the four ⅛" kerfs required to cut out the drawer fronts. I left the front length 1½" longer than the finished size to allow extra material to trim and square after gluing the front without the drawers. By marking out the drawer locations before cutting apart the front, I was able to glue the pieces back together so that the grain pattern was left almost intact.

2 THE FINISHED JOINT • This detail photo shows the assembled joint with cedar lining in place. Note the bevel cut on the top edge of the cedar lining. This detail plays an important role in providing an airtight seal for the lid.

STEP 1 Tricky Joints • Matching the original's mitered corners in ⅜" thick material gave me pause at first, but the answer was in the mail: a lock-miter router bit for thin stock. Before the lock-miter joints are run, the four sides must be cut to finished size. The photo shows only the fence and table as guides, but I also used finger boards to hold the pieces against the fence. This gave me a more uniform joint along the entire length of the cut. Test your cuts on scrap pieces first.

STEP 2 Pretty, Strong Joint • The assembled joint is as strong as it is



Resawing Sidebar

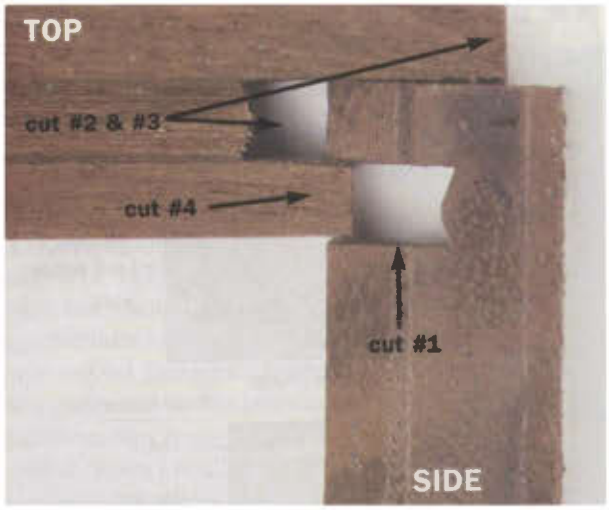
Exotic or highly figured woods go a lot further if they're resawn. The process also allows you to create your own book matched designs as on the top and sides of the JFK humidor. A ½" skip tooth blade makes quick (and square) work of most woods. The throat clearance on your band saw will determine how wide a board you can resaw, though a number of manufacturers offer 6" riser blocks as accessories to increase the depth capability of your band saw. A homemade jig like the one shown below helps keep things true and simple. Important features include a guide (preferably as high as the material being resawn), a rounded nose on the guide to provide the least amount of material wandering, and an ⅛" base setback from the guide piece to keep scraps or dust from pushing your board out of square.

Schedule of Materials: JFK Humidor

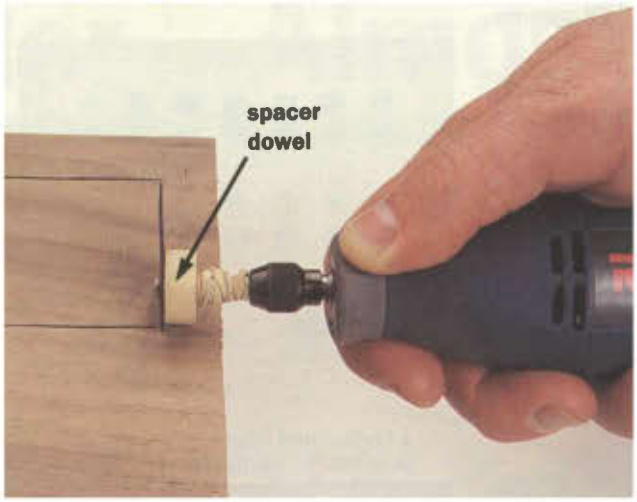
No.	Item	Dimensions T W L	Material
1	Front	3/8" x 11 1/8" x 17 1/4"	Walnut
1	Back	3/8" x 10 5/8" x 17 1/4"	Walnut
2	Sides	3/8" x 10 5/8" x 10 1/4"	Walnut
1	Top	3/8" x 10 1/4" x 17 1/4"	Walnut
1	Bottom	1/4" x 9 7/8" x 16 7/8"	Masonite
4	Top & bottom liners	3/8" x 4 1/4" x 16 1/2"	Cedar
2	Back liners	1/4" x 4 1/16" x 16 1/2"	Cedar
1	Front liner	1/4" x 3 3/16" x 16 1/2"	Cedar
2	Bottom side liners	1/4" x 2 3/8" x 9 1/2"	Cedar
2	Middle side liners	1/4" x 2 1/8" x 9 1/2"	Cedar
2	Upper side liners	1/4" x 3 1/8" x 9 1/2"	Cedar
4	Drawer runners	1/4" x 3/4" x 9 1/4"	Cedar
2	Lid front/back liners	1/4" x 3/4" x 16 1/2"	Cedar
2	Lid side liners	1/4" x 3/4" x 9 1/2"	Cedar
2	Tray front & back	1/4" x 2 7/8" x 15 15/16"	Cedar
2	Tray sides	1/4" x 2 7/8" x 8 11/16"	Cedar
2	Tray bottoms	1/4" x 4 1/4" x 15 5/8"	Cedar
2	Drawer fronts	3/8" x 1 7/8" x 16 1/8"*	Walnut
4	Drawer sides	1/4" x 1 7/8" x 9 1/8"	Cedar
2	Drawer backs	1/4" x 1 7/8" x 15 3/4"	Cedar
4	Drawer bottoms	1/4" x 4 7/16" x 15 11/16"	Cedar
2	Front/back mouldings	3/8" x 3/8" x 18"	Walnut
2	Side mouldings	3/8" x 3/8" x 11"	Walnut
4	Drawer pulls	3/4" dia. x 3/4"	Brass

*Drawer fronts are cut from case's front piece.

Parts available from The Woodworker's Store (800) 279-4441, Brass quadrant hinges #11099 $25.99 a pair; Credo Humidifier #10372 $54.99; Hygrometer #10398 $24.99; ¾" Solid brass knobs #36459 $2.99 each.



3 MAKE THE TOP • The half-blind tongue-and-rabbet (really, tongue-and-dado) joint for the top is made on the table saw and provides a captured panel that looks like it's glued to the sides. The first saw pass defines the groove in the lid's sides, front and back (1). The second and third cuts (2 & 3) define the top lip and the groove in the edge of the top. The final pass (4) trims the tenon on the lid to fit into the groove in the side.



4 A FAKE, JUST LIKE THE ORIGINAL • The original Dunhill humidor includes a false drawer detail at the top of the front panel. Because they didn't include knobs to complete the effect, I followed their lead to be true to the original. A standard v-groove router bit makes a decent width groove but doesn't quite reach the necessary depth. With the tools I had available, I marked out the location with a marking gauge and followed with an abrasive disc in a Ryobi multi-tool. I used a piece of dowel to make a stop to limit the depth of cut.

attractive and will no doubt cause some conversation among your woodworking friends. The joint's strength comes from the much larger gluing surface and the locking feature keeps the parts in place when clamping.

STEP 3 Planning for Growth • It isn't likely that a 10½" wide piece of walnut is going to grow or shrink dramatically (⅛"). However, by using this saw-made joint to capture the top piece, the depth of the lower tongue and groove can be left a little sloppy to make sure it will never be a problem. If I hadn't found a router bit to make the locking miter joint in photo one, I would have used this joint on the corners of the box as well. While cutting the sides for the top, a ¼" x 3/16" deep groove can be cut ¼" up from the box's bottom to capture the Masonite bottom.

STEP 4 False Front • While I used a Dremel-type multi-tool to cut the fake top drawer detail on the front, a 60 degree, razor-point v-groove router bit also would have done the trick.

STEP 5 Clamp Every Corner • Gluing the box takes a few clamps, but in general all the joints lock together so it's unlikely pieces will slide out of position while clamping. Remove excess glue and set the box aside to dry.

Ripping the lid from the box can be tricky. Work with

Storing Your Cigars

Dickson Farrington, director of premium product marketing at General Cigar Co. Inc., gave us some pointers about proper storage techniques for cigars and suggestions on getting a humidor ready for use. General Cigar provided the Macanudo and Partagas cigars shown in the opening photo.

Proper cigar storage is important to the enjoyability of a cigar. While it's true that a dried-out cigar can be revived, the flavor will likely never be quite the same. The following tips will keep you from ever having to worry about reviving a cigar.

To precondition a humidor before storing cigars, wipe down the cedar sides of the humidor with a damp sponge moistened with distilled water (which you also should use in the humidifying unit). Distilled water keeps minerals and chemicals from closing the pores in the sponges and foams used in humidifiers, thus lengthening their life span. Also, regular tap water can allow those same chemicals and minerals to collect on the stored cigars and affect the taste. You should always follow the humidifier manufacturer's instructions as some require different maintenance.

With the cedar moistened, the wet sponge should be left on a plate in the bottom of the humidor for 24 hours. The humidifier should also be filled with water and put in the box during this time. After about 48 hours, the sponge can be removed and your cigars can be safely stored in the humidor.

Preferably, cigars should be stored in a humidor with the cellophane removed to allow them to age

5 TIME TO GLUE • With all the joinery completed, I dry-fit the case and fine-tuned it a bit to get the best joints. I advise actually putting the clamps on during a dry-fit, as it gives you a good idea of any potential problems or awkward maneuvers you might encounter. When you're ready, put glue on the locking miter joints, but only put a little glue on the front joint of the top. Leaving the other three sides glue-free allows for expansion without breaking the joints. The bottom should be installed without glue.

6 THE CEDAR LINING • The cedar is a bit of a puzzle, but not complicated. Start with the top and bottom pieces, then work your way toward the top. Each piece should be fit as you go to ensure the best fit. The sizes in the Schedule of Materials are accurate, but check them against your box to make sure. The drawer runners are simply captured between the side pieces. All the lining pieces are superglued in place after the humidor is finished. The bottom and middle side pieces are mitered only on the back edge, allowing the front edge to overlap the drawer opening and serve as a drawer stop.

the larger bottom section against your fence. As you make each cut, slide a wedge into the kerf to keep it open. Make your last cut on the back so that a longer edge is lying on the saw table. Get a friend to help remove the top after the final cut. With the box separated, plane and sand the joint so the lid seats properly to the lower box.

STEP 6 **Fit the Cedar Liner** • The next step is simply press-fitting the pieces of cedar into place as shown on the diagram. The top edges of the upper side liners are beveled at a 45 degree angle (leaving a small flat at the top), while the lid's side liners are beveled in the opposite direction to form an airtight lip at the joint. Fit the liners so the lid will fit snugly.

STEP 7 **Holey Drawer Bottoms** • Because the humidifier is located at the top of the box, equal humidification throughout the box is difficult. To help this, all three bottoms have rows of holes to allow moisture to circulate throughout. **(See "Storing Your Cigars")**

The bottoms of all three boxes were made of two pieces (to use the best material yield in the cedar) and were drilled using a 1" Forstner bit in the drill press. To keep the drawers from sliding out all the way, but to allow for removal when necessary, a small piece of walnut was screwed to the

and season at an appropriate level. That being said, one advantage to leaving the cellophane on the cigars is if you remove an unwrapped cigar from the humidor to be smoked later in the day, it will begin to dry immediately unless stored in a travel humidor. Cellophane will not stop the aging and maturing process of the cigar, but it will slow it down.

When you're storing a lot of cigars, such as in this humidor, rotate the location of the cigars. If left unsmoked, the cigars stored at the top of the humidor should be moved to the bottom, and vice versa, on a monthly basis. There can be as much as a 10 percent difference in humidity between the top of the box and the bottom.

The optimal level of humidity for cigars is 70 percent, with an acceptable range of between 68 to 72 percent. But don't fixate on your hygrometer. Unless you're spending $300 for this gauge, it could be off as much as 5 percent in either direction. The best way to tell if your humidity level is correct is to feel the cigar and taste it.

Spanish cedar linings in humidors also enhance a cigar's aroma and taste. One misconception is that cedar assists in keeping the cigars moist. In fact, the cedar tends to absorb humidity, removing it from the controlled environment. However the historical and beneficial presence of cedar surpasses its negative affect on the humidor's humidity level.

If a cigar is stored in a well-made humidor with stable humidity, a cigar can remain smokable indefinitely. Depending on the cigar, often the longer they are stored the taste will improve and mellow with time, as with a fine wine.

drawer back just tight enough to allow for snug movement. When opening the drawer, the tab catches on the rail above, stopping the drawer.

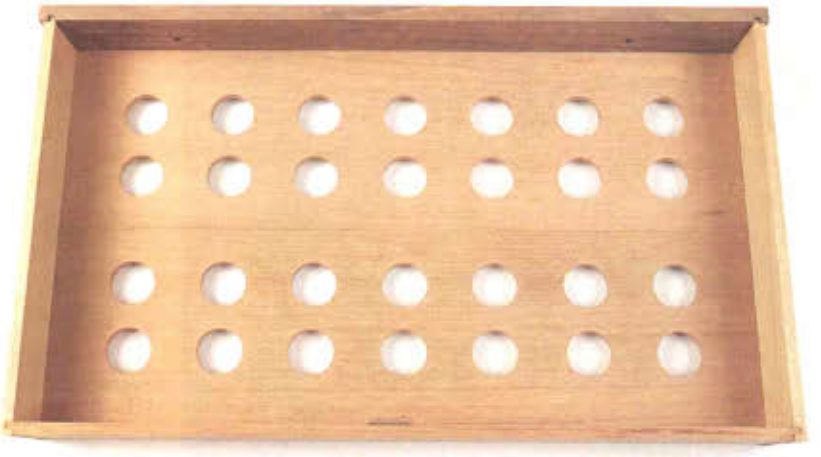
STEP 8 Indented Handles • Locate the routed finger pulls in the lid as shown in the diagrams and mill them with a router mounted in a router table. Another router table setup is for the quarter-clover detail on the boxes base molding. An ogee bit works well for this task, then glue or tack the moldings in place.

