

Feb/March 08

WOODCRAFT[®]

Projects, Techniques, and Products

magazine

Build an Heirloom

Step-Back Cupboard

See the 4-DOOR VERSION p.22

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- **Heart Music Box** p.42
 - **Carved Love Spoon** p.68
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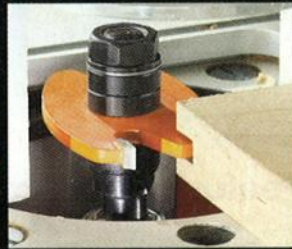
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ON THE COVER

Ohio craftsman Steve Rigrish designed and built our charming country step-back cupboard, which teaches the making of raised-panel doors, cove molding, beadboard, and applying a distressed milk paint and shellac finish. Photo by Jim Osborn.

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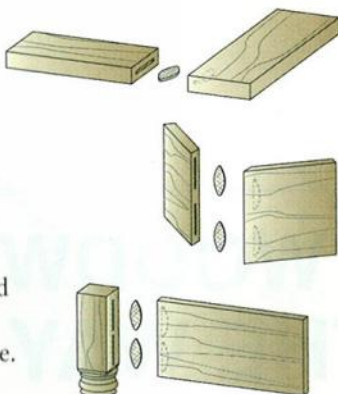
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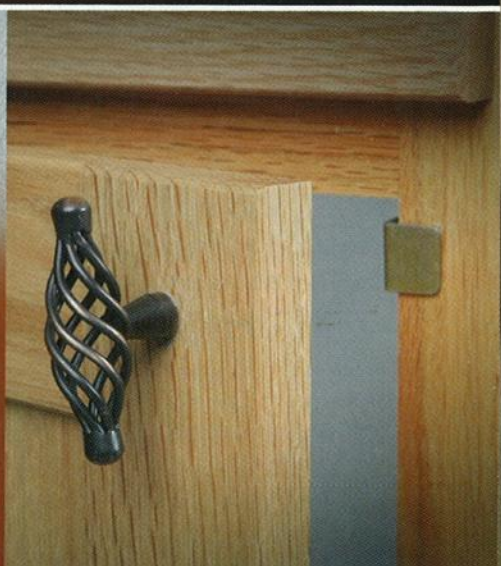
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CUTTING IN

IN SEARCH OF EXCELLENCE... AND SUCCEEDING



As we've ratcheted up the quality and variety of the project designs and techniques in our newly "reformulated" *Woodcraft Magazine*, we've also made a few key staffing improvements I'd like to tell you about.

For starters, we carved out a space for new hire Chad McClung. In his role as assistant art director, Chad works closely with creative director Ken Brady in looking after the page layout, photography, and illustration needs of the magazine. After graduating from the Art Institute of Pittsburgh, Chad returned home to Parkersburg, West Virginia, where he spent the next 10 years working professionally: two years for the *Parkersburg News and Sentinel*, four at a local advertising agency, and four at his own graphic design business, Livewire Studio. Magazine work excites him, Chad tells me, because it "allows me to apply a full range of graphic design skills."



Chad McClung

On the editorial side, we hired as senior editor one of the top woodworking writers in the business, seasoned woodworker Joe Hurst-Wajszczuk. Joe's background makes him well qualified for the tall order of tasks assigned to him, which include editing, writing, story development, and freelance and photography management. Joe has produced features, columns, and cover stories for a variety of woodworking, home improvement, and outdoor/garden publications. This impressive list reads like an industry who's who: *The Family Handyman*, *Woodcraft Magazine*, *This Old House*, *American Woodworker*, *WOOD*, *Mother Earth News*, *The Wood Post*, *Popular Woodworking*, *Woodworker's Journal*, and *Handy Magazine*. In 2006, he wrote, designed and built the projects for his Taunton Press book, *Furniture You Can Build: Projects that Hone Your Skills*. His 15 years in the journalism business span more work than we have room for here, and include stints as a staffer, contributing editor, and freelancer. Beyond that, I don't know of a single type of woodworking story Joe hasn't mastered, making him as versatile and talented a writer (and editor) as you'll find anywhere.

Needless to say, I'm as delighted over these additions as the woodworker who finally gets the cabinet saw he's dreamed of, and for the same reason—fulfillment in that ever-elusive search for excellence. Welcome aboard, Chad and Joe.

Jim Harrold

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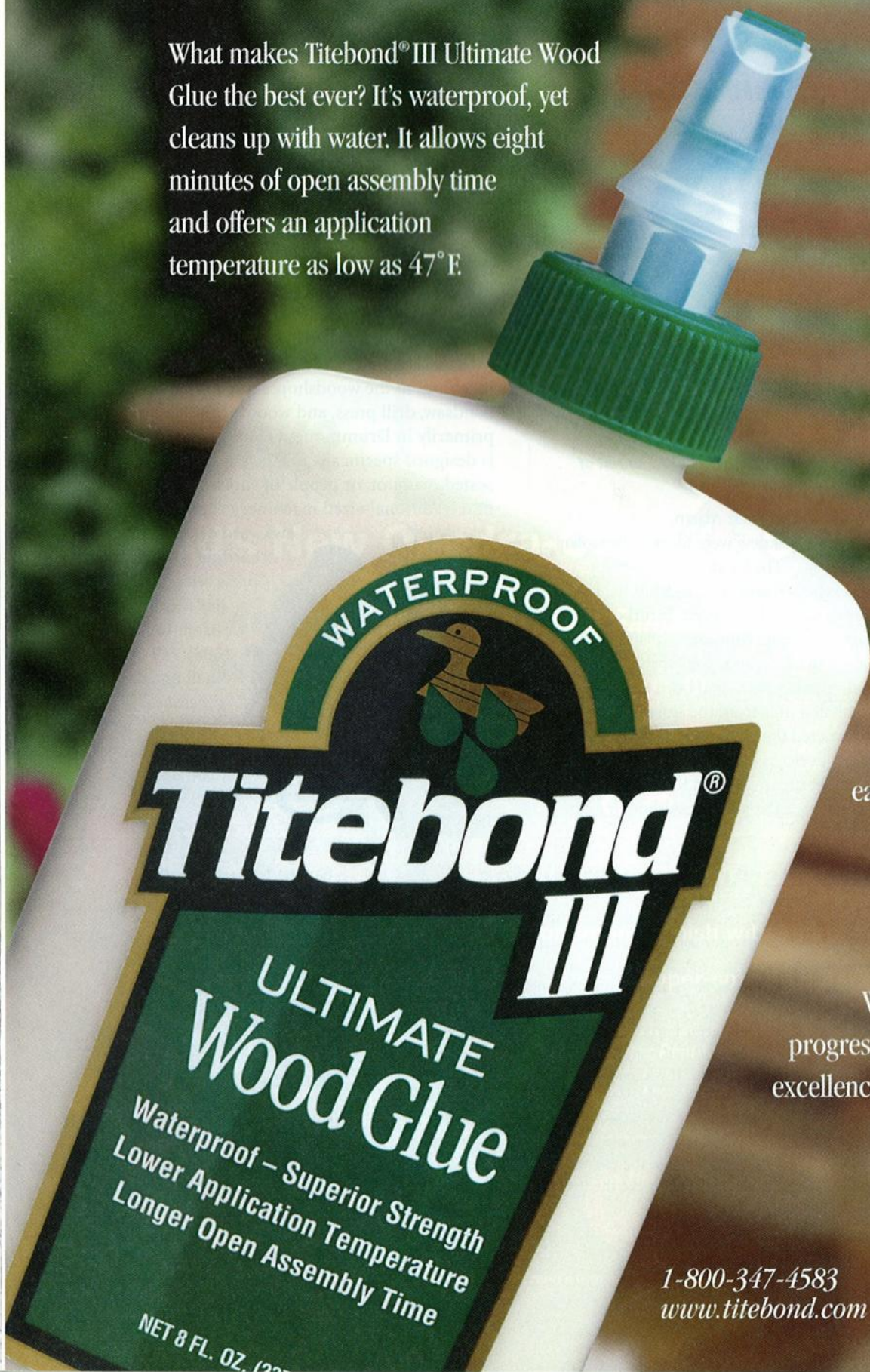
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Safety First! Working wood can be dangerous. Always make shop safety your first priority by reading and following the recommendations of your owner's manuals, using appropriate guards and safety devices, and maintaining all your tools properly. Use adequate sight and hearing protection. Please note that for purposes of illustrative clarity, guards and other safety devices may be removed from tools shown in photographs and illustrations in this publication and others.

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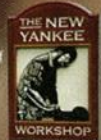


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NEWS & VIEWS

By Sharon Hambrick

GPS tracks elusive loot

IF YOU CAN'T CATCH A THIEF in action, GPS technology can lead you to his loot.

Indianapolis Woodcraft owner Chris Rowland was frustrated after five burglaries last year played havoc with his business. When he shared his problem with his DeWalt representative, the rep suggested Rowland might take advantage of a new DeWalt product—the MobileLock GPS Locator with Anti-Theft Alarm.

Soon Rowland had the tools he knew were likely to be stolen equipped with the GPS locators. “The locator can be set for sounding an alarm or a vibration. If someone touches the box it is in, it calls my cell phone to tell me it has been disturbed. I can track its movement on my computer,” Rowland explained.

During the sixth break-in in September 2007 the GPS devices alerted Rowland that stolen items had been taken to an apartment complex about half a mile from the store. Rowland notified the police who recovered the merchandise, although the thief was gone. The GPS device is designed to be attached to equipment or to secure a jobsite trailer, and Rowland said his use of the device to catch a burglar is a first. Although each



CHRIS ROWLAND found DeWalt's new GPS product right on target in tracking a thief and his loot during the sixth robbery at Woodcraft of Indianapolis.

device costs \$499, Rowland said the results are worth the cost. “There are multiple options for the kind of security you want. We are also using the devices to counter shoplifting.”

Rowland's unique approach to catching robbers was reported by the local ABC-TV affiliate, and he said other Woodcraft store owners expressed an interest in the devices. Anyone who has a shop of valuable tools in a theft-prone neighborhood may also find MobileLock to be the answer. (Learn more about the GPS devices at dewalt.com.)

New machines easier to use

GENERAL INTERNATIONAL now offers “Access by General,” a new line of woodworking machinery designed for wheelchair users and people with limited mobility.

Access includes the most commonly used machines in the woodshop: table saw, jointer, bandsaw, drill press, and woodturning lathe. Made primarily in Drummond, Quebec, the Access line is designed specifically for the wheelchair user, the seated operator, or people of shorter stature who find traditional-sized machinery cumbersome, awkward or dangerous, according to a company press release.

For more information call (888) 949-1161, email orderdesk@general.ca, or visit www.general.ca.

Prices range from \$1,690 to \$3,299.



Judy Gale Roberts Answers Inquiries

IN RESPONSE TO PHONE CALLS I have received about the “Intarsia George” project (Dec 2007/Jan 2008 issue), I would like to offer some additional information in answer to the most-asked questions.

On page 59 in Step 4, rather than “cut the parts just outside the lines,” just cut the outside edges first. Since these cuts do not fit against other pieces, this is a good way to test your scrollsawing skills before cutting the interior parts that have to fit together. Later in the same step instead of trying to “split and save the line,” simply saw through the center of the line. Just remember to leave the paper pattern on. If you encounter a fit problem, trim the pattern lines that are still showing.

A few have asked about the “slot-cutting blade” mentioned on page 63. Rotary saw blades are inexpensive and available anywhere Dremel tools are sold. However, for major hair and fur detailing, I prefer using the Wonder Wheel because it enables me to hold the piece with both hands. One final note: I used an aspen dowel to make the white dot on George's eye.

—Judy Gale Roberts (intarsia.com)

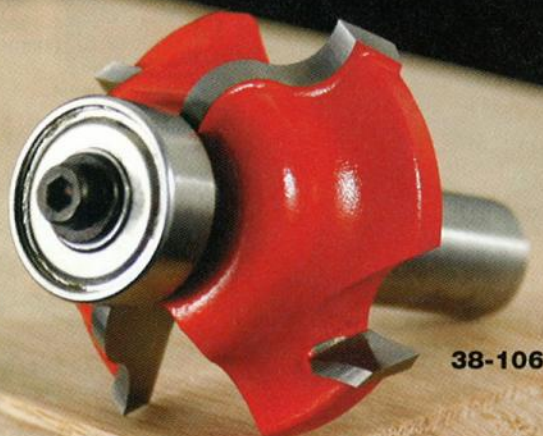
Submit Your Ideas, Comments

The staff of *Woodcraft Magazine* is eager to hear about your experiences when making projects, trying techniques, and using products from our pages. Do you have a different spin on a project of ours you built or a better way to do a woodworking task? Or do you know of an event of interest to woodworkers? Let us know by writing or emailing:

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What's The Secret To Flawless Edge Profiles With NO REWORK?

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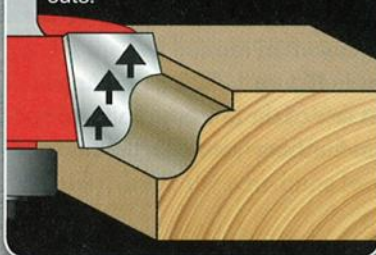
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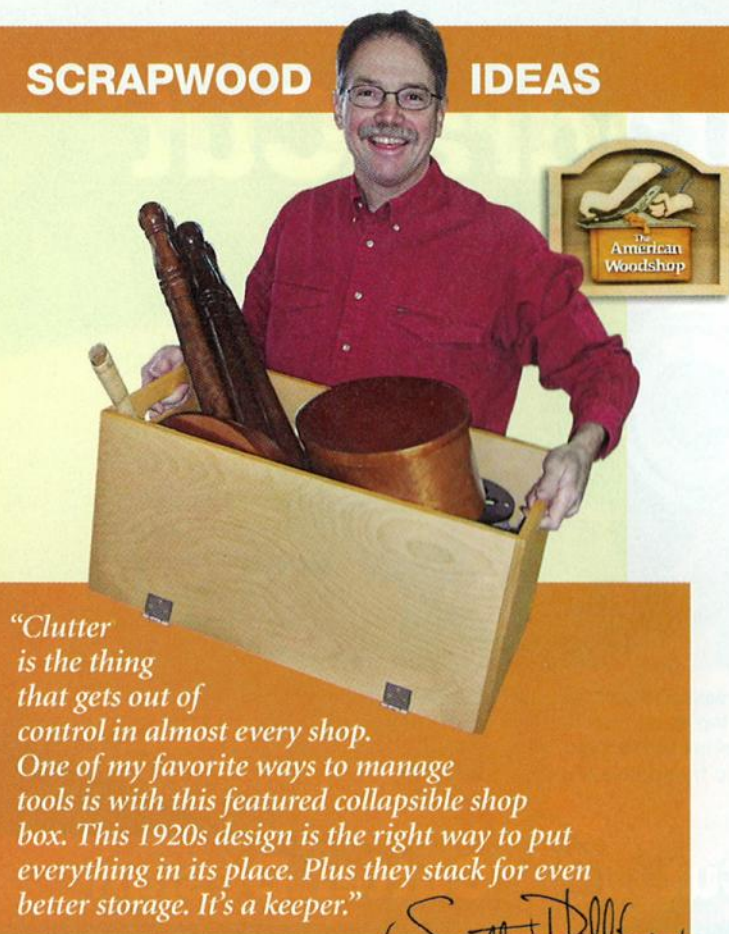
- Classical Cove & Round Bit
- Rounding Over Bit, 3/8" Radius
- Rounding Over Bit, 1/2" Radius
- Rounding Over Bit, 1" Radius
- Beading Bit, 5/16" Radius
- Beading Bit, 1-1/8" Radius
- Table Top Classical Bold Bit
- Table Edge Bit
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- Rounding Over Bit, 1-1/2" Radius
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"Clutter is the thing that gets out of control in almost every shop. One of my favorite ways to manage tools is with this featured collapsible shop box. This 1920s design is the right way to put everything in its place. Plus they stack for even better storage. It's a keeper."

Scott Phillips

Build the Basic Box

1 Cut two box sides (A) and two ends (B) (we used Baltic birch) to the sizes shown in the **Cut List** from $\frac{1}{2}$ "-thick scrap plywood. Then cut the bottom (C) from $\frac{3}{4}$ "-thick plywood.

2 Return to the ends (B) and mark two center points for the 6" handle openings where shown in the Box Exploded View, **Figure 1**. Drill the $1\frac{1}{4}$ " holes, strike cut lines at the top and bottom of the holes to connect them, and then jigsaw or scrollsaw out the elongated openings to form the

box handles. Rout $\frac{1}{8}$ " round-overs around the openings on both faces of each end (B) to ease the sharp edges for carrying the box.

3 Next, cut four triangular corner feet (D) and two rectangular edge feet (E) from $\frac{1}{4}$ "-thick scrap plywood. See the dimensions in **Figure 1**. Glue and clamp these pieces onto the bottom face of the box bottom (C) where shown. (If you plan on finishing your box, do this now before assembly.)

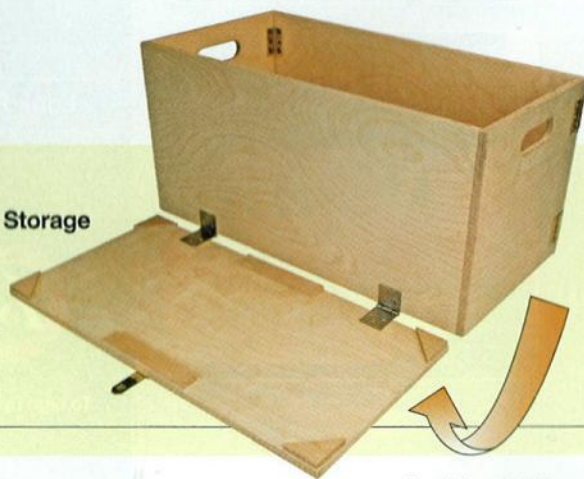
TIP ALERT

The screws that come with the hardware are too long for $\frac{1}{2}$ " plywood. Instead of buying shorter screws, simply snip the tips so they don't poke through.



Collapsing the Box for Easy Storage

To fold up your shop box simply unhook the bottom, let the bottom drop down, and collapse the sides.



Ready when you need it Folding SHOP BOX

By Scott Phillips and Jim Harrold

When is a box not a box? When you can fold it up and store it flat in a wink. This hinge-happy carry-all consists of scrap plywood and common hardware. A workshop favorite of Scott Phillips, host of *The American Woodshop* on PBS, the shop box lets you tote tools and materials from place to place, store turning blanks, and contain valuable cut-offs. Construction couldn't be simpler. Let's build one.

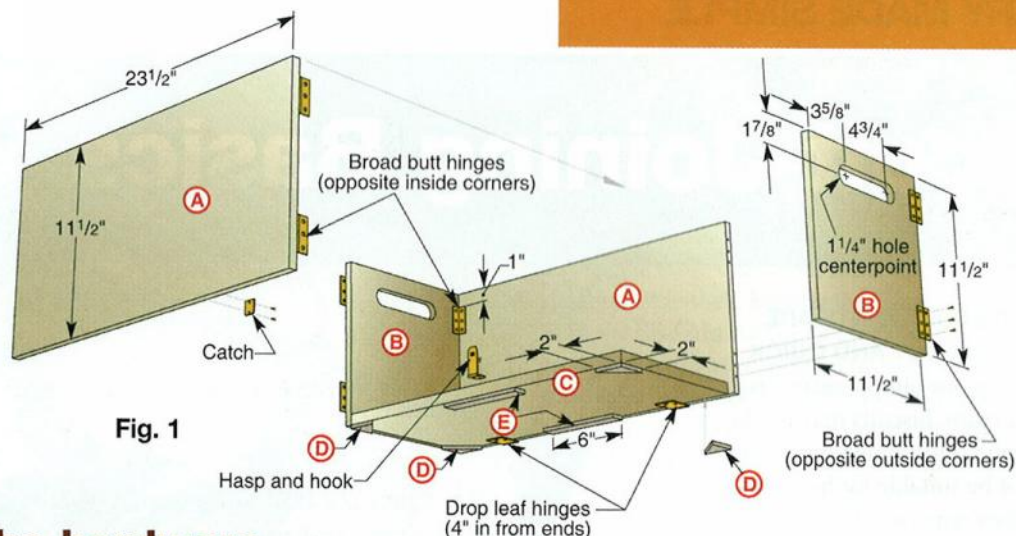


Fig. 1

Add the hardware

1 Stand one side (A) and one end (B) on their bottom edges and butt the side against the inside face of the end, ensuring that the outside face of the side is flush with end's edge. (See the hinge locations in **Figure 1**.) Place a broad butt hinge in the inside corner 1" down from the top edge. Start the screw holes with an awl or Vix bit, and then drive the screws. Place a second broad butt hinge 1" up from the bottom inside corner and secure it. Apply a pair of broad butt hinges to the remaining side and end, creating an opposing second side/end assembly.

2 Clamp the two side/end assemblies together, with the ends butting against the inside face of the sides. Mark the locations of the outside broad butt hinges where shown and drive the screws in the outside face of ends (B) and edges of the sides (A). You should now have an open-ended box.

3 Fit the box bottom in the hinged box assembly and attach the drop leaf hinges along one outside face of one box side where shown. With the bottom face of the box bottom (C) flush with the bottom edges of the box assembly, fasten the remaining leaves to the box bottom.

4 Center and install the hasp with hook on the top face of bottom (C) opposite the edge having the drop leaf hinges. Raise the hasp leaf to determine the catch location and install it. Using a sanding block and 150 grit, ease all exposed sharp edges. Now check out the photo sequence to see how to fold up the box for easy storage. 🌞

CUT LIST		Thickness	Width	Length	Qty.	Wood
A	Sides	1/2"	11 1/2"	23 1/2"	2	BP
B	Ends	1/2"	11 1/2"	11 1/2"	2	BP
C	Bottom	3/4"	11"	23"	1	BP
D	Corner feet	1/4"	2"	2"	4	BP
E	Edge feet	1/4"	1"	6"	2	BP

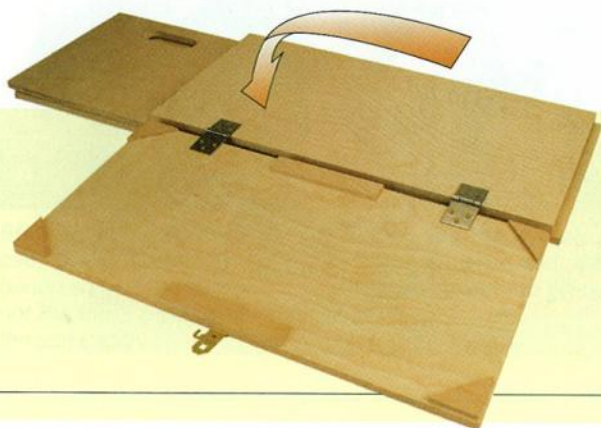
BP = Birch Plywood (or scrap fir plywood of the same thickness)

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☐ 3.	Solid Brass Hasp with Hook	130414	\$2.50

Above items available at Woodcraft stores, woodcraft.com or by calling (800) 225-1153.



Biscuit-Joining Basics

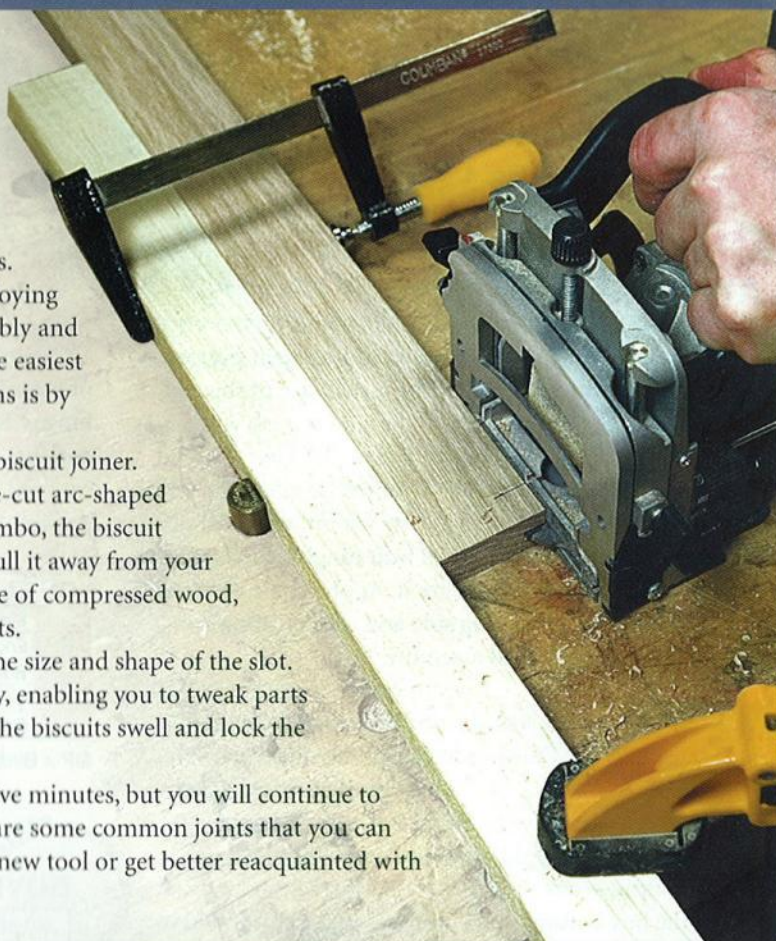
by Joe Hurst-Wajszczuk

BECAUSE BISCUIT JOINTS ARE EASY TO MARK OUT AND QUICK TO CUT, using one almost seems like cheating. In truth, biscuits may not be as strong as some traditional types of joinery and may not be suitable for heavy-duty loads, but they're perfect for plenty of projects. Woodworkers and carpenters have been employing biscuits to successfully solve all sorts of assembly and alignment problems for over two decades. The easiest way to appreciate their versatility and strengths is by putting them to use.

The safest way to cut biscuit slots is with a biscuit joiner. This tool is designed to do nothing but plunge-cut arc-shaped slots. (Unlike the router/biscuit-cutting bit combo, the biscuit joiner's cutter retracts inside the tool as you pull it away from your work.) From there, a flat, football-shaped piece of compressed wood, called a biscuit, fits into a pair of matching slots.

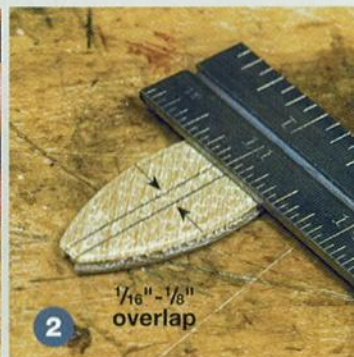
What makes biscuits better than dowels? The size and shape of the slot. The oversized slot lets the biscuit move slightly, enabling you to tweak parts into perfect alignment. However, once glued, the biscuits swell and lock the parts in place.

You can master basic biscuit joiner use in five minutes, but you will continue to learn new tricks with each project. Following are some common joints that you can practice making to familiarize yourself with a new tool or get better reacquainted with your old workhorse.



BEGIN WITH THE TWO SLOT TEST

A biscuit joiner should cut a slot slightly deeper than half the width of the biscuit you're trying to fit. This space provides some wiggle room, but still ensures that about half remains on each side of the joint. Here's how to check your joiner's depth setting. First, make a test slot. Next, stick in a biscuit and mark a pencil line where the biscuit touches the wood, as shown in **Photo 1**. Now flip the biscuit and mark a second line. Adjust the depth-setting dial on your tool so that overlap is about $\frac{1}{8}$ ", as shown in **Photo 2**.



THE FACE-TO-EDGE BISCUIT JOINT

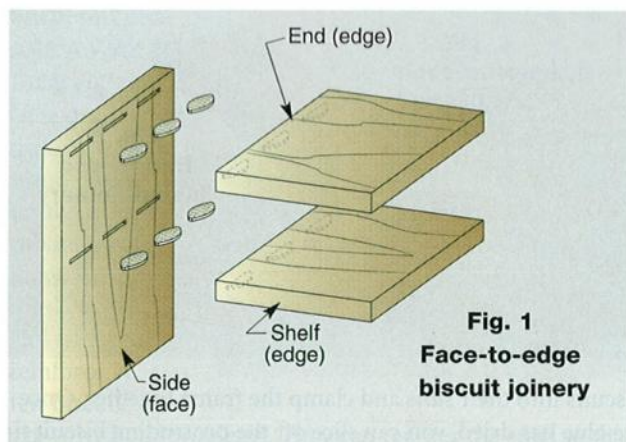


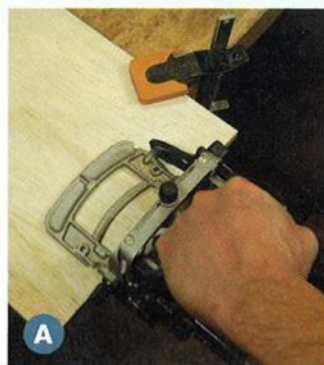
Fig. 1
Face-to-edge
biscuit joinery

FACE-TO-EDGE JOINTS ARE THE BREAD-AND-BUTTER JOINT for biscuit joiners. A biscuit joiner can cut the needed joints to assemble a cabinet in about as much time as it takes to drag a heavy sheet of MDF to your table saw.

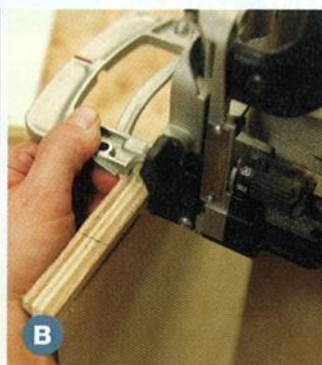
Building a simple box provides a good opportunity to explore the advantages and disadvantages of fence- or base-guided slot cutting. Sometimes, you'll have the freedom to choose the method, but sometimes the decision is made for you. Box-making uses both.

First, position the side and end panels together and draw lines across the joint to mark where you want a biscuit. (As a rule of thumb, place the biscuits about 6" apart.) When you pull the panels apart, you should see marks on the edges and ends.

To cut the grooves in the edge of the end panel, place the work flat on the workbench, as shown in **Photo A**. Adjust the fence so that the blade cuts a slot roughly through the center of your work. To cut the face grooves in the side, you'll balance the fence on the panel's edge as shown in **Photo B**.

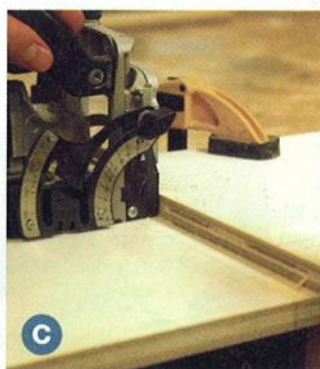


A
Stick the board's end over the edge of your bench so that the fence, not the tool's base, sets the slot depth.

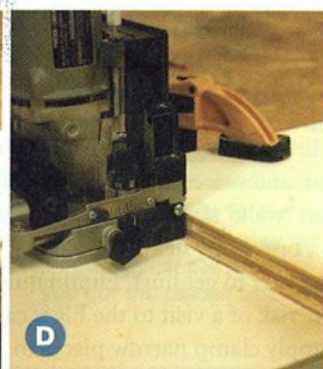


B
Balance the biscuit joiner's fence on the end of the side panel to cut the grooves in the face.

To cut the biscuit slots for the shelf, draw a pencil line across the inside face of the side and clamp the edge of the shelf against the line. Next, mark your biscuit slot marks on the top of the shelf. Resting the biscuit joiner on its base, place it on the side and cut the slot for the shelf as in **Photo C**. The base also serves as your reference when slotting the sides. Turn the joiner on its head, use the line engraved on the bottom of the tool to align it with your slot marks, and plunge it into the side, **Photo D**. Once cut, insert biscuits into the grooves and flip the shelf up on the location line.



C
Remove or retract the fence and use the joiner's base to cut the slots in the end of the shelf.



D
Don't move your wood; just flip your joiner so that the base rides against the shelf. Plunge the joiner into the side.

Biscuit Sizes

To cut grooves for most of the biscuit sizes (0, 10, 20), simply adjust the stop on your biscuit joiner. Smaller FF (or face frame) biscuits are available for the Porter-Cable biscuit joiner. To use these mini biscuits, you'll need to switch out the standard 4" dia. cutter with a smaller 2" dia. blade.

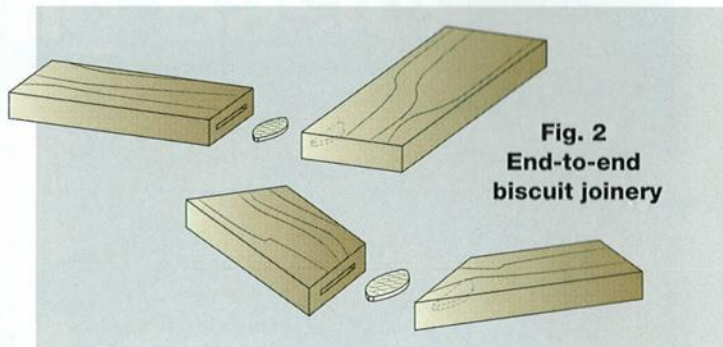
	Biscuit Size	Width	Length	Approx. Slot
	FF	1/2"	1 3/8"	1 9/16"
	0	5/8"	1 7/8"	1 3/16"
	10	3/4"	2 1/8"	2 3/8"
	20	15/16"	2 1/4"	2 1/2"

THE END-TO-EDGE AND MITERED BISCUIT JOINTS

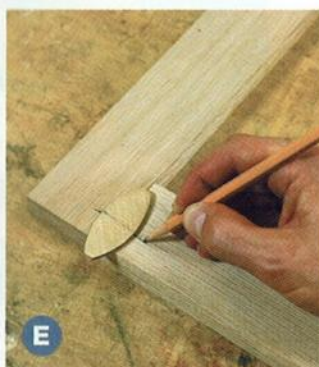
BISCUITS ARE ALSO AN EASY WAY TO BUILD MITERED AND END-TO-EDGE FRAMES that you would use for picture frames or for a cabinet's face frame. In this case, biscuits are very useful because they are adding reinforcement to otherwise weak end-grain joints.

