NEW TOOLS • MITERED STICKING JOINTS • BEREA COLLEGE

Woodworker's Journal

Vol. 19, No. 6 November December 1995

Governor Winthrop Cabinet

Part 1 **TOOL REVIEW**

9 HVLP Spray Guns

HOLIDAY PROJECTS

- *Spice Cabinet*
- *Leaded Glass Windows*
- *Mahogany Bookcase*
- *Aerial Firetruck*
- *Triangle Desk Clock*
- *Mail Truck Bank*

10% to 20% OFF HOLIDAY COMBO SALE

FREE $45 IN SHARPENING COUPONS

GOOD ON ALL FORREST OR *OTHER MAKES* OF CARBIDE BLADES OR DADO SETS. EXPIRES 12-31-95.
Must mention Woodworker's Journal to receive coupons & extra bonus.

CHOPMASTER FOR SLIDING COMPOUNDS & MITER SAWS

New specs, 5° Neg. Pts. & flat, runs out less than .002 for perfect, tight, smooth, splinter-free miter joints. **TAKE EXTRA 10% – 20% OFF FALL SALE!**

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

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

WOODWORKER I – For TABLE and RADIAL SAW

This trim and crosscut ALL PURPOSE blade gives scratch-free polished cuts on all materials RIP or CROSSCUT UP TO 2".

- ALL 60T AND 3/32" THIN KERF 30° ATB and 5° face hook on 10" diameter and under. 12" and 14" are 20° ATB 1/8"K.
- DOUBLE HARDER and 40% STRONGER carbide.
- THIN KERF: Saves 1/3 wood loss on each cut, radial or table. Feeds easy when used for moderate rip and crosscut on table saw. Reduces "JUMP IN" for better "PULL CONTROL." Practically eliminates bottom splinter on RADIAL CROSSCUT.
- Totally stops ALL bottom and top splintet on ply veneers in push-cut mode on RADIAL.
- Our STIFFENER STRONGLY RECOMMENDED AGAINST outside blade for best cuts. Made and serviced in U.S.A. for your benefit.

	LIST	SALE
14"x60Tx1" 1/8"K	$224	$159
12"x60Tx1" or 5/8" 1/8"K	$198	$139
10"x60Tx5/8" 3/32"K	$162	$129
9"x60Tx5/8" 3/32"K	$156	$119
8"x60Tx5/8" 3/32"K	$150	$109
NEW!		
8-1/4"x60Tx5/8" 3/32"K	$150	$109
7-1/4"x60Tx5/8" 3/32"K	$150	$109

RYOBI RA200
SEARS TS200
MAKITA 5008 NBA
HITACHI PSM8
PORTER CABLE 368-1

SPECIAL FALL SALE EXTRA 10%-20% OFF

BUY 1 BLADE OR DADO AT 10% OFF SALE PRICE
2ND BLADE 20% OFF (EQUAL OR LESSER VALUE)
15% OFF DADO AS SECOND CHOICE.

WOODWORKER II

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

- DOUBLE HARD and 40% STRONGER C-4 CARBIDE
- Ends blade changing
- Ends scratchy saw cuts
- Ends second-step finishing
- Ends cutting 1/16" oversize to allow for RESURFACING
- **BUY AND SHARPEN 1 BLADE INSTEAD OF 3**

5/8" holes, boring thru 1-1/4" add $7.50. Larger at Tim[illegible] Basis —Shipping $4.50

WOODWORKER II	LIST	SALE	10%	20%
14"X40TX1"	$215	$149	$134	$119
14"X30TX1"	$195	$139	$125	$111
12"X40TX1"	$183	$129	$116	$103
12"X30TX1"	$162	$119	$107	$ 95
10"X40TX1/8" or 3/32"	$156	$119	$107	$ 95
30T 1/8" or 3/32"	$135	$ 99	$ 89	$ 79
9"X40T	$146	$109	$ 98	$ 87
30T	$125	$ 99	$ 89	$ 79
*8-1/4"X40TX 3/32"	$136	$ 99	$ 89	$ 79
8"X40T 3/32"	$136	$ 99	$ 89	$ 79
30T	$115	$ 89	$ 80	$ 71
7-1/4"X30T 3/32"	$112	$ 69	$ 62	$ 55
**6"x40T 3/32"	$136	$ 89	$ 80	$ 71

*NEW for Sears & Makita Table Saws **New For Saw Boss

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

BUY OUR BEST SELLER 10" X 40T FOR ONLY $119 PLUS EXTRA 10%–20% OFF FOR FALL SALE!

RECEIVE WITH EVERY FORREST BLADE OR DADO LISTED, 9 SHARPENING COUPONS WORTH $5.00 EACH!

ONLY **$62 or $50** NET COST TO YOU AFTER USING SHARPENING COUPONS

Outperformed 36 other premium blades, both foreign and domestic!
WOOD® Magazine test, Sept. '93, pg. 45

TRY A FORREST CARBIDE BLADE TODAY!

NEW DELUXE DADO-KING!

FROM THE LEADER—20 yrs. IN DADO TECHNOLOGY!

"No tearout on all five woods tested"
(INCLUDES MELAMINE)
Fine Woodworking J/A '91, page 51
"Best Value" WOOD Magazine, Oct. '91, pg. 62,63

- **NEW 3/32" CHIPPER**
  - allows twice as many groove widths to match thin plywood
- **FREE SHIMS INCLUDED**
- **NO SPLINTERING**
  - when cross-cutting oak, ply-veneers, and melamine
- **PERFECT FLAT BOTTOM GROOVES**
  - not staggered steps or round-bottoms like a wobble-dado leaves
- **CUTS IN ALL DIRECTIONS**
  - rip, cross-cut, miter any depth
- **CUTS ALL SIZED GROOVES**
  - 1/8" through 29/32" in 1/32" increments
- **SUPER-HARD CARBIDE**
  - gives up to 300% longer life, especially good on plywoods and abrasive particle boards

Dado *FOR AS LOW AS* ***$184*** *(NET COST AFTER USING SHARPENING COUPONS)*

Here is why this great Dado Head has no equal!

C-4 Carbide Tips — 24 on each saw blade — twice as many as most competitors!

C-4 Carbide Tips — 4 on each chipper with special negative face hooks.

	LIST	SALE	10%	15%
6" D. 5/8" Bore **NEW**	$299	$269	$242	$229
8" D. 5/8" Bore	$321	$289	$260	$245
10" D. 5/8" & 1" Bore	$389	$349	$314	$297
12" D. 1" Bore	$499	$449	$404	$382

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

DURALINE HI-A/T FOR TABLE & RADIAL SAWS ALL FLAT FACE

5/8" HOLES. Boring up to 1-1/4" $7.50 extra. Larger holes–time basis. Shipping $4.50.

Faster feed rates & absolute splinter control. Stops splintering on OAK/BIRCH PLY VENEERS & MELAMINE.

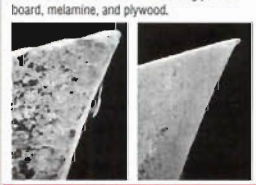
SIZES AVAILABLE	LIST	SALE
7-1/4"x60Tx3/32" K	$149	$129
8"x80Tx1/8" & 3/32" K	$202	$169
9"x80Tx1/8" & 3/32" K	$207	$179
10"x80Tx1/8" & 3/32" K	$207	$159
12"x80Tx1-1/8"K	$212	$181
12"x100Tx1-1/8"K	$253	$215
14"x80Tx1"	$232	$197
14"x100Tx1"	$266	$226
16"x80Tx1"	$262	$223
16"x100Tx1"	$294	$243

Above 1" bore standard.

SPECIAL FALL SALE EXTRA 10%-20% OFF

CARBIDE IS THE HARDEST OF THE C-4 GRADES AND 40% STRONGER, NOT WEAKER!
FOR 50% TO 300% LONGER LIFE.

Standard C-2 Carbide (below, left) and FORREST **still sharp** Oxidation and Corrosion Resistant Sub-Micron C-4 Carbide (below, right). Each shown after cutting 3,500 feet of MDF. Similar results obtained cutting particle board, melamine, and plywood.



STILL SHARP AFTER 3,500 FEET OF CUTTING!

BLADE DAMPENERS-STIFFENERS

FOR BETTER CUTS on all brands of blades, use our large 1/8" DAMPENERS-STIFFENERS against one side.

- Parallel and flat to .001
- Stop vibration, flutter, cutting noise, and blade ring
- Tryable and returnable for full cash refund.

4"	$21
5"	$24
6"	$25

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FULL RANGE OF OTHER INDUSTRIAL SIZES
REDUCES NOISE 50%–75%

WE RECOMMEND OUR FACTORY SHARPENING as some local sharpening creates problems with **MICRO-CHIPPED EDGES** reducing blade life & cutting quality.
3-5 DAYS ON THESE AND ALL MAKES OF FLAT FACE & CONCAVE CARBIDE TIP SAWS. Ship via UPS. Typical 10x40T $15.00, 60T $17.75. Add return UPS $5.00, $1.00 each additional blade.

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Woodworker's Journal

Vol. 19, No. 6 November/December 1995

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PROJECTS

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TOOLS

FEATURE

Cover photograph: *Studio Alex. Shot on location at Checkered Raven Gallery, Peoria, Ill.*

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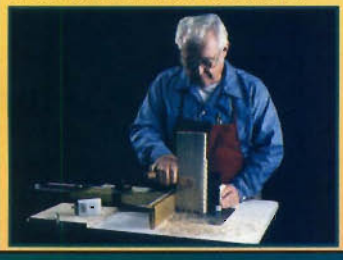

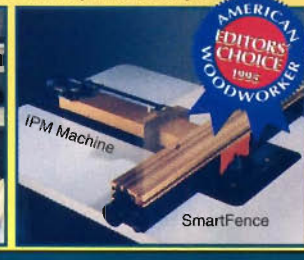

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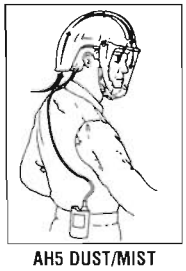

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READERS' INFORMATION EXCHANGE

I have an old bandsaw made by Power King Tool Co., Warsaw, Indiana. It has 12" wheels with a ⅞" lateral space for the rubber tires. Can someone tell me where I can order a pair of these tires?

John Porter
127 Palmer Drive
Sandusky, OH 44870
Telephone: (419) 625-6322

I need a source for plans for a glider rocker. Thank you.

Charlie Haggard
2601 Ave G
Scottsbluff, NE 69361-4417

Charlie:
Have a look at Woodworker's Journal, *July./Aug. '92, for a glider rocker with canopy.*

—the Editors

I'm searching for several 8" metal sanding discs with a ⅝" arbor hole formerly sold as accessories by Sears, part no. 9R-25135. They were originally supplied with a reducing bushing to fit a ½" shaft. Does someone have one gathering dust?

Karl C. Thomas
5226 Harpers Farm Road
Columbia, MD 21044

I'm looking for plans to build an English basket called the "Sussex Frug." Can any one help?

H.D Rodden
1480 St. Michael
Florissant, MO 63033

Editor's Note: Due to a formatting error, several mistakes appeared in the Bill of Materials for the CD Storage Cabinet (July/Aug. '95, p. 28). We regret any inconvenience to you. Here's the correct version.

CD Storage Cabinet

Part	T	W	L	Mtl.	Qty.
A Holders	⅝"	5"	28½"	M	4
B Sides	¾"	6⅜"	64"	M	2
C Divider	¾"	5⅞"	64"	M	1
D Plates	¾"	8"	15"	M	2
E Base	⅞"	10½"	17¼"	M	1
F Back	½"	12 1⁄16"	64 1⁄16"	BP	1
G Doors	¾"	6¾"	63⅞"	W	2
H Pulls	½"	½"	10"	M	2

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100 thru 150C	14.60	26.60C

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100 thru 280A	10.00	16.20C

NO LOAD PAPER(white)

100 thru 400A	$12.25	$21.25C

"C" = 100 SHEETS

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8 Hole pattern for Bosch sanders

Dia.	Grit	Price
5"	60	$ .48ea
5"	80	.46
5"	100 thru 320	.45

Available in 5 hole pattern

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Please Specify Grits

1X30	$.81 ea.	3X24	$.93 ea.
1X42	.81 ea.	3X27	.96 ea.
1X44	.81 ea.	4X21 3/4	1.06 ea.
2 1/2X16	.85 ea.	4X24	1.10 ea.
3X18	.86 ea.	4X36	1.35 ea.
3X21	.90 ea.	6X48	3.50 ea.
3X23 3/4	.93 ea.	6x89X80	6.24 ea.

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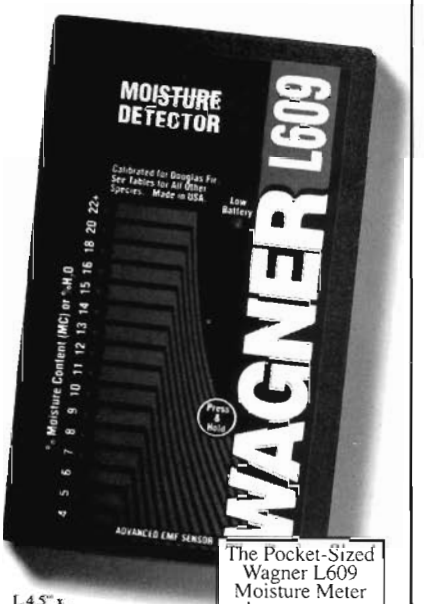

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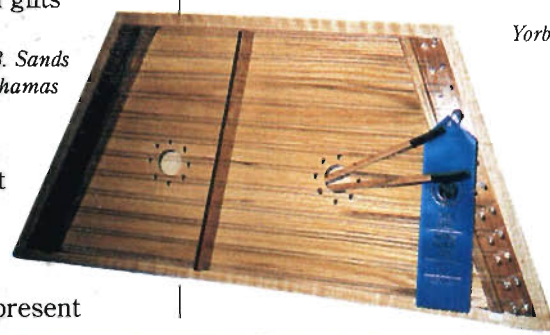
READER LETTERS

Enclosed are photos of the blockfront chest from your Sept./Oct. '93 issue that my wife and I completed together last year. We built it of mahogany and wild tamarind, a local hardwood not available commercially.

Over the years, your magazine has been a source of great enjoyment for us and well-received gifts for our children.

Harry B. Sands
Nassau, The Bahamas

It took me awhile to get around to it, but I've finally built the hammered dulcimer from your Jan./Feb. '93 issue as a birthday present for a very special friend. Before I gave it to her, I entered it in the '95 Orange County Fair woodworking competition, and, as you can see, it placed very well.



Ron Tye
Yorba Linda, Calif.

I received your June issue, and it has got to be one of your best efforts. From now on, I'll have to be content just reading it, since I've just been informed by my doctor that I have an incurable disease. Unfortunately, this will bring most activities like woodworking to an end.

I retired in 1985, and woodworking was a full-time hobby, making gifts, toys, and items for local fundraisers. However, last Christmas, I surprised my wife with this hutch from your

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Sept./Oct. '92 issue. It's made of white oak cut from a tree near our home. Since it will be my last major project, I would very much like to surprise her one more time by having her see it in print.

Godfrey Klimesh
Calmar, Iowa

Tool Award

For sending a photograph of his project, Alexander Fowler will receive a free Bosch 5" variable-speed, random-orbit sander (model B7255). This new Bosch sander features a powerful 3.3-amp motor with an operating speed range from 4,500 to 13,000 orbits per minute. It also incorporates Bosch's pad dampening system, quick-change hook and loop pad, and through-the-pad dust extraction.

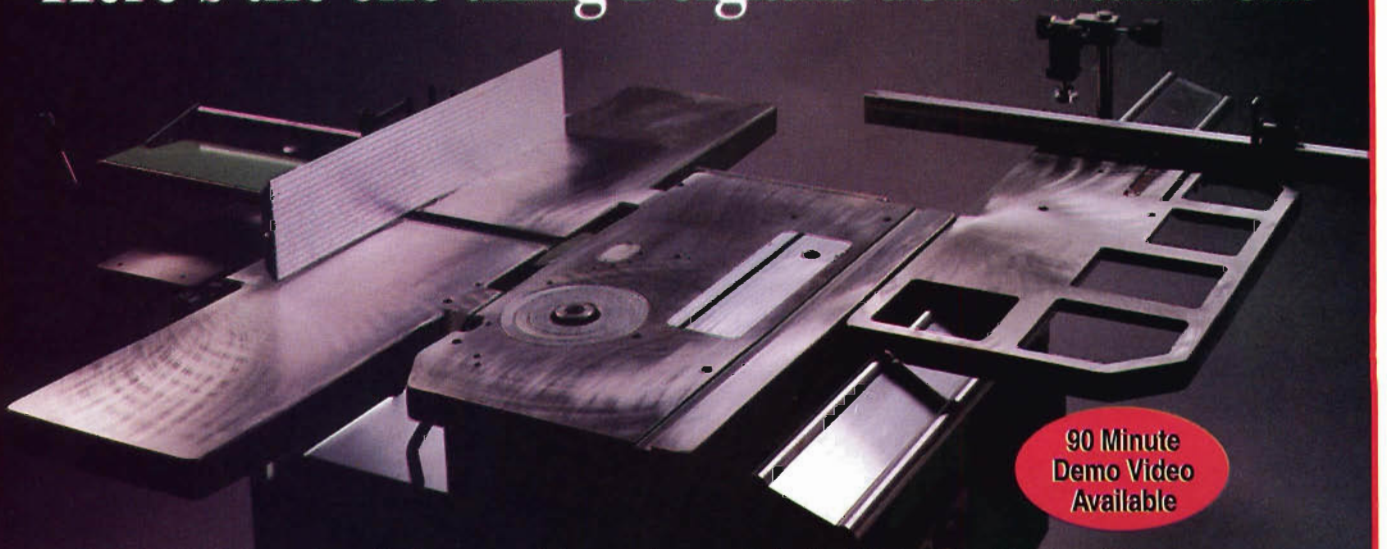
Woodworker's Journal *will award a free tool each issue to a reader whose letter and woodworking project appear on this page. To become eligible for future tool drawings, send us a good photo and description of a* Woodworker's Journal *project that you have made. If your letter and photo appear in the magazine, your name will automatically be entered into that issue's drawing.*

Please address correspondence to: Letters Dept., Woodworker's Journal, *News Plaza, P.O. Box 1790, Peoria, IL 61656. Please include your full name, address, and telephone number.*

Several years ago, I made a small Chippendale chest from your plans (Sept./Oct. '89) for my daughter and her family. It came out so well that I decided to make another to keep at home. Here it is, completed last fall with some interestingly grained cherry. I've also made a cherry end table from plans in your Jan./Feb. '93 issue.

Alexander R. Fowler
Cumberland Foreside, Maine

Here's the one thing Belgians don't waffle on.



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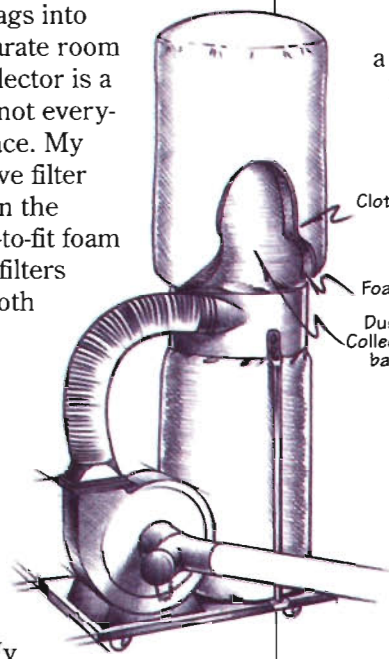
SHOP TIPS

Improve Dust Collector Efficiency For Cleaner Shop Air

Fine particles pass through dust bags into shop air. A separate room for the dust collector is a great idea, but not everyone has the space. My solution: improve filter efficiency within the shop. I sew cut-to-fit foam air conditioner filters into a simple cloth bag, sizing the foam assembly slightly smaller than the dust collector bag. The original bag inflates to hold the extra cover in place without attachments. My extra filtering cost less than $10 and took 30 minutes to sew. The real satisfaction is rinsing the filter and seeing all the powdery dust that would have otherwise been in my shop air and probably my lungs.

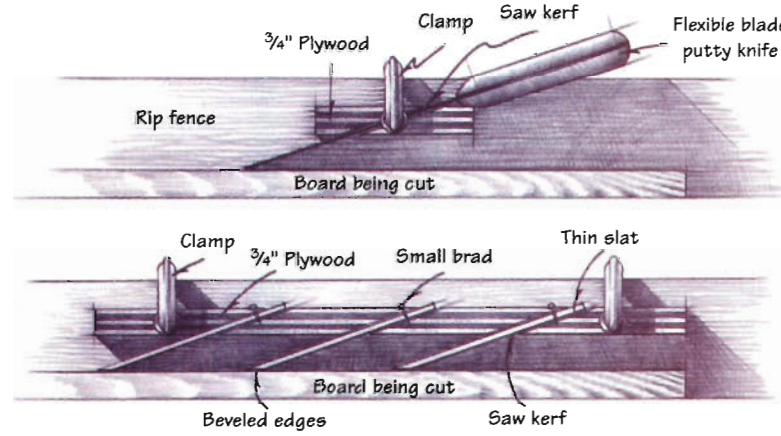


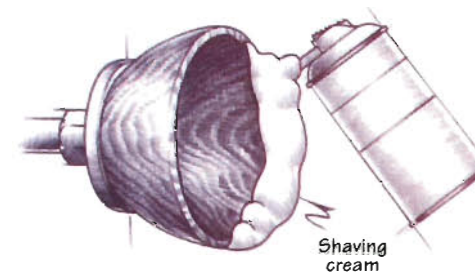
John Chapman, Copperas Cove, Texas

Low Cost Tablesaw Hold-Downs

Here are two quick and easy shop-built tablesaw hold-downs. For the first, take a piece of ¾" plywood and a thin kerf sawblade and cut a kerf at about a 30 degree angle. Slip a flexible blade (plastic or metal) putty knife into the kerf and clamp on the rip fence at the desired height. For the second, kerf a length of ¾" plywood as shown to accept thin wood slats (about ⅛" thick). Glue and tack the slats in place and use as above. The hold-down can be made any length. It's great for ripping long pieces.

R.B. Himes, Vienna, Ohio





A Close Clean Shave For Spalted Woods

Spalted woods make great turnings but they're especially prone to end-grain tearout. Nothing replaces a sharp tool, but I found that a coat of shaving cream on the tear and a final light cut leaves a very smooth surface. The shaving cream doesn't penetrate deeply enough to cause any moisture problem when finishing. I use the cheapest brand available.

Grady Butler, Lexington, N.C.

Best Tip Tool Winner

For submitting his shop tip, John Chapman, Copperas Cove, Texas will receive the DeWalt 5" random orbit palm sander (model DW423) shown at right. *This new sander incorporates the firm's unique variable-speed feature and patented Controlled Finishing System, designed to give more control over the sanding process. The unit uses a hook-and-loop pad, and its integrated dust collector will channel up to 80 percent of the sanding dust into the canister.*

To be eligible for a free tool or cash awards, send your original shop tip ideas (and sketches if necessary) to: Shop Tips Editor, *Woodworker's Journal*, News Plaza, P.O. Box 1790, Peoria, IL 61656. We redraw all sketches, so they need only be clear and complete. If you want the material returned, please include a self-addressed, stamped envelope.

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MORTISE-AND-TENON

Mitered Sticking Joints

by Bob Colpetzer

Matched stile and rail cutters teamed with your router or shaper work well for cutting the sticking on the edges of door stiles and rails. Unfortunately, the initial investment for these cutter sets can deter those of us who make these joints only occasionally.

Currently, street prices for sets of ½"-shank router cutters range from about $50 to $140. Shaper sets run even higher, starting at around $200 and climbing from there. You also need lots of router power—a minimum of 3 hp—to drive stacked cutters for one-pass cuts.

My Alternative

I go with this version of the mitered sticking joint when I want the strength of a mortise and tenon—on a door frame, for example. It's also an excellent choice if you're making the end panels for the raised-panel bookcase project shown on *page 20*.

As you'll notice in the photo *below*, the joint looks almost identical to what you get using matched stile and rail cutters. However, I form the sticking with a standard round-over bit, cut the panel groove using a dado head on the tablesaw, and then join the frame parts with blind mortises and tenons. Compared to the typical ⅜"-long stub tenon formed by the matched cutter sets, the longer tenons and deeper mortises offer greater strength.

Mitered sticking gives panel frame joints a classic hand-finished look.

Getting Started

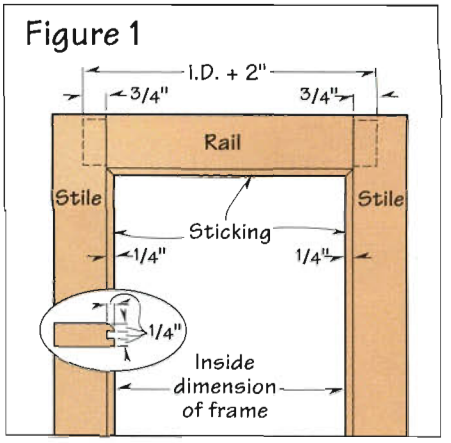
I've based all illustrations, descriptions, and procedures described here on the ¼"-radius round-over bit used to form the sticking profile. You can use other bit profiles, but the sticking depth created by those bits will probably be different. This would require that you adjust dimensions in panel groove placement, panel groove depth, mortise depth, and rail length. I use a ⅜" mortising chisel to form the mortises.

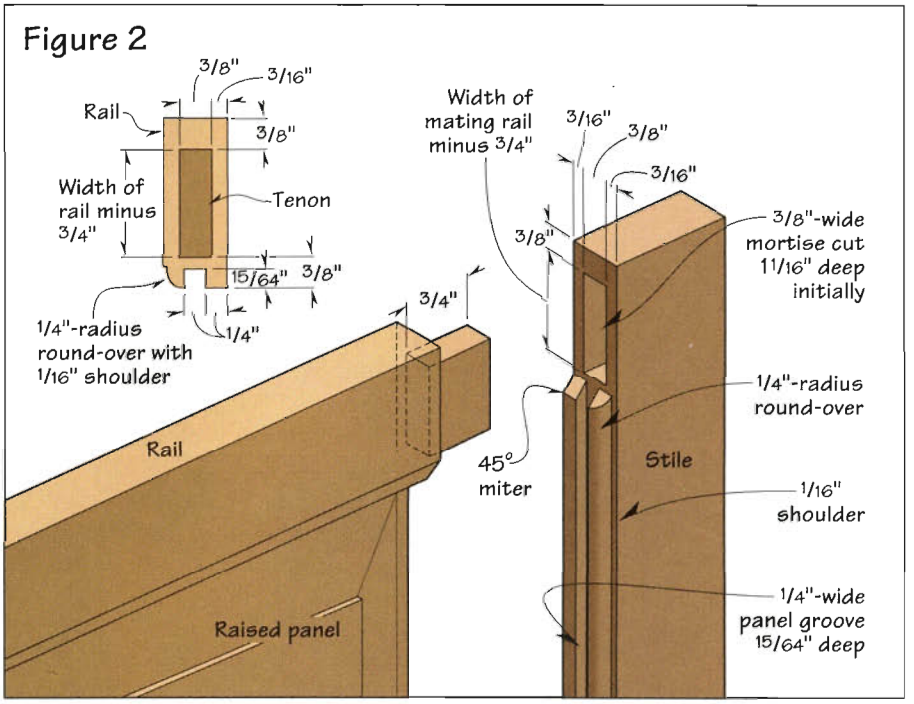
Step 1. Plane your stock to finished thickness, then rip and crosscut the stiles and rails to final width and length. I find rail length the trickiest to calculate. As shown in *figure 1*, rail length equals the inside frame dimension plus the depth of the sticking on both stiles plus the length of the tenons on each end. For example, since I form the sticking with a ¼"-radius round-over bit and make the tenons ¾" long, I add 2" to the inside frame dimension to arrive at the finished rail length.

Step 2. Lay out a mortise on each stile end as dimensioned in *figure 2*. I make the mortise ⅜" wide, centering it in ¾"-thick stock. The mortise length should measure ¾" less than the width of the mating rail. Starting the mortise layout ⅜" from the end of the stile will center the tenon on the end of each rail, leaving a ⅜" shoulder on each edge *(photo A)*.

Step 3. Using a mortising machine or a mortising attachment on your drill press, cut the mortises 1 1/16" deep in the stiles. This depth allows for the ¼" sticking (which will be removed at that point) and the ¾"-long tenon. The extra 1/16" provides clearance in the mortise bottom for excess glue.

Step 4. Cut a tenon on each rail end. To do this, first mount a sharp crosscut blade on your tablesaw. Next, set the rip fence ¾" from the outside face of the blade, and elevate the blade to cut 3/16" deep. Using the miter gauge to support the rails, make a shoulder cut on both rail faces on each end *(figure 3)*.





Step 5. Without moving the rip fence, raise the blade to cut ⅜" deep. Then, make the shoulder cut on both rail edges on each end *(figure 4)*.

Step 6. Switch to a tenon jig, and adjust it to cut 3/16" from each tenon face. Elevate the blade to ⅛", and make test cuts on each face of one tenon (shown in *figure 5* on *page 12*). Test-fit the resulting short tenon in a mortise. Adjust the jig if necessary, then elevate the blade to ¾" and cut the tenon cheeks (shown in *photo B* on *page 12*). Using this same blade height setting, reset the jig and cut ⅜" from each edge of the rails.

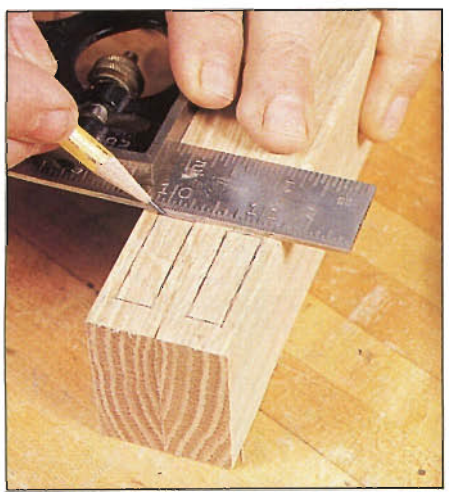
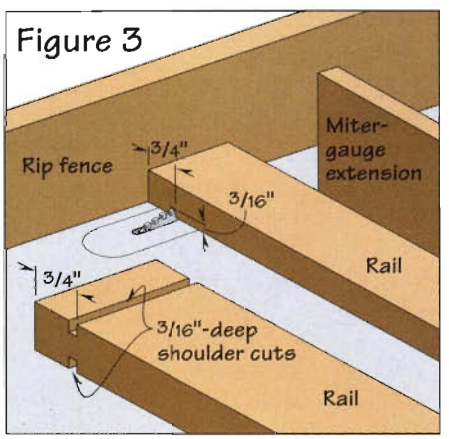
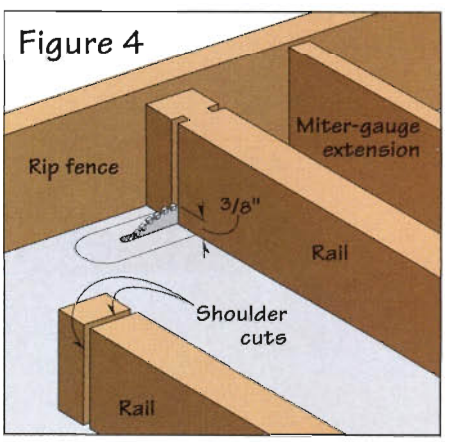
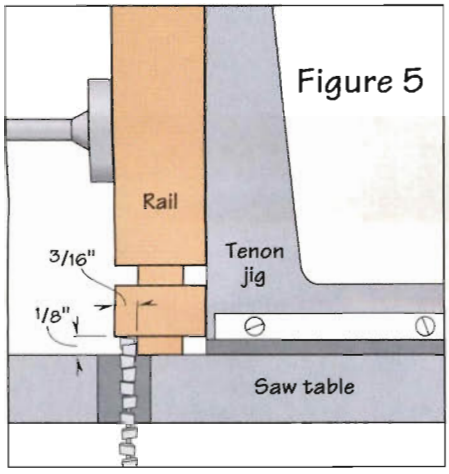
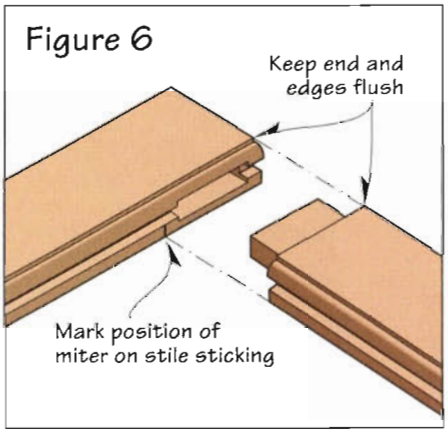


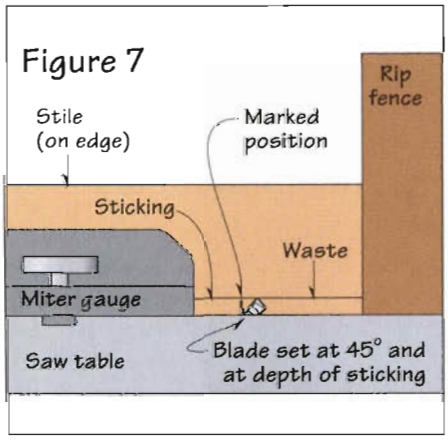
Photo A: Carefully lay out mortises on the edges of the stiles.

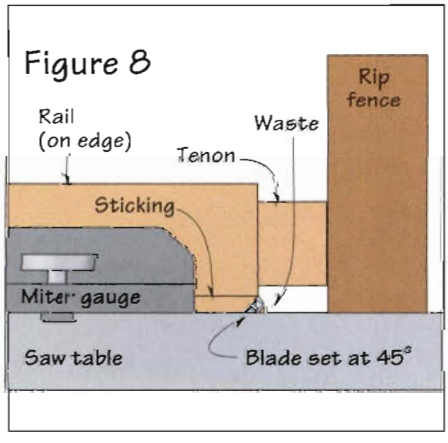












Next, Form the Sticking

Step 1. Secure a ¼"-radius round-over bit in your table-mounted router, or use a ¼"-radius cutter in your shaper. Adjust the bit and the fence to cut a 1/16" shoulder. Test the cutter and fence settings using scrap, then rout the inside edges of all rails and stiles *(photo C)*. Note: I suggest that you rout an additional piece of waste stock of the same thickness before changing the setup. You'll use it to make trial cuts when setting up to miter the sticking later.

Step 2. Complete the sticking by cutting the panel groove on the inside edge of the rails and stiles. To do this, install a ¼" dado head on your tablesaw. Position the rip fence ¼" to the right of the dado head, elevate the dado head to cut 15/64" deep, then cut the grooves. Note: Do not cut the panel groove deeper than the depth of the sticking. If you do, a hole will show on the end of the stile after assembly. Also, this setup centers the groove in the edge of the ¾"-thick stiles and rails. If you plan to install raised panels thicker than ½" and don't want them to extend beyond the front of the frame, you'll need to cut the groove off center, or cut a rabbet along the back edges of the panel to create a setback.

Mitering the Sticking

Step 1. Mark the position of the miter cut on the stile sticking as shown in *figure 6*. Note: Keep the end of the stile flush with the rail edge when marking. Next, lay out the 45° angle from the mark *(photo D)*.

Step 2. Tilt the tablesaw blade to a 45° angle. Make test cuts to confirm the accuracy of your setting. Once you have a precise 45° angle, set the saw blade to cut ¼" deep. To set this depth precisely, use the scrap stock that you shaped with the stick profile

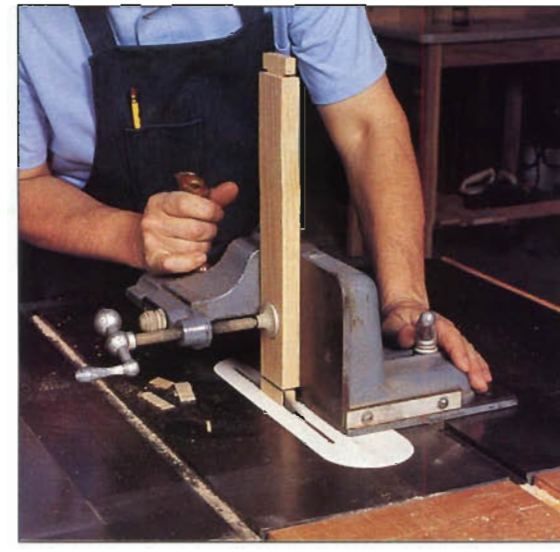


Photo B: A tenon jig allows accurate cutting of the cheeks on the rail tenons.

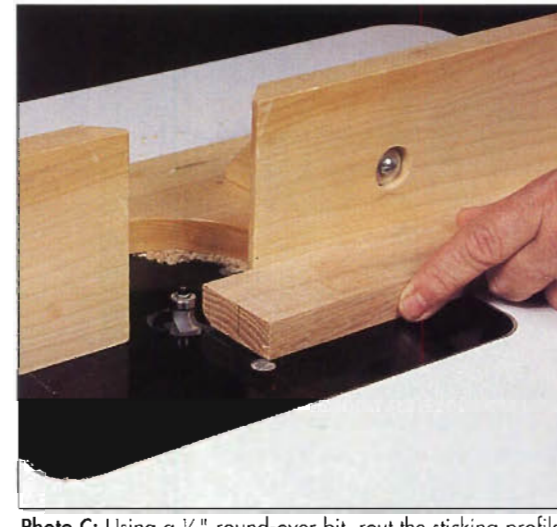


Photo C: Using a ¼" round-over bit, rout the sticking profile on the inside edge of each rail and stile.

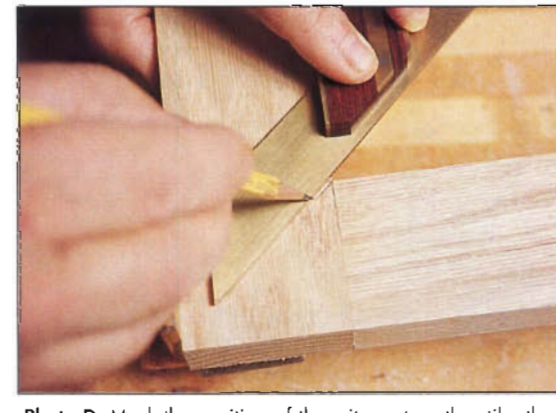


Photo D: Mark the position of the miter cut on the stile, then lay out the 45° angle from the mark.

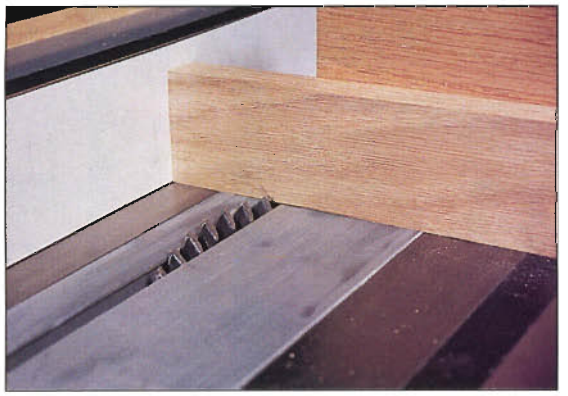


Photo E: Set up the tablesaw and cut a 45° miter across the stile sticking where marked.

Photo F: Without changing blade setting, cut the same 45° miter across both ends of the rail sticking.