STEP 9 Install the Hinges • The hinges are cut into the box in a two-step process. First rout an appropriate mortise space for the hinge plate in the lid and box sides. Then chain drill a line of 1/8" holes, 5/8" deep, to allow the hinge support arm (shown in inset) to retract into the sides. Clean up the mortise with a small chisel or knife to make the hinge work smoothly.

You're just about done, though the drawer fronts will need some fitting, and the drawer pulls still need to be installed. At this stage, however, finish sand the exterior to 180 grit and slightly round over the top edge of the lid by sanding.

I took the high road on the finish. Remove the Spanish cedar because it doesn't get finished, and start with a sealer coat of lacquer inside and out (varnish or shellac are good alternatives). After the first coat, I applied a grain filler (tinted with brown oil-based stain) to level out the surface of the wood. I next applied two more coats of lacquer, sanding between each, and let the finish cure for 48 hours. The next step was wet sanding the finish with 400 grit wet/dry sandpaper using mineral spirits as a lubricant. After an hour of sanding, I achieved a closed-pore surface. I then applied two more coats of lacquer and finally rubbed out the finish with 0000 steel wool and Murphy's oil soap to dull the finish to a satin sheen.

I'm looking forward to the challenge of stocking this humidor (and emptying it). **PW**



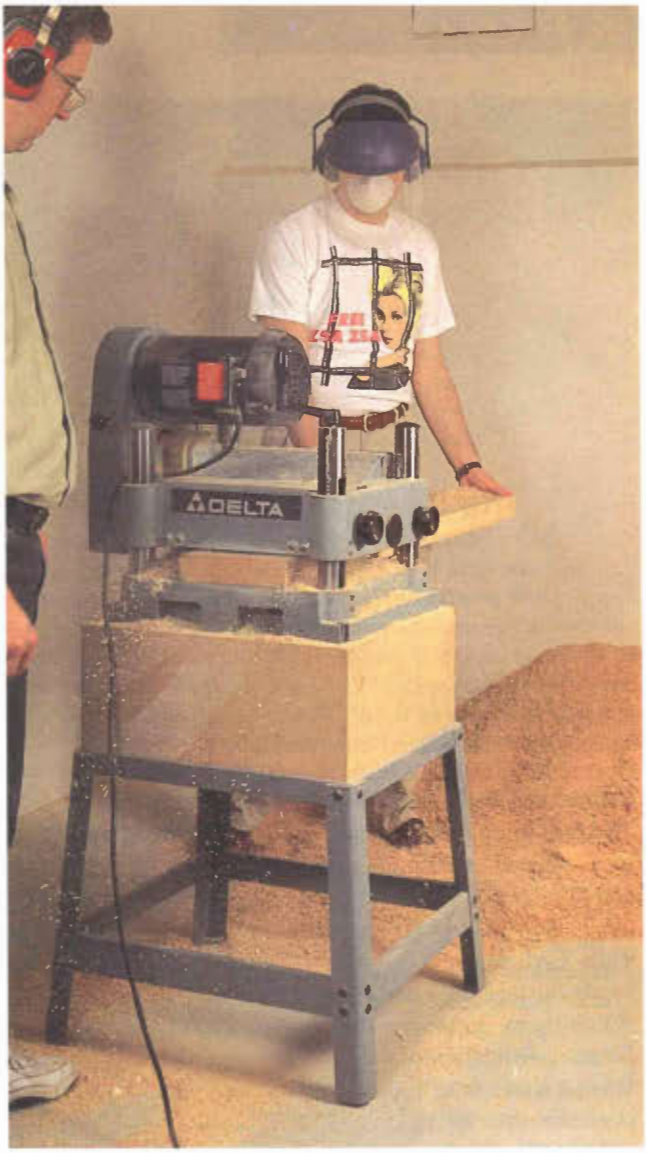
7 DRAWERS & TRAYS • The drawers and tray are joined together with simple tongue and rabbet joints, also formed on the table saw. With the tray, the sides are captured between the front and back. The bottom fits into a 1/4" groove held up an 1/8" from the bottom edge. The drawers' backs are captured between the sides, while the drawer front fits over side tenons cut to leave an 1/8" overhang on either side of the drawer. The inset photo shows the simple drawer stop mounted to the drawer back.

8 ELEGANT HANDLES • The finger pulls for the lid were cut with a simple 1/4" cove bit set in a router table. Since this was a stopped cut in the middle of a piece, I marked the first and last contact points of the bit on a piece of tape at the top of the fence. I then marked the corresponding handle location on the top edge of the lid. Make sure you either turn off the router when the cut is completed, or stop moving the piece forward as you remove it from the bit or you'll end up with tearout as shown on the left edge of this sample piece.

9 TRICKY HINGES • To mark the hinge location, place it flush to the inside corner on both sides and use a scratch awl or pencil to mark the sides. The hinge pocket is cut using a straight router bit set for 1/8" depth. I used an 1/8" diameter upcut spiral bit, which made freehanding the cut simple, with little cleanup necessary.

Don't Leave Your Shop in the Dust

Breathe easier, snore less and live longer with a dust-collection system.



FOR YEARS I USED SHOP VACUUMS to suck the chips and dust from my planer and table-mounted routers. But, despite my best efforts at jury-rigging a cheap dust collection system, I could never adequately deal with the mass of wood chips from my jointer or the clouds of sawdust that took wing from my contractors saw.

Then one day I had a revelation. I was starting a big three-cabinet order. I looked up from the saw and, for a moment, I thought I was back in San Bernardino, Calif., — the lights were dim, and a yellow-tinged cloud hung in the air. My eyes burned, my nose ran and I was coughing again. "Smog?" I thought. Unlikely because I was in my basement workshop 1,500 miles away from California. My slow-moving mind finally arrived at the answer — sawdust. I'd just finished ripping an overdose of maple. I knew then that I had to do something about it.

Now we've all heard the gospel on sawdust, but if you're like I was, you haven't bought a dust collector yet. We've known for quite a while that breathing sawdust is dangerous, and that the statistics on dust-caused diseases (even cancer) are downright dismal. Heck, the toxic woods alone can make you want to switch to knitting.

What about you? Eaten your weight in bubinga? Tired of singing bass when you're naturally an alto? Fed up with wheezing your way through the night? Well I've got relief for you, the best news a converted sawdust sucker can tell — buy a dust collector. It will be redeem your lungs if not your soul.

As you've probably guessed, I've sprung for a dust collection system and am now singing its praises. In this article, I'll detail how I planned for and selected my dust collection system, and how I finally installed it.

Planning for a Dust Collection System

The first steps in dealing with sawdust are taking an inventory of your equipment and drawing out a floor plan of your shop as it exists now or will exist in the future. For the last three years my shop has been a 10' x 30' space in my basement. However, after I'd picked up that big cabinet order, I knew I had to have more room. Consequently I designed a dust collection system to encompass both my garage and my basement workshop.

By creating a floor plan on a computer, I was able to play with 1/4" scale drawings for my machinery and my dust collector to find their optimal placement. Now if you're one of those fundamentalist woodworkers who hates computers worse than taxes and pettifogging bureaucrats, either draw up by hand or photocopy the machinery drawings in the PullOut™ Plans. (Enlarge or reduce the drawings until the scaled line measures exactly 1" long.) Then cut out each machine like you're cutting out clothes for paper dolls. Now draw the floor plan for your shop on 1/4" square graph paper and use the cut outs and graph paper to lay out your workshop.

Once you've tinkered with the layout for your shop, print out a copy from the computer or tape down the machines on the graph paper. Now tape down a sheet of clear plastic acetate (you can find it at a business supply store) over the floor plan. Now sketch your ideas for the network of dust collection machinery, ducting and various connecting devices on the plastic with pens especially made for drawing on plastic. (I used Staedtler Lumocolor® pens that I got from a store that sells artists' supplies.)

Four types of ducting, all with a 4" interior diameter: The left two are rigid PVC ducting, and the two on the right are flexible plastic hoses. The thin-wall rigid PVC ducting on the far left measures .1" thick for an outside diameter of 4.2", while the thicker walled electrical conduit pictured second from the left has walls .265"-thick for an outside diameter of 4.53". Both of the flexible hoses have a nominal interior diameter of 4".

There's two grades of flexible ducting. The black plastic grade is less flexible and much less durable than the clear plastic hose on the right. Additionally, the clear hose carries a hardened steel wire that, when properly grounded, helps dissipate the buildup of static electrical charges.

Selecting a Dust Collection System

The first thing that became clear as I began sketching was that I needed to become more acquainted with the ducting and accessories that were available. So I dug out a couple of catalogs and found pictures of dust collector accessories. Then I visited a local supplier of equipment and got a hands-on feel for each of these bits of metal and plastic. While there, I discovered a little book, "Dust Collection Basics," from Woodstock International Inc. (Bellingham, Wash.), that I bought on the spot. I also visited a hardware store to size up rigid wall PVC (poly vinyl chloride) sewage pipe and connectors. Check out the chart on **"Dust Collection Parts & Prices"** to see what I found in terms of the costs associated with these materials.

As I read the book and catalogs, it was apparent there were two choices in ducting material: metal or PVC plastic tubing in four different diameters. By installing 4" ducting throughout, I'd maximize the number of cubic feet per minute (CFM) my system could draw, so that made my diameter choice easy. Less easy was choosing the material. The metal ducting had one overriding positive attribute — it didn't build up static electrical charges the way plastic did. Because the metal pipe conducts electricity (rather than insulates, as PVC does), it's easy to ground your metal-ducted dust collection system. With the PVC system, you must string copper wire through every duct and ensure that it's properly grounded at each machine. With every other concern: economy, ease of installation, tightness of fit, etc., the rigid-wall PVC ducting seemed clearly superior to metal. I decided on the PVC. Although it's possible to directly attach every machine to the dust collector with rigid ducting, it isn't really practical unless you're certain that each machine is going to remain in that spot forever. If you're like me, you have to move your stationary machinery every once in a while to accommodate special operations. What this means for dust collection, however, is that you must use flexible ducting to connect the machines to the rigid ductwork.

There are two grades of 4" flexible hose available at your home center store or through catalogs. The first grade is your typical black PVC flexible hose, which is inexpensive and easy to work with. However, it wears out quickly and is more difficult to ground. The second is also a flexible PVC hose, but it's made of thicker plastic and has a continuous wire imbedded in the plastic that makes grounding easy. You

Dust Collection Parts & Prices

Some of the parts you need for a medium- to large-sized dust collection system, plus prices for those parts.

Device	Number needed	Price each
Cyclone separator	1	$34.95
4" flexible hose, 10' lengths	3	12.95
2" flexible hose, 10' lengths	1	8.95
2½" flexible hose, 10' lengths	1	9.95
4" diameter Ys	4	5.95
Reducer — 4" to 3"	1	3.95
Reducer — 3" to 2"	1	3.95
Adapter 4" to 2½"	1	3.95
Aluminum blast gates	8	12.95
Table saw dust hood	1	7.95
Jointer dust hood	1	7.95
Extra bags, lower section	2	10.95
Universal dust port	1	5.95
Hose clamps	22	.75

Source: Various catalogs, including Grizzly's 1997 catalog and Lee Valley Tool's 1997 catalog.

A floor sweep, a gate and a 90-degree elbow in PVC.

simply bare a few inches of wire at each end and screw one end to the metal of the machine. The other end is twisted together with the copper cable that you have run through the rigid-wall ducting. The flexible hose with the wire through it is also two to three times as expensive as the cheaper hose. After working with my system for a while, it became clear to me that having that grounding wire imbedded in the plastic was more than worth the extra cost.

Next, decide what you need for connectors and attachment devices. Simply put, there are: elbows, Y's, Tees and splicers. Splicers allow you to connect ductwork with sweeps, chutes and adapters that hook hose or ducting directly to your machines and your dust collector. Furthermore, clamps, gates and reducers maintain, control and regulate the airflow in the hoses and ductwork.

You can buy several other miscellaneous accessories, too. One is a Cyclone® adapter, which lets you imitate the big two-stage industrial dust collection systems. You also can get bags for the collector that have a finer weave and sift out the really fine dust. And a neat radio-controlled switch lets me turn on the collector from another room.

Once I'd acquainted myself with the parts of a dust collection system, I put my pen to plastic to sketch the system I wanted, identifying where the rigid wall ducting went, where the flexible hose went and what connectors I'd be using.

By doing all of this head scratching before buying, I was also able to analyze just how powerful a collector I needed. Initially I thought I could get by with a medium-sized dust collector. I knew I wanted to run the table saw and jointer at the same time, which only added up to a 650 CFM collector (see the CFM requirements listed in **"How Much Air Your Tools Need"**); but I also knew I was going to upgrade to a heavy-duty shaper soon, and that it would require at least a 1,400 CFM airflow. Then too, I had thought about hiring a part-time woodworker to assist me in this big cabinet order, which could double my CFM needs.

Given my situation, I decided to buy the largest home shop machine I could afford. In this case I had a choice of four machines, each with a three-horsepower motor and with four dust collection bags. (See **"Dust Collector Choices."**) I decided to buy the Grizzly model 1030, but please note that this isn't a product endorsement. I've purchased several Grizzly machines over the years, and they've been a good value for my circumstances.

A meeting of the Klan? Casper meets Banquo's ghost? I think not. This is the three-horsepower, four-bag dust collector from Grizzly.

