

Special
Outdoor Projects

Woodworker's Journal

Vol. 19, No. 3 May/June 1995

■ Redwood Hammock Stand

Front Porch *Breakfast Table & Chairs*

■ Chip Carving

2 Patterns To Get You Started

■ Tool Review

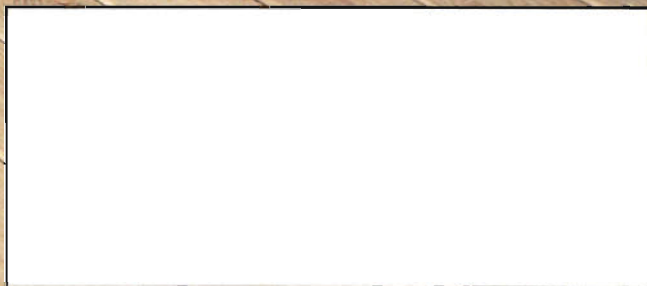
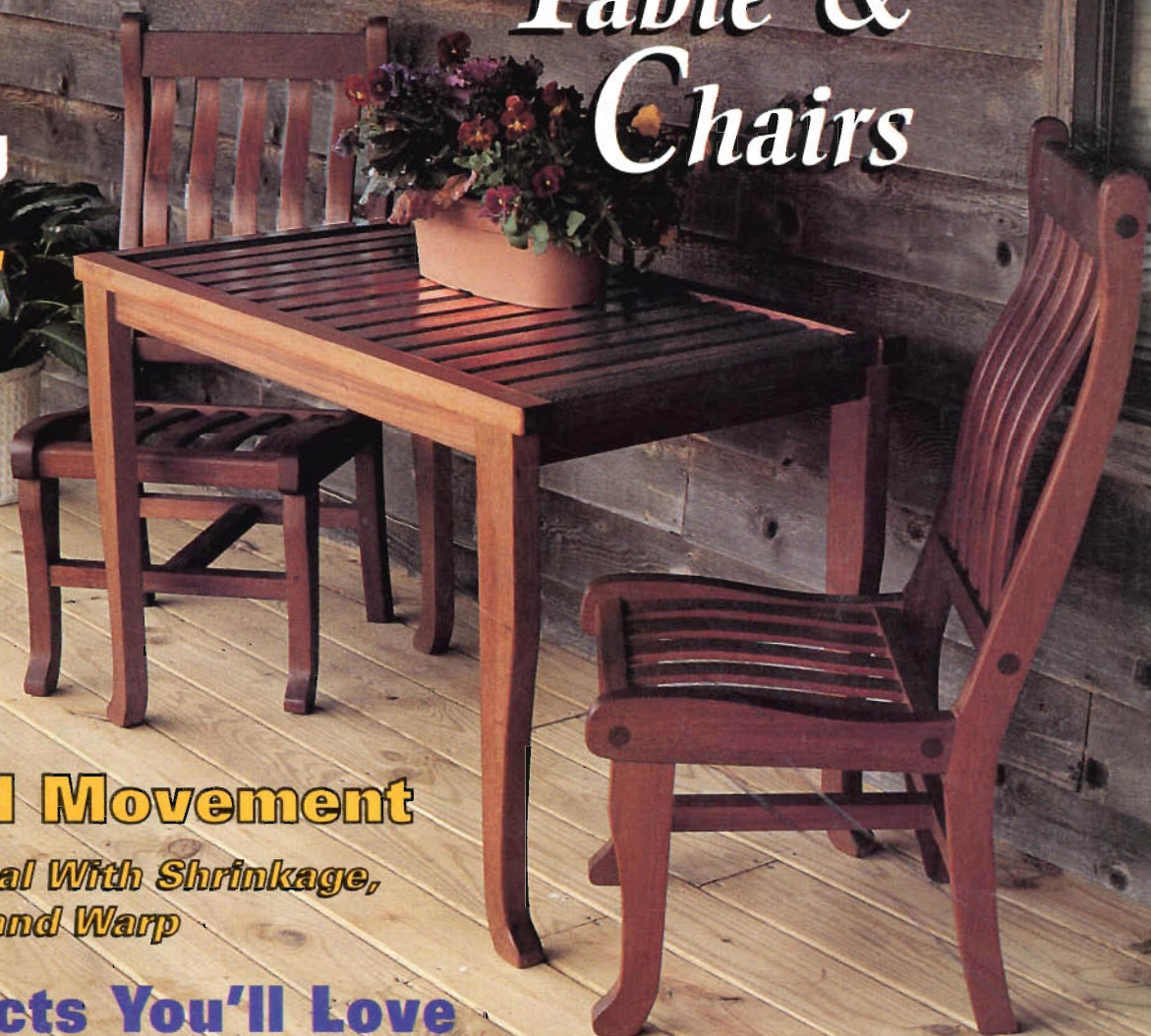
Benchtop Mortising Machines

■ Wood Movement

How to Deal With Shrinkage, Swelling, and Warp

■ Projects You'll Love

- 14 Custom-Designed Tool Holders for Your Tool Cabinet
- Laminated Trout Net
- Tablesaw High Fence
- Featherboard Holder



Make Beautiful Raised Panel Doors...

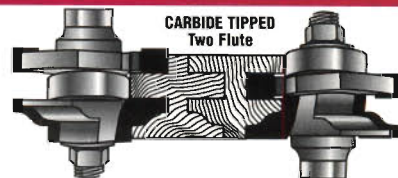
With Your 1/4" or 1/2" Router, Or With Your 1/2" or 3/4" Shaper.

Professional production quality bit makes it quick and easy to produce matching rails and stiles - the panel raising bit with ball bearing guide makes the raised panel perfect every time!



SIZE & FORM	ITEM #	PRICE/SET
1/4" Shank Router	#1301	\$69.95
1/2" Shank Router	#1302	\$79.95
1/2" Shaper	#1303	\$99.95

REGULAR VALUE OVER \$150.00!



***REVERSIBLE COMBINATION RAIL & STILE BIT**
(For making matching rails and stiles in raised panel doors, etc.) Works with stock from 11/16" to 7/8".



*Supplied With Ball Bearing

*2" Large Diameter (1/4" Shank)
*3-1/2" Large Diameter (1/2" Shank)
4-5/8" Large Diameter (Shaper)