Start by selecting the right biscuit. An easy way to do this is to position the joint together then arrange one or more biscuits on top. Drawing a center line on a test biscuit can help you lay out the slots as shown in **Photo E**. Wider biscuits provide more strength (even if you saw off an end), but there are times when you want the biscuit to be hidden within the joint. When form is as important as function, use the **Biscuit Sizing Chart** on page 13. When picking a biscuit, don't forget the wiggle room. The slot is usually about $\frac{3}{16}$ " wider than the biscuit you're trying to fit.

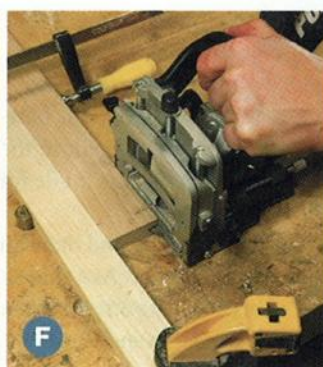
When slotting narrow pieces, don't hand-hold the stock. Because a portion of the blade will be exposed while making the cut, and since the spinning blade can "walk" if the tool or work isn't properly held in place, it's too easy to get hurt. Eliminating the risk of a visit to the ER is easy: simply clamp narrow pieces to a stopblock as shown in **Photo F**. You can now align the center mark on the joiner with the marks on your stock and make the cut. After making the cuts, glue the



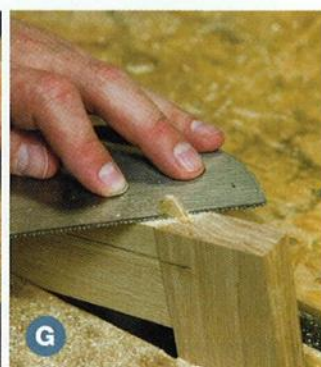
biscuits into their slots and clamp the frame together. Once the glue has dried, you can slice off the protruding biscuit tip as in **Photo G**.



E Position the bigger biscuit so that it won't protrude into the visible inside edge of the frame.



F Use clamps and extra backup, not your free hand, when cutting narrow stock.



G Saw off the biscuit tip with a handsaw or using your table saw and crosscut sled.

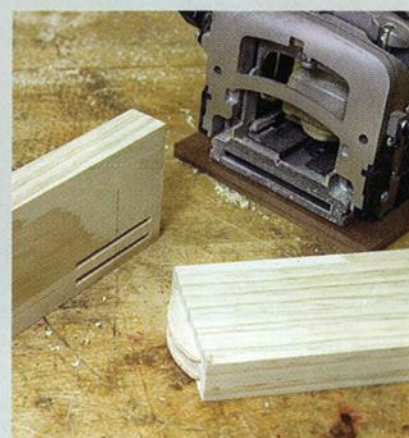
Double-Biscuit Joinery

Biscuits don't fare well when matched against other joints in wood-joint torture tests. Because biscuits are relatively short, it doesn't take a rocket scientist to realize that this joint isn't as strong as traditional mortise-and-tenon or half-lap joints.

An easy way to strengthen a biscuit joint is to cut two grooves, as shown at right. In seconds, you've doubled the gluing area of the joint. Try to leave a $\frac{1}{4}$ "- to $\frac{1}{2}$ "-

strip of wood between the biscuits to maximize available gluing surfaces and preserve the strength of the wood. (With careful spacing, you can use the double-biscuit technique on a $\frac{3}{4}$ "-thick rail and stile joint.)

To cut the grooves, I prefer to use spacers instead of my fence. Referencing the joiner and working against my bench is fast, and for those times when I forget to cut a slot, easily repeatable.



FACE MITERS

FACE MITERS ARE A WAY TO HIDE

end-and edge-grain when making solid wood boxes or plywood cabinets, but long miters are tough to glue and tricky to reinforce. A few biscuits can solve both problems. They can register the ends so that the corners can't slip during clamp-up and strengthen the otherwise end-grain joint. A biscuit-reinforced miter is as strong as a full table saw-cut spline, but biscuits can be hidden within the miter for a cleaner-looking joint. (With the table saw, you cut the spline from edge to edge.)

To cut a slot in an angled edge, use your fence. How you cut the slots in the mitered face depends on the fence-adjustment flexibility of your biscuit joiner and your working style. If your router has a fixed fence (or if you prefer working with your workpiece flat against your bench) you will want to

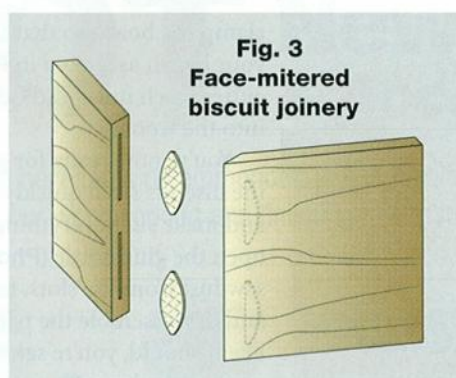
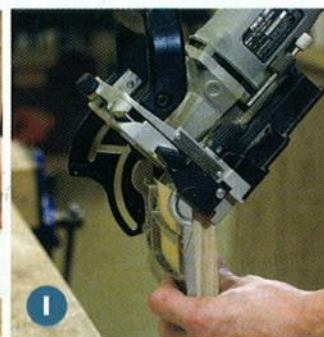


Fig. 3
Face-mitered
biscuit joinery

try making your cuts as shown in **Photo H**. Set your fence to 45°, adjust the cutter depth so that it doesn't slice through the thinner tip of your miter, and make a plunge cut into the end. Some joiners, like the Porter-Cable 557 (see the **Buying Guide**) have a two-stage fence that can reference the outer face of the miter as shown in **Photo I**. This design prevents corner alignment problems, especially if the stock thicknesses aren't equal. The wrap-around style of this fence also makes it easier to hold the tool in place while making the cut.



Adjust the fence height or add a shim so that the blade does not cut through the tip of the miter.



When the fence is set to 135°, you can squeeze the joiner against the miter as you cut the biscuit slot.

OFFSET JOINERY

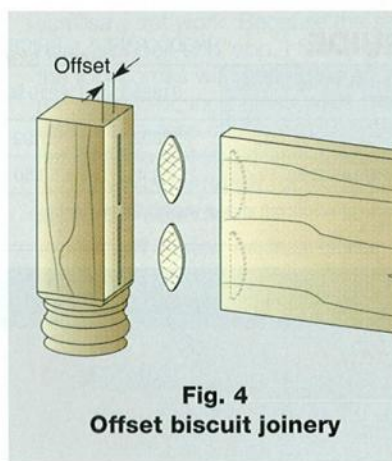


Fig. 4
Offset biscuit joinery

THERE ARE TIMES, AS WHEN JOINING A RAIL TO A LEG where you may not want a flush-fitting joint. Your biscuit joiner is equally adept at creating offsets. The trick is to use a spacer that the same thickness as your desired step back. The spacer-offset trick can be used with your

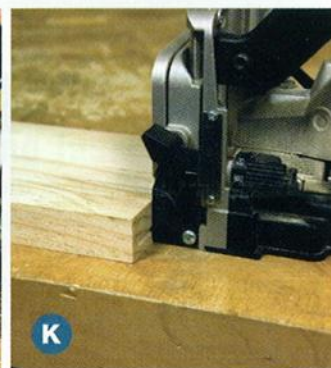
biscuit joiner's fence, or under the base of the tool, as shown here. (I think resting the joiner on top of a large hardboard spacer is a lot easier than trying to sandwich the spacer between the work and biscuit joiner's fence.)

To make the offset joint, mark the leg and apron for the biscuit slot just as before. Now choose a spacer that is the same thickness as your desired offset.

Position the spacer under the joiner as shown in **Photo J**, position the leg with the show face against the bench and cut the slot. To cut the matching slot in the apron, simply remove the spacer and slot the end of the board as shown in **Photo K**. Be sure the show face is touching the bench.



Place a spacer under the joiner to raise the slot and set the height of the offset.



Slot the mating piece without a spacer. The biscuits will create the offset on the workbench-touching face.

THE EDGE-TO-EDGE BISCUIT JOINT

YOU MIGHT WANT TO THINK

TWICE before using biscuits for solid-wood edge joints (See “Biscuits or No Biscuits?”), but biscuits are very useful for attaching solid wood edging to sheet goods, and also when you need to straighten out bowed boards. With practice, you may be able to biscuit an edge joint in less time than it takes to read how it’s done.

To start, position the boards edge-to-edge, then make short pencil lines across the joints about every 8" for the slots, as shown in **Photo L**. Make the first and last slots at least 3" in from the end; that way, you won’t accidentally expose a biscuit if you trim the panel later.

Next, set the joiner’s fence height to cut a slot roughly in the center of the board. To ensure that the joiner’s fence is setting the slot height, and not the base,

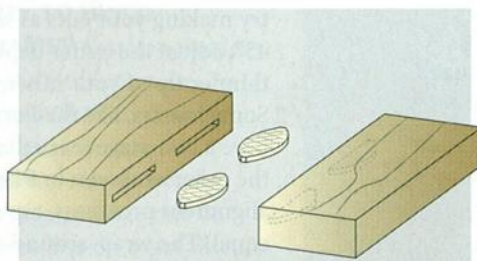


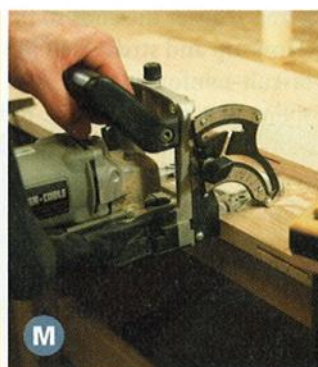
Fig. 5
Edge-to-edge biscuit joinery

clamp the board so that the edge sticks off your bench as shown in **Photo M**. Let the cutter reach full speed before plunging it into the wood.

You’re now ready for glue-up. Because the biscuits swell quickly, do a dry assembly and make sure everything’s set before you open the glue bottle (**Photo N**). Remove any sawdust from the slots, test-fit your biscuits, and dry-assemble the panel. If everything fits like it should, you’re set to reassemble it for good with glue. 🌲



L
Position the biscuits every 8" across the joint.



M
Keep the fence flat on the board surface when cutting slots.



N
Use a biscuit-slot bottle to quickly squeeze glue into the slots.

TIP ALERT

Polyurethane glue lacks the moisture biscuits need to swell and lock into their grooves. Wetting or misting the biscuits with water before installation will cause the biscuits to swell and activate the poly glue. Conversely, unused biscuits can absorb moisture, swell, and then fail to fit where they’re needed. To keep biscuits from “spoiling”, store them in zipper-lock plastic bags or other airtight containers.



BUYING GUIDE

		WOODCRAFT #	PRICE
☐ 1.	Porter-Cable Plate Joiner Model 557	813666	\$219.99
☐ 2.	Biscuit Slot Glue Bottle	128927	\$7.99
☐ 3.	Titebond Glue, 8 oz	07L41	\$3.50

Above items available at Woodcraft stores, woodcraft.com or by calling (800) 225-1153.

Biscuits or No Biscuits?

Edge joints appear at the end of this article because this may be the biscuit joint’s least important role. First, biscuits don’t add any strength to a carefully jointed edge joint. In fact, biscuits can make good glue-ups more difficult. In the time it takes to apply glue to the biscuit grooves and edge, the biscuits can swell enough to make it harder to pull the joint together. One miscut slot can create an alignment problem that’s mallet-proof.

A bigger problem can occur after removing the clamps. Even though this glue is dry, moisture from the glue can swell the wood above the biscuits. Sanding too soon after glue-up can remove too much wood and create divots when the excess moisture evaporates.

Biscuits can sometimes help pull bowed boards into alignment. When used for a large-panel glue-up, consider using them without glue.

HOT New Tools & Accessories

Check out these new items recommended by the Woodcraft Product Development Team to make your woodworking and finishing the best it can be.

Items featured here are available at Woodcraft stores, woodcraft.com or by calling (800) 225-1153. We've included the Woodcraft product numbers for your convenience and quick reference.



Master Shallow Mortises "Plane" and Simple Lie-Nielsen No.71 Large Router Plane

This is the perfect tool for working shallow mortises such as hinge gains, inlay, or door locks. A recent addition to the Lie-Nielsen line, the No. 71 Router Plane is based loosely on an early Stanley model but with notable improvements. Blade depth is set with an adjustment knob for precise settings then locked in position with a second knob. This provides easy, micro adjustment for perfect fitting of hardware and proved critical when I needed to take just a hair out of a hinge gain. The blade is held in a square broached hole in the body for a solid, no-slop blade fit.

#837416 \$125.00

Woodcraft Tester: Tim Rinehart

Sanding Versatility with One Tool

Sand-Flee 18" Portable Drum Sander

If there's one job that all woodworkers dread, it's sanding. The Sand-Flee, with its 18"-wide sanding drum, offers enough power (1/3 hp) to tackle large jobs like raised-panel doors and face frame carcass construction, but is also delicate enough to handle projects like jewelry boxes and scrollsaw fret work. Because the sandpaper (sold separately) is hook and loop, I found changing grits a snap. Also, the tool comes with numerous accessories. The metal fence let me edge-joint short stock while the exterior drum shaft allowed me to attach a keyless chuck for use with drum sanders having mandrels, or use a flex-shaft for rotary carving and sanding. Throw in the effective dust collection port, and you have a very handy tool to add to your sander arsenal.

#831158, \$699.99

Woodcraft Tester: Andrew Bondi



A Pyramid Scheme for Finishing Tasks

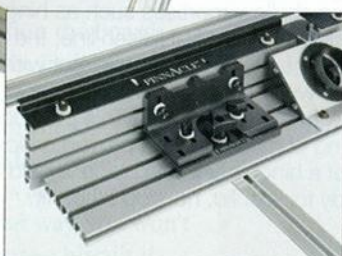
Painter's Pyramid

Typically, when I apply finish to a project I usually have to wait until the top half is dry before I can finish the bottom. Not any more. With these nifty, non-stick, plastic pyramids I can support a project or project part off a potentially dirty work surface, spray or brush, and then flip the project or part to finish the opposite portion. I found they work equally well elevating coffee tables and chairs when I need to finish the bottom of the feet. The pyramids are impermeable to solvents and have rounded tips that won't mar your work or finish. They're inexpensive and will save you time on every finishing assignment.

#148416 10-pack, \$5.99

Woodcraft Tester: Kent Harpool

HOT NEW TOOLS & ACCESSORIES



Expand Your Routing Capabilities

Pinnacle Premium Router Table System

If you own a Festool MFT (Multi-Function Table), then the new Pinnacle Premium Router Table System is your next must-have item! The router tabletop fits perfectly into the recessed area of an MFT frame to provide a huge 28½" x 45¾" surface area. I liked the action and functionality of the feature-filled fence with its dust collection, variable throat capabilities, and multiple T-slots for attaching featherboards and sub-fences. Nearly 4" tall with heavy wall thickness, the fence provides optimum support for heavy and tall material. I found the flexibility of the multiple T-slot fence faces especially useful when I slipped in a pair of shop-made scrapwood stops. Install the optional Offset Module to the infeed or outfeed or both for shaper-like performance.

NOTE: The Festool MFT is temporarily unavailable from the manufacturer.

If you do not already own an MFT you can purchase a Router Table Stand kit of Rousseau components, (#148646, \$119.97) to use with the Pinnacle system.

Tabletop #148487 **\$199.99**

36" Fence #148488 **\$179.99**

Offset Module #148489 **\$44.99**

Woodcraft Tester: Peter Collins

Go Mobile with Your Nailer

Jac-Pac Regulator Kit

For years I have been looking for another option to cordless nail guns that are expensive, bulky and require special maintenance. Now



I can use my favorite nail gun just like a cordless one! No more dragging around heavy compressors and long hoses. I found I could clip the new CO2-powered Jac-Pac system to my belt, and I can go anywhere in the house or shop. The reusable CO2 cylinder is economical to refill (at any paintball supply or sporting goods store), and one charge fires up to 500 brads/staples. The kit includes a 9 oz. CO2 cylinder (shipped empty), 10 ft. of hose, a replacement O-ring set, safety glasses, instructions and carrying case.

#148550 **\$99.99**

Woodcraft Tester: James Nuckolls

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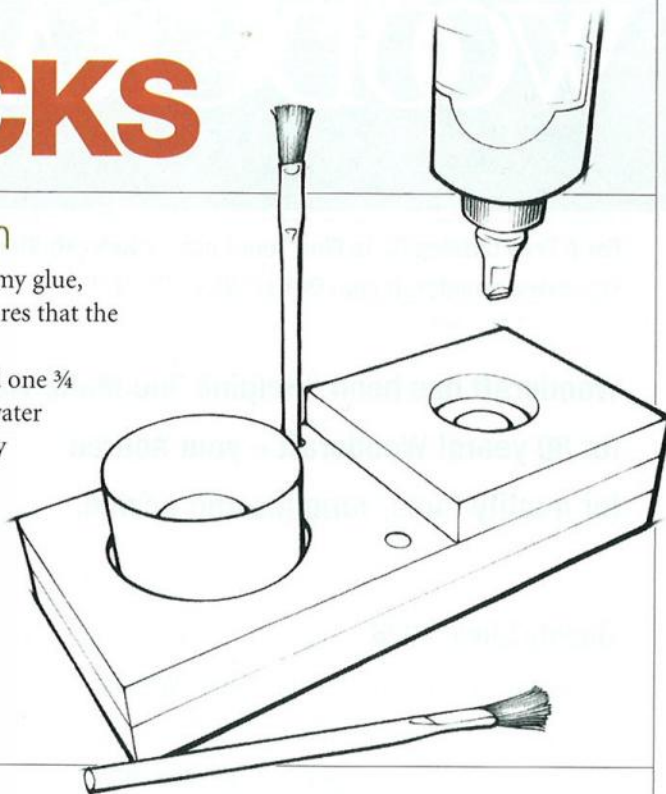
TIPS&TRICKS

Put glue materials within easy reach

FOR SMALL GLUE JOBS, I made this handy support to store my glue, glue brushes, and water. Storing the bottle upside down ensures that the glue is always ready at the first squeeze.

The scrapwood project requires two $\frac{3}{4}$ x 4 x 9" blocks and one $\frac{3}{4}$ x 4 x $4\frac{1}{2}$ " piece. To make a $2\frac{5}{8}$ " hole for the spray paint lid water reservoir, I used my scrollsaw and cleaned up the cut with my spindle sander. After gluing the blocks together, I made the two-step hole for the glue. Drill a $1\frac{1}{4}$ "-dia. x $\frac{3}{4}$ "-deep hole through the top board, and second 1"-dia. x $1\frac{1}{4}$ "-deep hole through the middle and into the bottom block. Finally, I made two $\frac{3}{8}$ "-dia. x $\frac{3}{4}$ "-deep holes for the glue brushes. Now my glue, glue brushes, and water are all at my fingertips.

—Melvin Rhodes, Jackson, Missouri



Sharpen anywhere with a portable station

TOO OFTEN MY WORKBENCH PULLS DUTY for a variety of tasks, forcing me to find another shop location to sharpen my tools. I also teach woodworking classes, taking my hand tools on the road. For both reasons, I needed a portable solution for sharpening with waterstones.

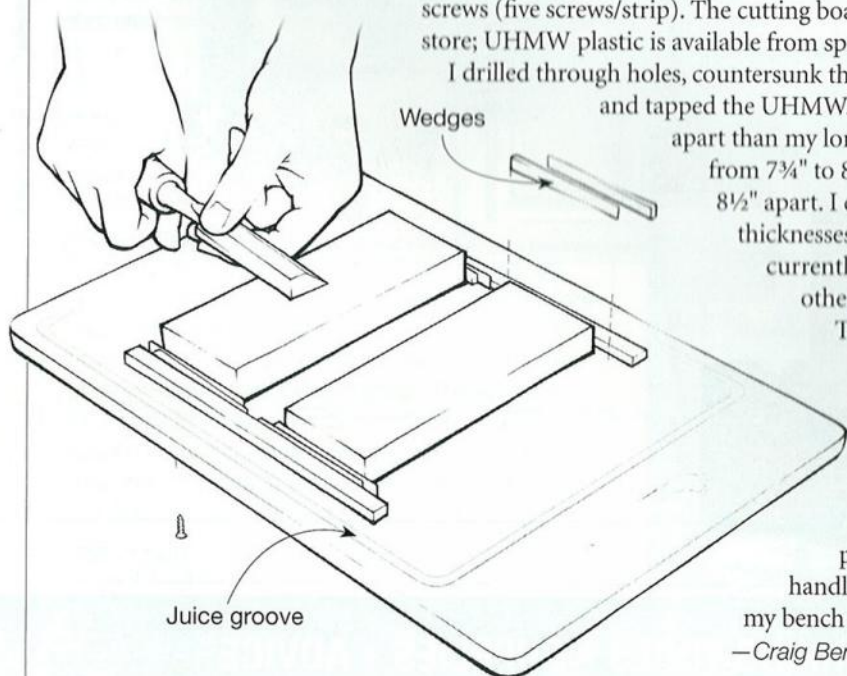
What I came up with is basic and compact, but it keeps my benchtop clean. It's just a $\frac{7}{16}$ x 12 x 18" polypropylene cutting board with a "juice groove" around the perimeter and two pieces of $\frac{1}{4}$ x $\frac{1}{4}$ x 9" UHMW (ultra high molecular weight) plastic attached with ten 6-32 x $\frac{5}{8}$ " stainless steel flat head machine screws (five screws/strip). The cutting board cost \$7.95 at a local discount department store; UHMW plastic is available from specialty woodworking shops.

I drilled through holes, countersunk the underside of the cutting board, and drilled and tapped the UHMW. I spaced the UHMW bars about $\frac{1}{4}$ " farther apart than my longest 8" stone. Actually, my 8" stones vary from $7\frac{3}{4}$ " to $8\frac{1}{4}$ ", so for my station I placed the bars $8\frac{1}{2}$ " apart. I cut a bunch of cherry wedges of varying thicknesses so I can accommodate all of the stones I currently use. The wedges are placed opposing each other and are used to lock the stones in place.

The "juice groove" around the perimeter keeps water off the bench, and the board easily cleans up when I'm done.

I set the whole apparatus on a piece of non-slip shelf liner (which comes in 12" wide rolls), and it really secures everything nicely. I can apply as much pressure as I want and nothing moves. The handle hole makes it easy to pull out from under my bench and can also be used to hang it on the wall.

—Craig Bentzley, Chalfont, Pennsylvania

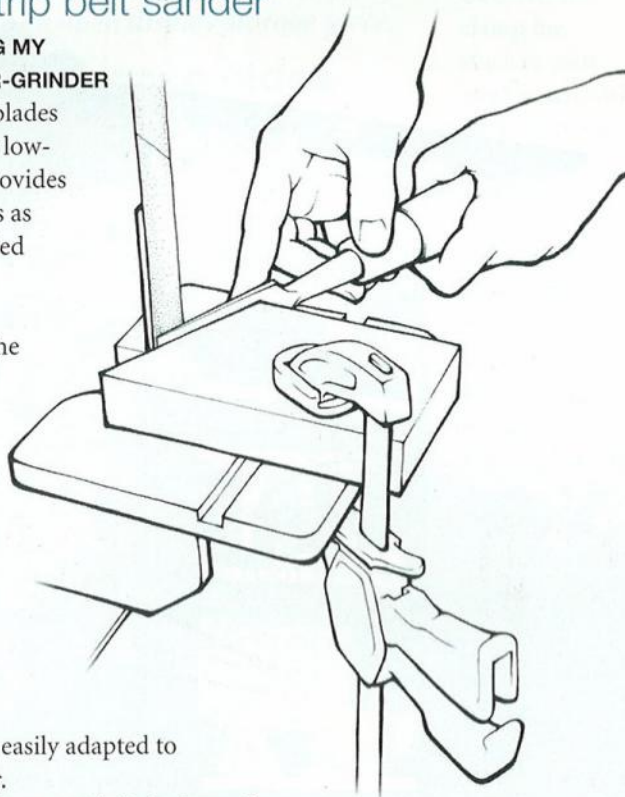


TIPS&TRICKS

Grind blades accurately with a narrow strip belt sander

I PREFER USING MY 1"x 42" SANDER-GRINDER

to grind plane blades and chisels. My low-tech method provides the same results as a regular-wheeled grinder, minus any expensive attachments. The belt also seems to run cooler than a wheel. This reduces the risk of accidentally overheating the edge and ruining the tool. This method can be easily adapted to fit a disc sander.



Starting with a 1-1 1/4" thick piece of scrap, miter one end to 25°. Next, adjust the sander's top so that it's perfectly perpendicular to the belt. Clamp the block to the table to match your sharpening needs.

To grind a fresh 25° bevel, use a square to make sure that the guide block's edges are perpendicular to the front the table. Alternately, you can rotate the block to match a completely different angle. To do this, simply touch the bevel against your belt before clamping your guide block.

Be aware that grinding does produce some sparks. If you use your sander for wood, be sure to clean out any sawdust before doing any metalwork. —Richard J. Libera, Newark, Delaware

How To Submit Your Ideas:

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STEP-BACK CUPBOARD

A CASUAL COUNTRY CLASSIC

By Robert J. Settich

Project designed and built by
Steve Rigrish

This charming cupboard earns its step-back name from the fact that its upper section is shallower than the base. But it's also a step back in time in terms of materials, joinery, hardware, and finish. Its overall dimension is 19"d x 48"w x 82" h.

The entire piece—front and back—is solid hardwood, without even a sliver of plywood. And the hand-planed surfaces and joinery duplicate the no-nonsense practicality of time-tested country craftsmen. The tradition continues with authentically-styled vintage nails and hardware. We distressed the cupboard to replicate generations of wear, using milk paint and shellac finish formulas that have remained virtually unchanged over hundreds of years.



What makes this piece better than a real antique is that you can easily customize the cupboard to suit your needs. Rearrange the upper shelves to create space for a flat-screen television, or omit some of the doors to create an open display storage piece.

Begin with the case sides

1 JOINT AND PLANE STOCK TO MAKE THE SIDES.

After thickening the boards to $\frac{7}{8}$ " thick, rip and crosscut the pieces to size. To save time and wood, each side is made of three pieces: parts A, the side (rear); B, the side (middle); and C, the side (front). When glued together as in **Figure 1**, the three boards create the step-back profile and the basic shape of the feet without a lot of extra sawing.

2 MAKE A FOOT PROFILE TEMPLATE. To do this, use a compass to draw a $\frac{3}{8}$ " radius on a piece of $\frac{1}{4}$ " hardboard. Bandsaw along the waste side of the line then drum-sand to final shape for the smoothest possible curve.

3 USE THE TEMPLATE TO DRAW THE FOOT PROFILE on one end of parts A, the sides (rear), and C, the sides (front). As you make your cut, stay about $\frac{1}{8}$ " to the waste side of the line.

4 ATTACH THE TEMPLATE TO YOUR STOCK, and clamp the stock to your workbench with the pattern on the bottom.

Chuck a flush-trimming bit (see the **Convenience-Plus Buying Guide**) into your handheld router. Adjust the bit's depth so that the bearing rides along the template as shown in **Photo A**. Rout clockwise (viewed from the top) along the edge of the pattern. (If using a pattern bit with a bearing near the collet, clamp the stock so that the pattern is on top of the stock.)



Used with a template, a flush trim bit makes quick work of removing saw marks and making a perfectly shaped foot.

TIP ALERT

Attaching the template to the side boards with a few screws will create a few character holes. This is OK if your piece will receive a distressed finish, but for blemish-free parts, use a couple of clamps or heavy-duty carpet tape.

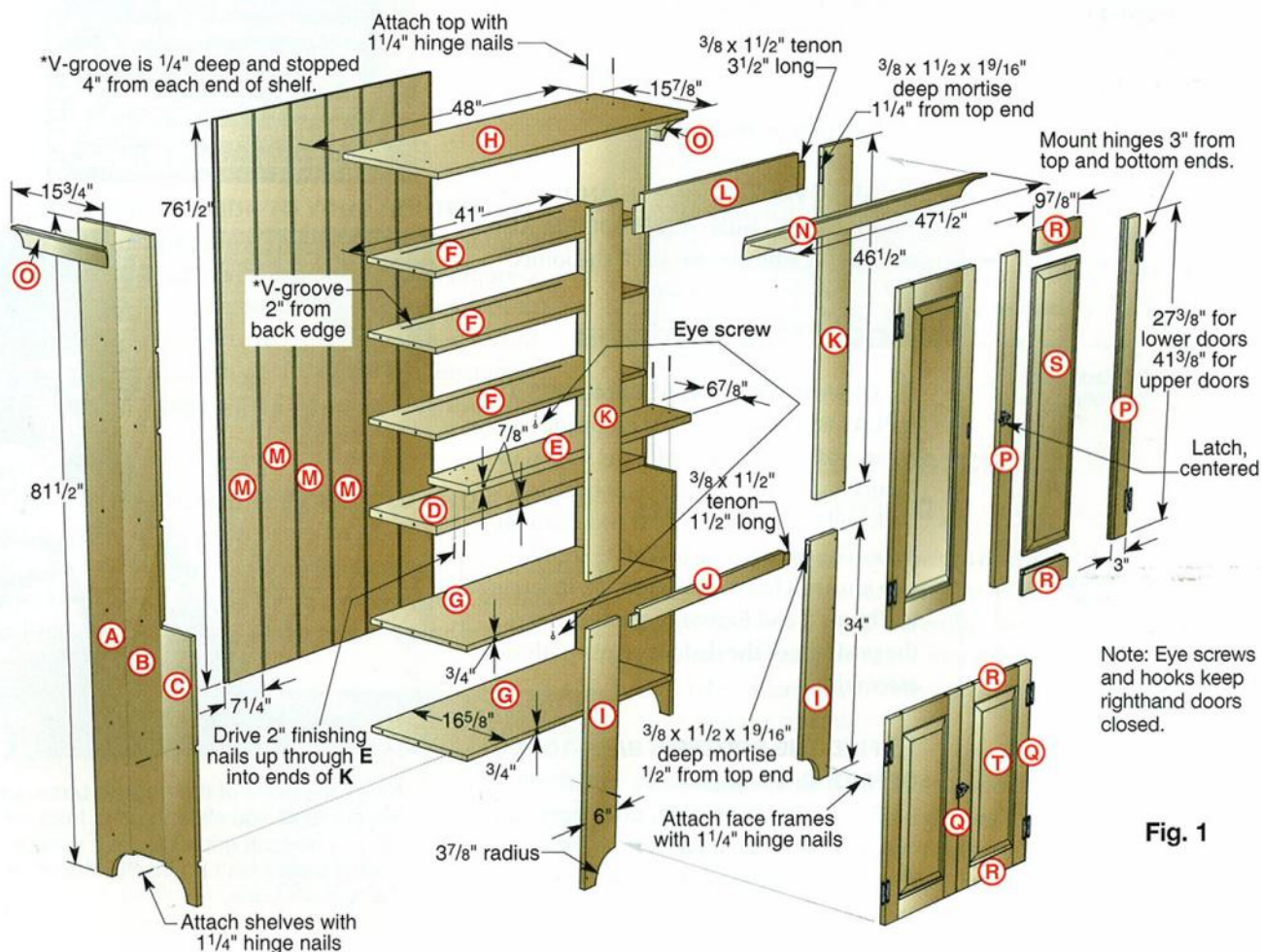
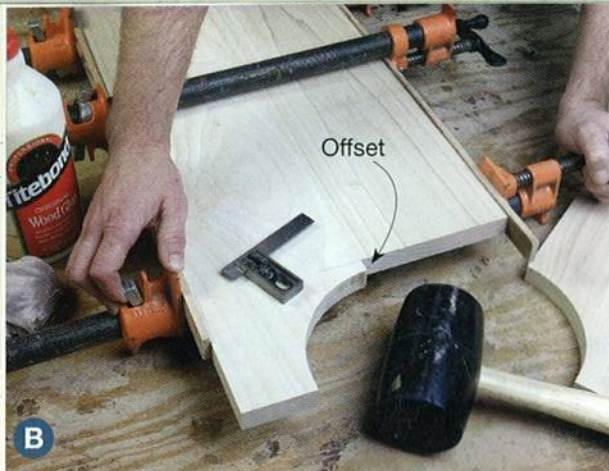


Fig. 1



Careful clamping creates the decorative stepped offset. Insert wood strips between the clamp jaws and side panels to avoid denting the edges.