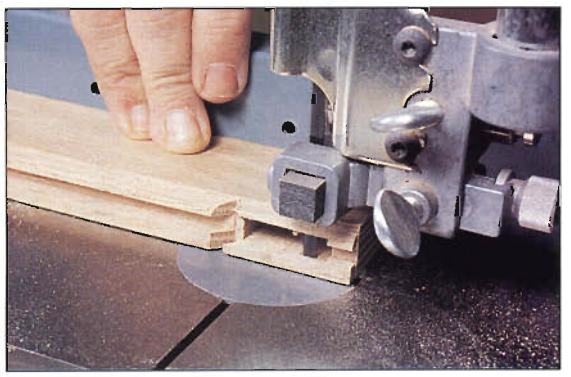
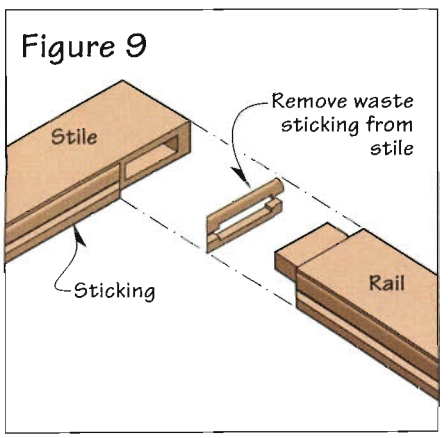


Photo G: Bandsaw away most of the waste sticking on the stiles, but keep the blade at least 1/16" from the shoulder.



in Step 1 of the previous section. Next, position the piece with one face against the miter gauge and the sticking edge down. Now, make a trial cut on the piece. The blade should cut to the shoulder of the profile without cutting into the shoulder.

Step 3. With the cutting depth set, place a stile against the miter gauge and position the fence so that the blade will cut next to the marked cut line. *(See photo E and figure 7.)* Lock the fence in position, then miter-cut the sticking on all stile ends.

Step 4. Without changing the blade setting, reposition the rip fence as shown in *figure 8* so you can make a 45° cut on the end of the rail sticking. Note that the angle meets at the shoulder of the sticking and the tenon shoulder *(photo F)*.

Remove the Waste Sticking

Step 1. After cutting the miters on the rail and stile sticking, you need to remove the waste sticking on the stile to complete the joint. *(See figure 9.)* Set up your bandsaw and fence and cut to within 1/16" of the shoulder of the sticking *(photo G)*. Be careful not to saw into the miter of the sticking at the end of the cut. (I use a stopblock clamped to the fence to prevent overcutting.)

Step 2. After sawing away most of the waste sticking, rout the remaining waste flush with the shoulder. To do this, secure a straight bit or bottom-cleaning bit in your table-mounted router, and use the fence and preset stops to hold the pieces squarely over the bit *(figure 10)*. You can "sneak up" to the correct height or use a piece of scrap to set cutter depth before you start.

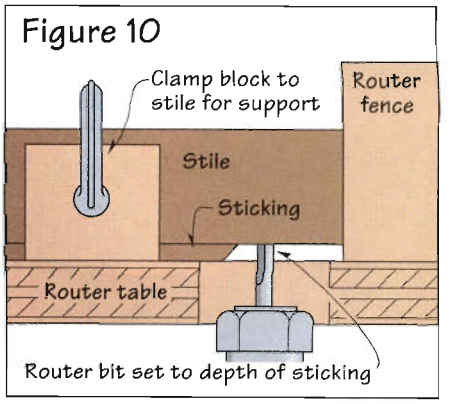


Photo H: Rout away the waste sticking with the aid of a routing jig.

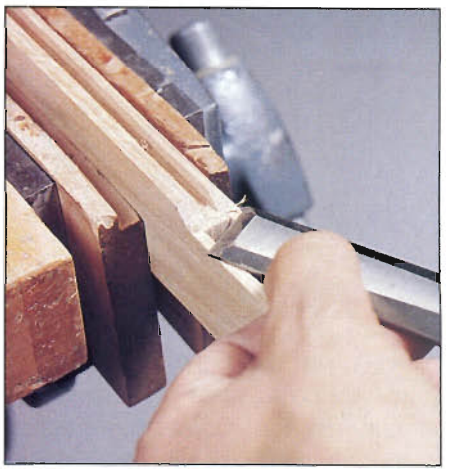


Photo I: After routing the remaining waste sticking, finish cleaning up the surface with a chisel.

If you prefer, you can make a routing jig to fit over the stiles to rout away the waste sticking as shown in *photo H*. Then, use a sharp chisel to cut away any waste that the router could not safely remove *(photo I)*.

Step 3. You've completed all frame cuts. The frame can now be test-assembled, the panels prepared, and the parts prefinished. WJ

Photographs: *Author*

For the Governor Winthrop Cabinet

Leaded Glass Windows

Try Your Hand At Making Them

Leaded glass and the Governor Winthrop cabinet *(page 52)* just seem to go together. In hopes that you won't shy away from this elegant cabinet because of the glasswork—or do it the injustice of using plain glass panes—we've asked our consultant, professional glass worker Anita Roth, to walk you through her technique. You'll find the process surprisingly simple, the tool and supply requirements minimal. With Anita's lucid, step-by-step instructions, you'll have a difficult time bungling even your first attempt. In fact, you might find yourself caught up in a new hobby.

Gather the Tools and Supplies

We show and list the tools and supplies you'll need. You should be able to find all of them at local stained-glass stores. If not, you can mail-order them from the catalog firms listed in Sources at the end of the article.

Supplies

- ¼" round-H lead came
- ⅜" U-channel zinc came
- ⅛" clear single-strength glass
- Flux paste (small jar)
- Solder (50/50 or 60/40)
- Putty (glazing compound)
- Whiting (plaster of Paris)
- Natural-bristle brush

You can purchase came in a variety of shapes. We chose rigid ⅜" U-channel zinc came (sometimes called adjustable U) for the borders because it provides more strength and rigidity than lead came. To partition the glass panels, we selected ¼" round-H lead came, primarily for its appearance. (See *figure 1* for cross-section profiles.) To make two cabinet windows, you'll need three 6' lengths of both the zinc and lead came.

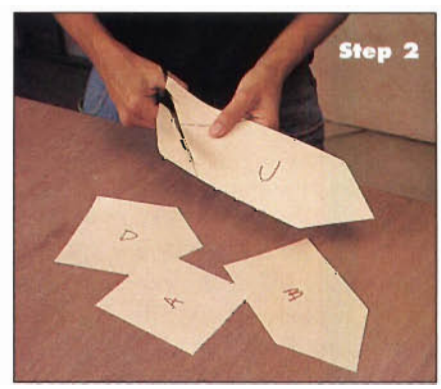
Caution: Lead is toxic. Wash your hands after handling the came and solder.

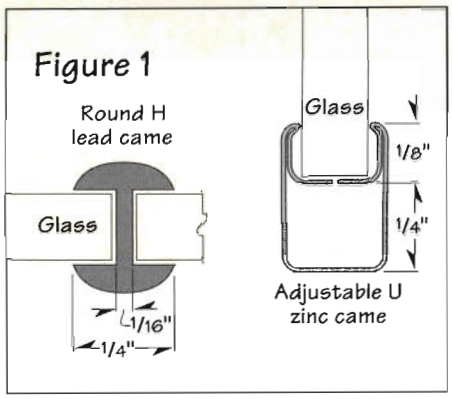
Before You Start

We designed the window panel to fit the rabbeted Governor Winthrop cabinet door opening as dimensioned on *page 60*. The window dimensioned in *figure 2* will fit those doors, leaving a bit of clearance on all sides.

Make a full-sized drawing using the dimensions shown in figure 2. Lay out the border first, then the glass outline, and finally the interior space, dividing it for the individual glass pieces. Note: The ⅜" U-channel zinc came we used for the border offsets the glass ¼", so we traced a second line parallel to but ¼" inside the border outline to indicate where the glass actually starts.

The ¼" round-H lead came we used for all internal joints has a 1/16"-wide heart, so remember to deduct this width from the glass dimensions for





each joint. To show this on your drawing, either make heavy joint lines or add a second, parallel line 1/16" from the first as you draw the glass panes.

The design requires only four patterns to make up each 13-piece panel. To keep it simple, we've used only straight cuts. If you start with the two suggested glass widths, the number of cuts you actually make will be minimal.

Assembly requires three techniques that may be new to you: cutting glass, cutting came joints, and soldering the joints. We suggest that you practice the steps you're not already familiar with before attempting them on your panels.

How to Make the Windows

Step 1. Using dimensions shown in figure 2 or taken from your actual window frame, prepare a full-sized drawing of the glass panel. Use squares and rulers to keep all parts square, and remember to allow 1/4" for the zinc frame and 1/16" for the lead came.

Step 2. After completing the full-sized drawing, use carbon paper to transfer the outline of the four different pattern parts (A, B, C, D) to thin cardboard. (We cut ours from a Manila file folder). Mark the patterns for identification and cut them to shape.

Step 3. Place the full-sized drawing on a piece of plywood that's a bit longer and wider than the drawing. Attach two cleats along two adjacent edges to form a right-angle border on the drawing. Then, test-fit your patterns on the framed drawing.

Step 4. Cut (or have your glass supplier cut) six 4 1/16 x 24" and three 5 1/16 x 24" strips of 1/8" clear, single-strength glass. Using a fine-point felt-tip pen, transfer the pattern lines to the glass strips. Two windows require 12 parts A, four parts B, two parts C, and eight parts D.

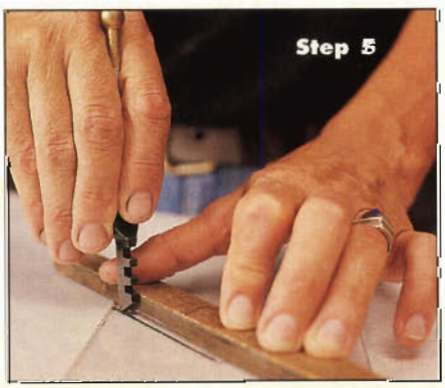
Tools Required

- Glass cutter
- Cutter oil
- Ruler
- Straightedge
- Running pliers
- Lead nippers
- Pins or small nails
- 80-100 watt soldering iron/control
- Flux (acid) brush
- Safety glasses
- Fume mask
- Plywood work surface or frame
- Drawing paper
- Fine-point black marker (Sharpie)
- Pattern cardboard
- 1/4" dowel

Step 5. Using a straightedge and glass cutter, score the glass along the inked pattern lines. To properly score glass, stand up, dip the cutter in oil, then hold it perpendicular to the glass. Using even pressure, pull the cutter (toward you) along the entire length of the glass. You should hear a continuous ripping sound as the cutter wheel scores the glass. Scoring weakens the glass along the line, making it easy to break. Score each line only once. Note: Anita uses a 1/2"-thick straightedge to help her keep the cutter perpendicular.

When cutting acutely angled (pointed) parts, score one of the intersecting lines and break the glass away before you score the second line to finish making the point. *Caution: Wear safety glasses when cutting and breaking glass.*

Step 6. To break the scored glass quickly and safely, align the centerline of your running pliers with the score and gently squeeze the handles. As an alternative, you can place the score over the edge of a straight-edge and press down on the waste side to snap it off; or, gently tap the glass with the cutter's ball end along the underside of the score, starting at one end and working toward the middle.



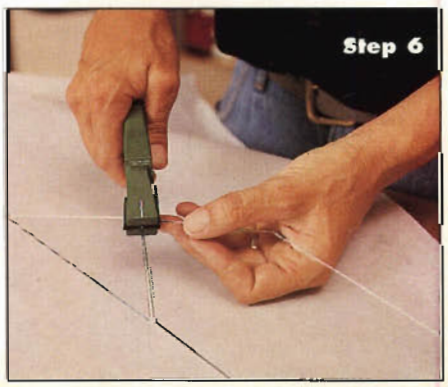
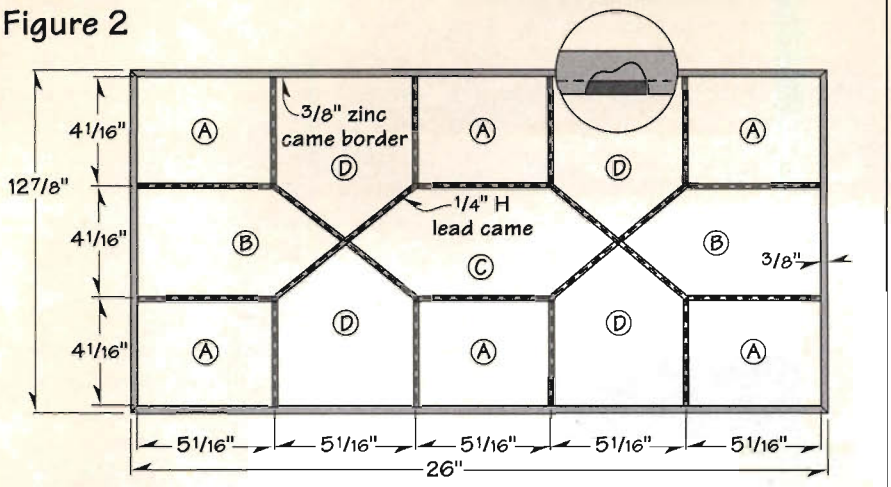
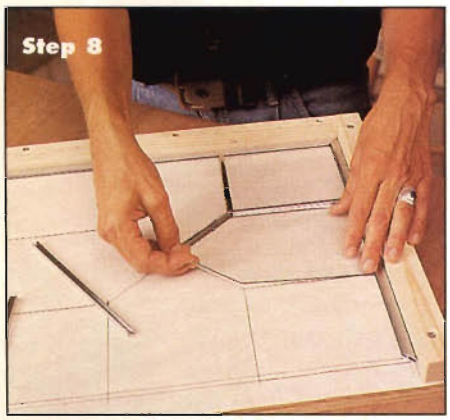
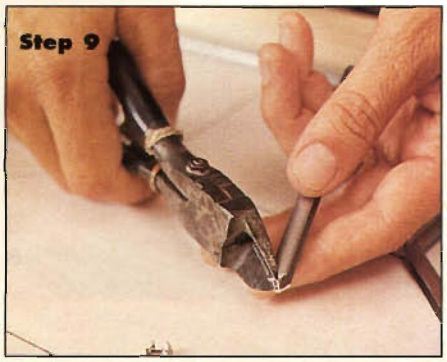


Figure 2







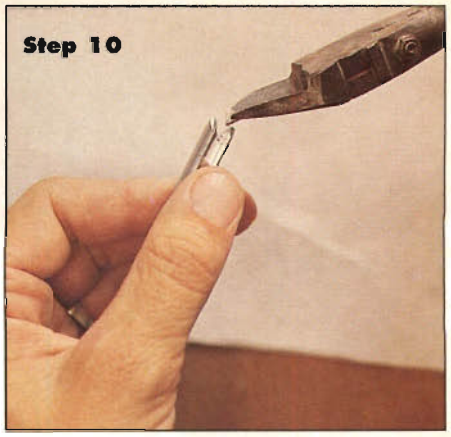
Step 7. Using a hacksaw, miter-cut eight zinc border parts to dimension. Use stops to ensure the paired parts will be uniform in length. To straighten the lead came, stretch it as shown. (Anita clamps one end in a vise and pulls the free end with a pliers.) Pull just enough to remove twists and kinks.

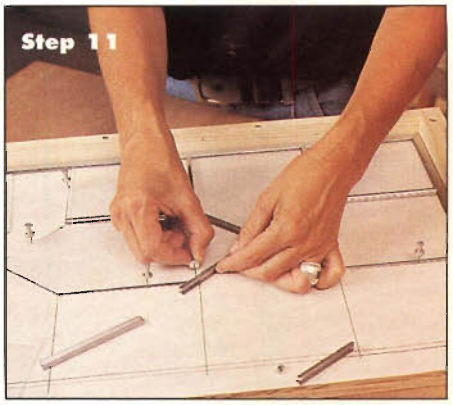
Step 8. Begin assembling the window by temporarily positioning the corner pane and several adjacent panes inside the frame. Rough-cut the came to fit between them. Pin or nail along the edges to hold the pieces temporarily in position. To cut the came, use a pair of flush-cutting lead nippers. Check the came channels to make sure they are open wide enough for the glass edge to fit inside.

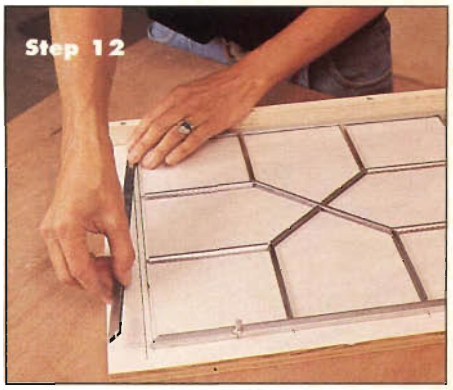
Step 9. Mark and cut each piece of came to final length. (Anita marks them with one of the pins.) Gap-free joints will give you the best results. For the perpendicular joints, make straight end cuts and butt the pieces. When a joint has one or more angled came pieces, cut the end of the intercepting piece to a pointed *V* as shown. (See *figure 3* for suggested came joint cuts.)

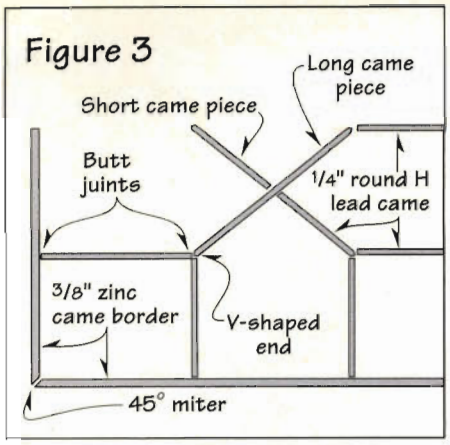
Step 10. At angled intersections, the came heart may interfere. To remedy this, remove a section of the heart at the *V* end with your lead nippers. (Anita makes sidewise V-shaped cuts. You can also cut the heart back about ¼" parallel to the edges, and then break it off square.)

Step 11. Continue assembling, adding glass panes and fitting came as you work. Slide the pieces together, but don't jam them—you want a small amount of play to allow adjustment of the parts as you work. When laying



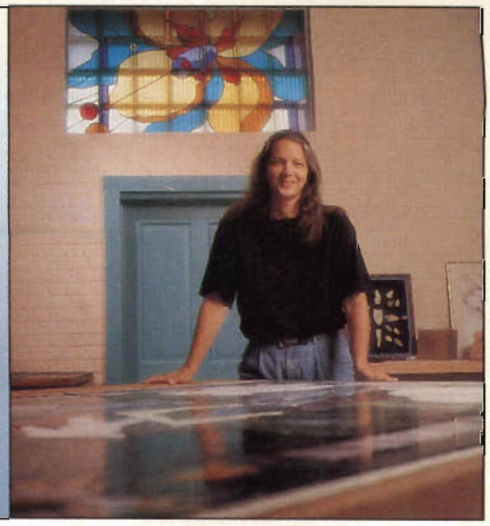


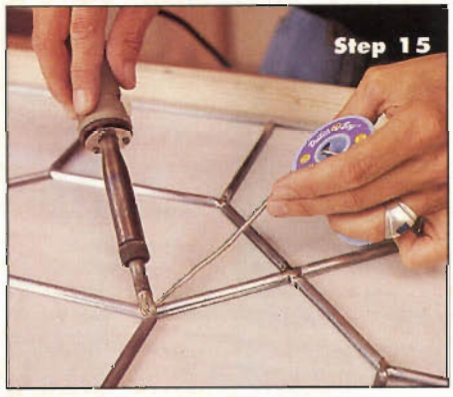




Meet Our Consultant

Artisan and glass consultant Anita Roth works in a variety of stained and leaded glass forms and has executed numerous original designs. Her client list includes churches, businesses, building contractors, and home owners. Anita accepts commissions at her studio, Custom Stained Glass, on Main Street in Morton, Illinois.





out the came, try to use the longest pieces you can—continuing across joints where possible—to help make the panel more rigid. Make certain, too, that the assembly stays within the pattern lines and doesn't "grow."

Step 12. After you've fitted all glass and came, add the two remaining zinc borders. Check the overall fit of the panel parts and adjust if necessary.

Step 13. You're nearly ready to solder the joints. First, clean the joints with fine steel wool. Next, using an acid brush, apply flux paste to each solder joint. Flux helps the melted solder adhere to the lead. Apply flux on all sides of each joint, treating an area roughly the size of a dime or slightly smaller. If necessary, you can remove excess flux with a cloth.

Caution: Wear a fume mask when applying flux and soldering. Anita suggests positioning a fan on one side to blow the flux and solder fumes away from you.

Step 14. If your soldering iron is new, it must be "tinned" with a thin coat of solder. For a copper tip, file the surfaces lightly, then coat it with flux and heat the iron to working temperature. Melt a small amount of solder in a tin lid and use it to coat all sides of the iron's tip with solder. Repeat these procedures whenever the iron becomes dirty or pitted.

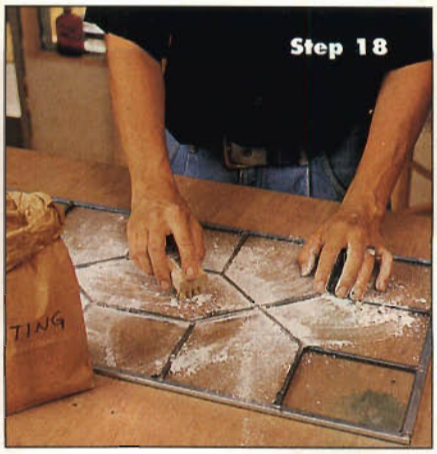
Step 15. Solder the joints using a 50/50 or 60/40 lead/tin solder. Test the iron's temperature—it should melt the solder but not the lead came. Place the iron's flat side over the joint, press down lightly for a few seconds, then touch the end of the solder to the tip. Melt enough solder (⅛" to ¼") to flow into and cover the joint, then lift the iron straight up without trying to push the solder around. Each solder joint should take only a few seconds. A good solder joint looks flat, smooth, and neat. Keep a wet sponge nearby to clean the iron.

Check all solder joints. If you don't like the looks of one, go back and reheat it. Then, turn the panel over and repeat steps 13 and 15 to solder the second side. When done, clean both panel faces with detergent and water to remove any remaining flux, then dry them.

Step 16. Glaze the window to make it tight and rattle-free. This can be a messy process, so you may want to move to a different work area and spread several layers of old newspaper underneath. Knead about a tablespoon of gray or black putty in your hands, making it soft and pliable. Then, using your thumb and fingers, force the putty into the space between the glass and came as shown. Use plenty of putty and make sure you fill all spaces.

Step 17. Remove the excess putty from the edges of the came. (Anita sharpens the end of a ¼" dowel in a pencil sharpener, then runs the point of it along the came edges as shown.) When finished, turn the panel over and putty the second side the same way.

Step 18. To finish cleaning up the putty, sprinkle a handful of whiting or plaster of Paris on the glass panel. Then, using a natural-bristle brush, brush the whiting against the putty. The powder absorbs oil from the putty and the brushwork helps pack it firmly under the came. Brushing also



darkens the lead. When done, turn the panel upside down to remove the whiting. Clean the second side the same way. Let the panel dry flat for several days. Finally, stand the panel on edge, then clean and shine the panes with a glass cleaner.

Photographs: Kevin May

Sources

Glass-working tools, supplies, and kits. Catalog $5, refundable with first order. For a copy of the current catalog, contact:

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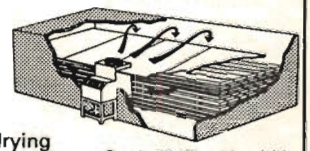

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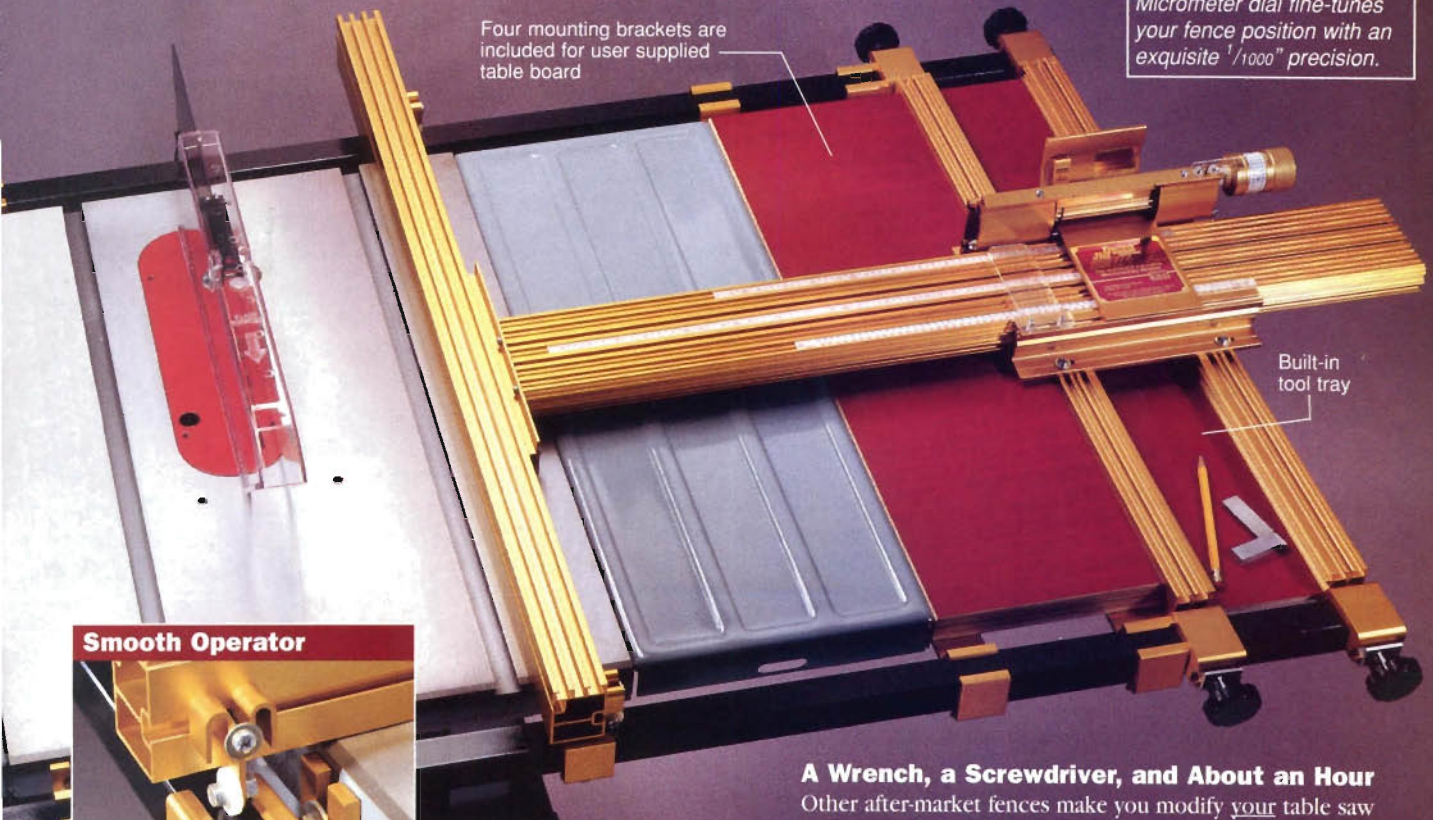

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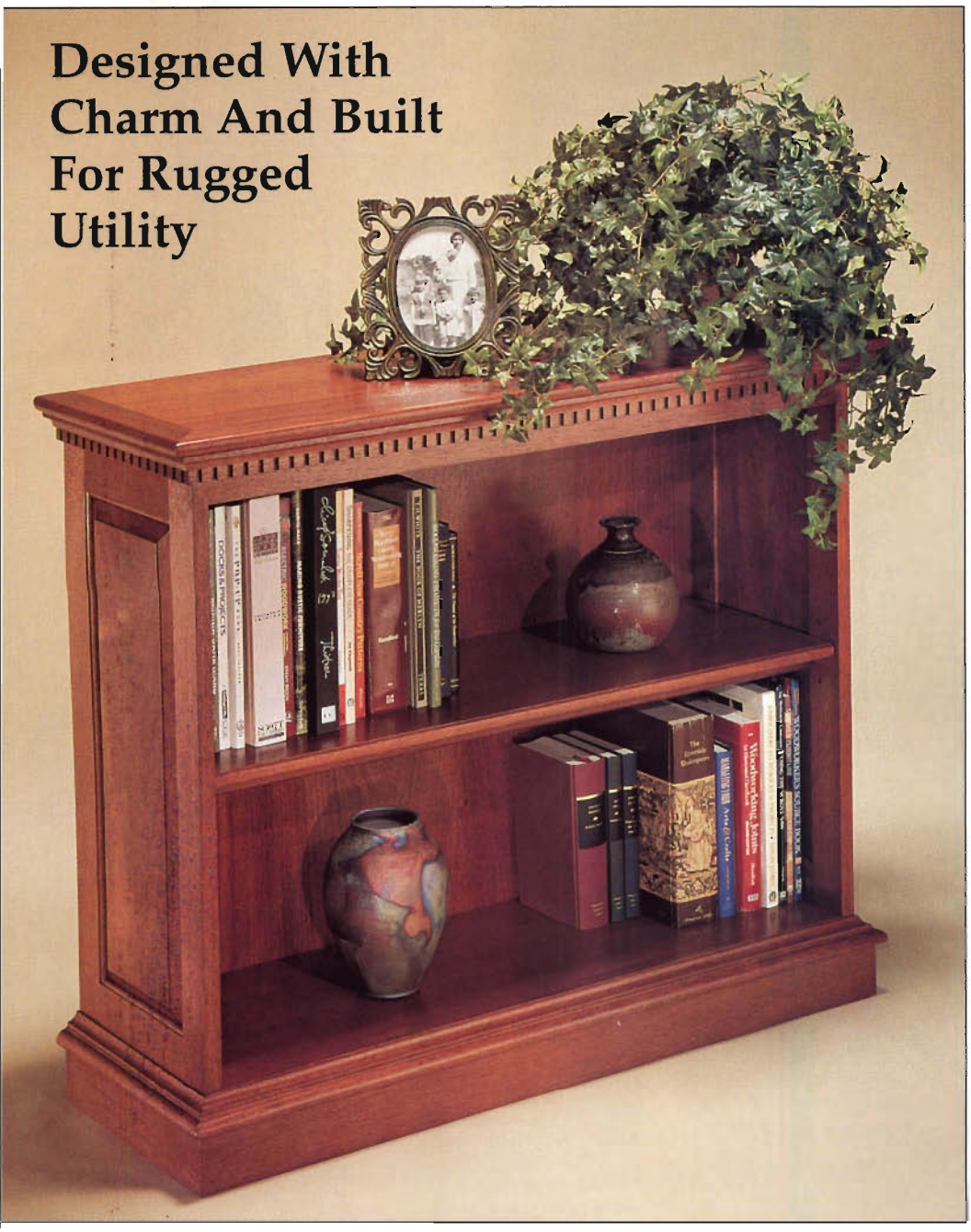
Mahogany Bookcase

Few furniture pieces take the structural beating that bookcases do. Heavy book loads stress joints, bend shelves, and rack frames. Designer Bob Colpetzer has encountered all of the problems peculiar to bookcase construction and has come up with solutions for them in this easy-to-look-at bookcase.



Before You Start

To prepare your stock for this bookcase, machine it to $^{13}/_{16}$" thickness, then joint one edge before cutting parts to dimension. We sorted our stock for grain and color, reserving the most higly figured boards for the side panels.

For simplicity, we joined the side frames with routed cope and stick joints, which are strong and rigid. (We've also included dimensions for loose tenons and matching mortises, in case you'd prefer to reinforce the joints.) We used a matched, two-piece stile and rail bit set (Freud #99-260 or MLCS #843) to rout the cope and stick, and a panel-raising bit (Freud #99-215 or MLCS #8696) to shape the panel edges. We recommend driving these bits with a 2-hp or larger router.

If you don't own these bits, we suggest making mitered sticking joints as described in the Special Techniques article on *page 10*. Use your tablesaw to bevel the panel edges if you decide to go with this alternative.

Make the End Panels

Step 1. From your $^{13}/_{16}$"-thick stock, rip and crosscut four frame stiles (A), two top frame rails (B), *and two bot*tom frame rails (C) to dimen-

Figure 1

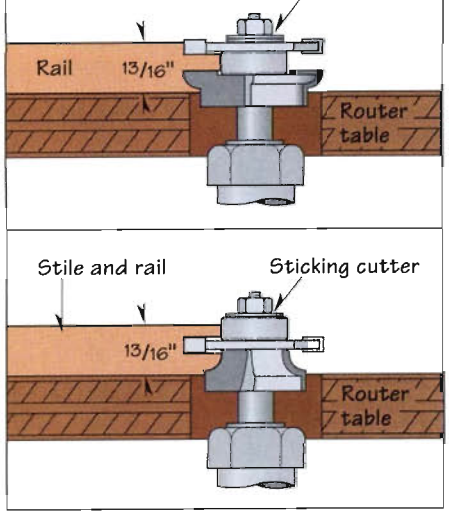
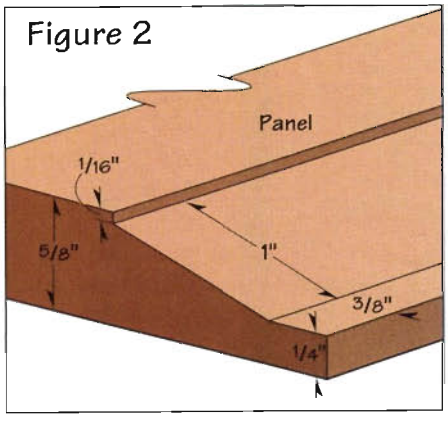


Figure 2



sion. Note: You may need to adjust rail length if your stile and rail bits cut a different profile from ours. To determine this, calculate the difference between the cope cutter diameter and its bearing diameter. The difference on our set was 13/16". If your set is more or less, adjust the rail length accordingly.

Step 2. Check the setup of your stile and rail bits. If you know that the joint they cut will fit, then proceed. If the set is new or if you're not sure that the bits cut profiles that match, see the Pro Tip on *page 23*. (See *figure 1* for our cutter setup.)

Step 3. Cut the cope on both ends of each rail. For assistance, see "How To Cut the Cope and Stick" on *page 24*. Then, cut the stick on the front inside edge of each rail and stile.

Step 4. If you opt to add loose tenons to the frame joints, lay out and cut the mortises in the ends of the rails and stiles as dimensioned on the detail shown with the Exploded View. Cut eight loose tenons to fit the mortises.

BOOKCASE

Bill of Materials

Part	T	W	L	Mat.	Qty.
A Side frame stiles	13/16"	2¼"	29¼"	M	4
B Frame rails–top	13/16"	3¾"	8⁵/16"	M	2
C Frame rails–bottom	13/16"	2⅞"	8⁵/16"	M	2
D Frame panels	⅝"	8"	23"	M	2
E Frame stiles–top	13/16"	2"	36¼"	M	2
F Frame rails–top	13/16"	2"	7"	M	2
G Bottom shelf	¾"	11"	36¼"	MP	1
H Bottom shelf edge*	13/16"	1"	35½"	M	1
I Bottom frame–front	13/16"	2½"	39½"	M	1
J Bottom frame–sides*	13/16"	2½"	13¼"	M	2
K Bottom frame–back*	13/16"	2"	34½"	M	1
L Top panel	¾"	11½"	36"	MP	1
M Top panel–front*	¾"	2"	40"	M	1
N Top panel–sides*	¾"	2"	13½"	M	2
O Base–front	13/16"	2¾"	38½"	M	1
P Base–sides	13/16"	2¾"	12¾"	M	2
Q Base-back*	13/16"	2¾"	34½"	M	1
R Front apron*	13/16"	2½"	36¼"	M	1
S Back*	¼"	36¼"	29¼"	MP	1
T Shelf–center*	¾"	11½"	35⁵/16"	MP	1
U Top cove–front*	¾"	1"	39"	M	1
V Top cove–sides*	¾"	1"	13"	M	2
W Base cove–front*	⅝"	¾"	38½"	M	1
X Base cove–sides*	⅝"	¾"	12¾"	M	2
Y Dentil–front*	⅜"	¾"	37¾"	M	1
Z Dentil–sides*	⅜"	¾"	12⅜"	M	2

* Parts cut to final size during construction. Please read all instructions before cutting.

Materials List

M–mahogany
MP–mahogany plywood

Supplies

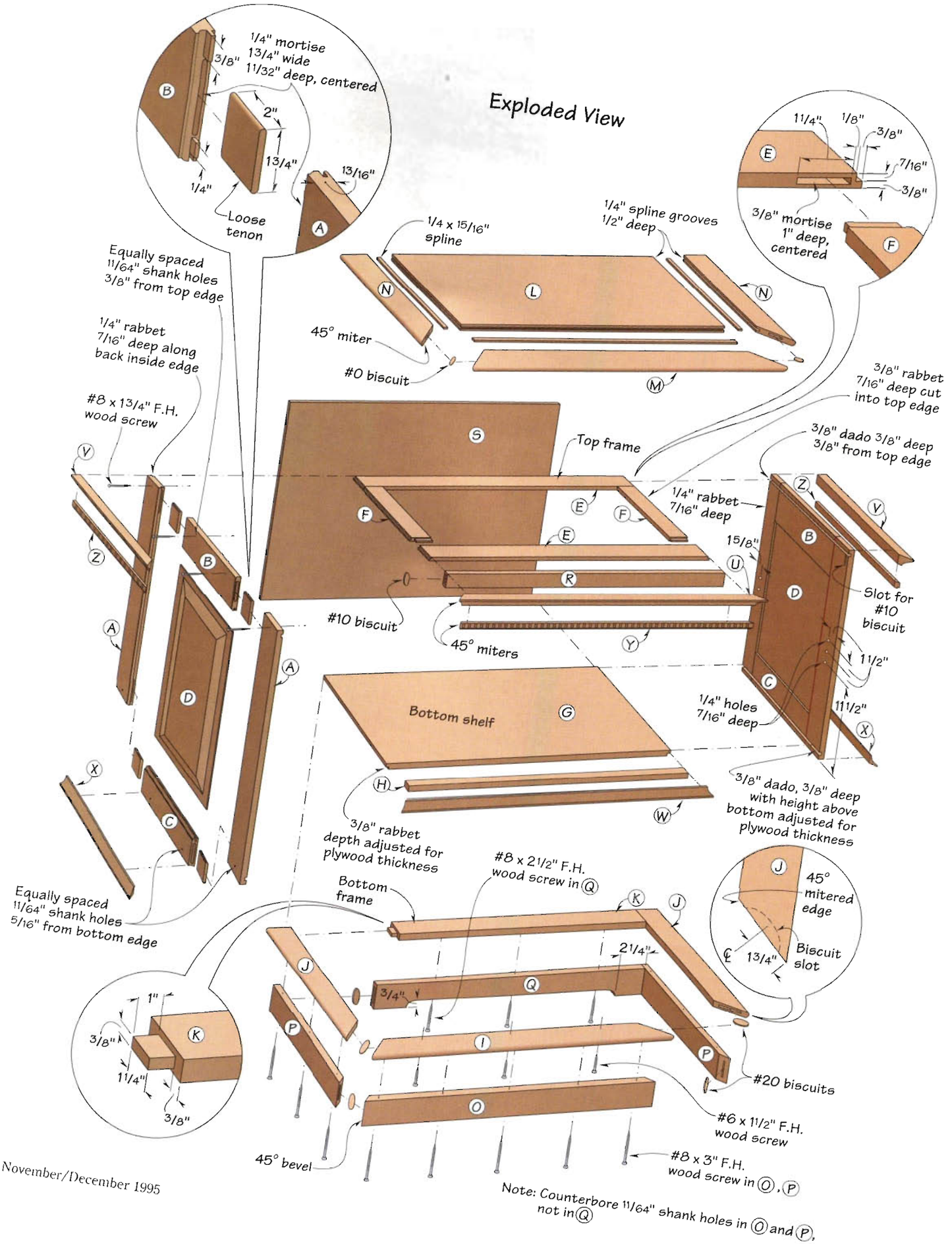
#0, #10, and #20 biscuits
#6x1½", #8x1¾", #8x2½", and #8x3" flathead wood screws
4–shelf brackets

Next, Prepare the Panels

Step 1. Dry-assemble one of the side frames. To determine panel size, measure the inside frame opening and add twice the groove depth. Note: If you're building these panels during the winter or in a dry environment, subtract ⅛" from the panel width to allow for seasonal expansion. If you're building during the summer, a 1/16" clearance should be adequate.