Judicious use of reducers allows you to pick up dust at smaller diameters than your 4" ductwork, such as the setup here for my router table. Remember, however, that reducing the hose diameter decreases the CFM draw of the dust collection system in that hose and increases the likelihood of chip jams.

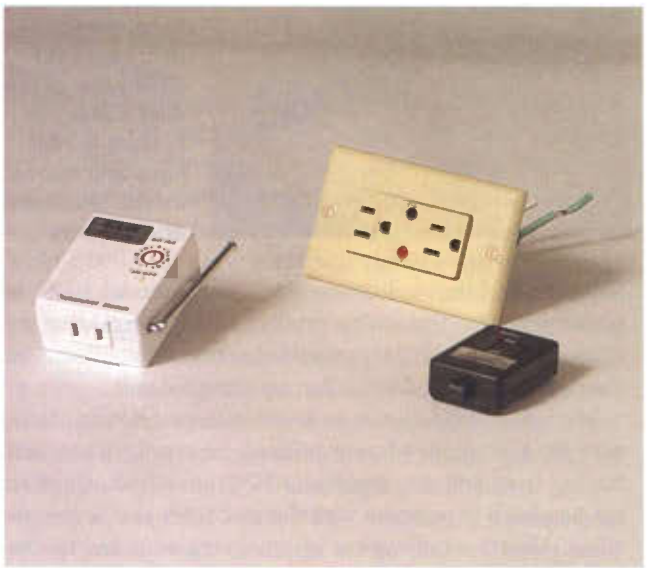
My recommendation is to know your preferences, recognize the limitations of your billfold, be careful who you're buying from and do your research. Go to a trade show and get hands-on experience with the machines you're interested in. Visit a woodworker in your area who has the unit you're interested in. Some manufacturers will provide you with the name and address of customers in your area willing to show you their machinery. By seeing how others cope

This is a dust-collection adapter for my contractor-style table saw. It fits between the sheet metal frame and the legs of the table saw.

with the sawdust problem, you may find that you haven't thought of everything you may need or that you've overestimated your needs. This can save you money and effort.

Installing the Dust Collection System

One of my first discoveries after accumulating everything I'd need was that the joints where the ducting meets the gates, elbows, hoses, etc., didn't fit well. Both the hoses and the PVC ducting had 4" inside diameters. When I slid the tapered fit of an elbow into the ducting, it was looser than a



Because I have a two-room shop, I wanted to be able to turn on the dust collector from the other room. This radio controlled switch enables me to do just that.

To ensure a tight fit, I heated up a banded piece of ducting in hot water and then tightened the hose clamp bands until I got a perfect fit.

10d nail in a 12d hole.

Luckily, I keep up with my reading, and I happened to see a letter in a magazine from a reader in Maine, Ian Walker, who'd been afflicted with the same loose joint problems. I copied his solution, heating up the PVC in a hot water bath and then clamping it smaller with hose clamps. I'm pleased to report it works well. Thanks for the tip, Ian.

By putting the elbow in the ducting before tightening the hose clamps on the ducting, I was able to establish perfect fits. So good in fact, I couldn't disassemble them and apply the adhesive I'd planned on using. I did back up these joints with

This five micron bag is available for a variety of dust collection systems. It filters smaller particles of dust than the standard twill bags that come with most dust collectors.

How Much Air Your Tools Need

Machine	CFM*
Table saw	300
Jointer	350
Planer	400
Radial arm saw	350
Drill press	250
Band saw	400
Router/shaper	300

**cubic feet per minute*

duct tape to prevent air leaks. On the other PVC joints, however, I used PVC adhesive to establish solid leak-proof joints, after I'd strung the bare braided copper wire through the ducts. Some woodworkers recommend avoiding the adhesive so you can disassemble the PVC to clear jams — especially on the long sections of PVC. To each his own.

I also had to reduce the ducting's outer diameter in several places so I could insert it into a flexible hose. Again, in the places where I used the cheap black flexible hose, I had to string the copper ground through it. With the better grade of hose, I just bared a couple of inches of the metal wire, then twisted the copper and steel wires together and covered the wires with a wire nut. I used a hose clamp at each of these intersections, a 4" band of galvanized steel. I preferred these to the wire type hose clamps, as I could not get a tight enough seal with the wire style hose clamp.

I cut the 4" ducting to size by hand with a crosscut saw. If you use the band saw, make sure you wear safety glasses and hearing protectors. The blade can grab suddenly, and the PVC ducting can shatter during the cut.

The standard J-hooks you find at hardware stores worked well to hang the ducting under the exposed floor joists in the basement shop. If your ceiling is finished, you could use galvanized steel strapping, also called plumbers tape, sold at hardware stores.

I'd already been collecting the chips from my router table setup, and I wanted to continue using the fence apparatus I'd purchased previously. Consequently, I had to reduce the 4" hosing to a 2½" hose. Generally, you want to keep as big a hose as possible to maximize your airflow; but in this case I just used a reducer and ran the 2½" flexible hose above the router table and down to the fence. I did the same reduction for the band saw and drill press.

The whole project went remarkably well. I'm now pretty much dust-free. I installed the system over a weekend, and I'm proud to report that my dust collector regularly devours potatoes, tennis balls and the occasional pesky neighbor. (I suspect that's where Jimmy Hoffa really went.) Although I'll probably never sing soprano again, my wife says my snoring's more melodic. Now if we could just find our cat. **PW**

Dust Collector Choices

Stationary single-stage, 3-HP dust collectors

Manufacturer	Model	Voltage	CFM	HP	Price	4" ports
Bridgewood	BW-003A	220	1,836	3	$479	4
Grizzly	G1030	220	1,883	3	$445	3
Jet	DC1900	220	1,900	3	$609	3
Penn State	DC4	220	1,900	3	$499	3
Powermatic	75	220	1,900	3	$670	3
Reliant	NN830	220	1,833	3	$500	3
Woodtek	864-381	220	1,900	3	$499	3

Stationary single-stage, 1½ to 2½-HP dust collectors

Manufacturer	Model	Voltage	CFM	HP	Price	4" ports
Bridgewood	BW-002A	110/220	1059	2	$279	2
Grizzly	G1029	220	1,182	2	$275	2
Jet	DC-1200	220	1,200	2	$439	2
Penn State	DC250	220	1,350	2½	$354	2
Penn State	DC2	110/220	900	1½	$299	2
Powermatic	73	110	900	1½	$400	2
Reliant	NN820	110/220	1,182	2	$299	2
Woodtek	805-930	220	1,200	2	$399	2

Stationary single-stage, 1-HP dust collectors

Manufacturer	Model	Voltage	CFM	HP	Price	4" ports
AMT	4710	110	N/A	1	$220	1
Bridgewood	BW-015A	110/220	700	1	$189	1
Craftsman	29978N	110	650	1	$299	1
Grizzly	G1028	110/220	610	1	$265	1
Jet	DC-650	110	650	1	$219	1
Penn State	DC1-B	110/220	700	1	$209	2
Reliant	NN720	110	610	1	$199	1
Woodtek	802-124	110	650	1	$229	1

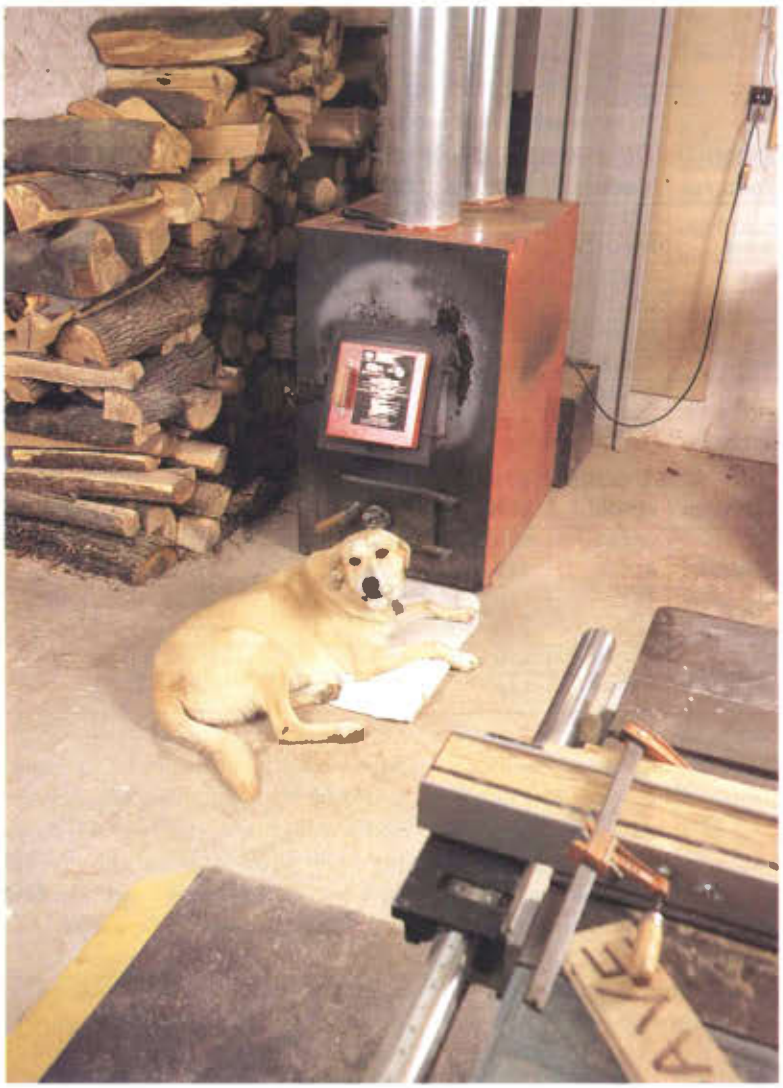
Portable dust collectors

Manufacturer	Model	Voltage	CFM	HP	Price	4" ports
Grizzly	G1163	110/220	450	1	$149	1
Harbor Freight	31810	110	660	1	$149	1
Makita	410	110	307	1½	$379	1
Penn State	DC3	110/220	760	1½	$199	1
Reliant	NN620	110	500	1	$159	1
Woodtek	864-367	110	650	1	$209	1

***Andy Schultz** is a life-long woodworker who lives with his incredibly tolerant wife, two children, dog and cat (which they found, by the way) in Lincoln, Nebraska. His book "Build Your Own Entertainment Centers" (Betterway Books, Cincinnati, Ohio) is now available in stores.*

The Woodworker Who Came In From the Cold

Cold chisels and cold-setting adhesives shouldn't be taken literally. Here are some of the best, and not necessarily conventional, ways to heat your workshop.



Katie the dog rests in front of Troy Sexton's woodburning stove in his woodshop one winter morning. Troy's entire scrap pile goes into this stove during the winter months. In addition to that, he has to buy two or three cords of wood to keep his shop heated. Even so, wood is still one of the most economical ways to heat your shop.

The temperature outside Troy Sexton's shop is cold enough to make Katie the dog turn into Katie the shivering ball of a dog. But inside Sexton's 3,600-square-foot woodworking shop, Katie immediately unfolds into a toasty tan-colored rug in front of the woodburning stove.

The black and red "Hot Blast" stove sits off in one corner of the metal building, but with some ductwork that Sexton installed himself, the stove keeps the whole place warm.

It seems a natural marriage between a woodburning stove and a woodworking shop. But in this modern world of forced-air, climate-controlled HVAC systems, the woodburning stove and many other alternative forms of heat get short shrift. And that's too bad because many woodworkers don't have a penthouse shop with a 100,000 BTU gas furnace and humidifier. Instead we work in the darkest, dampest and coldest places in the house. So for you cellar dwellers, here's what you can do.

Woodburning Stoves

First the bad news. No matter how many scraps you make in your shop, it's not going to be enough to feed a wood stove in the winter (unless you live in Mexico). Sexton estimates he uses between two and three cords of wood each year. Now the good news. Despite this, wood is still dirt cheap to burn. In fact, other than coal, wood is the least expensive fuel per BTU (British Thermal Unit). The stoves themselves start around $400.

In fact, the biggest downside to woodburning stoves is the exercise you'll get. Even if you purchase your wood already cut, you'll break a sweat because you have to haul it, stack it, throw it in the stove, stoke it and then clean the chimney.

Unlike woodburning stoves of the past, today's models rival many gas furnaces in their efficiency, sometimes they're as high as 80 percent efficient. That's because in 1988 the U.S. Environmental Protection Agency put strict limits on emissions from woodburning stoves. As a result, modern woodburning stoves burn many of the gases that used to go up the chimney. So if you're considering buying a used stove, make sure it was built after 1988 when the EPA started requiring the energy efficiency be labeled on these stoves. Otherwise, most of your heat is going to go right out your flue.

However, unlike gas or oil stoves, the federal government doesn't set standards for how efficient woodburning stoves must be, according to Cyrus Nasseri, a senior program manager with the Department of Energy. So be sure

to quiz your salesperson about how efficient the models are that you're thinking of buying.

Another consideration when buying a woodburning stove for your shop is to make sure it has some sort of humidifier because wood heat is dry heat. Sexton installed a humidifier himself on the ductwork directly above his stove. He says it's best to keep the humidity in your shop around 55 percent. If it goes below 50 percent, the wood gets brittle; above 60 percent it's likely to warp.

You also have to keep the fire as hot as possible. Otherwise your chimney liner will get coated with creosote, a black and sticky carcinogenic mess. The hotter you burn the fire, the less creosote you'll have. For this reason, Sexton recommends buying a stove that is a little smaller than what you think you'll need. That way you'll keep the stove running hotter.

One last safety tip. Make sure your stove is far away from large quantities of sawdust (which can explode under certain conditions) and away from your spray booth and your shop's flammables.