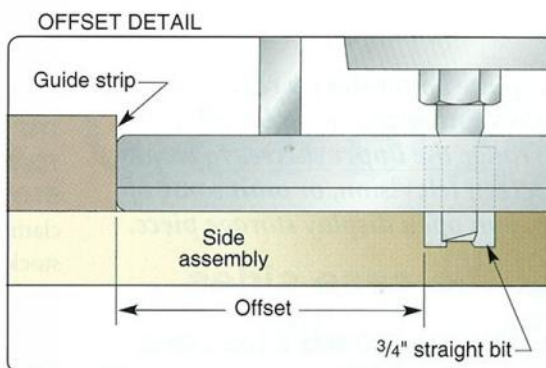
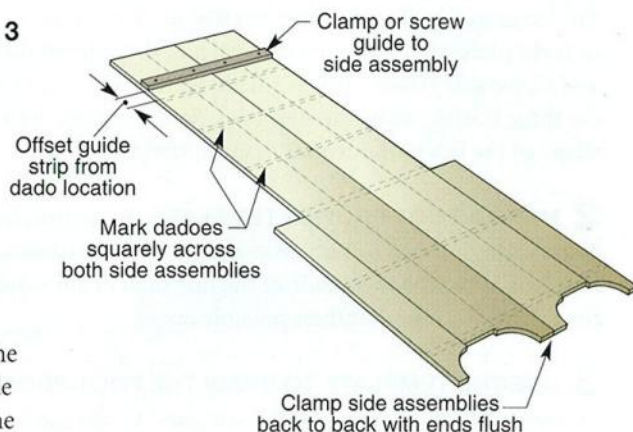


Fig. 3



TIP ALERT

When clamping the side assemblies, alternate your clamps on the top and bottom, as shown in Photo B. This arrangement eliminates the risk that the panel might bow under uneven clamp pressure.

5 ASSEMBLE THE SIDE

ASSEMBLIES ONE BOARD AT A

TIME. Start by positioning part B, the side (middle), next to part A, the side (back), to create a $\frac{1}{2}$ " offset above the foot, as shown in Photo B. Glue these boards together before attempting to add part C, the side (front). To check the positioning of the last side board, butt a straightedge or carpenter's square against the bottom of the side assembly to make sure that both feet are on the same level.

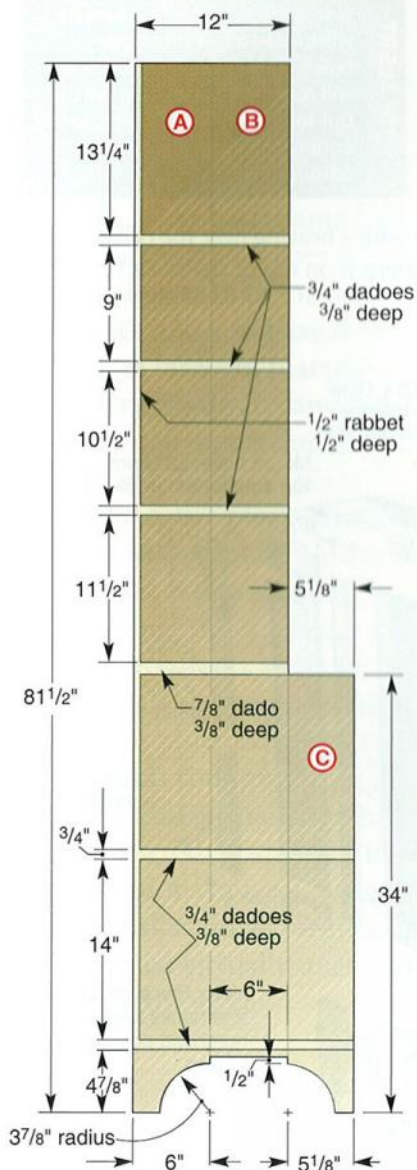
6 REMOVE THE CLAMPS AND

INSPECT THE SIDE ASSEMBLIES. Also, scrape glue squeeze-out from the joints.

Route the dados

1 CLAMP THE SIDE ASSEMBLIES TO A FLAT SURFACE, with their inside faces up and back edges touching, as shown in Figure 3. Positioning the sides back to back will enable you to rout two dados at once. The mirror-image dados should also ensure a hassle-free glue-up. Referring to Figure 2 and Figure 3, carefully mark the position of the dados across both side assemblies.

2 FIND THE ROUTER'S BASE-TO-BIT OFFSET. To do this, install a $\frac{3}{4}$ " straight bit (see the Buying Guide) into your router and set it for a cut depth of $\frac{1}{8}$ ". Clamp a straightedge guide to a piece of scrap stock, and make a short test cut. (Make sure that



SIDE ASSEMBLY INSIDE VIEW

Fig. 2



Keep one point of the router's base against the guide as you slide the tool from left to right. A no-spin grip ensures a straight cut even if the bit isn't precisely concentric to the router's base.

the router's base stays in constant contact with the guide.) Measure the offset between the guide and the edge of the dado as shown in **Figure 3**. Use this measurement to position the edge guides on the side assemblies.

3 CLAMP OR SCREW THE GUIDE STRIP TO THE SIDE ASSEMBLIES, as shown in **Figure 3**. When routing the dados, focus on keeping the base against the guide, as shown in **Photo C**. Make the cut in $\frac{1}{8}$ " increments until you reach final depth. (Note that all but one of the dados are $\frac{3}{4}$ " wide. To fit the $\frac{7}{8}$ "-thick counter shelf, you'll need to widen the dado above the side assembly's step. To do this, rout a $\frac{3}{4}$ " dado, then reposition the guide and remove an additional $\frac{1}{8}$ " of material from the top edge.)

TIP ALERT

Attaching a few extra guide strips, one for each dado, can make the 3-step cut less tedious. Rout each groove before lowering the bit.

4 CLEAN UP THE SIDE ASSEMBLIES. You can use a sander, but this is another opportunity to practice your planing skills. Using a No. 4 or 5 bench plane, as shown in **Photo D**, can fix any glue-up irregularities, such as offset edge joints, and finish the surface as quickly as any power sander. In addition, you'll feel the difference that the plane will make through the milk paint finish.

Rout a rabbet, and make the shelves

1 ADD AN EDGE GUIDE TO YOUR ROUTER, and adjust it for the first pass of the $\frac{1}{2} \times \frac{1}{2}$ " rabbet along the back edge of each side assembly. As shown in **Figure 2**, the rabbet runs from the bottom dado to the top of the side assembly. Rout this rabbet in $\frac{1}{8}$ " increments until you reach the final depth of $\frac{1}{2}$ ". With a sanding block and 220-grit sandpaper, clean up any splinters or fuzz on the edges.

2 JOINT, THEN PLANE THE COUNTER SHELF (D) AND LEDGE (E), so that it's a little too thick to fit (about $\frac{15}{16}$ " thick). Use a hand-plane to remove any machine marks, then test-fit the counter shelf in the $\frac{7}{8}$ "-wide groove. Continue hand-planing the top (or machine-planing the bottom) until the shelf fits. Don't force the shelf into the dado—if it's that tight, removing it could splinter the edges of the dado. Finally, rip and crosscut the counter shelf and ledge to their final sizes.

TIP ALERT

When machine-planing stock to fit a dado, measure the thickness along an edge, not at the end. Planer snipe can leave one—or both—ends noticeably thinner than the middle of the board.

3 DIMENSION STOCK FOR THE SHELVES, including the upper shelves (F), and lower shelves (G) to $\frac{15}{16}$ " thick. Edge-glue stock to make the width required for these parts. When the glue is dry, rip and crosscut the shelves to final dimensions. As when fitting the counter shelf, Steve uses a hand plane to erase milling marks and to sneak up on a perfect shelf fit. After fitting, mark the dados and the ends of the shelves with a pencil so that you can reposition them later.

4 ROUT THE PLATE GROOVES WITH A V-GROOVE BIT INTO YOUR HANDHELD ROUTER. (See the Buying Guide for a V-groove bit source.) To set your router, adjust the bit's depth to $\frac{1}{4}$ " and set the edge guide so the tip of the bit will cut

TIP ALERT

Make sure that the back edge of the shelf does not extend into the rabbet you cut along the back edge. If a shelf board is too wide, let the front extend past the front edge of your case and plane it flush after assembly.

2" from the shelf's back edge. As shown in **Figure 1**, you'll want to stop the groove about 4" in from each end. After routing, square off these ends with a chisel to give the groove a hand-cut appearance.

Glue up the carcass and add the top

You may want to recruit a helper or two to assist with this big glue-up. The carcass starts out on its side, but after inserting the shelves, you'll stand the entire assembly upright to apply the cauls and clamps. Make sure that the spot where you'll stand the carcass is perfectly flat, or you could introduce twist into the assembly.

1 MAKE FOUR CUSTOM CLAMPING CAULS $17\frac{1}{2}$ " long from 2 x 2 pine and eight cauls $12\frac{1}{2}$ " long to distribute the clamping pressure across the width of the side assemblies. Next, gather your clamps. You'll need eight bar or pipe clamps that are long enough to span the width of



Hand-planing levels edge joints and smooths the side assemblies in a single step. Before planing, scrape away dried glue so it won't chip your blade.

5 LAY THE CARCASE ASSEMBLY ON ITS BACK and position the lower face frame assembly in place. (Remember that the outer edges are supposed to overhang each side by $\frac{1}{8}$ ".) Remove the face frame, spread some glue on to the mating surfaces, then reposition the face frame and clamp it to the case. After the glue dries, remove the clamps and drive the 3d ($1\frac{1}{4}$ ") hinge nails.

6 TRIM THE EDGES OF THE LOWER STILES (I) FLUSH WITH THE SIDES, using a flush-trim bit. (See the **Buying Guide** for more on this bit.) If necessary, you can remove evidence of a machine-made cut with a pass or two of your hand plane.

7 EDGE-GLUE THE LEDGE (E) TO COUNTER SHELF (D), centering it side-to-side. (It should overhang each side by approximately $\frac{7}{8}$ ".) Fasten it with glue and 3d fine finish nails.

8 CUT THE UPPER STILES (K) TO FIT between the ledge (E) and top (H). These stiles do not require any shaping at the ends. Otherwise, construction and installation of the upper face frame follows the same procedures used for the lower face frame.

After attaching this frame, the ledge (E) and top (H) will prevent your router from trimming the ends the upper stiles flush with the sides. In those areas, you'll need to switch to a chisel or chisel plane to finish the cleanup work.

9 LAY A STRAIGHTEDGE ON THE LEDGE (E) to check that the front surfaces of the upper stiles (K) align with each other. Make any adjustment necessary, then drive a 6d (2") nail up through the bottom face of the ledge and into the end of each upper stile.

Make the beadboard back

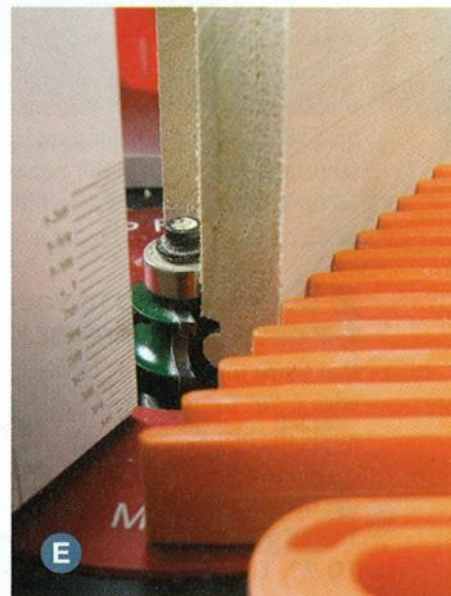
1 JOINT AND PLANE SIX BEADBOARD PIECES (M) TO MAKE the cabinet back. Rip and crosscut to the size in the Cut List.

2 CHUCK A BEADING BIT INTO YOUR TABLE-MOUNTED ROUTER, and adjust the fence so that it's flush with the bit's bearing. (To order a beading bit, see the **Buying Guide**.) If possible, attach a featherboard to hold the stock

firmly against the bit, as shown in **Photo E**. Rout this profile along one edge of each beadboard (M).

3 SET UP TO CUT A $\frac{1}{2}$ " RABBET $\frac{1}{4}$ " DEEP, using a dado head in your table saw or with a straight bit in your table-mounted router. (With a router-table setup, you'll probably need two passes.) Referring to **Figure 6**, you'll see that one rabbet is on the edge opposite the bead and the other is behind the bead. Note that the board at one edge does not have a back rabbet, while the board at the opposite edge doesn't have a rabbet at the front.

4 FIT THE BEADBOARDS (M) INTO THE CARCASE, with a gap of approximately $\frac{1}{8}$ " along each rabbet in the carcase. The intermediate gaps between the individual boards should all be equal, at approximately $\frac{3}{32}$ " each—the thickness of a combination square rule—as shown in **Photo N**, on page 30. When you're satisfied with the spacing, make pencil registration marks on each board and the carcase so that you can easily install them in the same position after finishing.



A tall fence and featherboard work together to produce a consistent beadboard profile.

TIP ALERT

The rabbet's depth is specified at $\frac{1}{4}$ ", but you actually want to set it about $\frac{1}{32}$ " more than half the stock's thickness. When you lap two test pieces, you'll then have a gap between them of about $\frac{1}{16}$ ". Even after you apply finish to both pieces, you'll still have a tiny gap. That will allow the individual boards to expand and contract in width during seasonal humidity changes without scraping off the finish.

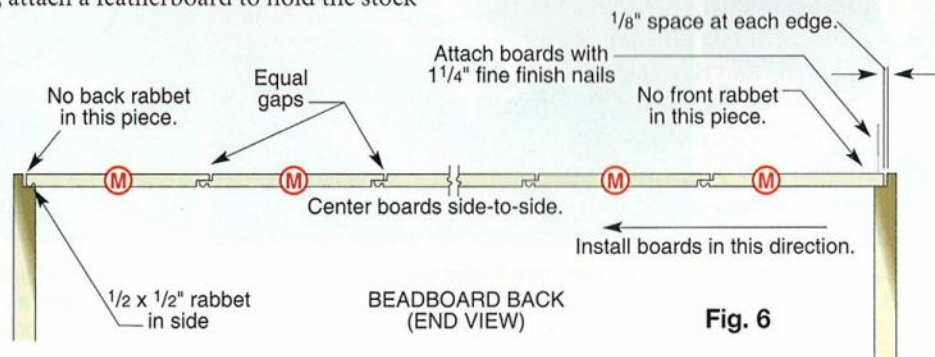


Fig. 6

Make and attach the cove molding

1 JOINT THEN PLANE STOCK FOR THE COVE to 1" thick. Rip blanks $3\frac{7}{8}$ " wide, crosscutting the cove front (M) 50" long, and two blanks to 20" for both the cove sides (N). It's a good idea to also cut a test piece about 16" long. Always mill the test piece first to prove your setups. Also, some woodworkers find it helpful to draw the molding profile (shown in **Figure 8**) on the end of the workpiece to ensure accurate setups, as when determining where the cove cut ends when the blade is raised to final height for fence location.

2 CLAMP A BOARD TO YOUR SAW TABLE TO SET THE COVE-CUTTING FENCE as shown in **Figure 7**. Note that when the saw blade is raised to $\frac{1}{16}$ " high, its leading edge is $\frac{3}{16}$ " from the fence. Attach a featherboard to help guide the blank.

3 LOWER THE TABLE SAW BLADE TO $\frac{1}{8}$ ". This cove-cutting procedure involves an angled cutting direction, something that the blade was not engineered to do efficiently. As a result, you need to minimize stress on the blade by raising it in very small increments between passes and not forcing the stock during the cut. As the cut deepens, more surface area comes into contact with the blade, so you need to raise the blade in even smaller increments. Mill all of the cove blanks before raising the blade to its new setting.

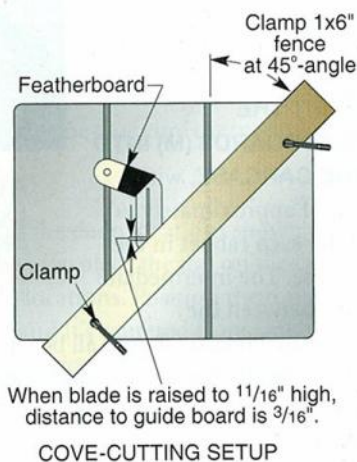
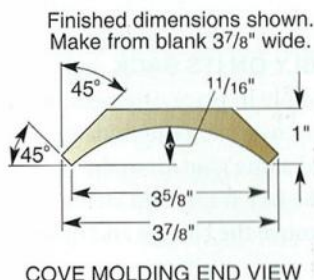


Fig. 7



COVE MOLDING END VIEW

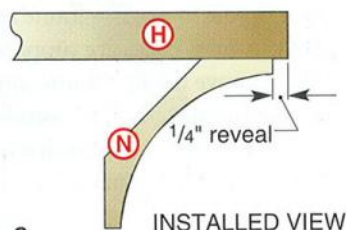


Fig. 8

INSTALLED VIEW

As shown in **Photo F**, Steve uses a flat pushblock to hold the stock against the table and the fence and a pushblock with a hooked end to advance the stock.

4 CUT A $\frac{1}{16}$ " DEEP COVE as indicated in **Figure 8**. Tilt your table saw blade to 45° , and with the cove facing the table, make angled cuts along both edges of the blanks as shown in **Photo G**.

5 CUT FILLETS ALONG BOTH EDGES OF THE COVE, with the concave face up, as shown in **Photo H**. Referring to **Figure 8**, you'll see that the fillet is $\frac{1}{4}$ " wide and cut at a 45° angle.

TIP ALERT

Because of the advanced nature of cutting cove molding on a table saw, you may want to purchase the molding from our source in the **Buying Guide** on page 31.

TIP ALERT

The shape of the gooseneck scraper enables you to position it for a close match to the cove's profile. Gently flex the back of the scraper with your thumbs to improve the cutting action. Skewing the scraper at a slight angle also helps it cleanly shear off wood fibers.

6 SMOOTH THE COVE WITH A GOOSENECK CABINET SCRAPER as shown in **Photo I**. See the **Buying Guide** for a cabinet scraper set. Also see the **Tip Alert** for

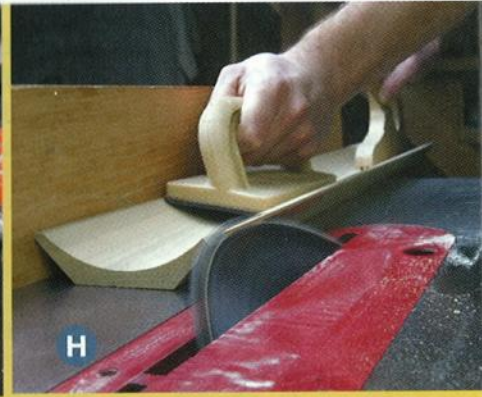
scrapping suggestions. Sandpaper wrapped around a curved form will complete the smoothing. Use spray adhesive



F



G



H

Using a pair of push blocks keep your hands safely away from the blade during the coving operation.

For safety, don't raise the blade higher than absolutely necessary when you make the back cuts on the molding.

Cutting the fillets on the molding is another operation that requires push blocks and extreme caution.



Strive for shavings, not dust, when you scrape the profile of the cove molding.



Molding retainer strip

To use the non-compound method for cutting crown, place a retainer strip on your miter saw to keep the angled molding from slipping during the cut.



With the cove front temporarily held in place, fit the right cove side to it and mark the end at the cabinet's rear edge.

to attach sandpaper to a piece of 3" PVC drain pipe or a cardboard mailing tube. You can also use a spindle sander arbor and sleeve.

7 CUT THE COVE FRONT (N) AND OPPOSING COVE SIDES (O) using the non-compound cutting method in **Figure 9**. This simple approach requires that you squarely rest the bottom of the molding against the fence and the top of the molding on the miter saw table. (See **Photo J**.) To do this effectively, place a molding retainer strip in front of the molding as it rests in its angled position against the fence. This prevents the workpiece from slipping during the cut. Note, too, that when cutting the cove front (N), you'll need to sneak up on its exact length, ensuring that the short ends align with the cabinet corners. Cut the sides long at first for easy trimming of the 90° ends later. Mark all pieces and edges to avoid confusion.

8 MITERCUT THE LEFT FRONT CORNER OF THE COVE FRONT (N). Now, cut the miter on the mating cove side (O). Use these two pieces to match the corner joint, and clamp the long piece of molding in place, as shown in **Photo K**. Also refer to the installed view on **Figure 8** to see the 1/4" reveal

between the edge of the molding and the edge of the top (H). Position the cove

side (O), and mark the 90° cutline on the piece at the rear of the carcass. Cut this end to final length. Fasten this cove side with 1 1/4" finishing nails.

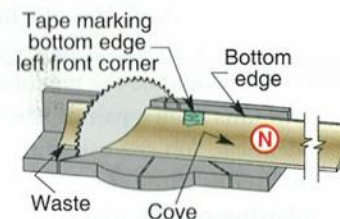
TIP ALERT

It's not necessary to use glue when installing the moldings, but if you do, Titebond Molding & Trim Glue is a thick formulation that resists running. You can apply glue along the full length of the cove front (N), but apply glue only to the corner and a couple of inches at the front of each side cove (O). This will help keep the miters tight but allow the sides to move independently of the molding

CUTTING CROWN MOLDING OUTSIDE CORNERS

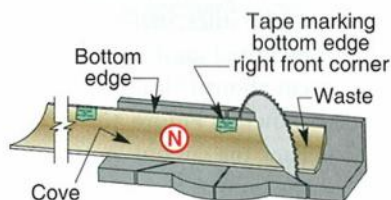
To cut the end of the front cove (N) for the cabinet's left side front corner:

- 1) Place cove against right fence, bottom edge up.
- 2) Adjust saw angle 45° to left. Make cut.



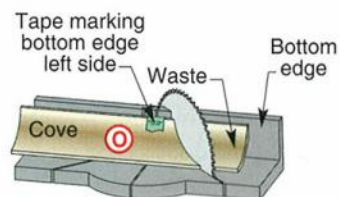
To cut the end of the front cove (N) for the cabinet's right side front corner:

- 1) Place cove against left fence, bottom edge up.
- 2) Adjust saw angle 45° to right. Make cut. Check against cabinet corners and sneak up on outline.



To cut the cove side (O) for the cabinet's left side front corner:

- 1) Place cove against the left fence, bottom edge up.
- 2) Adjust saw angle 45° to right. Make cut.



To cut cove side (O) for the cabinet's right side front corner:

- 1) Place cove against the right fence, bottom edge up.
- 2) Adjust saw angle to 45° to left. Make cut.

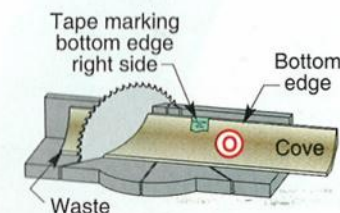


Fig. 9

9 MARK THE RIGHT MITER CUT AT THE OPPOSITE END OF THE COVE FRONT (N), and unclamp it from the carcass. Make this cut, then install the molding.

10 FIT THE OTHER SIDE COVE (O), cut it to length, then glue and nail this piece to the cabinet.

Make and attach the doors

1 MAKE THE RAISED-PANEL DOORS by referring to the companion article "Trouble-Free Raised-Panel Doors" on page 32. The **Cut List** provides you with the finished dimensions of the rails and stiles, but you'll want to carefully confirm these sizes with the face frame openings in the carcass that you built. Consider making the doors slightly oversized, then trimming them to final size after assembly. Here's an easy way to increase the size of the door by $\frac{1}{8}$ " in both height and width: add $\frac{1}{16}$ " to the width of each rail and stile, and lengthen each stile by $\frac{1}{8}$ ". The size of the raised panel is unaffected.

2 FITTING AND INSTALLING THE DOORS is easier when you lay the carcass on its back. A gap at the edges and ends of the door should be, at a minimum, $\frac{1}{16}$ ". With a rustic or country-styled cabinet you can make the reveal larger, but $\frac{1}{8}$ " would be the maximum. Be careful to remove equal amounts from a pair of stiles or rails to keep their width identical. You can use your jointer to trim doors to length. To do this without blowing-out the edges of the stiles, make an initial jointing cut about 1" long, as shown in **Figure 10**. Back the cut out of the jointer, and turn the door to restart the cut at the opposite edge of the door. The initial cut will help prevent grain blow-out at the door's edge.

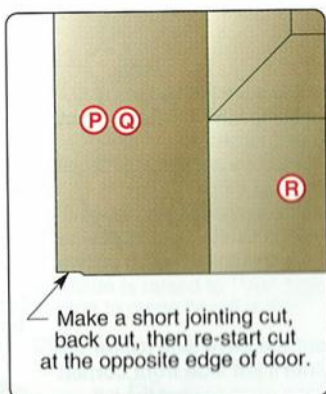


Fig. 10

3 BACK-BEVEL THE MATING EDGES OF EACH DOOR PAIR with a block plane to create opening clearance. Referring to **Figure 11**, you'll see that the bevel starts $\frac{1}{8}$ " behind the door's front edge. This maintains the appearance of neatly tailored square corners along these edges. Beveling the entire thickness of the door would produce a fragile knife edge that could be easily damaged.

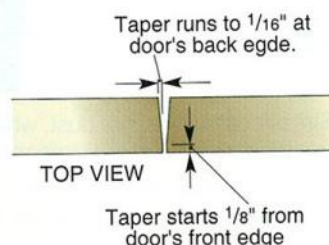


Fig. 11

4 MOUNT THE HINGES ON THE DOORS, vertically positioning them 3" from the top and bottom ends of the stile as shown in **Figure 1**. For the horizontal placement, position the hinge on the door so that the hinge pin is centered in the gap between the door and the face frame stile. Drill pilot holes for the hinge screws, and drive the screws.

5 POSITION THE DOORS INTO THE OPENING, and use shims to set the reveal and keep the doors from sliding. Mark the centerpoints of the hinge holes on the face frame stiles with a scratch awl as shown in **Photo L**.

6 FASTEN THE LEFT DOOR OF EACH PAIR TO A SHELF with a simple hook and eye fastener (the type used on old-fashioned screen doors). Attach the hook to the back of the door, and the screw eye beneath the middle shelf in both the top and bottom sections.

7 CENTER AND ATTACH THE CATCH TO THE FRONT OF THE DOORS as shown in **Photo M**. Drill pilot holes to avoid splitting the wood.



Mark the hinge hole centerpoints with a scratch awl or choose a self-centering pilot bit to skip the marking operation.



Attaching surface-mount hardware is a quick and easy process with predictable results. Center the latch along the length of the doors.



Drill pilot holes through the beadboard back and into the shelves to avoid splitting. Use a square's blade to maintain a small board-to-board gap.

Ready for finish and final assembly

1 REMOVE ALL OF THE HARDWARE, and store it in zip-top plastic sandwich bags so that you don't lose any screws or other parts.

2 APPLY THE FINISH TO THE CUPBOARD, following the procedure in the companion article "Go Antiquing with Milk Paint and Shellac" that begins on page 36.

3 LAY THE CUPBOARD FACE DOWN on an elevated padded surface, making sure that there is no pressure against the cove molding. Referring to the registration marks you made earlier on the beadboards, install them one at a time into the opening in the back. Refer to **Figure 6** to see the installation sequence for these shiplapped boards. As shown in **Photo N**, space the boards and drive two nails through each board into each shelf as well as into the rabbets at the top and bottom using fine finish nails. Do not fasten the boards to each other.

4 CAREFULLY PLACE THE CUPBOARD FACE UP and replace the doors. 🪵

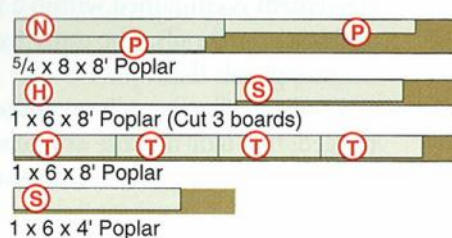
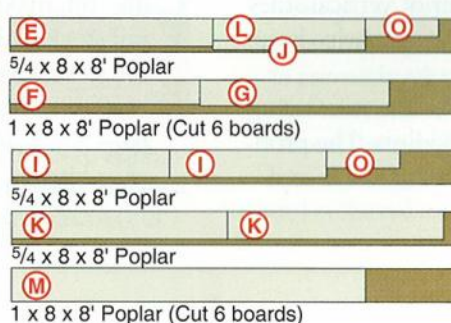
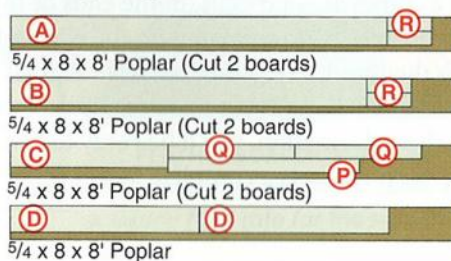
About our Builder/Designer

Steve Rigrish is a freelance designer/builder based in Columbus, Ohio. He has a BFA in furniture design from Kendall College of Art and Design. He also spent a year at the Rio Grande Fine Woodworking School in Rio Grande, Ohio.

During the construction of the cupboard, Steve had to stop everything as his wife, Kristen, gave birth to their first child, Maxwell. You can get in touch with Steve through his email address: rigrishdesign@gmail.com.



Cutting Diagram



Cut List		Thickness	Width	Length	Qty.	Mat'l
A	Side (rear)	7/8"	6"	81 1/2"	2	P
B	Side (middle)	7/8"	6"	77"	2	P
C	Side (front)	7/8"	5 1/8"	34"	2	P
D	Counter shelf*	7/8"	11 1/2"	41"	1	P
E	Ledge*	7/8"	6 7/8"	43 5/8"	1	P
F	Upper shelves	3/4"	11 1/2"	41"	3	P
G	Lower shelves	3/4"	16 5/8"	41"	2	P
H	Top	3/4"	15 7/8"	48"	1	P
I	Lower stiles	7/8"	6"	34"	2	P
J	Lower rail	7/8"	2"	33"	1	P
K	Upper stiles	7/8"	6"	46 5/8"	2	P
L	Upper rail	7/8"	4 3/4"	33"	1	P
M	Beadboards	1/2"	7 1/4"	76 1/2"	6	P
N	Cove front*	1"	3 7/8"	47 1/2"	1	P
O	Cove sides*	1"	3 7/8"	15 3/4"	2	P
P	Upper door stiles*	7/8"	3"	41 3/8"	4	P
Q	Lower door stiles*	7/8"	3"	27 3/8"	4	P
R	Door rails*	7/8"	3"	9 7/8"	8	P
S	Upper door panels	1 1/16"	9 5/8"	36 1/8"	2	P
T	Lower door panels	1 1/16"	9 5/8"	22"	2	P

* Indicates a part that is initially cut larger; please see the instructions for further details.

P = Poplar (125 board feet of stock purchased at lumberyard. See the **Cutting Diagram**.)



BUYING GUIDE

WOODCRAFT # PRICE

☐ 1.	Woodcraft Flush Trim Router Bit, 1/2" Shank	129685	\$18.99
☐ 2.	3/4" Straight Cut Router Bit, 1/2" Shank	144156	\$15.99
☐ 3.	CMT 3-Piece Kitchen Set Router Bits, 1/2" Shank	822173	\$184.99
☐ 4.	Whiteside 60° V-Groove Bit, 1/4" Shank	24B81	\$22.99
☐ 5.	Antique Beading Bit, 1/2" Shank	129734	\$24.99
☐ 6.	Lynx Cabinet Scraper Set	147419	\$14.99
☐ 7.	Titebond Extend Wood Glue (16 oz)	140441	\$5.99
☐ 8.	Titebond Molding Glue (16 oz)	124513	\$5.50
☐ 9.	Acorn H-Hinges (4 Pairs Required)	148647	\$10.99/pair
☐ 10.	Acorn Forged Iron Latch	148648	\$14.99/each
☐ 11.	Tremont Hinge Nails, 1 1/4"	148649	\$9.99/lb
☐ 12.	Tremont Fine Finish Nails, 1 1/4"	148650	\$11.99/lb

Above items available at Woodcraft stores, woodcraft.com or by calling (800) 225-1153.

☐ 13. As an alternative to making your own molding, Falls Millwork can provide precut 3 3/4" x 8' poplar cove molding (shipped as a 5' and a 3' piece). \$28.00 plus shipping and handling (Continental U.S.) \$16.50. Send check or money order to Falls Millwork, PO Box 278, Kelley, IA 50134 or call (515) 769-2212.

MAJOR TECHNIQUE

Panel

Rail

Stile

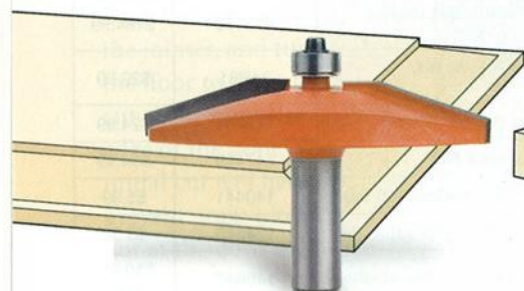
Precise preparation leads to no-fuss assembly and perfect doors



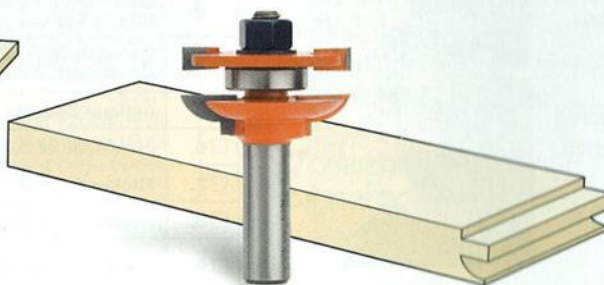
PHOTOS: JOSH ARMSTRONG

TROUBLE-FREE RAISED-PANEL DOORS

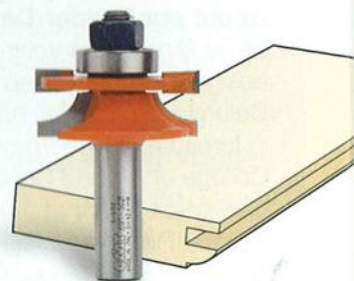
BY CRAIG BENTZLEY



Panel bit



Rail or coping bit



Stile or sticking bit

At one time, the raised-panel door represented a technological breakthrough in cabinetry. The five-piece door solves the movement-related problems inherent in a solid-plank, enabling woodworkers to build light, yet strong cases. The captured panel can still expand and contract, but now the movement is contained within a pair of vertical stiles and horizontal rails. The outer frame also helps keep thinner panels flat.