WHEN ORDERING ANY THREE OR MORE DEDUCT \$1.00 EACH

CARBIDE TIPPED ROUTER BITS

PROFESSIONAL PRODUCTION QUALITY GUARANTEED
FREE SHIPPING IN CONTIGUOUS USA

ITEM NO.	DESCRIPTION (ALL 2 FLUTED)	SHANK SIZE	PRICE		ITEM NO.	DESCRIPTION (ALL 2 FLUTED)	SHANK SIZE	PRICE		
#1314	ROUND OVER - 1/8" Radius	1/4"	\$11.00			MOLDING PLANES				
#1315	ROUND OVER - 3/16" Radius	1/4"	\$11.00		#1362	1" C.L.	1/4"	\$24.95		
#1394	ROUND OVER - 1/4" Radius	1/4"	\$14.00		#1363	1-5/8" C.L.	1/2"	\$29.95		
#1316	ROUND OVER - 5/16" Radius	1/4"	\$14.00		#1364	1-5/8" C.L.	1/2"	\$31.95		
#1369	ROUND OVER - 3/8" Radius	1/4"	\$15.00		#1365	1" C.L.	1/4"	\$31.95		
#1370	ROUND OVER - 1/2" Radius	1/4"	\$17.00		#1366	1-11/16" C.L.	1/2"	\$31.95		
#1395	ROUND OVER - 1/4" Radius	1/2"	\$15.00		#1330	BULL NOSE - 1/2" Diameter of Circle	1/4"	\$16.00		
#1318	ROUND OVER - 3/8" Radius	1/2"	\$15.50		#1331	BULL NOSE - 3/4" Diameter of Circle	1/4"	\$21.00		
#1319	ROUND OVER - 1/2" Radius	1/2"	\$17.00		#1332	BULL NOSE - 3/4" Diameter of Circle	1/2"	\$21.00		
#1320	ROUND OVER - 3/4" Radius	1/2"	\$21.00							
#1333	TONGUE & GROOVE - Straight	1/4"	\$29.00		#1371	STRAIGHT - 1/4" Diameter	1/4"	\$ 6.50		
#1334	TONGUE & GROOVE - Straight	1/2"	\$29.00		#1372	STRAIGHT - 3/8" Diameter	1/4"	\$ 6.50		
#1335	TONGUE & GROOVE - Wedge	1/4"	\$29.00		#1373	STRAIGHT - 1/2" Diameter	1/4"	\$ 7.00		
#1336	TONGUE & GROOVE - Wedge	1/2"	\$29.00		#1374	STRAIGHT - 3/4" Diameter	1/4"	\$ 9.50		
#1337	FLUSH TRIM - 3/8" Diameter - 1" Cutting Length	1/4"	\$ 7.50	#1375	STRAIGHT - 3/8" Diameter	1/2"	\$ 7.50			
#1338	FLUSH TRIM - 1/2" Diameter - 1" Cutting Length	1/4"	\$ 8.00	#1396	STRAIGHT - 1/2" Diameter	1/2"	\$10.00			
#1400	FLUSH TRIM - 1/2" Diameter - 1-3/16" Cutting Length	1/2"	\$ 9.00	#1377	STRAIGHT - 3/4" Diameter	1/2"	\$10.00			
#1340	PATTERN / FLUSH TRIM - 1/2" Diameter	1/4"	\$15.00	#1397	COVE - 1/4" Radius	1/4"	\$13.00			
#1341	PATTERN / FLUSH TRIM - 3/4" Diameter	1/4"	\$17.00	#1398	COVE - 3/8" Radius	1/4"	\$14.00			
#1342	PATTERN / FLUSH TRIM - 3/4" Diameter	1/2"	\$19.00	#1399	COVE - 1/2" Radius	1/4"	\$15.00			
#1351	LOCKMITRE - 7/8" Cutting Length	1/4"	\$32.00	#1381	COVE - 1/2" Radius	1/2"	\$15.00			
#1352	LOCKMITRE - 1-1/8" Cutting Length	1/2"	\$45.00	#1401	ROMAN OGEE - 5/32" Radius	1/4"	\$18.00			
#1353	OGEE RAISED PANEL - 2" Large Diameter	1/4"	\$28.00	#1402	ROMAN OGEE - 1/4" Radius	1/4"	\$20.00			
#1354	OGEE RAISED PANEL - 2-3/4" Large Diameter	1/2"	\$32.95	#1403	ROMAN OGEE - 1/4" Radius	1/2"	\$21.00			
#1389	SPIRAL UPCUT - 1/8" Diameter (solid carbide)	1/4"	\$ 9.95		Special BISCUIT JOINING SET 5/32" Slot Cutter - 1/4" Shank. Plus 250 #20 Biscuits. "Biscuit Joining with your Router", Instructional sheet included. Order Item #1385 FAST & EASY Reg. Price \$34.00 SALE \$29.00					
#1390	SPIRAL UPCUT - 1/4" Diameter (solid carbide)	1/4"	\$13.25							
#1391	SPIRAL UPCUT - 1/4" Diameter (solid carbide)	1/2"	\$15.45							
#1392	SPIRAL UPCUT - 3/8" Diameter (solid carbide)	1/2"	\$26.45							
#1393	SPIRAL UPCUT - 1/2" Diameter (solid carbide)	1/2"	\$33.00							

TECHNICAL HELP & EXPERT ADVICE • CUSTOMER SERVICE BEFORE & AFTER SALE • FREE 40 PAGE CATALOG

CONTROL THE SPEED OF YOUR ROUTER

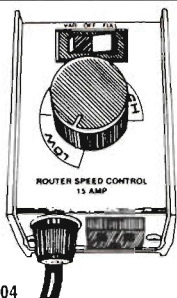
ROUT AT THE SPEED THAT GIVES THE BEST RESULTS WITH THE WOOD & BIT YOU ARE USING!

FEATURES:

- Works with all routers 3-1/4" HP or LESS - 120V 15 Amp
- Full horsepower and torque at all speeds
- Gives your router a feature only available on routers costing hundreds of dollars!

Reg. Price \$39.95
SALE \$29.95

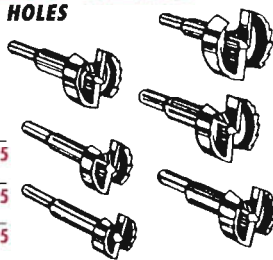
Order Item #1304



FORSTNER BIT SETS FOR PERFECT HOLES

Forstner bits are designed to drill flat bottom and through holes cleanly in end grain, thin stock, veneers & regular stock. Comes with it's own attractive wooden box.

	Regular Price	SALE Price
7 PIECE SET - Item #1386 1/4" TO 1", In 1/8" Increments	\$ 40.65	\$ 25.95
16 PIECE SET - Item #1387 1/4" TO 2-1/8", In 1/8" Increments	141.20	69.95
24 PIECE SET - Item #1388 1/4" TO 3-1/8", In 1/8" Increments	298.80	189.95



To Order By MasterCard, VISA or Discover.
Call Toll-Free 7 Day - 24 Hour Order Service

1-800-533-9298

Or Send Check To: **MLCS, Ltd.** ©1995
P.O. Box 4053 J, Rydal, PA 19046

Woodworker's Journal

Vol. 19, No. 3 May/June 1995



28

PROJECTS

28 Tablesaw High Fence

This one features "zero" adjustment for easy squaring and a featherboard holder

32 Trout Landing Net

Our gluing form and simple laminating technique remove the mysteries

38 Redwood Hammock Stand

Redwood laminated into a handsomely styled structure

44 "Front Porch" Breakfast Table and Chairs

Durable mahogany furniture built to handle the elements

52 Custom-Designed Tool Holders

Fourteen ideas to help you outfit your tool cabinet



22

TECHNIQUES

14 In The Shop: Wood Movement

How To Deal With Shrinkage, Swelling, and Warp

22 Woodworking Basics: Woodcarving For the Would-Be Artist

Roger Holmes shows how to carve two patterns you can use to embellish projects



56

TOOLS

56 Tool Review: Benchtop Mortising Machines

Read our side-by-side comparison of these affordable units before you buy

64 Shoptest: Polyurethane Glues

Excel and Gorilla Glue: Two new adhesives certain to find their way into your shop



38

DEPARTMENTS

6 Shoptalk

7 Reader Letters

9 Readers' Information Exchange

10 Product News

12 Shop Tips



32

EDITORIAL

Founder James J. McQuillan
Executive Editor James W. Bequette
Editor Charles Sommers
Managing Editor Doug Cantwell
Contributing Editors David F. Peters
 Rick and Ellen Bütz
 Robert J. Hlavacek Sr.
 Jim Barrett
 Roger Holmes
Designer/Craftsman Richard R. Coers

ART

Art Director Mari-Rose M. Minyo
Technical Illustrator Dana L. Quirom
Production Directors Terry Boyer
 Laurie Roth Hahn
Production Artist Terri Sutter

ADVERTISING

Advertising Manager Michael F.S. Copping
 (309) 682-6626
Classified Ad Manager/Ad Coordinator Carmen Martin
 (309) 682-6626
Advertising Sales J.F. Van Gilder Co.
 Jim Van Gilder, Joe Tarelli/
 Publisher's Representatives
 P.O. Box 145
 Addison, TX 75001
 (214) 392-1892
 Fax (214) 392-1893

CIRCULATION/MARKETING

Circulation Manager Marcia Jackson

PUBLISHER

President Jerry Constantino
Men's Group Publisher Art Setterlund

BUSINESS

Chief Financial Officer Dennis Dietrich
Controller Matthew R. Taphorn
Credit Manager Gary W. Norton
Vice President/Production & Manufacturing Wayne Mathison

CORPORATE OFFICES

Woodworker's Journal
 PJS Publications, Inc.
 News Plaza, Box 1790
 Peoria, IL 61656

Woodworker's Journal (ISSN 0199-1892) is published bi-monthly in Jan/Feb, Mar/Apr, May/Jun, Jul/Aug, Sept/Oct and Nov/Dec by PJS Publications Inc., P.O. Box 1790, Peoria, IL 61656. Telephone (309) 682-6626. Second class postage paid at Peoria, IL and additional offices.
 Copyright 1995 by PJS Publications Inc. No part of this publication may be reproduced by any method without permission from the publisher.
 Subscription Rates: In the United States and its possessions—One year (6 issues): \$19.98; Two years (12 issues): \$33.90. Canada—One year: \$29.99 (U.S. funds), includes 7% GST; Two years: \$53.40 (U.S. funds) includes 7% GST. Foreign countries—One year: \$27.95 (U.S. funds); Two years: \$49.90 (U.S. funds).
 To Subscribe, Renew or Change Address: Write to Woodworker's Journal, P.O. Box 5308, Harlan, IA 51593-2808, include mailing label for renewals and changes. For gift subscriptions, include your own name and address as well as those of gift recipients.
 Postmaster: Send Change of Address to Woodworker's Journal, P.O. Box 5308, Harlan, IA 51593-2808. Materials submitted for editorial consideration will be treated with care while in our possession, but we cannot assume responsibility for loss or damage.
 Printed in the U.S.A.

■ CONTOURED COMFORTABLE DESIGN
 ■ POSITIVE EASY TO USE THUMB LOCK
 ■ EASY TO READ DUAL MARKINGS FOR LOCATING STUDS ■ PRO-TECH™ ANTI-CORROSION FINISHED BLADE

ARROW presents...