Gas for the Lucky Ones

Not everybody has natural gas running to their shop, but those who do have a couple options. If your shop is in your basement and you have a forced-air furnace down there, you can tap into the main duct, also called a plenum, and run 6" ducting to what's called a boot. The boot caps the end of the duct and has a place to attach a register.

If you don't have a forced-air furnace, you can still use natural gas. Several companies, including Space-Ray in Charlotte, N.C., make radiant heaters that use natural gas or propane. These heaters, which start at about $650, look like large florescent tubes and are commonly used by auto repair shops and manufacturing facilities. Unlike furnaces, these heaters don't heat the air and then circulate it. They heat objects, such as the floor, your bench and you.

Bob Genisol, the vice president of sales and marketing for Space-Ray, says these heaters will save you 30 percent to 50 percent compared to forced-air systems.

How much you will save is really determined by how high your ceiling is, says Norman A. Buckley, a retired engineer who has designed many different kinds of heating systems. On average, you'll save 15 percent compared to forced air, he says. If the shop ceiling is 14', you could save as much as 50 percent. Space-Ray's product, called Cold Blocker™, is best used in a shop that has at least an 8' ceiling, which is where the unit is mounted, and must be vented to the outside.

Venting is important, according to Nasseri with the Department of Energy. Gas devices that burn the oxygen in a room and are not vented to the outside can give you trouble. First, if your room is pretty airtight (like most modern homes), you could lower the amount of oxygen in the room. This can make you sleepy, dizzy or dead.

Second, if you burn the air in the room you're in, that lowers the static air pressure in that room. So either your house will then bring in more air from the outside through its cracks (which you then have to heat), or something else will happen.

"If you open a door, a large draft will come in, like a wind tunnel," Nasseri says. Then your shop is cold again.

Suggested Reading

"Harrowsmith Country Life Guide to Wood Heat"

- **by Dirk Thomas**
- **Camden House Publishing Inc., Charlotte, VT.**
- **ISBN 0-944475-30-2.**

"This Old House Guide to Heating, Ventilation, and Air Conditioning: A Guide to the Invisible Comforts of Your Home"

- **by Richard Trethewey with Don Best**
- **WGBH Educational Foundation**
- **ISBN 0-316-85272-4.**

Electric Heat

Everybody's shop has electricity, unless you're one of those few hand-tools-by-candlelight-in-a-cave woodworkers. As a result, many shops use electricity to heat their shops. Nationwide, electricity is about 4 percent more expensive than natural gas, according to the Department of Energy. But where you live can make a big difference. If you live in New York, electricity is 12 cents per kilowatt hour, which is 4 cents higher than the national average of 8 cents. Woodworkers in the Pacific Northwest, specifically Washington and Oregon, have the lowest electricity costs in the country. So check with you electric company before you start considering your heating alternatives.

In general, you're going to pay more than twice as much to heat your shop with electric baseboard heaters than you will with a woodburning stove. But boy are they cheap and easy to install and maintain. And unlike woodburning stoves, there's no ashes to clean, no wood to chop. There's no flue and no potentially lethal fumes. Maintenance is an occasional dusting of the coils and heating fins. Plus, many baseboard electric heaters can be installed with a thermostat in your shop in just a couple hours.

But the cost is real. So unless you live in one of those states with low electric costs, or you live in a warm climate, you should really do the math before you install baseboard electric heaters.

Troy Sexton did the math, and he chose a woodburning stove — though he has an electrical system as a backup.

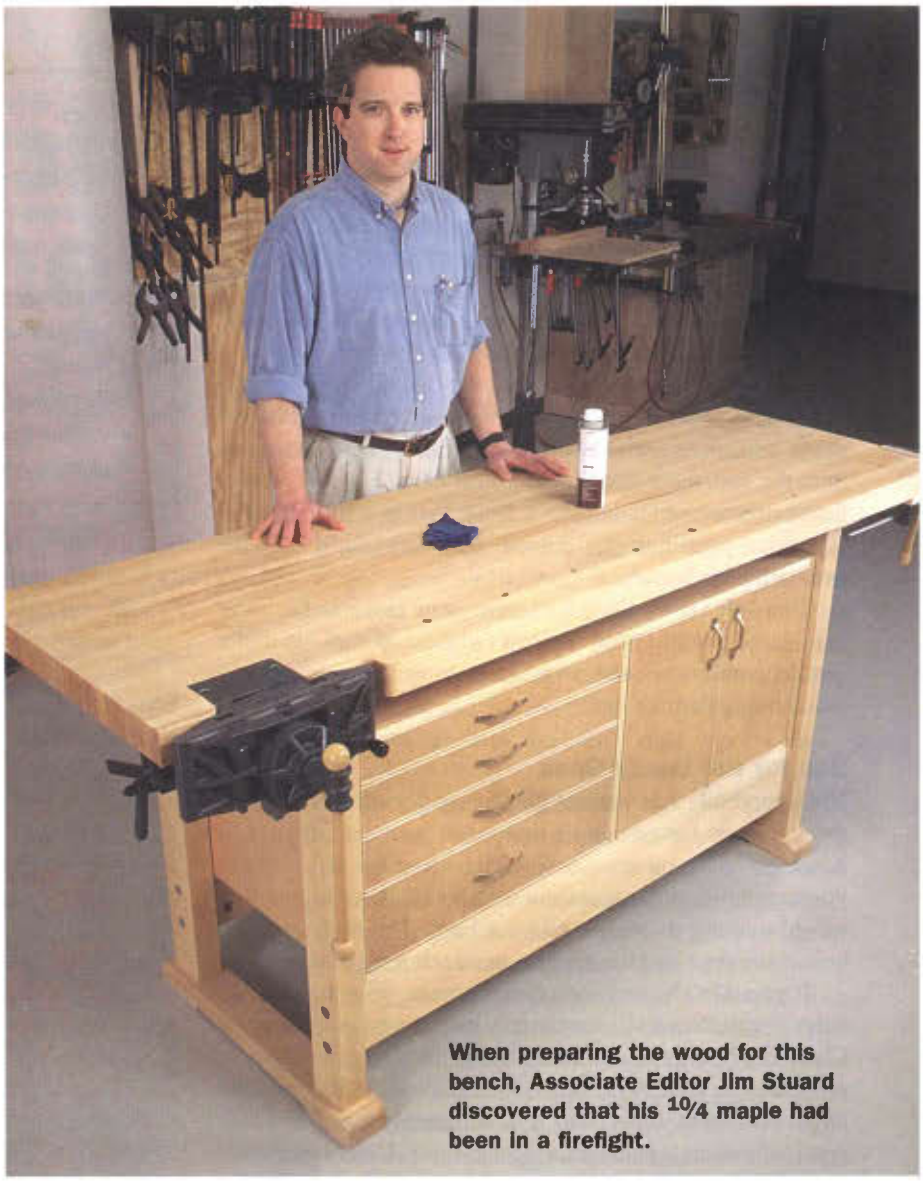
His shop in Sunbury, Ohio, makes antique reproductions and kitchens for some of the fanciest homes in Columbus, Ohio. Right now he has a full-time employee and a part-time employee. And while they're working, so is the stove. "In the winter, we pick up scraps right off the floor and throw them in the stove," he says.

First, of course, they have to step over Katie. **PW**

—Christopher Schwarz, PW staff

Bullet-Proof Bench

This workhorse combines the best of European and patternmakers' benches



When preparing the wood for this bench, Associate Editor Jim Stuard discovered that his 10/4 maple had been in a firefight.

THE FIRST SHOP I worked in was run by a German cabinetmaker from the old school. Even though it was a commercial shop, things were done in the traditional way. We used modern power tools, but most of our work was performed on traditional European-style workbenches. These benches were made with a sturdy frame and a thick maple top. One twist was the cast iron vises on the front and the end and a row of dog holes drilled in line with the dog on the tail vise. Until a couple of years ago, that bench was the best I'd used.

Then I got to use an actual 19th century patternmaker's bench. It was a bit lower than I was used to. It was equipped with a patternmaker's vise made by the Emmert Co. The vise pivoted 90 degrees and rotated 360 degrees. It also had a small set of jaws on its bottom side for holding small parts. The wide jaws tapered to hold odd-sized objects. It was an excellent vise for just about any type of woodworking. Alas, the Emmert Co. is long gone, and unless you find an old one of those cast iron behemoths, you'll have to settle for a reproduction. The American Machine Tools Co. has a nice Emmert reproduction (shown in the photo); and at $250, it costs roughly one-fifth of what actual patternmaker's vises are going for today.

For my bench I wedded my two favorite benches; the bench in the photo above is their first born. And in addition to possessing the best traits of its parents, their offspring has a few options that make it an original.

The bench has the versatility to perform many tasks. For hand planing, routing and carving, it has a row of dog holes. There's a utilitarian tail vise on one end with the patternmaker's vise on the front.

STEP 1 Choose Your Metal • Before you cut the first piece of wood, make sure you have all the hardware you need. This includes the vises, any dog hardware and the bolts for the knockdown base. Begin your bench by laying out the top to accommodate the vises. Measure the vises and the dogs to find the proper spacing they require to operate. Make sure the dogs don't interfere with vise operation. Next determine what style of base you will use. My "apprentice" bench had four stout legs with upper and lower stretchers. The patternmaker's bench had sled feet, and the base was two end assemblies connected by two wide stretchers. This is the base I chose.

STEP 2 Make the Top • The top and much of the base was made from two large planks of 10/4 hard maple (about 80 board feet). The stretchers were made from laminated pieces of 4/4 maple that yielded material about 1 5/8" thick (two boards 7" x 14', about 16bf). Lay out the rough cuts on the large planks and make your initial cross cuts.

After jointing an edge on each plank, rip the planks to about 2 1/2" widths. The lumber that I bought was flat sawn. What I accomplished by ripping was to turn the 2 1/2" widths 90 degrees and glue them together, thereby creating a quartersawn top. This is a desirable feature because a quarter-

1 VISES AND DOGS • Some of the hardware I chose for my bench includes a Jorgensen tail vise (left), a patternmaker's vise (right), several dogs and hold downs from Veritas Co. (top) and the bolts for the legs (bottom).

2 RIP YOUR PLANKS • Cut your maple planks into 2½" widths. The photo here shows the cuts being made on a band saw. I made a few cuts this way, and then I made the remainder of the cuts on the table saw. Either way, make sure you have a friend or a roller table to catch your work.

3 ASSEMBLE THE TOP • Now that you have ripped your maple into strips, it's time to glue them back together. Use regular wood glue (no biscuits) and make sure the one side of the wooden strips that hasn't been squared is facing up. In addition to clamping the width of the top, I also clamped the ends to my gluing surface.

sawn surface cuts down on cupping and warping.

STEP 3 Put the Pieces Back Together • Glue the top together in sections of 8" or less in width. This makes it easier to surface one side on an 8" jointer and then plane to get a uniform thickness. Then glue up two halves of the top; and after cleaning these sections up, glue the two halves together. For a little variety I added pieces of ¾ maple into the top for their decorative effect. When you have the entire top glued together you can begin doing whatever flattening is necessary. I have an old 24" Stanley #7 corrugated jointer plane, which worked perfectly for this process. Feel free to use Jeff Jewitt's flattening method as explained in PW #96 (May '97).

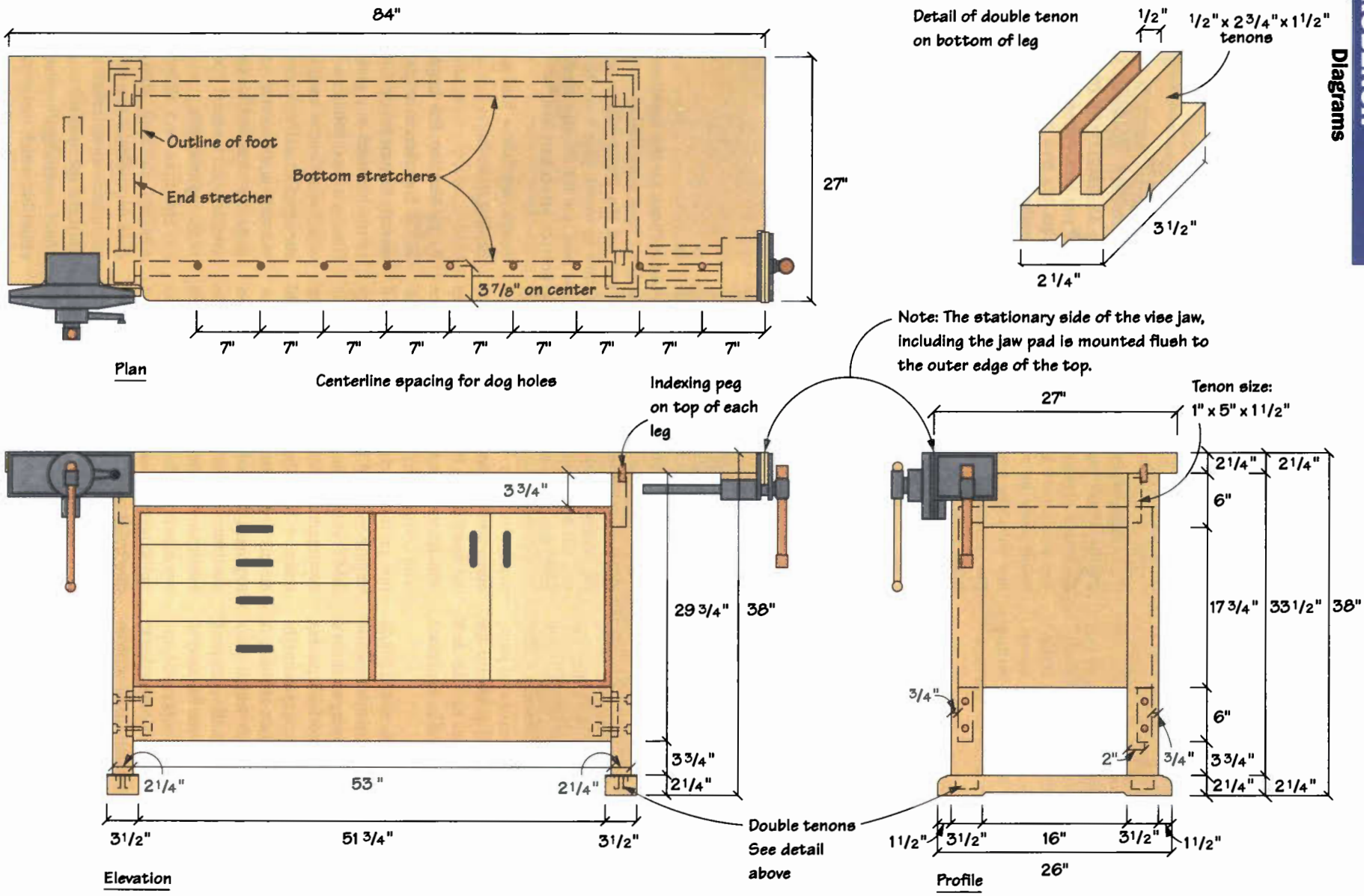
To cut the ends square, you could use a very nice cabinetmaker's saw and sliding table, but I am going to share a simple and cheap method for squaring the ends of large panels using a straight edge and a circular saw. I have a "Clamp'n Tool Guide," which is a straight edge with small clamping jaws. The straight edge can be used to guide a circular saw. Simply measure the distance from the saw base edge to the blade and mark that distance from your finish cut line on the top. (Do this with a framing square.) Clamp the straight edge to the top at the offset line and cut the top square. You might have to take more than one pass at different depths if your saw isn't powerful enough to cut the entire thickness.