Traditionally, the rails are joined to the stiles using pegged, through-mortise and tenon joints. The problem is that cutting these joints can be a tedious and

time-consuming process. Fortunately, there's an easier way. By using a good rail-and-stile router bit set (see the **Convenience-Plus Buying Guide**), you can build good-looking doors in just a few hours. The stile bit, commonly referred to as a "sticking" bit, profiles the edge of your stock. The rail bit, also known as a "coping" bit, makes a complementary cut on the ends of the rail stock which enables them to mate into the edges of the stiles. Here's the step-by-step process Steve Rigrish used to make the doors for his step-back cupboard (see page 22). With this information, you'll be ready to give your kitchen or shop cabinets a complete face-lift.

1 Start Flat, Stay Flat

The secret to successful door making is working with dead flat stock—anything less will mean doors that won't hang or close properly. Start by carefully choosing your material. Use 4/4 stock for the rails, stiles, and panels. Select the driest, straightest grain stock you can find, preferably quartersawn, and allow it to stabilize to your shop environment for a few days prior to milling.

For the straightest stiles and rails, dimension your stock carefully. First, rip the parts just 1/4" wider than needed. (Ripping your stock to rough width first gives the wood an opportunity to move before you do any jointing or planing.) Now cut your rails and stiles to rough length. Since the rails are short, you may want to leave several of them together on a longer board to make jointing and planing steps safer and easier.

After making the rough cuts, joint one face and thickness plane all of your material in one step. (When planing, remember to flip your stock end-for-end after each pass to maintain equilibrium.) Finally, triple-check your table saw blade and jointer fence for square, then joint an edge and rip to final width.

You're almost ready to start routing. Install the stile or "sticking" bit in your table-mounted router and use a straightedge to align the guide bearing flush with the

fence. Adjust the bit height so that the fillet depth is 1/16" and make a test edge cut as shown in **Photo A**.

Inspect the groove before routing the rest of your rail and stile stock. The groove

should be positioned between the front and back face so that neither side is too thin. Once you're satisfied, rout the profile on all your stock.

TIP ALERT

Mill some extra material for fine-tuning your router bit heights. Test and tweak as necessary for a perfect fit.

2 Crosscut Your Parts

It's time to crosscut your parts to exact length.

Whether you're using a miter gauge or sled on a table saw, or using a miter saw, use a stop block to ensure parts of identical length. If the lengths are off by even a tiny bit, you'll end up with doors that aren't square.

To find the lengths of the stiles, simply measure the length of the opening and subtract the desired door gap/gaps (from 1/16"-3/32"). Determining the rail length requires a little math. First, measure the width of the opening, subtract the width of the two stiles, and then add the depth of the two panel grooves (the groove is usually 3/8" deep).

Rail length = opening width - (2) x stile width + (2) x panel groove depth

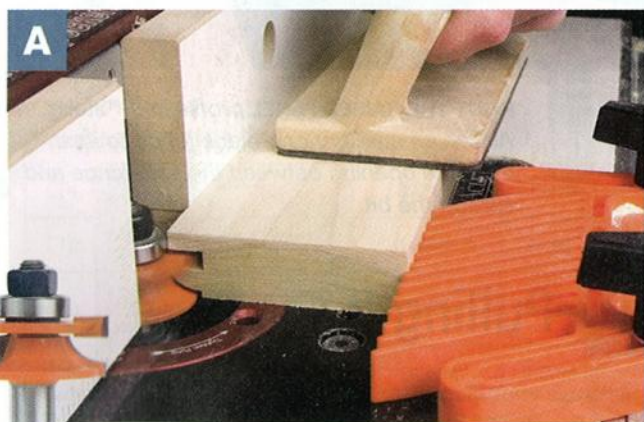
Now mark and cut the parts. It's best to aim for a door width that matches the opening perfectly, and machine or hand-plane the frame to remove the extra material when final-fitting the doors.

3 Learning to Cope

To rout the coped ends, install the rail or "coping" bit and align the guide bearing with the fence just as you did in the previous step. Use the profile you previously cut to rough-set the bit height. Make a test cut and adjust the bit height so that the faces are perfectly flush (**Photo B**). When routing the ends of the rails, use a backer board to prevent breakout. (See "A Simple and Safe Coping Sled" on the next page for a solid stock-gripping jig you can use instead of your miter gauge.) Feed the rail slowly while holding it firmly against the table, making sure the end of the rail is tight against the fence.

TIP ALERT

Cope-and-stick doors won't tolerate abuse as well as traditional mortise and tenon. For a sturdier door, consider loose tenons. If you plan on a painted finish, a super-strong, money-saving alternative is to make the panels from MDF.



USE FEATHERBOARDS AND PUSH BLOCKS to apply even pressure against the table and fence. Maintain a steady feed rate for the smoothest-possible cut.

A SIMPLE AND SAFE COPING SLED

This wide two-sided sled works with any router table and ensures a tear-out-free cope. To cope the rails, start with the unprofiled edge against the flat edge of the fence. To cope the opposite end, flip the sled, fit the rail into the coped fence edge as shown and slide the sled past the bit.

toggle clamp
(long enough to clamp
stock on center)

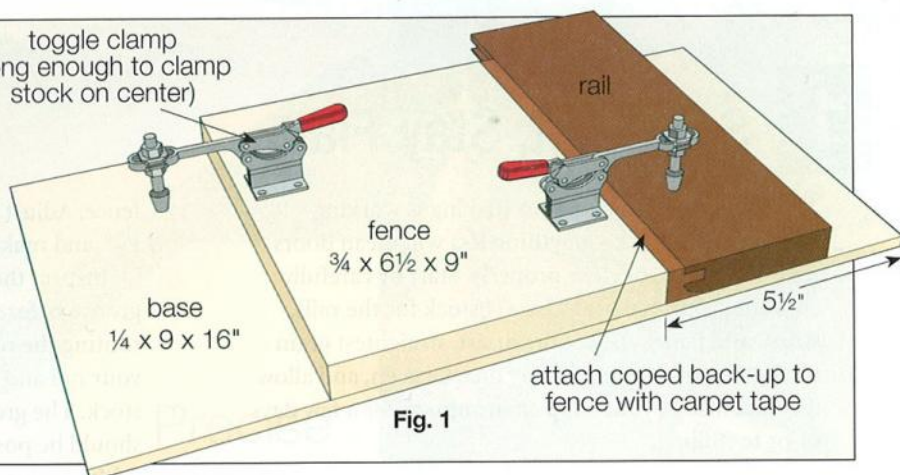


Fig. 1

attach coped back-up to
fence with carpet tape



WHEN USING A SPLIT FENCE, make sure the two halves are perfectly aligned so the stock doesn't catch on the outfeed side and spoil your cut. Hold your stock down firmly as you make the pass.

4 Make Your Panels

Just like your stiles and rails, the panels must be flat. Start by jointing and planing your panel stock to $\frac{1}{16}$ " thick. Before ripping the stock to width, you'll need to think about seasonal movement. If you're building these doors during drier winter months, allow roughly $\frac{3}{16}$ " for future expansion. During the humid summer months, cut the panels about $\frac{1}{16}$ " undersize. To determine the length of the panel, just subtract the width of the rails from the length of the stiles, and

then add the depth of the grooves.

Using a panel-raising bit included with the kit

TIP ALERT

If you own a smaller, fixed-speed router, consider using a vertical panel-raising bit instead of a horizontal. You can also raise the panel on the table saw using a tall fence.

requires some common sense. Because of the bit's large diameter, you'll want to use a 3 to $3\frac{1}{2}$ hp router, and slow it down to about 10,000 rpm. To start, align the guide bearing with the fence and raise the bit to take about a $\frac{1}{8}$ " cut. Now rout the cross-grain ends first, then rout the edges. Rout each panel before raising the bit (**Photo C**). You'll need to take at least three passes, saving a light finishing cut of no more than $\frac{1}{16}$ " for the last run. The goal is a panel that fits snugly into the groove.



ROUT THE RAISED PANEL profile in $\frac{1}{8}$ " steps. Attach an auxiliary one-piece fence to span the wide opening between the split fence and shroud the bit.

5 Pulling It Together

Arrange your clamps on a flat surface so your glue-ups stay flat. Apply glue to the stub tenons on the rails as shown in **Photo D**, and a small amount in each end of the stiles. Be extra careful to keep glue out of the

panel areas. Insert a rail into a stile, position the panel in place, then insert the second rail. Attach the remaining stile then press the assembly together. Make sure the outside rail/stile joints are flush.

Carefully lay the assembled door onto your clamps. Center the clamp heads on the rails, then apply light pressure. (You may need a few taps with a rubber mallet to line the parts up.) Check for square by measuring the diagonals as shown in

Photo E and tweak as necessary before tightening the clamps. Don't apply too much pressure or you'll risk flexing the stiles and

possibly breaking them. Finally, use a straightedge to make sure the stiles are flat with the rails. If the rails are flexed, loosen the clamps a bit, push the parts flat and lightly retighten the clamps. Clean up any glue squeeze-out you can reach, and then let the assembly dry.

TIP ALERT

Apply a coat of paint or stain to the edges of your panel before you glue up your doors so future shrinkage will not be noticeable.

6 Finishing Up

Once dry, clean up any glue that you missed. Put the doors into the cabinet openings and determine how much material you need to remove to create even gaps or reveals. If you need to remove a lot of material, you can use the table saw and finish up with a hand plane.

If your doors fit together tightly, you may want to plane a back-bevel on the leading edge as shown in **Photo F** to provide a little extra swing clearance.



APPLY YOUR GLUE neatly and evenly. Aim for minimal squeeze-out to clean up. You'll also minimize your risks of gluing the panel into the grooves.



CHECK YOUR DOORS FOR SQUARE before you fully snug up the clamps. Check for flatness using a straightedge after you tighten them.



A WELL-TUNED HAND PLANE does a great job on final fitting and creating back-bevels, as well as evening up door faces at joints and door/opening locations.

convenience-PLUS

BUYING GUIDE

		WOODCRAFT #	PRICE
☐ 1.	CMT Three-piece Kitchen Set	822173	\$184.99
☐ 2.	Titebond Extend Wood Glue, 16 oz	140441	\$5.99
☐ 3.	Lie-Nielsen Low-angle (12 1/2") Bronze No. 102 Block Plane	07071	\$94.99
☐ 4.	Vertical Handle Toggle Clamp	143934	\$10.99

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Go Antiquing with

MILK PAINT AND SHELLAC

Create a century's worth of character in a weekend with friendly finishes and some simple tools.

by Joe Hurst-Wajszczuk



While you will need these items to complete the cupboard or other similar project, you'll have plenty left over to continue experimenting with this safe and colorful finish combo. See the Buying Guide key on page 39.

Traditionally, painted finishes were used for softwoods and plainer hardwoods, but as you can see there's nothing plain about it. As demonstrated in the "Step-back Cupboard" on page 22, a painted finish can be as important to the success of your project as your choice of wood or hardware. Adding color also gives extra freedom and flexibility to create a piece that can complement any room in your home.

The materials used for this project might create an "antique" look, but they are not old-fashioned. The milk paint and shellac treatment used for Steve Rigrish's reproduction is similar to materials that would have been used on the original, but this simple finishing technique is equally suitable for modern furniture. Milk paint is not only easy to apply and quick to dry, it's also a no-VOC (Volatile Organic Compounds) finish. You can pour excess finish down

the kitchen drain. Similarly, shellac is another all-natural safe product that's widely used in food, drugs, and cosmetics in addition to wood finishes.

Once, woodworkers made their own milk paint by combining lime, milk protein, clay, and pigment. Now, all you have to do is add water (See the **Convenience-Plus Buying Guide**, page 39). Steve also combines shellac flakes and denatured alcohol to make a smooth, fast-drying topcoat.

The best thing about milk paint is that it looks better as it ages. While other paints chip or peel, milk paint wears away to reveal wood, or additional colors, beneath. To help the aging process along, Steve applies a simple but convincing strategy for adding all sorts of scratches, dents, and dings. Using his technique, (see "Distressing Done Right," page 40), you can add a century's worth of character in an afternoon.

Step 1: PREPPING AND PREDISTRESSING THE SURFACE

As shown in the project, Steve carefully removes milling marks with a combination of hand planes and card scrapers. Part of his interest is to create a handcrafted look. (It takes longer, but you can also machine and/or hand-sand all surfaces up to 180 grit.)

To prevent the water in milk paint from raising the grain, wet the surfaces with a damp rag or plant mister. When the wood dries, knock off the raised wood whiskers with 220-grit sandpaper. Be careful not to sand too much, or you may cut into the wood, which will only lead to more whiskers when you apply the paint.

At this point, most woodworkers would fill dents and nail holes with latex filler, before applying the first coat. Here, Steve adds a few dents and bumps to the surface (See "Distressing Done Right"). These spots will reveal the base coat even after the topcoat has been sanded away.

Step 2: MIX AND APPLY THE PAINT

Mixing milk paint is no more difficult than making pancakes; brushing it on is the same as with any thin-bodied paint. The hardest part is believing that the final finish will look good. Dry milk paint is depressingly flat and blotchy, until you apply the topcoat. Try out these steps on a sample board, and you will soon see what we mean.

MIX THE MILK PAINT. For the base and topcoats, make the paint from the milk paint powder. To do this, simply pour dry mix (Steve is using marigold yellow) into a water-filled container, as shown in **Photo A**. The water-to-powder ratio is about 1:1, but as when making pancakes, don't be afraid to tweak the mix. Add more water—a few drops at a time—until you get a mix that's smooth enough to spread, but still thick enough to cover the wood. Finally, give the paint about 30 minutes to sit to ensure that the dry ingredients have had enough time to absorb moisture. Give the paint one more stir, scoop away any froth from the top, and you're ready to paint.



Mix together equal amounts of milk paint powder and water, then gradually add water for better brushing consistency.

APPLY THE BASE COATS. Lay on the first coat using dabbing and brushing strokes, as shown in **Photo B**. Don't worry if it doesn't look even; focus on not leaving any drips or puddles on the wood. Stir the paint to make sure the solids stay mixed in the paint.

The first coat will dry to the touch in minutes, but wait at least four hours between coats. Once dry, the first coat will look blotchy, but don't worry. The paint will even out by the

Milk paint will spoil, just like regular milk. You can extend the working time of mixed paint for a few days by storing it in the refrigerator, but the easiest solution is to mix up only as much as you need.



Dab on the first coat with a disposable brush, focusing on a thin, even coat. Let dry and add a second coat. Sand lightly between coats.



Apply the topcoat following the grain of the wood. Two light coats of Salem red paint should completely cover the marigold yellow base.



Brush on the shellac quickly. Try to catch drips on the return brushstroke before they have time to film over.

second same-color coat. It will feel slightly rough, so sand between coats lightly with 220-grit sandpaper.

APPLY THE TOPCOATS. Mix up a second color of milk paint, just as you did for the base and primer coats. (Here, Steve uses Salem red.) Your next coats should brush on just like a thin-bodied latex paint or stain.

Apply the first topcoat as quickly and evenly as possible, as shown in **Photo C**. Avoid leaving puddles which later can flake off and reveal unwanted circular patches of base color. Give the first coat at least four hours to dry, sand lightly, then brush on a second coat. Let dry and sand again.

Step 3: SAND SMOOTH AND START ANTIQUING

After giving the milk paint a full day to dry, lightly hand-sand all surfaces with 320-grit sandpaper or a maroon-colored abrasive pad. (See the story "True Grits" on page 56.) Excess paint will quickly crumble off. Additional sanding will begin to uncover the yellow base coat.

You now have a choice. For a newer-looking piece, brush off the milk paint dust and go to **Step 4**. If you wish to make your new piece look old, read "Distressing Done Right." The beauty to Steve's technique is that it allows you to choose how much character you want to start off with.

TO DISTRESS OR NOT TO DISTRESS?

Some folks want a piece that looks 100 years old; others want something that looks like it came fresh out of the workshop (albeit, 100 years ago). The choice is yours. The nice thing about distressing is that you can control the history of your piece. If you're patient, there's nothing wrong with watching it naturally develop its own patina, just like a real antique.

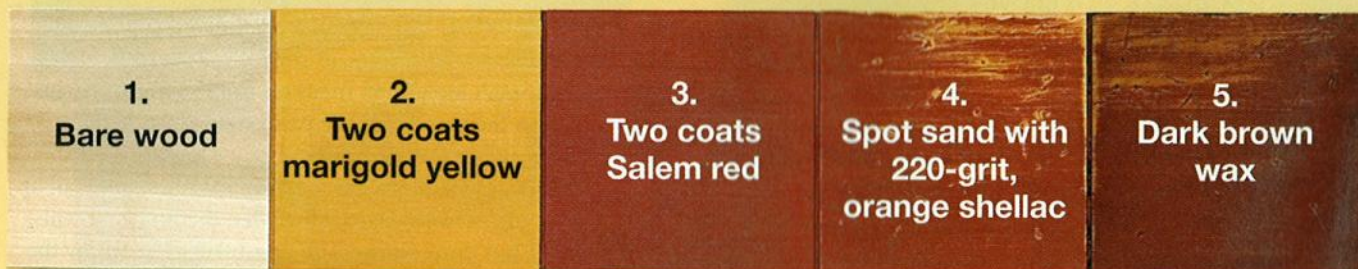
Step 4: SEALING THE FINISH

Although it wears like iron, milk paint is porous and can waterspot and stain. A sealer coat of shellac or varnish solves both problems. Either topcoat can provide smooth surface protection and will bring out the rich look of the paint.

MAKE A 1-LB SHELLAC CUT. The shellac-to-solvent ratio, called a "cut," refers to the amount of shellac (in pounds) dissolved in denatured alcohol (in gallons). For brushing, Steve suggests a 1-lb or 2-lb cut.

Some shellac comes brush-ready in a can, but Steve prefers starting with fresh flakes (see the **Buying Guide**). To make a smaller 1-lb cut batch for this project, simply measure about 1 oz of flakes on a small kitchen scale and 8 oz of alcohol in a measuring cup. Mix the two ingredients

IT'S IMPOSSIBLE TO APPRECIATE MILK PAINT UNTIL YOU'VE LAID DOWN A FEW COATS. Trying out the finish on a practice board, like the one shown below, can help. If your scrap box is full, consider building a small test project, like the salt box featured in Issue #18, (Aug/Sept 2007). One nice thing about painting a project is that it gives you the freedom to mix different species of wood in the same piece. Under a few coats of paint, no one will know the difference.



in a wide-mouthed jar. (Shaking will help prevent the flakes from caking at the bottom and can speed up the process, but to ensure that the flakes have time to completely

TIP ALERT

Shellac has a shelf life. To test your store-bought or homemade shellac for freshness, apply a few drops onto a hard surface and let it dry for several hours. If you can dent the drop with your fingernail, make a fresh batch.

BRUSH ON THE SHELLAC. Pour some shellac into a separate clean container. Dip half the length of the bristles into the finish and lightly tap the flat side of the brush against the container's side to shake off excess.

The trick to brushing shellac is to work quickly and evenly. Apply the first coat using full, even strokes following the wood grain (**Photo D**). To avoid making drips and runs on vertical surfaces, work from the top down and use a drier brush.

Shellac sets up almost immediately. When shellac is still wet but no longer flowing, you may lightly tip-off the surface, but don't overdo it. Over-brushing will lift or

dissolve, Steve suggests mixing the ingredients a day or two before you plan to brush.) When you can't see any more flakes, your shellac is ready to apply.



E Use a wiping varnish on the white shelves and cabinet back to seal and protect the paint without adding unwanted color.

the finish a day or two to completely cure before attempting to sand off any dust nibs with 320-grit sandpaper.

APPLY THE WIPING VARNISH. While testing his finish combination on a sample board, Steve discovered that the orange shellac turned the snow white milk paint pink. The easy solution was to

switch to a different finish. In this case, he chose a wipe-on varnish, not only because it didn't

affect the color of the white paint, but also because it offers extra protection for those areas that will receive extra wear. A wipe-on

TIP ALERT

You don't need to clean a dedicated shellac brush. To revive a hardened brush, simply place it in alcohol for a few minutes to soften the bristles.

varnish doesn't build nearly as rapidly as full-strength varnish, but the fast-drying product is handy when finishing in a dusty workshop.

To apply, Steve wipes on just enough varnish to wet the surface, as shown in **Photo E**. Then he wipes off the excess before it gets too tacky. For a thicker, more protective film for the shelves, apply two to three coats.

APPLY WAX. Over many years, grime gradually collects in pores, cracks, and crevices. Steve's found that dark brown wax can replicate the aged look, but without the wait. Besides adding color, the wax, applied with 0000# steel wool as shown in **Photo F**, gives the piece a smooth hand-rubbed finish. After applying the wax, rub off most of the excess, leaving a few extra gobs in the cracks and corners, such as around the door knobs and in the crown molding's sharp corners.

The neatest aspect of an antique finish is that it's never truly finished. Starting from the minute you bring the piece out of your shop, it will start developing its own custom patina. Just wait, watch, and enjoy. 🌟



F Apply a dark wax topcoat. Buff off the flat surfaces but leave some wax behind in cracks and crevices.

**CONVENIENCE-PLUS
BUYING GUIDE**

		WOODCRAFT #	PRICE
☐ 1.	Old Fashioned Milk Paint Marigold Yellow	811625	\$13.99
☐ 2.	Old Fashioned Milk Paint Snow White	811629	\$13.99
☐ 3.	Old Fashioned Milk Paint Salem Red	811180	\$13.99
☐ 4.	2" China Bristle Disposable Brushes (5)	124952	\$7.99
☐ 5.	HOCK Dewaxed Shellac Flakes, Orange, 1 lb	143156	\$23.99
☐ 6.	Denatured Alcohol, 1 qt	37D31	\$5.50
☐ 7.	General Finishes Satin Arm-R-Seal, 1 qt	85F08	\$13.99
☐ 8.	Dark Brown Briwax	85C28	\$13.99
☐ 9.	0000# Liberon Steel Wool	145928	\$9.99

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(See photo page 36)



Distressing Done Right



A brick is Steve's all-purpose distressing tool. Depending on how it's held, it can be used for dents, chips, or scraping away paint. The roughest corner works much like a coarse rasp.



A pottery shard can replicate the scratches and dents that would come from generations of kitchen wear and tear. Use the rough rounded face for making dents and the sharp edge for deeper gouges.



Use an awl to make insect holes in exposed end grain, along the base, or any other spots where bugs might see an easy way in. Use different amounts of pressure to create different-sized holes.

SIMULATING THE DENTS AND SCRATCHES THAT ACCUMULATE

through years of everyday use is an art in itself. According to Steve, the secret is building a believable story about the life your piece would have led if it had been built 100 or more years ago. Using that story, you can start making authentic-looking wear marks with just a few simple tools. (To see how and where the tools are used, refer to the photos left and below.)

Note that wear doesn't happen evenly. For example, shelves bear minor scratches from pottery, while the base might suffer larger dents and chips from accidental kicks and knocks. A piece that spent a few years in a basement or barn might sport more worm holes than one that never left the kitchen. One side or shelf may see more damage than the rest. When in doubt, wait and watch. Adding a few extra wear marks later is a lot easier than trying to correct the damage if you go overboard.

Finally, use sandpaper to slightly advance the wear along corners, edges, and those areas where hands would naturally wear through the finish.



Break hard edges with 220-grit sandpaper. Give extra attention to the corners of tabletops and the upper front edges of shelves. Soften the edges of chips and gouges so that they don't look fresh.

CORNICES DON'T SEE MUCH WEAR, but leave dark wax in cracks and crevices to mimic years of built-up grime.

POTS AND PLATES TAKE THEIR TOLL.

Round over the leading edges of the shelves then scratch and sand the top faces to reveal the base coat.

OUTSIDE CORNERS SEE THE MOST WEAR. Break outside corners and top edges with a rasp or brick.

A LOOSE HINGE WILL PIT THE DOOR AGAINST THE FRAME. Use a brick or rasp to create wear marks on both parts.

BASE CABINETS ALWAYS SUFFER MORE ABUSE THAN THE TOP.

Add more dents and holes as you move closer to the feet.

R&R Clamp

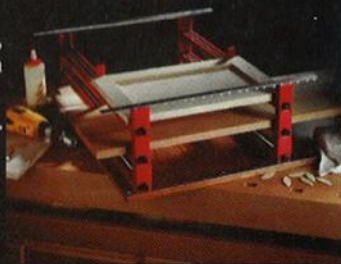
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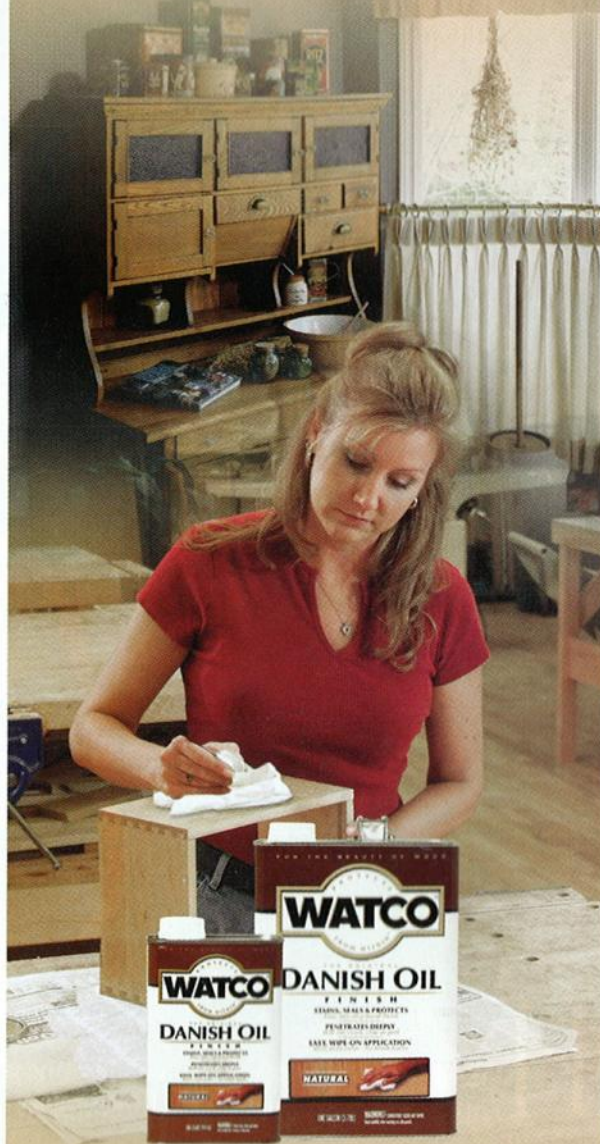
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The Perfect Gift

Sweetheart's Music Box

By Robert J. Settich
Project designed and built by
Stephen Johnson

Here's a great gift for Valentine's Day, but you'll find it equally appropriate for a birthday, Mother's Day, a wedding anniversary, or simply as a special surprise. Of course, stocking the two compartments with an additional gift of jewelry will win you extra points.

But even after you give away the box, you'll keep the new skills you developed while making it, among them bandsaw-box making, tricks for cutting and inserting a decorative strip, pattern-routing a shape, flocking, and more.



Begin with the box body

1 PREPARE THE BLANK FOR THE BOX BODY (A1, A2, A3).

Unless you're fortunate enough to have some 2"-thick stock on hand, you'll need to laminate several boards—we used three—to obtain this thickness. Begin by jointing and thickness-planing the stock so that it's flat on

both sides. Spread the glue evenly—we used Titebond III—following the advice in the **Tip Alert**. Stack the pieces, making

TIP ALERT Spread glue quickly over a large surface with a disposable applicator such as a business card or playing card. Plastic cards such as digital hotel "keys" or gift cards can endure repeated uses. Simply wipe clean and store near your glue.

sure that the grain direction is parallel in every layer. Clamp securely, and let dry overnight.

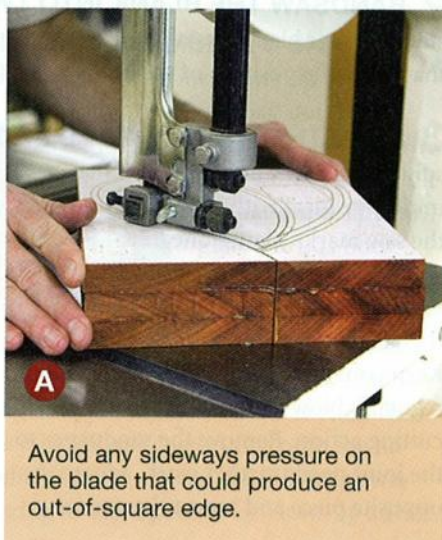
2 SET UP YOUR BANDSAW with a sharp blade that's thin enough to negotiate the curves in this project. A $\frac{1}{4}$ " blade with 6 teeth per inch will give you good results. Carefully square your table to the blade, and adjust your blade guides. Hook up your shop vacuum or dust collector to the bandsaw for the reasons explained in the **Tip Alert**.

3 MAKE PHOTOCOPIES OF THE FULL-SIZED PATTERNS, (see page 78 and 79). You'll need one copy of the box body pattern and two copies of the lid/base pattern. Adhere the box body pattern to the block with spray adhesive. Note that the grain direction indicated on the pattern runs from top to bottom. Use an awl to mark the centerpoints of the hinge mortises and spring-rod hole.

4 BANDSAW THE BOX BODY,

following the cutting sequence shown on the full-sized pattern and referring to **Photo A**. Note that the first

slice is a relief cut that lets the waste fall free at the end of the second cut instead of requiring you to back out the blade. Stop the relief cut about $\frac{1}{16}$ " from the outline on the pattern. Make cuts 2 and 3 just to the waste side of the line



Avoid any sideways pressure on the blade that could produce an out-of-square edge.

because you'll sand the edge to the cutline. Especially on the interior cuts (5 and 6), don't back up if your blade strays slightly from the cutline. Instead, gradually steer the blade back to the cutline.

5 DISCARD THE PLUG FREED BY CUT 4, or save it for another project. Save the smaller plug resulting from cut 6. This piece, called part A3, will become the cover for concealing the music box movement.

TIP ALERT

Some people experience allergic reactions to various hardwoods—especially tropical varieties such as the paduak chosen for this project. Dust on your skin could generate a rash, and inhaled dust could lead to coughing and other problems. Wearing long sleeves and a respirator is prudent and inexpensive insurance.

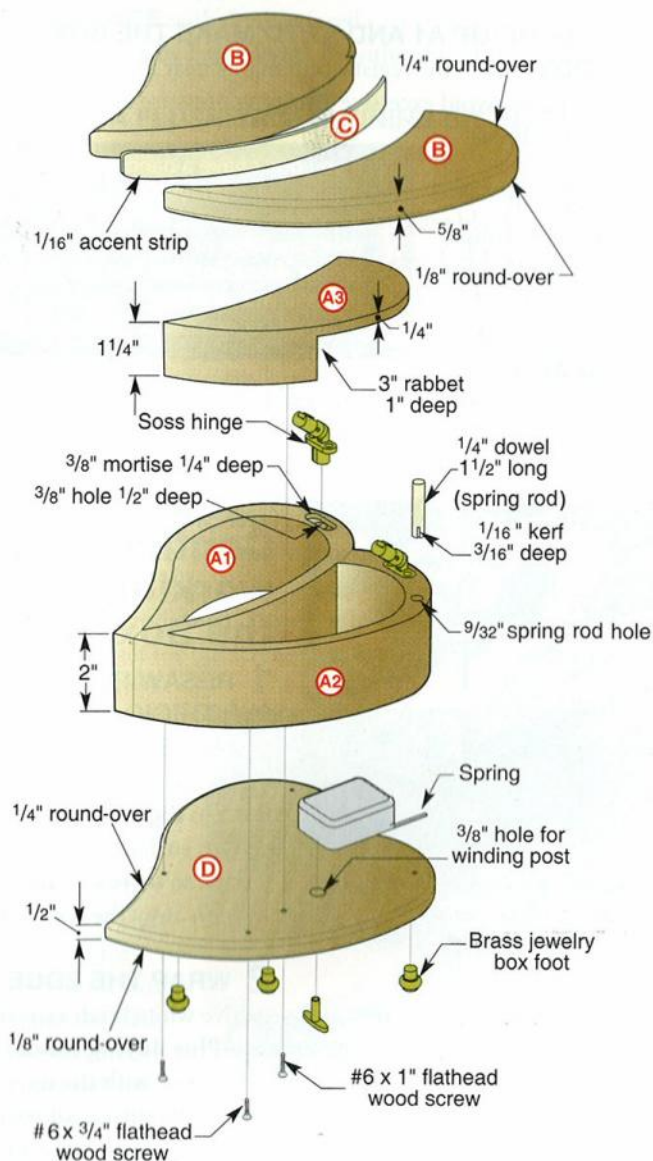


Fig. 1

6 USE A SPINDLE SANDER TO SMOOTH THE EDGES OF PARTS A1, A2, AND A3. For smooth-sanded edges with minimal burning, sweep the workpiece along the spindle and use a light sideways pressure. Use 80 grit to remove saw marks, then switch to 120 for smoother results. Finally, hand-sand with 220 grit.