Step 2. Plane two panel blanks to ⅝" final thickness. Then, cut both side panels (D) to the dimensions you determined in the previous step.

Step 3. Using a panel-raising bit in your table-mounted router or shaper, cut the panel bevels. (See *figure 2* for our suggested profile.) Note: Set the router speed recommended for the bit you're using. Also, make several shallow passes, increasing the cutting depth with each pass until the panel tongue fits into the frame grooves. To eliminate splintering, start routing along one


Exploded View
1/4" mortise
13/4" wide
11/32" deep, centered
3/8"
2"
13/4"
1/4"
13/16"
Loose tenon
1/4" spline grooves
1/2" deep
1/4 x 15/16" spline
11/4"
1/8"
3/8"
7/16"
3/8"
3/8" mortise
1" deep, centered
Equally spaced
11/64" shank holes
3/8" from top edge
1/4" rabbet
7/16" deep along
back inside edge
#8 x 13/4" F.H.
wood screw
45° miter
#0 biscuit
3/8" rabbet
7/16" deep cut
into top edge
Top frame
3/8" dado 3/8" deep
3/8" from top edge
1/4" rabbet
7/16" deep
15/8"
Slot for
#10
biscuit
#10 biscuit
45° miters
11/2"
1/4" holes
7/16" deep
111/2"
Bottom shelf
3/8" dado, 3/8" deep
with height above
bottom adjusted for
plywood thickness
3/8" rabbet
depth adjusted for
plywood thickness
#8 x 21/2" F.H.
wood screw in Q
Bottom
frame
45°
mitered
edge
Biscuit
slot
13/4"
21/4"
3/4"
1"
3/8"
11/4"
3/8"
#20 biscuits
#6 x 11/2" F.H.
wood screw
#8 x 3" F.H.
wood screw in O, P
45° bevel
Equally spaced
11/64" shank holes
5/16" from bottom edge
Note: Counterbore 11/64" shank holes in O and P,
not in Q

end (end grain) and work counterclockwise around the panel, finishing with edge grain.

Step 4. Finish-sand each panel, then apply stain using the same products and technique you'll use on the rest of the bookcase. This will prevent unstained tongue from showing when the panels shrink. (See the section on finishing on *page 26*.)

Step 5. Dry-assemble each frame with the loose tenons in place but without the panels. Sand the routed profiles very lightly with 220-grit sandpaper to remove any machine marks and break sharp edges. Note: If you sand the frame while it's assembled, you won't spoil any joints. You should never sand individual frame parts. If you have splintering around the groove, wrap sandpaper around a ½" dowel and slide it up and down the groove to break the edges. Sand with the grain so you don't deepen or break off splinters.

Step 6. Glue, assemble, and clamp both side frames with the loose tenons and panels in place. Note: Apply glue sparingly to the joints, even omitting it for the last ½" of the inside edges so it doesn't squeeze into the groove and lock the panels. Check each frame for squareness and flatness.

Make the Top and Bottom Frames

Step 1. From 13/16"-thick stock, rip and crosscut two top frame stiles (E) and two top frame rails (F) to dimension plus ¼" extra length. Cut mortises in the stiles and matching tenons on the rail ends as detailed on the Exploded View.

Step 2. Glue, assemble, and clamp the top frame. To square, measure diagonally from corner to corner, and make these measurements equal.

Step 3. From ¾" mahogany plywood, cut an 11x36" bottom shelf (G).

Step 4. From ¾"- or 13/16"-thick solid stock, cut a 1"-wide strip as long as the bottom shelf, then glue and clamp it to the shelf's front edge. After the glue dries, flush-trim the edging to the same thickness as the shelf plywood using a router and flush-trim bit. Caution: If you sand, be careful not to sand through the plywood's thin veneer.

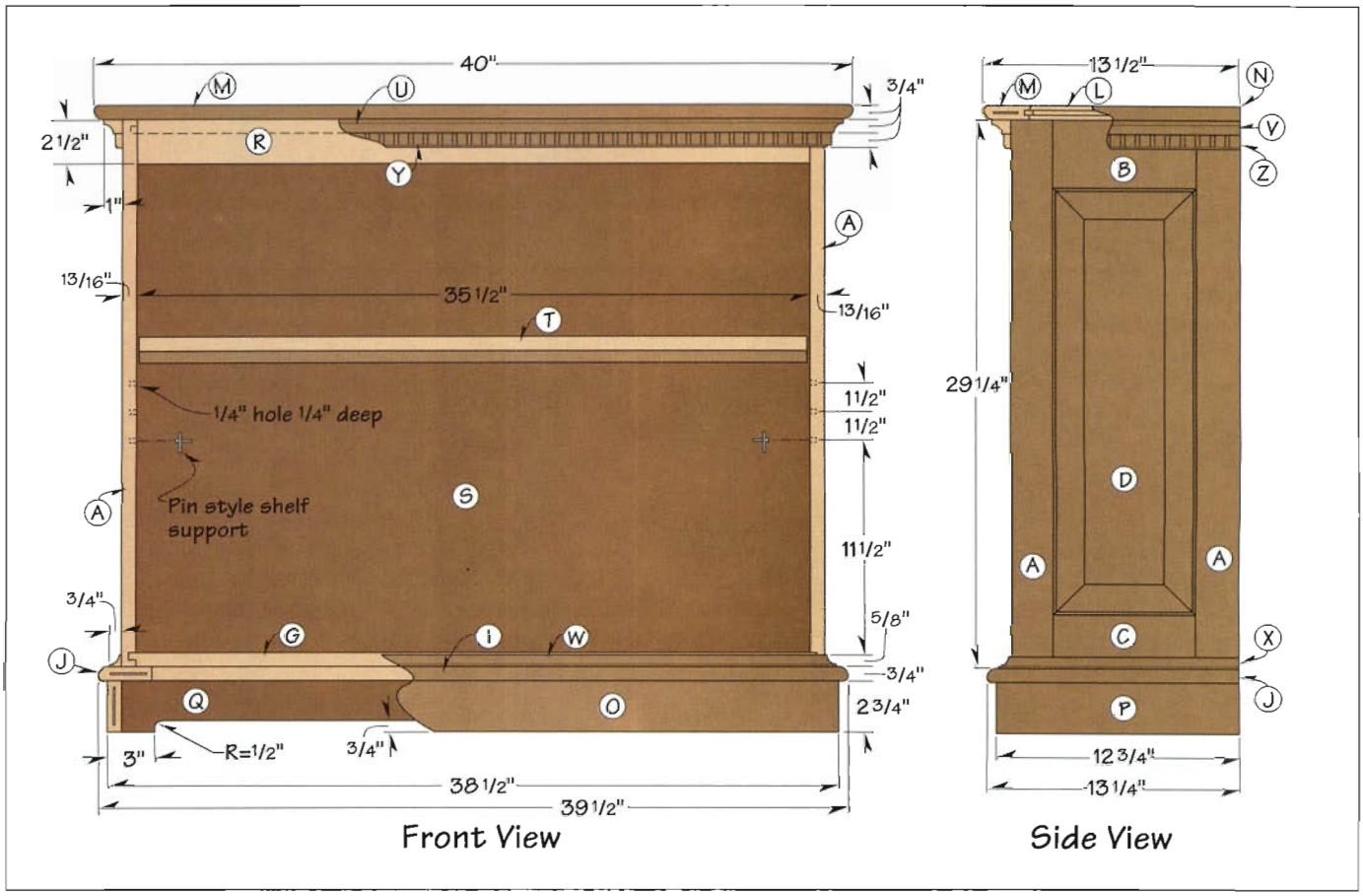
PRO TIP

We prefer to use a set of separate stile and rail bits (rather than a single, reversible bit) because you can, by using *shims*, match the two bits perfectly. Once they're set up, you never have to touch them again. (The set we used came with a shim pack installed at the factory and included extra shims under the lock nut for adjusting the profile.)

If you have to match the bits, move the wing cutter either closer to or farther away from the profile bit on the cope-cutting bit by adding or removing shims. This changes the tongue thickness.

Step 5. Trim the top frame and the bottom shelf to 11¾x35¾". Use a stop-block when cutting both parts to ensure identical dimensions.

Step 6. Cut ⅜"-wide dadoes ⅜" deep along the inside face of each side (parts A, C) where dimensioned on the Exploded View drawing. Note: The bottom of the shelf should fit



flush with the bottom edge of the side, so adjust the height of the dadoes to compensate for the actual thickness of your plywood. Also, the trim covers the top dadoes and nearly all of the bottom dadoes.

Step 7. Using a 3/8" dado head on your tablesaw, cut a rabbet along the top edge at both ends of the top frame. This will form a 3/8"-long, 3/8"-thick tongue to fit into the dadoes you just cut across the top of both sides. (See the detail on the *Exploded View.*)

Step 8. Using the same technique, form a 3/8"-long, 3/8"-thick tongue along *the ends of* the bottom shelf (top face) to fit into the dadoes.

Step 9. Cut a 1/4"-wide rabbet 7/16" deep along the back inside edge of both sides (parts A) to accept the back panel.

Step 10. Drill and countersink eight equally spaced 1/64" shank holes through each side where shown on the Exploded View. Locate the lower holes 5/16" up from the bottom, the upper holes 3/8" down from the top.

Make the Bottom Frame

Step 1. From 13/16"-thick stock, cut the bottom frame front (I) and two bottom frame sides (J) to length plus 1/4". Miter-cut both ends of the frame front to length. Miter-cut one end of both bottom frame rails, then crosscut both to 13 1/4" final length.

Step 2. Dry-assemble the bottom frame front and sides, then cut the bottom frame back (K) to fit. Note: Remember to add 2" to the length for the tenons you'll cut in the next step.

Step 3. Lay out and cut centered tenons on the ends of the frame back and matching mortises in the edges of the frame sides. (For dimensions, see the detail on the Exploded View.) If you don't own a plate joiner, cut and fit 1/4"-thick splines to reinforce these corner joints.

Step 4. Lay out centerlines for #20 biscuit slots in the mitered corners where shown. Then, cut the slots using a plate joiner.

Step 5. Glue, assemble, and clamp the bottom frame. Check it for squareness and flatness.

Step 6. Using a handheld router, rout a 1/4" round-over on the bottom edge of the bottom frame front and sides as dimensioned in *figure 3.* Using a table-mounted router and fence, rout a 1/2" round-over with a 1/16" shoulder along the top edge of the bottom frame's front and sides. Then, finish-sand the bottom frame.

Now, Make the Top

Step 1. From 3/4"-thick plywood, cut the top panel (L) to dimension. Be careful to get it exactly square.

Step 2. From 3/4"-thick solid stock, rip and crosscut the top panel front (M) and two top panel sides (N) to dimension plus 1/4" additional length.

Step 3. Using a 1/4" slot cutter in your table-mounted router, lay the

Figure 3

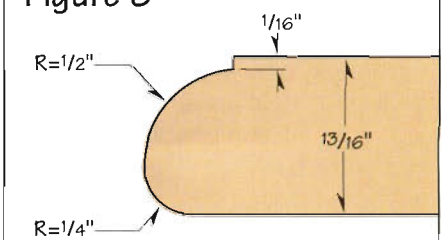


Figure 4

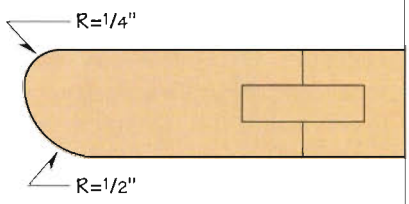
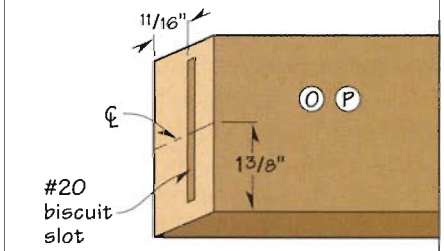
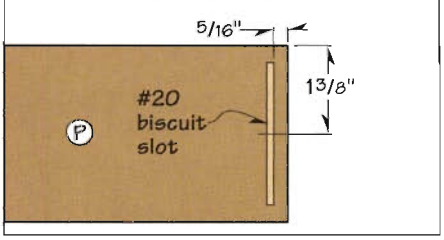


Figure 5





How To Cut the Cope and Stick

With a matched, two-cutter set, one bit cuts the cope and one cuts the stick. For clarity, think of the stick profile as a rip cut you make with the grain along the workpiece edges. The cope, which is the profile you cut across the end grain of the workpiece, resembles a crosscut.

First, secure the coping bit in your table-mounted router, then notch a wooden fence to fit over the bit. Using one of the rails as a gauge, place it against the bit and elevate it to cut the desired profile. With a straightedge, align the front of the fence with the front of the bit's bearing, then clamp the fence in place.

Set the router at the speed recommended for the cutter. Place the rail facedown on the table with one end squarely against the fence. From scrap, cut a square backing block, and use it to hold the rail perpendicular to the fence while moving it across the cutter. Note: If you make the cross-grain coping cuts first, the sticking cuts will then clean up any residual splinters. Cope both ends of each rail.

Switch to the sticking bit. To set cutting height, place one of the coped rails facedown on the router table with the edge against the fence. Elevate the cutter to match the coped profile, then test it by just nicking the corner of the stub tenon on the rail end. Adjust the router up or down until the bit cuts squarely on the tenon. Cut the sticking along the inside front edge of each rail and then each stile. Note: Before routing each piece, check the grain direction. Where possible, rout in the direction least likely to produce splintering.

panel facedown and slot the front edge and ends.

Step 4. Raise the slot cutter just a hair. Then, with the pieces facedown, slot the inside edge of the frame front and sides. Note: Elevating the slot cutter will place the frame slightly proud of the top when assembled.

Step. 5. Cut enough ¼x15⁄16" spline stock to surround the three sides of the top panel. Machine it to a sliding fit in the slots, then cut the splines to length.

Step 6. Miter-cut the frame front to match the top panel length, then miter-cut and fit the sides. Lay out and cut #0 biscuit slots into the mitered ends. Nip the ends of the splines so they don't interfere with the biscuits.

Step 7. Dry-assemble the top panel and frame parts with the splines and biscuits. Check the parts for fit and adjust if necessary. Then, glue the frame front to the panel and clamp generously to make tight, invisible joints. Next, glue and clamp the two frame sides to the top.

Step 8. Scrape and sand the frame parts flush with the plywood panel. Do not sand the plywood until you're ready to do a very light finish-sand. If you have hairline cracks along the joints, mask off the cracks and fill with red oak-colored Famowood.

Step 9. Rout the profile along the top and bottom edges of the top as shown in *figure 4*. Use the same approach you used for the bottom frame.

Next, Cut and Assemble the Base

Step 1. From 13⁄16"-thick stock, cut one base front (O), two base sides (P), and one base back (Q) to dimension plus ¼" additional length. Bevel-cut the base front to final length. Bevel-cut one end of both base sides, then crosscut both to final length.

Step 2. Dry-assemble and square the base parts (O, P). Determine the final length of the base back (Q) and cut it to length. Cut the ¾"-deep relief from the bottom edge of the base back, starting 2¼" in from the ends.

Step 3. Lay out and cut #20 biscuit slots along the beveled edges of the base front and adjoining base sides as dimensioned in *figure 5*. Lay out and cut slots near the back ends of the side base pieces where dimensioned. Cut mating slots into the adjoining ends of the base back.

Step 4. Dry-assemble the base parts with biscuits to check the fit. Then, glue, assemble, and clamp the base. Check for squareness and flatness.

Start Assembling the Carcass

Step 1. Dry-assemble the sides, top frame, and bottom frame, aligning the front edges of the frames and sides. Use bar or pipe clamps to temporarily hold the parts together. Check the fit, and square the assembly.

Step 2. From 13⁄16"-thick stock, cut the front apron (R) to final size plus ¼" additional length. Square one end of the part, then hold it in position on the carcass, and mark the length on the opposite end. This part must fit precisely, so cut initially on the long side of the mark and make small incremental cuts until the piece fits snugly between the sides.

Step 3. Hold the apron temporarily in place, then mark a centerline for #10 biscuit slots at both ends and on the adjoining sides (*figure 6*). Cut the slots in the apron and the side frame faces.

Step 4. Lay one of the sides on its outside face. Apply glue to the slots, then place the top frame in its dado. Glue a biscuit into the end of the apron and insert it into the side-frame slot.

Step 5. Lay the second side flat and apply glue to the slots. Turn the first subassembly onto its back, then join the second side to it. Clamp across the front apron and sides, then clamp the front apron to the top frame (E). Check the assembly for square, then drive #8x1¾" flathead wood screws through the holes you drilled earlier in the sides and into the top frame.

Step 6. With the carcass still on its back, add the bottom shelf. Use bar clamps to hold the front edge of the bottom flush with the sides. Again, check the assembly for square, then drive screws through the sides and into the bottom shelf. Allow the glue to dry.

Step 7. Set the carcass upright. Place the top panel on the top frame. If your plywood thickness is undersized, you'll find a gap between the underside of the top and the frame.

PRO TIP

To fit the moldings, first miter-cut one end of one side piece to 14" long, then miter-cut one end of the front piece to 42" long. Position these two mitered pieces on the case, then mark the length of the front piece at the opposite end. Cut this second miter on the front piece at the mark.

Position the front piece on the case, then fit the second side piece. Now, mark and trim both side pieces to final length.

Figure 6

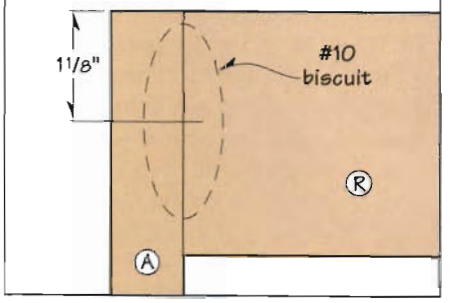
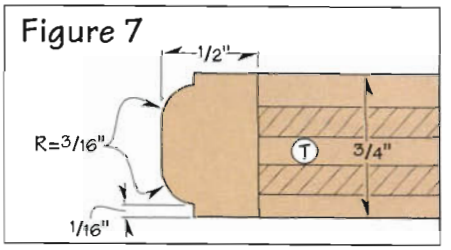


Figure 7



(Ours measured almost ⅛".) To fill this space, cut two 1¼"-wide, 35"-long shims to that thickness and insert. Glue and clamp the top to the top frame, centering it from side to side and aligning the back edges flush.

Now Make the Back and Shelf

Step 1. To make the back (S), measure the back opening, then cut a piece of ¼" plywood to fit. Set it aside for now.

Step 2. For the center shelf (T), rough-cut a piece of ¾" plywood to dimension plus ¼" extra length. From ¾"-thick stock, cut a strip ½" thick and as long as the plywood. Glue and clamp the strip to the front edge of the plywood.

Step 3. Using a 3/16"-radius beading bit, rout the edge as profiled in *figure 7*. Trim the shelf to final width (11½").

Step 4. Using your tablesaw and dado head, cut two ¼" grooves ¼" deep lengthwise in the bottom face of the shelf to accept the shelf supports. Locate the grooves 2" in from the edges.

Step 5. Make two shelf supports by first rough-cutting a piece of 13/16"-thick stock to 3½x36". Rout a ⅜" round-over along all four edges (*figure 8*). Then, rip a 1¼"-wide support from each edge of the piece.

Step 6. Using a dado head or rabbeting bit, form a ¼"-thick tongue centered along the edge of both pieces to fit the shelf grooves. Note: Set the cutting depth first using a scrap of the same thickness, then cut the tongues on the supports.

Step 7. Glue and clamp the shelf supports to the shelf. Trim the shelf to final length, then finish-sand.

Step 8. Drill the holes into both sides (parts A) to accept shelf-support pins. (For locations and dimensions, see the Front and Exploded View drawings. We made a plywood drilling template to ensure uniform hole spacing.)

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Cut the Moldings and Trim

Step 1. To make the cove moldings, first joint both edges of a 4x70" piece of ¾"-thick stock. Using a ½"-radius cove bit, rout a cove into both edges of the piece.

Step 2. For the top molding, rip a 1"-wide strip from one edge of the piece (*figure 9*). From this strip, miter-cut and fit the front molding (U) and then the two side moldings (V). (See the Pro Tip on *page 25* for help in fitting the moldings.)

Step 3. Glue and clamp the front trim piece in place, then the sides. (To clamp the moldings, we placed ¾" dowel stock in the coved area and applied clamps to the dowels.)

Step 4. For the base cove moldings (W, X), rip a ⅝"-wide strip from the remaining molded edge of the piece. Fit the front and side moldings to the carcass bottom where shown on the Exploded View, using the same technique described in the Pro Tip. Glue and clamp them to the carcass.

Step 5. Lay out, drill, and counterbore 11/64" shank holes in the bottom edge of the base where shown on the Exploded View. Note: Do not counterbore the holes in the back (Q).

Step 6. Apply a bead of glue along the top edge of the base, then position it on the bottom frame. Center it from side to side, and align the back edges flush. Clamp temporarily, then drill pilot holes and drive wood screws through the base and into the bottom frame. (We used #8x2½" screws in part Q and #8x3" screws in the remaining parts.) Note: Check as you work to make sure the screws don't break through the bottom frame.

Step 7. To make the dentil molding (Y, Z) as shown in *figure 10*, rip and plane a strip of ¾"-thick stock to ⅝" wide and 6' long. Cut ¼"-wide dadoes ⅛" deep at ½" intervals across the face of the strip. (We used an indexing jig, which is similar to a box-joint jig, to cut the dadoes.) Cut a ⅛"-wide rabbet ¼" deep along the bottom front edge of the strip to remove any splintering.

Step 8. Miter-cut and fit the dentil trim to the carcass using the same technique you used to fit the cove moldings. Note: Fit the strips so that the miters cut through solid blocks at the corners rather than through the dadoes. Glue and clamp the dentil pieces in place.

Figure 8

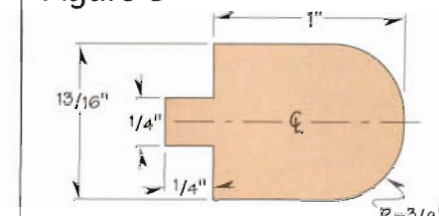


Figure 9

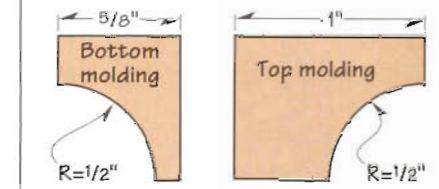
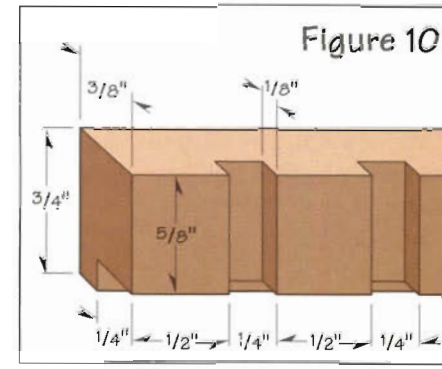


Figure 10



The Final Steps

Step 1. Finish-sand all parts that you haven't yet sanded to 220-grit. Lightly block-sand all sharp edges to break them. Remove the sanding dust.

Step 2. Apply finish to the case, shelf, and back. (We brushed on Minwax #225 red mahogany stain, then wiped it immediately to keep it from going really dark. We let the stain in the dentil slots penetrate fully. After the stain had dried, we applied two coats of Magnalac lacquer. We sanded all surfaces very lightly with 320-grit sandpaper, then applied a third coat.) Note: When sanding, work carefully along the edges to avoid sanding through the clear finish.

Step 3. Nail the back in place. Then, install the shelf supports and shelf.

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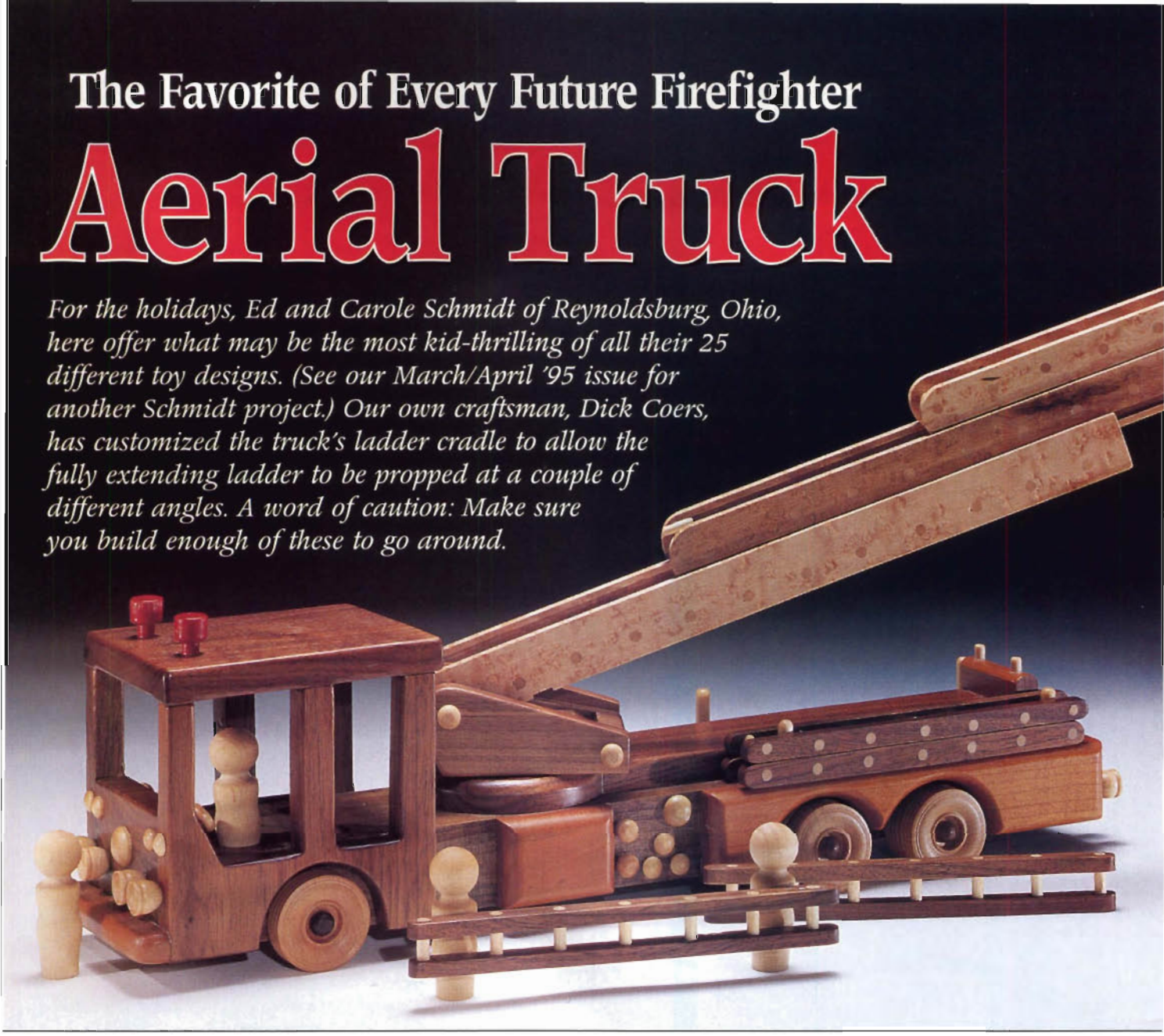
Aerial Truck

For the holidays, Ed and Carole Schmidt of Reynoldsburg, Ohio, here offer what may be the most kid-thrilling of all their 25 different toy designs. (See our March/April '95 issue for another Schmidt project.) Our own craftsman, Dick Coers, has customized the truck's ladder cradle to allow the fully extending ladder to be propped at a couple of different angles. A word of caution: Make sure you build enough of these to go around.



Before You Start

Our aerial firetruck requires many small turned parts, so we've asked a mail-order supplier to put together a kit. (For ordering information, see Source at the end of the article.) Note that dimensions shown throughout the article for mushroom plugs refer to the tenon diameter. The head of a plug typically measures ⅛" larger in diameter than the tenon.

Although the extension ladder is fairly durable, it might not withstand the kind of treatment it likely would get from younger children. So, we recommend you make the truck for kids five and older.

Make the Dashboard and Chassis

Step 1. To make the truck's dashboard and chassis, first rip and crosscut two blanks from ¾"-thick walnut to 3⅛x19" and 3⅛x17½" respectively. Tilt your tablesaw blade to 30° from perpendicular (to cut a 60° angle), and bevel-cut a 1"-long dashboard (A) from the end of the 19" chassis blank.

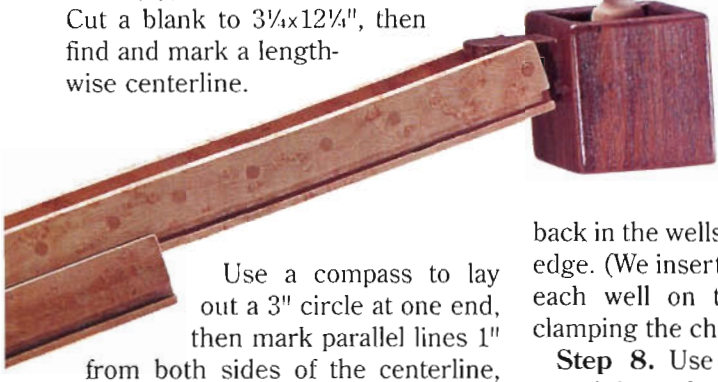
Step 2. Face-glue and clamp the two blanks to form a 1½"-thick chassis blank. After the glue has dried, joint, plane, and then trim the chassis (B) to 1⅜x3x17". (See the Chassis Assembly drawing *opposite*.)

Step 3. Using a 60° angle jig clamped to your drill press, drill a 3/16" hole for the steering-wheel post and ¼" holes for instrument dials in the beveled dashboard face. (For locations, see the Exploded View on *page 30*.) Finish-sand the dashboard, rounding the top edges slightly, then glue and clamp it to the top face of the chassis, aligning the ends. After the glue has dried, sand the edges of the assembly flush.

Step 4. Cut a ¾" length of 3/16" dowel for a steering-wheel post. Sand a 5/16x1"-diameter wheel to 3/16" thick, then glue it onto the dowel. Glue the dowel and six ¼" mushroom plugs into the dashboard holes.

Add the Other Chassis Parts

Step 1. To make the ladder platform (C), start with ½"-thick walnut. Cut a blank to 3¼x12¼", then find and mark a lengthwise centerline.



Use a compass to lay out a 3" circle at one end, then mark parallel lines 1" from both sides of the centerline, stopping at the circle. (See the Chassis drawing.) Bandsaw the platform to shape, keeping the blade outside the line, then sand to the line.

Step 2. Rout the top edge of the platform using a ⅛" round-over bit. Finish-sand the platform, then glue and clamp it to the chassis, aligning the back ends.

Step 3. Lay out a centered 5/16" hole for the ladder cradle peg 2" back from the front end of the ladder platform. Drill the hole 1" deep.

Step 4. For the rear fenders (D) and side panels (E), cut a 3x14" blank from ½"-thick cherry. Find and mark a lengthwise centerline. Using a 2" Forstner bit, bore two holes for the wheel wells, centered 3¼" and 5½" from one end. (See the Exploded View.) Now, crosscut the 7¾" fender section and a 2" length for the two side panels from this piece.

Step 5. Using a ¼" round-over bit in your table-mounted router, rout the ends (not the edges) of the fender and side panel blanks. Then, rip both blanks in half using a bandsaw and rip fence. Use a chisel to remove the bottom ⅜" of the stock remaining between the wheel wells on each fender, then rout a ¼" round-over on the wheel well edges. Now, glue and clamp the fenders and side panels to the chassis where shown on the Chassis Assembly drawing, leaving a 1¾" gap between the two parts on each side. When the glue has dried, sand both faces of the chassis flat.

Step 6. Using the wheel wells on the fenders as guides, bore the wells an additional ½" into the chassis. (To do this, we clamped the chassis and a 1¼"-thick backing board to a tall fence secured to the drill-press table.) Now, bore the wells on the opposite side.

Step 7. Using a tall fence, drill an axle hole through the chassis in each wheel well. Center the holes front to back in the wells ¼" above the bottom edge. (We inserted a backing block in each well on the exit side before clamping the chassis to the fence.)

Step 8. Use a chisel to trim the remaining chassis stock between the wheel wells flush with the fenders (which you trimmed earlier). Then, rout a ¼" round-over on the top and bottom fender and side panel edges.

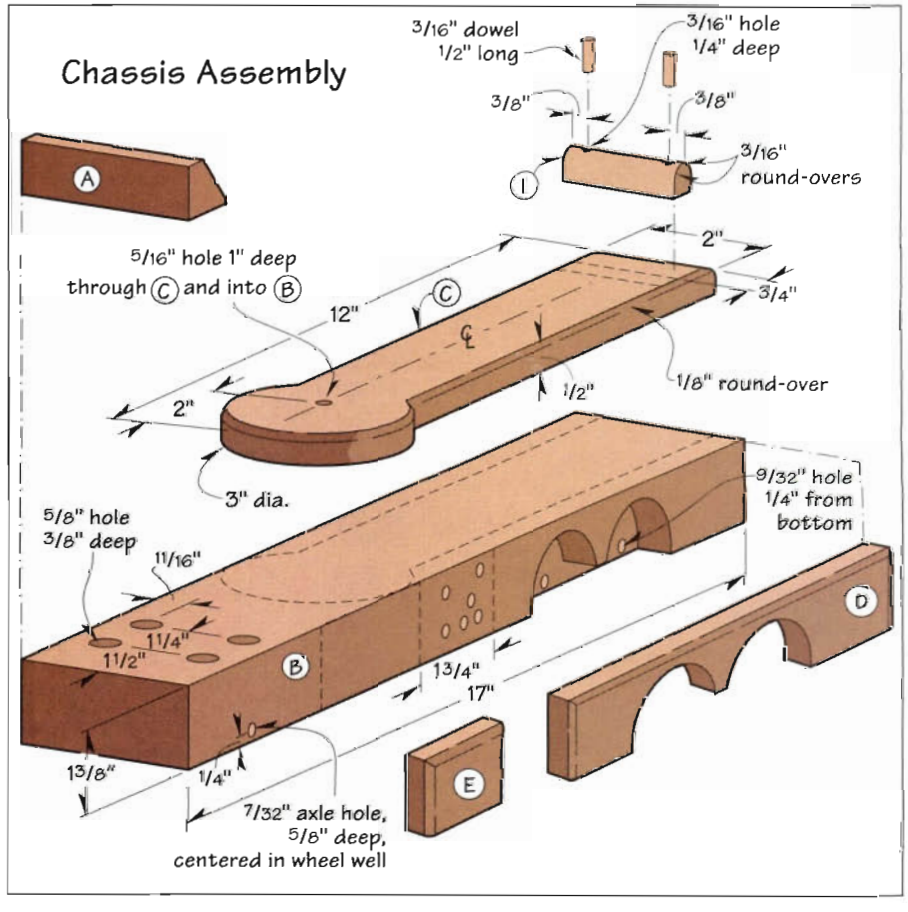
Step 9. Lay out and drill ⅜", ¼", and 7/32" holes in both edges of the chassis for hose connections and gauges where detailed on the Exploded View. Drill four ¼" holes ½" deep for the auxiliary ladder posts where shown on the same drawing, centering them on the joint line between the chassis and rear fender. Now, bore four ⅝" holes ⅜" deep in the cab area for the firefighters.

Next, Build the Cab

Step 1. From ½"-thick walnut, cut two cab sides (F) to size, orienting the grain vertically. Stack them using double-faced tape, then transfer the full-sized pattern shown on *page 31* to the top face. Bandsaw the windows and wheel well to shape, keeping the blade inside the line. Then, sand the wheel well to the line using a drum or spindle sander. Because of the short grain at the wheel well, separate the cab sides carefully. (We applied lacquer thinner along the edges to dissolve the tape adhesive.)

Step 2. Position each cab side against the chassis, then trace the profile of the dash and chassis on the inside face of the side. Sand or file the edges of the windows to the line to make them flush with these surfaces.

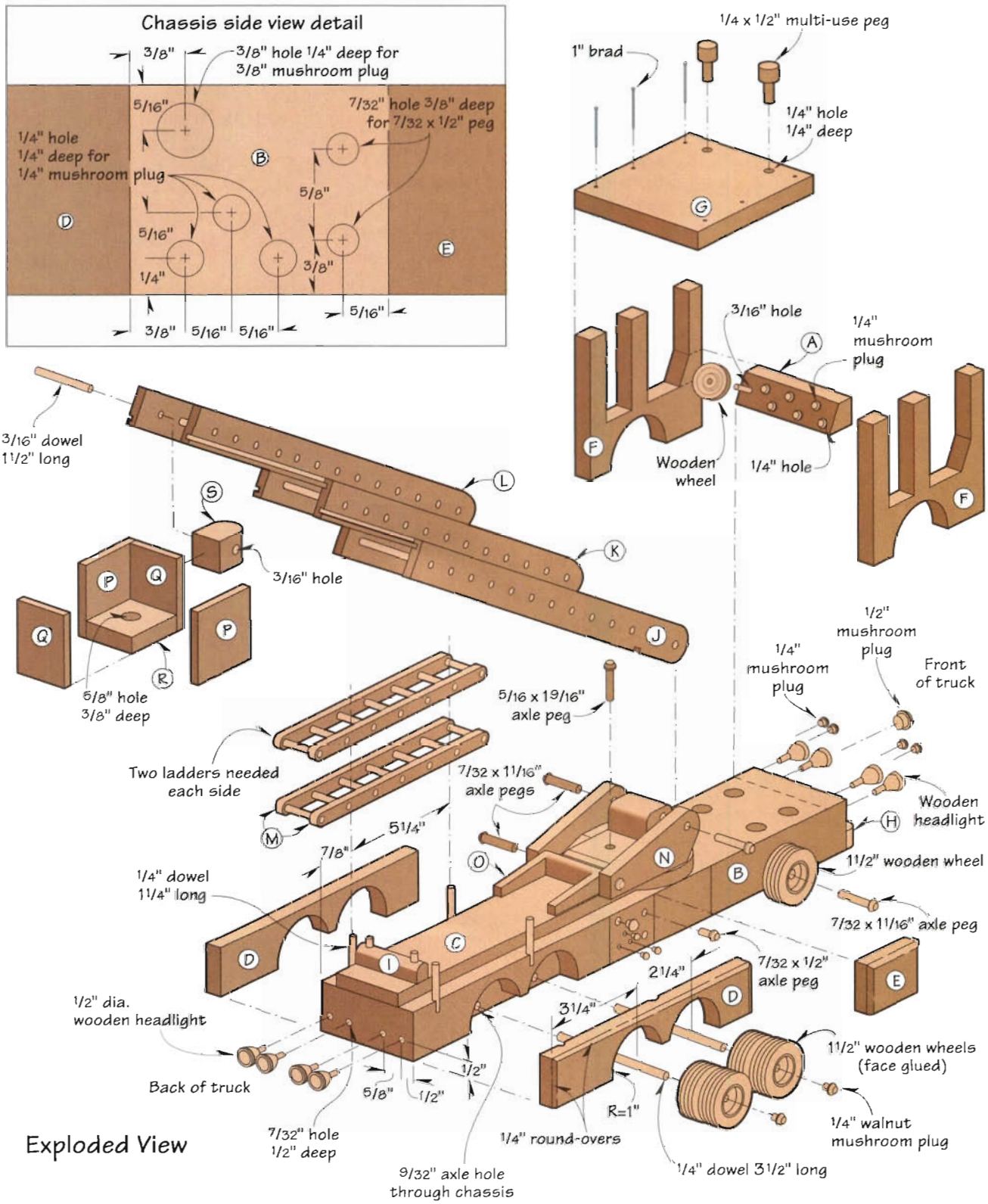
Step 3. Rout the outside edge of the wheel well on both cab sides using a ⅛" round-over bit and table-mounted router. (See the Cab Side pattern for round-over dimensions



and locations.) Next, rout the front and back edges of each side, stopping the round-over ½" from the bottom end of the front edge (where it joins the bumper).