THE BRUTE™

■ TEMPERED STEEL BLADE REMAINS RIGID FOR APPROXIMATELY 7 FEET ■ TRIPLE REINFORCED NON-SLIP END HOOK
 ■ CALIBRATED FOR TRUE ZERO
 ■ HEAT TREATED HIGH CARBON STEEL RETURN SPRING GIVES LONGER LIFE

AVAILABLE IN METRIC/INCHES

TRIPLE BRIGHT RUGGED CHROME HOUSING

RUGGED HEAVY DUTY PROFESSIONAL RULES!

AVAILABLE IN SIZES OF:

12' 16' 25' 30' 50' 100'

ARROW...AMERICA'S BEST BUY FOR OUTSTANDING QUALITY AND VALUE. AT LEADING HARDWARE AND RETAIL STORES EVERYWHERE.

EXCLUSIVE NON-SLIP END HOOK

THE BRUTE™ AVAILABLE IN NEON GREEN & ORANGE RULES; 25' ONLY ALSO AVAILABLE "PROFESSIONAL GRADE" IN BRIGHT YELLOW, 25' & 30'

THE BRUTE™ STEEL RULE BIG BRUTES 50' & 100'

ARROW FASTENER COMPANY, INC. 271 MAYHILL STREET, SADDLE BROOK, NEW JERSEY 07663
 IN UNITED KINGDOM: ARROW FASTENER (U.K.) LTD., 14 BARCLAY ROAD, CROYDON CRO 1 JN., SURREY
 IN CANADA: JARDEL DISTRIBUTORS, INC., 6505 METROPOLITAN BLVD. EAST, MONTREAL H1P 1X9 QUEBEC
 ©1994, ARROW FASTENER CO., INC.

Breathe Clean Air with Rascal Powered Respirators

Airstream • Airlite Air Visor • Air-Mate Systems
 Protects against wood dust, brazing and grinding fumes, allergy causing particulates.

Breathe-Easy Systems

Filters paint/lacquer vapors and Dust/Mist/Fumes

Call for all your safety needs.
 Disposable respirators, goggles, glasses, hearing protectors, skin protectant.



ENVIRO-SAFETY PRODUCTS

(Formerly Airstream Dust & Spray Helmets)
 21344 Ave. 332, Woodlake, CA 93286
 Call us for more information and FREE brochure.

Toll Free 1-800-637-6606

Special Price for Woodworkers



Photo courtesy of Jim Mathias - Three Rivers, CA

●●●AIR-MATE 3●●●
 Battery powered, light weight, portable...can be worn with glasses and beard

"My Woodshop Makes Me \$300 a Week, Part Time. Yours Can, Too!"

by Rick Gundaker

You've heard of "the woodworker who was a real butcher."

It's true, for many years I was a meat cutter in a butcher shop in Erie, Pennsylvania. But several years ago the poor economy in the Erie area forced me to look for a new job.

After four months, I found a new job, but it paid less and had fewer benefits. I desperately needed a second income.

I was sitting at the kitchen table very late one snowy night in December. I couldn't sleep. My checkbook was overdrawn, bills were piling up and the bank was threatening to foreclose on our home. Then it came to me.

For many years I had been making woodcrafts. I had made many unique items for our home. Everybody raved about them, so I started making them for gifts.

My wife, Amy, always said, "Rick, you should start selling your woodcrafts." But I would just laugh. Well, I wasn't laughing that night. Maybe Amy was right. Maybe I could sell them!

I took what little money we had, borrowed some from my Mom, and turned to my hobby with serious determination.

At first my income was small, \$60.00 to \$90.00 a week. But time and experience helped me develop many easy-to-make woodcrafts and a very successful method for selling them. My income grew beyond my greatest dreams.

Today, Amy and I live in a nice country home on ten acres of land and it's paid for! That's a great feeling, *but the best feeling of all is the self satisfaction I have of being able to make the extra money I need whenever I need it.*

You, too, can make the extra money you need while enjoying your hobby. Using your basic woodworking skills, you can create great gifts and turn your woodshop into a part-time money maker. I know it can be done because

I did it, and I've helped many other woodworkers make money, too!

The following are excerpts from letters I've received from woodcrafters I've helped.

"You sure know what sells! The items I made from your plans have been on display at the local bank in St. Joseph. In less than 30 days I have sold \$1,700 of my woodcrafts! I'm enclosing a news story our local paper did on my work."

W.F.H. of St. Joseph, MN

"My wife is a school teacher. I made her one of your cute designs to set on her desk. Other teachers saw it and she sold eleven of them before the day was over. Keep up the good work!"

C.M. of Baltimore, MD

"You're doing good. I've made several of your plans and the response to buy has been great. Every year I sell my crafts at our church fair and donate all the proceeds to the church. In 3 days I made over \$600!"

C.R. of Chalmelle, LA

"Your patterns are simple and very easy to follow. I'm fairly new to woodworking and it's great to see full-size patterns with enough information so that even a beginner with limited woodworking knowledge can complete a project on their own. I'm really having fun with woodworking. Thanks for sharing your knowledge and experience, it's invaluable to the novice."

C.L. of Houston, TX

If these woodworkers can do it, you can, too!

There's plenty of room for everyone in woodcrafting. I won't be competing with you and you won't be competing with me. That's why I would enjoy showing you how you can start your own profitable craft business using your basic woodworking skills. You can go as far as you want... *profits are virtually unlimited!*

Here is what I'll send you:

I've put all my successful methods, plus 35 of my fastest selling designs, with step-by-step instructions into one fact-filled guide.

I'll show you...

- * How to begin with a small amount of money.
- * What tools you will need. I'll give you an exact list.
- * How to buy a saw and other woodworking equipment, cheap!
- * What designs are the best sellers.
- * What type of lumber and hardware to use and where to buy it.
- * How to give your crafts that personal touch that will increase sales by 80%.
- * How to set up books and records.
- * How to avoid the mistakes that I made... and save hundreds of dollars.
- * PLUS... I'll send you THIRTY-FIVE of my show-tested, fast selling woodcrafts in easy-to-copy full size plans.
- * and much, much more...

Start turning your woodworking shop into a money maker today! I'll send you my complete guide to examine for 31 days. A full month! There is absolutely no risk to you. NONE.

I'm so sure it will help you, I'll give you my personal guarantee: I'll send you my guide, *Woodcrafting for Profit*, to read for 31 days.

There is no obligation; in fact you can postdate your check for 31 days in advance. If you're not absolutely satisfied, return the guide in 31 days. I'll promptly return your original uncashed check. No excuses. No delays. This is the fairest way I know to help you get started.

To order, send your name, address, and postdated check for \$12.95 (plus \$2.00 shipping and handling) to Rick Gundaker, 8042-EV Old Oliver Road, Erie, PA 16509.



Pickup Owners!

Good looks, convenience and weather-tight protection for your truck bed. This key-locked vinyl cover automatically retracts and is reinforced with interlocking aluminum ribs.

ROLL-TOP-COVER™

For a free brochure, call or write:

PACE-EDWARDS CO., Dept. H
2400 Commercial Blvd. • Centralia, WA 98531

1-800-338-3697

FREE TOOL CATALOG!



Your Best Work Starts With Us...

With over 4,000 of the finest woodworking tools in the world, Woodcraft can help you work more efficiently and skillfully than ever. Call for your Free copy today.

1-800-542-9115

WOODCRAFT

210 Wood County Ind. Park, Dept. 95WJ055
PO Box 1686, Parkersburg, WV 26102-1686

SHOP TALK



What A Difference A Year Makes

It has been said that "nothing is so constant as change." And so it is at *Woodworker's Journal*. The apparent differences that you see between the Mar./Apr. '94 and '95 covers shown at left represent just a small part of the graphic and editorial evolu-

tion that has taken place between the covers of the magazine this past year.

This evolution has been gradual and designed with one major purpose: To pack more useful information into each *Woodworker's Journal*, and to make it more interesting, appealing, and usable for you.

Redesigning a magazine is not done frivolously. Literally hundreds of graphic elements and editorial procedures must be considered and choices made—from selecting the most readable typefaces and line weights on drawings, to standardizing spelling and punctuation style.

All *Woodworker's Journal* staffers have had a hand in this process. But, the lion's share of credit for the new design goes to art director Mari-Rose Minyo (shown at right), who expertly juggles and transforms our zillions of ideas and necessary elements into well-blended editorial realities. Woodworking magazines are complex to produce, and we appreciate Mari-Rose's talent for easing the process considerably.

I've called this an evolution—not a revolution, and for good reason. As editor, I'm dedicated to maintaining the qualities that have made *Woodworker's Journal* the highly respected publication it is today. I've also accepted the editorial challenge to build on that reputation and produce an even better magazine for you.



To that end, I promise you'll see more drawings carrying more useful, detailed information. You'll read more detailed step-by-step how-to instructions and helpful Pro Tips right from our experienced project builders so you won't be left guessing as to how the project should be built. And we'll work hard to create better illustrations and text that will be easier to understand and follow.