7 SMOOTH THE INNER LOWER TIP OF PART A1 BY HAND. This area is too tight for the spindle sander, so you may need a file and sandpaper stuck with spray adhesive to a flat stick (such as a paint stirring paddle).

8 CHECK THE FIT OF PARTS A1 AND A2 for a snug glue joint, and sand any correction that's necessary.

9 GLUE-UP A1 AND A2 TO MAKE THE BOX BODY. Match the registration marks near the top of these two parts. Avoid excessive clamping pressure that could bend or even break

the pieces. Instead of straight clamps, you might want to try a band clamp. See the **Tip Alert**

for other clamping suggestions. Let the box body dry thoroughly, then unclamp.

TIP ALERT If you don't have a band clamp, consider using $\frac{1}{4} \times 4$ " rubber bands. Glue-up the pieces on a flat surface, such as your saw table or workbench, to ensure proper alignment. But first put down a piece of waxed paper to make sure the assembly doesn't stick to the surface.



Use a fence on your bandsaw to help stabilize the stock when resawing it.

Continue working on the box body

1 RESAW PART A3 TO $\frac{1}{4}$ " THICK, and bandsaw a rabbet to form a recess for the music box movement. Refer to **Figure 1** and **Photo B**. This surface won't be visible, so there's no need to smooth away the saw marks.

2 WRAP THE EDGE

OF PART A3 with pressure-sensitive white birch veneer edgebanding (see the **Convenience-Plus Buying Guide**). First, run one strip along the inside curve, with the upper edge of the banding a scant $\frac{1}{16}$ " above the surface of part A3. Press the banding down firmly with a small roller or your fingertips. Cut the ends flush to the wood with a utility knife or veneer saw, then run another strip along the outer curve, and trim its ends flush. Test-fit part A3 into

its recess: You're aiming for a smoothly sliding fit. Sand the edgebanding with 150-grit paper as needed. Wrap the paper around a block and sand off the edgebanding above the top face of A3, making it flush.

3 CHUCK A $\frac{9}{32}$ " BIT INTO YOUR DRILL PRESS,

and drill through the box body where shown on the full-sized pattern. You'll also notice dashed lines on the pattern connecting the hole you just drilled with the right-hand cavity in the box body. Chisel out a notch in this channel, as shown in

Photo C, about 1" deep from the bottom of the box body, for the on/off spring wire of the music-box movement.



Chisel a notch on the bottom edge to house the spring wire that turns the music box movement on and off.

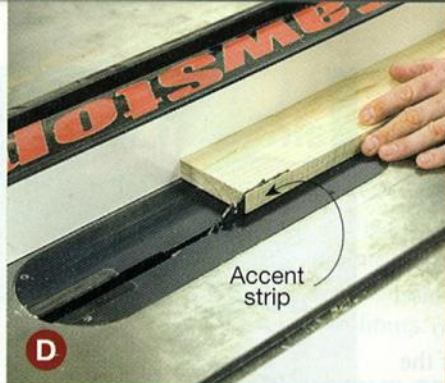
Construct the lid

1 THICKNESS-PLANE A $\frac{5}{8}$ "-THICK BLANK FOR THE LID (B), and rip and crosscut it approximately $8\frac{1}{2}$ " square. Spray-adhere one of the lid/base patterns to the bottom of the blank.

2 BANDSAW THE BLANK INTO TWO PIECES, steering your blade down the center of the twin dashed lines that show the position of the accent strip (C).

3 SAND THE SAWN EDGES SMOOTH using your spindle sander. Check the fit of the edges against each other until they meet without a gap. After you've sanded away the saw marks, clamp one of the pieces to your bench. With spray adhesive, stick a strip of 80-grit sandpaper to the cut edge. Lay the other piece next to it, and rub its edge against the sandpaper to smooth its edge to a mating surface. Keep your strokes fairly short—about an inch or so—and regularly blow away the dust to maintain an aggressive cutting action. Remove the sandpaper to check the fit. If the joint needs further work, adhere the sandpaper to the opposite piece and repeat the process.

4 THICKNESS-PLANE A BLANK $1\frac{1}{16}$ " THICK and at least 12" long for accent strip (C). Ensure that the edges of the blank are parallel to each other, and joint both of them straight and smooth. Set up your table saw to rip the thin strip from the blank as shown in **Photo D**.



Using a 4" wide or wider blank for safe ripping, cut a $\frac{1}{16}$ " strip, letting the piece fall away from the blank at the end of the cut.



With the lid assembly flat, apply the clamping pressure to close the joint and sandwich the accent strip.



With the face of the lid up, and against a stopblock, shave the strip flush with the surface.

5 DRY-ASSEMBLE (NO GLUE) THE ACCENT STRIP (C) between the two halves of the lid (B). Mark the strip's length and cut it. Do one more dry assembly, clamping firmly to make sure that the joint closes cleanly.

6 SPREAD GLUE ON ALL OF THE JOINT SURFACES, and clamp together the lid (B) and accent strip (C) as shown in **Photo E**, aligning the registration marks on the pattern. In addition to sideways pressure, you may also need to clamp the pieces to your workbench to ensure that they cannot slide against each other. Also, make certain that the accent strip doesn't slide upward. Let the assembly rest until the glue sets.

7 FLUSH THE ACCENT STRIP (C) TO THE LID (B). Remove most of the waste with a razor-sharp block plane as shown in **Photo F**, or card scraper, then sand it flush.

8 BANDSAW THE LID ASSEMBLY TO SHAPE, sawing just to the waste side of the line. Don't sand it yet.

Instead, put the lid assembly face down on your workbench (with the pattern facing up). Place the box body face down onto the lid assembly (with the pattern facing down). Check that the lid has

a consistent overhang of approximately $\frac{3}{16}$ " all around the box body. If necessary, pencil any corrections onto the lid assembly, then spindle-sand the edge of the lid. Strip away the lid pattern, referring to the **Tip Alert** for clean-up advice.

Make the base

1 THICKNESS-PLANE A BLANK FOR THE BASE (D) TO $\frac{1}{2}$ " THICK, and rip and crosscut it $8\frac{1}{2}$ " square.

2 JOIN THE LID (B) AND THE BASE BLANK (D) FACE-TO-FACE with double-faced carpet tape. Remove most of the waste by bandsawing to within $\frac{1}{8}$ " of the cutline

3 CHUCK A FLUSH-TRIM RUNNING BIT INTO YOUR TABLE-MOUNTED ROUTER, and rotate the lid/base blank assembly counter-clockwise against the bit to trim away the excess material from the base blank. The bit won't be able to reach into the sharp point of the V to complete the cut, so mark this edge with a pencil.

4 SEPARATE THE LID (B) AND BASE (D). Refer to the **Tip Alert** on page 46 for help. Complete the shaping of the base's edge with a utility knife or chisel, followed by sanding.

5 CUT ALONG THE OUTLINE OF THE REMAINING PATTERN with scissors, and lightly mist it with spray adhesive to adhere it to the bottom of the base (D). Drill all the holes where indicated. The walls of the box body are a fairly small target for the screws that attach the base. Instead of relying strictly on the pattern for the location of the holes, you'll find that it's safer to lay the base on your workbench, then center the box body on it. Now trace the walls of the box body onto the base to make sure that the screws will hit their target. Drill the holes from the top side of the base, but countersink them on the bottom.



Use a router to round over the top edge of the base. A laminate trimmer would be even easier to handle for this task.

TIP ALERT

If the pattern doesn't strip away cleanly, use a cabinet scraper to remove the paper. You can dissolve excess glue with lacquer thinner on a rag. Repeat the wiping several times to lift adhesive residue from the pores of the wood.

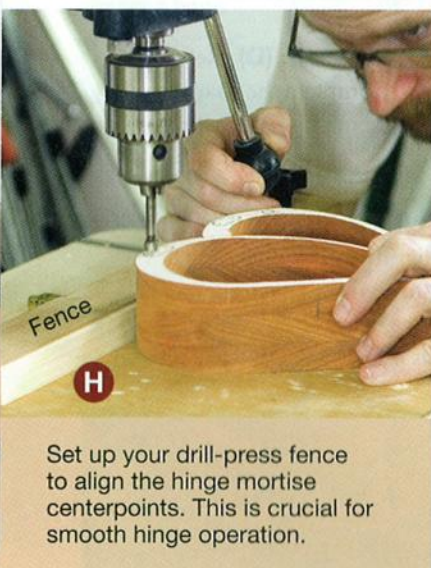
Pieces joined together with double-faced tape can be tough to pry apart. Try tapping a tapered softwood shim between the parts, or drizzle lacquer thinner into the seam to weaken the tape's bond.

or chuck the bit into your table-mounted router. Remove the pattern from the base.

7 ROUT THE TOP EDGE OF THE LID (B) with the $\frac{1}{4}$ " roundover bit. Switch to a $\frac{1}{8}$ " roundover bit, and rout both the lid (B) and base (D). Finish-sand all the pieces with 220-grit sandpaper.

Drill for the hinges

1 CHUCK A $\frac{3}{8}$ " DIAMETER FORSTNER BIT INTO YOUR DRILL PRESS, and set it for a $\frac{1}{4}$ " deep hole for the hinge mortises into the box body (A). See the **Buying Guide** for more on this bit. All of the hinge mortise centerpoints lie along a single line, so you can set up a fence, as shown in



Set up your drill-press fence to align the hinge mortise centerpoints. This is crucial for smooth hinge operation.

Photo H, to help ensure consistent results. Drill only the two outer- and inner-most holes for each hinge at this time.

2 PUT DOWEL CENTERS INTO THE FOUR HOLES. (See the **Buying Guide** for this inexpensive but handy accessory.) The center may not fully seat up to its rim, but don't worry about that. Use a strip of masking tape for each pair of centers to ensure that they won't fall out when you invert the box body.

3 PLACE THE LID (B) FACE DOWN ON YOUR WORKBENCH, and center the inverted box body on it. Lightly tap the box body so that the dowel centers transfer their marks to the lid. Don't overdo the tapping pressure: You want a distinct but small mark as the target for the tip of your drill bit.

4 DRAW A THIN PENCIL LINE CONNECTING EACH PAIR OF MARKS. This will help you accurately position the drill bit for the deeper center holes.

6 ROUT A $\frac{1}{4}$ " ROUNDOVER AROUND THE TOP EDGE OF THE BASE. Use a handheld router as shown in **Photo G**,

5 REMOVE THE DOWEL CENTERS, and drill the $\frac{1}{2}$ " deep center holes into the box body (A). Tap a $\frac{1}{2}$ " chisel straight downward to complete the edge of the hinge mortises in the box body. Test-fit the hinges, and clean up the mortises as shown in **Photo I**.

6 DRILL AND CHISEL THE HINGE MORTISES into the lid (B), using the same procedures you used for the box body. Be very careful with the $\frac{1}{2}$ " depth setting for the center hole because the lid is only $\frac{5}{8}$ " thick.

7 TEMPORARILY INSTALL THE HINGES into the lid, drilling $\frac{7}{64}$ " pilot holes for the supplied screws. Check the action of the hinges.

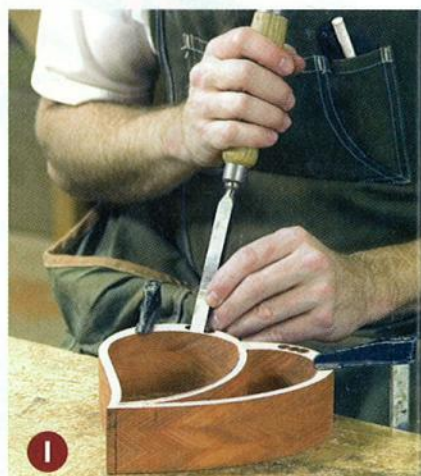
Begin the assembly

1 CENTER THE BOX BODY (A) ONTO THE BASE (D), and clamp these parts together. Using the countersunk shank holes as guides, drill $\frac{7}{64}$ " pilot holes $\frac{3}{8}$ " deep into the box body. Drive the $\#6 \times \frac{3}{4}$ " screws to secure the base.

2 TEST-FIT THE MUSIC BOX MOVEMENT into the box body (A), and trim the spring arm with wire cutters to fit into the channel notch below the spring rod hole. Also ensure that the winding post is centered in the hole in the base (D). Drill $\frac{7}{64}$ " pilot holes, and screw the movement to the base with two $\#4 \times \frac{1}{2}$ " screws.

3 CUT A $\frac{3}{16}$ "-DEEP KERF INTO THE END OF A $\frac{1}{4}$ " DOWEL, where shown in **Figure 1**, using a fine dovetail saw. Fit the dowel into the spring rod hole, engaging the kerf with the spring arm on the music box movement. With the lid open and no downward pressure on the rod, wind the movement and let it play. Slowly press down on the rod until the movement stops completely. Make a pencil mark on the dowel $\frac{1}{16}$ " above the surface of the box body. Cut the dowel to length, and re-insert it to check its action.

4 REMOVE THE HINGES AND MOVEMENT, and inspect the wood pieces, doing any touch-up sanding necessary.



Clean up the hinge mortises with a chisel so that the hinge edge fits closely and the hinge sits flush to the surrounding wood.

Apply the finish

1 APPLY A GENEROUS COAT OF DANISH OIL to all of the wood parts, including inside the cavities of the box body (A). Don't forget to finish the dowel. Let the oil soak in for about two minutes, then wipe off all you can with dry cloths. Let dry for two hours.

2 MAKE A ONE-POUND CUT OF SHELLAC by mixing three fluid ounces of denatured alcohol with two fluid ounces of liquid shellac. (See the **Buying Guide**.) Using a 1" natural-bristle brush, apply three coats of shellac, waiting 30 minutes between coats. Shellac dries fast, so try to flow it onto the surface quickly, with minimum brushing. Let the finish dry overnight.

3 SMOOTH THE SHELLAC BY LIGHTLY SANDING with 400-grit and then 600-grit sandpaper. Use a light touch, and inspect your paper frequently.

4 APPLY A THIN COAT OF WAX, avoiding the surfaces to be flocked. Buff with a soft cloth.

Apply the flocking and reassemble

1 MARK THE LARGE COMPARTMENT ON THE BASE, and remove the base from the box. Unscrew the movement cover (A3). While the directions for the flocking adhesive state that it should be applied to a finished surface, it will stick provided you scuff the marked area and the top face of part A3—both of which receive flocking—with 120-grit sandpaper.

2 FILL THE MINI FLOCK APPLICATOR halfway with black suede flocking. (See the **Buying Guide**)

3 APPLY THE FLOCKING ADHESIVE with a 1" foam brush on the surfaces to be flocked. Immediately wipe up any that strays onto unwanted areas with a dry paper towel.

4 GENTLY PUMP THE HANDLE OF THE MINI FLOCK APPLICATOR as shown in **Photo K** to puff the material onto the adhesive. Let dry overnight.



Apply the flocking to the special colored adhesive using the Mini Flocker Applicator.

5 REMOVE EXCESS FLOCKING by shaking the parts and lightly wiping with a clean brush.

6 REPLACE THE MUSIC BOX MOVEMENT and base. Next, attach part A3 by positioning it, and using the shank hole in the base (D) as a guide to drill a pilot hole. Drive the screw to secure the part. Epoxy the feet into the base, and replace the hinges and dowel. Don't forget to wind the movement before wrapping the box as a gift. 🎁

About Our Builder/Designer

Stephen Johnson operates a workshop studio in Athens, Ohio, specializing in fine furniture and custom woodworking designed to achieve a balance between form and function. View more of his work at SJDfinewoodwork.com.

convenience PLUS

BUYING GUIDE

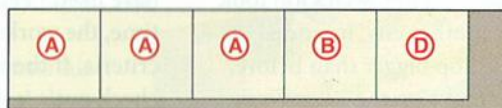
		WOODCRAFT #	PRICE
☐ 1.	Suede Flocking, Black, 3 oz.	16W43	\$10.99
☐ 2.	Suede-Tex Flocking Adhesive, Black, 8 oz	17H31	\$10.99
☐ 3.	Mini Flocker Applicator	127115	\$5.50
☐ 4.	Watco Danish Oil, Natural, 1 pt	123976	\$9.50
☐ 5.	Bulls Eye Amber Shellac, 1 qt	140701	\$11.99
☐ 6.	Clear Briwax, 16 oz	85C25	\$13.99
☐ 7.	Brusso Jewelry Box Feet, Pack of 4	145296	\$11.50
☐ 8.	SOSS Invisible Hinges, 3/8" x 1", 2	03H33	\$19.99/pair
☐ 9.	Denatured Alcohol, 1 qt	37D31	\$5.50
☐ 10.	Dowel Centers, 3/8", Pack of 10	123719	\$6.50
☐ 11.	5/64" Vix Bit for #3 & #4 Screws	16I43	\$13.99
☐ 12.	7/64" Vix Bit for #5 & #6 Screws	16I41	\$11.99
☐ 13.	3/32" Five Star HSS Drill Bit	146673	\$7.99
☐ 14.	#6 x 1" Brass Flathead Wood Screws, 5	16I22	\$10.99/box of 100
☐ 15.	#6 x 3/4" Flathead Wood Screws, 2	16I21	\$7.99/box of 100
☐ 16.	Fastedge Peel & Stick Edge Banding, 15/16" x 8'	146846	\$5.99

Above items available at Woodcraft stores, woodcraft.com or by calling (800) 225-1153.

☐ 17.	18-Note Standard Music Movement with Spring (sold separately-call (423) 639-5850 to order)		\$38.95 (includes spring, shipping)
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Item above available at: giftsonline.net/catalog_Music_Box_Movements.html

Cutting Diagram



1 x 10 x 45" Padauk



1 x 2 x 12" Curly maple

The High-Powered Gift Shop

BY MICHAEL L. MAINE



Peter Howell took a different approach to house hunting than most folks. Instead of looking for a nice house that happened to have space for a workshop, he designed the perfect workshop and then built a house on top.

Every time Peter Howell's job took him to another city, he ended up with a workshop bigger than before. But the last move, to the West Virginia town of Hurricane 12 years ago, didn't provide a suitable offering. "Previously my shops were not as big as I would

have liked," Peter explains. "So this time, the workshop was my primary criteria. If the workshop space didn't check out, we didn't consider buying the house."

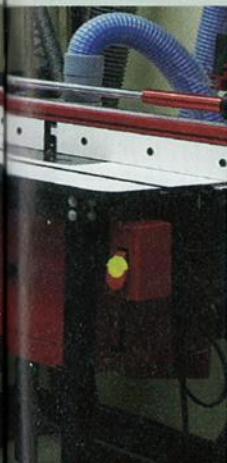
After three or four months of disappointment, Peter decided what

he wanted either didn't exist or wasn't available. "We couldn't find any with a large basement, so I decided to design and build my own home," he says.

The result was a 20 x 58' main workshop in the basement with plenty of room for expansion. Not big enough?



Meeting Peter's needs for safety and precision, his 7.5 hp sliding-table saw has a computer controlled fence, electronically controlled blade height and blade angle with digital readouts, a riving knife, and enhanced dust collection.



"I have learned through my industrial experience that the macho culture of American males is totally wrong. Men are not always tough, and the accident doesn't always happen to the other guy. Safe practices and safety equipment like safety glasses, hearing protection, and dust and toxic fume respirators don't make you a wimp. They show that you care about protecting yourself and your family."

Peter Howell

Gifts for the kids

Shortly after moving into his new home, Peter joined the local woodworking club. Valley Woodworkers of West Virginia has been making toys they donate to the Salvation Army since 1991. The toys are distributed to underprivileged children at Christmastime.

"I got very involved with the toy project and within two years was selected chairman of the toy committee," says Peter. "One of my observations was that it took too long to produce the toys."

With the acquisition of some high-end European machinery (which Peter first saw at an industrial woodworking show that he attended out of pure curiosity), club members cut the production time for each cradle from 6 hours to 2½ hours. In addition, they were able to add rocking horses, alphabet block and wagon sets, and toy wagons. Overall production increased from 100 items annually to 300.

Not only does Peter donate his time, energy, and main workshop to this cause, but he also donated his basement family room—

it's the only place where the new panel saw would fit and still allow the main workshop to function smoothly.

Peter was instantly attracted to the European tools for several reasons. Their bases and cabinets are made of thicker cast iron and steel resulting in less vibration and noise, and they are more precise. Although very pricey, these top-shelf tools have saved thousands of hours of shop time.

"Before, we spent countless hours hand-sanding each part. This not only wasted time, but led to results that were less than uniform," Peter says. "These tools were expensive, but now all we need to do is put the 400 parts through the machine once and that's it. There is nothing left to fix."



Size: Main shop, 58 x 20'; panel saw area, 24 x 17'; spray booth, 13 x 13'; lay down and storage area, 22 x 14'. Shop area also includes office and full bathroom.

Construction: Basement shop with 12"-thick concrete-filled concrete block with rebar. Interior 4 x 2 stud walls with fiberglass insulation. HVAC system is separate from house above. Suspended ceiling with acoustical tile.

Heating and cooling: 80,000 Btu furnace; 3-ton condensing unit.

Lighting: 37 four-tube, 40-watts-per-tube fluorescent lights.

Electrical: Phasemaster rotary phase converter rated at 40-hp (200 amp 220 volt single-phase panel).

Dust collection: Camfil-Farr 10-hp dust collector; four Gold Cap Duraplate cartridges rated at 99.99% removal of 0.5 micron dust with nylon over-bags.

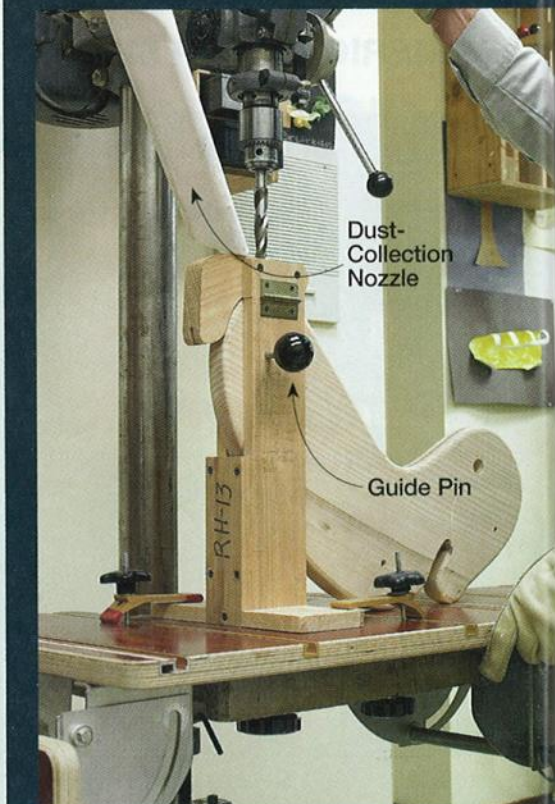
Air compressor: 5-hp, two-stage Quincy, 80-gallon tank.

AMERICA'S TOP SHOPS

Safety first

A chemical engineer with 40 years experience in the chemical and petrochemical industries, Peter has developed an expertise in industrial safety. That expertise carries over to his shop, and during the toy production period he's got more than just his own well-being to think about. From September through November from four to six club members at a time can be involved in some facet of toy production. Keeping them safe is a high priority for Peter, another reason for the European tools—he was impressed with their safety features. For example, they include multiple safety interlocks. "If the machine isn't fully ready to run, it won't turn on. This prevents the machine from turning on when making adjustments," he says. Other features include dust collection that is integral to the design (to protect the machine's circuitry as well as to help clean the air); easy to find emergency stop buttons that activate a brake to stop the blade/cutter; and better designed guards (to discourage the user from removing an inferior guard that gets in the way).

When drilling holes to insert tails into rocking horse bodies, Peter clamps a special jig to the drill press table with the drill guide hole positioned directly below the drill chuck. A $\frac{5}{16}$ "-diameter guide pin penetrates the jig and slides into an alignment hole drilled into the horse body. A $\frac{5}{8}$ " drill bores a 1"-deep hole into the body. Once all horses have been drilled, the bit is replaced with a countersink. The hinged top section of the jig is then opened and a chamfer is cut around the edge of the hole to ease insertion of the tail. A flexible hose connects the dust collection nozzle to a Fein Turbo Vac III. Mounting the nozzle on an articulated arm helps maximize chip collection.



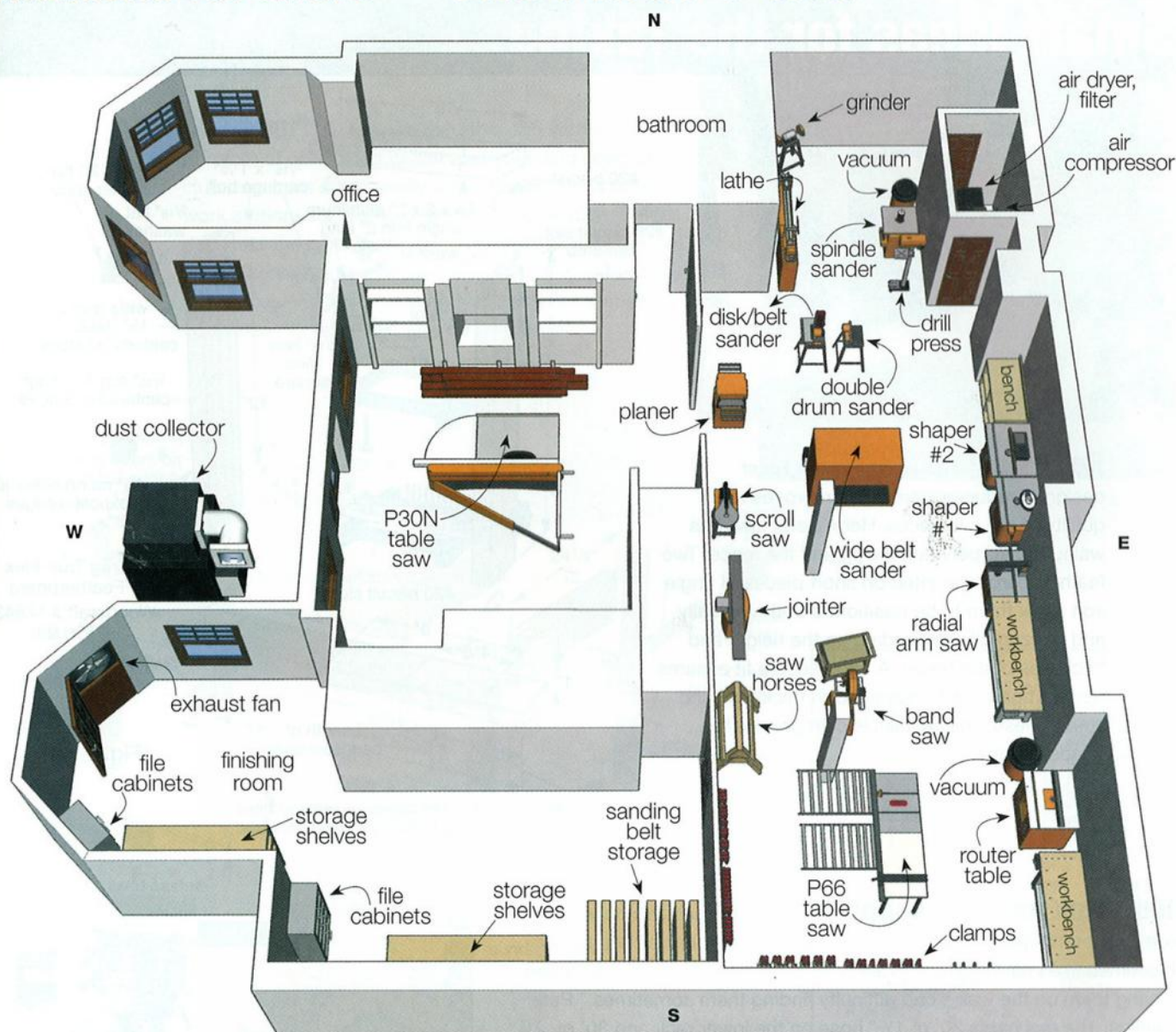
The addition of two shapers to Peter's shop dramatically reduced production time. After running components through the bandsaw to cut them to approximate size, club members can cut project parts to final size by pattern shaping. The components are clamped to a pattern jig (several are shown on the wall in the background) that

rides against a rub collar mounted below the shaper cutter. The cutter cuts the parts to final size and rounds over the edges in one pass. The shaper shown on the right has a Tapoa guard that serves as both a dust-collection hood and a guard to minimize the risk of fingers getting too close to the cutter. And it includes a spindle that will tilt from -5° to 45° ; the left-hand shaper has a tilting spindle as well.



Beyond machinery, Peter has taken additional steps to make his shop safe.

- Depending on the task, all workers must wear hearing protection, safety glasses, and respirators.
- Guards that are on the tools must stay there.
- Jigs and hold downs keep hands away from danger.
- A dust-collection system that doubles recommended air flows.
- Steel duct instead of plastic pipe for dust collection. (A grounding wire along plastic pipe makes the system a capacitor and increases the amount of charge that can be stored.)
- Anytime 100% of wood dust is not collected, Peter wears a P100 NIOSH-approved dust mask.



"I swear by my shapers. They are the most versatile tools in my shop. For those jobs that could be done on either the router table or a shaper, the shaper does the work quicker and better."

When he designed his workshop, Peter had no idea it would be Santa's toy workshop part of the year. Good thing he had extra basement space.

"The one thing that changed was converting the family room to a shop so I could put the sliding panel saw there," he says.

But the original design, which Peter finalized before the house was built, was on the mark anyway. The tools were arranged to

maximize available space. Tools that needed long space to function properly—the radial-arm saw, jointer, planer, and workbenches—were located along walls. Other equipment was located next to support columns to reduce the impact on workflow. As a result, four club members at a time can form a production line vastly increasing the overall volume.

The tool arrangement in the main shop lends itself to high-

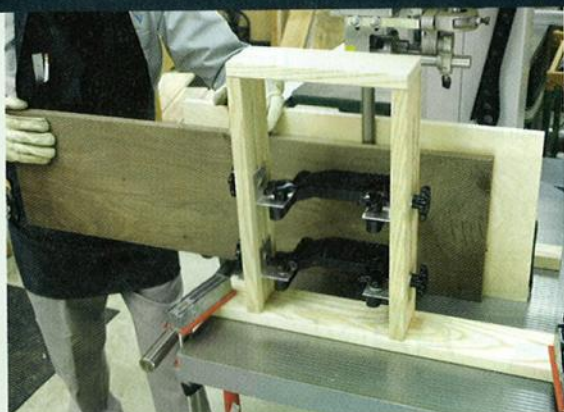
volume production. A workbench and radial-arm saw are aligned to facilitate cutting rough stock to manageable lengths. A few steps through an unobstructed area takes the worker to the jointer. A few steps right takes him to the planer for surfacing, back to the table saw and the adjacent bandsaw. From there, it's just a few steps to the shaper for final sizing, then over to the wide-belt sander and flap sander. Carts Peter designed (see

illustration on page 53) allow for the easy transfer of project parts from station to station.

To keep the work area more spacious, the air compressor sits in a separate room; the dust collector is outside.

Lumber is stored over the four-car attached garage. Peter had it specially designed, including a steel beam and columns, to support 300 lbs. per square foot. Sheet goods are stored with the panel saw.

Smart Ideas for the Taking



Resaw jig: This resaw jig that Peter designed reduces waste and improves the quality of the cut pieces. Here, Peter inserts a walnut board between the jig and the fence. Two featherboards mounted on short pieces of angle iron allow them to be positioned both vertically and horizontally, depending on the height and thickness of the board. A tight, secure fit ensures resawn boards will have uniform thickness and smoothness. The jig itself is clamped to the bandsaw table.