Step 4. Use sandpaper to break the inside vertical edges of the window posts on each cab side. Note: Do not break the edges that join the chassis and dash. Now, finish-sand the cab sides, then glue and clamp them to the chassis flush with the bottom edge and front end. (We first clamped the chassis to our bench to ensure that the bottom edges would stay flush during clamping.)

Step 5. Cut the cab roof (G) from ½"-thick walnut. Sand the roof edges to align flush with the cab sides. Next, drill holes for the two flashers (multi-use pegs) on the top face where shown on the Exploded View. Rout the back roof end on the bottom face using a ⅛" round-over bit, then rout



the roof's top edges. Now, finish-sand the roof.

Step 6. Glue and clamp the roof to the cab sides. After the glue has dried, drill pilot holes, then gently reinforce these end-grain joints with 1" brads or dowels. Set the brads, fill the holes, and sand flush. Using a ⅛" round-over bit and a handheld router, rout the outside edges of the windows on the sides and front of the cab (including the roof edges).

Complete the Detail Work On the Truck

Step 1. Lay out and drill holes on both ends of the chassis for the headlights, center light, parking lights, and taillights. (For locations and dimensions, see the Front View drawing on *page 33* and the Exploded View.)

Step 2. Lay out an axle-peg hole in each front wheel well. Center the holes front to back, and position them the same distance from the chassis bottom as the rear axle holes. Drill 7/32" holes ⅝" deep.

Step 3. To make the front bumper and ladder rest, first cut a 4" square of ½"-thick cherry. Bandsaw and sand a ½" radius on the corners along one edge. Using a 3/16" round-over bit and a table-mounted router, rout all edges on both faces. Rip the ½"-wide bumper (H) from the radiused edge using a bandsaw and rip fence, then sand the ripped edge flat. Glue and clamp the bumper to the front end of the chassis, aligning the bottom edges. Reinforce this joint with 1" brads or dowels using the same procedure you used on the roof joints.

Step 4. From the opposite edge of the bumper blank, bandsaw a ½"-wide strip for the ladder rest (I), and trim both ends to a finished length of 2". Sand the bandsawn edge flat, then drill two 3/16" holes ¼" deep in the rounded edge ⅜" from the ends. Finish-sand the rest, then glue and clamp it to the ladder platform ¾" from the back end.

Step 5. Glue four headlights, four ¼" birch mushroom plugs, and a ½" plug to the front end; four headlights to the back end; one ⅜" plug, three ¼" birch plugs, and two 7/32x½" pegs to each chassis edge; and two ¼ x ½"

Bill of Materials

	Part	T	W	L	Mat.	Qty.
Truck	A Dashboard*	¾"	3"	1"	W	1
	B Chassis*	1⅜"	3"	17"	W	1
	C Ladder platform*	½"	3"	12"	W	1
	D Rear fenders*	½"	1⅜"	7¾"	C	2
	E Side panels*	½"	1⅜"	2"	C	2
	F Cab sides	½"	4⅜"	3 15/16"	W	2
	G Roof	½"	4"	4½"	W	1
	H Front bumper	½"	9/16"	4"	C	1
	I Ladder rest	½"	9/16"	2"	C	1
Ladders	J Bottom stringers	¼"	1"	12½"	M	2
	K Middle stringers	¼"	1"	11½"	M	2
	L Top stringers	¼"	1"	12½"	M	2
	M Aux. stringers	¼"	⅜"	7"	W	8
Ladder Cradle and Bucket	N Cradle*	1½"	2¾"	3½"	W	1
	O Ladder catch*	½"	2"	2¼"	W	1
	P Bucket sides	¼"	2"	2⅛"	W	2
	Q Bucket ends	¼"	1½"	2⅛"	W	2
	R Bucket floor	¾"	1½"	1½"	W	1
	S Bucket stem	¾"	1⅛"	⅞"	W	1

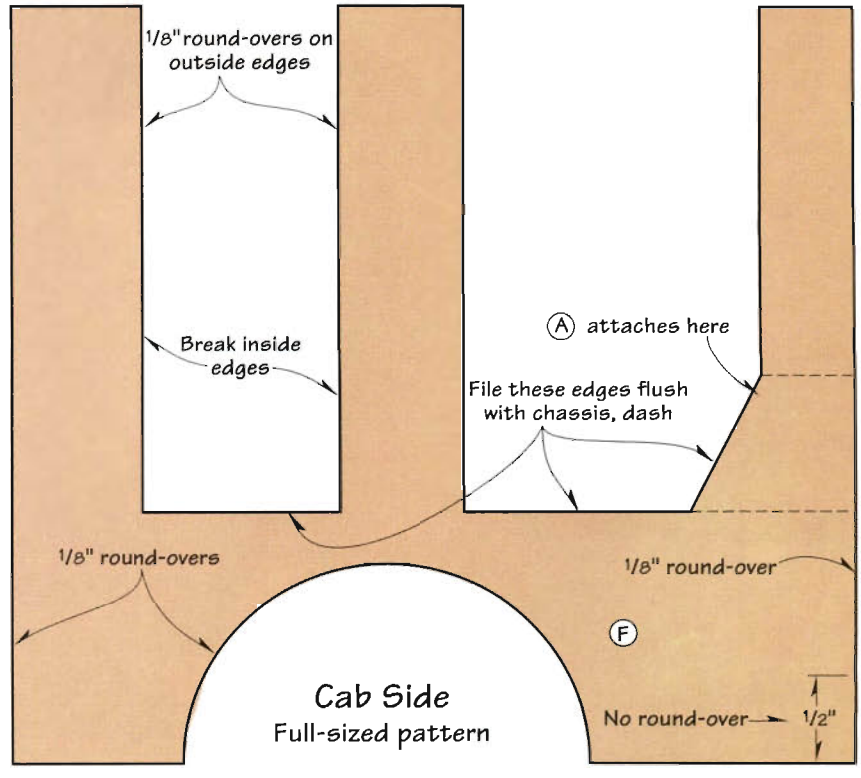
*Parts cut to final dimensions during construction. Please read all instructions before cutting.

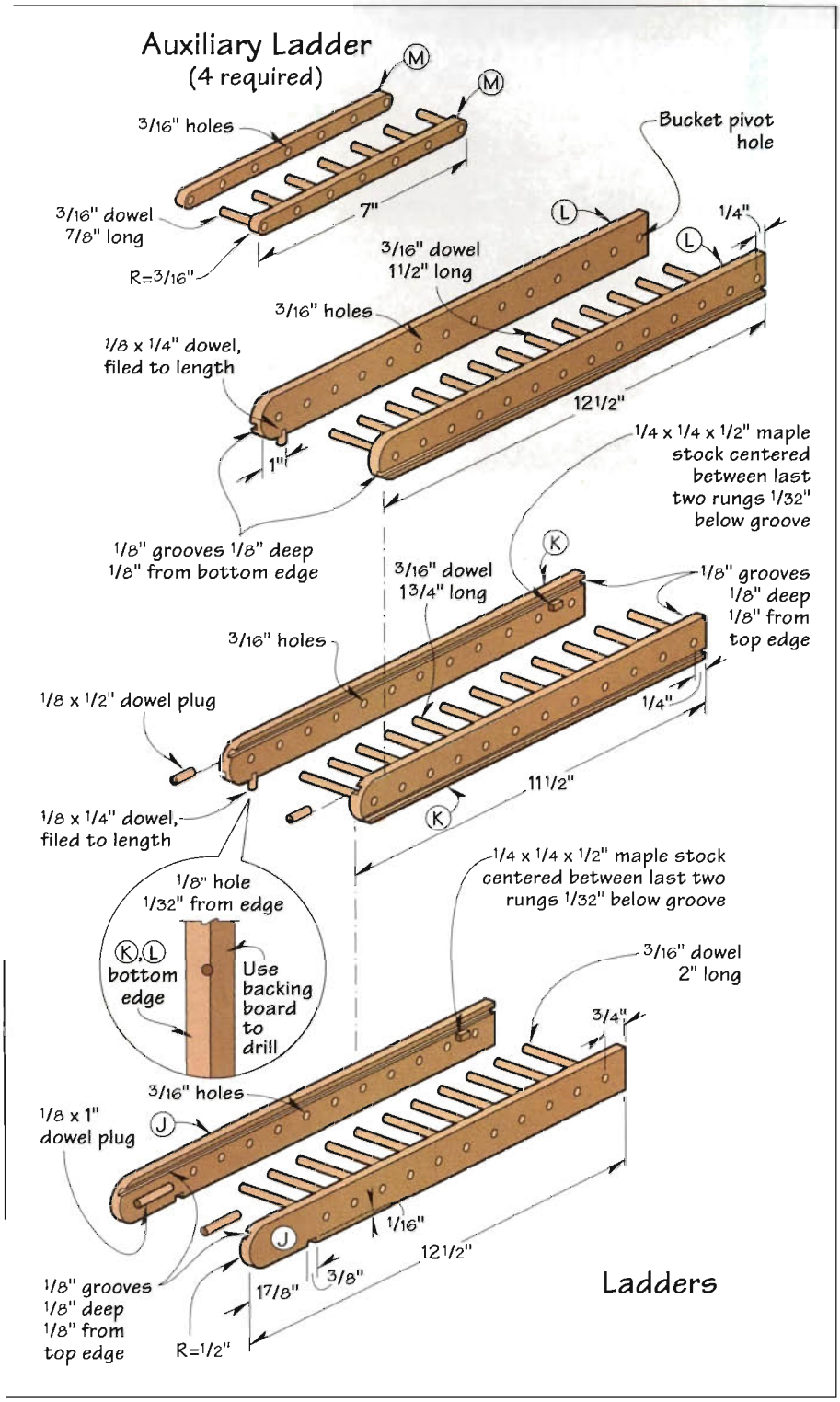
Materials List

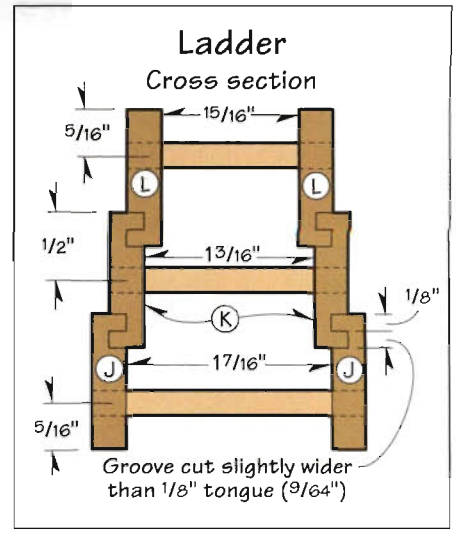
W—walnut
C—cherry
M—hard maple

Supplies

1" brads; 9' of 3/16", 3' of ¼", 12" of ⅛" birch dowel stock; semigloss lacquer; satin polyurethane finish. (See Source for turned parts.)







multi-use pegs to the roof. (We stained the exposed parts of these pegs red with a permanent felt-tip marker before gluing.)

Step 6. Cut four 1¼"-long ladder posts from ¼" dowel stock, chamfer the ends, and glue them into the holes on both sides of the chassis. Cut and chamfer two ½"-long posts from 3/16" dowel, and glue them into the holes on the ladder rest.

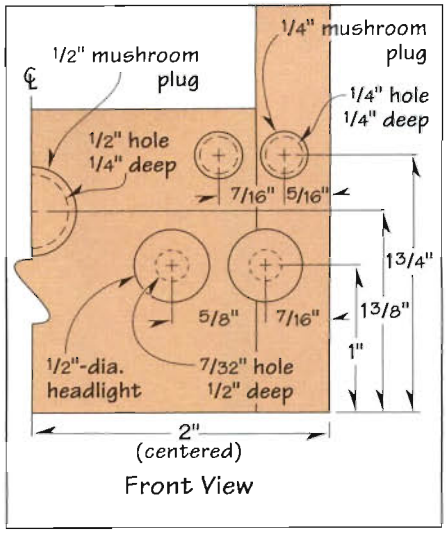
Build the Ladders

Step 1. For the three pairs of ladder stringers (J, K, L), cut a 3x13" blank from straight-grained 5/4 hard maple stock, and plane it to 1" thick. On your tablesaw, resaw six ¼"-thick stringer blanks from this piece. Note: Because these will be moving parts, we suggest you machine a few extra blanks to use for testing your setups in the following steps.

Step 2. Cut a ⅛" groove ⅛" deep ⅛" from one edge of all six stringers. On one pair of stringers (K), cut an additional groove on the opposite face along the other edge. (See the Ladder Cross Section drawing *above*.) To ensure that the ladders will interslide after assembly and finishing, move your fence over 1/64", and rerun the stringers to widen the grooves slightly. Now, interlock a couple of the stringers and check the sliding action. Adjust if necessary. Note: You want the action to be slightly snug so the sections will stay in position once extended. However, allow for a slight buildup of finish in the grooves, which will snug up the fit later.

Step 3. Arrange the stringers in pairs, then mark them for identification, including inside and outside faces. (See the Ladder Cross Section drawing.) Stack each pair using double-faced tape. Lay out and drill 3/16" rung holes spaced at 1" intervals through each pair, starting ¼" from one end on parts K and L. On parts J, start ¾" from one end and drill only 11 holes. Position the holes as shown on the Ladders and Ladder Cross Section drawings. (We used a fence and backing board.)

Step 4. With the stringers still stacked, lay out and sand a ½" radius on one end of each pair where shown on the Ladder drawing. Note: On parts J, sand the ends that lack rung holes. (We used our stationary disc sander.) Next, crosscut the other end to length as dimensioned on the drawing. Then, cut a ⅜" notch 1/16" deep in the bottom edge of the



bottom stringers (J) where shown and dimensioned.

Step 5. Separate the pairs, and drill a ⅛" hole for the lower stop in the bottom edge of one middle stringer (K) and one top stringer (L) 1" from the radiused end. (See the detail on the Ladder drawing.) To do this, secure a fence to your drill press and clamp a backing board to the inside edge of the stringer as shown. Note: Don't glue in the stops until later.

Step 6. From 5/16" dowel stock, bandsaw eleven rungs to 2" long and twelve each to 1¾" and 1½". Group the appropriate stringers with their respective rungs. Then, glue each set of rungs into one stringer first, inserting them until they protrude slightly. Note: Do not glue a rung in the top hole in parts L, since this hole will seat the bucket pivot. Before assembling the second stringers, cut three 11"-long spacers to 1 7/16", 1 3/16", and 15/16" wide. Use them to space the stringers. After the glue has dried, sand the rung ends flush with the stringer faces on each ladder section.

Step 7. For the two upper stops, bandsaw and sand two ¼x¼x½" pieces of maple stock. Glue and clamp a stop to one bottom stringer (J) and one middle stringer (K) where shown. Note: Make sure you position these parts exactly where shown on the drawing. Glue them to the same side of the ladders you drilled for the lower stops in Step 5.

Step 8. Slide the three sections together in proper order and check the action. If everything works smoothly, separate the sections and apply finish as described below for the rest of the truck parts. Note: Make sure you mask the holes for the lower stops.

Step 9. After the finish has dried, reassemble the ladder sections. Cut two ¼" lengths of ⅛" dowel for the lower stops, and trial-fit them in the holes on parts K and L. These stops should make solid contact with the upper stops on parts J and K to prevent the ladder sections from separating—without bumping ladder rungs or interfering with the sliding action. Adjust the length of the lower stops as necessary, then glue them into the holes you masked from the finish.

Step 10. Glue ½" lengths of ⅛" dowel into the lower ends of the inner grooves on parts K to prevent parts L from separating at that end. Glue 1" lengths of the same material into the same locations on parts J. (For locations, see the Ladder drawing.)

Step 11. Cut eight auxiliary ladder stringers (M) to dimension from ¼"-thick walnut. Stack them in pairs as before, then drill seven rung holes at 1" intervals starting ½" from one end. Sand a 3/16" radius on both ends, then separate and finish-sand the inside faces. From 3/16" dowel, cut 28 rungs to 1 5/16" long. Assemble and sand the ladders as you did the extension-ladder sections, using a ⅜x7" spacer for accuracy.

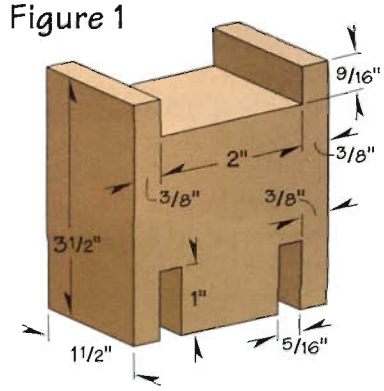
Machine the Ladder Cradle and Catch

Note: After studying the problem at length, we concluded that the safest way to make a sturdy cradle was to machine it from a single block of stock. We found the same to be true of the pivoting ladder catch.

Step 1. To make a blank for the ladder cradle (N), first rip a 2¾x12" piece of 1½"-thick walnut stock. Crosscut it to 3½". Using a 5/16" dado head, cut two 1"-deep notches in one end (this will be the front end) where dimensioned in *figure 1.* (We used a miter-gauge extension and stop-block.) Now, lower the dado to 9/16", and make 1" deep multiple passes to cut a 2"-wide notch in the back end.

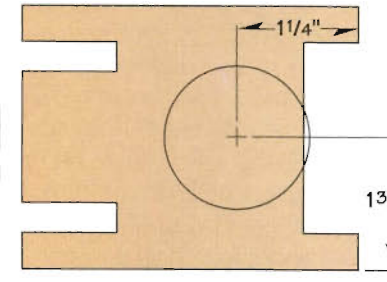
Step 2. Bore a 1½" hole ⅞"-deep in the top face of the block centered 1¼" from the back end *(figure 2).*

Figure 1



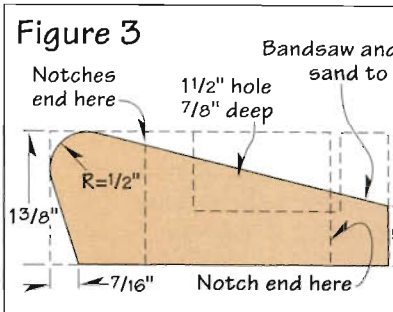
Cut blank to size, then cut notches in front end using 5/16" dado head. Then, notch back end where shown.

Figure 2



On top of blank, bore centered 1 1/2" hole 7/8" deep. This will overlap the back-end notch slightly.

Figure 3



Step 3. Lay out the cradle profile as dimensioned in *figure 3* on one edge of the blank, starting at the back edge of the blank. Bandsaw and/or sand the blank to shape. Note: Be careful to make the inclined top face flat. (We used our stationary belt sander.)

Step 4. Reset the 5/16" dado head you used in Step 1 to cut ⅜" deep. Then, cut grooves in the top (inclined) face of the blank that align with the notches you cut in the front end *(figure 4).* Note: Cutting the grooves will partially square the 1½" hole.

Step 5. Remove all material to fully square what remains of the 1½" hole

you drilled earlier. The cradle should now appear as shown in *figure 5*.

Step 6. Lay out and drill a centered hole for the pivot pin where dimensioned in *figure 6*. Next, use a chisel to level the front ⅜" of each groove. Then, chamfer the back end of the level surface in the middle of the cradle using a chisel or file.

Step 7. To make the ladder catch (O), start with a ½x2x2¼" piece of walnut. Transfer the full-sized profile shown in *figure 7* to one edge, then sand the blank to shape. Lay out ¼"-wide arms where shown, then bandsaw using a rip fence for accuracy. Sand the arms, then sand a round-over on the inside top edge of the axle section where shown on the profile.

Step 8. Drill 7/32" axle-peg holes through the cradle edges for the ladder and ¼" holes for the catch *(figure 8)*. To do this, stand the cradle on edge and clamp it to a fence secured to your drill press. Drill through one edge, then flip the cradle edge for edge and reclamp to drill the opposite edge. Note: For now, drill the ladder peg holes through the outer cradle edges only. Don't drill into the middle cradle block until later.

Now, Make the Bucket and Assemble the Ladder

Step 1. From ¼"-thick walnut stock, cut a 2x16" blank. Crosscut two bucket sides (P) to length, then rip the remaining blank to 1½" wide. Cut two bucket ends (Q) to length. From ¾"-thick walnut, bandsaw a 1½" square for the bucket floor (R).

Step 2. Locate the centerpoint of the floor, then bore a ⅝" hole ⅜" deep to seat a firefighter. Glue, assemble, and clamp the bucket. After the glue has dried, sand all surfaces smooth. Then, using a 1/16" round-over bit and a table-mounted router, rout all bucket edges, including the inside top edge.

Step 3. To make the bucket stem (S), cut a scrap of ¾"-thick walnut to 1⅛x12". Rout a ¼" round-over along both faces on one edge. Drill a ⅛" hole through this blank, centering it between the edges. Now, crosscut a ⅞" length for the stem, locating the hole's center ⅜" from one end. Finish-sand the stem, then glue and clamp to the bucket, centering it ¼" from the top of one end.

Step 4. Temporarily assemble the ladder cradle to the platform by inserting an axle peg through the cradle and partially into the platform hole. Position the assembled ladder on the cradle and ladder rest, aligning the front ends of the bottom stringers flush with the front of the cradle. Using the holes in the cradle as guides, drill a 7/32" hole through the ladder stringer and into the middle cradle block to a depth of ½". Note: Drill one side only for now.

Step 5. After drilling the first side, remove the ladder, and enlarge its hole to ¼" using your drill press. Next, reposition the ladder in the cradle, and temporarily insert a peg to hold it in position. Then, drill the opposite side, and repeat the hole enlargement. Now, insert a second peg, and raise and lower the ladder to check the action. If the ladder binds at all, elongate (don't enlarge) the stringer holes by 1/32" increments until the action is smooth.

Step 6. Temporarily adhere a 3/32"-thick shim to the bottom face of the catch. (We used double-faced tape.) Position the catch between the cradle sides as shown on the Exploded View, then insert a 1/32"-thick spacer between the catch's axle and the back of the cradle. Clamp or adhere the shimmed catch in position. Then, drill a 7/32" hole ⅝" deep (through the predrilled cradle hole) in each edge of the catch. Again, drill the first hole, temporarily insert a peg to hold it, and then drill the opposite hole. Now, remove the shims and tape.

Add Finish and Install the Ladders and Wheels

Note: Before spraying, remember to mask holes and other areas that should not receive finish.

Step 1. Finish-sand any surfaces that still need it. Then, apply several coats of a clear finish to the truck, the firefighters, the cradle, the ladders, and the bucket. (The Schmidts spray everything but the wheels with three coats of Deft aerosol lacquer, scuffing between coats with 0000 synthetic wool.) Hold off on finishing the wheels until Step 4.

Step 2. To make the dual rear wheels, sand one face of eight wheels nearly flat. (To do this, we adhered a sheet of 120-grit sandpaper to a flat surface.) Glue and clamp these flattened faces together to make four

Figure 4

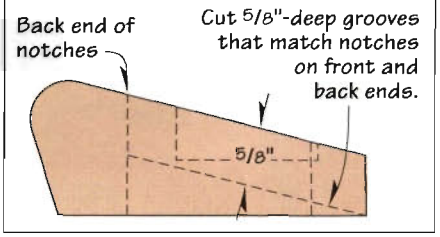


Figure 5

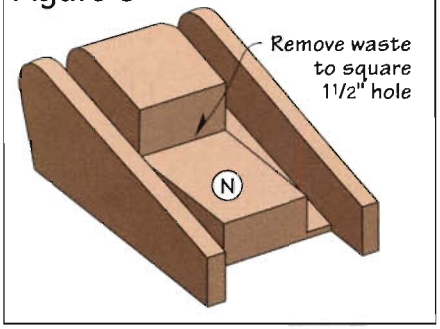


Figure 6

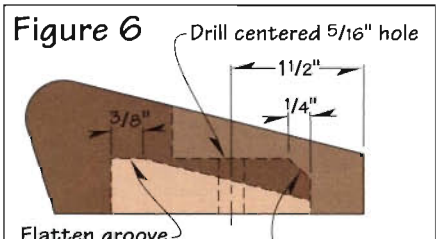
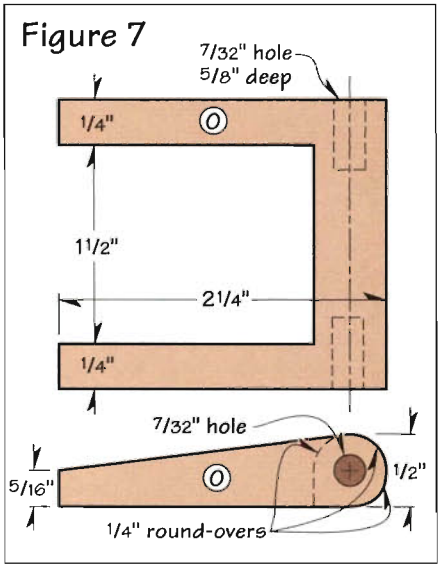
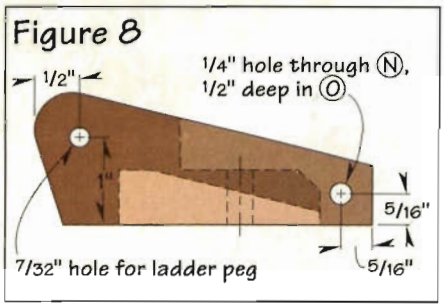


Figure 7





duals. Note: Before gluing, string the wheels on a dowel to align them.

Step 3. Glue a ¼" walnut plug into the outer face of each dual. Next, cut two 3½" lengths of ¼" dowel stock for axles, and glue a dual onto one end of each, inserting the axle through the inner wheel and halfway into the outer wheel.

Step 4. Insert the other end of the axle temporarily into the opposite dual. Apply two or three coats of satin polyurethane finish, scuffing between coats. Finish the front wheels the same way. After the finish has dried, insert the axles through the chassis, and glue on the second set of duals.

Step 5. Stain or paint the heads of two 7/32x1 1/16" axle pegs walnut or dark brown. Apply glue sparingly and carefully to the holes in the front wheel wells, then insert a peg (with wheel) into each. Use a 1/16"-thick spacer to set the clearance.

Step 6. Using 7/32x1 1/16" axle pegs, attach the extension ladder and catch to the cradle. To do this, insert the pegs carefully (without glue) through the cradle sides and ladder stringers and into their holes.

Step 7. Cut a 1⅝" length of 3/16" dowel, and sand the ends round. Insert it through one of the stringers on the top ladder section, then drive it through the bucket stem and into the other stringer.

Step 8. Assemble the cradle temporarily to the ladder platform using a 5/16x1 9/16" axle peg. Check the pivoting action, and adjust if necessary. When everything works properly, drive the pin in permanently without glue. Note: To prop the ladder at a 45° angle, seat the catch in the notches on the bottom ladder section. For a 30° angle, pivot the catch all the way forward so it lies flat in the cradle grooves. WWJ

Illustrations: Cad Art
Photograph: Lynxwiler Photography

SOURCE

Turned Parts Kit. Includes 5–⅝x2¼" people; 8–head/taillights; 2–¼x½" multi-use pegs; 16–¼" mushroom plugs; 4–¼" walnut mushroom plugs; 2–⅜" mushroom plugs; 1–½" mushroom plug; 4–7/32x½" pegs; 6–7/32x1 1/16" pegs; 1–5/16x1 9/16" axle peg; 10–½x1½" grooved wheels; 1–5/16x1" wheel (for steering wheel). Ask for kit no. WWJ-11. Price: $13.29 ppd. Order from:

Cherry Tree Toys, Inc.
800/848-4363

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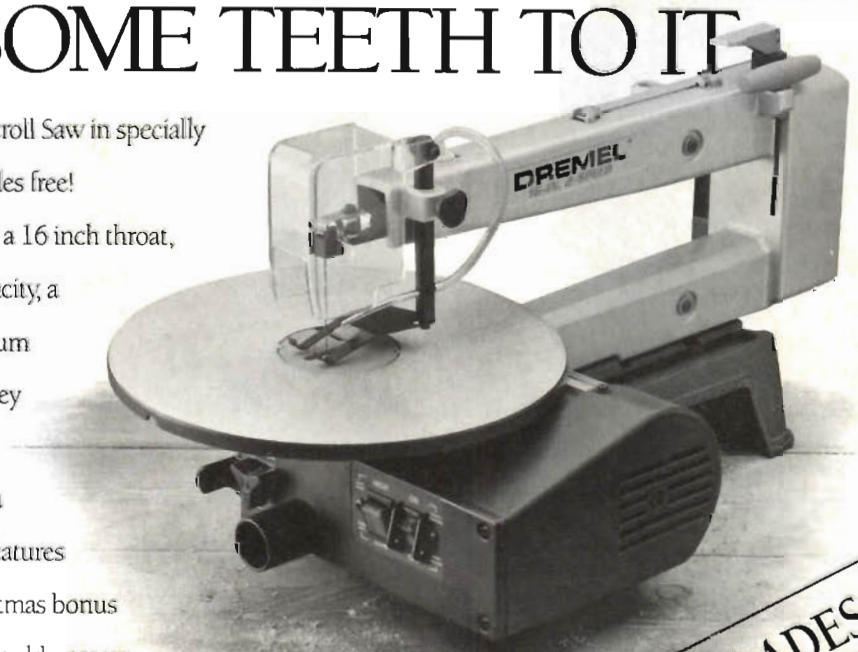


50 FREE BLADES (A $35 VALUE)

DREMEL®

Spice Cabinet

Arched Rails and Book-Matched Panels Make for a Piquant Design

Conventional spice racks leave your bottles of herbs and spices exposed to ultraviolet light, which saps their flavor; and, you seldom see them styled in anything but Early Generic. When Doug Stowe of Eureka Springs, Arkansas, applied himself to these problems, his flair for originality prevailed once again. (Doug, you'll remember, designed the striking earring chest that we presented on our Sept./Oct. '95 cover. See the Craftsman Profile on page 63.)

Assemble Your Materials

For his door panels, Doug selected richly figured Arkansas pecan, which he resawed and book-matched. If you don't have anything similar in stock, we suggest using some variety of crotch or other tension wood that complements the curly maple frame and cabinet.

Doug used ash for the shelves and ash plywood for the back. You'll probably have trouble finding this latter material, so we recommend Baltic birch or other sedately grained birch plywood that has no heartwood in the veneer. The object is to avoid clashing with or overpowering the cabinet's exterior appearance.

You'll need four brass butt hinges and a pair of ¼" bullet catches, which you can order as a kit from the supplier listed in the Sources on *page 42*. Note: If, like most households, yours has accumulated herbs and spices in variously sized containers, check their dimensions and adjust the spacing of your shelves if necessary.

Bill of Materials

Spice Cabinet

Part	T	W	L	Mat.	Qty.
A Sides	11/16"	2⅞"	21½"	M	2
B Top/bottom	11/16"	3⅝"	11½"	M	2
C Shelves*	¼"	2"	10⅝"	A	3
D Back*	¼"	10¾"	20¾"	BP	1
E Outer door stiles	11/16"	¾"	20⅛"	M	2
F Inner door stiles	11/16"	⅝"	20⅛"	M	2
G Top door rails	11/16"	2⅜"	4 11/32"	M	2
H Bottom door rails	11/16"	1⅜"	4 11/32"	M	2
I Door panels* **	½"	4⅝"	17⅞"	P	2
J Door pulls*	⅜"	1¼"	1¼"	W	2
K Wall mounts	⅜"	1⅜"	10⅝"	H	2

*Parts cut to final dimensions during construction. Please read all instructions before cutting.

**To book-match panels, resaw from 5/4 or thicker stock.

Materials List

M–curly maple
BP–Baltic birch plywood
A-ash
P–pecan
W–walnut
H–hardwood

Supplies

2–¼"-dia. bullet catches;
4–⅞x1½" brass butt hinges;
¼" dowel stock; hardening oil finish; paste wax.

Dovetail and Rout the Cabinet Parts

Step 1. Surface enough stock for the sides, top and bottom, door stiles, and door rails to 11/16" thick. For now, rip and crosscut the sides (A), top (B), and bottom (B) to the dimensions listed in the Bill of Materials.

Step 2. Lay out and cut through dovetails in the ends of the sides and mating pins in the top and bottom. (Doug used an adjustable jig and router, cutting his pins and tails to the dimensions detailed on the Front View drawing on *page 41*.) Because the sides differ in width from the top/bottom, index the tails and pins from the back edge of all parts.

Note: Before you rout a groove for the back panel, check the actual thickness of your back-panel stock. If it is significantly less than a full ¼", adjust the groove width accordingly.

Step 3. Fit your table-mounted router with a ¼" straight bit, and set it to cut ¼" deep. Rout a groove (to accept the back) on the inside face of the top and bottom ⅜" from the back edge. (See the detail that accompanies the Side View drawing.) Then, rout an identical groove on the sides, but stop this groove ½" from each end. To do this, clamp a pair of stops to your router-table fence.

Step 4. Lay out ¼"-wide stopped dadoes on the sides to accept the three shelves. (For locations, see the Front View drawing.) To ensure that the paired dadoes will be level, align and clamp the sides (back edge to back edge, like an open book). Then, clamp on a perpendicular guide strip, and set stops to limit the dadoes.

Step 5. Using a plunge router with a ¼" straight bit set to cut ⅜" deep, start at the right-hand stop, and plunge the bit to depth. Rout from right to left, stopping the cut within the vertical groove you routed earlier along the back edge. Plunge the bit into the groove on the second side, again routing from right to left, and continue to the left-hand stop.

Step 6. Lay out and drill ¼" holes for the bullet catches and door stops in the inside faces of the top and bottom. (For locations, see the Exploded View drawing. Adjust the catch hole depth to fit your catches.)

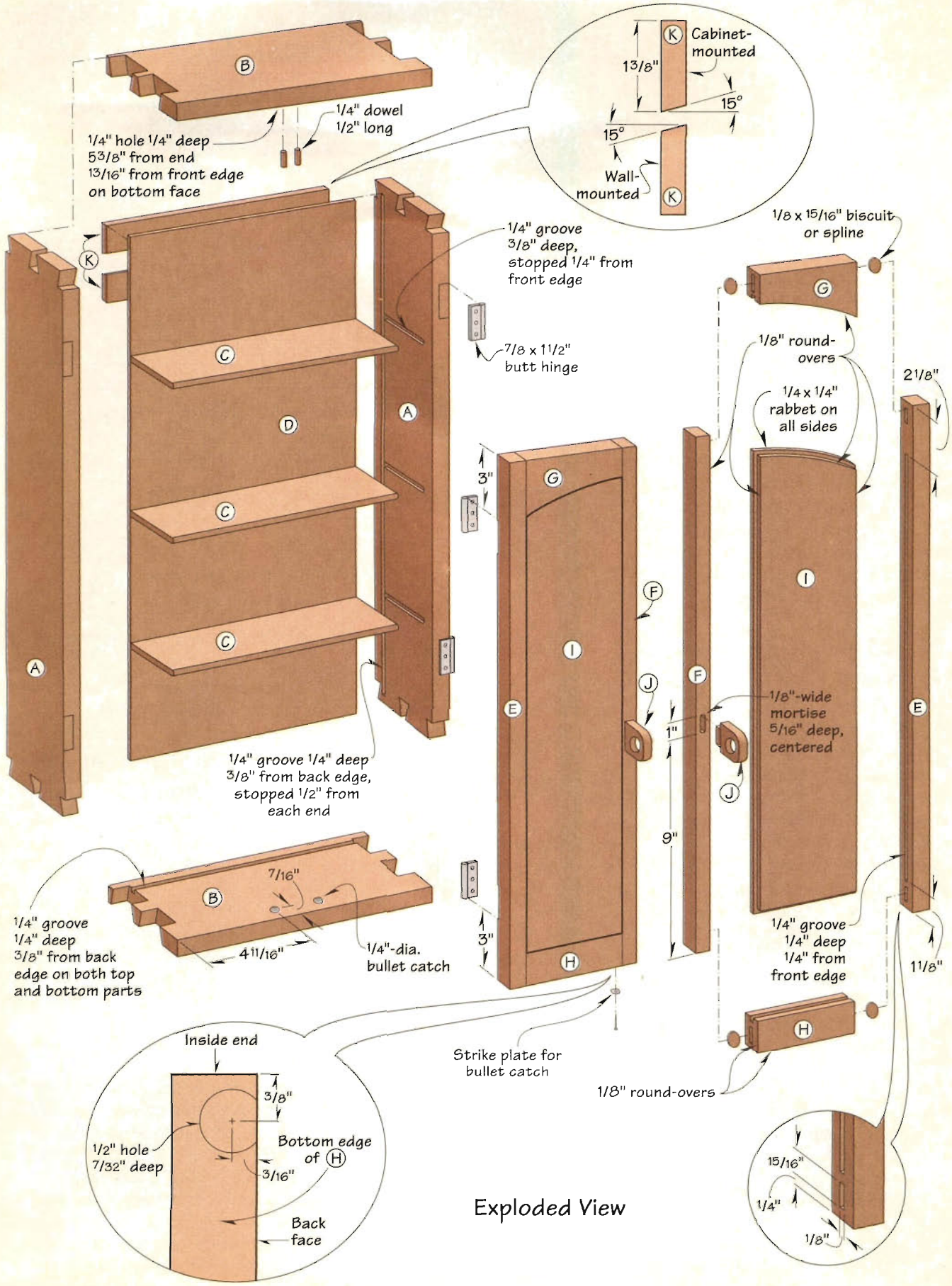
Make the Shelves and Back, Then Assemble the Cabinet

Step 1. From ¼"-thick stock, rip and crosscut the three shelves (C) to 2¼x10⅝". Fit your table-mounted router with a ⅛" round-over bit and fence, and rout one edge (both top and bottom) to create a half-round.

Step 2. Dry-fit the shelves into their dadoes on the sides to check for width. Then, rip the back edge of the shelves to exact width.

Step 3. To establish dimensions for the back, measure the actual length of the sides and the top/bottom, and subtract ⅜". Cut the back (D) to these dimensions from ¼"-thick plywood. Then, finish-sand the shelves, the back, and the inside face of the cabinet parts.

Step 4. Dry-assemble the sides, top, bottom, shelves, and back to check for fit. Adjust any parts that need it. Then, apply glue to the joints


B
1/4" hole 1/4" deep
5 3/8" from end
13/16" from front edge
on bottom face
1/4" dowel
1/2" long
K
13/8"
Cabinet-
mounted
15°
15°
Wall-
mounted
K
1/8 x 15/16" biscuit
or spline
1/4" groove
3/8" deep,
stopped 1/4" from
front edge
7/8 x 1 1/2"
butt hinge
G
1/8" round-
overs
1/4 x 1/4"
rabbet on
all sides
2 1/8"
K
C
D
A
C
C
A
3"
G
I
F
J
E
1/4" groove 1/4" deep
3/8" from back edge,
stopped 1/2" from
each end
1/8"-wide
mortise
5/16" deep,
centered
1"
J
9"
E
B
7/16"
1/4" groove
1/4" deep
3/8" from back
edge on both top
and bottom parts
4 11/16"
1/4"-dia.
bullet catch
3"
H
1/4" groove
1/4" deep
1/4" from
front edge
1 1/8"
Strike plate for
bullet catch
H
1/8" round-overs
Inside end
3/8"
1/2" hole
7/32" deep
Bottom edge
of H
3/16"
Back
face
15/16"
1/4"
1/8"
Exploded View

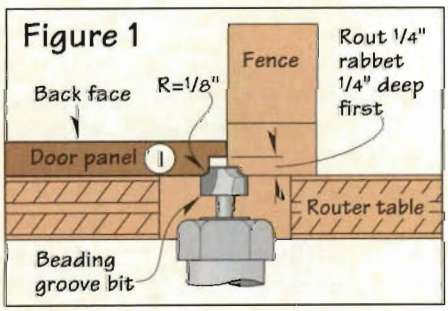
on the top, bottom, and one side, and assemble the tails to the pins. Insert the shelves into their dadoes without glue, then assemble the back into its groove, also using no glue. Now, add the second side and clamp the assembly. Check for squareness and flatness, and adjust if necessary.