There will be more technique and project combinations to help you put newly learned procedures into practice with fail-safe assurance. You'll continue to have a variety of interesting and worthwhile projects to choose from, each selected to match your particular interests and woodworking skills. You'll also get the latest scoop on new tools and detailed user reviews on those of most interest to you and fellow woodworkers.

I'm proud of the redesign and redirection that's evident already, and I trust it will make *Woodworker's Journal* even more useful and enjoyable for you.

Charles Summers

READER LETTERS



I enjoyed reading the Nov./Dec. '94 issue, and was especially interested in Brian Angwin's letter and picture of his beautiful Governor Winthrop slant-front desk. My

father, Paul Trahan, built the same slant-front desk for me. He added a very special display case using

stained glass in the doors. I'm very proud of my father's work, and I want to take this opportunity to brag!

Paula Trahan Butkevich, Danielson, Conn.

I recently built the '37 Pontiac Deuce Coupe from your Nov./Dec. '94 issue. However, I made a few changes. For example, the body, interior, and dash are made of high-gloss beige plastic laminate, the bumpers, hub caps, fenders, running boards, grills, and louvers are polished aluminum, the wheels are suspended by ball bearings, and the headlights, handles,

and axle caps are polished metal. I covered the roof with leather, used Plexiglas for the windows, made the steering wheel of nylon and wood, and covered the seats with vinyl. Oh yes, I made the tires from rubber and cut treads in them with a rasp.



I enjoyed building the car and gave it to my 6-year-old godchild for Christmas.

Daniel Poirier, Perkins, Quebec

Continued on page 8

Sevco

BOX 472749
GARLAND, TX
75047-2749

The Scroll Saw Specialists, INC.

1 (800) 462-3353

SEYCO Features Intarsia Patterns by: Judy Gale Roberts

BOOK "Intarsia Patterns & Techniques" ... \$19.95*

(147 pages of professional instructions with practice patterns)

VIDEO "Intarsia Woodworking Basics" \$29.95*

(VHS format - 90 minutes of detailed instruction)

• Intarsia Patterns •



BALD EAGLE
16" Diameter 35 pcs.

\$6.95 ea. OR All 6
Patterns for \$35.00*

*Plus \$5.00 Basic
Shipping Charges

(No additional shipping for
multiple items!)

FREE CATALOG WITH
OVER 80 MORE PATTERNS

WITH YOUR ORDER.



PUP W/DECOY
12 X 20 51 pcs.



GOLFER
21 X 13 92 pcs.



ELK
17 X 18 41 pcs.



COWBOY
19 X 16 71 pcs.



CARDINALS
20 X 14 69 pcs.

SEYCO - Now Has Available
The Easy-To-Use Finger Release "Quick-Clamps"
for ALL BRANDS of Scroll Saws!
Call 1 (800) 462-3353 for details.

NOW Try The - EXCALIBUR

19" Scroll Saw or 30" Scroll Saw

and Experience Scroll Sawing Without Frustration!

FEATURING

- Variable Speed
- Finger Release "Quick Clamps"
- "Flip" Tensioner
- Built-In Dust Blower
- 12"x17" Tilting Table
- Sturdy Steel Stand
- 2" Thickness capacity
- Smooth & Quiet operation
- "Cast Housing" Design

CALL SEYCO

(800)462-3353

FOR OUR

DEMO

VIDEO

\$15.00

(REFUNDABLE)



**Unique "TOP ARM LIFT" for
EASIER BLADE CHANGES!**



Scroll Saw & stand
Quick Clamps
Flip Tensioner
Variable speed
144 blades

SUPER SPECIALS

EX-19 \$995.00

Regularly \$1295.00

EX-30 \$1195.00

Regularly \$1495.00

READER LETTERS

Continued from page 7

Here's my two-year renewal for *Woodworker's Journal*. I'm also

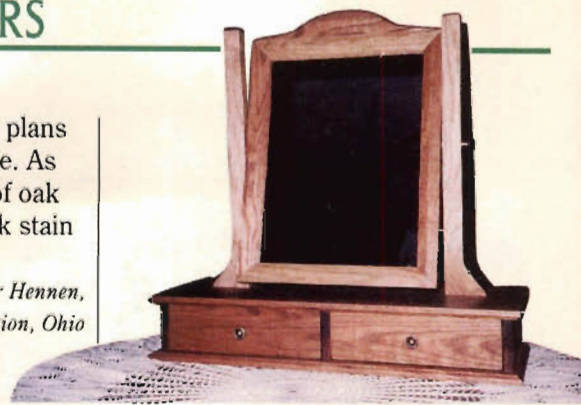


enclosing a picture of our corner cabinet I made from your plans. I enjoyed building it, and my wife really loves it. We've received many compliments on it. Thanks very much.

Bob Reeves,
St. Petersburg,
Fla.

I made this vanity from the plans in your Mar./Apr. '91 issue. As you can see, I've made mine of oak and finished it with golden oak stain and Deft.

Elmer Hennen,
Mingo Junction, Ohio



Just wanted to tell you—about a year ago I started looking for a good Grandfather clock plan and noticed in your index that you had one in 1984. So, I went

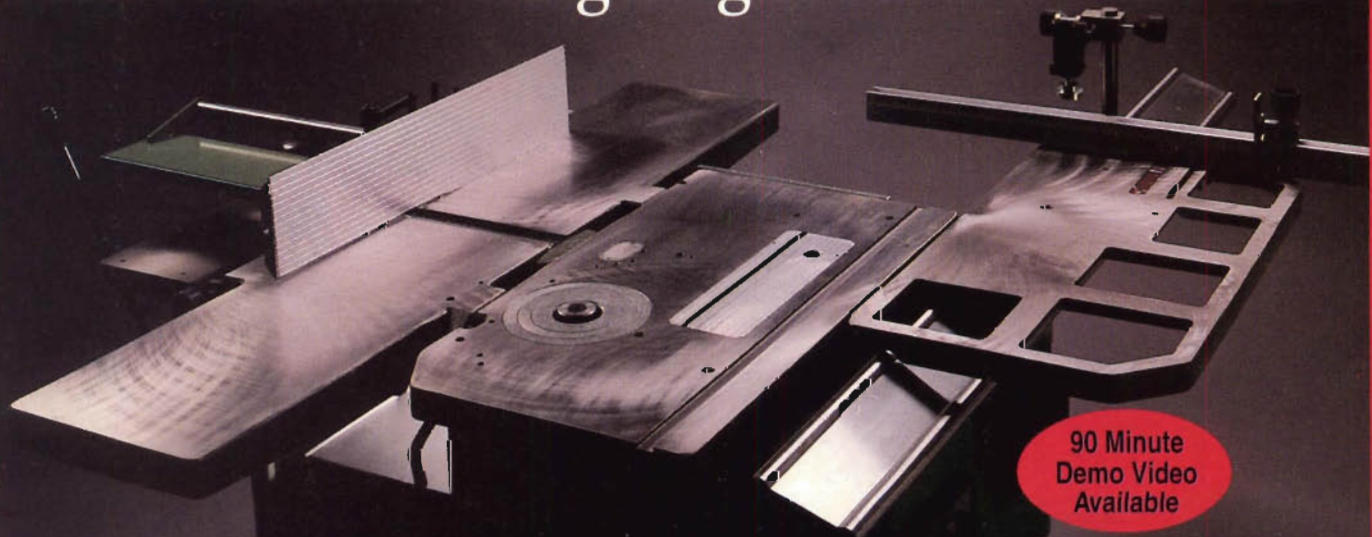
through my back issues and lo and behold—there it was. Six months later, here they are—one for daughter Belinda, and one for son David.

Just wanted you to know the plans are super.

J.T. (Tom) Coffman, Clarksville, Tenn.

We welcome opinions and comments (both pro and con) from our readers. 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.

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



90 Minute
Demo Video
Available

The Robland X31 is as welcomed in European workshops as a home run in the World Series. We put together a 12" jointer, 12" planer, 10" table saw, 50" sliding table, and a shaper with a mortiser. No cheating. No compromises. Some 1100 lbs. of cast iron stability, with three separate 3HP motors. It stays put. It stays true. and it stays neatly in a little corner of your shop.

That's why Belgians call the Robland X31 The Intelligent One Man Shop. About the only thing you can't make on it is breakfast.

LAGUNA TOOLS

(800) 234-1976 • (714) 494-7006 • FAX (714) 497-1346 • 2265 Laguna Canyon Road, Laguna Beach, CA 92651

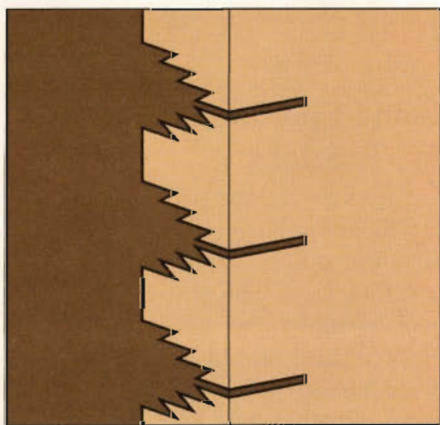
READERS' INFORMATION EXCHANGE

While visiting the Kerr Mansion in Onancock, Maryland, we saw a large captain's chest with the most unusual "dovetail" joints I've ever seen. The chest dates to the 1700s or earlier, is made of oak, and reportedly was carried aboard sailing merchant ships.