4 MAKE MORTISES • See the PullOut™ Plans for the locations of the mortises on the legs and feet. If you don't have a mortising machine, use a drill press with a ½" bit and then clean out the waste with a chisel. No matter which machine you use, you will have to clamp your work to the table as you cut each hole. The mortises in the feet and for the top stretchers are 1½" deep; the mortises for the long bottom stretchers are ¾" deep.

Next shape the top so your vises will fit well. Both of the vises came with complete instructions for installation on the bench top. Some vises will require routing in the top (like my AMT vise), others need buildup (like my Jorgensen vise). Next come the dog holes. I used bench dogs and hold downs from the Veritas Co. These require a ¾" hole. In order to lay out the holes properly, first measure the maximum opening on your tail vise. In my case it was the Jorgensen. The maximum opening was 9", so I laid out the dog holes on 7" centers at 7" from the dog on the vise. So unless your material is less than 7" in length it can comfortably be clamped in this dog system. Next make the holes in the top for the dogs. The instructions for the Veritas bench dogs show how to rig a jig for drilling those holes.

STEP 4 Mortise the Legs and Feet • Your bench height should relate directly to your height. I used the height of my hip bone as a guide (about 38"). This is a good height for me because it won't cause undue back strain. First cut the legs, feet and stretchers to length. Lay out and cut the mortise and tenon joints in the legs, feet and stretchers. The short stretchers are mounted flush to the inside of the leg assembly.

The front and back stretchers are mounted ¾" back from the front and back legs. This gives me room to add accessories to my bench down the road. To make the mortises, I used a hollow-chisel mortising machine with a ½" chisel bit, which makes nice, even mortise-and-tenon sizes.


84"
Outline of foot
End stretcher
Bottom stretchers
3 7/8" on center
27"
7" 7" 7" 7" 7" 7" 7" 7" 7"
Plan
Centerline spacing for dog holes
Detail of double tenon on bottom of leg
1/2"
1/2" x 2 3/4" x 1 1/2" tenons
3 1/2"
2 1/4"
Note: The stationary side of the vise jaw, including the jaw pad is mounted flush to the outer edge of the top.
Indexing peg on top of each leg
3 3/4"
29 3/4"
38"
2 1/4"
53"
2 1/4"
3 1/2"
51 3/4"
3 1/2"
Elevation
Double tenons See detail above
27"
Tenon size: 1" x 5" x 1 1/2"
2 1/4"
2 1/4"
6"
17 3/4"
33 1/2"
38"
6"
3 3/4"
2 1/4"
2 1/4"
3/4"
2"
3/4"
1 1/2"
3 1/2"
16"
3 1/2"
1 1/2"
26"
Profile

A Bullet-Riddled Bench

When you're dealing with heavy lumber, don't be surprised to find a few old bullets in wood. Mills usually find these stray projectiles in thinner stock before they get to your lumberyard, but that's not always the case with wood this thick.

I found a few slugs in the 10/4 maple while I was resawing the wood for the top. The bullets appeared as a shiny glint on the wood's surface during a cut. I easily removed the metal with a chisel. The small slugs I found were most likely from a .22-caliber rifle, though I've found much larger ones in the past. I'd recommend keeping the bullets as a conversation piece so that when people ask you about your bench, you can tell them a "war story."

5 TENONS • Use a dado set in your table saw to cut the tenons. Your first pass should be the one that defines the shoulder. Then make several other passes to cut to the end (left). For extra strength, make the tenons that go into the feet double tenons. After you make the standard tenon, clamp the leg to a piece of wood as shown in the photo. Set your dado to cut 1/2" wide. The end result is two 1/2" tenons (right).

6 CLEAN UP • To clean up the mortises, use slicing cuts with your chisel as much as possible (left). Avoid the hammer. The only place you might have to use it is at the very end of the cut. Use a shoulder plane to trim the tenon cheeks (right). Make a few passes with the plane, then test your fit. Keep doing this until everything is snug.

7 HARDWARE HOLES • After cutting the access holes in the side of the stretcher for the bolts (left), use a self-centering doweling jig to drill the holes for the bolts in the end of the stretchers (right).

STEP 5 For Sturdy Feet • Use a double tenon on the feet. This doubles the gluing surface and is a stout joint. Cut the tenons with a dado set, which yields a nice flat tenon. The stretchers' tenons are 1" thick. The double tenons for the feet are 1/2" wide each.

STEP 6 Making Things Fit • After cutting the mortises and tenons, some fitting may be required to get a snug fit. I used sharp 1/2" and 3/4" chisels to clean out the mortises and used a shoulder plane to thin the tenons to size.

STEP 7 Make Room for the Hardware • Before gluing the end assemblies together, drill the 7/16" holes for the hardware. Use a drill press for the holes in the legs and a doweling jig for the holes in the stretchers.

Schedule of Materials: Workbench

No.	Item	Dimensions T W L	Material
1	Top	2 1/4" x 27" x 84"	Maple
4	Legs	2 1/4" x 3 1/2" x 35"	Maple
2	Feet	2 1/4" x 3 1/2" x 26"	Maple
2	Front/Rear Stretchers	1 1/2" x 6" x 54 1/2"	Maple
2	End Stretchers	1 5/8" x 6" x 19"	Maple

Now make the square access holes in the stretchers with a 3/4" Forstner bit, then square and clean up the holes with a sharp chisel. The 3/8" bolt will pass through the end of the legs, into the stretcher and end up here, which is where to attach the nut. Then cut the 7/16" holes for the bolts in the ends of the stretchers.

8 FANCY FOOTWORK • If you don't have a 7/8" router bit to shape the top edges of the feet (left), cut a 45-degree bevel on the top with your table saw. Then ease the edges with sandpaper. To make the 16" long cut out on the bottom of the sled feet, first make the relief cuts that define the ends. Then cut the bulk of the material out (right). And finally, clean up the ends.

9 TIME FOR THE BOLTS • To make the holes in the legs for the bolts, first drill a 1" counterbore that is as deep as the head of the bolt (left). Then drill through the rest of the leg with a 7/16" bit. Insert the stretcher into the mortise, put the bolt in, then tighten the bolt. I held the nut in place with needlenose pliers (right).

10 LAY OUT THE TOP • After you sand the top, put it face down on two saw horses. Then put the base on top and move it into position. Mark the location of the base on the bottom of the top (left). Then mark the location for the holes for the dowels and drill 1" deep holes into the legs and top for the 3/4" dowels that hold the top to the base (right).

STEP 8 Shape the Feet • To keep the ends of the feet from looking blocky, shape the top edge with a 7/8" roundover bit in your router table. Use a band saw to make a 3/8" cut out on the underside of the feet.

STEP 9 Assemble the Base • Bore the holes in the legs for the bolts. Then glue the end assemblies together. After the ends are dry, cleaned up and sanded you can do a test assembly on the base.

With the bottom stretcher inserted into the leg mortise, use the 7/16" bit to ream out the bolt passage. This will make your assembly easier. As you proceed to bolt the base together, you can set the nuts with some hot melt glue. Dip your bolt ends into some petroleum jelly to keep them from sticking into the bolt, then squirt some hot melt into the hole until the nut has been covered. This will make sure the nuts stay in the same place. When the glue has hardened, repeat the process on the other side of the base. Go ahead and disassemble the base and sand it. A coat of Watco™ oil finish will seal the bench from humidity. Then reassemble the base.

Tips on the Bench

- When using a stacked dado to cut tenons, make the shoulder cut first. This will prevent tearout occurring on the shoulder.
- When using circular saws to cut thick wood, take two or three passes at progressively deeper cuts. This will save your saw from burning out.
- A good way to drill the bolt holes is to drill the 1" counterbore to the depth of the bolt head and washer then drill the bolt hole with a 3/8" brad point bit. Follow this with the 13/32" bit.
- When cutting tenons, cut them to be a snug fit, one that allows you to push it into the mortise using hand pressure only.

STEP 10 Place Your Top • With the bench's top upside down on the floor, position the base where you would like to attach it and mark those locations. Turn the base over and mark the centers of the top of each leg. Drive a nail into the center of each leg. Leave about 1/4" showing so you can remove the nail. Now set the top down on the base. Press down on the top to transfer the nail marks to the underside of the top. Drill 3/4" holes into the top using the nail marks as centers. Do the same in the base. Glue a 3/4" dowel into the top of each base leg and then attach the top. Don't glue the top to the dowels, the weight of the slab is enough to hold it in place.

When the glue is dry, install your vises. Then comes the one step you cannot skip. Put your mark on this bench, whether it's your signature or brand. Otherwise you'll be cheating future generations out of ever knowing its lineage. **PW**

—Jim Stuard, PW staff

All This and Storage, Too

THE BENCH SHOWN on the preceding pages stands on its own merits, but we decided tool storage space wouldn't be gilding the lily. The height of the cabinet allows the bench dogs to operate without obstruction, as well as adding storage for large flat items such as jigs.

First cut the carcase pieces to size according to the Schedule of Materials on the next page.

STEP 1 Cut the Rabbets • The rabbet joints are made on the table saw using a dado set and an auxiliary jig for the rip fence. Set the saw to remove 3/4" (or whatever dimension your 3/4" plywood is). Raise the dado set to 1/2" height and run both sides flat on the saw, rabbeting the top, bottom and back edges. The back edge of the top and bottom pieces should also be run at this time to form a rabbet for the 3/4" back.

Reset the saw to cut a 1/4" deep dado for the center partition. By setting the rip fence to cut 25 3/4" to the dado stack, the partition should be centered; but just to be on the safe side, make both dado cuts from the same end of the top and bottom (left or right).

Assembly is next. Glue and nail (or screw or staple) the center partition between the top and bottom. The partition should fit flush to the front edge, and flush to the inside edge of the rabbets in the top and bottom. If it's a tad wide, allow the extra on the front so it can be planed flush later. Attach the sides the same way, then drop the back in place housed by the four rabbets, and fastened.

1 RABBET JOINTS • The corners use a standard rabbet joint. Cut them using a dado stack on the table saw, leaving a 1/4" x 3/4" tab. The 1/4" deep dado for the center partition can also be cut in the top and bottom at this time.

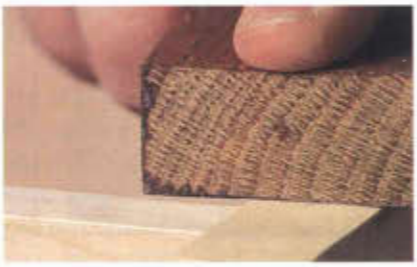
STEP 2 Tape the Ends • Cover the plywood edges with birch veneer tape that's sold in rolls with pre-glued, heat-sensitive adhesive. Cut the tape a little long for the piece and then apply it with a hot iron.

STEP 3 Press the Tape • When applied correctly, the cabinet looks like it's been assembled from solid lumber. First apply the edges to the top and bottom pieces, trimming the ends of the tape flush to the inner edges of the sides. Next apply the tape to the center partition, allowing the tape to run over the top and bottom. Trim the tape flush to the previously taped edges. Tape the ends last. Use a wooden block to press the tape down.

STEP 4 Make the Drawers • With the case basically complete, it's time to build the drawers. Make your drawer boxes with simple joinery. A 1/4" groove (set 1/4" up from the bottom of the drawer sides and front) accepts the drawer bottom, which is nailed in place through the back.

All of the joints can be cut on the table saw. These drawers are just like those used in the "Practical Cabinets" story. The four drawers shown in our

2 IRON-ON TAPE • The veneer tape is applied using a standard household iron set for cotton. The iron should be kept moving to avoid scorching.



3 PRESS YOUR WORK • While the adhesive is still warm and soft, use a block to keep the edges of the tape from curling while the glue cools and sets.

4 DRAWER CORNERS • A tongue and rabbet joint at each corner gives the drawer box lots of strength. The drawer face is then screwed to the box front.