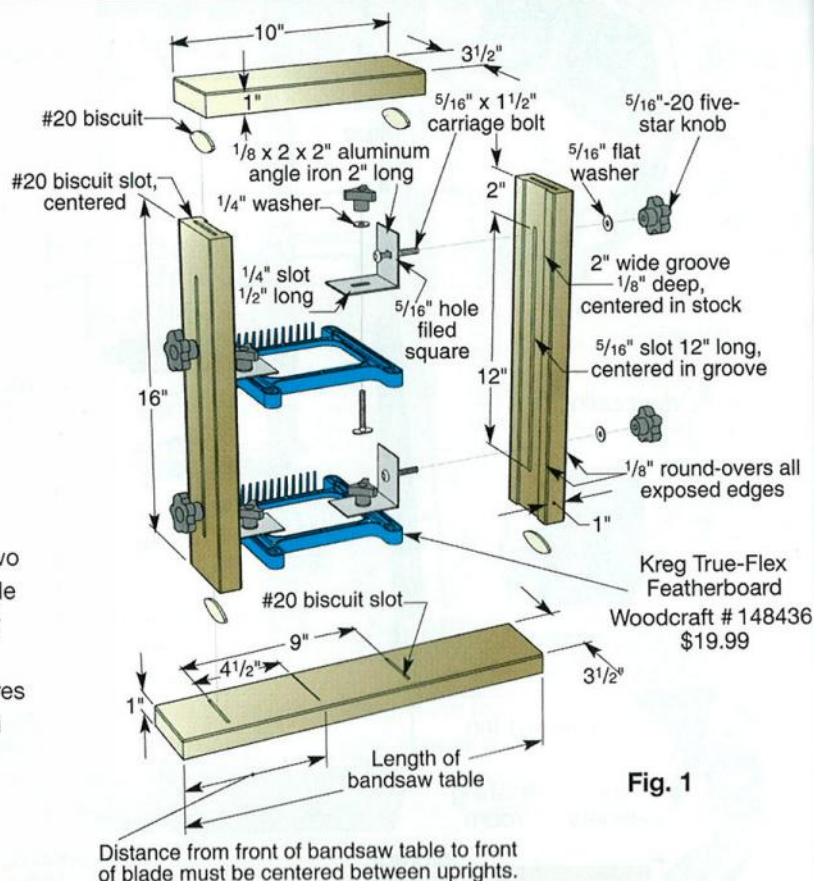
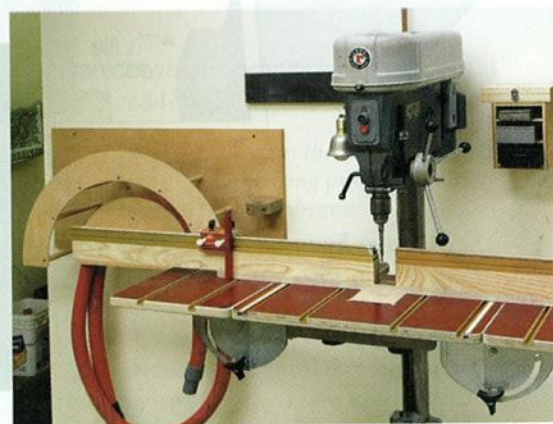
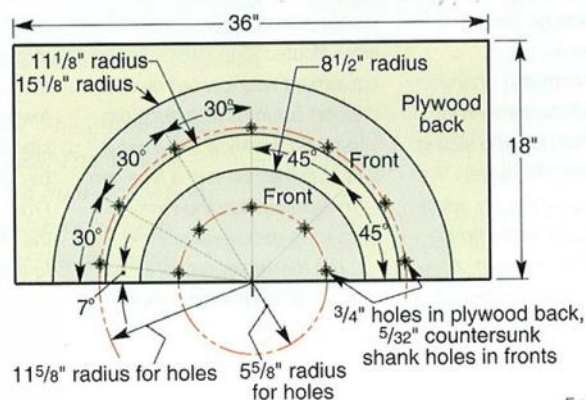
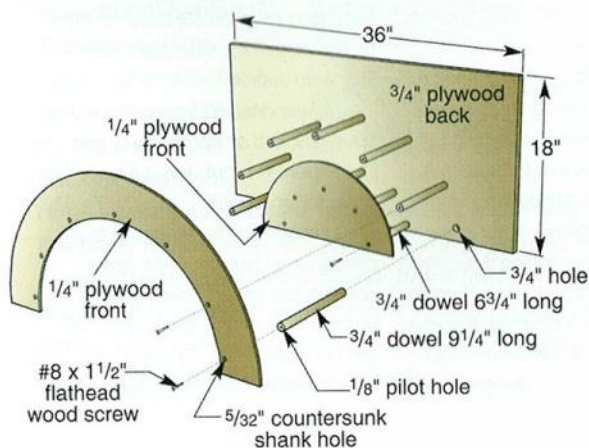


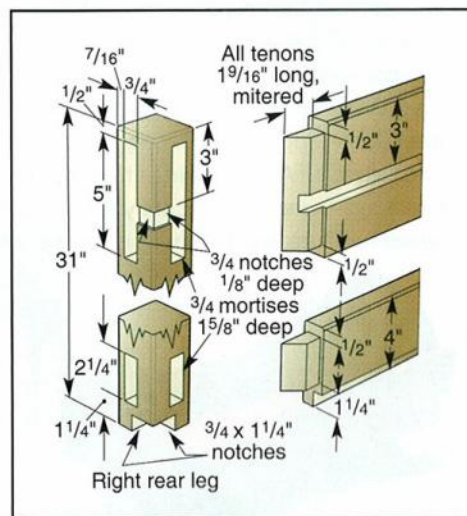
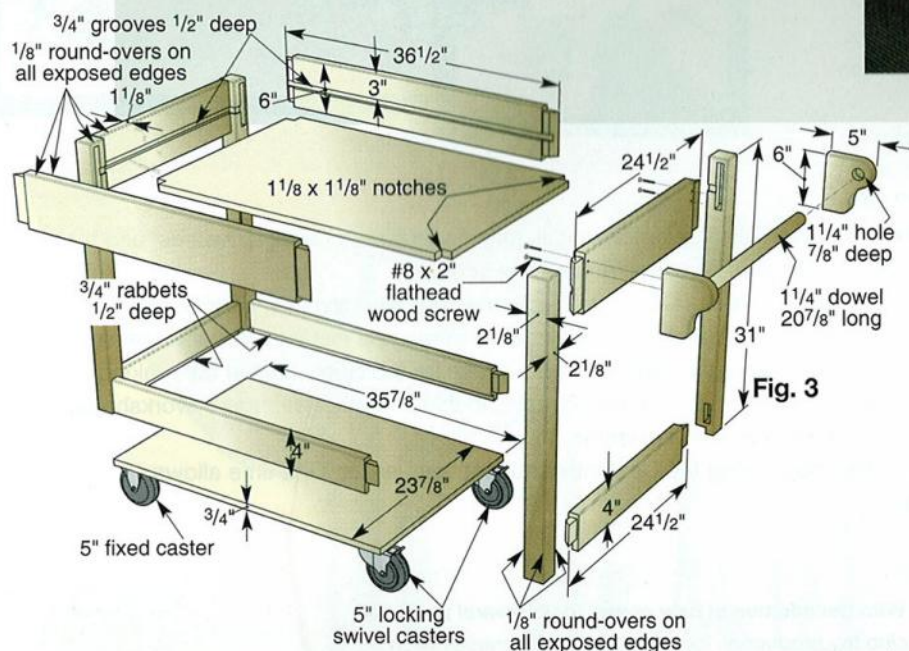
Fig. 1

Hose rack and drill support: Peter designed this hose reel (left side of photo) 15 years ago and it remains a standard in his shop today. "It seemed like I had vacuum hoses lying all over the floor or I was trying to hang them on the wall. I had difficulty finding them sometimes," Peter explains. The reel holds 20' of 1 1/2" hose on the lower rack and 30' of 2 1/2" hose on the upper rack. A collapsible leaf at each end of the drill press table gives Peter the flexibility to easily work on vertical pieces, but when locked into the horizontal position, larger pieces, such as rocking horse bodies or wagon parts, get plenty of support.



4

Shop cart: Peter designed this cart with the express purpose of controlling clutter and speeding production so club members could easily move project parts between work stations for the next machining operation. Before he designed the cart, Peter says, "We had piles of wood and components scattered hither and yon on workbenches and saw tables. We were constantly moving components so we could use the table saw or workbench."



Spray booth: Here's a safe solution. With 300 toys that need finish coats, club members spend a lot of time in Peter's spray booth. Peter inserts a 3/4" plywood panel into the 36" exterior door. The panel holds the 3/4-hp, 24" explosion-proof fan. Four large screened windows in the office are opened to provide clean makeup air while the fan clears fumes and overspray. The booth walls are covered with 4 mil plastic sheeting; a canvas drop cloth protects the floor. The spray gun operator is fitted with a full-face supplied air respirator when working with toxic materials. A cartridge respirator could also be used, Peter says, but the cartridges would have to be replaced frequently.

Inset: a block glued to the plywood panel provides a filler allowing the clamp to hold it securely against the doorstops. "It works well. I've been doing it this way for a long, long time," Peter says.

Peter Howell - *safety engineer and toymaker*

"Making toys for the Salvation Army not only helps underprivileged children but also is a great way for our club members to learn the basics of woodworking and how to safely use tools and machinery."

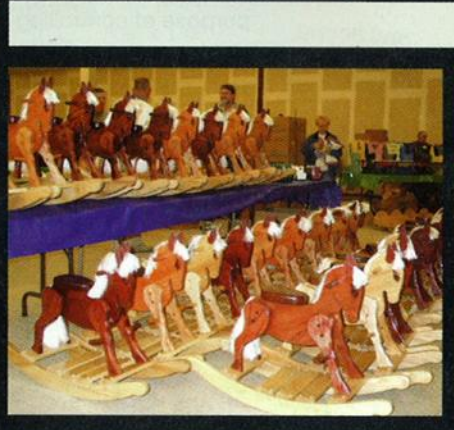
Peter got his introduction to woodworking as a youngster, making wooden boats, planes, and cars under the watchful eye of his grandfather, a master carpenter. His interest never waned, but other than woodshop classes in middle school, working with power tools had to wait until Peter graduated from college, got a job, and had an income.

"I bought a radial-arm saw with my first paycheck," Peter recalls. "In those early years, I used my income tax refund each year to buy another piece of machinery," including the drill press and combination belt/disk sander he uses to this day.

As a chemical engineer, Peter spent 30 years involved in the design, operation, maintenance, and management of chemical plants. For the last 10 years he has been self-employed as a safety consultant to the chemical, petrochemical, refining, pulp and paper industries, and the federal agencies that regulate them. Yet, at age 63, he has no plans to retire any time soon.

Peter joined the Valley Woodworkers of West Virginia Club after moving to the Charleston, West Virginia, area 12 years ago. It was his first experience with a club, but his knowledge of woodworking and workplace safety was instantly valuable. He served as chairman of the club's Toy Committee and offered his basement shop as headquarters for the club's annual toy-making program. From September through November, club members produce over 300 toys, in this and other members' workshops, that the Salvation Army provides to underprivileged children as Christmastime.

Peter says there is significantly less activity in his shop during the December-August "off-season." As time allows, he makes furniture and toys for his family. 🌿



With the addition of new power tools several years ago, club toy production increased from 100 cradles each year to 175 cradles plus alphabet blocks with wagons, rocking horses, and wagons. The club has donated 5,540 toys since 1991. The toys are made from local Appalachian hardwoods such as ash, cherry, walnut, and maple, which the West Virginia Forestry Association provides. A local business, Evans Lumber Company, donates hardwood plywood, and other local businesses donate steel axles, lacquers, and other supplies, which cover about 90% of the total cost. The balance comes from the club's treasury.

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TRUE GRITS

What you need to know about sandpaper for a faster, finer finish

by Joe Hurst-Wajszczuk



"Running through grits" not only means going from coarse to fine, but also matching the abrasive to the job. Before you stockpile any more sandpaper, make sure what you do buy (and apply) is the right stuff.

Despite its importance, sanding may be the most under-appreciated step in the project-building process. Few of us enjoy it, even fewer enjoy talking about it, but no one can deny the contribution it makes to the look (and feel) of a finished project. In most shops, sandpaper does a lot more than just raise sawdust. The right abrasives—in the appropriate grits—can help rub out brush marks and dust nibs from finished surfaces, scrub rust from machines, even sharpen planes and chisels. Add up the cost of a career's worth of disks, belts, sheets, and rolls and you might find the price tag approaching the cost of a cabinet saw. All good reasons to give sandpaper a closer look. This primer can help you finish faster and with better results.

All about abrasives

Although the teeth are significantly smaller, sandpaper is a cutting tool not unlike saw blades and router bits. With each back-and-forth pass of the sanding block or disk rotation,

the abrasive grains work like miniature cutters, shaving off hundreds of chips (called swarf). Understanding the cutting qualities of each abrasive type can help you find the right sandpaper for the job.

Don't let all those colors in the sandpaper section or catalogs throw you. Abrasives boil down into four main categories. From there, manufacturers offer different combinations of backings and bonders to help the abrasive cut longer without clogging or falling off.

SAND SMARTER, NOT HARDER

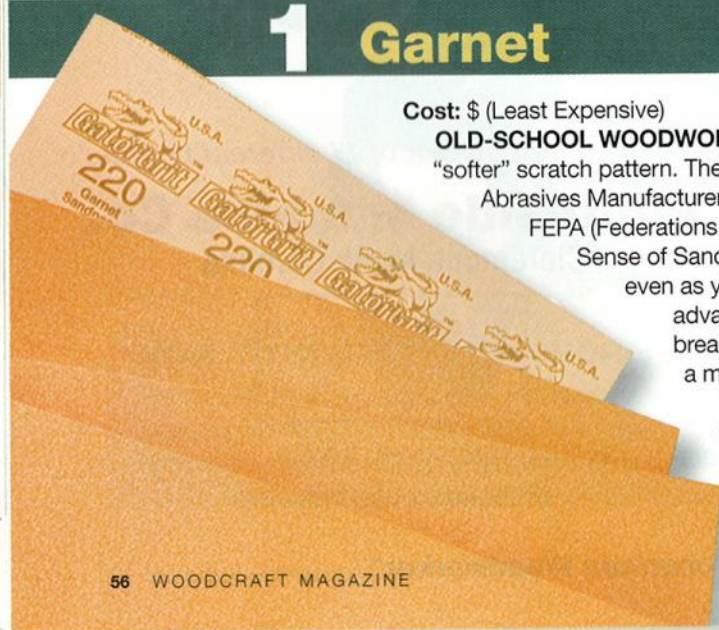
Like the food at an "All-You-Can-Eat, \$3.99" buffet, more sanding isn't necessarily a good thing. You may be able to stop sanding sooner and achieve the same results.

Realize that sanding's primary purpose is erasing mill marks and other surface blemishes. For a film-forming finish, 150 or 180 grit is usually fine enough. For oil, 220 grit will often be fine enough, but for blotch-prone woods such as cherry, you may want to step up to 320 or 400 grit.

1 Garnet

Cost: \$ (Least Expensive)

OLD-SCHOOL WOODWORKERS CLAIM that the naturally occurring mineral produces a "softer" scratch pattern. Their claims may have a few grains of truth. The older CAMI (Coated Abrasives Manufacturer's Institute) grit grading allows a wider particle-size spread than the FEPA (Federation of European Producers of Abrasives) grading system. (See "Making Sense of Sandpaper Scales," page 59.) A few rogue grains can create scratches even as you sand others out. In this case, garnet's relative softness is an advantage. Unlike harder abrasives, the larger grains are more likely to break out before creating coarser scratches. This attribute can help create a more consistent scratch pattern. Garnet crystals are friable, meaning that they fracture in use, exposing additional small, sharp edges. Garnet wears quickly, making it less suitable for heavy sanding or for metal work. In addition, water-soluble hide glue is used to attach the abrasive to the paper. This makes the paper unsuitable for wet-sanding. In humid conditions, the grit can flake off the paper.



2 Aluminum Oxide

Cost: \$-\$\$ (Price varies with quality)

THE DO-IT-ALL ABRASIVE, Al-O is suitable for wood, metal, cured finishes, even stripping off old paint. However, within this category you'll find the widest range of quality and performance. The abrasive used on the least-expensive paper does not fracture easily; instead the grit dulls or simply flakes off. This can lead to an inconsistent scratch pattern.

Better-quality sandpapers employ a more friable abrasive for a longer cutting surface. Higher-quality papers also use better bonding resins to hold the grit onto the paper. This is especially important when machine-sanding. Manufacturers use different ranking systems to differentiate their own products, but to compare brands, you'll need to do your own sanding tests. You can sometimes tell the good from the great abrasives by checking the price tag (better backings and abrasives cost more), but realize that you can spend less for the good stuff if you buy in bulk.

Check your paper before finish-sanding. Some aluminum-oxide sandpapers are designed for wet-sanding; others contain special clog-busting coatings called stearates and are designed to be used dry.



3 Silicon Carbide

Cost: \$\$

SILICONE CARBIDE IS GOOD FOR FINE-SANDING metals, plastics and rubbing-out finishes. Glass-sharp grains cut quickly but are less suitable for heavy-duty sanding or metal grinding as when flattening chisel backs or plane blades. In these cases, the grit will wear quickly or shear off the paper. For serious sanding, look for aluminum oxide or a synthetic abrasive.

Most silicon-carbide sandpapers are matched with waterproof bonders and backings so that they can be used with a sanding lubricant. A few drops of water or oil can help remove the sanding swarf that might otherwise keep the paper from cutting, or caking up and creating unwanted scratches.

TIP ALERT

Stearates keep wood resins and finishes from sticking to and clogging the sandpaper. Any post-sanding stearate residue should not affect waterborne finishes, but to be sure, wipe down sanded surfaces with denatured alcohol.

4 Synthetics

Cost: \$\$ - \$\$\$ (Most Expensive)

INDUSTRIAL-GRADE ABRASIVES SUCH AS ALUMINIA ZIRCONIA AND CERAMIC ALUMINUM are the most

expensive, but make sense in heavy-duty applications. These abrasives are harder and hold up to heat better than ordinary aluminum oxide, an advantage when doing serious power sanding or major metal work, such as cleaning up the sole on a rust-pitted jointer plane. Many also are equipped with stearate coatings to prevent clogging when sanding resinous woods or finishes.

Although these high-tech abrasives work well for power sanding, the extra investment may not always offer a worthwhile return. Low-speed hand-sanding doesn't make use of the abrasive's heat- or abrasion-resistant qualities like a disc or belt. When sanding turnings or curved surfaces, or when wet-sanding a finish, you may still want to use a less-expensive sandpaper and toss the worn-out scraps when you're done.



Special Sandpaper 1: Micro-Mesh

THIS ABRASIVE ISN'T NEW, but Micro-Mesh's special sanding properties and unique grit grading scale deserve extra explanation.

With regular sandpaper, a flat back keeps the abrasive on the same level plane for a more consistent cut. Micro-Mesh solves the scratch problem by going in a completely different direction. The cushioned backing works like a pressure-safety valve, allowing the grit to sink in so that the cutting tips contact the sanding surface at the same level. This grit-backer combination results in a more refined scratch pattern. (Although it's great for polishing, the cushioned backing makes the paper less aggressive. For removing deep scratches, you'll want to switch over to regular sandpaper.)

Additionally, the flexible adhesive used to bond the grit to the backing allows the crystals to rotate instead of shearing off prematurely. Like wet-or-dry paper, Micro-Mesh can be used for wet-sanding, or you simply flush the swarf from the sandpaper at the sink.



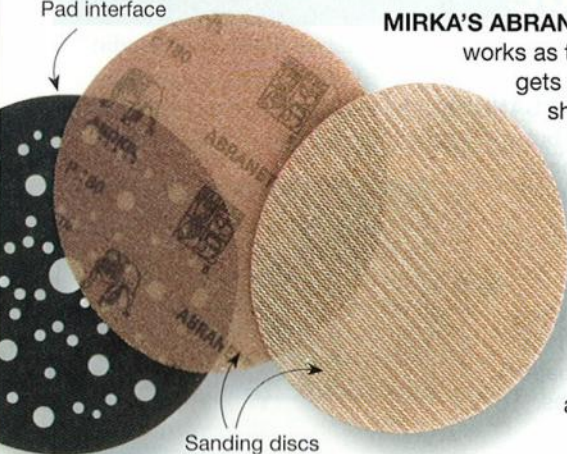
Special Sandpaper 2: Abranet

Pad interface

MIRKA'S ABRANET EMPLOYS A MESH BACKING, similar to drywall sanding screen, which works as the ultimate open coat. As soon as material is cut from the surface, the dust gets sucked through one of the thousands of holes in the mesh and straight into your shop vac. By preventing crud from caking up on the cutting surface, the mesh discs can cut faster and last longer than regular sandpaper. The mesh backing means superior dust extraction to help make a cleaner shop.

Abranet is available in sheets, but to make best use of through-venting mesh, outfit your random orbit sander with the 5" or 6" discs. The discs can stick onto hook-and-loop bases, but you may want to buy a new multi-holed backing pad to take full advantage of the mesh.

The interface pads are also optional, but if you've ever worn out the hooks on a sanding pad and been left with a disc-chucking sander, you'll appreciate the investment. Used between the pad and disc, the interface provides a sacrificial set of hooks, protecting your pricier pad.



Good Backup

The backing material (cloth, paper, or plastic) that the abrasive is adhered to is almost as important as the grit itself. The backing material performs a balancing act between flexibility, stiffness and durability—a combination that works for one type of grit or machine may not perform as well with another. In most cases, you'll find that the sandpaper companies have already done the selection process for you, and have matched the grit to the backing that best suits your needs. However, a little information helps you fine-tune your sandpaper stockpile.

Cloth offers the most flexibility and durability, making it the best choice for belt and disc sanders. Heavy X-weight and lighter J-weight cloth backings are stiff and strong, but not as flat as paper or plastic, making them less suitable when polishing with finer grits.

Although not as long-lived as cloth, paper's versatility makes it suitable for the widest range of grits. Paper comes in five different weights: A, C, D, E, and F. Stiffest E-weight papers deflect the least and offer the fastest cut. Lightest A-weight papers are reserved for the finest grits. Mid-grade C-weight paper is commonly used for random-orbit sanders.

Film backings are more expensive than paper, so you won't find them used in many instances. However, the plastic backing is flatter and stiffer than paper, making it especially well-suited for the finest grits. You'll likely find it used with abrasives designed for sharpening and super-fine finish sanding.

Additionally, manufacturers offer abrasives in cords, pads, and sponges in a variety of different densities and thicknesses. These choices are less about controlling the cutting-depth of the abrasive, and more about getting the grit in contact with the work that needs sanding, nooks and crannies included.

Making Sense of the Sandpaper Scales

THE NUMBER ON THE BACK OF YOUR SANDPAPER doesn't always provide the apples-to-apples comparison. You might think you're "running through the grits," but without understanding the grit-grading systems, you might accidentally use a coarser paper.

Years ago, most of the sandpaper sold in the United States was graded on the CAMI scale. This standard was so commonplace that sandpapers simply listed the grit number on back. In Europe, the FEPA had its own metric grit-grading system. FEPA-graded paper carried a P prefix in front of the grit number.

Today that's not always the case. Now that most manufacturers have switched to the FEPA-grading system, the letter P isn't always stamped on the paper. Although most abrasives now sold use the FEPA grading system, you may still run into problems if you're using up stockpiled sandpaper.

Although similar, the cross-continental grit-grading systems are different enough to create sanding problems, especially when finish sanding. As shown in the scale at right, the grit-ratings line up to 220. From there, the FEPA-grade gets increasingly coarser than the similarly-numbered CAMI paper. For example, the 400-grit CAMI paper is finer than 600-grit FEPA. 🌲



Cleaning Stick

An easy and affordable way to add new life to old belts and discs is with an abrasive cleaning stick (Woodcraft #04W11, \$7.99). Simply press the block against the moving belt or disc to unstick caked-on wood and resin. After a few seconds' worth of contact, your old belt or disc will work almost as good as new.

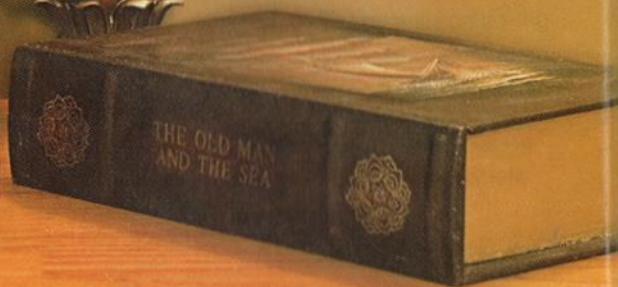
Grit Comparison Chart

Avg. Grit Size in Microns	CAMI (USA)	FEPA (Europe)	Micro-Mesh Regular	Abrasive Pads
195		P80		
192	80			
156		P100		
127	100			
127		P120		
116	120			
97		P150		
93	150			Light Grey or Green
78	180	P180		Light Grey or Green
65		P220		
60	220			Maroon
58		P240		Maroon
53	240	P280		Maroon
46		P320		Maroon
43	280			Maroon
40		P360		
36	320			Grey
35		P400		Grey
32				Grey
30			1500	Grey
25.8		P600		Grey
23	400			Grey
22		P800		
18		P1000		
16	600	P1200		White
15			1800	
14				White
12	800	P1500	2400	White
11				
10.3		P2000		
9	1000		3200	
8.4	1500	P2500	3600	
7.5				
6				
5			4000	
4			6000	
3			8000	
2			12000	



ARTS & CRAFTS SHELF CLOCK

By Robert J. Settich
Project designed and
built by Ben Svec



If you enjoy adding to your bag of woodworking tricks, you'll have a great time building this project. In store for you are lots of tips and techniques that take the mystery out of making perfectly square columns, producing precision chamfers, crafting crisp miters, and much more. You'll build and employ a simple jig

that produces a perfectly square column assembly. But this project isn't just about techniques and jigs. After completing the steps, you'll find yourself with a handsome clock for a shelf, or a sofa or hall table, that showcases the Arts and Crafts style as well as your craftsmanship. Overall size: 6 $\frac{3}{4}$ "d x 12 $\frac{7}{8}$ "w x 18 $\frac{1}{4}$ "h.

Start with the column parts

Note: For safer cutting of thin stock put a zero-clearance throat insert into your table saw. (See **Photo A** and the **Convenience-Plus Buying Guide**.)

TIP ALERT

To make perfectly square stock, cut the thickness and width of the blanks slightly oversized and send them through the thickness planer. Rotate them 90° for a second pass. Do this at each height setting before lowering the head.

1 RIP STOCK FOR THE COLUMNS (A).

and thickness-plane the blanks so they measure ¾" in both thickness and width. Crosscut the blanks ½" longer than shown in the **Cut List**, and set these parts aside.

2 MAKE A BLANK $\frac{3}{4}$ X $2\frac{1}{2}$ X 24", and then resaw it through the center of its thickness to make two strips. Use a featherboard to press the stock to the fence before it reaches the blade, and a pushstick to move the blank past the blade to prevent kickback.

3 THICKNESS-PLANE 1¾" STRIPS to ¼" thick. Referring to the **Cut List**, crosscut the long spacers (B), arch (C), and short spacers (D) to size. Consider using a carrier board to safely plan thin stock. Referring to **Figure 1**, lay out the curve on the arch. To do this, mark the two endpoints and height of the arch on your wood. Spring a thin metal rule or wood strip into a smooth curve to connect the three points, and draw the shape with a pencil. Now, with a bandsaw or scrollsaw, cut just to the waste side of the line, then sand to the line.

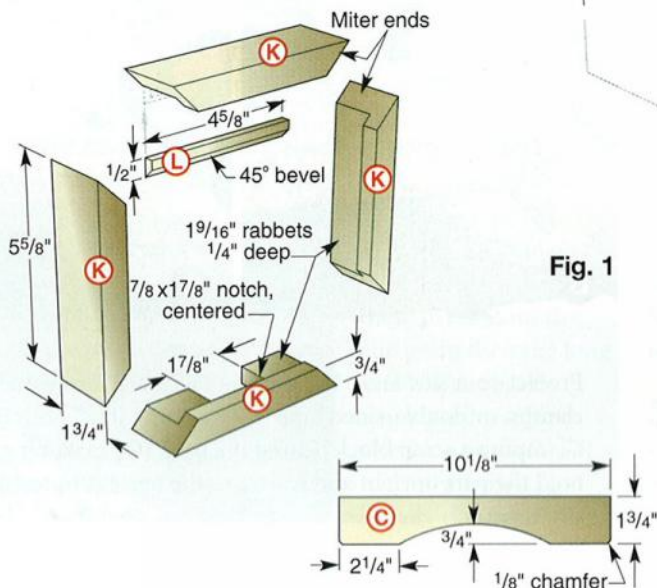
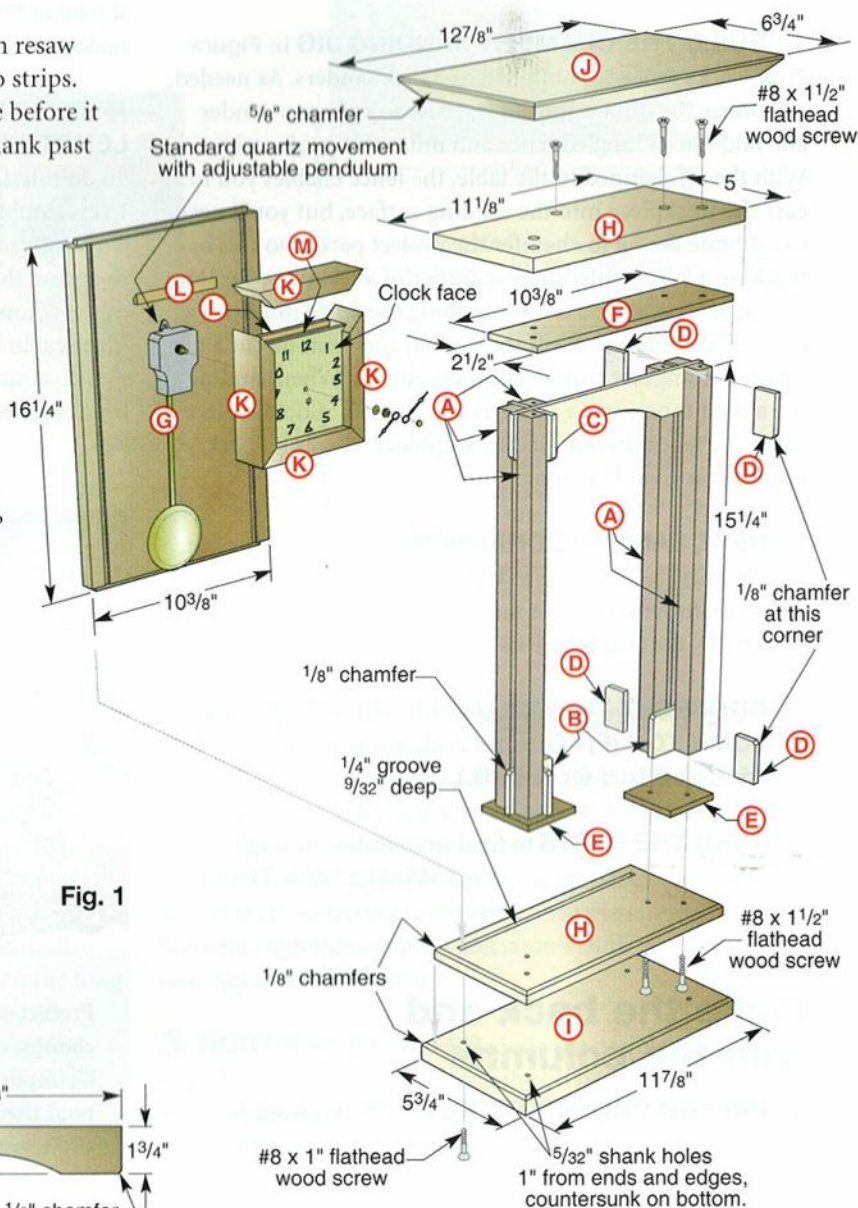


Fig. 1



To install a zero-clearance throat insert, lower the blade fully, then level the insert to your table using the set screws. Slide your rip fence next to the insert and clamp on a scrapwood block as shown. Turn on your saw, and slowly raise the blade about 1/4" higher than the cut you'll make, then lower the blade slightly to reduce both noise and heat-producing friction.



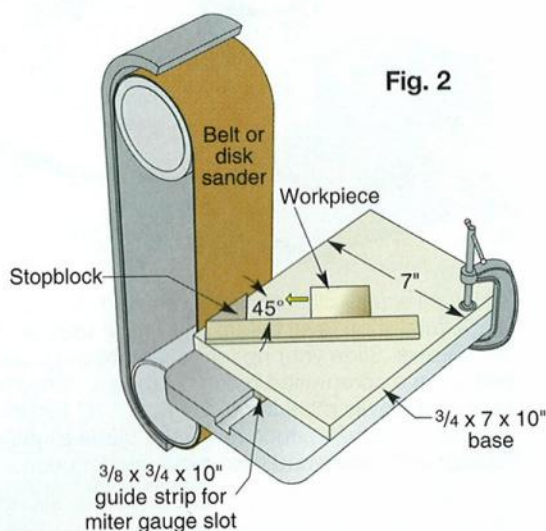


Fig. 2

4 BUILD THE CHAMFER-SANDING JIG in Figure

2. It works well with both belt and disk sanders. As needed, customize the dimensions of the base to suit your sander and add the 45° angled fence and miter slot guide strip. With the jig clamped to the table, the fence enables you to ease the workpiece into the sanding surface, but you'll need to calibrate the jig to chamfer the project parts. Do this by marking a 1/8" chamfer on one corner of a test piece for long spacer B. Now, slide a test piece along the fence until you've cut a 1/8" chamfer. Shut off the sander, and custom-cut and attach a triangular stopblock where shown. When sanding, use a light touch and a 150-grit belt or disc. Slide the piece along the fence until it hits the stopblock, then pull back promptly to avoid burning.

5 NEXT, SAND THE CHAMFERS at two corners of the long spacers (B), referring to **Figure 1**. You also sand chamfers at the two lower corners of the arch (C). Note that the short spacers (D) are chamfered at only one corner.

6 CROSSCUT THE COLUMN BOTTOMS (E) AND COLUMN TOP (F) to size. Set aside any leftover 1/4"-thick material to use later for cleats (L).