Step 5. After the glue has begun to set, remove squeeze-out from the interior surfaces with a chisel. When the glue has dried, sand the tails and pins flush with the outside faces of the cabinet.

Machine and Assemble the Door Parts

Note: Before cutting the door parts, measure the actual width and length of the door recess on the front of your cabinet. Adjust the lengths of the stiles and rails as necessary. You needn't alter the widths of these parts; it's easier to adjust the dimensions of the door panels.

Step 1. From 11/16"-thick maple stock, cut the outer stiles (E), inner stiles (F), top rails (G), and bottom



rails (H) to dimension. On each part, select and mark a front face. Using a 1/2" Forstner bit and fence on your drill press, bore a strike plate hole on the bottom edge of each bottom rail where detailed on the Exploded View.

Step 2. Next, cut slots for loose tenons where detailed on the Exploded View drawing. (Doug mortised his parts with a router mortiser and cut 1/4"-thick loose tenons from scrap stock. We found it more convenient to use miniature biscuits, which require a special slot cutter for use on a table-mounted router. See Sources for a mail-order supplier.)

Step 3. Using a table-mounted router and a 1/8" straight bit, rout mortises for the door pulls on the front faces of the inner stiles. (For location and dimensions, see the Exploded View.) To do this accurately, use a fence and attach stops.

Step 4. To make the door panels (I), cut a piece of 1 1/4" or thicker stock to 5 1/2x18 1/2". Using the bandsaw and rip fence, resaw this piece in half to create book-matched panels. (Before you proceed, see the Pro Tip at *right*.) Then, surface the two panels to 1/2" thick. Dry-assemble a set of stiles and rails, and measure the interior space. Add 3/8" to both the width and length, then cut the panels to these dimensions.

Step 5. Cut mating arcs along the bottom edge of the top rails and the top ends of the door panels. To do this, see "Forming the Arched Panels and Rails" on *page 40*.

Step 6. Rout a 1/4" groove 1/4" deep in the stiles and rails to accept the door panel. (We used a 1/4" slot cutter with a bearing that limited its cutting depth to 1/4".) Install the cutter in your table-mounted router, and adjust it to clear the table by 1/4". Turn all stiles and rails facedown, then rout a groove along one edge of the rails. On the stiles, stop the groove 1/4" beyond the point (at both ends) where the stiles join the rails. Then, square the ends of the stile grooves with a chisel.

Step 7. Fit your table-mounted router with a 1/8" round-over bit, and rout a round-over on the front edges—not the ends—of all stiles. Rout the ends and inside edges of the rails.

Step 8. Using your table-mounted router and a rabbeting bit, rout a 1/4" rabbet 1/4" deep on the front edge of the door panels. This will create a tongue that should fit the stile and rail grooves. If it doesn't fit, adjust the cutting depth of the bit and rerout.

Step 9. Round over the new front edge of the door panels (the edge created by the rabbet) as shown in *figure 1*. To do this, use your table-mounted router, a fence, and a 1/8" beading groove bit (Freud no. 39-202).

Step 10. Dry-assemble the doors (stiles, rails, panels, and loose tenons or biscuits). Check for fit, and adjust as necessary. Then, glue, assemble, and clamp the doors, allowing the panels to float in their grooves without glue. Check for square, and allow the glue to dry. Finish-sand the doors,

PRO TIP

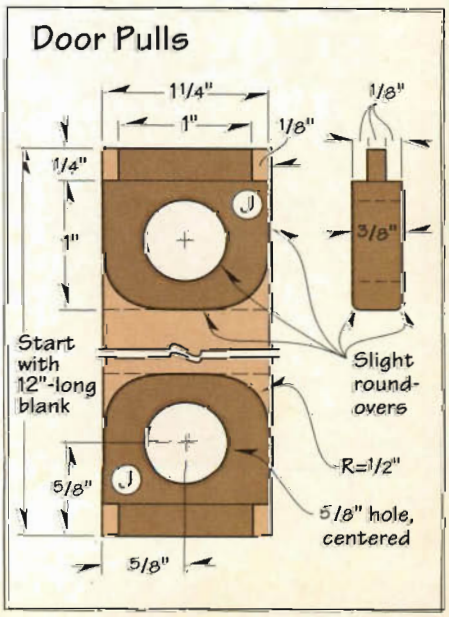
Panels often dry and move soon after resawing. We suggest letting them "rest" for a couple of hours, then checking them for movement before surfacing them to final thickness. Cupping or twisting panels can put serious stress on small stiles and rails like these.

being careful not to flatten the round-overs any more than necessary.

Machine the Door Pulls, Then Install the Doors

Step 1. From 3/8"-thick walnut stock, cut a blank for the door pulls (J) to 1 1/4x12". (See the Door Pulls drawing *below*.) Mount a 60- or 80-tooth trim blade on your tablesaw, and attach an extension to the miter gauge. Using a stopblock for accuracy, lay the blank flat, and cut the tenons to thickness. Note: Work up to final thickness, test-fitting the tenons in their mortises as you work. At each stopblock setting, turn the blank on edge and cut the tenons to width. Once you've established final thickness, file the edges of the tenons round to fit in the mortises.

Step 2. Lay out the radii and hole centerpoints on the blank where shown on the Door Pull drawing.



Forming the Arched Panels and Rails

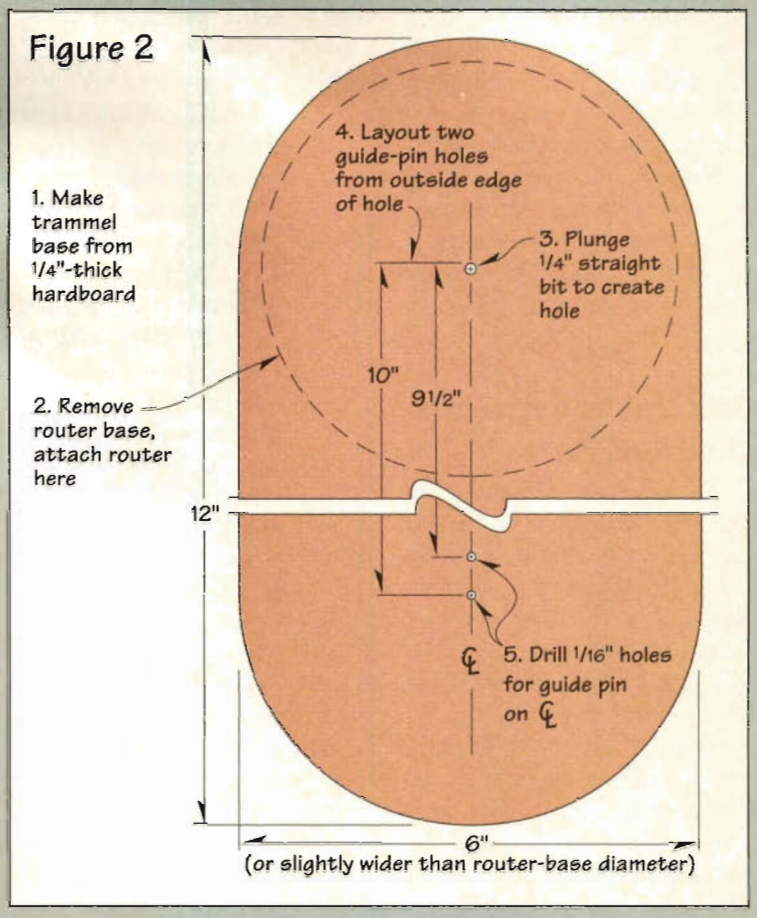
To cut mating arcs on the top rails and panel ends, first make templates using a trammel base on your router. To make the base, cut a 6x12" piece of ¼"-thick hardboard, then find and mark a lengthwise centerline. (See *figure 2.*) To remove excess stock, we radiused the ends to 6" diameter.

Remove the base from your router (a plunge router, if you have one), then center and mount one end of your trammel base in its place, countersinking the screw holes. Install a ¼" bit in the router, then plunge it through the base to create a hole. (If you're using a fixed-base router, loosen the depth-adjusting screw and carefully lower the spinning bit until it cuts through.) Lay out and drill a pair of centered 1/16" guide-pin holes 9½" and 10" from the outside edge of the routed hole.

To make the templates for the rail and panel, first cut a 9½x11⅞" piece of ¼" hardboard. (See *figure 3.*) Find and mark a lengthwise centerline. Next, drill a 1/16" hole 1" from the bottom edge on this centerline. Secure the template blank to a large piece of scrap plywood using wire nails at the corners.

Set the cutting depth on the router to cut all the way through the template stock. Align the 9½" hole in the trammel base with the template blank hole, then drive a wire nail through the two holes and into the plywood work surface. Start at the right edge of the blank, and rout far enough to clear the centerline. This will create the 9½"-radius arc for the top rail as shown in figure 3.

Figure 2

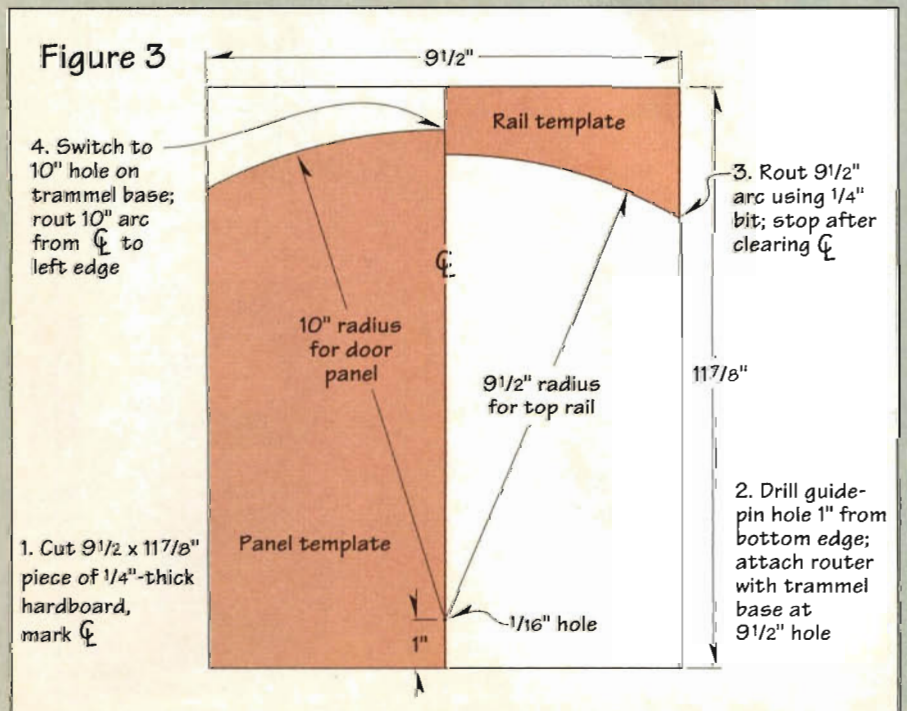


Switch to the 10" guide-pin hole on the base, and reattach it to the template blank. Before you start the router, position the bit just to the right of the centerline on the blank. Plunge in at this point, and rout to the left edge of the template blank.

Remove the template blank from the work surface, and rip it to one side of the centerline to ensure that the door-panel template is a full 4¾" wide. Because the rails are ½" shorter than the width of the panels, you'll need to trim ¼" from the right end, then trim the left end of the rail template to make it 4¼" long.

Secure the two templates to their respective parts using double-faced tape. Bandsaw outside the template. Then, fit your table-mounted router with a flush-trim bit, elevating it so the bearing will ride on the template edge. Rout the arc to final shape on the first part. To bandsaw and rout the other rail and panel, remove the templates, flip them over, and reattach them to the second of the two parts.

Figure 3



Bore the holes using a ⅝" Forstner bit. Crosscut the pulls to length, then align and stack them using double-faced tape. Now, sand the radii to shape.

Step 3. Separate the stacked blanks. Using 150-grit sandpaper, round the edge of each hole on both faces. Round the outside edges, then finish-sand both pulls.

Step 4. Glue and clamp the door pulls into their mortises. Then, install the strike plates for the bullet catches in their counterbores.

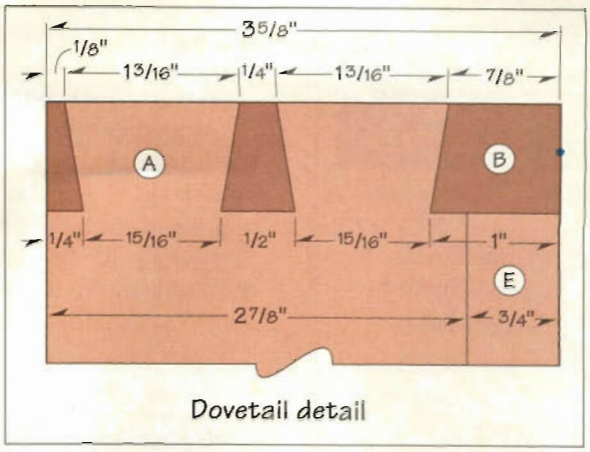
Step 5. Lay out and cut hinge mortises on the cabinet and doors where shown on the Exploded View drawing. (We used a marking gauge to establish the mortise width on door stiles and cabinet side edges. Then, we laid out and cut mortises on the doors. We drilled holes and mounted the hinges, then centered the doors in their recess. We marked each hinge location along the edge of the sides, then cut the cabinet mortises.)

Step 6. Drill hinge holes in the cabinet mortises, then hang the doors temporarily. Cut and sand the door stops (¼" dowels) and glue them into their holes. Now, mount the bullet catches in their holes. Check the doors, stops, and catches for fit and action, then remove the doors to apply finish.

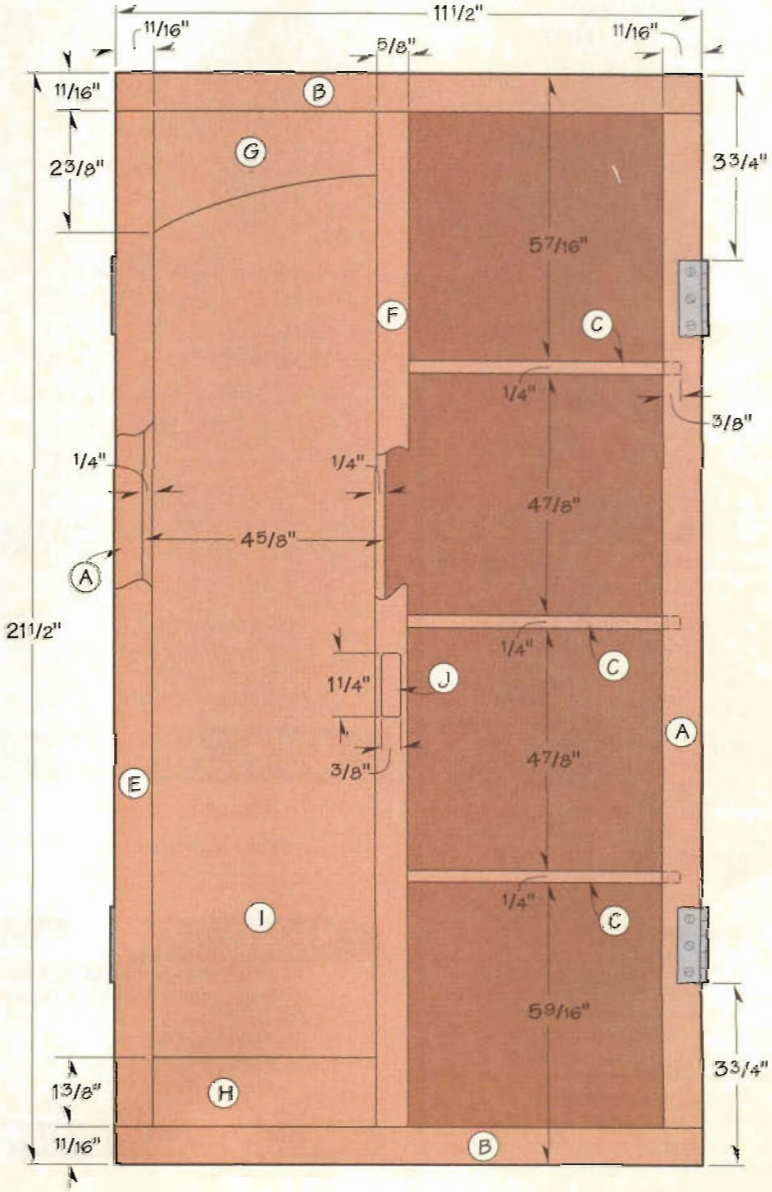
Add a Wall Mount, Then Apply Finish

Step 1. To make a pair of wall mounts (K), first cut a 3x12 blank from ⅝"-thick hardwood. Tilt your tablesaw blade to 15° from perpendicular, then bevel-rip the blank to 1⅜" wide to yield two mounting strips of roughly equal width. Trim one of these to fit between the cabinet sides, then glue and clamp it—with the long point of the bevel facing outward—to the back and the underside of the top. Drive three #4x½" screws throught eh mount and into the back.

Step 2. Trim the other wall mount to 10" long. Drill and countersink a centered hole, then space two more holes evenly, one near each end. Locate a stud in your chosen wall



Dovetail detail



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location, and screw the mount to it using the center hole. Use molley screws or wall inserts to secure the ends to the wall.

Step 3. Apply your choice of finish to the outside of the cabinet. (Doug used two coats of Deftoil Natural Danish Oil Finish, then applied a coat of paste wax after the finish had dried thoroughly. To eliminate vapors inside the cabinet, he applied wax only.) Now, reattach the doors.

Photograph: *Lynxwiler Photography*

Sources

Hardware Kit. Includes four solid brass butt hinges, ⅞x1½" (catalog no. 25718); 2–¼"-dia. solid brass bullet catches with strike plates (no. 62075). Price: $9.95 ppd. Ask for kit no. 16247. Order from:

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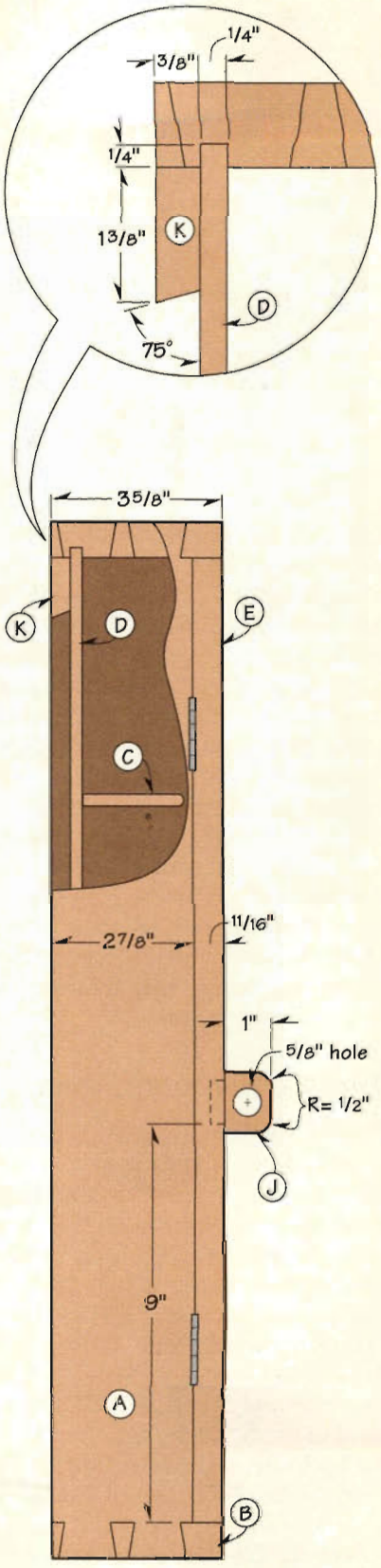

Side View

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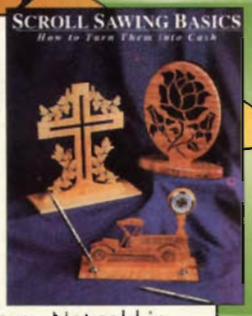

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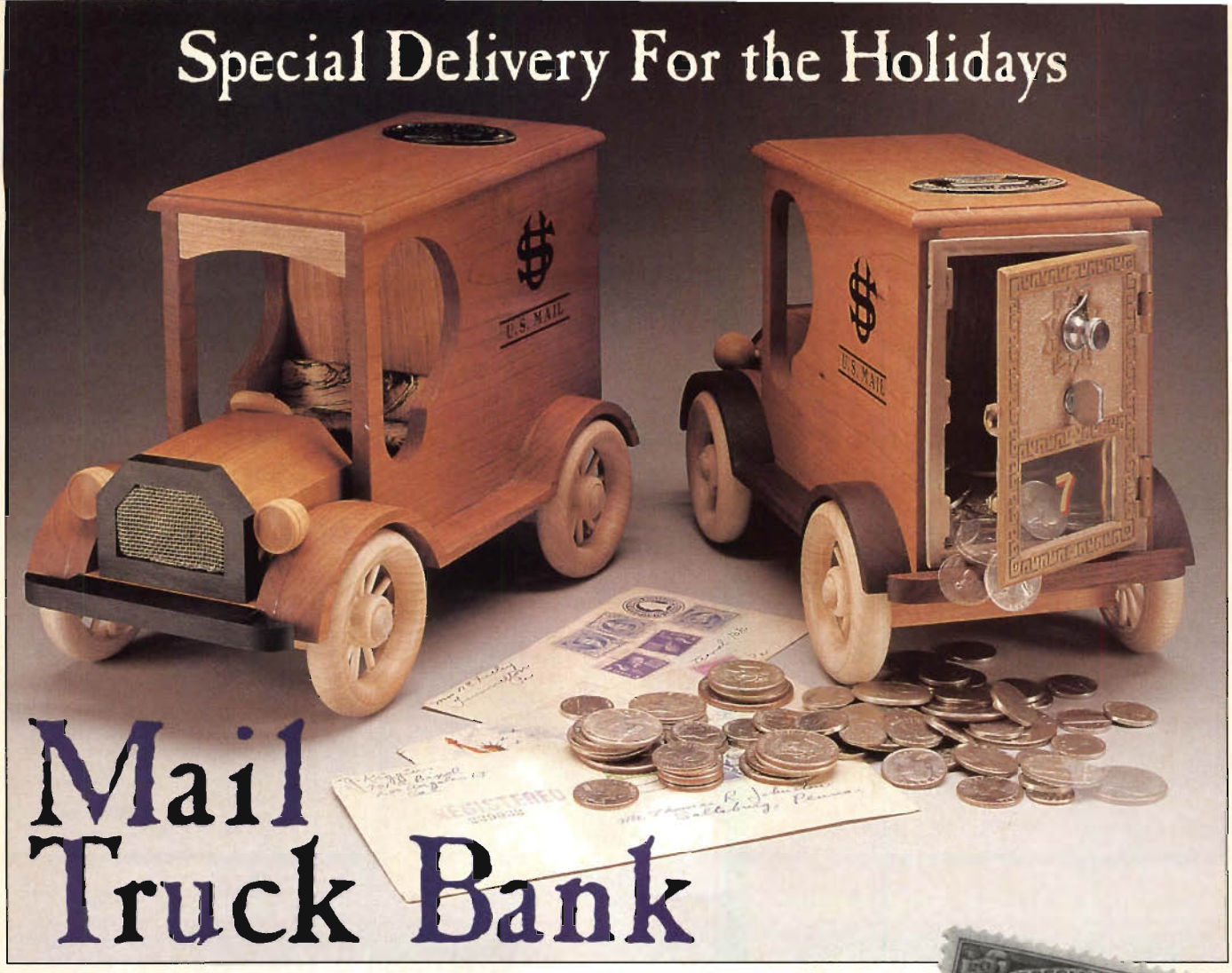


Mail Truck Bank

Few things can hold a kid's attention like a combination lock. Put one on a bank, and that fascination carries over into an interest in saving money. This design, from Jane Ingram of Greenville, South Carolina, ingeniously combines form with function—it uses a surplus post-office box door to commemorate the stalwart little truck that kept America's mail moving during the '20s. (See the 1925 issue special delivery stamp at right.)

Before You Start

This project calls for a no. 1 (3⅝ x 5") U. S. post-office box door, an escutcheon plate, spoked wooden wheels with axle pegs, wooden headlights, an additional small wheel with axle peg (for a steering wheel), and a small piece of aluminum or galvanized window screen (for a radiator grille). The designer has agreed to supply these parts as well as two sets of U.S. Mail decals, so you'll have a choice of black or gold. (See the Source listed at the end of the article.)

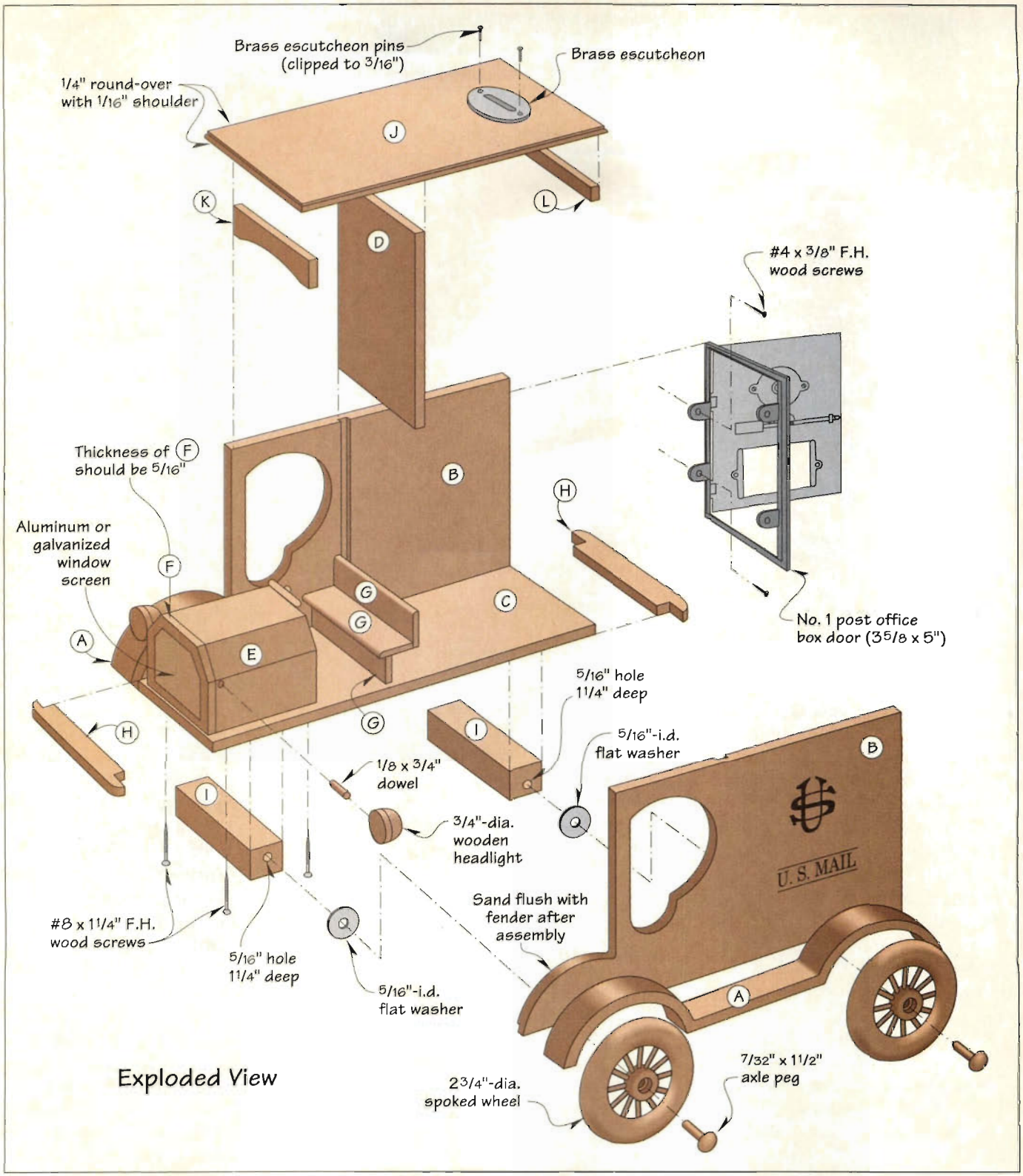
Because several different contractors have supplied official P.O. box doors over the years, the doors vary slightly in dimensions and mounting brackets. Whether you order the kit or find a door on your own, we suggest you acquire the hardware and read all instructions before cutting any stock.

We assembled some of our bank with slow-cure cyanoacrylate, using a spray accelerator on some of the joints. We found the slow-cure formula well-suited to a project like this that involves a number of small, hard-to-clamp pieces that need to be assembled one or two at a time.

If you opt to try cyanoacrylate, apply it more sparingly than you would yellow or white glue, and use waxed paper to avoid bonding workpieces to your work surface. Note: Avoid using CAs to assemble the body (sides, floorboard, and cab panel)—you'll need more open time than even the "slow-cure" formula offers to square these parts properly.

Build the Basic Body

Step 1. To make the two fenders (A), first cut two 2x11" blanks from ¾"-thick stock. (We used cherry, although the truck looks good in walnut, too. Align and stack the blanks using double-faced tape. Then, transfer the full-sized Fender pattern shown on *page 49* to the top face. Fit



Exploded View

your bandsaw with a ¼" fine-tooth blade, and saw the fenders to shape, keeping the blade outside the line.

Step 2. Sand all fender surfaces to the line. An oscillating spindle sander works best for the wheel wells. To smooth the outside contours, use a 1" belt sander or stationary disc sander. Use a scraper and chisel to flatten the running boards. Separate the fenders to complete the sanding.

Step 3. From ⅜"-thick stock, cut the sides (B) to the dimensions listed in the Bill of Materials. Stack the sides using double-faced tape, then lay out the front-end profile, including the fender contour, on the top face. (Use one of the fenders as a template to trace this contour. Also, see the Side drawing on *page 50.*) Bandsaw the fender contour to shape, keeping the blade outside the line. Then, use the bandsaw rip fence to make the straight crosscut. Sand the crosscut end smooth.

Step 4. Transfer the full-sized Window pattern shown on *page 49* to the top face of the stacked sides. Drill

Bill of Materials

Mail Truck

Part		T	W	L	Mat.	Qty.
A	fenders*	¼"	¾"	10¼"	C	2
B	sides	⅜"	5½"	10¼"	C	2
C	floorboard	⅜"	3½"	10⅛"	C	1
D	cab wall**	⅜"	5⅛"	3½"	C	1
E	hood	2"	2¾"	2¾"	C	1
F	radiator*	5/16"	2"	2¾"	E	1
G	seat parts*	¼"	1"	3¼"	SM	3
H	bumpers	⅜"	⅝"	5"	E	2
I	axle blocks	1"	1"	4"	C	2
J	roof	¼"	4¼"	7⅞"	C	1
K	cab filler*	⅜"	¾"	3¼"	C	1
L	door filler*	⅜"	7/16"	3¼"	C	1

*Parts cut to final dimensions during construction. Please read all instructions before cutting.

**Grain direction on cab wall runs horizontally.

Materials List

C–cherry
SM–spalted maple
E–ebony

Supplies

Supplies: ⅛" dowel; #4x⅜", #8x1¼" flathead wood screws; 5/16"-i.d. flat washers; 3x3" piece of aluminum window screen.

a start hole, then scrollsaw the window to shape, keeping the blade inside the line. Using a 1" drum on your oscillating spindle sander, sand the scrollsawn window to the line.

Step 5. Select the better face of each side, and mark this the outside face. Fit your tablesaw with a ⅜" dado head, and elevate it to cut ⅛" deep. Using a backing board to minimize chip-out, dado the inside face of each side where shown on the Side drawing. Next, reset the fence, and cut a ⅜"-wide rabbet to the same depth along the inside bottom edge of the two sides.

Step 6. Finish-sand both faces of the sides. Then, check the fenders to make sure you have them oriented correctly (larger wheel well forward). Glue and clamp a fender to each outside face, aligning the ends of the parts.

Step 7. After the glue has dried, sand the fenders flush with the contoured front end of the sides. (We used a 1" belt sander.) Remove any squeeze-out along the rest of the fender with a chisel, being careful not to scratch the parts.

Step 8. From ⅜"-thick stock, cut the floorboard (C) and cab wall (D) to dimension. Note: To minimize wood-movement problems, cut the cab wall with the grain running horizontally.

Step 9. Finish-sand the floorboard and cab wall. Next, dry-assemble these two parts with the sides, and check for fit. Note: Seat the cab wall in the dadoes and the floorboard in the rabbet. Now, glue and assemble the parts. Check for squareness, then clamp.

Make the Hood and Radiator Assembly

Step 1. To make the hood (E), cut a 2¾x12" blank from 2"-thick stock. Move your tablesaw rip fence to the side of the blade opposite its direction of tilt, then set it 2⅛" from the blade. Tilt the blade to 45°, and chamfer one of the top edges of the hood blank. Turn the blank end for end, and chamfer the other top edge. Crosscut a 2¾"-long hood from the blank.

Step 2. Trace one end of the hood onto 5/16"-thick contrasting stock. (We used a scrap of ebony.) Bandsaw the radiator (F) to shape, keeping the blade outside the line. Adhere the radiator to the front end of the hood using double-faced tape, then sand it flush with the hood on all edges. Remove the radiator from the hood.

Step 3. Using a marking gauge, scratch a line ⅜" in from all edges of the radiator. Drill a start hole inside the waste area, then scrollsaw inside the line to remove the waste. Using flat and half-round files, file to the line.

Step 4. To make the grille, trace both the outside and inside outlines of the radiator onto a small piece of aluminum window screen. Cut along the outside line, then cut a V at each of the six corners, stopping the cut at the inside line. This will allow the screen to fold in and conform to the interior of the radiator.

Step 5. To make a gluing form for the grille, trace the radiator's interior outline onto ¾"-thick scrap stock. Bandsaw this piece to shape, keeping the blade on the line, then cover it with waxed paper. Fold the grille around the form, bending it at the cutouts, and pull it snug. Apply slow-cure cyanoacrylate to the inside edges of the radiator, then insert the grille and form into the radiator from the back. Remove any squeeze-out and allow the cyanoacrylate to cure.

Step 6. Remove the form and sand the back face of the radiator (and excess screen) flat. Using paint or a permanent marker, blacken the front end of the hood where it will be visible through the grille. Glue and clamp the radiator to the hood, then remove any squeeze-out.

Step 7. Drill holes in the hood for the steering-wheel column and headlights. (For location and dimensions, see the Hood drawing on *page 50.*)

Step 8. Lay out a centered dowel hole on each headlight. Note: Make sure you position the holes identically so the headlights will attach symmetrically to the hood. Clamp each one into a handscrew clamp laid flat on the drill-press table, set the depth stop, and drill a ⅛" hole ⅜" deep.

Step 9. Glue the steering wheel to the column, then glue the column into its hole. Cut two ¾" lengths of ⅛" dowel, and glue one into each headlight. Glue the dowels into the hood, and level the headlights. (We used slow-cure cyanoacrylate for these parts.)

Add the Seat, Bumpers, and Axle Blocks

Step 1. To make the seat parts (G), cut a 12" strip of ¼x1" stock. (We used a scrap of spalted maple.) Cut a 4" strip from this blank, and set it aside for the seat base. (See the Seat Assembly drawing on *page 50.*) Rout a ⅛" round-over along one edge of the remaining blank, and use it for the seat bench and back.

Step 2. Measure the cab interior, then cut the three seat parts ⅛" too long. Using a stopblock on your miter-gauge extension, trim the parts to fit snugly. Next, glue the seat base to the bench and the bench to the back where shown on the Seat Assembly drawing. (We applied slow-cure cyanoacrylate and held the parts against the edge of our saw table to square them.) Apply glue to the cab wall and to the bottom edge of the seat base, then maneuver the assembled seat into position without smearing the glue. (Again, slow-cure cyanoacrylate made this step much easier.)

Step 3. To make the bumpers (H), start with a ⅜x⅝x12" blank. (We used ebony.) Cut each bumper to 5" long, then bandsaw a ¼x¾" notch in the back edge at each end where shown on the Bumper drawing on *page 50.* Lay out a 1" partial radius on each end of the front edge, then sand these radii to the line. (We used a stationary disc sander.)

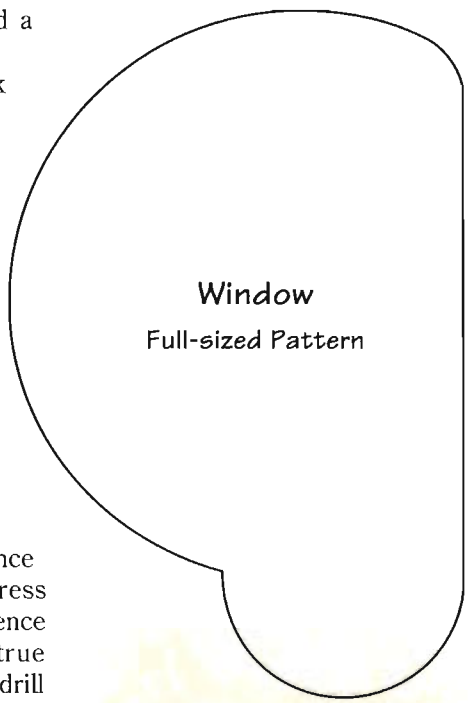
Step 4. Drill two 1/16" shank holes through each bumper. Then, center and glue a bumper to each end of the floorboard. Using the shank holes as guides, drill pilot holes into the floorboard. Now, drive 1¼" brads, set them, and fill the holes.

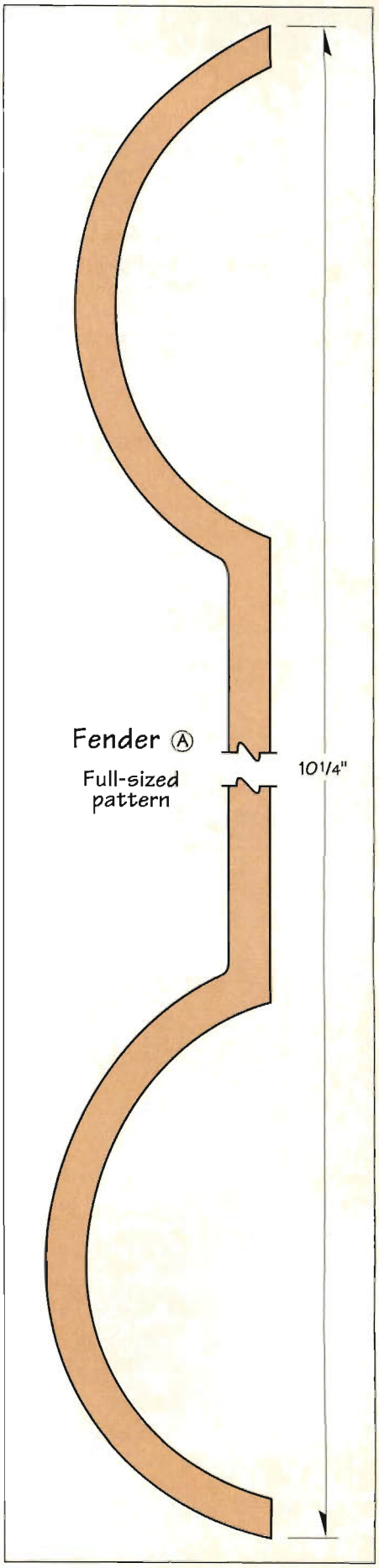
Step 5. Rip a 1x1x12" blank. From it, crosscut two 4"-long axle blocks (I). On one end of one of the blocks, locate and mark a point ⅜" from one edge and centered side to side. Use this point to position a tall fence and stopblock on your drill-press table. Clamp each block to the fence and stopblock. Measure the true diameter of your axle pegs, then drill an axle-peg hole 1¼" deep in both ends. Note: As you drill the first hole in each block, mark the near edge (⅜" from the hole centerpoint) to ensure that you orient the block the same way before drilling the opposite end. (For help on vertically positioning the wheels in the wheel wells, see the Pro Tip on *page 51.*)

Step 6. After you've positioned the wheels vertically, place the body on a work table that allows you to view it from both sides without moving it. Set the body on the assembled blocks and wheels, then maneuver the wheels to center them horizontally in the wells. Now, adjust the wheels on the opposite side to center them. Once you've centered the wheels in the wells on both sides, make a pencil mark on the floorboard along one edge of each block. Turn the body upside down, and use a try square to scribe a perpendicular line at each pencil mark. Align the blocks with these lines, or, if necessary, cut dadoes for the blocks. Center them from side to side, then glue and clamp them to the floorboard.