The dovetails, which are illustrated here, appear to be primarily decorative as they do not "lock" any parts together. The rear of the chest was joined with conventional dovetails.

I would like to know more about this joint—especially how they were cut, what they're called, and why they were used.

*Paul L. Stoiler
28 Cooper Dr., Rt. 3
Leonardtown, MD 20650-9542*



I need the headstock for a #930 Milwaukee-made Delta 11" cast-iron bed lathe. The part number for the headstock is DDL-291. The lathe was manufactured around 1941 and parts are not available from the manufacturer. I would appreciate hearing from anyone who might have this part available.

*Thomas J. Millmeyer
22 W 223 Buena Vista Drive
Glen Ellyn, IL 60137-6814*

I recently inherited a Dualathe (model 18, I think). My machine is incomplete and I know nothing about it except that you turn bowls on it. I would like to know more about the machine, the manufacturer, and whether parts and manuals are available for it.

*Don Stuart
1201 Burleyson Dr.
Dalton, GA 30720*

I have a Jointmatic machine made by the Strong Tool Company of Michigan. The firm apparently has gone out of business. I've lost my video instructions and would like to get a copy. Any help in procuring a copy of the video would be greatly appreciated.

*John D. Varner
2730 Rosalind Avenue, S.W.
Roanoke, VA 24014*

I need a manual for a Sears radial-arm saw, model no. 113.29501. I would be happy to pay for copying and mailing.

*Joe Ransil
19801 Braemar Dr.
Saratoga, CA 95070*

I would like to obtain an owner's operating manual and parts list for a Dunlap benchtop saw, model no. 103.0207. I will pay the costs of copying and mailing.

*Walter M. Zawacki
1127 Silver Meadow Lane
Clarks Summit, PA 18411*

I need two items of information for my Craftsman bandsaw, model no. 103.0103. First, where can I get a copy of the operator's/parts manual for this tool? Second, where can I get parts for the blade guide?

I will pay for copying and mailing.

*Don Banwart
4725 525th Avenue
West Bend, IA 50597*

A Country Cabinet

by
Southern Living



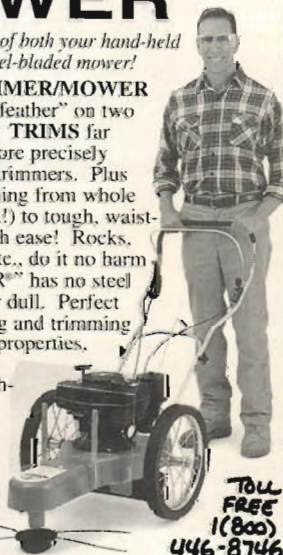
To order plans, send a self-addressed, stamped envelope and a check for \$3.50 (made out to SOUTHERN LIVING) to:

Computer Cabinet,
SOUTHERN LIVING,
P.O. Box 523-WJ,
Birmingham, AL 35201

Revolutionary "2-in-1" TRIMMER/ MOWER

Takes the place of both your hand-held trimmer and steel-bladed mower!

The **DR® TRIMMER/MOWER** rolls "light as a feather" on two **BIG WHEELS!** TRIMS far easier, better, more precisely than hand-held trimmers. Plus **MOWS** everything from whole lawns (even wet!) to tough, waist-high growth with ease! Rocks, roots, stumps, etc., do it no harm because the "DR" has no steel blade to bend or dull. Perfect for ALL mowing and trimming around smaller properties, vacation homes etc., or for finish-up mowing and trimming after riding mowers on larger parcels. A delight for anyone to use!



**TOLL
FREE
1(800)
446-8746**

Please mail this coupon today for **FREE DETAILS** about the Revolutionary **DR® TRIMMER/MOWER** including prices of Manual, Electric-Starting and All-Electric Models, "Off-Season" Savings now in effect, and 30-Day Risk-Free Trial. There is no obligation.

Name _____ WJ
Address _____
City _____ State _____ ZIP _____
To: **COUNTRY HOME PRODUCTS®**, Dept. 311
Ferry Road, Box 89, Charlotte, VT 05445

PRODUCT NEWS

Bronze Mallet Delivers Full Impact Accurately

Developed by stone carvers during the Renaissance and handed down through the generations from teacher to apprentice, the bronze



Michelangelo's mallets

mallet still finds use today by carvers roughing out large projects.

Although wood is the more contemporary mallet material, the age-old bronze provides numerous advantages. For information on either the 2.2-lb. or 1.5-lb. Michelangelo's Mallet, contact Calvo Studio, P.O. Box 4, Gloucester, MA 01930, telephone 508/281-3227.

Flat-Fold Respirator Shapes Easily To Your Face

The Delta 1-Plus disposable respirator, manufactured by Racal Health and Safety, Inc., comes in a convenient flat-fold design. The patented soft filtering material adapts easily to the user's face for a protective, mask-to-skin seal, yet allows free air exchange with



Delta 1-Plus respirator

little breathing resistance. According to the manufacturer, this filter may be used for respiratory protection against dusts and mists having a time-weighted average of not less than 0.05 milligrams per cubic meter or 2 million particles per cubic foot. This makes it useful for sanding, woodworking, and similar applications in shops and sawmills. For more information, contact the distributor, Enviro-Safety Products, 21344 Ave. 332, Woodlake, CA 93286, telephone 800/637-6606.

Tool Family Shares The Same Battery

When it comes to convenience, you can't beat cordless tools. But, they all require costly batteries.



The Black & Decker VersaPak system

Black & Decker has come up with a solution—the VersaPak system—a new line of cordless power tools that share interchangeable rechargeable batteries. Tools currently available in the new VersaPak line include a 3.6-volt screwdriver, a 3.6-volt flashlight, and a 7.2-volt drill. Additional tools will join the line as they're developed. The manufac-

turer, in cooperation with the Portable Rechargeable Battery Association and the Rechargeable Battery Recycling Corporation, is organizing a national recycling program for all brands of nickel-cadmium batteries. At present, you may take expired B&D batteries to any B&D service center for recycling. For more information, contact Black & Decker, Consumer Services, P.O. Box 618, Hampstead, MD, telephone 800/762-6672.



Stand-up clamp pads

Stand-Up Clamp Pads Do Two Jobs

Slip these unique pads onto your 3/4" pipe clamps, and you'll have built-in stock protection and a stable free-standing base. The glue-resistant pads eliminate the usual fuss with inconvenient wood blocks, and their wide base helps keep the clamps from rolling around while you position the stock. For information, contact Woodcraft Supply Corporation, P.O. Box 1686, Parkersburg, WV 26102-1686, telephone 304/464-5286.

This Saw Is No Copycat

The Bosch Sabre-Plus in-line jig-saw has no equal. It looks and works like a pint-sized reciprocating saw, but provides the versatility of a jig-saw. According to the manufacturer, the 3.6-amp B4050 offers variable

Bosch B4050 Sabre-Plus in-line jigsaw



speeds ranging from 300 to 3,800 blade strokes per minute. The 6" blade will handle stock up to 2 3/8" thick. The unit also accepts a bristle brush, a wire brush, and a rasp attachment that will take care of a variety of jobs. Other features include double-insulated construction, heavy-duty ball-and-needle bearings, a select-speed dial control, and electronic feedback circuitry to maintain cutting speeds under load. For more information, contact S-B Power Tool Company, 4300 W. Peterson Ave., Chicago, IL 60646, telephone 312/286-7330.

Quick Corners Make Corner Marking Quick

No more fumbling with rules and compass. Using color-coded Quick Corner templates, you can trace either convex or concave arcs or 45° corners in seven different sizes ranging from 1/2" to 2" in seconds. The fourth template enables you to draw corner radii of 3, 4, 5, and 6". To use, simply slide the appropriate template onto the corner and trace around its edge. Made of see-through polycarbonate plastic, the templates feature cast-in ribs that guide them into correct position. For more information,



Quick Corner templates

contact Streamline Manufacturing, Inc., 210 E. 1000 South, Brigham City, UT 84302, telephone 801/723-8665.

A New Solution For Corner Clamping and More

The more you use the Can-Do clamp, the more uses you'll find for it. A bench-vise screw and floating pivots enable it to hold different-sized objects in many different positions. More than just a corner clamp,



Can-Do Clamp

it can hold stock pieces in place parallel or at right angles to one another for drilling, gluing, or nailing. According to the distributor, the floating pivots allow the jaws to adjust automatically to different stock dimensions, while maintaining equal pressure at all points. Constructed of durable cast aluminum, the 6"-square clamp incorporates convenient slots for bench or board mounting. For more information, contact Woodworker's Choice, P.O. Box 165, Huntingdon Valley, PA 19006, telephone 215/938-0404.