5 FINISHING TOUCH • The cock beading on the edges of the drawers and doors hides the plywood core and provides a nice detail to the project.

cabinet are all different sizes, providing a graduated depth that not only looks good but also provides for efficient use of the space. Feel free to make your drawer depths to suit your needs.

We used enamel-coated under-mount slides for the drawers that required 3/8" clearance on both sides of the drawer box. Many standard slides require a 1/2" clearance per side, so adjust the drawer sizes in the Schedule of Materials if your slides don't use 3/8" clearance. Otherwise, your drawers could be made the wrong size.

STEP 5 Extra Touches • The drawer faces and doors are dressed up by applying a simple moulding made from 1/4" x 7/8" solid maple. Round over one edge with an 1/8" radius bit in a router mounted in a table. These mouldings are then miter cut and glued to the plywood edges.

One piece of advice on the moulding's miter cuts: We had difficulties with tear out on our saw, so we set up our disk sander and a slot miter gauge set at a 45 degree angle. After cutting the moulding to rough length, we finished the miter using the sander. To hang the doors, we used European-style hinges. The hinges you use are up to you.

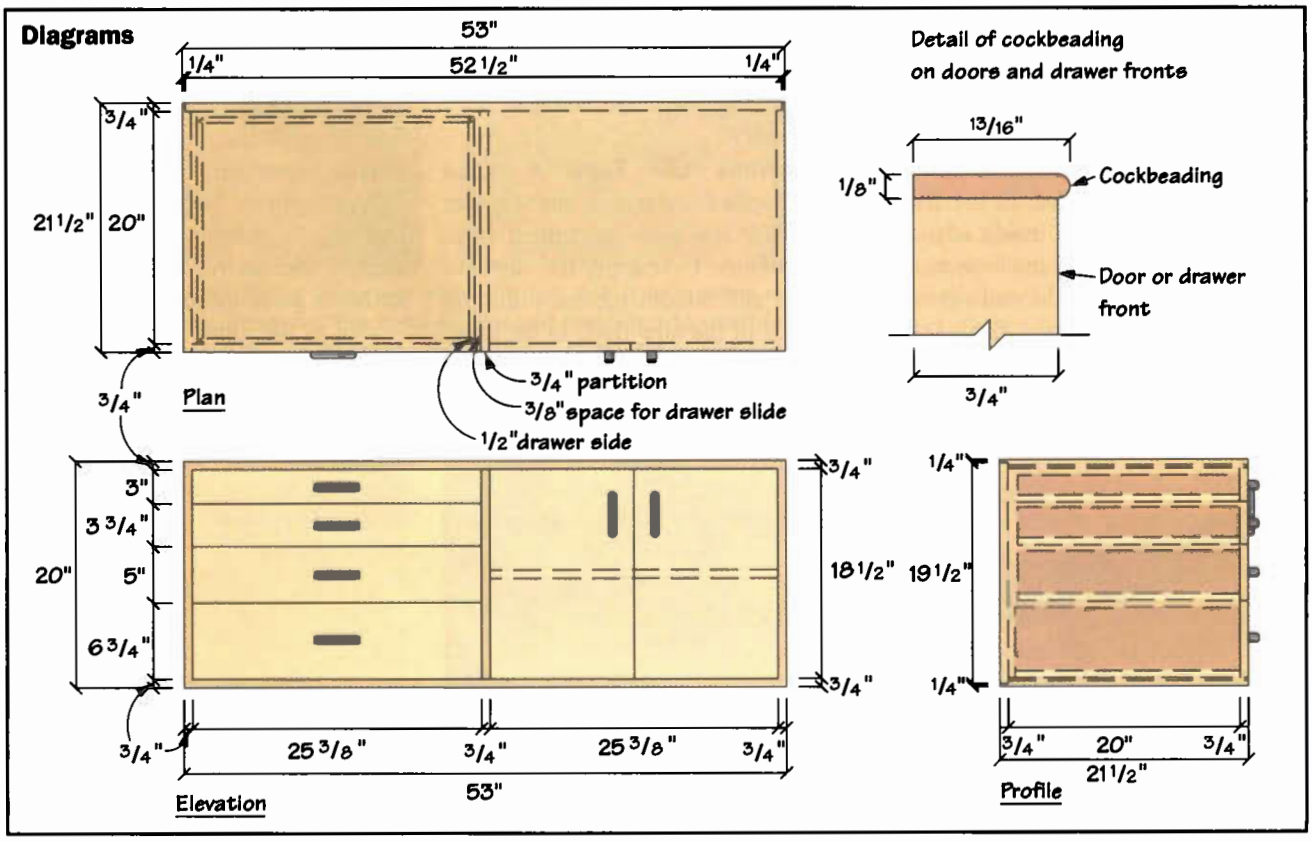
To keep the cabinet in place between the bench's stretchers, we attached four 1/2" thick blocks to the bottom of the cabinet. These held the cabinet in place while still allowing it to be easily removed when necessary. **PW**

—David Thiel, PW staff

Schedule of Materials: Workbench Storage Cabinet

No.	Item	Dimensions T W L	Material
2	Top & bottom	3/4" x 21 1/2" x 52 1/2"	Birch Ply
2	Sides	3/4" x 21 1/2" x 20"	Birch Ply
1	Partition	3/4" x 20 3/4" x 19"	Birch Ply
1	Back	3/4" x 19 1/2" x 52 1/2"	Birch Ply
2	Doors	3/4" x 12 1/8" x 17 7/8"	Birch Ply
1	Drawer face*	3/4" x 24 3/4" x 2 1/2"	Birch Ply
1	Drawer face*	3/4" x 24 3/4" x 3 1/2"	Birch Ply
1	Drawer face*	3/4" x 24 3/4" x 4"	Birch Ply
1	Drawer face*	3/4" x 24 3/4" x 6 1/4"	Birch Ply
2	Drawer sides	1/2" x 2" x 19 1/2"	Birch Ply
2	Drawer sides	1/2" x 3" x 19 1/2"	Birch Ply
2	Drawer sides	1/2" x 3 1/2" x 19 1/2"	Birch Ply
2	Drawer sides	1/2" x 5 3/4" x 19 1/2"	Birch Ply
1	Drawer front	1/2" x 2" x 24 1/8"	Birch Ply
1	Drawer front	1/2" x 3" x 24 1/8"	Birch Ply
1	Drawer front	1/2" x 3 1/2" x 24 1/8"	Birch Ply
1	Drawer front	1/2" x 5 3/4" x 24 1/8"	Birch Ply
1	Drawer back	1/2" x 1 1/2" x 24 1/8"	Birch Ply
1	Drawer back	1/2" x 2 1/2" x 24 1/8"	Birch Ply
1	Drawer back	1/2" x 3" x 24 1/8"	Birch Ply
1	Drawer back	1/2" x 5 1/4" x 24 1/8"	Birch Ply
4	Drawer bottoms	1/4" x 19 1/4" x 24 1/8"	Birch Ply

*(Note: W is cross grain direction, L is long grain direction.)



Unlock the Secrets of the Puzzle Box

Sure, it looks like you have to be insane to build a band sawn box, but with just a few pointers you can crank out your own crazy containers.

Beautiful to behold but a challenge to take apart, band sawn boxes can be made out of any wood, remembering that the softer the wood, the easier it is to work. Shown here is a hidden drawer box made from maple burl (left), a three-dimensional puzzle made from western red cedar (center), a round drawer box made from madrone (on bottom), and a box made from buckeye on top.

BAND SAWN BOXES might just be the slightly crazy cousin of Shaker-style nesting boxes. The two bear a family resemblance in that both are made up of boxes that fit inside one another. But while the Shaker boxes are good for storage, the band sawn boxes and their odd-shaped interlocking innards are good for puzzling a loved one.

Making a band sawn box is actually pretty easy, once someone shows you a handful of tricks. And the resulting box makes an excellent package for that special gift, such as an engagement ring or other small treasure. Or, if you make a box out of an odd piece of burl, the boxes themselves can become a beautiful piece of art.

But I'm getting ahead of myself here. First you need to learn to make a simple band sawn box before you can create some of the strange but beautiful designs shown above. And before you can make your first cut on a band sawn box, you need a brief lesson in drying the wood for these bizarre boxes.

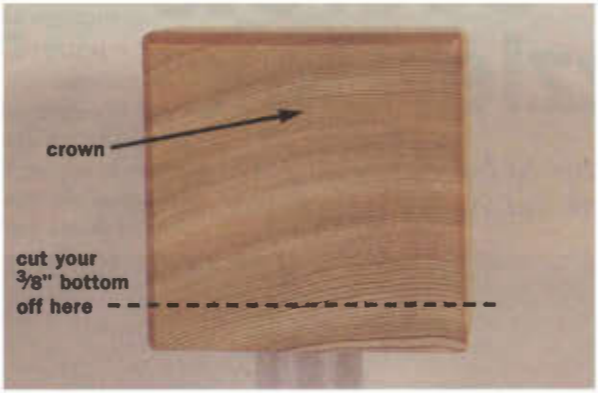
Dry the Wood

You're not going to want to hear this, but you're not going to be able to make a band sawn box today, tomorrow or even next week. Even wood from the lumber yard that's already dried has to be dried for 30 more days before you can begin. This is important because the moisture content of each box blank must come into equilibrium with the environment in which it will be cut apart and workerd, otherwise it will warp after cutting.

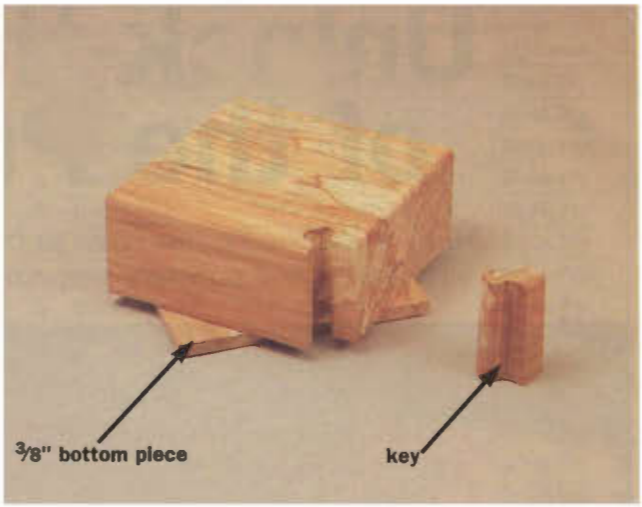
Luckily, though, it's not a big investment to start the drying process. For your first box, buy an air-dried redwood or cedar 4 x 4 (avoid heartwood). These woods are easy to find, cut and sand — and they dry quickly. A hardwood might take years to dry.

Cut the wood into 5" lengths, avoiding knots, and stack your blocks

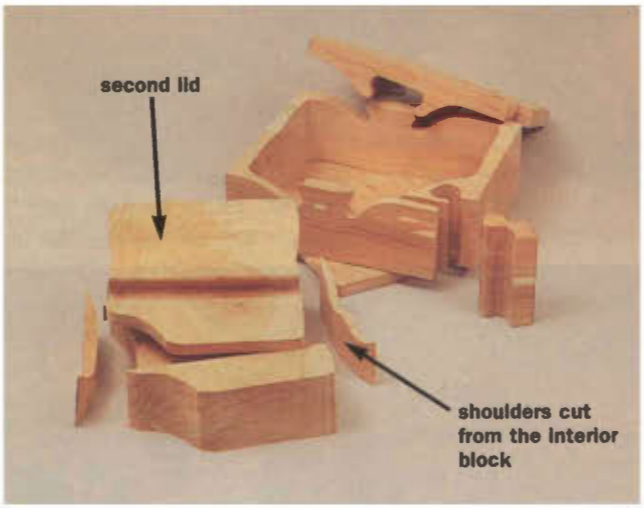
BAND SAWN BOX



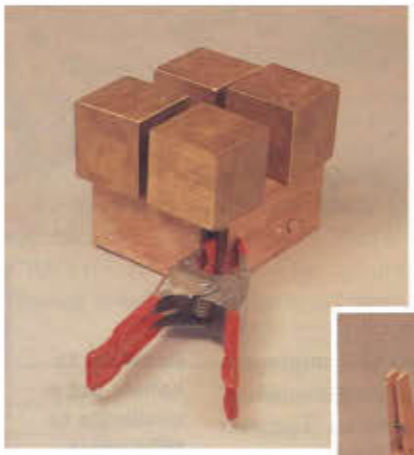
1 FIND THE CROWN • The crown is the high spot on the curve of the end grain. The crown is the best part for the top of the band sawn box. Make your first box from a 5" block cut from a 4 x 4. The boxes in these photos are smaller and are made from maple burl.



2 THE KEY IS KEY • After you saw off the bottom, cut the key from one corner. Start the cut from the long grain side about 1/2" in from the end. Cut into the block about 3/8", make your tight circle and then exit on the end grain side.



5 LID #2 • With the block from the last cut, remove a second lid from the top and set the top aside. Then cut shoulders from the sides of what's left. Keep the shoulders, the rest goes into the scrap pile.



6 GLUE AND CLAMP • Don't try to clamp the bottom to the rest of the box, or you'll likely end up with a warped box. Use heavy weights to make sure the box dries flat.

Clothes pins hold the shoulders in place while the glue dries.