7 SAND THE PARTS to final smoothness through 220 grit.

Make the back and trim the columns

1 RIP AND CROSSCUT THE BACK (G) from 3/4" stock to the size shown in the **Cut List**. (If you need to

edge-join two pieces to form part G, make sure the joint is centered for the best look.) Put a 1/4" dado set into your table saw, and adjust the height to cut 1/8" deep. Lock the rip fence 3/4" from the inside edge of the blade, and slice the grooves where shown on **Figure 3**.

TIP ALERT

While dressing up the rear face of the back with grooves may seem like wasted effort, it gives the rear of the clock a finished look when in a visible location.

2 ATTACH A SACRIFICIAL PLYWOOD FACE TO YOUR RIP FENCE, and lock your fence when the edge of the dado cutter just "kisses" the face. Set the depth of cut to just below 1/4" as explained in the **Tip Alert**. Use this setup to cut the tenons at the ends of the back (G) as shown in **Photo B**.

3 TRIM THE ENDS OF THE TENONS using the setup shown in **Photo C**. To do this, raise the dado set 3/8" and make the cut at all four corners of the back (G).

4 CUT THE COLUMNS (A) TO THE EXACT LENGTH OF THE BACK (G) MINUS THE TENONS.

To do this, lay a column on the back as shown in **Photo D**. Use a stopblock with your miter saw to ensure that all of the columns are identical in length. Finish-sand the columns and back.

TIP ALERT

Take time to adjust the saw setup to remove equal amounts from both sides to produce a centered tenon that's 1/4" thick. Raise the blade in tiny increments to sneak up on the thickness.



Protect your saw fence by adding a sacrificial face with screws, clamps, or double-sided tape when cutting the tenons (**Photo B**). Clamping a scrap block behind the back (G) makes it easier to hold the part upright and square to the fence (**Photo C**).



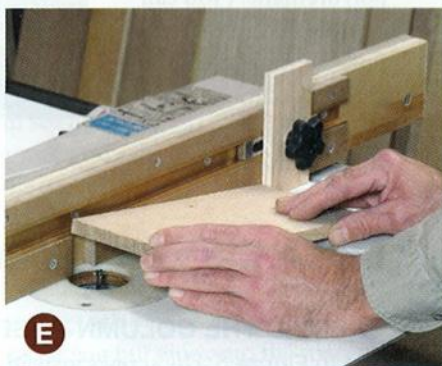
Make the base and top

1 THICKNESS-PLANE STOCK TO 1/2" THICK for the base/top (H). Rip and crosscut these identical parts to size, referring to the Cut List and **Figure 3**.

Mark the length of one column, using the back's shoulder cuts as a reference. Use this length to set up your mitersaw stopblock.

2 ROUT STOPPED GROOVES IN THE BASE/TOP (H) PARTS

using 1/4" straight bit mounted in your router table. Clamp a fence 5/8" behind the bit, then clamp stopblocks to the fence 10 3/8" from each edge of the router bit. Now rout the grooves by placing one end of a base/top (H) against the fence and right-hand stopblock. Lower the left end onto the running bit, as shown in **Photo E**. When you reach the other stopblock, lift the right end of the wood to end the cut. Make the stopped groove in the remaining base/top (H).



With the two stopblocks in place on the fence, carefully lower base/top (H) onto the bit. Move the part forward to the other stopblock and raise the trailing end.

3 DRILL THE SHANK HOLES

through the base/top (H) where shown on **Figure 3**, including

the one centered in the groove. Countersink these holes in the face opposite the groove.

4 NOW CHUCK A 45° CHAMFERING BIT INTO YOUR TABLE-MOUNTED ROUTER,

and rout 1/8" chamfers along the ends and edges of the base/top (H). Refer to the **Tip Alert** for a sequence that helps eliminate chipout. Finish-sand these parts. Rout the end grain then the long grain. This routing sequence doesn't prevent tear-out, but will remove any that has already occurred.

TIP ALERT
When routing the perimeter of a workpiece, machine the ends first because the end grain is more susceptible to chipout than the edge grain. When you rout the edges, that cut will likely remove any chipout from the previous end-grain pass.

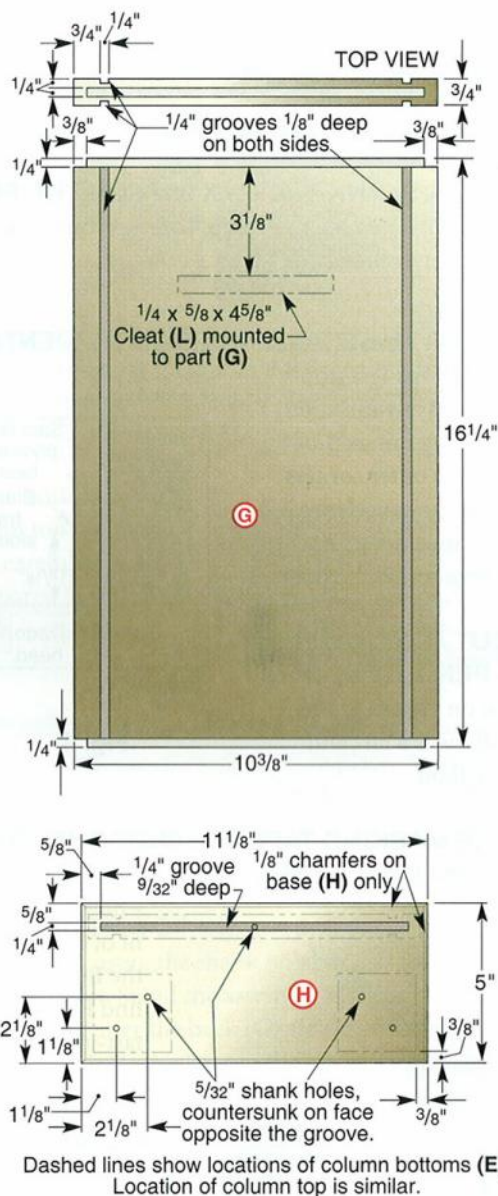


Fig. 3

Make the sub-base and cap

1 RIP AND CROSSCUT THE SUB-BASE (I) AND CAP (J) to size, referring to the Cut List and **Figure 1**.

2 ROUT A 1/8" CHAMFER along the perimeter of the sub-base (I). Referring to **Figure 1**, drill the screw shank holes through the sub-base, and countersink the holes on the face opposite the chamfer.

3 ROUT A 5/8" CHAMFER along the perimeter of the Cap (J). Do this in steps, raising the bit between cuts. Make the final cut a very light one. Finish sand the subbase and cap up to 220 grit.

Make the clock movement housing

1 CUT A BLANK $\frac{3}{4}$ X $1\frac{3}{4}$ X 30" FOR THE FRAME SIDES (K). Referring to **Figure 4**, set up your table saw to cut a rabbet in the blank.

2 MITER THE FRAME SIDES (K) TO IDENTICAL LENGTH, using a stop-block setup at your miter saw. Cutting miters produces crisp outer corners with no tear-out. If any does occur, most of it will be hidden inside the box.

3 CUT A NOTCH FOR THE PENDULUM where shown on **Figure 1**. Using a scrollsaw is a fast and easy method.

4 USE MASKING TAPE TO HINGE THE FRAME SIDES (K) INTO A STRIP. Fold up the strip as shown in

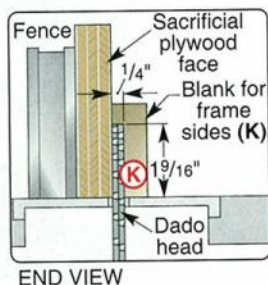


Fig. 4

Photo F to check the fit of the corners. (See the **Buying Guide** to find Ben's favorite fast-grabbing glue.)

5 MAKE THE CLEATS (L) by cutting a $\frac{5}{8}$ x 12" blank from $\frac{1}{4}$ "-thick stock. Bevel one edge with a chamfering bit at your router table, using a push block.

6 GLUE ONE CLEAT (L) TO THE FRAME, position-

ing it under the upper frame side (K), the one opposite the notch. Carefully note the slope of the bevel in **Figure 1**.

7 FASTEN THE OTHER CLEAT (L) TO THE BACK (G) at the location shown in **Figure 3**. In this case, the bevel slopes toward the back. Carefully square and center the cleat, fastening it with glue and a pair of $\frac{5}{8}$ " brads.

Apply the stain to selected parts and finish them now

1 CAREFULLY INSPECT ALL OF THE PARTS, and do any touch-up sanding necessary.

2 MASK GLUE SURFACES on the bottom face of the base (H), top face of the top (H), top face of the sub-base (I) and the bottom face of cap (J). Apply dye or stain to those parts and let dry.

3 APPLY ONE COAT OF SANDING SEALER, let dry, and smooth with 320-grit sandpaper. Remove the dust, and apply one coat of satin polyurethane. (You can apply a second coat of finish, if desired, after the clock is assembled.) You'll stain the column parts after assembly.

TIP ALERT

If you use a water-soluble aniline dye, first lightly apply water to the parts with a foam brush, let dry, and then lightly sand with 220-grit sandpaper before staining. The water raises the wood grain, and the sandpaper shaves off tiny whiskers for a smooth result. For more info about working with dyes, read "Mission Finish Two-Step," WC #20, Dec/Jan '08.

Make the column assemblies

1 BUILD THE COLUMN-ASSEMBLY JIG by referring to **Figure 5**. Use screws instead of nails. That way, if the assembly is too tight to lift out easily, you can unscrew the jig parts to free it. Carefully ensure that the blocks and strips are square to each other to breeze through the assembly.

2 LAY FOUR COLUMNS (A) INTO THE JIG, a pair at each side. Referring to **Photo G**, temporarily insert a pair of short spacers (D) between each pair of columns.

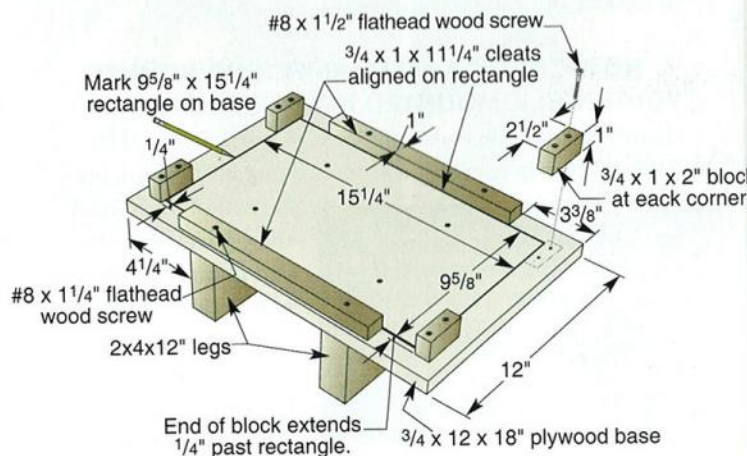
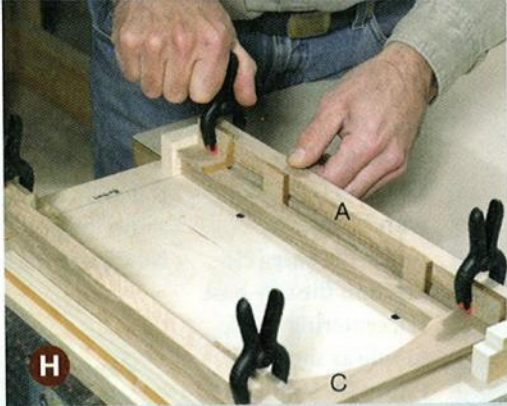
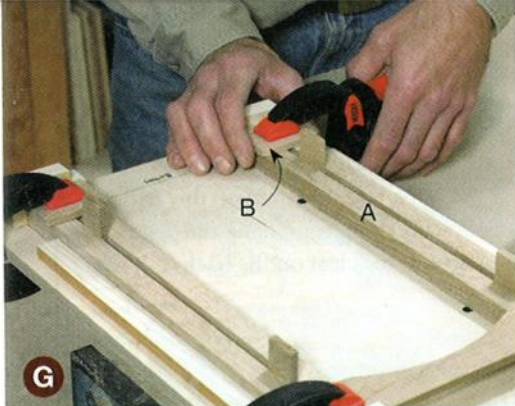


Fig. 5

Wrap the clock housing with masking tape to pull the mitered corners tightly together.



Fit the columns in the jig in **Figure 5**, separating the columns with short spacers in part D (no glue). Glue and clamp in long spacers (B) as shown in **Photo G**. Add arch (C), and then front columns (A) as in **Photo H**. Stand up the assembly and glue in short spacers (D) to complete the column assembly (**Photo I**). Once dry, stain and finish the subassembly. Do not apply finish to surfaces receiving glue later.

3 GLUE AND CLAMP THE LONG SPACERS (B) AT THE BOTTOM of the columns (A) as shown in **Photo G**, aligning the end of each spacer with the ends of the corner blocks of the jig. Make sure that the chamfered corners are oriented correctly, as shown in **Figure 1**. Next, glue and clamp the arch (C) at the top of the column assembly, flushing the ends of this part with the ends of the jig's corner blocks.

4 GLUE AND CLAMP THE FRONT COLUMNS (A) to the assembly. As you can see in **Photo H**, the spacers help align the edges of the columns. Once the glue has dried, remove the assembly from the jig.

5 STAND UP THE COLUMN ASSEMBLY, and glue the short spacers (D) into the remaining slot between the columns as shown in **Photo I**. Apply a tiny dab of glue between the columns to secure this piece. (If you put glue onto the spacer itself, the columns would wipe off the adhesive as you slide it in place, creating a mess.) Stain and finish the assembly.

You're ready for final assembly

1 ELEVATE THE COLUMN ASSEMBLY on a pair of $\frac{3}{8}$ x $1\frac{1}{2}$ x 12" spacers as shown in **Photo J**. Glue and clamp

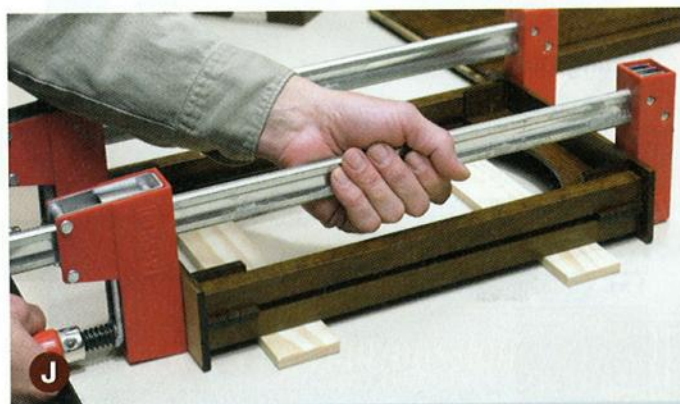
the column bottoms (E) and column top (F) to the assembly, carefully centering these parts. See the **Tip Alert** for a caution about this procedure.

2 POSITION AND CLAMP THE BASE (H), carefully centering it side-to-side, then clamp it in place. As shown in **Photo K**, use the countersunk holes in the base as guides to drill pilot holes into the column assembly. Drive the screws, then unclamp.

3 POSITION THE TOP (H), and drill the pilot holes as you did before, using the shank holes as guides. Do not drive the screws yet. Stand the assembly upright on your workbench, and center the back (G) side-to-side in the groove in the base (H). Make sure the cleat faces the inside of the assembly and is at the top. Fit the top (H) into position, as shown in **Photo L**, guiding the tenon on the back (G) into the groove in the top. Drive the screws through the top into the column assembly. Using the remaining shank hole as a guide, drill a pilot hole into the back and drive a screw. Invert the assembly to repeat at the other end.

TIP ALERT

Parts under clamping pressure can slip out of alignment before the glue sets. Avoid the problem by driving a few brads to immobilize the parts.



Apply glue on the contact surfaces of the ends of the column assembly and add the bottoms (E) and top (F), clamping these pieces in place (**Photo J**). Later, center and clamp the base (H) in place, drill pilot holes into the column assembly, and attach with screws (**Photo K**).



Stand the base/column assembly upright, center the back (G) in the base groove, and center and screw on the top (H) as you did the base. Similarly, using pilot holes, attach top and bottom to the back.

4 LAY THE ASSEMBLY ONTO ITS BACK

with $\frac{3}{8}$ " spacers under the base (H). Position the sub-base (I), centering it side to side as shown in **Photo M**. Using the countersunk shank holes as guides, drill pilot holes. Then glue and screw this part to the assembly. Repeat this process with the top (H).



Center sub-base (I) on the base (H) using $\frac{3}{8}$ " spacers. Drill pilot holes, then glue and screw the two parts together.

5 GLUE AND CLAMP THE CAP

onto the assembly, carefully centering it. Set the assembly aside to dry.

6 FIT THE FACE

(M) into the clock case. (This mail-order part comes with a paper clock face and a centered hole sized to the movement; see the **Buying Guide**.) Attach the

face to the clock movement housing through pilot holes with #2 x $\frac{5}{8}$ " brass roundhead screws.

Cut List	Thickness	Width	Length	Qty.	Mat'l
A* Columns	$\frac{3}{4}$ "	$\frac{3}{4}$ "	15 $\frac{1}{4}$ "	6	QWO
B* Long spacers	$\frac{1}{4}$ "	1 $\frac{3}{4}$ "	2 $\frac{1}{4}$ "	2	QWO
C* Arch	$\frac{1}{4}$ "	1 $\frac{3}{4}$ "	10 $\frac{1}{8}$ "	1	QWO
D* Short spacers	$\frac{1}{4}$ "	1 $\frac{3}{4}$ "	1"	8	QWO
E* Column bottoms	$\frac{1}{4}$ "	2 $\frac{1}{2}$ "	2 $\frac{1}{2}$ "	2	QWO
F* Column top	$\frac{1}{4}$ "	2 $\frac{1}{2}$ "	10 $\frac{3}{8}$ "	1	QWO
G Back	$\frac{3}{4}$ "	10 $\frac{3}{8}$ "	16 $\frac{1}{4}$ "	1	QWO
H Base/Top	$\frac{1}{2}$ "	5"	11 $\frac{1}{8}$ "	2	QWO
I Sub-base	$\frac{3}{4}$ "	5 $\frac{7}{8}$ "	11 $\frac{7}{8}$ "	1	QWO
J Cap	$\frac{3}{4}$ "	6 $\frac{3}{4}$ "	12 $\frac{7}{8}$ "	1	QWO
K* Frame sides	$\frac{3}{4}$ "	1 $\frac{3}{4}$ "	5 $\frac{5}{8}$ "	4	QWO
L* Cleats	$\frac{1}{4}$ "	$\frac{5}{8}$ "	4 $\frac{5}{8}$ "	2	QWO
M** Face	$\frac{1}{4}$ "	4 $\frac{9}{16}$ "	4 $\frac{9}{16}$ "	1	P

*Refer to the instructions before cutting these parts.

See **Buying Guide.

Materials: QWO = Quartersawn white oak; P = Plywood

7 INSTALL THE MOVEMENT into its housing, and add the battery and hands. Use wire cutters to cut the pendulum rod to 8", bend over the hook end, and snip off any excess that shows. Slip on the bob, set the time, and hang the pendulum. Now, hang the housing onto the cleat on the back (G).

About our Builder/Designer

You first saw Ben Svec's work in issue 19 with his flat-panel entertainment center. Ben shifted scale for this project, but the carefully proportioned elements of this clock give it its architectural presence and style. Ben operates Falls Millwork in Kelley, Iowa.

CONVENIENCE-PLUS BUYING GUIDE

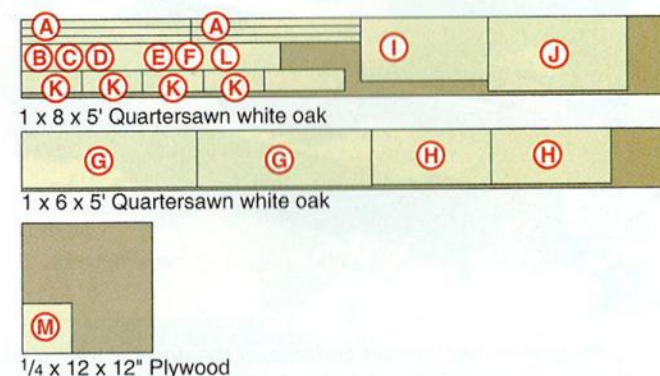
		WOODCRAFT #	PRICE
☐ 1.	Woodcraft 45° Chamfer Router Bit, $\frac{1}{2}$ " Shank	129675	\$24.99
☐ 2.	Whiteside $\frac{1}{4}$ " Upcut Router Bit	03K33	\$19.99
☐ 3.	Super T Instant Adhesive, 2 oz	08X11	\$9.99
☐ 4.	Trans Tint Dye: Dark Mission Brown, 2 oz	128486	\$16.99
☐ 5.	General Finishes Sanding Sealer, Waterborne, Qt	813684	\$15.99
☐ 6.	General Finishes High Performance Waterborne Polyurethane, Qt	85T60	\$24.99
☐ 7.	Leecraft Table Saw Throat Insert	Check with Woodcraft for the insert that fits your table saw.	\$24.50-\$34.50
☐ 8.	Featherboard, twin pack	145502	\$33.50

Above items available at Woodcraft stores, woodcraft.com or by calling (800) 225-1153.

CLOCK PARTS

☐ 9.	Schlabaugh & Sons stock all the components needed to build this clock. Order pendulum and battery movement #200500-A (\$9.95), hands #200703BLK (no charge), and dial #20096D (\$10.95). Call (800) 346-9663 or send check/money order to Schlabaugh & Sons, 720 14th St., Kalona, IA 52247. Add \$5.95 shipping for your total order.
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Cutting Diagram



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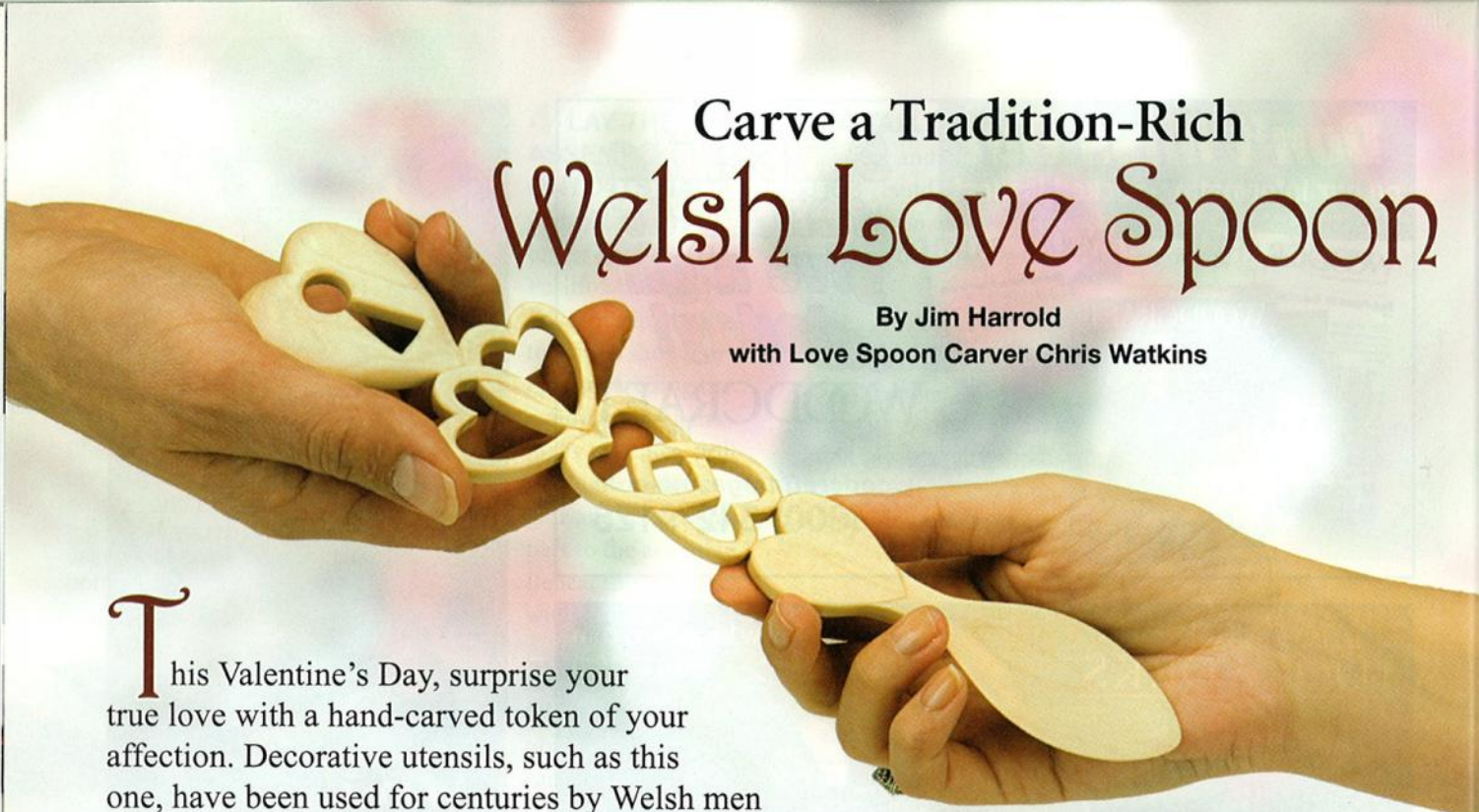


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Carve a Tradition-Rich Welsh Love Spoon

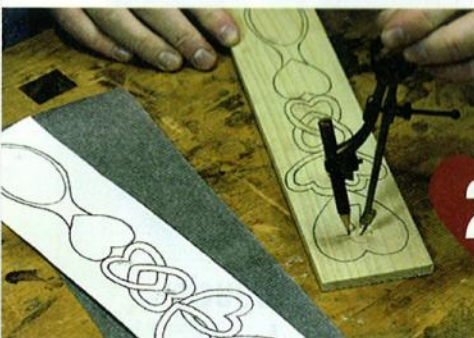
By Jim Harrold

with Love Spoon Carver Chris Watkins



This Valentine's Day, surprise your true love with a hand-carved token of your affection. Decorative utensils, such as this one, have been used for centuries by Welsh men to impress their lady loves. And whether you're a novice or an advanced carver, you'll find the instructions from Welsh spoon carver Chris Watkins easy to follow. (See page 71 for the tools and materials you will need.)

1 **PLANE AND CUT OUT A BLANK (CHRIS USED POPLAR) TO 1/4 X 2 1/2 X 11".** Now, make a photocopy of the spoon pattern on page 71 and copy that pattern onto the blank using transfer paper and pencil. Hold the pattern firmly in place with one hand or with tape. Or you can spray-adhere the pattern to the blank.



2 **REMOVE THE PATTERN AND TRANSFER PAPER, THEN SCRIBE A PERFECT CIRCLE** at the top of the keyhole with a compass.

WORKING IN SMALL STROKES AND WITH THE GRAIN, CARVE THE SPOON BOWL front with a 3/8" #5 Pfeil gouge. Make cuts inside the



inner oval to a center depth of 1/8".

4 **USING AN 18 1/2 TPI (TEETH PER INCH) BLADE, SCROLL-SAW THE BOWL TO SHAPE,** cutting on the pattern and going no farther than the first heart as shown.



5 **SWITCH TO A DETAIL KNIFE AND SHAPE THE GENTLE CONVEX BACK OF THE BOWL.**

Support the fragile neck as shown to prevent breakage. Sand the bowl front and back using a progression of 80-, 100-, and 180-grit sandpapers.



Carving a love spoon step-by-step



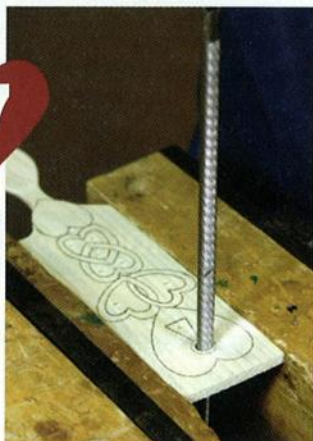
MARK BLADE START HOLES IN THE HEART AND KEYHOLE OPENINGS WITH AN AWL.

Next, chuck in a $\frac{1}{8}$ " bit and drill a hole in each of the heart openings. Change to a $\frac{1}{4}$ " bit and drill through the center of the keyhole circle as shown.

6

PLACE THE BLANK IN A WOODWORKING VISE, drill a hole large enough for the $\frac{3}{8}$ " cabinetmaker's round file, and then remove most of the waste in the keyhole circle with a straight up and down abrasive motion. Make cigarette-sized rolls of sandpaper in grits mentioned earlier and sand the opening to the line.

7



SCROLLSAW OUT THE OPENINGS, going from the top heart and working down to the bowl. Apply downward pressure with your fingers to prevent the workpiece

8



from chattering and breaking. Now, sandwich the faces of the workpiece in the vise and sand the inside edges of the openings, using narrow strips of sandpaper to remove

saw marks. Finally, saw away the waste on the outside of the spoon handle as shown.

MEET THE CARVER



Wearing traditional dress from his native Wales, Chris Watkins demonstrates the folk art of love spoon carving at a festival where he sells his wares.

A native of the Vale of Neath in Wales, **CHRIS WATKINS** emigrated to the United States in 2000, after marrying

his Ohio-born wife. Now a resident of Wooster, Ohio, he tends to his spoon carving business Llwyau Sgwdd (Waterfall Love Spoons), which he began in 2004 with his father. Together they carve about 100 spoons a year, selling them at festivals and at waterfall-lovespoons.com.

RETURN THE WORKPIECE TO THE VISE, or hold

it firmly in one hand, and use a detail sander in grits from 100 to 180 to clean up the outside edges as shown.

9



TIP ALERT

Chris cuts up strips from the sanding belts for his detail sanders to sand the inside edges of the openings.

CREATE THE ILLUSION OF INTERTWINING HEARTS

10

by first making a stop cut at joint locations. To do this, hold a palm gouge vertically and sink

the sharp edge $\frac{1}{16}$ " into the lower heart segment. (See the opening photo on page 68 as a relief guide.)

Now, angle the



palm gouge and shave off the $\frac{1}{16}$ " of wood leading up to the stopped cut as shown above. Consider using the palm gouge and detail knife in combination.



REMOVE THE WASTE BETWEEN THE SIDE-BY-SIDE HEARTS with a chip-carving approach.

11 First, using the detail knife, angle-cut into the area to be recessed from one side, and then slice in from the opposite side at the same angle, lifting out a crescent-shaped sliver

of wood. Similarly remove the triangle of waste between the single and side-by-side hearts, carefully scoring along the contours of the surrounding hearts as shown. Scrollsawing out the waste is another way to go.

SCORE A 1/32" STOPPED CUT around the lower edges of the bottom-most (solid-wood) heart to relieve it from the stem leading into the bowl. Peel off a thin layer of waste coming from the direction of the spoon's bowl.



12



CARVE A ROUND-OVER ON THE UPPER-MOST HEART

to give it a pillow-like appearance with the detail knife. While you are at it, break the front-face edges of the linking hearts and solid lower-most heart.

13

TIP ALERT Chris relied on a non-slip pad on his benchtop to keep the workpiece in place during sanding.

FINISH-SAND THE WORKPIECE, removing all knife and saw marks. Move through 100, 120, 180, and 600 grits. Either fully support the workpiece in the palm of your hand when sanding, or press it firmly on a workbench top as shown.



14

FINALLY, APPLY WAX TO FINISH THE SILKY-SMOOTH WOOD,

using your fingers or a Q-tip to work it into the grain as shown at right. Let it sit for at least 30 minutes, then wipe off the excess with a soft cotton cloth. Continue rubbing the spoon with the rag to achieve a pleasing luster. 🌻

15



ABOUT WELSH LOVE SPOONS

Love spoons were hand-carved by the men of Wales and offered to a lady as a token of affection. Decorated with romantic symbols, they convey the feelings of the carver toward the spoon's recipient. During the early 1900s, the Welsh love spoon tradition experienced a rebirth. Love spoons are now the ideal gift to friends and loved ones worldwide, for weddings, anniversaries, engagements, birthdays, and other special occasions. Any tight-grain wood can be used, such as poplar seen here, walnut, butternut, maple, bass, and cherry.

Chris Walker

COMMON LOVE SPOON SYMBOLS

- Hearts: love
- Bells: wedding or anniversary
- Balls in a cage: captured love, number of children
- Chains: together forever
- Cross: Christian faith
- Diamond: good fortune
- Flowers: love that grows
- Heart-shaped bowl: a life full of happiness
- Horseshoe: good luck
- Key/keyhole: key to my heart
- Twisted stem: two become one



Tools and Materials



CARVING TOOLS AND MATERIALS NEEDED

In addition to a scrollsaw and drill, Chris used the following items shown here and listed in the **Convenience-Plus Buying Guide** below. Inventory what you already have on hand, checking off the boxes in the **Buying Guide** as an aid.