New Sears Planer Actually Two Tools In One

Sears' new planer/molder (model no. 23383) planes rough-cut lumber



Sears Planer/Molder #23383

up to 5" thick and 12 1/2" wide. Add a set of molding cutters, and it will cut decorative designs and edges in furniture trim, baseboarding, casings, frames, glue joints, rabbets, and more. Sears reports that its 2 1/2-hp motor drives the three-bladed cutter head at 4500 rpm and feeds wood at 26 fpm for thickness planing, 13 fpm for molding. The 12 1/2 x 19 1/4" one-piece cast-iron table rides vertically on precision-ground steel columns. Roller pressure can be adjusted for smoother feeding and reducing snipe. And, there's an anti-kickback mechanism for operator safety. For more information, contact a Sears store.

Take a Coffee Break While Your Battery Recharges

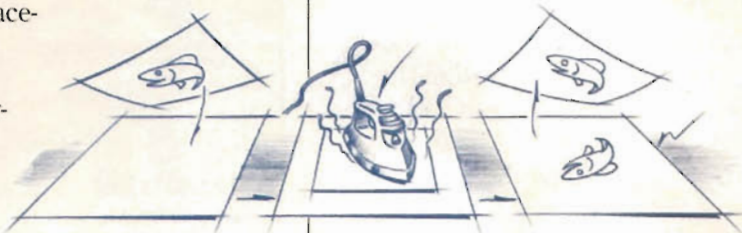
DeWALT has announced that it will introduce a new, faster charger for use with all of its nickel-cadmium batteries. According to the firm, the DW9115 charger will recharge any DeWALT battery, including the new XR Packs, in 15 minutes or less. The unit features an LED digital display to indicate battery status. It reads the amount of charge needed by the battery, then charges only to that level to avoid overcharging. For more information, contact DeWALT Industrial Tool Co., P.O. Box 158, 626 Hanover Pike, Hampstead, MD 21074, telephone 800/433-9258. 

SHOP TIPS

Reversing Patterns

Occasionally I need to reverse a project pattern. To do this, I first make a photocopy of the pattern. Next, I place this photocopy face-down on a piece of white posterboard and iron the back of the photocopy with a hot iron to transfer the pattern to the posterboard. When that's done, I photocopy the image on the posterboard. The resulting copy will be my desired reverse-image pattern.

L.K. Bolay, Oak Harbor, Ohio



Use dowels that fit fairly snugly in the base holes— $\frac{3}{8}$ " dowels work fine in my sander.

David Darmstadt, Elyria, Ohio

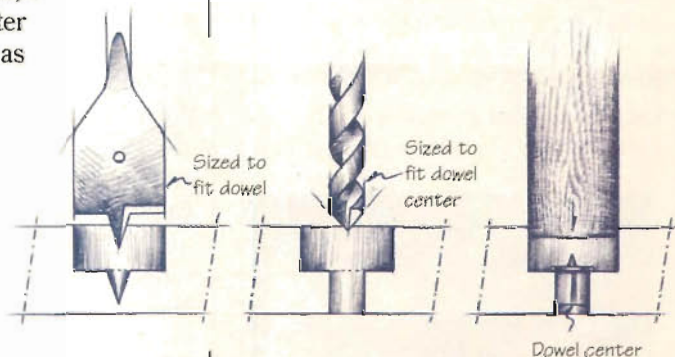
Center Finder For Dowels and Round Tenons

When I need to centermark the ends of a dowel, I make my own jig. Here's how:

First, I clamp a scrap piece of 2x4 to my drill-press table, then drill a 1" deep hole of the same diameter as the dowel I want to mark. Without moving the 2x4, I switch to a $\frac{3}{8}$ " bit and drill the rest of the way through the 2x4. Next, I drop a $\frac{3}{8}$ " dowel center into the bottom hole as shown. Then, I simply insert the

dowel into the hole and tap it gently to ensure that the point of the dowel center penetrates the dowel's end. Note: If working with smaller dowels, drill smaller holes and use a smaller dowel center.

After using the jig, I write the diameter of both holes on the jig, then hang it on my shop wall for future use. Over the

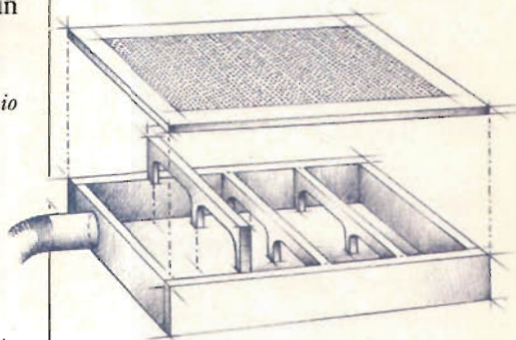


years, I have acquired jigs for the common dowel sizes this way.

Larry Verdon, Kalamazoo, Mich.

Shop-Made Sanding Table

My sanding table consists of a simple 1x2 frame with a vacuum connector, bottom, and $\frac{1}{8}$ " Pegboard top. To support the top, I made several of the bridge-type supports as shown and placed them inside the box. The bridge tunnels allow the vacuum



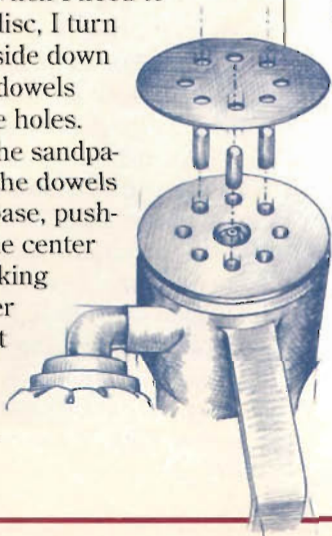
to evacuate dust from all areas of the box. I also attached a 1x2" strip to the box bottom so I can clamp the entire table in my folding workbench.

Paul Shaffer, Arona, Penn.

Align Sanding Discs on Orbital Sanders

Optimum dust pickup on random orbital sanders requires that the holes in the sandpaper disc be properly aligned with the holes in the sander's base. Even a slight misalignment reduces the efficiency.

To reduce my frustration and ensure good alignment of the holes, I've resorted to this simple procedure. I crosscut three 2" lengths of dowel stock. When I need to mount a new disc, I turn the sander upside down and place the dowels into three base holes. Then, I slide the sandpaper disc over the dowels and onto the base, pushing down in the center first, then working out to the outer edges. Pull out the dowels and the tool's ready to sand.



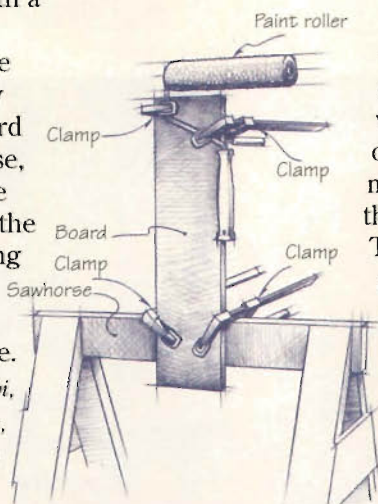
Quick Roller Stand Substitute

We all know how useful roller stands are when milling or sawing long stock. I prefer to use one on both the infeed and outfeed side. Unfortunately, I don't have two

stands, so I devised this quick and inexpensive substitute using items already in my shop—a sawhorse, a 1x6 board, several clamps, and a paint roller with a clean sleeve.

To set up the stand, I simply clamp the board to the sawhorse, then clamp the paint roller to the board, adjusting its height to align with the machine's table.

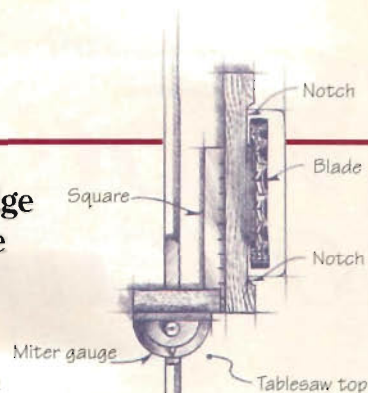
Zoltan Gilanyi,
Vincentown,
New Jersey



Modified Straightedge Makes Squaring the Miter Gauge Easy

The projecting teeth of my table-saw blades always seem to interfere with my square, T-bevel, or plastic angle when I need to adjust or square the miter gauge.

To solve this problem, I completely bypass the blade teeth with the modified straight-edge shown above. To make it, I selected a straight piece of maple (or other stable hardwood), squared one edge, then ripped the opposite



edge parallel to the first. Next, I bandsawed notches in one edge to clear the teeth.

To use, I simply place the straight-edge against the blade as shown, then square off the edge of it to set the miter gauge.

Dick Dorn, Oelwein, Ia.