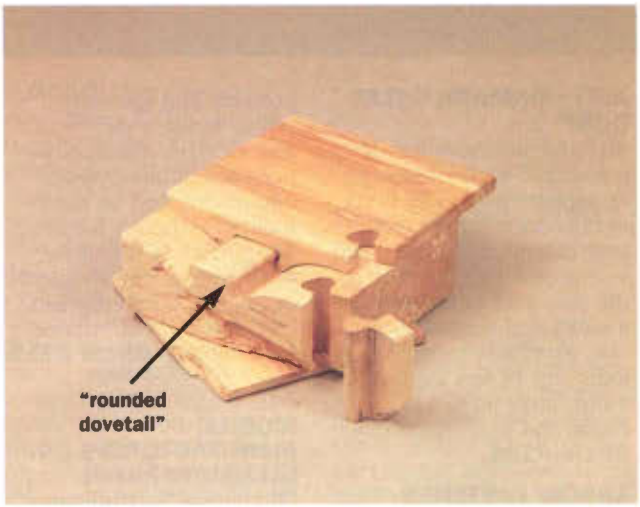
on top of each other with the end grain facing up. Place a piece of 1" scrap on top of your tower and let the wood dry in a heated room for about 30 days.

STEP 1 One Month Later... • After eight phases of the moon have passed, it's time to make your band sawn box. Sand the exterior using 150- to 180-grit sandpaper. Then decide which side of each block will be the top of the box. Examine the end grain and look for the "crown" of the grain. The side that is at the top of the crown should be the top; this will give you a strong, stable box.

STEP 2 Get Ready to Saw • Use a 1/8" blade on your band saw that has 11 to 15 teeth per inch and is .020 to .025 thick, which is the standard thickness of most bandsaw blades. Make sure your blade is square to the table — both side to side and front to back — or your box will be a disaster. Your band saw blade needs to be very tight. If it's loose, it could bend during your cuts and make a lid that's impossible to remove, for example. First cut a 3/8" bottom off the box. A 1/8" blade does not want to cut straight, so don't try to make it do that. Instead, make your cut bow slightly upward in the middle, giving you a more stable block. Put the bottom aside.

Now cut the "key" from your block. This corner piece holds the whole thing together. From the top of the box, it looks like a puzzle piece that nests into another piece. Put the key aside.

STEP 3 Cut the Lid • This is the toughest cut. Place the block on its side and start your cut on the end grain side, about 1/2" from the top. About halfway through the



3 DON'T BLOW YOUR TOP • This cut is tough. Start from the end grain, head for the bottom, then cut the rounded dovetail that holds the lid to the body of the box.

4 THE SECRET TO THE INSIDE • Cutting out the interior is the secret to making many of the boxes. Start the cut in the end grain by the key hole.

7 THE END RESULT • In this box I made one more little box on the right-hand side. After finishing, you can flock the interior, which makes it look like you covered the inside with velvet. Flocking tools are available in catalogs and craft stores everywhere.

Jeff Vollmer shows off some of the amazing burls he has collected in his Cincinnati, Ohio, shop. Some of these will dry for years before becoming boxes.

cut, make a "rounded dovetail" as shown in the photo. Exit the wood on the opposite end. Put the lid aside.

STEP 4 Hollow the Interior • Lay the remaining center section flat again. Start the hollowing cut on the end grain where the key is located. Cut around the inside of the block, making sure the exterior wall is at least 3/8" thick. Cut a gentle curve around the key hole and then carefully back the blade out. Remove the inside piece; set the exterior aside.

STEP 5 Make a Second Lid • Place the inside piece on its side and cut about 3/8" off the top, following the curve of the top. Set this second top aside. Then take the remaining block and put it back on the bottom. To make the shoulders that support the second lid, cut off the sides of this interior block. These shoulders should be 1/8" thick.

STEP 6 Glue and Clamp • Glue and clamp the entry hole you made at the keyhole with a spring clamp. Slide the top lid onto this piece. Glue the bottom piece from your first cut onto the bottom edge. Place on your workbench, put weights on top and allow to dry. After it's dry, slide the lid off and glue and clamp the shoulders to the sides using clothespins.

STEP 7 Finish • Sand the box, finish it and then flock the interior (if desired). **PW**

Jeff Vollmer has been making band sawn boxes for seven years. His company, Royal Woods in Cincinnati, Ohio, sells his boxes in 60 galleries nationwide and in Paris.

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J/J 97

Organize Your Shop

Five ways to put clutter in its place.

FOLLOWING THE OLD MAXIM "a place for everything and everything in its place," I've made this goal No. 1 in my shop. But not because I'm a neatnick. I simply agree with a sign I once saw in a shop that proclaimed, "Poor Housekeeping is Dangerous."

Besides, organizing your shop helps prevent the "Where'd I put it?" syndrome. And further, if a tool is put away, it's protected from damage.

Here are my "storage solutions," which have brought order to my shop. All but one can be built in a weekend, some in an afternoon.

SCRAP WOOD TOOL CABINET

Let's start with the tool cabinet. Unlike the tool cabinets of old, this cabinet is super-simple with ample storage space built of readily available scraps (mostly). It's also strong, spacious and functional **(photo 1)**.

The cabinet features deep doors, two drawers (one deep and one shallow) and one shelf. Because I wanted an adaptable cabinet, I also made space for slide-in shelves that can be added at a later time.

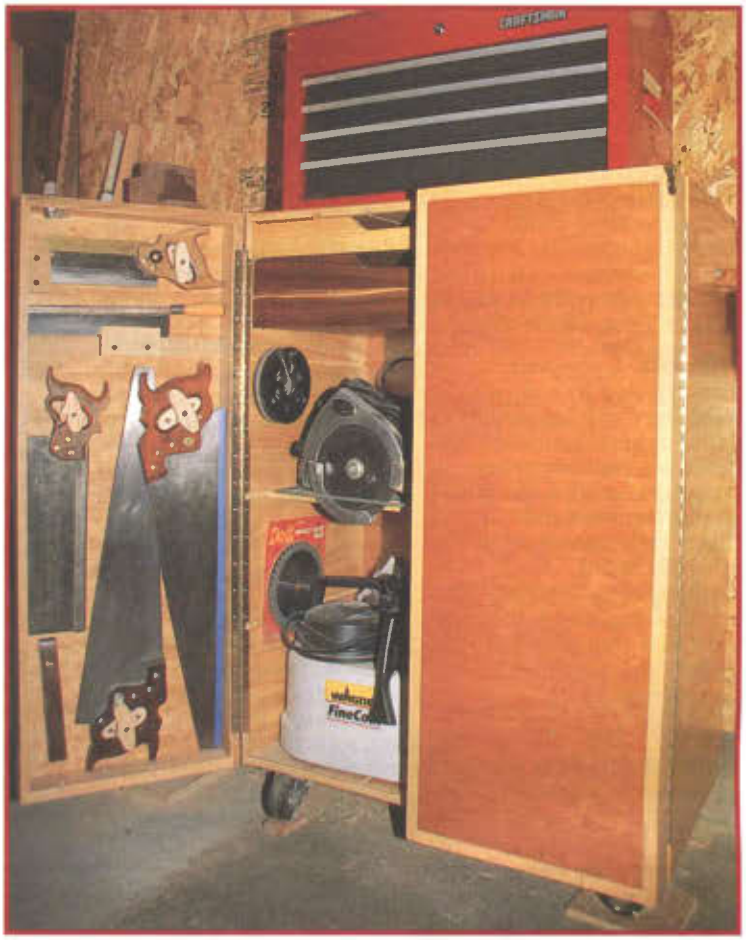
The cabinet's dimensions (42" high, 32" wide and 17" deep, with two full length doors 2½" deep) allow you to conveniently set a tool box on top; four locking casters make your cabinet mobile.

The construction is straightforward. Use rabbets in the sides for the top and bottom joints, Cut a rabbet in the top, bottom and sides at the back edge to accept the ½" plywood back. Many of the joints are simple butt joints. It's unnecessary to cover the exposed plywood edges, but make sure you sand them smooth and flush. The doors are made the same way, although I used oak scraps for the frames that hold the ¾" plywood panels. Attach the doors to the cabinet with continuous hinges.

The drawers are also glued and nailed using butt joints. You can buy inexpensive metal slides that hold about 75 pounds of "stuff." Or spend more for full-extension slides that cost about $15 a pair.

The most time-consuming part of the cabinet is making the storage doodads, such as the saw handle "kidneys" in the doors. You want the tools to be secure in the door when the cabinet rolls across the shop. This is where the deep doors are helpful.

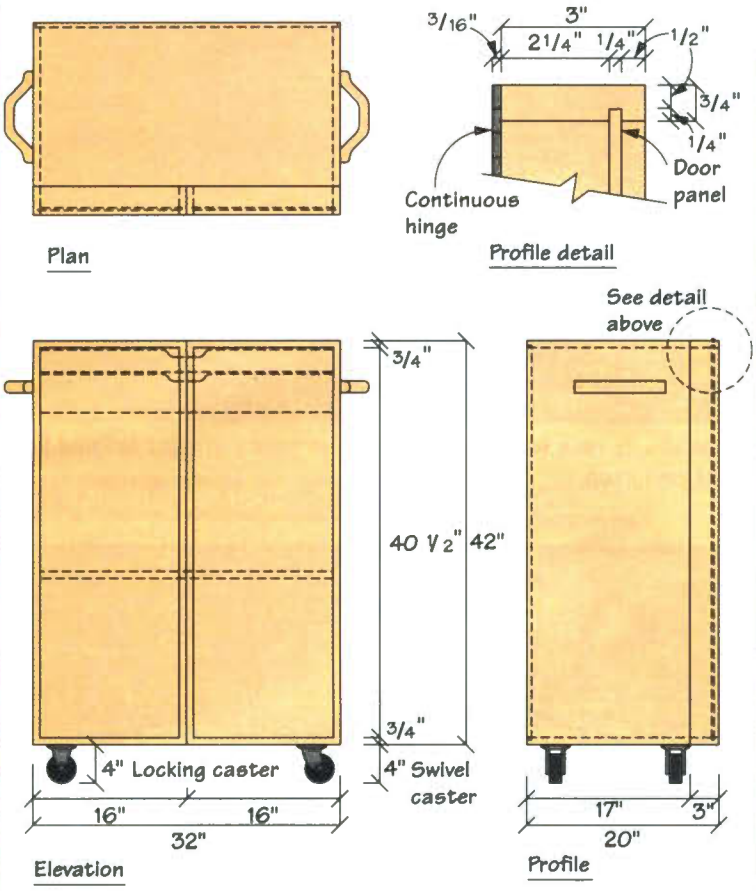
You can install a cylinder lock to keep little hands out. An added touch is the handles on the ends of the case, which make moving the cabinet around the shop a breeze **(photo 2)**. When the cabinet is done, two coats of clear finish should do the trick.



1 **This tool cabinet might not look like Duncan Phyfe's, but its spaciousness and straightforward construction get the job done. The "kidneys" that hold the saw handles are made with two identical oval-shaped pieces of wood that your saw handle hangs on. Attach one of the ovals to the inside of the door with screws and glue. Then attach the second oval to the first oval with one wood screw. Don't tighten it all the way, though. This will give you just enough play to lock the saw to the door.**

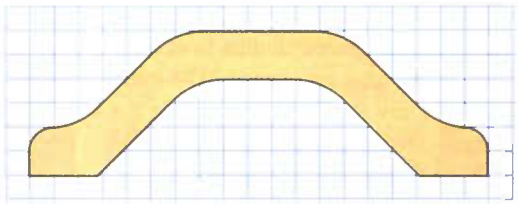
2 **To attach the handles, locate and drill holes in the sides and install ¼" tee nuts on the inside of the cabinet so you can bolt the handles directly to the sides.**

Diagram for Tool Cabinet



Schedule of Materials: Tool Cabinet

No.	Item	Dimensions T W L	Material
2	Sides	3/4" x 17" x 42"	Plywd
2	Top/Bttm.	3/4" x 17" x 31 1/2"	Plywd
1	Back	1/2" x 31 1/2" x 41 1/2"	Plywd
4	Door stiles	3/4" x 3" x 41"	Oak
2	Door rails	3/4" x 3" x 15 1/2"	Oak
2	Door panels	1/2" x 14 15/16" x 40 15/16"	Plywd
2	Up. drwr fr.	3/4" x 2 1/2" x 30 3/8"	Oak
2	Up. drwr sides	3/4" x 2 1/2" x 15 1/4"	Plywd
2	Up. drwr back	3/4" x 2 1/2" x 28 1/2"	Plywd
2	Up. drwr bott.	1/2" x 14 1/2" x 29"	Plywd
2	Lo. drawer fr.	3/4" x 5" x 30 3/8"	Oak
2	Lo. drwr sides	3/4" x 5" x 15 1/4"	Plywd
2	Lo. drwr back	3/4" x 5" x 28 1/2"	Plywd
2	Lo. drwr bott.	1/2" x 14 1/2" x 29"	Plywd
1-3	Shelves	3/4" x 13" x 31 1/4"	Plywd
2	Handles	1 1/4" x 3" x 10"	Oak



Detail of handle One square equals 1/2"

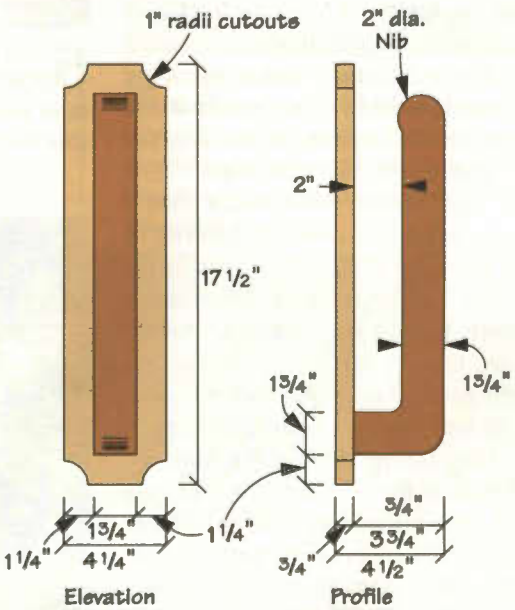
SIMPLE HOSE HANGER

3 Sure, it looks like something to hang an elephant's trunk on, but this hose hanger will grip your hose and hold it firmly against the wall — no small tusk, er, trick.