Assemble the Hood and Door to the Body

Step 1. Center the hood on the front of the floorboard so its back end





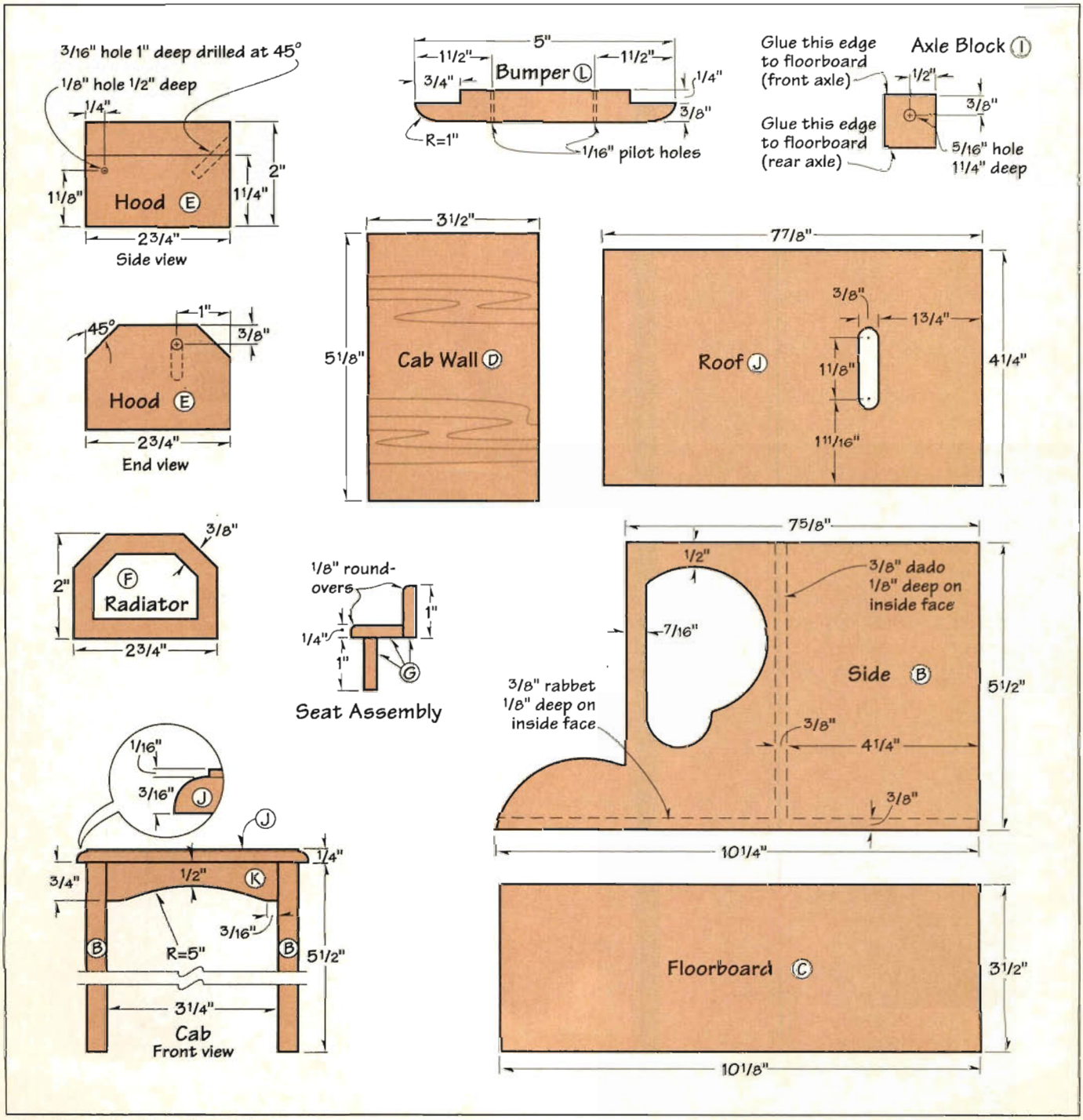
is approximately flush with the back edge of the cab posts. Make faint pencil marks to mark this location, then temporarily adhere the hood to the floorboard with double-faced tape. Drill and countersink four shank and pilot holes—two in front of the axle block, two behind it—through the bottom face of the floorboard and into the hood. Remove the hood, peel off the tape, and set the hood aside for now.

Step 2. Position the P.O. box door in the back opening with its bottom edge resting on the bumper. Mark the four screw-hole locations for the mounting brackets with a short pencil. Note: Space is so tight that you'll have trouble using even a right-angle or flex-shaft drill. We found it necessary to "drill" holes using the #4x⅜" screws themselves, which is not an elegant solution. However, the mounting brackets on the door will conceal any tear-out. After you've "drilled" the four holes, temporarily attach the door with screws to check its position. Now, remove the door until later.

Make the Roof, Then Add the Coin Slot

Step 1. From ¼"-thick stock, rip and crosscut the roof (J) to dimension. (See the Roof drawing *below*.) Using a ¼" round-over bit, rout the ends and then the edges. (We elevated the bit enough to create a slight shoulder along the top edge. We made three passes, gradually raising the bit to full height to make a cleaner cut.)

Step 2. Lay out the coin slot where shown on the Roof drawing. Using a



fence on your drill-press table, drill overlapping ⅜" holes to rough out the slot. File or scrollsaw the slot edges flat, keeping in mind that this slot will be concealed by the escutcheon plate. Now, finish-sand the roof.

Step 3. Center the escutcheon plate over the coin slot, then mark the hole locations. Drill 1/16" holes ⅛" deep. Clip the brass escutcheon pins that come with the plate to 3/16" long. Now, apply slow-cure cyanoacrylate sparingly to the back of the bronze plate, and position it on the roof so the holes align. Dip the pins in cyanoacrylate and insert them into the holes. Hold the plate in place until the glue cures.

Step 4. Center the roof on top of the body, then mark its location faintly on the underside. Apply glue to the top edges of the body, position the roof, then gently clamp. Remove any squeeze-out.

Step 5. To make the cab and door fillers, first cut a ⅜x¾x12" blank. Crosscut a 3½"-long piece for the cab filler (K), then trim it to fit snugly between the top front ends of the cab. (See the Cab Front View *opposite*.) Next, lay out a 5"-radius arc on the bottom edge, centering it 3/16" from either end. Sand the arc to shape using a drum or spindle sander. Now, finish-sand the cab filler, then glue and clamp it to the underside of the roof.

Step 6. Position the P.O. box door in its opening, and measure the gap between the top of the door and the roof. Add ⅛", then rip the remainder of your blank to this width. Trim the door filler (L) to fit snugly between the sides, then glue and clamp it to the underside of the roof.

Meet The Designer

Photograph: Joe F. Jordan

Although she enjoys running her own woodworking business, Jane Ingram of Greenville, South Carolina, gets most excited about post-office box doors. Most of us take these for granted as a mundane part of the landscape, but talking to Jane for 10 minutes will pique your interest.

"Through the early 1900s, you'd usually find the post office located in the general store," says Jane. "This was the hub of your social activities during the day, a place for you to gather and swap news. Until 1932, postmasters actually bought and owned the equipment themselves."

When she's not designing and building projects around doors of various styles and vintages, Jane tracks down rare specimens for her personal collection. Her home, which resembles a postal museum, showcases 550 different doors dating from 1863 to 1974, some of them one-of-a-kind.

While delving into their origins, Jane uncovered enough information to write a book—so she did. The earliest boxes had wooden doors, which eventually gave way to cast bronze. During the "bronze age," sizes, designs, and lock styles proliferated, which accounts for most of Jane's collection.

PRO TIP

Positioning the wheels vertically in the front and back wheel wells requires a bit of trial and error. First, dry-assemble the wheels, pegs, and blocks. Place the body on the blocks, orienting the front block so that the edge nearest the axle hole faces up. Orient the rear block so that the opposite edge faces up. (The offset holes and the difference between radii on the front and back wheel wells should raise the back end of the truck slightly.)

Check for wheel position. You should have about ⅛" clearance between the top of the wheels and their respective wells. If you end up with too much clearance between the wheel and its well, disassemble the parts and rip 1/16" or more from the top edge of the axle block. Mark this edge, reassemble, and check again. If necessary, remove more stock.

If you still have too much clearance and find that you're too close to the axle hole to remove any more stock, cut a shallow dado in the underside of the floorboard. Note: Before you do this, see Step 6 on *page 49* to position the dado horizontally.

Now, For the Finish and Final Assembly

Step 1. Using a small artist's brush, apply gold enamel to the grille.

Step 2. Apply a hardening oil finish, such as Waterlox or Minwax Antique Oil, to the truck, the hood assembly, the wheels, and the axle-peg heads. Wipe off the excess according to the manufacturer's instructions, then repeat. After the second coat has dried overnight, lay out decal locations, then apply the decals. When the decals have dried, apply a coat of paste wax to the exterior surfaces.

Step 3. Attach the hood to the floorboard using #8x1¼" flathead wood screws. Next, use #4x⅜" screws to mount the door in its opening. Fit each wheel with an axle peg and washer, then drive the pegs into their holes in the axle blocks. (We refrained from gluing the pegs to make wheel replacement or adjustment easier.) Check the action to make sure the wheels turn freely but don't wobble. WW

Project design: Jane Ingram
Photograph: Studio Alex

SOURCES

Hardware and Turned Parts Kit. Includes reconditioned bronze U.S. post office box door (no. 1) and four mounting screws; brass escutcheon plate with pins; 4–2¾"-dia. spoked birch wheels with 5/16"-dia. axle pegs; 1–1"-dia. birch wheel with ⅛"-dia. peg; 2–¾"-dia. birch headlights; 3x3" aluminum screen; 2–sets U.S. Mail decals (black and gold). Price: $23.95 ppd. Order from:

Little Wood Works
104 Batesview Drive
Greenville, SC 29607
803/233-9931

A COLONIAL CHARMER FROM BEREA COLLEGE'S WOODCRAFTS SHOP

GOVERNOR WINTHROP CABINET

The Berea furniture catalog offers this fetching design as a companion to the Slant-Front Desk (shown below) that we featured on our cover three years ago (Nov./Dec. '92). To open up additional possibilities, however, we called on Dick Coers, our designer/craftsman, to come up with a floor cabinet to support this piece. (That's Dick's elegant solution you see in the photograph. Look for it in our Jan./Feb. '96 issue.)

By the way, don't let the leaded glass in this cabinet intimidate you. On page 14, *Anita Roth demonstrates that it's simpler to make than it looks.*

Before You Start

At the Berea Woodcrafts shop, they usually make this cabinet of walnut, which looks every bit as elegant as the cherry we used. Your choice will probably depend on whether you're attempting to match the cabinet to an existing desk or bookcase.

Dick used several specialized router bits on this project, so we've listed their catalog numbers in the instructions. We've asked a mail-order supplier to provide a kit that includes the hinges, door pulls, shelf support pins, and door catch. (See the Source listed at the end of the article.)

Glue Up the Panels

Step 1. Joint and plane cherry stock to 15/16" rough thickness. (See the Pro Tip on *page 59*.) Match boards carefully for grain and color, then edge-glue panels for the top, base, sides, and crown. Make the base blank at least 10½x36" and the others an inch longer and wider than dimensioned in the Bill of Materials. Note: To make the joint on the crown as inconspicuous as possible, glue up the blank from an 8" width and a 3" width.

Step 2. Plane your 10½x36" base blank and a ⅞x21" blank for the breadboard ends to 13/16" final thickness. Rip a ⅞"-wide strip from one edge of the base panel. (This will become the molded front edge.) Joint the ripped edge of this strip to 13/16" wide, then joint the ripped edge of the blank. Joint one edge of the 21"-long blank to 13/16" wide.

Step 3. Crosscut the base to 34". (This allows for a 7/16"-long tongue on each end.) Note: Wait until after you've breadboarded the ends to rip the panel to final width.

Step 4. Using a ¼" dado head, cut a centered 7/16"-deep groove along the jointed edge of your breadboard end stock. Change to a ½" dado head, and add a scrap piece to your rip fence. Elevate the dado head to 9/32" and set the fence to expose a 7/16" width of blade. Cut a tongue on each end of the base panel. You need a snug-fitting tongue, so sneak up to the setting, test-fitting the tongue in the groove.

Step 5. Miter-cut both ends of the front edge strip to panel length minus tongue length. Glue and clamp it to the jointed edge of the base panel.

Step 6. Miter-cut and dry-fit the end pieces to mate with the front edge strip. Next, lay out and drill a ⅛" hole 1/16" deep through the bottom face of each end. (See *figure 1.*) Center this hole over the tongue 1½" from the back edge of the panel. The hole should penetrate through the tongue but not break through the top face of the end.

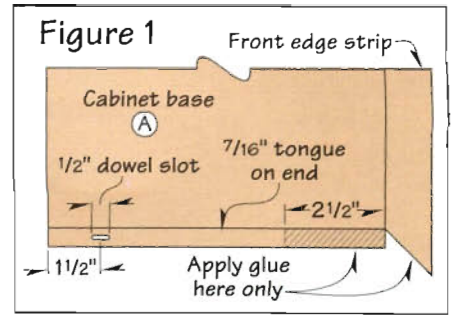
Step 7. Elongate the hole in each tongue (both directions) to create a ½"-long slot as shown in figure 1.

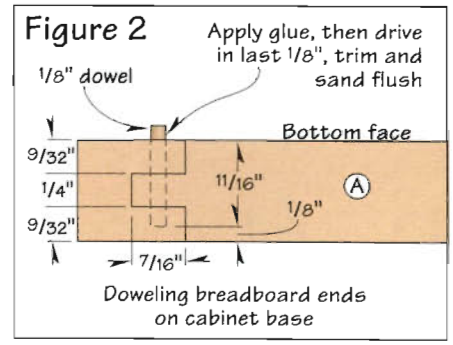
Step 8. Apply glue only to the mitered surfaces and along the first 2½" of the tongue, then clamp the ends to the panel. Cut two 1" lengths of ⅛" dowel, and insert them partially into the holes. Apply glue to the last ⅛" before inserting them the rest of the way (*figure 2*). Note: Use glue sparingly here to avoid locking the dowels in the slots. Trim and sand the dowel ends flush.

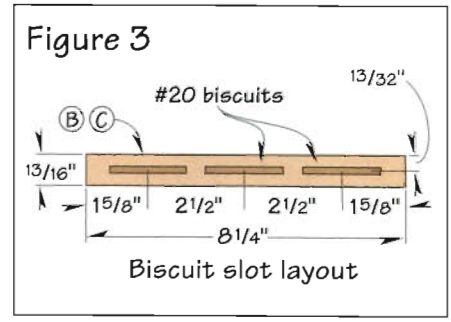
Prepare and Assemble the Cabinet Parts

Step 1. Rip the back edge of the base to 9⅝" final width. Cut the top (B) and sides (C) to dimension.

Step 2. Select and mark an inside face and top end on each side. Using a plate joiner, slot the inside top face of both sides and both ends of the top for three #20 biscuits where shown in *figure 3.*







Step 3. Fit your table-mounted router with a classical ogee bit (Freud no. 38-614). Rout the top front edge and ends of the base (*figure 4*). Note: To get a clean profile without end-

Builder's Notes

This project requires a lot of similarly colored cherry heartwood. You can't get by using sapwood except on the case base, case top, and maybe a little on the shelves.

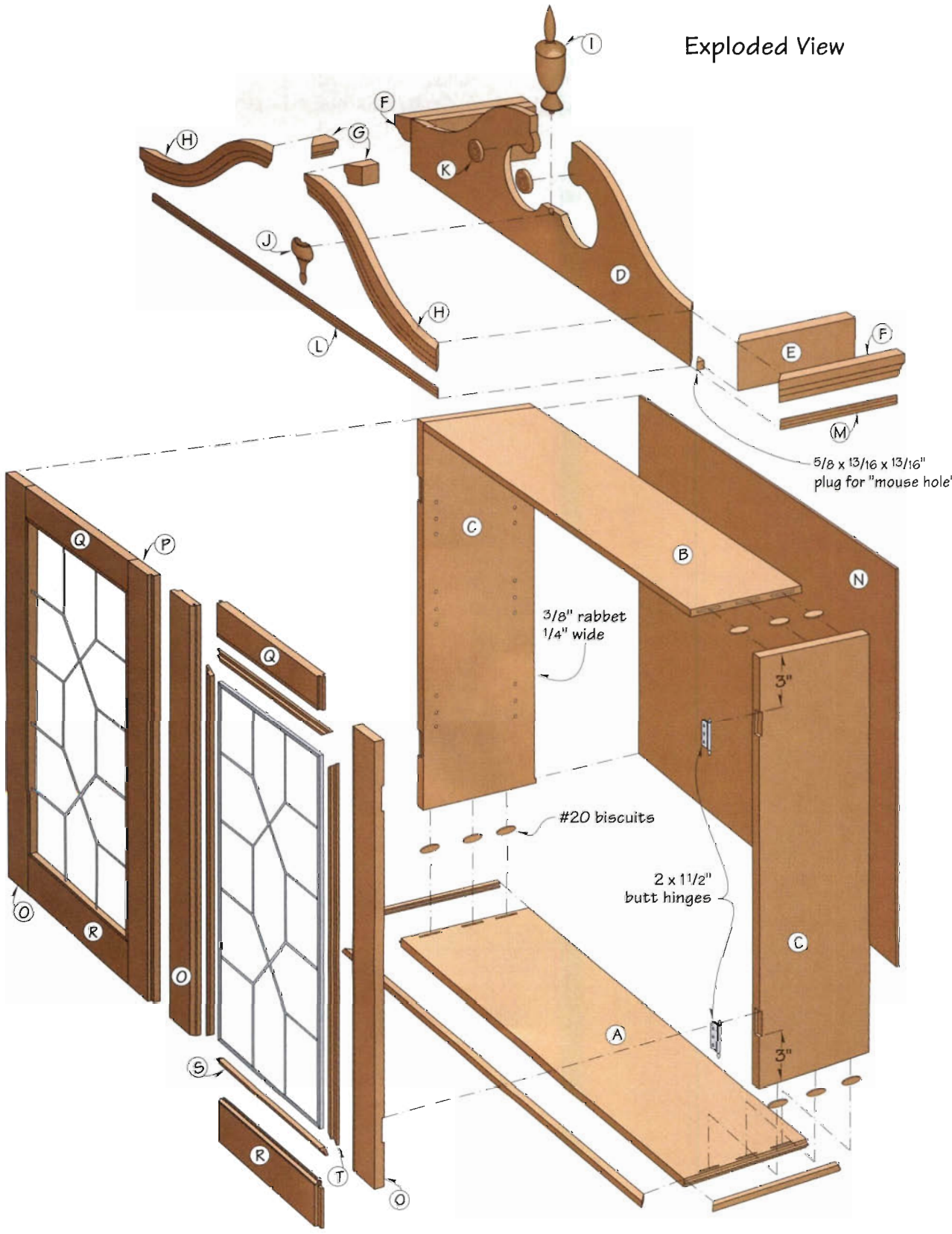
Because the cabinet requires careful matching of color and grain, you're better off starting with S2S material (surfaced on two sides). Hardwood suppliers usually mark up the price on roughsawn stock if you specify no sapwood. Also, roughsawn material doesn't give you much to go on when selecting for grain and color.

I prefer to buy 5/4 S2S, SLR1E (surfaced two sides, straight-line rip one edge). This lets me check color, amount of sapwood, and general characteristics before I buy. It doesn't cost much more than roughsawn stock and allows me enough thickness to joint flat and true and still have enough to machine after glue-up.

I also try to buy wide stock because it yields more material of identical color and grain. Then, I'll rip it into narrower widths for glue-ups.

Unfortunately, many general hardwood suppliers don't keep the boards from a single log together through the shipping and selling stages. Many specialty dealers and small, private cutters offer this little "extra," which I find really helpful.

—Dick Coers


Exploded View
I
F
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M
5/8 x 13/16 x 13/16"
plug for "mouse hole"
C
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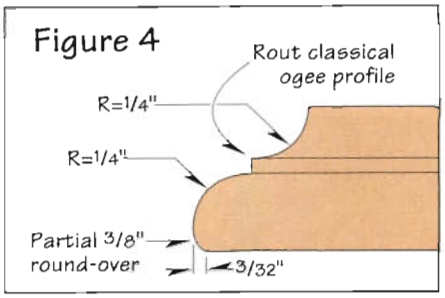
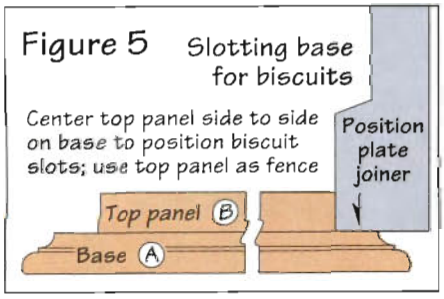




grain tear-out, make several passes, easing the bit up to final height for the last pass. Rout in counterclockwise, end-edge-end sequence. Then, rout a partial ⅜" round-over along the bottom of these same ends and edge.

Step 4. Center the top from side to side on the profiled base, align the back edges, and clamp. Lay out the biscuit slot centerlines. Using the top in this position as a fence, cut biscuit slots into the base (*figure 5*).

Step 5. Finish-sand (to 220-grit) all parts. Using biscuits, dry-assemble the top between the sides, then the sides to the base. Check for fit, and adjust if necessary. Now, glue and assemble these parts in this same order, and clamp. Check for squareness and twist.

Step 6. Using a rabbeting bit, rout a ⅜" rabbet ¼" deep along the inside back edges of the cabinet to accept the back. Square-cut the corners using a sharp chisel.

Build the Crown, Then Add the Molding

Step 1. To make the crown front (D) and sides (E), cut a 13/16"-thick blank to 11x58". Note: This length provides enough stock for cutting a side piece from each end for better grain continuity. Also, if you're using edge-joined stock, try to position the joint within 3" of the top edge on the crown front. This way, the crown molding and rosettes will cover most of it.

Bill of Materials

	Part	T	W	L	Mat.	Qty.
Cabinet	A Base* **	13/16"	9 3/4"	33¾"	C	1
	B Top	13/16"	8¼"	30⅝"	C	1
	C Sides	13/16"	8¼"	30⅞"	C	2
	D Crown–front*	13/16"	10¼"	32¼"	C	1
	E Crown–sides*	13/16"	3⅛"	9⅛"	C	2
	F Crown moldings–sides*	1"	1¼"	10⅛"	C	2
	G Crown moldings–returns*	1"	1¼"	1 13/16"	C	2
	H Crown moldings–front*	1"	1¼"	16¾"	C	2
	I Finial*	–	2 5/16" dia.	7⅞"	C	1
	J Lower half-finial*	–	2¼" dia.	3⅛"	C	1
	K Rosettes*	¼"	1¾" dia.	–	C	2
	L Bead molding–front*	3/16"	¾"	32⅝"	C	1
	M Bead molding–sides*	3/16"	¾"	9 5/16"	C	2
	N Back	¼"	31⅜"	30 13/16"	CP	1
	O Door stiles–narrow	13/16"	2"	30"	C	3
	P Door stile–wide	13/16"	2¼"	30"	C	1
	Q Door rails–top	13/16"	2"	13"	C	2
	R Door rails–bottom	13/16"	2¾"	13"	C	2
	S Glass stops–short*	5/16"	¾"	13¾"	C	4
	T Glass stops–long*	5/16"	¾"	26⅞"	C	4
	U Shelves* **	13/16"	7¾"	30 7/16"	CP	3

* Parts cut to final size during construction. Please read all instructions before cutting.

** Dimensions include edge strips and/or ends. For initial panel dimensions, see instructions.

Materials List

C–cherry
CP–cherry plywood

Supplies

#20 biscuits; #4x½" brass flathead wood screws; #8x1½", #8x2" flathead wood screws; ⅛" dowel stock; lacquer. (For other supplies, see the Source listed at the end of the article.)

Step 2. Select a front face, then find and mark a vertical centerline across the blank. Lay out the profile as dimensioned on the Crown Front drawing on *page 57*. Include the molding location lines. Crosscut an 11" piece from each end, then mark and set them aside.

Step 3. Make the vertical cuts above the rosette circles. To do this, clamp the blank upside down to an extension on your miter gauge. Elevate the blade enough to make the cut. Repeat the procedure to make the second cut.

Step 4. To establish the finial base, make a plunge cut through the center of the blank where shown on the drawing. To do this safely, set the rip fence 4¾" from the blade, then lower your saw blade below the table surface. Place the board on the table and center it over the blade and against the fence. Then, start the saw and slowly elevate the blade through the workpiece enough to make the cut approximately 3" long. Lower the blade, then shut off the saw.

Step 5. Bandsaw the crown profile to shape, keeping the blade outside the line. Note: Don't sand the profiles until after attaching the molding and rosettes.

Step 6. From 1"-thick stock, rip a 2½x30" blank for the crown side moldings (F) and molding returns (G). Using a large cove and bead bit (Eagle America's no. 178-3345) and

Making the Contoured Crown Moldings

The crown front moldings (H) are high-visibility parts, so take special care as you machine them.

First, make a pattern from a ¾x10x21" plywood blank, using dimensions shown on the Crown Front drawing. (See *figure 6* as well.) Draw both parallel lines to mark the position of the 1¼"-wide moldings. Bandsaw along the inside molding line (shown as dashed line on drawing), staying wide of the line. Carefully sand to the line, making the edge smooth and perpendicular. Lay out and scribe the 30° line (A-B) on both pattern faces where shown in figure 6.

Next, cut a pair of 1x4x21" blanks from matched cherry stock. Position the pattern on top of one of the blanks as shown in figure 6, using the 30° line to orient it.

Lay out and drill two mounting holes through the pattern where shown on the figure. Make sure to locate them ¼" off the top edge of the profile so the router bits do not come in contact with them. Since you'll have to flip the pattern to make the opposite molding, countersink the holes on both faces of the pattern.

Mount the pattern on the back face of one of the blanks using #8x1½" flathead screws. Trace the profiled pattern edge onto the blank. Next, mark the part's orientation to the pattern, then remove the pattern. Bandsaw the blank, keeping the blade at least 1/16" outside the line. Repeat the procedure to prepare the second blank.

Reattach one of the blanks to the pattern, then rout the edge using a flush-trim bit and your table-mounted router *(photo A)*. Remove the first blank, attach the second blank to the opposite face of the pattern, and repeat the operation.

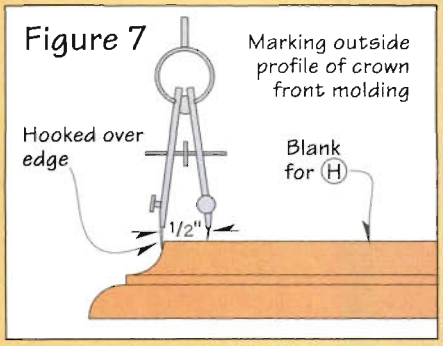
Next, install the same cove and bead bit you used to rout the side moldings, elevating it to only half its full cutting height. Note: For safety, install a starting pin on your router table. Begin profiling the molding edge, raising the bit in small increments to its full cutting height to make a clean cut *(photo B)*. Note the final cutting depth—you'll need to reset to this depth for the second blank. While each blank is attached to the pattern, mark the top cut line where shown. This establishes the inside (short) end of the miter at the top end of the molding. Shape the second blank the same way, then mark the top cut line.

Cut compound miters (30° miter and 45° bevel) on the ends you just marked. (We used a compound miter saw, although you could set your tablesaw miter gauge to 30° from square and tilt the blade to 45°.)

Scribe the top (unprofiled) edge of both moldings. To do this, set the points of a compass ½" apart, hook one point over the molded edge, and then scribe a line parallel to the molded edge as shown in *figure 7*. Bandsaw each top edge to shape, keeping the blade 1/16" outside the line. Note: Don't sand this edge to final shape until after attaching the moldings to the crown.

Photo A: Bandsaw outside the line, then attach pattern and flush-trim the edge of the crown molding to shape.

Photo B: After flush-trimming, rout profile on the crown molding using a large cove and bead bit.



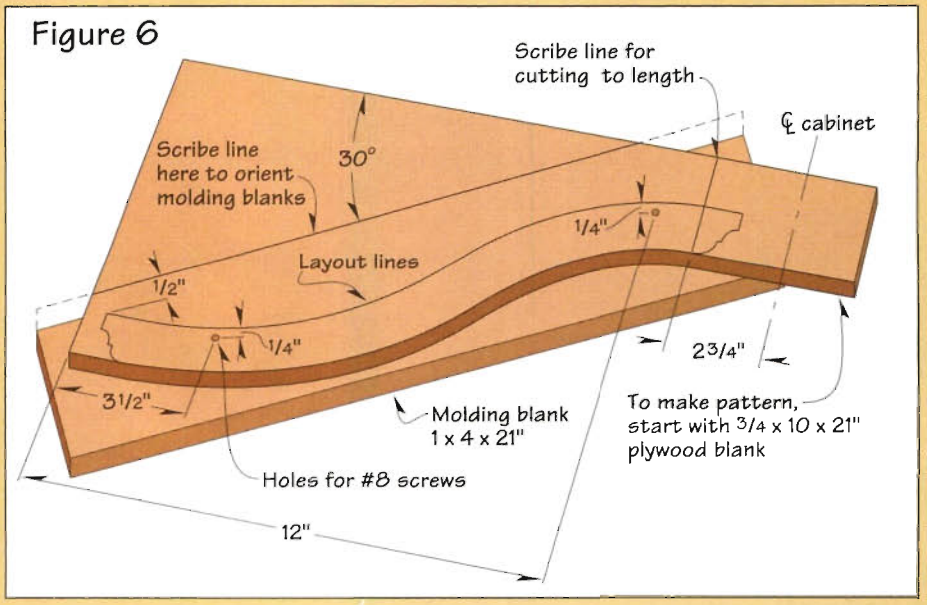


table-mounted router, rout the profile along one of the blank's edges. Rip a 1¼"-wide molded strip from the piece. Miter both ends. (These mitered ends will be used for the molding returns on the crown top.)

Step 7. Make the crown front moldings. For help, see "Making the Contoured Crown Moldings" *opposite*.

Step 8. Glue and clamp the moldings to the crown one at a time, using plenty of clamps. Note: To position each molding, align the miter with the vertical cut made earlier above each rosette circle, using one end of the mitered straight molding you cut earlier as a guide. To align the rest of the molding, use the faint pencil line you scribed on the crown earlier identifying the inside edge.

Step 9. Crosscut two mitered ends to length for the crown molding returns (G) from the 30" length of molded stock you made earlier. Glue and clamp them to the crown and mitered ends of the crown front moldings *(figure 8)*. (We used the crown waste pieces to establish opposite clamping faces.)

Step 10. Turn the center finial, the lower half-finial, and the rosettes as described in "Turn the Ornamental Parts" on *page 58*. Then, glue and clamp the lower half-finial and rosettes to the crown. To position the half-finial, use the centerline and align the top flush with the crown. Use the layout lines to position the rosettes snug against the moldings.

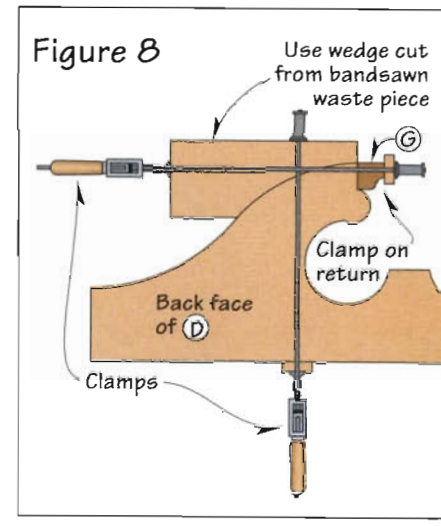
Fit the Crown Parts, Then Assemble To the Cabinet

Step 1. Sand and file the crown profile to conform with the attached parts (moldings, half-finial, and rosettes). Note: Use an oscillating spindle sander to do the large contours. Do the detail work, especially around the rosettes, with small flat and half-round files. Note: Be patient, and work carefully. This cleanup will require considerable handwork.

Step 2. Bore a ⅜" hole ¾" deep centered on the half-finial. Note: The centerline falls on the seam between the half-finial and crown. Use your drill press and a fence to ensure that the hole is perpendicular to the surface.

Step 3. To miter the crown to length, first mark the case centerline on the face of the top. Align the crown's centerline with that mark, then mark the case's width on the crown face. Note: Take extra care on this step, and double-check your measurements and setup before mitering. Miter-cut both ends.

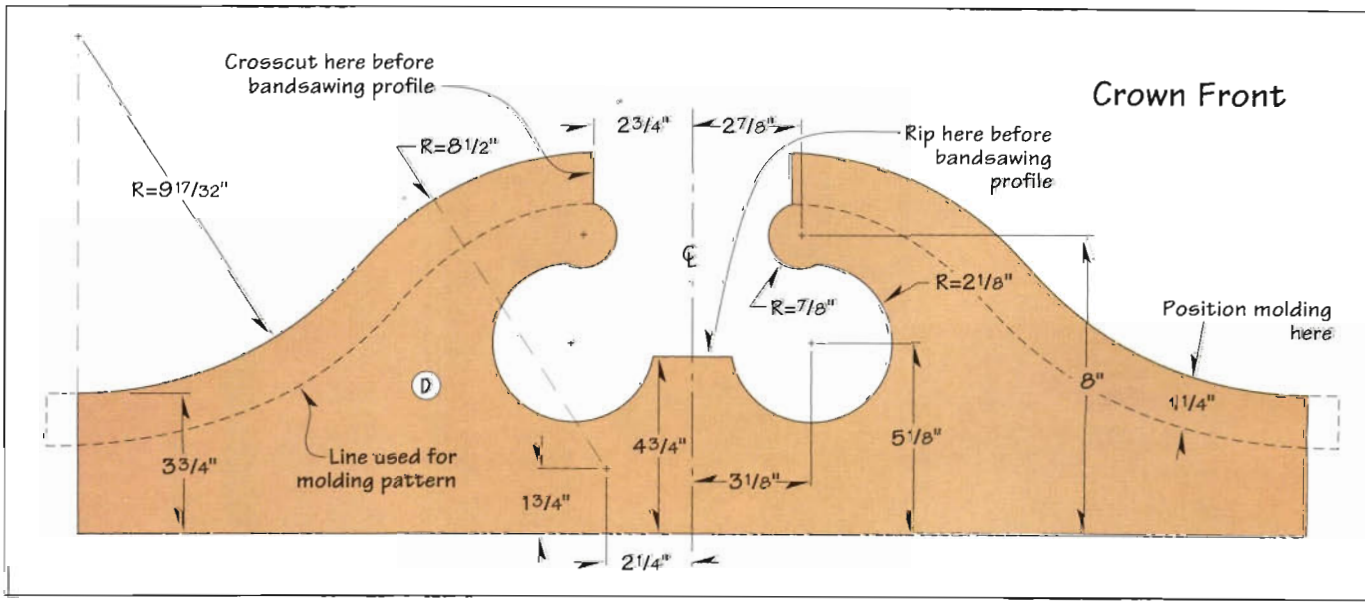
Step 4. Cut two spacer boards (¾x3x30 3/16") to position the crown on the cabinet front. Clamp the spacers to the front of the cabinet (where the outer door stiles will go) with the bottom ends seated squarely on the base. To position the crown from side to side, use a straightedge to align the mitered end of the crown with the case side. Then, glue and clamp the crown to the top front edge of the cabinet. After clamping, recheck the crown position.



Step 5. Find the crown end cutoffs (E) you set aside earlier. Before dimensioning, lay out the parts for best grain match with the crown. Miter the front ends, then cut them to width and length using your case for actual length.

Step 6. Cut two 1½x6½" glue blocks from ¾"-thick stock. Drill two shank holes through the edge and face of each. Since the blocks will attach cross-grain to the cabinet, elongate the edge holes to form slots, then countersink the slots.

Step 7. Apply glue to the mitered ends of the crown front and sides, then clamp the sides in position. Position each glue block flush with the back end, and transfer all mounting holes. Remove the blocks and drill pilot holes. Glue and screw the blocks (standing



Turn the Ornamental Parts

If you don't have thick stock for the finial (I), laminate two lengths of a single board to keep color and grain consistent, then cut a 3x3x9" blank from it. To turn, follow the full-sized profile shown at *right*, and work carefully. It's best to turn the two small-diameter areas last. Also, size the tenon to match your drill bit size. Watch the mounting face, too: make it square or slightly undercut so it won't show a gap when installed.

Make a 3x3x9" blank for the lower half-finial (J) by joining two 1½x3x9" pieces face-to-face with double-faced tape. Clamp the blank firmly for a few minutes to improve tape adhesion. Saw off the corners at 45°, then drill a small centering hole with a spade bit on the tailstock end to accommodate the lathe center. This will help keep the centerpoint from spliting the blank apart.

Mount the blank between centers, then turn to shape. Work gently to avoid catching a chisel. When turning the point, leave enough stock to safely complete all turning and sanding. Then, remove the turning, cut off the waste, and sand the point to finished profile.

To separate the half-finial, remove the blank from the lathe and trim the piece to length, cutting only halfway through *(photo C)*. (We used our bandsaw and miter gauge.)

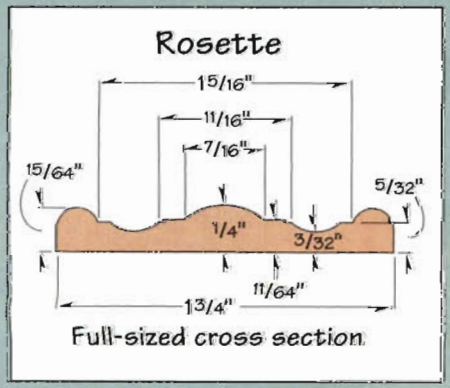
Note: Work carefully to avoid breaking the small-diameter areas of the finial. Use lacquer thinner or a hair dryer to soften the tape for easy separation. Don't bruise the sides of the finial by prying apart.

To make the two rosettes (K), first lay out the perimeter lines for two blanks on ¼"-thick cherry stock as shown on the full-sized profile. Bandsaw the outside diameter, keeping the blade outside the line.

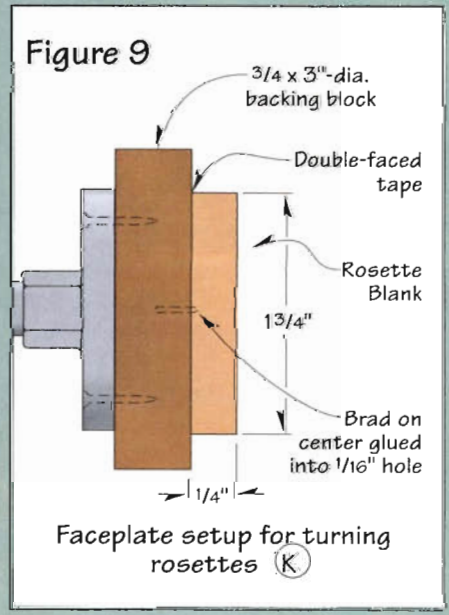
Photo C: To separate lower half-finial from split blank after turning, first crosscut to length and depth on tablesaw, then gently insert a razor blade between finial halves to loosen double-faced tape.