Woodworker's Journal pays \$25-\$100 for reader-submitted shop tips that are published. Send your ideas (including sketch if necessary) to: *Woodworker's Journal*, News Plaza, P.O. Box 1790, Peoria, IL 61656, Attn: Shop Tips Editor. We redraw all sketches, so they need only be clear and complete. If you would like the material returned, please include a self-addressed stamped envelope.

Multico

The Original Square Hole Machines
Made in England Since 1947

You could say that Multico "wrote the book" on hollow chisel mortising. They certainly invented the Bench Top Mortiser, with a patent to prove it!

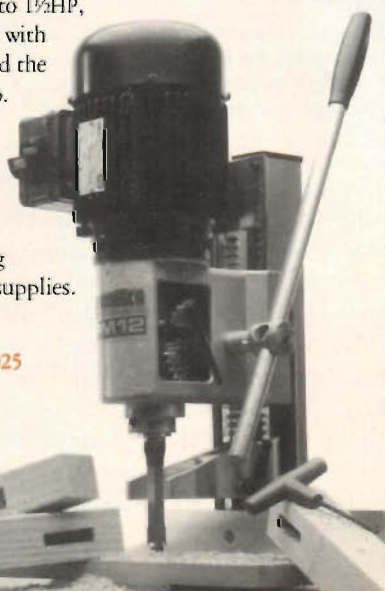
From 1/2HP, to 3/4HP, on up to 1 1/2HP, there is a Multico Mortiser with the features, accessories, and the price, to fit every workshop.

Check out the "Original Square Hole Machines," made only in England.

Call Toll Free or Write for our FREE 208 page catalog of woodworking tools and supplies.

Garrett Wade Co., Inc.
161 6th Avenue, Dept. 1025
New York, NY 10013
800-221-2942

The 1/2HP Model PM12,
bench mounted, \$389.
Other models are available.



The **Toughest**
glue on Planet Earth is
now at your local
hardware store.

If not, tell the big ape who
runs the place to get it for you.

GORILLA BRAND PREMIUM GLUE™
100% SOLVENT FREE • POLYURETHANE
BONDS WOOD, STONE, METAL, CERAMICS & PLASTICS
1-800-WOOD-GLU (1-800-966-3458)
THE GORILLA GROUP 122 Powers Ave. Santa Barbara CA 93103

Wood Movement

By Jim Boelling and Doug Cantwell

How To Deal With Shrinkage, Swelling, and Warp



Wood movement has everything to do with how a board's sawn. The quartersawn zebrano on top graphically shows the growth rings oriented perpendicular to its faces. In the plainsawn walnut

(bottom), the faces run tangent to the rings. The paduk (center) is called "quartersawn" in commercial practice because its faces are oriented at between 60 and 90° to the rings.

Once living timber is felled in the forest, processed through a mill, and dried in a kiln, we'd like to think that Technology has prevailed over Nature. However, wood in a sense refuses to die, even after the "undertakers" have had their way with it. "Wood is not plastic," observes Jim Fuller, research scientist at the U.S. Forest Service's Forest Products Lab, "nor is it metal. It has its eccentricities." A common organic tendency lives on in the lum-

ber pile, whether it be pine 2x4s or quartersawn white oak—wood moves. Kiln-drying may reduce it to a seemingly inert state, but this apparent stability rests on a continual exchange of moisture between the wood's cell walls and the ambient atmosphere.

This explains why dimensional stock—softwood that's milled for outdoor use and dried only to a 12% or higher moisture content—will undergo a Jekyll-Hyde transformation if you fabricate it into a

harvest table and bring it indoors. Construction lumber is not dried by the same process as hardwood prepared for interior use. Dry indoor heat or air conditioning will put it through abrupt changes, something like the effects of salting a slug. You'll probably see the same phenomenon, though on a lesser scale, if you build an oak jewelry box in Baton Rouge and ship it to your niece in Albuquerque for her birthday in July.

Equilibrium Moisture Content: Wood Seeks Stability

When hardwood is kiln-dried for interior use—usually to between 7 and 9%—all *free water* evaporates from the cell cavities, along with most of the *bound water* held within the cell walls. The remaining bound-water content will then fluctuate over time along with the humidity of the surrounding air. The cell walls will slowly absorb or lose moisture until the wood reaches a state of equilibrium based on the *relative humidity* (RH)—the amount of moisture suspended in the surrounding air relative to the maximum amount it could hold at its current temperature. At this point, the wood has arrived at its *equilibrium moisture content* (EMC).

For example, the oak in that jewelry box, accustomed to a steamy 75% relative humidity in Louisiana, has probably leveled out (depending on where it's been stored) at an EMC of 14 or 15%. Send it off to New Mexico—protected only by a tung oil finish—and the arid 15% RH there will draw moisture out of the wood, reducing its EMC to the 5%-or-less range. A three-coat finish of lacquer or varnish would have retarded the more abrupt moisture exchange permitted by the tung oil, but some exchange would still occur, no matter how thorough a seal the finish provides.

Mills and wholesalers that kiln-dry hardwoods usually follow guidelines aimed at maintaining a stable EMC within the climatic conditions that prevail in a particular region. They calculate drying schedules based on the annual regional range of relative humidity (*figure 1*). Often such firms will target a moisture content a couple of percentage points lower than the EMC, which will cause the wood to absorb back a bit of moisture after it leaves the kiln. The idea here is to establish uniformity of moisture content throughout each board and from board to board within a particular lot.

Such guidelines obviously cannot take into account the microclimate you create within your four walls by heating, cooling, and tampering with the humidity. Then, too, there's the humidity gradient that likely exists

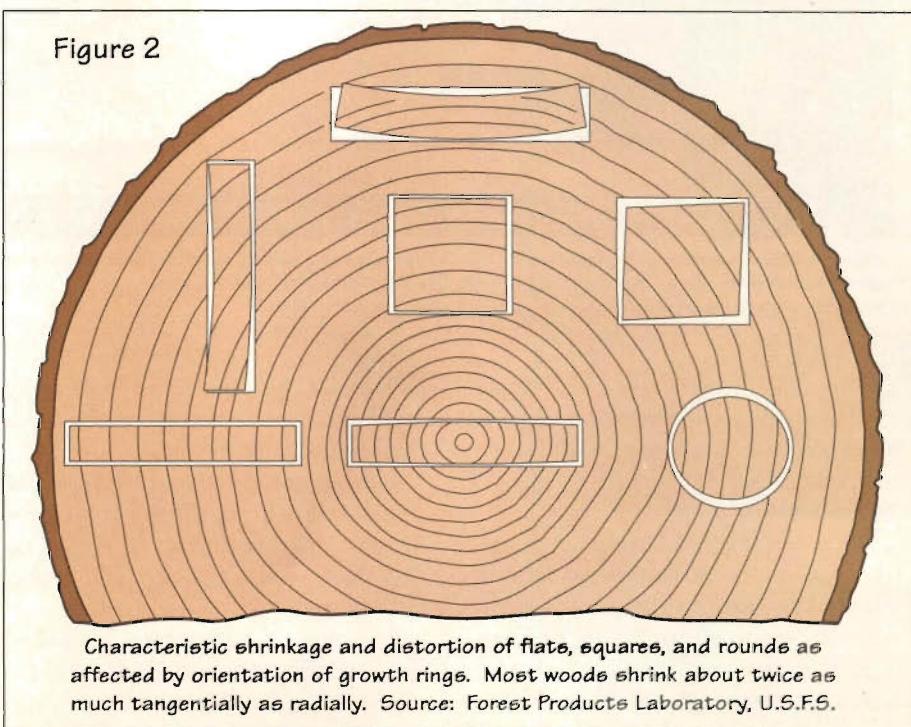
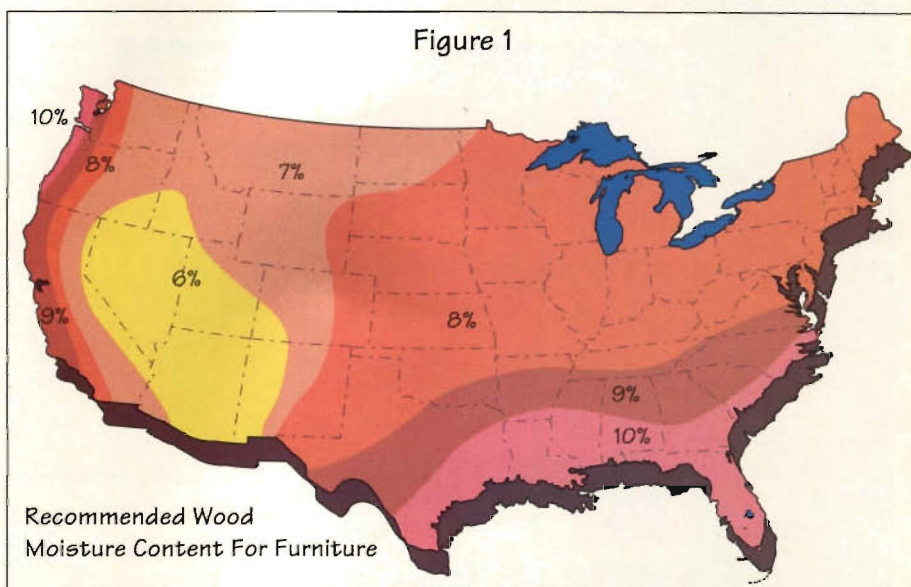
between your dank cellar shop, where you're building that armoire, and the upstairs bedroom, where it will eventually reside.