I get more comments and odd looks on this vacuum hose hanger **(photo 3)** than on anything else in my shop.

I use 2 1/4" shop vacuum hose with my dust collector that begged for a place to be stored. No matter where I hung it, it always uncoiled. So I found a piece of 1 3/4" maple about 6" wide by 15" long and made it into a "horn" on which to hang the hose. To ensure the hose doesn't slip out, I made the distance between the back plate and the inside of the arm 2" instead of 2 1/4". This squeezes the hose in place. To make doubly sure it stays put, the top end of the arm on the inside has a "nib" to stop any upward movement. The back is 4/4 oak.

Diagram for Hose Hanger



On a whim I put a 3/8" roundover on the "horn" and a 3/8" bead roundover on the back plate with quarter circles cut out of each corner.

"H"-RACKS

The next two organizers are similar, but they keep different tools: clamps and lathe chisels.

For my clamps, I built "H" racks **(photo 4)**. First determine the depth you need in the horizontal section of the "H" (which is determined by what type of clamp you will hang on the rack), then decide how many clamps you want each rack to hold before you begin laying out the pieces. Be careful not to make the fingers that separate clamps too narrow or they'll snap off easily when you hang your first clamp.

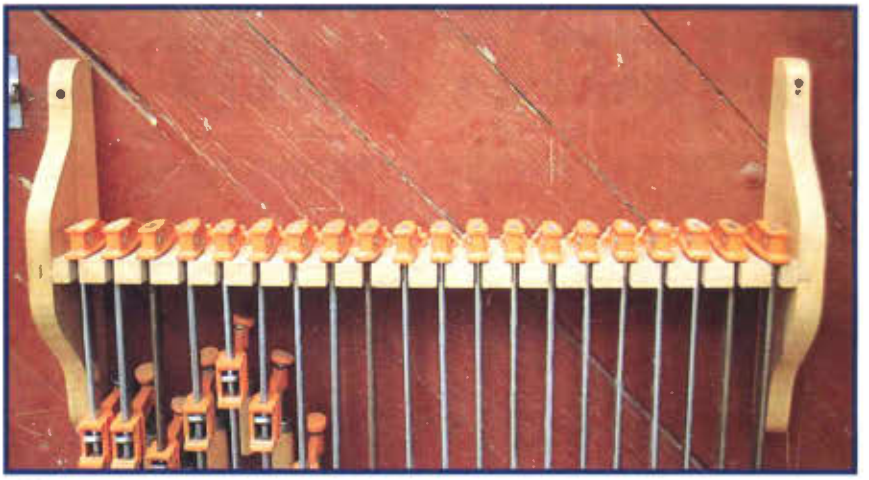
The rack I made for bar clamps holds 20 clamps, which was more capacity than I needed at the time. Make kerf-cut slots for the clamps and leave space between clamps to accommodate the clamps' heads. The total width for my rack is 25¼" inside the vertical uprights.

I joined the uprights to the horizontal "H" with a simple sliding dovetail (for practice), but a dado works just as well. If you use a dado to join the uprights to horizontal piece, however, run a couple of screws through the side into the horizontal piece to hold it in place while the glue dries.

The other rack holds my pipe clamps **(photo 5)**. The considerations here are the same as in building the bar clamp rack, but allow for a ½" or ¾" pipe instead. Each notch should be cut equal to the outside diameter of the pipe plus 1/16".

My third "H" rack holds lathe chisels **(photo 6)**. I wanted a secure place to hang my chisels behind my lathe because a dropped tool is a damaged tool that must be resharpened.

Here I drilled holes in the horizontal part of the "H" for all the chisels that have a blade equal to or smaller then the diameter of the tool's ferrule (the metal ring around the handle where the tang of the blade enters). For the chisels that have blades wider than the tool's ferrule, I first drilled a hole and then cut an entry slot to allow the blade to slide in from the front.



4 **Build this simple rack for your bar clamps so they don't get tangled in the corner of your shop.**

5 **This is the same design for the bar clamps that has been adapted to hold pipe clamps. It's always a good idea to build these racks a little bigger than you need them. (You never know when you might get another clamp for your birthday.)**

6 **If you're tired of scrounging around for your lathe tools, this rack mounts easily behind your lathe, giving you quick access to the correct tool.**

ROUTER BIT CADDY

To protect your router bits, make this simple tray with a handle to keep in the bottom drawer of your tool cabinet **(photo 7)**.

It is nothing more than a 6" x 10" piece of scrap beech with a handle. Lay out all your router bits by size and cut a suitable sized piece of stock. Make the tray big enough for all the bits you have now, plus 10 to 20 more. When you have the bits laid out, drill a series of holes that are 1/32 larger than the bit's shank.

Also, for the bits with separate cutters and arbors, put in 3/16" dowels for these. Cut the handle from 3/4" stock and screw it to the center of the tray.

7 This router bit caddy protects the cutting edges from banging into each other and into your fingers.

SAW BLADE RACK

This saw blade rack is a simple plywood box with kerf-cut risers inside to hold each blade **(photo 8)**. The sides are cut from a roughly 5 1/2" x 20" strip of plywood. Miter cut it into two equal halves on a 45 degree angle to produce two identical sides **(see diagram)**.

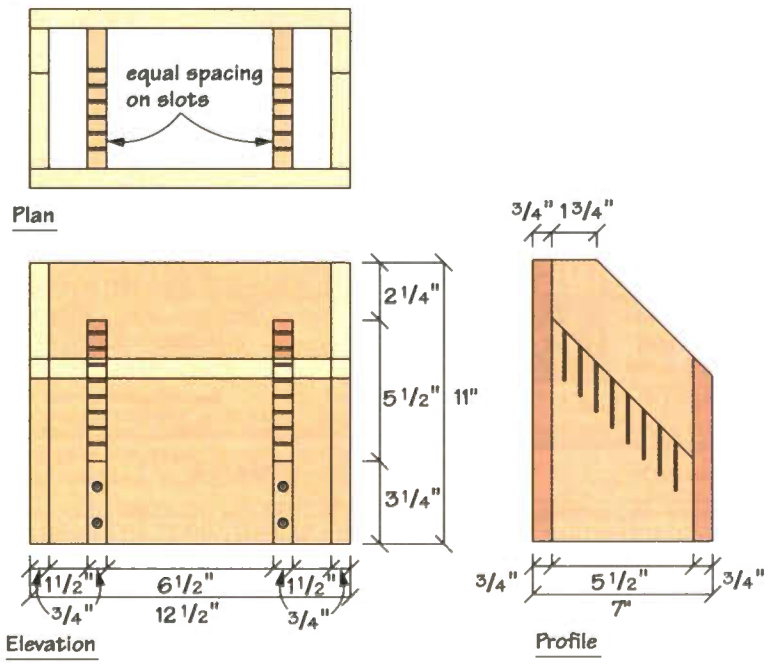
The interior risers are made the same way and are the same width, but shorter. On the risers, mark where you want each kerf cut to be made, then clamp the risers together, tilt the table saw blade to 45 degrees, and run them through with the miter gauge. The spacing between kerf cuts should be enough to prevent the spacers from breaking off; but otherwise, the rack can have as many slots as you want. If you need more, just make the sides and risers wider.

The top edge of the front and back are cut with a 45 degree angle as well. First cut the bevel, then mark the length to get an accurate fit. Glue the assembly together using butt joints, finish nails and glue.

It's easy to get carried away with this organizer. If you keep it near your saw, you'll be hanging other table saw accessories on it **(photo 9)**. Like the "L" channel on the front to hang your machinist's square and protractor. A screw will hold your tape. Another couple screws below will hold the table saw wrench. On the side you can store your bevel gauge and make a box for pencils, a 6" rule, 6" square, pen, drafting compass and other drawing supplies. **PW**

Larry Heinonen writes woodworking-related articles and is the owner of Benchmark Wood Works in Burlington, Michigan, which specializes in custom and reproduction cabinetmaking.

Diagram for Saw Blade Rack



8 This saw blade rack keeps your blade collection handy by your table saw, protects the tips of the blades and can even store many of the other tools frequently used at the table saw.

9 With a little imagination, you can turn this blade keeper into a virtual table saw "tool belt."

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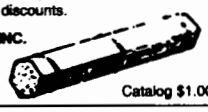

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CAPTION the CARTOON

PORTER•CABLE

illustrated by Bob Rech

Submit your caption(s) for this issue's cartoon on a postcard to ***Popular Woodworking*, Cartoon Caption #25, 1507 Dana Ave., Cincinnati, OH 45207** by June 18, 1997. Winning entries will be chosen by the editorial staff.

The winner will receive a Porter-Cable Limited Edition, 90th Anniversary router. The model 90690 is a 1½ hp, 23,000 rpm router featuring 100 percent sealed ball bearing construction. The fixed base router accepts both ¼" and ½" collets with an auto-release system to prevent bits from freezing in the collet. This limited edition also has a special anniversary finish and logo, and includes an all-metal carrying case.

The two runners-up will each win a one-year subscription to *Popular Woodworking*.

The winner of our "Caption the Cartoon Contest #23" from the March issue and recipient of the Porter-Cable router is:
Rick Johnston, from Cincinnati, Ohio.

The runners-up receive a one-year subscription to *Popular Woodworking*:
Steve Haggbloom, from Jonesboro, Arkansas, for:
"This gives a whole new meaning to 'shooting board.'"

Tom Peterman, from Atlanta, Georgia, for:
"This plane can be used in 'navel' warfare."

And finally, for coming up with the best names for the characters in our cartoon contest, Charles T. Roe, of Colorado Springs, Colorado, for:
"The Gopher Brothers couldn't wait to try their new planer, the 12" uppercut model by Helmlich."

"Suddenly, Dr. Helmlich, amateur woodworker, gets an inspired idea!"

Exercising Tool Savvy

Come on everybody, let's turn that old exercise equipment into something you can actually use.

THERE NEVER SEEMED TO BE ENOUGH HOURS in the day, when you totaled six hours for sleeping, three hours a day for school, four-and-a-half hours practicing on the lathe, nine hours and 45 minutes in my shop working on projects, 30 minutes for dinner and — of course — the obligatory 15 minutes for housework.

Something had to go, and I decided it would be my exercise regimen. After all, it was enough of a workout just carting around large sheets of plywood, hoisting huge chunks of wood onto the lathe, sanding until my triceps ached, and running across the shop between my table saw and jointer until I reached my target heart rate.

What use was a scale in the upstairs bathroom when all my time was spent in the garage? Besides, I could get a more accurate reading of body-fat-to-muscle ratio using dial calipers.

But then the parsimonious person that I am wondered, "What am I going to do with a basement full of expensive exercise equipment?"

While pondering this question, I happened to look at my work bench where a pile of veneer was in desperate need of flattening. After laying down my secret water-and-white-glue-glycerine-and-denatured-alcohol formula, I needed something bulky to press down this stack. Something weighty. Something massive.

"Aha," I thought. "What about the weights from my barbell set?"

I trudged down to the basement and removed the substantial 30-pound disks from my "Hulk Hogan Barbell Set" and plopped them on the stack of glued veneer. That should do it, I thought, but now I had a long steel bar with no weights. Because I never have enough clamps, I decided I could easily convert the bar into a pipe clamp.

I was on to something.

I dragged my "Suzanne Somers Thigh Master" out from under the clothes dryer and turned it into a quick-release spring-action clamp. It should last a lifetime. (Besides, after almost a lifetime of prolonged, repetitive thigh exercises, I was still not the master of my thighs.)

Next I deflated my "Body by Jake" exercise balls. I cut them into circles of various sizes and mounted them on plywood. Now I had several non-skid bowl-turning jigs for turning the underside of my bowls (as if it would help).

Pleased, I looked up and saw my "Mighty Morphin' Power Rangers" bicycle, which was hanging from ceiling hooks. I deflated the tires and used the inner tubes as band clamps. Then I ground the spokes into microturning tools for my lathe.

My "Cher Underarm Exercise Bands" became heavy-duty rubber bands. I drilled a hole into the tops of my two "Jane Fonda Aerobic Steppers" and filled them with mortar. This made a solid, heavy platform that raised my lathe to a more comfortable height.

My Tonya Harding-brand ice skates became skews and scrapers. (They had lost their value, anyway.) Face shields on my Barbie doll bicycle helmet added that designer touch I had been looking for in protective eyewear for my shop.

However, my Micky Mantle baseball glove remained unscathed. That would be needed to catch those flying lathe-turned *objects d'art.*

By the end of the day I had nearly cleaned out my basement. I was proud of my efforts and couldn't wait for my family to come home and see what I had accomplished: A more user-friendly workshop *and* a clean basement. I had just started to prepare my "Richard Simmons Deal-a-Meal" dinner plan when my husband arrived home. His only response to my efforts was this, "That's great honey, but what are you going to do with the treadmill?"

"That was easy," I said. "Now I have a great big giant belt sander!" **PW**

Ryta R. Weiner *gave up her career as a freelance court reporter to pursue her long-time dream of being a furniture maker. She is currently enrolled in the fine woodworking program at Bucks County Community College in Newtown, Pa.*

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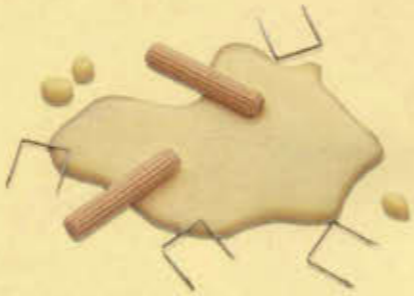

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