Install a ¾x3"-diameter backing block on the faceplate on your lathe *(figure 9)*. Mount a Jacobs chuck on the tailstock, then drill a 1/16" hole ⅜" deep in the center of the backing block. Nip off the head of a brad, and glue it into the hole with cyanocrylate, allowing only 1/16" of the brad to protrude.

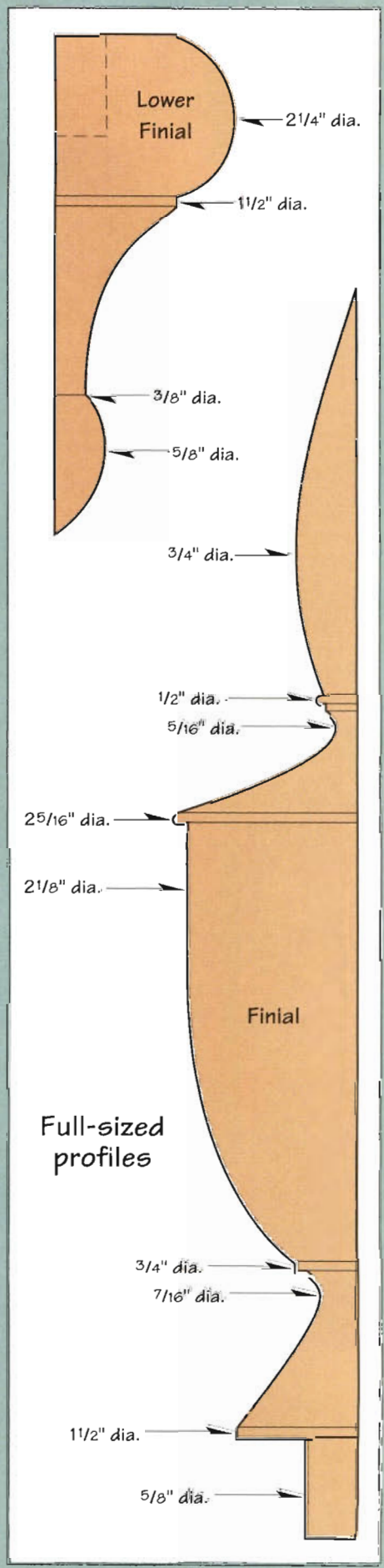
Apply double-faced tape to the back of each blank, then center the compass-point hole on each rosette blank over the brad. Apply pressure to set the tape by holding a scrap block between the tailstock and the rosette. Now, turn the rosettes to profile as shown on the cross section. Note: It's not important that your rosettes look exactly like the pattern, but it is crucial that they look identical. Also, keep the back surfaces square so they make less visible seams when glued to the crown.



Full-sized cross section



Faceplate setup for turning rosettes (K)



Full-sized profiles

on edge) to the inside surface of the crown sides. Now, attach the blocks to the cabinet top using screws but no glue *(photo D)*.

Step 8. To reinforce the crown front, cut a 27" block from ¾x1½" stock. Center, glue, and screw it to the top of the cabinet and back of the crown front where shown in photo D.

Step 9. Cut right-angle blocks (4½" long on the 90° sides) from ¾"-thick stock. Using your drill press, drill and counterbore screw holes perpendicular to the mounting faces. Glue and screw them into the crown corners to reinforce the mitered joints. (Again, see photo D.)

Step 10. Miter one end of two 11" lengths of the straight crown molding you machined earlier. Position them along the top of the crown sides, then measure and trim the back ends to length. Glue and clamp these to the mitered ends of the front crown molding and to the sides.

Add the Trim and the Back Panel

Step 1. To make the front and side bead moldings (L, M), first cut a ¾x2x36" blank. Install a three-bead bit in your table-mounted router (Amana no. 54212), and rout both edges of the blank. Rip a 3/16"-thick molded strip from each edge.

Step 2. Miter both ends of the front bead molding to fit the crown front, then glue and clamp it to the front, aligning the bottom edges flush with the bottom of the crown. Cut two 10" lengths for the side moldings, then miter the front ends. Trim the back ends to length, then glue and clamp them to the front molding and crown sides only—not to the cabinet sides. Use glue sparingly and with care. Note: Gluing this strip to the case sides could cause the miter to fail when the wood expands.

Step 3. Because the crown front overhangs the cabinet (whereas the crown sides rest on top), a small triangular "mouse hole" is left on the underside of the two miter joints behind the bead molding. (See the detail shown on the Exploded View.) To fill these, cut two small triangles, 13/16" long on two sides, from ⅝"-thick stock. Glue them into the holes and sand flush if necessary.

Step 4. Measure the rabbeted opening in the back of the cabinet. Cut the cabinet back (N) to size from ¼" cherry plywood. Note: Because the cabinet has no face frame, fit the back snugly to help square it. Temporarily install the back to hold the cabinet square while fitting the doors, but don't fasten it until after finishing.

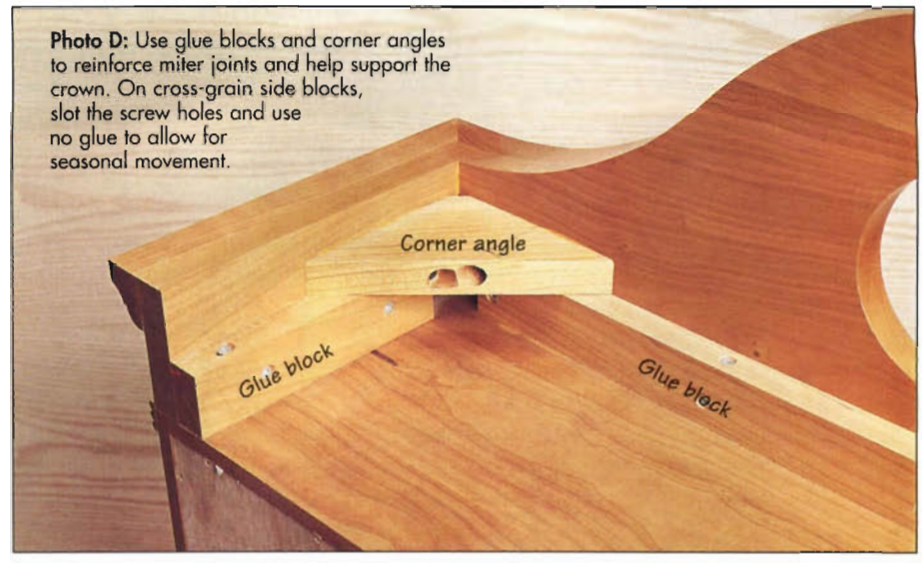
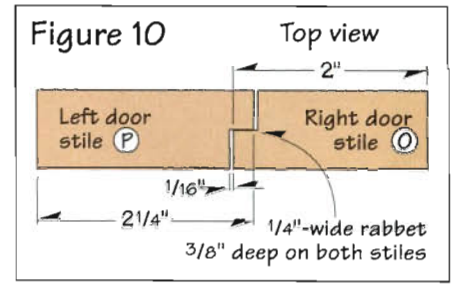


Photo D: Use glue blocks and corner angles to reinforce miter joints and help support the crown. On cross-grain side blocks, slot the screw holes and use no glue to allow for seasonal movement.



Now, Make the Doors

Step 1. From 13/16"-thick stock, cut the door stiles (O, P) and rails (Q, R) to dimension plus ⅛". Note: We overlapped the doors in the center, which required ripping the inner stiles to different widths and rabbeting the wider one on the front, the narrower one on the back *(figure 10)*.

Step 2. Mount a ⅜" dado head on your tablesaw. Attach a wooden auxiliary fence to your rip fence, then partially "bury" the dado head in it to leave ¼" of cutting width exposed. Elevate the dado to remove one-half the stile thickness. Cut a ¼"-wide rabbet along one edge of both inner stiles (P and one part O). This edge will become the back inside edge on the narrower, overlapping stile (O) and the front inside edge on the wider, overlapped stile (P).

Step 3. Using a stile-and-rail bit set, cope the ends of the rail blanks. (We used Freud's no. 99-260.) Then, mark all stiles and rails for identification (front, left, top, etc.). Now, cut the sticking along the inside edges of the stiles and rails.

Step 4. Dry-assemble the doors to check for fit. Glue, assemble, and clamp. Check for square and flatness, then allow the glue to dry. Unclamp, then position the doors in their opening to check for fit. Trim the outside edges and ends to create a 1/16" clearance at the top and bottom and between the doors.

Step 5. Install a ⅜" rabbeting bit in your table-mounted router. With the door's back face down on the router table, elevate the bit so the bearing rides on the radius of the outer pro-

PRO TIP

Cherry often chips if you machine it against the grain. Each time a pass through the planer or jointer produces a chip-free surface (indicating that you've machined with the grain), mark an arrow on the edge at one end to indicate grain direction. Then, align all the arrows when you glue up panels, and make sure you plane each panel with the grain during final thicknessing.

file. Make the cuts to form a rabbet deep enough for your glass panels. (We cut our rabbet 7/16" deep.)

Step 6. Make glass stops for the doors (S, T) to retain your glass panels. (We cut our stops to the profile *shown in figure 11* using a dado head on our tablesaw.)

Step 7. Miter both ends of the stops to length so that the thick part of the stop fits inside the rabbeted recess. Position the stops, then attach them to the doors using #4x½" flathead brass screws. Remove the stops, then finish-sand them along with the doors.

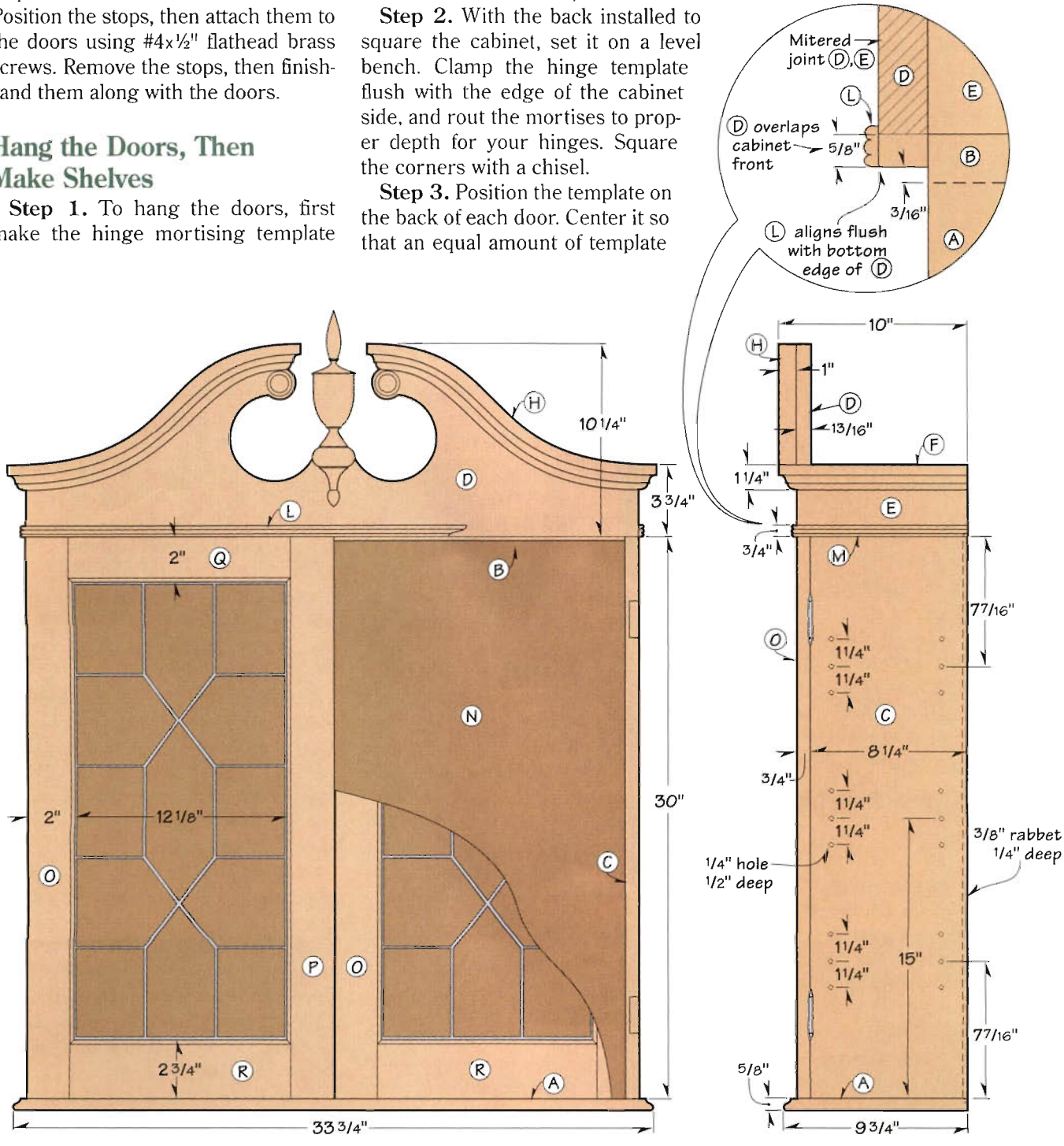
Hang the Doors, Then Make Shelves

Step 1. To hang the doors, first make the hinge mortising template shown in *figure 12*. To do this, cut a 3x31" piece of ¾" plywood, then trim it to fit snugly between the cabinet base and crown front. Using your tablesaw and miter gauge, cut a ⅜x2" notch in one edge 3" from each end. Mark one end as bottom to use for orientation on the case and doors. Note: To use this template, you'll need a piloted mortising bit. (We used Eagle America's no. 104-0802.)

Step 2. With the back installed to square the cabinet, set it on a level bench. Clamp the hinge template flush with the edge of the cabinet side, and rout the mortises to proper depth for your hinges. Square the corners with a chisel.

Step 3. Position the template on the back of each door. Center it so that an equal amount of template overhangs the door at each end, then clamp. Rout and square the mortises.

Step 4. Using a Vix bit, install one screw in each hinge leaf on both doors. (To mail-order hinges, a door catch, and shelf support pins, see Sources at the end of the article.) Check the alignment and overlap. To adjust the door position, loosen the



Front View

Side View

screw, move the door slightly, and then drill the second hole. Then, install a screw and recheck. When the alignment looks good, drill the third hole, drive a screw, and then go back and tighten the first screw.

Step 5. Install the catch on the overlapping door, centering it ⅞" from the rabbeted edge of the inner stile and 7/16" from the top end. Snap on the mating part of the catch, then close the door to mark screw hole locations on the underside of the cabinet top. Drive the screws, check the action, then remove the catch, doors, and hinges for finishing.

Step 6. Drill holes for door pulls in the inner stiles. Center them side to side and top to bottom on the stiles.

Step 7. Cut three shelves (U) to rough dimensions (8x31") from ¾"-thick cherry plywood. Rip a 5/16x¾" edge strip for each shelf, then glue it to the front edge. Using a ¼" round-over bit elevated to cut a 1/16" shoulder, rout the front edge top and bottom (*figure 13*). Measure the width of the cabinet interior, subtract a generous ⅛" to allow for the shelf pin flanges, and cut the shelves to this length. Then, rip the back edge of each shelf to width.

Add the Finishing Touches

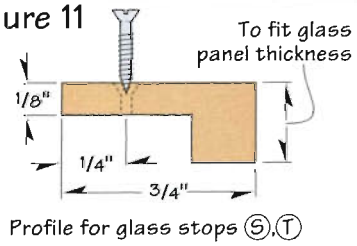
Step 1. Drill three sets of holes in the sides for the shelf support pins where shown on the Front View/Side View drawing. (We centered the middle set of holes from top to bottom, then positioned the top and bottom holes so that the shelves would align with the top and bottom lead crossmembers in the glass panels. For accuracy, we cut a ¾"-thick template that matched the dimensions of the sides, then drilled the holes on the drill press. This helped us keep the bit square during drilling and ensured uniform positioning on both sides.)

Step 2. Finish-sand all parts that still need it to 220-grit. Break any sharp edges. Mask off the finial tenon and its mating hole.

Step 3. Apply the finish. (We sprayed on two coats of Magnalac, sanded with 320-grit sandpaper, then added a third coat.) After the finish has dried, install the hardware and attach the doors. Mount the glass panels in the doors using the stops. Insert the shelf pins and add the shelves. WWJ

Lead photograph: Studio Alex
Other photographs: Kevin May

Figure 11



Profile for glass stops Ⓢ,Ⓣ

Figure 12

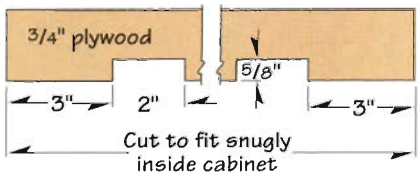
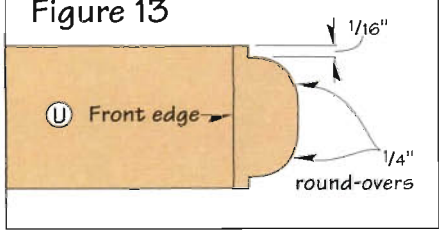


Figure 13



SOURCE

Hardware Kit. Includes 2 pairs–2x1½" heavy-gauge brass butt hinges with finials (no. 19117); 2–polished brass pendant pulls (no. 35527); brass ball catch (no. 28613); 20–clear plastic shelf support pins (no. 30429). Ask for kit no. 16312. Price: $42.95 ppd. Order from:

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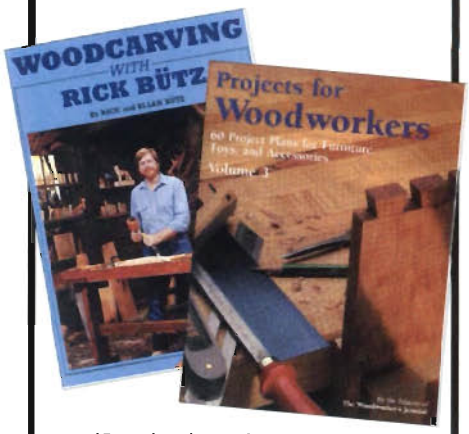

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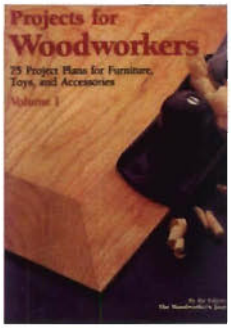

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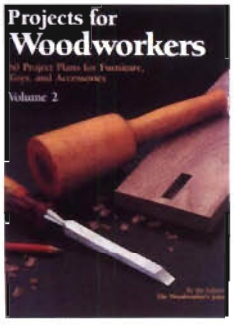

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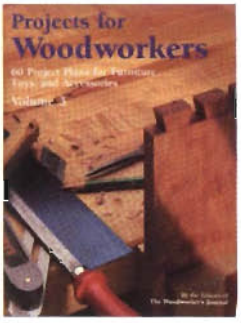

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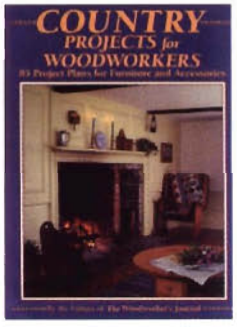

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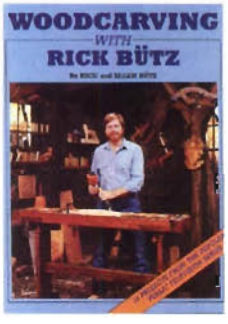

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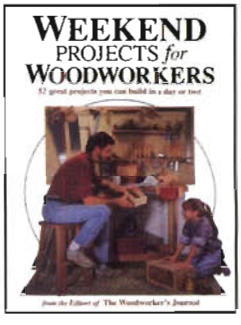

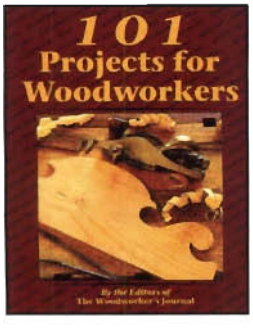

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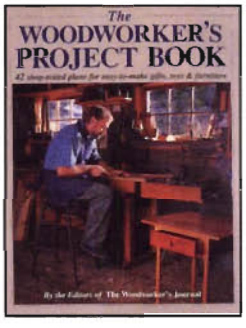

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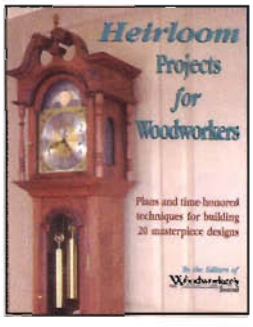

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Arkansas Artisan Doug Stowe Leaves His Imprint On Eureka Springs

by Doug Cantwell

Inlaid Box.
Walnut, cherry, hackberry.

In 1890, you'd probably have come here "for the waters." The mineral-rich springs in this corner of the Ozarks spawned a prosperous cluster of baths, hotels, and shops. When newcomers rediscovered the village during the '70s, they began renovating the charming ruins. Since settling here in 1975, Doug Stowe has made a tangible imprint on what is now a lively community of artisans.

As we hiked up Spring Street, which snakes its way along a ridge through the old part of town, Doug pointed out a door he had made for this shop, a set of cabinets he'd built for that one. Of the fifty or so elegantly restored shops we passed, a pretty fair number had benefitted from Doug's attentions.

This suggests a certain immodesty, which is not at all what Doug is about. He'd rather tell you about the mistakes he's made in woodworking and how he's learned from them than about his unqualified successes. Eastern thought has had a palpable influence on his relationship to his work.

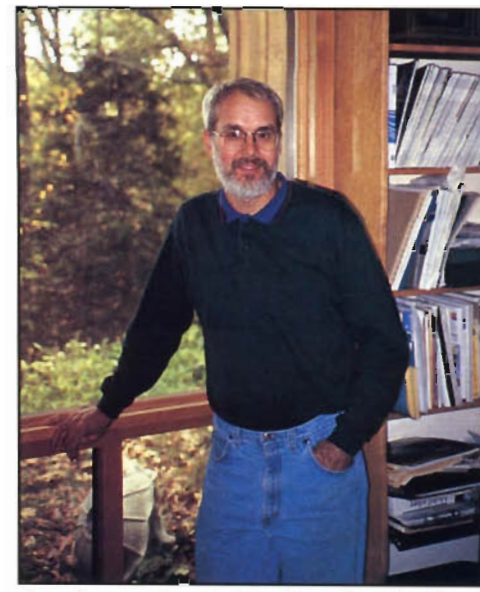
Oak door with dentils. Magee Jewelry Co., Eureka Springs.

Doug shares a hideaway to the north of town with his spouse Jean, who runs the library in Eureka Springs, and their six-year-old, Lucy. The first thing you notice, aside from the idyllic seclusion, is a handmade oak front door with two stained glass panels. Inside, you find exposed beams and lots of furniture made on the premises from local hardwoods.

The Ozark forest further imposes its presence by way of a southern wall that is mostly glass. Doug's shop and office, which are connected to the house by a breezeway, also admit lots of light and landscape. "Jean, the guardian of order, introduces my disorderly shop to visitors as 'the Wilderness,'" says Doug. "Since what I do is intimately connected to wilderness, I take this as a compliment."

Although his commission work has established him locally, Doug's line of inlaid boxes has gained him national recognition and today generates most of his income. In addition to the 45 U.S. galleries that carry these pieces, Arkansas business reps have taken Doug's boxes to Germany, Russia, and Saudi Arabia as executive gifts. During a 1989 trade mission, then-governor Bill Clinton presented the boxes to Pacific Rim leaders.

"In Chinese," Doug explains, "the concepts of *crisis* and *opportunity* are virtually indistinguishable. This makes sense to me. It's usually been the errors I've made that have resulted in great moments of insight—what I call eureka experiences. I try to stay focused on the process of learning, rather than staking everything on the finished product."



Doug Stowe at home in his office, where the Ozark forest is an imposing presence.

Photographs, clockwise from top right: *Doug Cantwell, Doug Stowe, Glenna Booth, Allen Smith*

Hall Table, detail. Cherry, ebonized cherry, and bird's-eye maple.

"For Mountain Youth"

In the Cumberland Foothills of Kentucky, Berea College's Unique Crafts Program Continues To Teach the "Independence of Self Help and the Dignity of Labor"

by Doug Cantwell

Cheryl Humphrey, a Child and Family Studies major from West Virginia, scuff-sands a rocker in the Berea Woodcrafts shop.

Enroll at Berea College today, and you'll pay no tuition. Period. There is, however, one condition: you'll have to put in 10 to 15 hours a week in Berea's unusual student labor program to help cover your room, board, and other expenses. Nobody gets out of this obligation—not even varsity athletes. A belief in the *dignity of labor* is a value that Berea has always held dear.

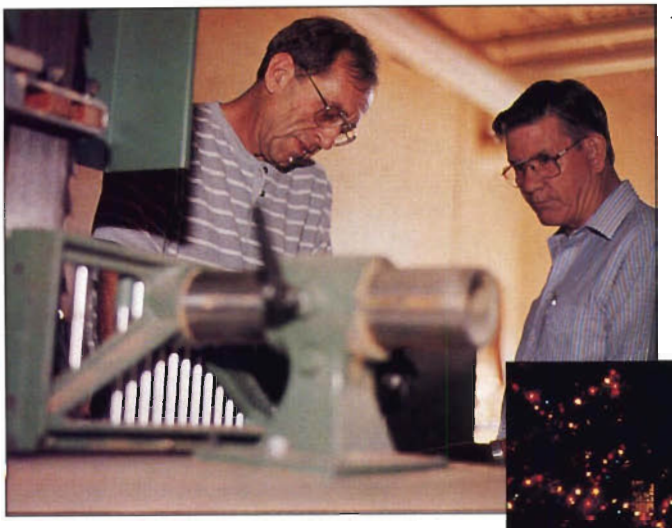
As you work toward your degree in one of the 26 majors offered at the college, you'll also get a unique opportunity to learn a "real" skill. The Berea Crafts Program, which operates something like the traditional apprentice system, keeps 200 of Berea's 1,500 students busy in woodworking, weaving, ceramics, ironworking, and the Appalachian specialty of broom-making.

The Draper Building, Berea's main academic classroom facility, is a replica of Independence Hall in Philadelphia.

Instead of trimming hedges in front of the library or washing dishes in the cafeteria, you'll learn to handcraft quality wares in one of the program's five shops. The furniture, blankets, stoneware, candlelabra, and brooms students make under the tutelage of skilled craftspeople are sold at several retail stores on campus and throughout Kentucky. They're also marketed through trade shows, national mail-order firms such as L.L. Bean and *Plow and Hearth*, and the college's own handsome mail-order catalog.

What makes this unlikely system work? Well, there's Garry Barker, Berea alumnus and program director, who markets, promotes, publicizes, oversees quality control, and probably changes light bulbs as well during his lunch hour. When Garry and former director Terry Fields arrived in 1985, the program was losing money due to halfhearted marketing and unpredictable product quality. The turnaround charted by Barker and Fields has made itself felt; today, the program contributes five times the revenues to Berea's operating fund that it did 10 years ago.

When I visited the Berea Woodcrafts shop in July, manager John Powell first showed me stacks of select, locally milled walnut and cherry air-drying out back. Some of this stock will go for bed frames, some for biscuit cutters, some for board games, depending on special orders and inventory needs. Inside, a handful of summer-term students were putting in their hours: a couple of them scuff-sanded rockers in preparation for a final coat of lacquer; others cleaned up cutting boards on the pneumatic bag sander; one of the



◀Garry Barker (left), Crafts Program director, and John Powell, Woodcrafts shop manager, discuss inventory in the Woodcrafts shop.

Photograph: *Jason Ingleman*

▲ In Woodcrafts, student employees learn stock preparation as well as assembly and finishing. Here, students surface parts on the planer.

◀Berea's historic Boone Tavern Hotel. The hotel has been completely outfitted over the years with furniture crafted by students in the Woodcrafts shop.

full-time supervisors was turning a finial for a Governor Winthrop cabinet. (See this same cabinet, our cover project, on *page 52*.)

Like most traditions at Berea, the crafts program can trace its roots to practical and utilitarian beginnings. The Woodcrafts department, which has been around since the 1880s, began as a shop that provided tables, chairs, and other furniture for college facilities. Nearly every stick of furniture you'll find in the college's historic Boone Tavern Hotel, for example—from the lobby to the restaurant to the guest rooms—has come out of the Woodcrafts shop.

The Weaving department grew out of the "Homespun Fairs" that were held on campus as early as 1896. These fairs gave the parents of local students a chance to sell handwoven goods as a means of covering college expenses. The demand for these items grew, and looms eventually were moved to campus so that the students themselves could learn the lucrative art of weaving.

Berea student employee finish-sands a cutting board. All students put in 10-15 hours a week in some facet of the work/study program to contribute toward their room, board, and other expenses.

It's not just the Crafts Program that makes Berea unique. This is probably the only college in the country that turns away otherwise qualified students because they *lack* financial need. As one of its founding missions, Berea seeks out students who have high ability but limited financial resources.

The school was founded in 1855 with a commitment to serve the needs of southern Appalachia. Even today, Berea draws 80 percent of its students from Kentucky and the surrounding mountain states. Chartered as an independent, nondenominational Christian institution, the college also was (and still is) committed to educating blacks and whites together, which made it the first interracial college in the South.

After my walking tour of Berea, it took me a while to get used to the idea of a liberal arts college that promotes and partially depends on the handcrafting of quality goods. Our high-tech, service-oriented economy, after all, teaches us that working with one's hands and working with one's mind are mutually exclusive occupations.

Maybe you won't have as much time to party as you would at one of the big football schools, but you'll probably come away from Berea and its crafts program more truly *educated* than the "party majors" who got a free ride through school. There's also another fringe benefit of the Berea experience: "Working with your hands," as one of the college's early presidents observed, "puts you closer to God."

Note: Several of the most popular designs offered over the years in Woodworker's Journal *have come from Berea Woodcrafts. See especially the Governor Winthrop desk (Nov./Dec. '92), the Corner Cupboard (July/Aug. '93), the Blockfront Chest (Sept./Oct. '93), and the Jenny Lind Cradle (Sept./Oct. '94).*

You'll find Berea College in Berea, Kentucky, 43 miles south of Lexington, just off Interstate 75. Tours of the college (led by students) are offered daily at 9 am, 10 am, 1 pm, and 3 pm.

Photographs: *Courtesy of Berea College except where noted*

A Beveled Triangle DESK CLOCK

You don't often see a piece this simple that has so much visual appeal. Robert Leung of Benicia, California, returns to the pages of Woodworker's Journal *with a design that reworks the Art Deco style in a contemporary vein. We include this simple faceplate turning project as a holiday gift idea that you'll find easy to make in any quantity. (For other giftworthy Leung designs, have a look at our Nov./Dec. '86 and July/Aug. '87 issues,* pages 40 *and* 46 *respectively.)*

Before You Start

To bore the 2 1/16"-wide, 1/2"-deep recess on the back face of the blank for the movement, Robert starts with a large Forstner bit, then cleans up the hole on the lathe using a three-jawed chuck. If you don't have a large bit or the chuck, we suggest the alternate approach described below. Note: Procure the movement and check dimensions before starting the project.

Cut the Blanks To Shape, Then Bore the Recess

Step 1. Surface-plane 5/4 stock to a minimum thickness of 15/16". Fit your tablesaw with a combination blade, and tilt it to 11° from perpendicular. Bevel-rip both edges of the stock to 5 1/4" wide. Decide how many clocks you intend to make, then bevel-cut both ends of the stock to the proper length. (See *figure 1.*)

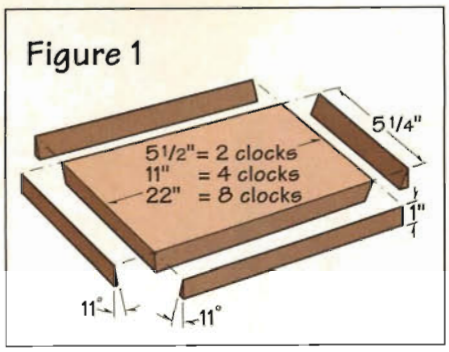
Step 2. Bevel-cut a 5 1/4" length of stock for each pair of clocks (*figure 2*). Then, using a mitering jig or miter gauge and extension set to 45°, bevel-miter each 5 1/4" square in half (*figure 3*). Note: For safety and accuracy, use a stopblock and adhere sandpaper to the extension to help keep the workpiece from creeping. Remove the correctly cut triangle, then rotate the remaining triangle 180° and recut its bevel to the correct angle.

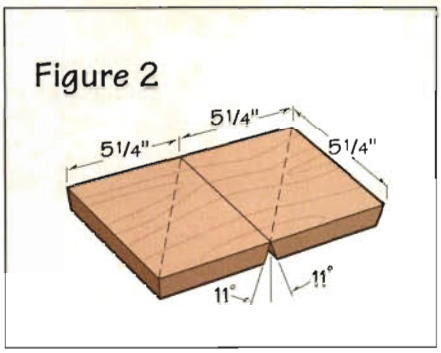
Turn the Movement Recess, Then Turn the Clock Face

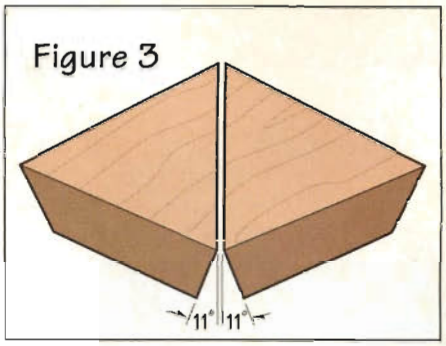
Step 1. On the back of each blank (the smaller face), find and mark a vertical centerline by aligning a try square with the apex of the triangle. Using a compass, locate (by trial and error) a point on this centerline that is equidistant from all three edges. Drill a 7/64" hole through the blank at this point.

Step 2. Mount a 3"-diameter faceplate on your lathe's headstock, and attach a 1 1/2x4" backing block. Note: Use 3/4" faceplate mounting screws so the screws won't interfere later when you turn the 3/8"-long jam chuck. Mount a Jacobs chuck on the tailstock, and drill an 11/64" shank hole through the block's center. Secure the front face of the blank to the backing block using a #8x1 3/4" screw and double-faced tape. (See *figure 4.*)

Step 3. Turn a square-walled, 2 1/8"-diameter recess 1/2" deep in the blank's back face. (See the Section







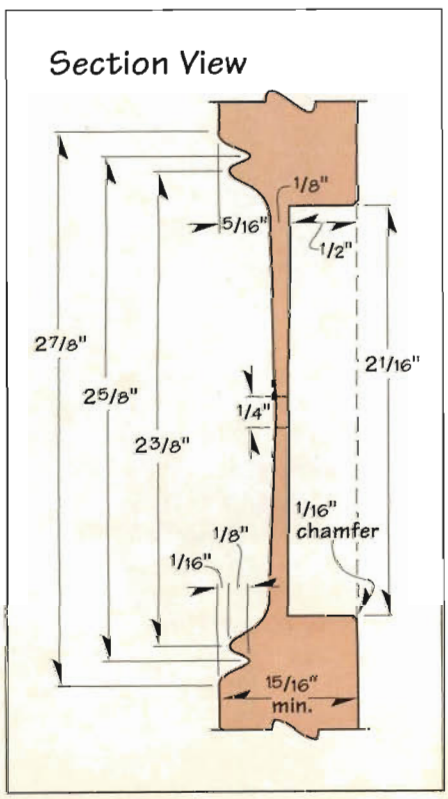
View drawing *below*). Test-fit the clock movement in the recess as you work to ensure a close but not tight fit. Once you've turned the recess to final diameter, chamfer the edge of the recess where shown on the drawing.

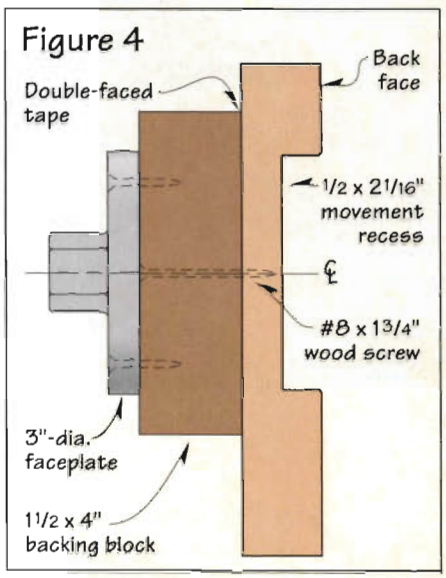
Step 4. Remove the blank from the backing block. Turn a 3/8"-long lip on the backing block to fit snugly into the recess you turned in the blank. Note: Test-fit the blank on this "jam chuck" as you work to ensure a tight fit. (See *figure 5*. For more information on this technique, see "Turning a Lidded Box," pages 54-59, *Woodworker's Journal*, March/April '95.) Now, press-fit the blank onto the jam chuck, making sure it fits tightly.

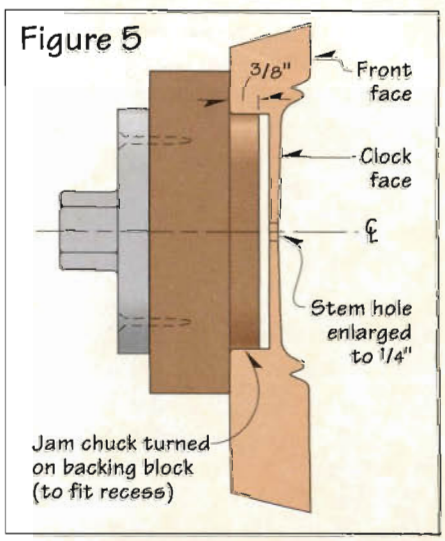
Step 5. Using a 1/4" bit, enlarge the center hole you drilled through the blank earlier. On the blank's face, lay out 2", 2 3/8", 2 5/8", and 2 7/8" diameters for the initial recess, the bead, the V-groove, and the clock face perimeter. (See the Section View drawing.)

Step 6. Turn a 2"-diameter, 1/4"-deep recess (with square walls for now) in the blank's front face. Deepen this recess to 5/16", rounding out the edge to a 2 3/8" diameter where shown on the Section View drawing. Because the movement stem is quite short, carefully thin the center of the face a bit more to create clearance for the 3/4"-long hour hand.

Step 7. Next, turn a 3/16"-deep V-groove to create a 3/16"-wide bead around the recess. Round the bead, smoothing it down to 1/16" shy of the face. Then, round the outer edge of the groove.







Sand and Finish the Clock, Then Install the Movement

Step 1. With the clock still mounted on the lathe, sand the turned portion with 220-grit sandpaper, then buff it with 0000 synthetic wool. Remove it from the chuck. Finish-sand the rest of the clock to 220-grit on your belt sander, then buff. Note: Since the face and bead are recessed, belt-sanding won't scratch these parts, and, if done carefully, will prevent rounding of the edges.

Step 2. Apply the finish. (Robert applies two coats of a Danish oil finish according to the manufacturer's instructions. After the oil dries overnight, he wipes on a coat of paste wax.)