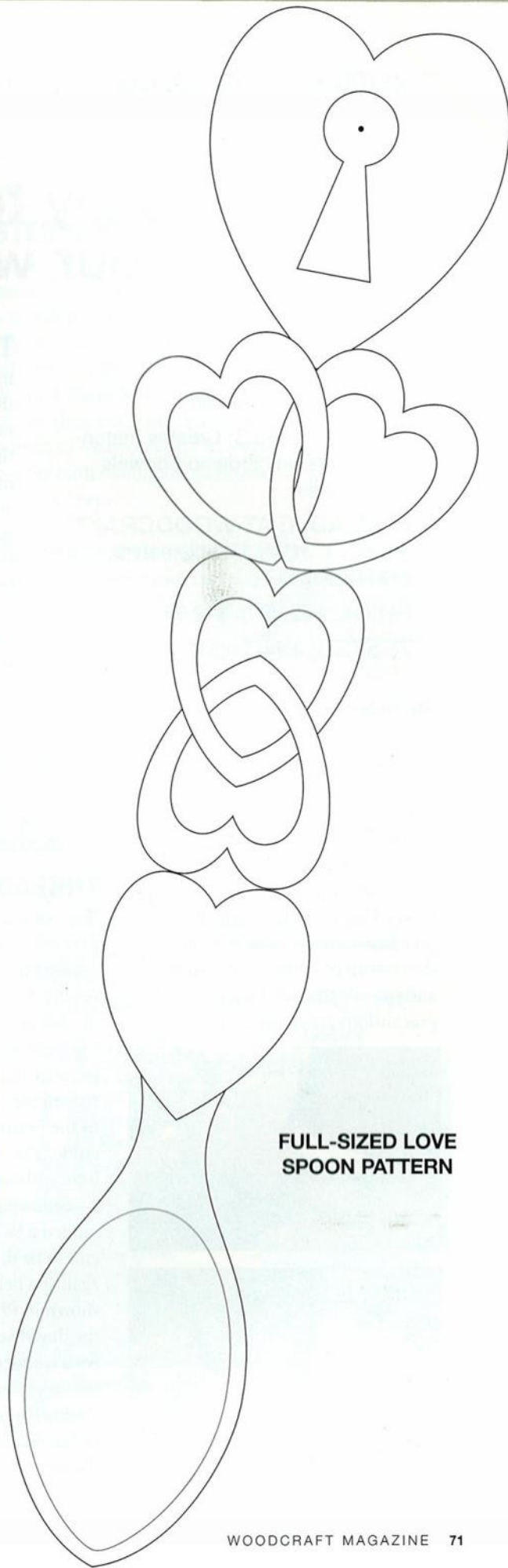
Note: Be sure to see the carving safety story on page 76.

convenience-PLUS

BUYING GUIDE

		WOODCRAFT #	PRICE
☐ 1.	Flexcut Detail Knife	814267	\$18.99
☐ 2.	Pfeil Swiss-Made Gouge, #5, 10mm (3/8")	05E35	\$25.99
☐ 3.	Flexcut Palm Gouge, #3, 3/8"	128307	\$16.99
☐ 4.	Cabinetmaker's Round File, 3/8" dia, 10" long	06B04	\$17.99
☐ 5.	General Pencil Compass/Scriber	13G3A	\$5.99
☐ 6.	Wood Plans Transfer Paper, 18 x 24" sheets, 6/pack	143766	\$8.95
☐ 7.	Sanding Sticks, Standard Kit (4 color coded sticks, 5 belts each in 80, 120, 180, and 240 grits)	123283	\$21.99
☐ 8.	Norton 9 x 11" 3X Sanding Sheets, 80 grit, 3/pack	146358	\$3.99
☐ 9.	Norton All-Purpose Sanding Sheets, 9 x 11", 100 grit	37H13	\$2.25
☐ 10.	Norton All-Purpose Sanding Sheets, 9 x 11", 150 grit	37H12	\$2.25
☐ 11.	Norton 9 x 11" Wet Sand Sheets, 600 grit, 5/pack	85W10	\$4.50
☐ 12.	Clear Briwax, 16 oz	85C25	\$13.99
☐ 13.	Woodcarver's Safety Glove: 142886 extra, extra small, 06164 extra small, 06161 small, 06162 medium, 06163 large	*See description	\$20.50
☐ 14.	Leather Thumb Guard: 16V22 small, 16V23 medium, 16V24 large	*See description	\$3.99

Above items are available at Woodcraft stores, woodcraft.com or by calling (800) 225-1153.



FULL-SIZED LOVE SPOON PATTERN

When it's okay to screw up your wood

THE PRODUCT: Wood Threading Kit

MADE BY: Woodcraft

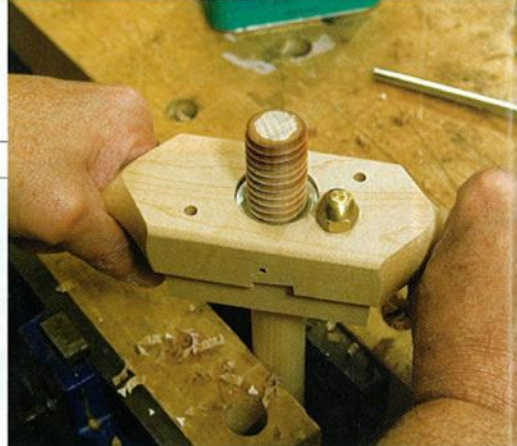
WHAT IT DOES: Creates matching threads on hardwood dowels and in holes.

AVAILABLE AT WOODCRAFT: 1/2", 3/4", 1", 1 1/4", 1 1/2" diameters, #12T13-#12T17

PRICE: \$32.99 to \$42.99

TESTER: John English

THE KIT: The kit includes a threadbox for threading the dowel and a tap to thread holes for the threaded dowel. The hard maple threadbox has a cast and machined aluminum guide and a V-shaped steel cutter held in place by a brass cutter lock. The matching tap comes with a steel T-bar handle that provides torque while threading the pilot hole.



The Wood Threading Kit accommodates 1/2", 3/4", 1", 1 1/4", 1 1/2" hardwood dowels and includes a threadbox (A) for the external threads and a tap with T-bar (B) for carving out internal threads; to drill the starter tapping holes, you'll also need a 3/8", 5/8", 7/8", 1 1/8", 1 3/8" drill bit, respectively. For a blind hole (as opposed to a through-hole tap) pick up an appropriately sized bottom tap (D).

Anybody who collects antiques knows of the myriad of applications that old world woodworkers found for threaded dowels (see "Best Applications" on page 69). The large, coarse threads offer remarkable holding power and an astonishing degree of torque. And now, with the Wood Threading Kit—which offers precision cutters—you can make short work of cutting both inside and outside threads, though a few precautions are in order.

TIP ALERT

Consider soaking your hardwood dowels in water for the cleanest, easiest cutting action.

THREADING SETUP:

For external threading, choose perfectly round and straight-grained hardwood dowels for best results. I took the threadbox to the lumberyard to check that the dowels I bought were a good fit—not too loose or tight. Use the hole in the rectangular hardwood block screwed to the bottom of the threadbox as a guide. The dowel should fit into this hole without any slop.

Following the instructions, I sanded a 1/8" chamfer on the dowel end to be threaded by rotating it against a belt sander at about 45° as shown in **Photo A**. Then I clamped the dowel vertically in a bench vise with wooden jaws, and applied a light coating of linseed oil as a lubricant during threading. (The oil can be reduced later on with mineral spirits, if a different finish will be applied,



and tung oil works, too. See the **Tip Alert**.) More lubricant usually means a smoother cut, but a bigger mess.

THE TEST: Next, I placed the threadbox on the dowel end, applied a little downward pressure during the first turn, and then kept turning in a clockwise direction as shown in the above photo. Once you start, do not back up more than a quarter turn or you could mess up your threads. If the cutter is sharp (and ours came from the factory that way), the whole operation will go very smoothly. I achieved excellent results on the very first try.

TIP ALERT

Never thread end grain; working with face and edge grain yields the strongest and sharpest threads.

THE TAPPING SETUP: To make matching internal threads, I found that the tap is even easier to use. First drill an appropriately sized hole (1/8" smaller in diameter than



the dowel) in the workpiece as shown in **Photo B**. If drilling a through hole, back the workpiece with

scrap to avoid tear-out on the bottom face.

THE TEST: Now, secure the workpiece in a wood vise or elsewhere, slip the T-handle in the tap, and turn the tap clockwise into the hole as shown in **Photo C**. It's important that the tap is vertical to begin with. Unlike the threadbox, reverse the cutting motion constantly to clear chips. A little oil goes a long way here. Bottoming taps, sold separately, are available for cutting threads all the way down to the bottom of a blind hole.

BEST APPLICATIONS: The Wood Threading Kit proves ideal for making antique planes, handscrews, bar clamps, vises, and veneer presses. In the world of home furnishings, you'll see threaded parts used in adjustable candle and music stands, novelty boxes

(having wooden nuts and bolts), tabletop nutcrackers, knockdown furniture, and toys.

TESTER'S TAKE: Though the kit is remarkably easy to use, the cutter will require sharpening with extensive use. I found it fun to use contrasting species such as walnut dowels on maple projects. Two things to keep in mind when threading dowels are to oil the threads before screwing the dowel into the hole (or it will never come out!), and also to thread a long dowel and then cut it off close to the threadbox, so that you don't have to reverse the cutter along the part that you want to keep.

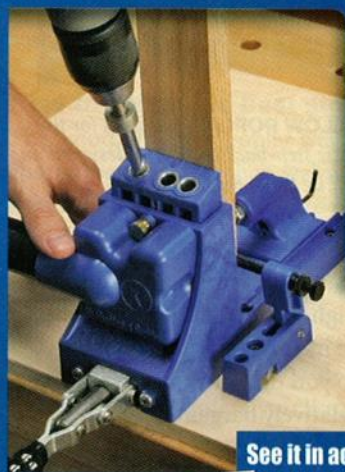


4 out of 5 biscuits

WHAT PRODUCTS PERPLEX YOU?

Have you ever looked in a woodworking catalog or browsed in a woodworking store and encountered a product that baffled you? You eyeball the item, read the promotional information, but still don't see the product's value? Hopefully, with this column in *Woodcraft Magazine*, these days are over. We'll select a few "mystery products" for each issue and show how to use them beyond the manufacturer's take. We'll point out their pluses, problems, practical shop applications, and grade them. If you know of a few such products that need more explanation, email us at Editor@WoodcraftMagazine.com to let us know.

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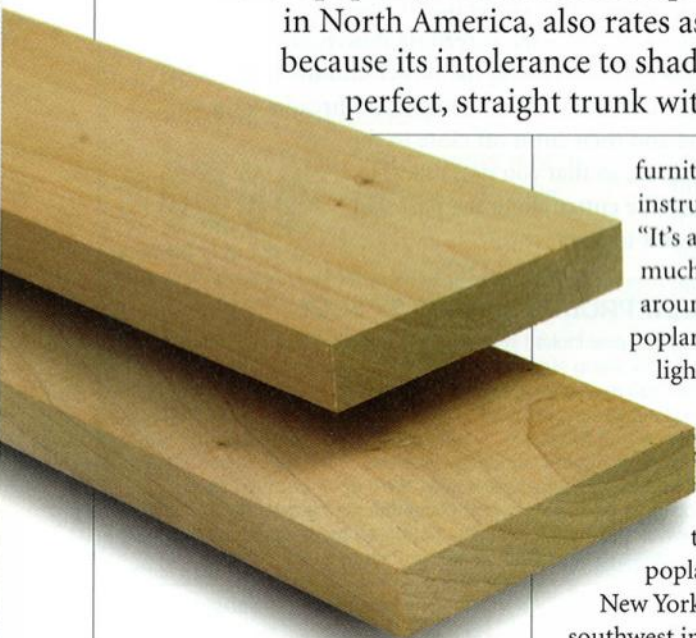
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SPOTLIGHT ON YELLOW POPLAR

By Pete Stephano

Yellow poplar (*Liriodendron tulipifera*, or tulip tree), the tallest hardwood tree in North America, also rates as the most valuable commercial species because its intolerance to shade stifles lower branches and produces a perfect, straight trunk with clear lumber even in small trees.



YOU MAY FIND IT

SURPRISING that yellow poplar has yet another commercial value—as a “honey” tree. The blossoms can annually yield up to eight pounds of nectar, equivalent to about four pounds of delectable honey.

History in woodworking

Old yellow poplar trees develop massive trunks. In fact, pioneers hewed dugout canoes from those big boles. They also learned to make everything from fruit baskets to boxes to trim and household furniture and utensils called “treenware” from the easily worked and versatile wood.

Today, the wood of yellow poplar has a variety of uses no other tree can match. With enough strength for most applications, sufficient stiffness, stability, and wear resistance, it's made into cabinets, doors,

furniture, mouldings, musical instruments, plywood cores (see “It's a fact that...”), toys, and much more. In some locales around the country, yellow poplar even finds its way into light construction and siding.

Where the wood comes from

Principally an eastern tree, you'll find yellow poplar growing from upstate New York to the Carolinas, and southwest into Missouri, with nearly two-thirds of the nation's old growth in the southeastern Appalachians. There, yellow poplar reaches 100'+ heights and 8' diameters, often free of branches for 80' or more. In total, the tree represents more than 11% of commercially available hardwoods in the United States.



YELLOW POPLAR was used for this classic step-back cupboard designed and built by Steve Rigrish.

Yellow Poplar Quick Take

	LOW	MEDIUM	HIGH
COST - relatively inexpensive			
WEIGHT - moderate			
HARDNESS - moderate			
STABILITY - high			
DURABILITY - moderate (indoors, and outdoors w/paint)			
STRENGTH - high			
TOXICITY - none			
TOOL TYPE - hand and power tools			
COMMON USES - utility cabinets and furniture, carvings, doors, millwork, mouldings, shelving, toys, treenware, and turnings			

What you'll pay

Although yellow poplar has high commercial value due to its incredible versatility, to you the consumer, it's relatively bargain priced. A board foot of 4/4 (3/16") FAS lumber costs about \$2.60. Sorry, you won't find plywood available, nor veneer (it all goes for cross-banding).

It's a fact that...

- There may be taller yellow poplars, but you'll discover the overall largest one in Bedford, Virginia. The National Register of Big Trees lists it as the species' champion at only 111' tall, but it boasts a girth of 516"!
- Want to see a bunch of big yellow poplars? Visit the Joyce Kilmer ("I think that I will never see...") Forest in North Carolina. Many tower up to 150' tall.
- In the late 1800s, some of the first plywood made in the United States was three-ply, cross-grained, yellow poplar panels used for one-piece carriage tops.

However, near its source you can expect to find boards in widths up to 20", thicknesses to 3" or more, and lengths to 16'! (Because wood from magnolia, the cucumber tree, is practically identical, it's sometimes mixed in.)

How to select the best stock

The wood of yellow poplar weighs about one-third less than walnut, is only half as strong and hard (see chart), and has similar texture and straight grain. In other words, it's a great wood for working. The

problem? Choosing the right boards—unless you'll paint your project (the wood takes paint very well, by the way). That's because the sapwood has a pleasing creamy color but the heartwood can be a mixed bag.

That part of the wood ranges in color from pale green to tan, many times streaked by deep blue, gray, and purple, all harmless mineral stains that won't go away. To some these streaks prove attractive under a clear finish. But if you like less color variation, specify all sapwood or sort through the boards for uniform tone.

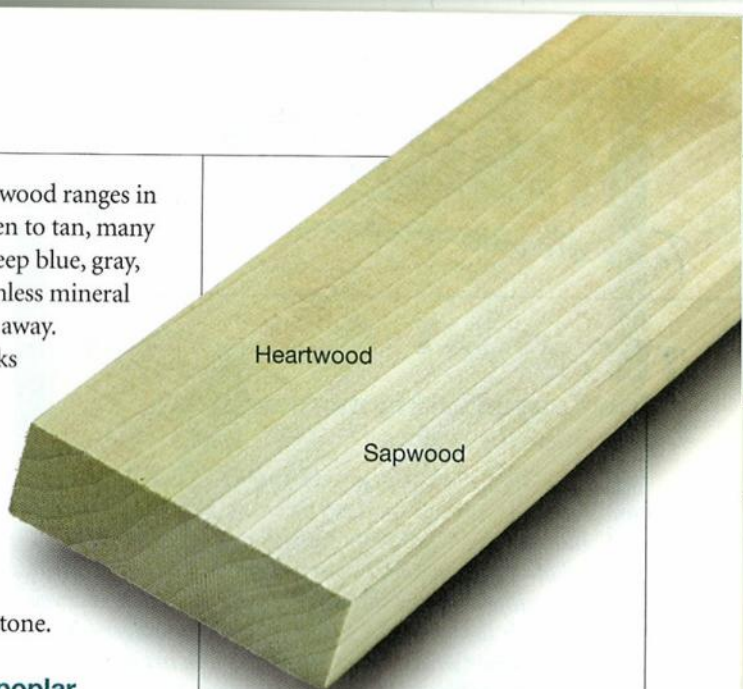
Working yellow poplar in the shop

Looking for wood that's easy to work with hand tools? You'll find it with yellow poplar, but keep the following in mind when using power tools to machine the wood.

- **Ripping and routing.** Yellow poplar does tend to burn, so cut it with sharp blades and bits. Always use a steady feed rate.
- **Assembling.** Hardwoods normally require a slower rpm when drilling and boring. With yellow poplar, speed it up to avoid burning. And frequently clean chips from the hole when using large-diameter bits.

Deciding on the right finish

The only finishing headache you'll have with yellow poplar is staining. It has a yellow-green cast that you can neutralize by adding a toner to the clear coat, but the heartwood color variations make results unpredictable.



Heartwood

Sapwood

So first test any stain on scrapwood similar to your project stock.

There's no doubt that yellow poplar ranks as a top-rate paintable wood. For outdoor use, paint is absolutely necessary.



Unstained
Sapwood
w/clear finish



Cherry-Stained
Sapwood
w/clear finish

Yellow Poplar Finishing Secrets

■ You may find the simple figure of this wood boring unless stained. If you do, use either a pigmented stain or dye. It can be a low-cost look-alike to cherry and mahogany.

■ Sheen makes even

this Plain Jane wood look great, and a film finish (over stain or dye) will give you that. A penetrating finish, such as oil/varnish, won't.

■ For durability plus sheen, apply a water-based polyurethane.

Sand off all fuzz between coats.

■ Water-based paint requires a primer coat followed by light sanding to eliminate raised wood fibers and achieve a smooth finish.

MISHAPS

True stories we can all learn from

THE STORY

From a wandering moment to a woodcarver's woe

In mid-May 2006 I acquired a replica of a 300-year old hand tool that can be best described as a bent-knife with a 24" handle. It is what young Welsh men used to carve the bowl of their love spoons since the 17th century, resting the long handle on their shoulder as they pulled the curved blade through the wood towards them. As a modern-day love spoon carver who demonstrates the folk art at festivals and shows, I was very excited at the prospect of showing people how my ancestors performed their work using this most unusual tool.

At a Celtic Festival in Cincinnati, Ohio, after driving the 3½ hours early that morning in order to set up my booth, I began carving, using my new bent-knife to gouge the bowl of a spoon from butternut. By now the festival was in full swing with loud, raucous Celtic music filling the air. In a nanosecond of inattention from watching the sights (and not the carving) I drove the bent-knife into my bare hand, resulting in a 3½" slice that traveled up and down my thumb. Within 20 minutes—a roll of gauze wrapped around the wound—my wife was driving me to the local emergency room.

Chris Watkins

THE VICTIM

Thirty-two-year old Chris Watkins, whose Welsh love spoon we feature on page 68, took up professional carving four years ago, starting up his business Llwyau Sgwd (Waterfall Love Spoons). Today, working his chisels, gouges, and knives, Chris (and his father) sell decorative spoons through festivals, stores, and waterfall-lovespoons.com.

CASE ANALYSIS

Chris admits he was too tired to safely demonstrate carving after getting up early and then driving and setting up his booth at the festival. Nor did the musical entertainment on stage near his booth help his concentration. Says Chris, "We are frequently warned of the dangers of operating power tools when tired, but my experience suggests that this caution

should also be applied to hand tools, particularly razor sharp ones."

Another mistake he admits making is using a new tool in public without becoming familiar with its quirks. "I had not practiced enough with the bent-knife in the two weeks it had been in my possession to claim to be expert enough to show others how to use it."

One final note: it wasn't until Chris had his accident that he purchased a woodcarver's safety glove and leather thumb guard (see the **Convenience-Plus Buying Guide** on page 71), items that could have saved him a lot of grief.



SHOP-SMART STRATEGIES

As you'd expect, Chris has redoubled his efforts to stay safe while carving. Here's his list of pointers to help you make wood—and not yourself—the object of your well-honed tools.

- Never carve when you're tired or feel rushed.
- Remove yourself from any distractions that could take your mind off your work such as TV, lively conversation, and babysitting kids.
- Wear a carver's glove or leather thumb guard on the hand holding the workpiece. Both help you avoid cutting yourself from a carving tool slip. The thumb guard is particularly effective when drawing the carving knife toward you.
- When possible, place your work on a solid benchtop and non-slip pad for maximum control.
- Turn the workpiece as needed or work the carving tool so the cutting edge cuts with the wood grain. Cutting against the grain could cause you to remove big chunks and cause the knife to slip.
- Always plan to cut away from yourself. When possible, use the thumb of the hand not holding the carving knife to direct the blade and apply cutting pressure.
- Always direct gouges away from you.

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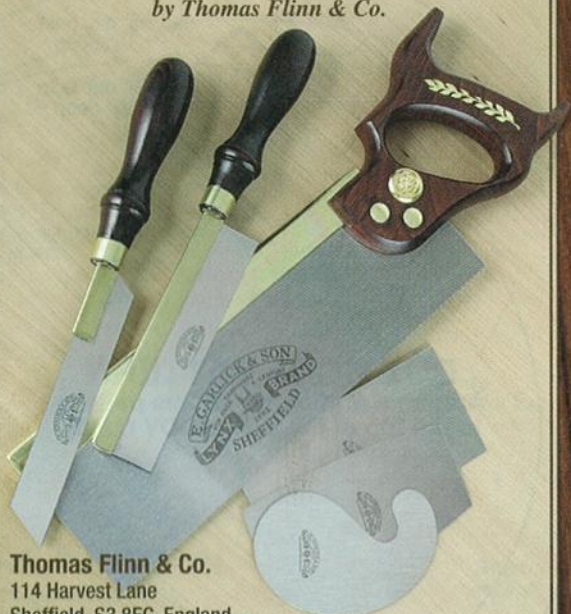
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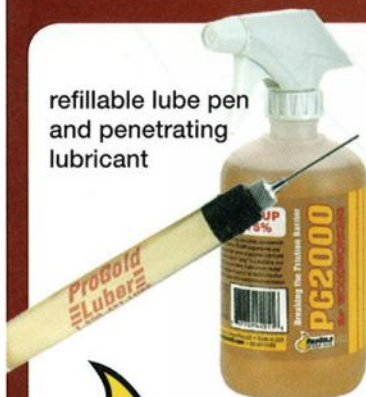
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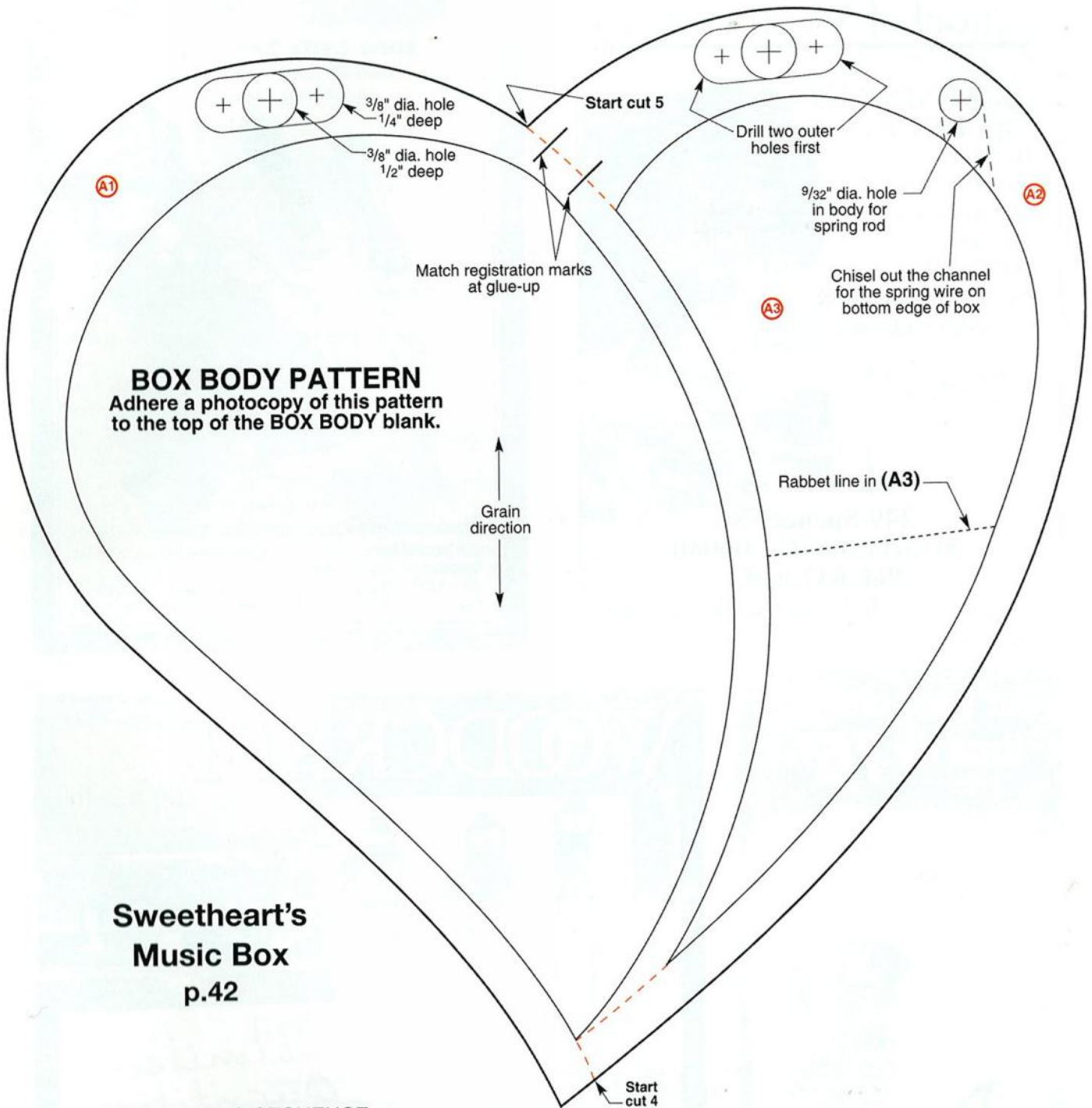
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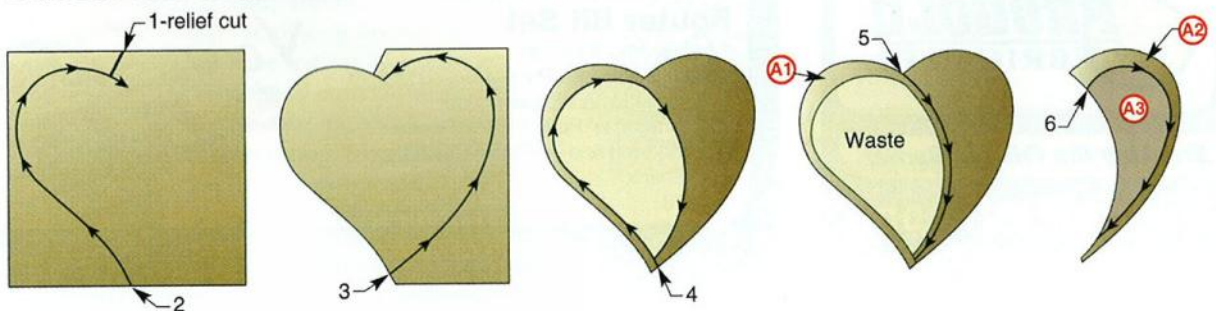
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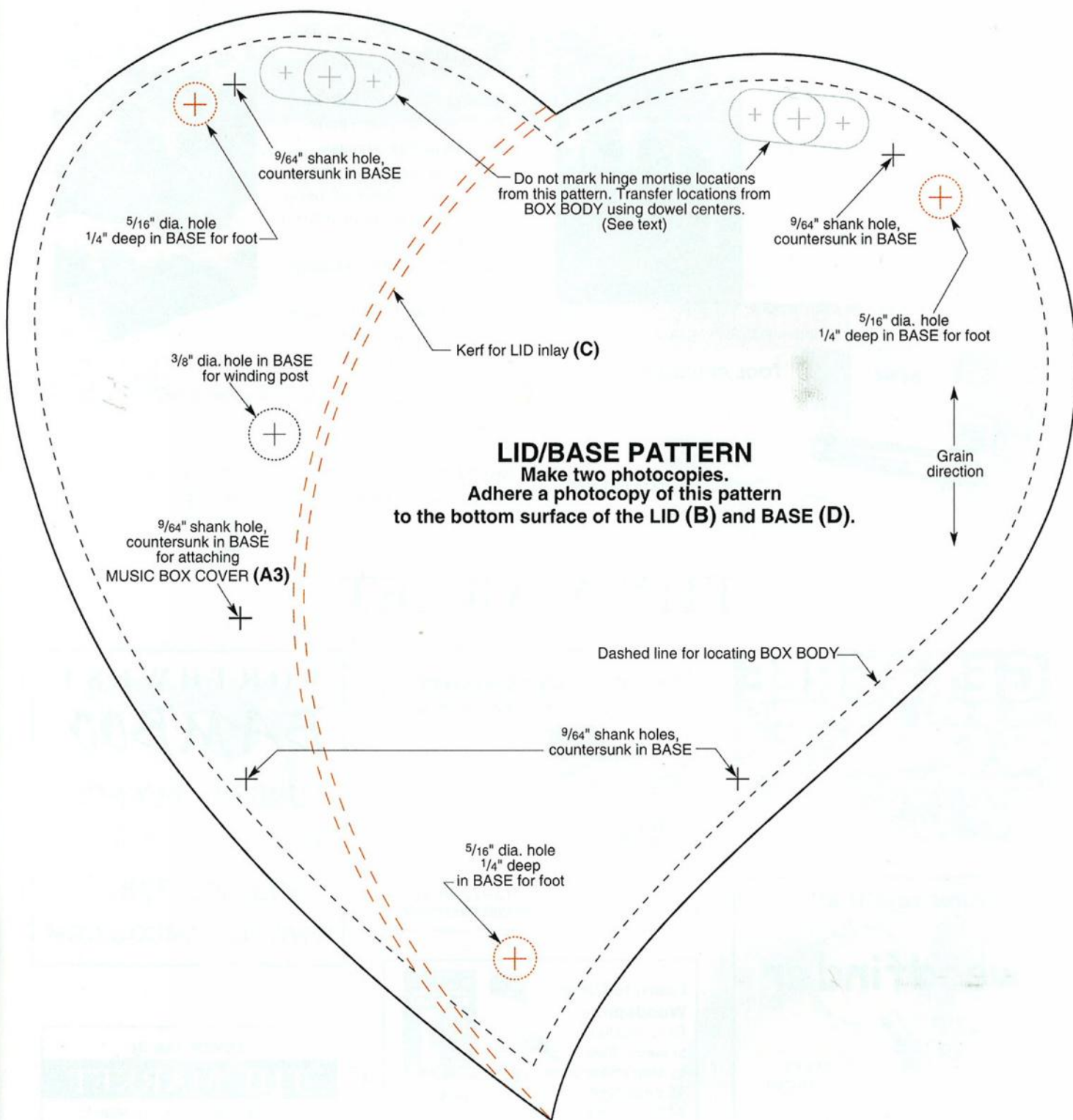
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Sweetheart's Music Box p.42

BOX CUTTING SEQUENCE





NEXT ISSUE'S HIGHLIGHTS

Take a peek at the April/May 08 issue of Woodcraft Magazine.

PROJECTS

FOR YOUR HOME AND YARD

- Garden Arbor and Gate inspired by the Arts and Crafts cottage style of the early 1900s
- Scott Phillips' One-Hour Chair
- Fisherman's Rod and Reel Stand: A clever way to store all your fishing gear in one very dedicated organizer



PRODUCTS



TOOL ROUNDUP

- Workshop Stands and Mobile Bases
- Hot New Tools and Accessories
- Problem-Solving Products

SKILL-BUILDING TECHNIQUES

- Hand-cut Dovetails with Pro Rob Cosman: Learn from the best as Rob shares his secrets for making the venerable dovetail joint, using a technique he's been refining for over 25 years.
- How to Cut Dead-On Dadoes, Grooves and Rabbets
- Best Outdoor Finishes, Glues, Fasteners, and Woods



AMERICA'S TOP SHOPS

Travel to Indian Springs, Alabama, to see how woodworkers Buzz and Nelda Kelly transformed their two-car garage into a comfortable workshop built for two and stocked with great take-away ideas.

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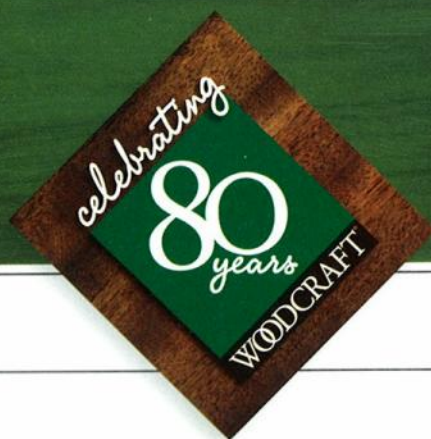
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