Step 3. Install the movement in its recess using a silicone or other flexible adhesive. (This will allow for seasonal wood movement.) After the adhesive has cured, press on the clock hands. WWJ

Photograph: Studio Alex

SOURCES

Clock Movement. Includes 5/8 x 2 1/16" quartz movement, black hour, minute, and sweep second hands, and one 1.5-volt N battery. Note: Hands differ from those shown. Ask for kit no. 71264. Price: $7.95 ppd. Order from:

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HVLP CONVERSION SPRAY GUNS

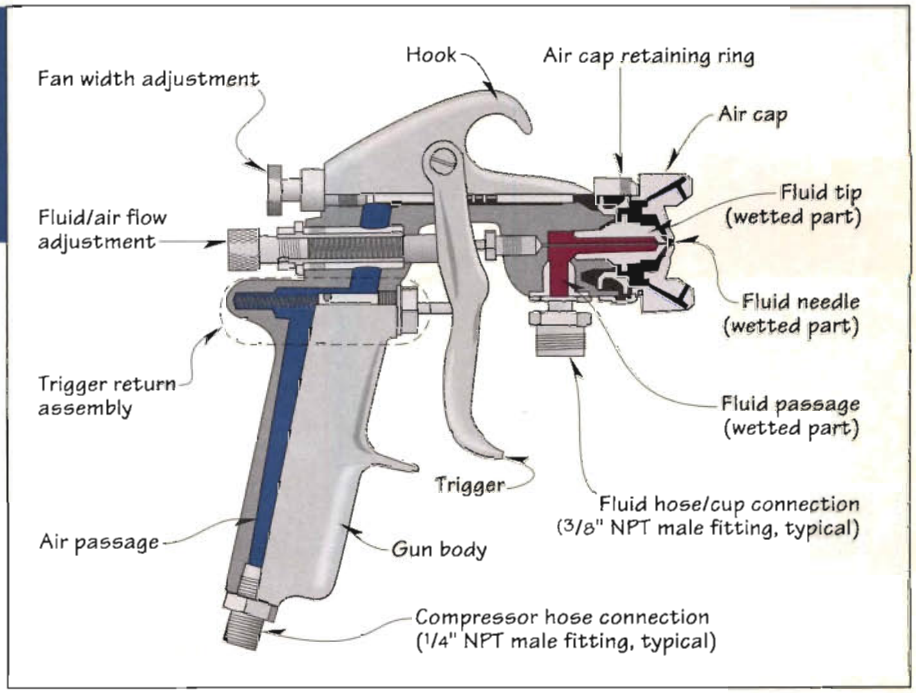
A Practical Way To Upgrade To A State-of-the-Art Spraying System

We test high-volume, low-pressure spray guns powered by conventional air compressors

by Jim Barrett

Many professional woodworkers have already switched from conventional high-pressure spray guns to HVLP systems. Why? Mainly because HVLP (high-volume, low-pressure) guns produce much less overspray than conventional spray guns. This makes for less wasted material, a cleaner and safer work environment, and less air pollution.

Although many woodworkers do without spray finishing by using hand-applied products, spray finishing does offer distinct advantages on most projects. HVLP conversion guns provide an affordable way to outfit your shop for spraying.



Conversion spray guns, as illustrated in this DeVilbiss cutaway, incorporate special baffles, enlarged air passages, and modified air caps to reduce the pressure and increase the volume of compressed air available for spraying.

Here's the Difference

Conventional spray guns rely on low volumes of air (5-10 cfm) at high pressures (40-90 psi) to atomize the finishing materials. The high pressure does a great job of atomizing the material, but it also has a major drawback—it produces fast-moving particles and clouds of fine droplets, many of which bounce off the target or overspray it.

Conversely, HVLP guns deliver a greater volume of air (50 to 150 cfm) using lower pressure (2 to 10 psi) to atomize the finishing material. This produces slower-moving particles and a softer spray, with considerably less overspray or bounce-back. The result: more finish gets transferred to the target, and less is lost as overspray.

Experts evaluate the amount of finish that actually ends up on your project (compared to the total amount sprayed) as a sprayer's transfer efficiency (TE). Currently, most manufacturers claim up to 80 percent TE for their HVLP systems. By comparison, the TE of conventional high-pressure, siphon-fed guns typically falls within the 30-35 percent range. That works out to a 50 percent TE advantage for HVLP equipment, which can translate into a comparable savings on finishing materials.

In some areas, commercial shops have been required to convert to HVLP and to use high-solids, low-VOC (volatile organic compound) finishes. California's South Coast Air Quality Management District was the first agency to define and mandate TE standards in the U.S. It defines an HVLP spray system as one that has a gun air cap pressure of 10 psi or less and a TE of at least 65 percent. Most states have accepted this definition as the industry standard. You, as a home woodworker, needn't comply with these regulations, but you certainly can reap the benefits of the technology.

Turbine Or Conversion?

You have two ways to equip yourself for HVLP spraying—HVLP conversion guns or HVLP turbine systems. These two options require different equipment and operate differently. For this review, I've limited my tests to the conversion guns; we'll tackle the turbine-powered systems—and the differences between the two—in a future review.

If you own a good air compressor, you already own half of an HVLP conversion system. Simply add an HVLP

conversion gun, and maybe a few refinements, and you'll have a sound, working system. Even if you do have to buy a compressor, keep in mind that you can also use it for other jobs.

Converting Compressed Air to HVLP

Until Binks offered the first conversion gun in 1989, the only HVLP systems you could buy were turbine-driven units. Today, most major spray equipment manufacturers offer HVLP conversion guns as part of their line.

Because of their hefty price tags and huge appetite for air, the early HVLP conversion guns didn't really catch on. Most of them required anywhere from 12 to 20 cfm at 60-80 psi. You had to have a large (and expensive) compressor to power them.

Although some of today's guns still require a fairly gutsy air source, you can buy air-miserly units. Several of the models I tested can be run off 3-hp or smaller compressors.

Today's HVLP guns aren't cheap, but they do cost less than turbine systems. Most will handle a wide variety of finishing materials, from thin stains and lacquers to prepared latex paints and polyurethanes. The ones I tested ranged in price from about $140 to $480. All were soundly made, simple to use once adjusted, and capable of applying a fine, uniform finish.

How Conversion Guns Work

In simple terms, conversion guns convert high-pressure, low-volume compressed air (delivered by a compressor to the gun inlet) into high-volume, low-pressure air at the gun tip. The specially designed guns incorporate unique parts to decompress the air and atomize the finish.

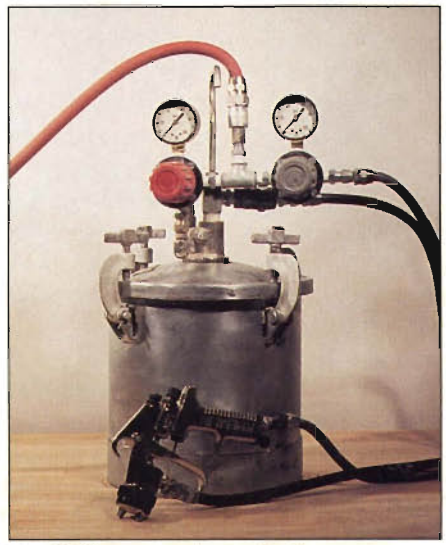
All conversion guns provide air and fluid adjustments. By controlling air pressure and fluid delivery at the tip, you can adjust the gun precisely to match the spray materials. (See "Features to Look For" at *right*). On some guns, one knob controls both air pressure and fluid delivery; others have separate air and fluid controls. The cutaway gun drawing *opposite* shows the components and adjustable parts of a typical HVLP conversion gun.

You'll also find an adjustment for changing the width of the spray pattern from narrow (1" to 3") up to wide (12" to 18"). On some guns, you turn a knob on the top rear of the gun body; on others, you turn a ring on the air cap on the front of the gun. You adjust line pressure with a regulator between the compressor and the gun. Worked in combination, these adjustments enable you to do both fine detail work and fast coating of large projects.

With the exception of Apollo's "2-in-1" spray guns (see Apollo model A5100 on *page 70)*, HVLP conversion guns will not run off a turbine. However, some turbine-driven guns, such as the Wagner model NBC *(page 73)*, can be fitted with a low-pressure regulator for use with a compressor. Sometimes called an "air amplifier," it must be connected between the supply hose and the gun's air inlet.

What It Takes To Switch

Besides a compressor, you may need a few additional accessories or upgrades to make the system operate at maximum efficiency. First, match the compressor's air hose to the gun. If you're currently using ¼"-i.d. hose, you may need to buy a 5/16" or ⅜" air hose to provide more air at the gun inlet to atomize thicker finishes.



Most HVLP guns can be used with remote two-quart cups or larger paint pots, such as this 2½-gallon Binks unit. The regulators and gauges control air and fluid pressures to the gun.

Any oil, dirt, or moisture in a compressor tank can move into the air hose and contaminate the finish. To prevent this, add an oil/water filter (also called an extractor or separator) between the gun and the compressor. The filters often come as part of a high-pressure regulator and gauge, although you can buy separate units.

Don't expect perfect results right out of the box—you'll need practice. Even experienced conventional-spray operators find spraying with an HVLP gun different. For example, because the system doesn't blast the material with as much pressure, products of various viscosities atomize differently, often forming larger and fewer particles. Adjustments for this include holding the gun closer to the work and using a slower hand speed. Although applying an initial tack coat first works well with a conventional system, it usually doesn't with HVLP.

Features To Look For

You'll find that most guns come set up with a one-quart cup attached to the bottom of the gun, although you can purchase smaller cups. Most of the guns can also be hooked up to a pressurized remote cup or a pressurized paint pot (shown *below left*). Remote containers add to the cost, but they lighten the gun, make it more maneuverable in tight spots, and enable you to work longer without refilling.

HVLP guns use one of three systems to deliver material to the nozzle: siphon feed, pressure feed, or gravity feed. Most conversion guns have pressure-feed systems, diverting some of the compressed air to pressurize the paint cup (or remote paint container) to force the material into the gun. Pressure-feeders require less overall air pressure to atomize the material and generally do a better job of delivering thick or heavy finishes to the gun than do the other systems.

Pressure cups cost more, however, and changing them can be more of a hassle. Also, if you overpressurize a cup, it may leak or even rupture. Screw-on cups tend to be less leak-prone than quick-release types, but they take longer to change.

Continued on page 74

The Guns I Tested

For this review, I called in a representative sampling of the guns being sold today. I connected each one to a conventional 5-hp air compressor, then sprayed both low- and high-viscosity finishes through it (a light, solvent-based stain and a high-solids, low-VOC urethane). All of the guns performed according to their specifications. A brief description of each gun follows.

Apollo A5100

Apollo's "2-in-1" happens to be the only gun that will work with compressed air as a conversion gun, or with an air turbine. Its large air ports and passages enable it to run off a 3-hp, 20-gallon compressor. If you plan to use it with a turbine, I'd suggest at least a three-stage unit for shooting high-viscosity finishes.

To operate this gun as a conversion unit, simply attach the hose to the air inlet at the bottom of the gun. To run it off a turbine, you'd cap the bottom inlet and attach the 1" hose to a second air inlet near the top of the gun using the turbine hose coupler. Switching takes less than two minutes.

The A5100 uses all stainless-steel wetted parts and a screw-on one-quart Teflon-coated cup. A less expensive version (model A5110) comes with a quick-release, one-quart aluminum cup. There's also a barebones gun (model A5105) with a ⅜" NPT threaded fluid hose fitting for use with a paint pot or other remote source. All three versions come with a 1mm (.040") fluid tip/needle set, but you can order three other sets (.75mm, 1.5mm, and 2.5mm). Standard accessories include a no. 2 Zahn viscosity cup and an air-pressure test gauge (used to verify air pressure at the gun tip).

I found the gun to be sturdy, well-balanced, and comfortable to operate. With the 1mm fluid tip/needle set, it adjusted down to produce a ¼"-wide line but also sprayed a 15" wide pattern. For better results with high-solids, low-VOC finishes, pick up a 1.5mm (about .060") fluid tip/needle set for the gun.

Apollo A5100, $299.

Apollo Sprayers International, Inc.
1030 Joshua Way, Vista, CA 92083
619/727-8300

Binks Mach 1

This is the "original" HVLP conversion gun developed back in 1989—with a few improvements. Most noteworthy is its newly designed air nozzle assembly (part no. 90P). It allows the gun to be used with only 15 to 18 psi of inlet pressure (as opposed to 60 to 80 psi for earlier models). With this nozzle, you can easily run it off a 1½-hp compressor.

The Mach 1 ships with a .055" fluid tip/needle set. Binks claims this is the only size you need, provided you fit the gun with an optional fluid inlet control assembly (shown). A knob-operated valve attached to the fluid inlet controls the feed rate to the gun from the pressurized cup. The gun will also attach to a pressurized remote cup or paint pot.

Considering the gun's meager air appetite, the Mach 1 did an excellent job of atomizing the various finishes I forced through it. With the 90P nozzle, it wasn't as "fast" as models with larger compressor requirements. You can order the gun with four other HVLP air nozzles; these will speed up output but also increase compressor requirements. Binks recommends the 93P nozzle for production wood finishing.

The Mach 1 features a lightweight aluminum body and stainless steel fluid passages, needle, and fluid tip. A one-quart, stainless-steel, quick-release pressurized cup, extra cup gasket, and wrench come as standard equipment.

Binks Mach 1 with 90P nozzle and fluid inlet control assembly (model 98-1120), $480.

Binks Manufacturing Company
9201 Belmont Ave.
Franklin Park, IL 60131-2887
708/671-3000

Binks M1-G

This gravity-feed spray gun produced an exceptionally smooth, uniform finish with a variety of materials and did it with relatively low air intake. Binks sells the M1-G with low-volume air nozzle (93P) and .055" fluid tip/needle set. Like the Mach 1, it needs only 15-18 psi at the gun inlet, which a 1½-hp compressor will provide. (Equipped with the 90P nozzle, the M1-G is even more air-miserly.) Using the standard setup, I had no trouble spraying my test finishes, although they went on at a slower rate than with the "high-volume" guns.

You can fit the M1-G with higher-capacity air caps (nozzles) and fluid tip/needle sets that let you lay down heavier materials at higher flow rates and with wider spray patterns. While I wouldn't try to paint a house with this gun, it would work well for most furniture and woodworking projects.

Top-loading, gravity-feed guns like this one take a bit of getting used to, but I found the M1-G to be light, well-balanced, and easy to reload. You simply pop the plastic cap off the 1⅓-pint aluminum cup, pour in the finish, replace the cap, and get on with your job. Like other gravity-feed guns, the M1-G uses every last drop of finish in the cup. The cup and gun also clean easily. If you work with water-based finishes or other corrosive materials, buy the optional plastic cup.

For overall performance, convenience, and price, I'd choose this gun for my own shop. (Most automotive shops and many small cabinet shops prefer gravity guns).

Binks M1-G, $320.

Binks Manufacturing Company
9201 Belmont Ave.
Franklin Park, IL 60131-2887
708/671-3000

DeVilbiss JGHV-530

This well-constructed, high-capacity gun sprayed a wide variety of materials at a high flow rate and produced a full-sized pattern. However, it also requires lots of compressor muscle—5 to 7 hp, depending on the nozzle/needle set you use.

As with the other guns, you can adjust the pattern size and material flow on this model to do fine detail work and small projects. However, like the other guns with full-sized cups, it's a bit too bulky to allow precise control. (See the DeVilbiss EGHV comments).

The gun shown has a Teflon-lined, stainless-steel pressurized cup and stainless-steel wetted parts. An optional cup-pressure regulator and gauge enable you to adjust for optimum material flow to the gun by varying the cup pressure. The regulator gauge shows the pressure in the cup, so you can record this information and reset to the same pressure when you use that finish again. A quick-release fitting lets you detach the regulator easily to clean the gun. (Other manufacturers offer similar devices for their guns.)

For fast, high-volume work, the JGHV-530 would be a good choice. However, it's probably a bit too much gun for most of us weekend warriors.

DeVilbiss JGHV-530 (gun only), $365; TLC-576 1-qt. pressurized Teflon-lined cup, $79; cup-pressure control and regulator assembly, $99.

DeVilbiss/Ransberg
1724 Indian Wood Circle, Suite F
Maumee, OH 43537
800/338-4448

DeVilbiss EGHV Touch-Up/Detail Gun

This mighty mite provides precision control for spraying small projects and detail work. One of the few siphon-feed HVLP conversion guns on the market, the EGHV doesn't require a lot of air to run—a 2-hp compressor works just fine. Weighing in at just 7½ ounces, it does a nice job of atomizing low- and medium-viscosity finishes with the .040 (1mm) fluid tip/needle assembly provided. (Note: Optional tips aren't available for this gun).

You can order the gun with a half-pint clear resin cup or a half-pint solvent-resistant polyethylene cup. You can also use it with a pressurized two-quart remote cup, a handy option if you need to spray several dozen birdhouses or a slew of other small items.

DeVilbiss EGHV Touch-up/ Detail Gun, $139.50; 8-oz. polyethylene cup attachment (shown), $15.95.

DeVilbiss/Ransberg
1724 Indian Wood Circle,
Suite F
Maumee, OH 43537
800/338-4448

Grayco Optimiser M-1265

Here's the lightest production-type gun on the market. For me, it was also the most comfortable to use. Like the DeVilbiss JGHV-530, it handles a variety of finishes and can lay down a lot of material in a hurry. However, it requires at least a 5-hp compressor to do it.

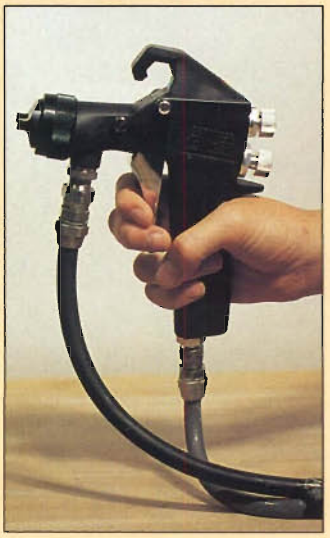
This gun accepts a wide range of nozzle sizes—from .020" up to .125". You can fit it with an optional high-pressure air cap for "non-HVLP" operation, in effect transforming it into a conventional high-pressure gun. The high-impact composite plastic body accounts for its light weight and relatively low price. (While the Optimiser performed well in my tests, I question whether the plastic air cap and retainer ring will hold up over time.)

All wetted parts are stainless steel. Grayco sells replacement fluid tips, needles, and air caps in a kit. Options include one-quart pressurized cups (aluminum and stainless steel), two-quart remote cups, a gravity-feed cup kit, and pressurized paint pots of various sizes.

This gun offers good versatility at an attractive price, as well as a healthy selection of cups and accessories.

Grayco Optimiser M-1265 (gun only), $259.

Grayco Inc.
P.O. Box 1441
Minneapolis, MN
55440-1441
800/367-4023.



Kremlin M21LP

For overall performance and versatility, I admit I'm partial to this gun. It provided excellent atomization and spray-pattern control with a wide variety of finishes, including the unthinned white latex paint I applied to my fence.

The Kremlin is what I would dub a "cheater" gun. At 30-psi inlet pressure, it delivers 10 psi and 9.5 cfm at the tip—using a mere 3-hp compressor. You can also crank up the psi on the compressor to make it perform more like a conventional high-pressure gun (50-psi line pressure to give you 17 psi at the tip) and really lay on the finish, but without nearly as much overspray as with a conventional air gun.

The aluminum gun body is fitted with stainless-steel wetted parts and weighs less than the other all-metal guns I tested. Unfortunately, Kremlin doesn't provide very many accessories for it. The barebones unit (shown) comes with a ¼" NPT male fitting for the air hose and a ⅜" NPT male fitting for the fluid hose or cup. Kremlin sells hoses, fittings, and one-quart siphon-feed cups, but you'll have to go to another company to buy remote pressurized paint cups or paint pots. The model shown won't adapt to a pressurized cup.

Kremlin M21LP Gun, $295.

Kremlin, Inc.
201 S. Lombard Blvd.
Addison, IL 60101
800/573-5554

Lex-Aire Pro 2000

This high tech-looking gun has a lot going for it. I especially liked the unique pneumatic trigger, which is very easy on the fingers. The trigger actuates a power piston that starts the air flow before pressurizing the cup. This starts fluid flow to the tip; when you release the trigger, the fluid flow stops before the air flow. The sequential valve action stops spit or spatter on startup and shutoff. Also, the piston moves the needle back in a straight line, rather than in an arc like the mechanical triggers on other guns. The manufacturer claims that this "straight pull" produces a more even fan pattern and causes less wear on the needle and tip.

In my tests, the gun worked as advertised, laying down a uniform spray pattern at a rapid rate with good atomization of thick and thin finishes alike. The 1-mm (.040") nozzle set that comes with the gun will handle most finishes, and Lex-Aire offers other sizes as well.

The gun comes with a non-corroding anodized aluminum body and a stainless-steel needle and fluid tip. An air-pressure regulator knob on the side of the handle and a built-in air-tip pressure gauge eliminate the need for an in-line high-pressure regulator between the compressor and gun.

Unlike some guns that require a specific size of compressor, this one will work with a compressor as small as 1½-hp for small projects or light, intermittent use. For larger jobs or heavier use, you'll need a 3- to 5-hp unit to drive it.

You can order the gun with a pressurized bottom-feed cup (shown), a pressurized top-feed cup, or without these options for use with remote pressurized systems.

Lex-Aire Pro 2000 with 1-qt. pressurized aluminum cup (model P2-BF), $395.

Lex-Aire Products, Inc.
34 Hutchinson Road
Arlington, MA 02174
800/537-2473

Wagner NBC

This gun, designed for use with Wagner's turbine systems, can also be ordered with an optional gun-mounted regulator for direct hookup to 3-hp or larger compressors. The gun has separate air- and fluid-control adjustments. (The large knob on the back of the gun controls fluid flow; a dial on the side of the gun controls air flow at the tip.) You can adjust spray pattern width from ¼" up to 12" by turning the knurled air-cap ring.

The gun looks solidly built and performed reasonably well in my tests. However, it took more than the usual fiddling with the various controls to get everything to work properly. Even so, the Wagner would be a good choice if you think you might switch to a turbine system in the future. To convert, simply remove the regulator and reattach the quick-change fitting (supplied) for the turbine air hose.

Wagner Model NBC, with regulator and 1-qt. pressurized aluminum cup, $340.

Wagner Spray Tech
1770 Fernbrook Lane
Minneapolis, MN 55447
800/443-4500

Other HVLP Gun Manufacturers

The following companies also sell HVLP conversion guns:

AccuSpray, Inc.
26881 Cannon Road
Cleveland, OH 44146
800/618-6860

Fuji Industrial Spray Equipment, Ltd.
65 Martin Ross Ave. #5
Toronto, Ontario M3J 2L6
416/650-1430

Mattson Spray Equipment, Inc.
230 W. Coleman St., P.O. Box 132
Rice Lake, WI 54868-0132
717/234-1617

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Woodworker's Journal

Tool Review

Continued from page 69

Siphon-feed guns, which are more common on the turbine systems, rely on a venturi or vacuum to draw material from the cup into the gun body. Gravity-feed systems offer a good compromise between convenience and efficiency. The top-mounted cups rely on gravity to deliver the material to the gun. I found these cups easy to change, and they allow you to apply every last drop of material. They cost a bit less than pressure-feed cups but also offer less capacity.

Better guns typically use stainless steel fluid passages, needles, and tips (referred to as "wetted parts" in manufacturers' catalogs). The gun bodies may be aluminum, stainless-steel, or even plastic. While plastic-body guns are relatively inexpensive and lightweight, one has to wonder about their durability and service life.

You'll find cups made of aluminum, stainless steel, Teflon-coated steel or aluminum, and plastic. Aluminum cups aren't recommended for use with products such as water-based finishes that contain chlorine or other aluminum-corroding chemicals. Stainless steel cups are compatible with all common finishes. Teflon linings also make good sense; they can be used with all materials and clean up easily.

You'll find plastic cups only on gravity-feed and a few siphon-feed systems. They're compatible with all finishes and solvents except acetone. Several manufacturers offer disposable plastic liners for use with aluminum cups and the paint pots.

External gun controls offer some adjustment during spraying, but you must also size a gun's air cap, fluid tip, and needle to match the material you intend to spray. Most manufacturer's catalogs and manuals provide general guidelines for choosing fluid tip/needle sets and corresponding air caps for the finishes you'll be spraying. I found that a .055"-i.d. fluid tip and needle made a good starter set for spraying wood finishes. This general-purpose set should handle 75 percent of your spraying jobs. WJ

Photographs: Author

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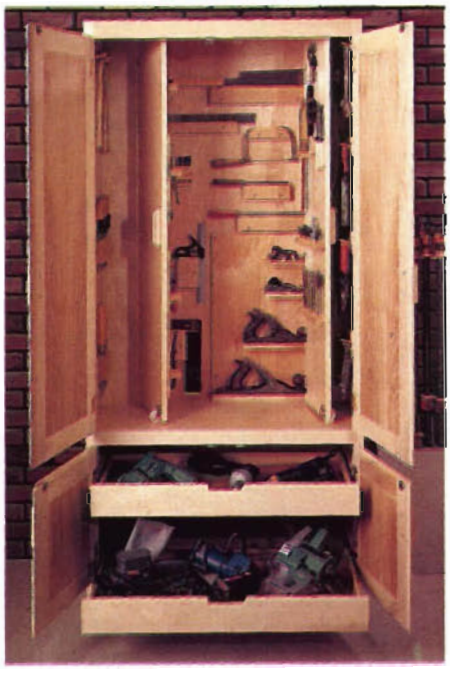

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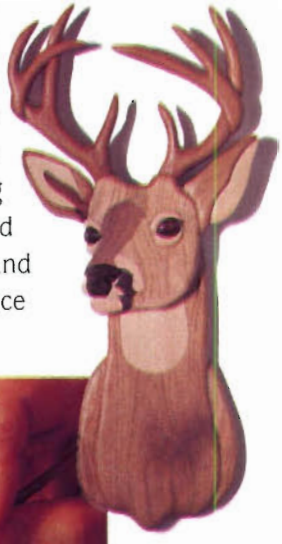

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SHOP TEST

Two New Benchtop Tools

Skil Heavy-Duty Drill Press

Skil Heavy-Duty 10" Bandsaw

by Rob Cook

In setting up my garage woodshop, I realized that space limitations would force me to make compromises on my choice of tools. I decided to go with benchtop models for those tools I didn't already own, provided I could find machines that offered "real tool" capabilities. So far, the tools I've found that can hold their own with floor-model machines include Skil's heavy-duty drill press and bandsaw, which I'll review here. To be honest, I didn't expect Skil's benchtop line to impress me, but I'm happily surprised.

What the Skil 13" Drill Press (HD3580) Can Do

This five-speed, heavy-duty machine weighs in at a hefty 110 lbs. In fact, the first thing I noticed was the sturdiness of the materials: the column is machined steel, the head cast iron, and the pulley housing pressed steel. The hinged pulley cover and switch assemblies are made of ABS plastic. In general, this tool creates a first impression of durability.

A 120-volt, 6-amp motor turning at 1725 rpm drives the two-pulley head at five different speeds (500 to 3100 rpm). The quill, which you operate with a conventional three-handled hub, travels 3⅜". It locks by means of a depth-adjustment ring on the hub assembly—just like the ones you find on larger floor models. The spring can be adjusted to increase or decrease the quill's return force.

Skil HD3580 benchtop drill press features five speed options, a 6½" spindle-to-column clearance, a 9x9½" tilting table, and an optional column-mounted fence.

The center-of-spindle to column distance measures 6½". By comparison, large floor models offer a 10½" spindle-to-column distance. Cranked to its lowest setting, the table measures a generous 13½" from the chuck. The ⅝" chuck uses a spring-loaded (self-ejecting) key that stores in a rubber keeper mounted conveniently on the head.

The 9x9½" table tilts 45° in both directions, but I found getting it back to 90° (square with the spindle) quite troublesome. To work around this, I resorted to clamping an adjustable angle jig to the table for angle-drilling operations.

I like Skil's unique, column-mounted fence, which you can buy as an option (catalog no. 80540). Its locking mechanism lets you position it anywhere on the column above the table. Best of all, you leave it attached to the column and simply push it aside when you don't need it.

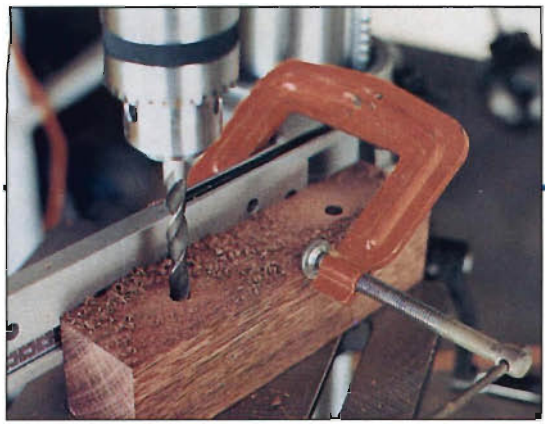
The fence incorporates a V-block with a stepped end for locating centers on round stock. This handy accessory can be accurately positioned for both horizontal and vertical boring. The integrated adjustable stop bar can be set for repetitive drill operations. Unfortunately, the bar was made of a soft metal that bent rather easily. I mentioned this to Skil, and their technical rep informed me that this part has been changed.

I found the drill press at a local discount warehouse priced at $295.

What the Skil 10" Bandsaw (HD3640) Has To Offer

You won't find any frills on this conventional two-wheel, single-speed saw. It stands 35½" tall and 21½" deep at the table, about three-fourths the size of a stationary unit. The table measures 13⅝" square.

Set up, the unit weighs 60 lbs. The base is made of cast iron, the table and body are die-cast aluminum, and ABS plastic makes up the side cover. The saw comes out of the box in five easy-



The optional fence accessory attaches to and pivots from the column. It proved an excellent addition, especially for operations that required clamping.

to-assemble pieces. The thorough, well-written instruction manual made assembly easy.

Upper and lower blade guides and thrust bearings are conventional in design and simple to adjust. The hex wrench included for this purpose stores on the inside of the cover. The HD3640 comes with ⅜"-square guides that can be replaced with "cool blocks" when they've worn.

A 120-volt, 6-amp motor powers the blade at 3,000 feet per minute. With sharp blades, power was adequate to handle all of my test cuts. The saw accepts blades from ⅛" to ½" wide and from 72" to 73½" long.

Changing blades isn't difficult, although I'd prefer to have the table slot exit toward the front of the table rather than to the side. The table and slot have been set up this way to accommodate the mounting guard for the fence, which attaches to the front edge of the table. You must remove the blade guard to change the larger blades, although I managed to get ⅛" and ¼" blades around it without kinking them.

Blade tensioning and tracking adjustments are straightforward and don't require a trip to the tool box for a wrench or pliers. To set tension, you turn a large knurled knob. For tracking adjustments, the designers have provided two serrated nuts. One of these is a locking nut, which is large enough that I could hand-tighten it against the adjustment nut. Once adjusted, the tracking kept the blade centered nicely on both wheels.

Skil provides a 2" dust-extraction port on the lower back side. Hooked up to my shop vacuum, it effectively removed most of the dust during a variety of sawing operations. There's also a brush mounted inside to scrub sawdust off the bottom tire.

I found the aluminum table, which tilts from -5° to 50°, to be light in weight but sturdy and flat. The miter slot lies to the right of the blade and accepts the small sliding miter gauge shipped with the saw. It proved adequate for crosscutting stock up to about 6" wide. Out of the box, mine fit rather sloppily in the groove, but a strip of tape on the bar and a little paste wax in the groove provided a snug fit and smooth action.

The saw impressed me with its full 7" cutting height and its overall resawing performance. Using a 1/16"-thick, ½"x4-tpi blade, I was able to resaw a 6"-wide 4/4 mahogany board smoothly enough that it yielded two ⅜"-thick book-matched pieces after planing.

The 7" cutting height gives the Skil bandsaw good capacity.

Skil HD3640 benchtop bandsaw features 10" throat depth, 7" cutting height, and a 13⅜"-square table. The saw requires less than two square feet of bench space.

Street price for the 10" bandsaw in my area (northern California) runs about $340.

The Last Word

The HD3640 bandsaw performed all essential bandsawing operations efficiently and precisely, but on a slightly smaller scale than full-sized (14") machines.

The HD3580 drill press meets my drilling needs nicely, although I wish the table were larger. An auxiliary plywood top, however, would remedy this drawback. The fence helps compensate for the small table, since there's little room for clamping a straightedge. I especially like the drill's heft and sturdiness and the accuracy of the quill and spindle—not much visible wobble here.

Lead Photograph: *Kevin May*
Other Photographs: *Skil-Bosch Corp., Rob Cook*

SHOP TEST

Forrest Woodworker II 10" Saw Blade

by Charles Sommers

There's an old adage that claims "You can't tell a book by its cover." The same might be said of a saw blade. Not many of us can look at a saw blade and predict just how well it will perform.

Over the last two months, we've had the opportunity to use and test several Forrest blades in our shop on three different tablesaws: a well-seasoned 3-hp Delta Unisaw, a new 10" Delta Contractor's Saw II, and a new 10" Craftsman Contractor.

To many woodworkers, Forrest represents the Cadillac of saw blades. Buying one can set you back anywhere from two to three times what you might spend for an alternative. Our most pressing question was whether the Forrest blades perform well enough to deserve the reputation.

What You See and What You Get

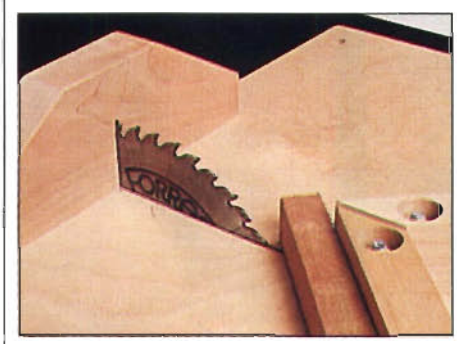
Forrest promotes the Woodworker II as a general-purpose rip and crosscut blade for making up to 2" cuts in solid soft- and hardwood stock and for crosscutting certain plywood veneers. We tested both the thin-kerf (3/32") and the standard 1/8" 40-tooth, 10" carbide-tipped versions.

Forrest ships blades individually in flat, reinforced corrugated boxes. You don't get any fancy molded carrier or storage box. While not elaborately packaged, the blades were protected adequately for shipment.

Open the package, and you find a heavy, stout-looking blade. You won't find a glassy polish, fancy coatings, or elaborately cut expansion slots. The finish grinding on the steel disk is coarse; the brazing is thick and heavy, as are the C-4 carbide tips. (Carbide is extremely hard, and the top-rated C-4 has a hardness value of 94 on a scale that rates diamond as 100.) Grinding on the carbide cutting surfaces looks mirror-smooth. There are five laser-cut expansion slots spaced equidistantly around the blade's perimeter.

The Proof Is In the Cutting

Both Woodworker II blades performed very well, whether cutting through butter-soft 3/4"-thick pine or iron-hard 1 3/4"-thick ash. The 20° positive hook angle and 15° alternate top bevels give the blades an aggressive attack; we maintained a brisk, uniform feed rate while ripping a variety of woods on the powerful Unisaw and experienced no discernible resistance or slowing. On the smaller saws, switching to the thin-kerf blade allowed very similar feed rates, again with barely noticeable resistance.



Although we've used blades that cut faster, their cut quality couldn't touch what we got with the Forrest blades. On solid stock, ripped edges came off our saws jointer-finished, smooth and slick with no visible teeth marks—good enough to edge-glue without additional machining. Crosscuts came out crisp and clean with no fuzzing or tiny splintering. On plywoods, veneer plys, and melamine, we got excellent top cuts but encountered some chipping and fuzzing on the bottom side. (If you cut these materials frequently, we suggest switching to a blade designed specifically for them.)

The clean, burnished cut we got with these blades results from the shallow taper Forrest grinds into the blade bodies. Most manufacturers grind a high-angled taper, which permits the blade body to clear the kerf walls with less friction. On the Forrest, the very low clearance between the blade body and kerf walls actually helps smooth and burnish the stock. The trade-off? Blades with the high-angled taper generally will cut a bit faster, require less power, and generate less heat, but they won't produce the finely finished, high-quality cut that Forrest offers.

Forrest blades, on the other hand, may cut a bit more slowly and run hotter than other blades. However, feeding the stock faster and elevating the blade 1" to 2" above the workpiece will help cool the blade and lessen the likelihood of burning.

The Bottom Line

Performance of the WoodworkerII is impressive enough that you could bolt this versatile, general-purpose blade on your saw and use it for virtually all of your cutting operations.

No matter how good a saw blade may be, it won't perform up to its full potential if your tablesaw is misaligned or performing poorly. Tune your saw to the manufacturer's specifications, and keep it tuned.

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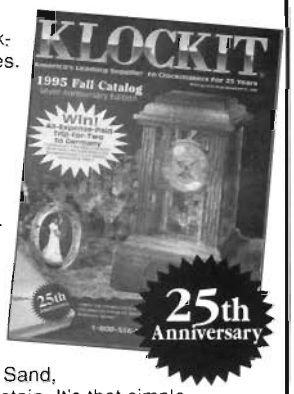

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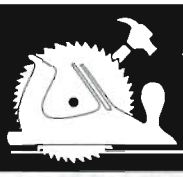

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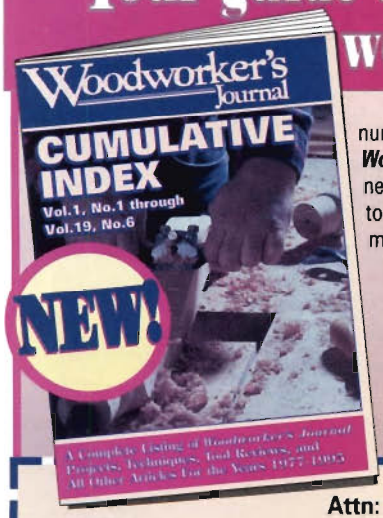

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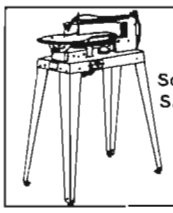

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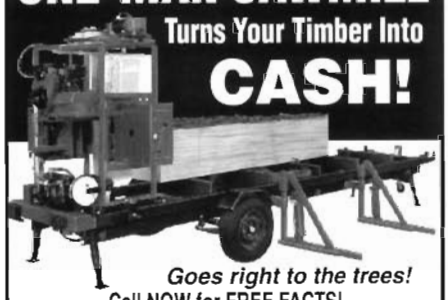

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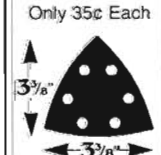

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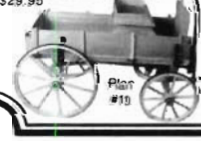

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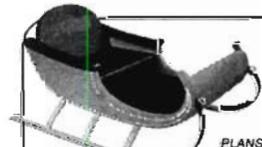

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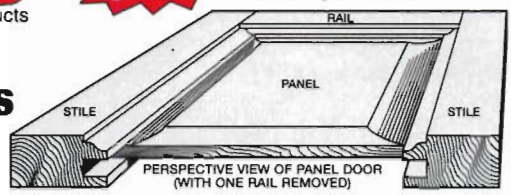

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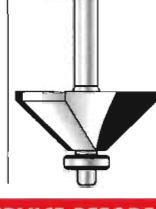
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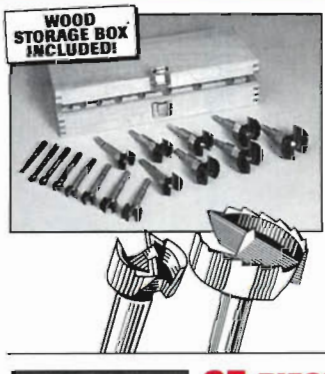

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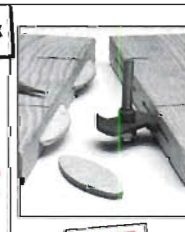

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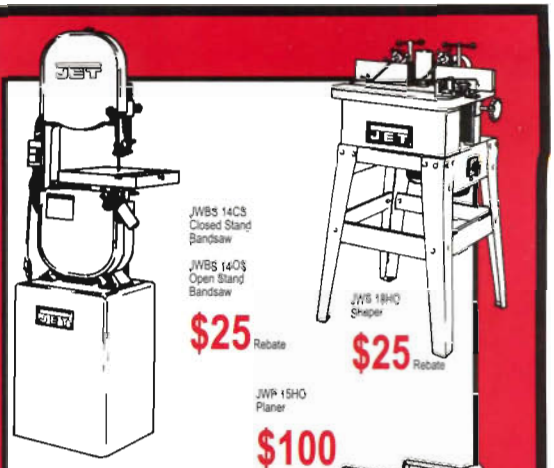

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