Shrinkage, Swelling, and Distortion: How Wood Seeks Stability

Wood scientists call their object of study *anisotropic*, which simply means that when wood moves, it doesn't move equally in all dimensions. As shown in the cross-sectional drawing (*figure 2*), wood shrinks most around the circumference of

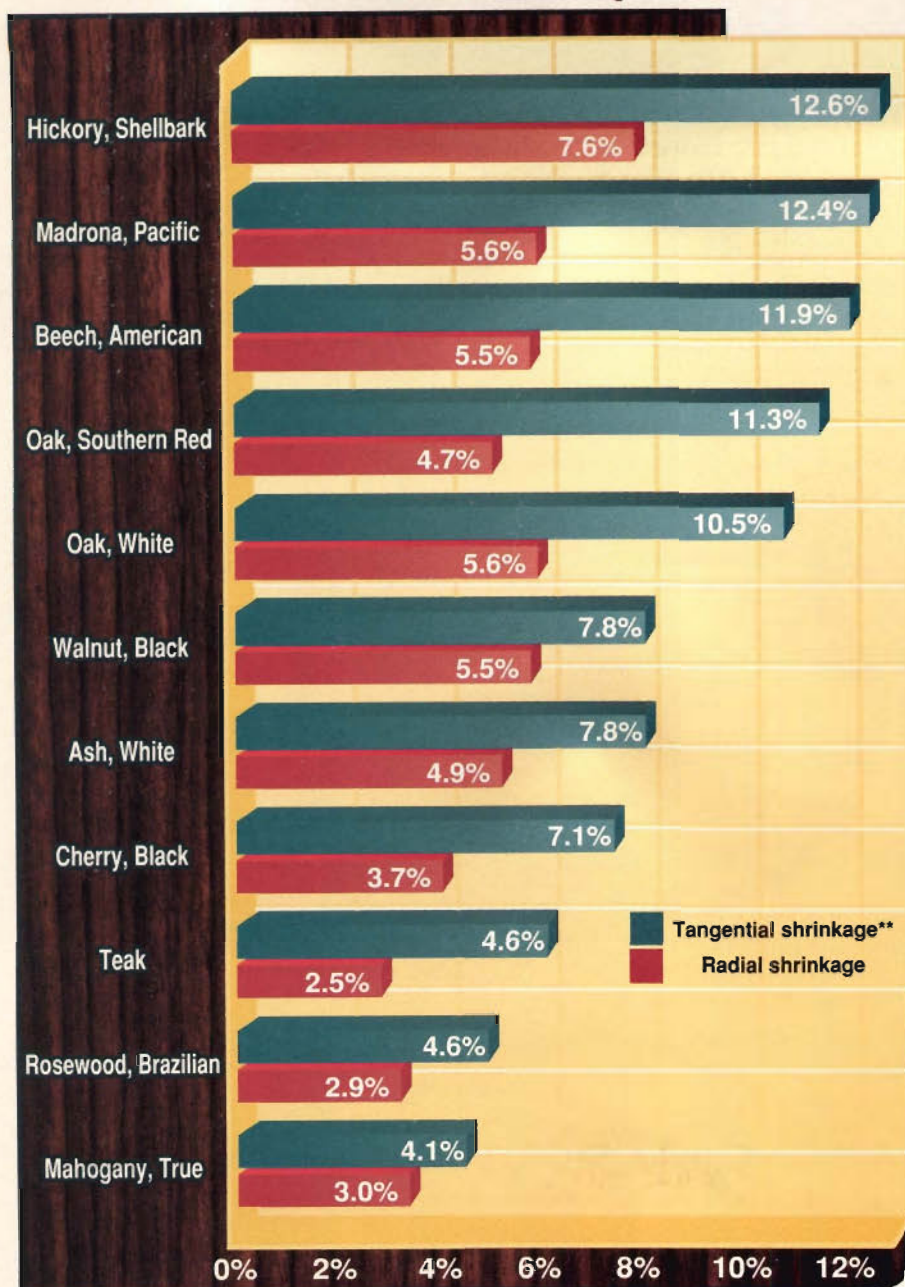


Photo A: The three axes of wood that pertain to grain direction and growth rings, labeled here on a slightly cupped, 8/4 red oak board.



Comparative Shrinkage of Hardwoods

From Green To Oven-Dry*



* Oven-dry refers to a laboratory procedure in which samples are placed in an oven at 212° to 221° F until constant weight is reached.

** Expressed as a percentage of the green dimension.
Source: Forest Products Laboratory,
U.S. Forest Service

the annual growth rings, or *tangentially* (photo A). It shrinks about half as much *radially*, or across the rings, and only marginally along the length of the tree, or *longitudinally*.

To complicate matters, you also need to factor in the native tendencies of the species in question. Some hardwoods, such as beech, red oak, hickory, and madrona, shrink considerably more than others as they

dry (table 1). Honduras mahogany, teak, and the rosewoods, at the other extreme, shrink the least. Note: With kiln-dried wood, you won't face anything as drastic as the green-to-oven-dry parameters shown in the table, but these numbers are still useful for comparison.

And don't forget grain irregularities, which (in addition to the machining problems they create)

almost guarantee instability. *Reaction wood*, a catch-all term for various cell-structure deformities, tends to dry unevenly and unpredictably. *Tension wood*, for example, results from a tree's efforts to resume vertical growth after an uprooting. It also develops in the crotch formed by an offshooting branch, creating highly figured but also highly unstable grain. Various forms of cross grain, including spiral and diagonal grain, are caused naturally by irregular growth or artificially by sawing at skewed angles.

Your first line of defense against grain irregularities is to spot them in the dealer's stacks and avoid them. Then, once you search out the smooth, even-grained stock of your dreams and take it home, you still need to anticipate possible changes in response to the change of microclimates. When you deposit the new stock in your shop, remember to stack it (using uniformly spaced stickers between boards) so that air may circulate freely around each board (photo B). Keep it well off the floor, which is probably damp, and take steps to level the stacking surface if necessary.

If you store and work wood in the basement level of your home, it's wise to dehumidify. "The rule of thumb," according to Jim Fuller, "is to store the material for your armoire under the same conditions in which you intend to build it and use it." If you encounter resistance from your spouse over the matter of stacking lumber and edge-gluing panels in the master bedroom, you might try reducing the household humidity gradient instead. In addition to removing excess moisture from your basement shop, you may want to humidify the upper levels as well when seasonal dryness calls for it.

Plainsawn Versus Quartersawn: Each Has Its Pros and Cons

Given wood's anisotropic properties, it's not hard to understand why plainsawing and quartersawing cause wood to behave differently as it



Photo B: Store lumber on flat, level supports well off the floor with evenly spaced stickers to ensure air circulation between boards.

shrinks and swells. (See the lead photo on *page 14*.) Since the rings in a quartersawn board run more or less perpendicular to the board's faces, the board will lose a bit of volume as it dries, but it won't cup like a plainsawn piece cut from the same log.

In their efforts to deal with irregular tree growth and minimize waste, mills often do not cut "quartersawn" lumber strictly perpendicular to the rings; nor are the broad surfaces of plainsawn stock always cut exactly tangent. In commercial practice, boards with rings oriented at 60 to 90° to their faces are sold as *quartersawn*. Some woods are *riftsawn* at an angle of 45 to 60° in order to strike a happy medium between quartersawn and plainsawn

appearance. Everything else (rings oriented at 0 to 45°) you'll find in the *plainsawn* bin. The likelihood of cupping in "quartersawn" stock depends on how far off square the rings are with respect to the board's surface. By the same token, distortion in plainsawn and riftsawn lumber varies along with the orientation of the cut.

As another line of defense in combating movement problems, select stock that is as close to truly quartersawn as you can find. Quartersawn material shrinks and swells less in width than does plainsawn and is less inclined to cup or twist. It tends to split and surface-check less during the drying process and also wears more evenly over the long term.

Quartersawn stock has a couple of its own drawbacks, however. You may have trouble finding the stuff, and if you do, you'll probably pay more for it. If you're looking for dramatically figured grain for your tabletop, you won't find it in the quartersawn stack. (In sycamore, beech, and the oaks, the quartersawn face does, however, reveal striking patterns of rays.) It's plainsawing that reveals the annual rings in longitudinal section on the broad surface—what we commonly call "cathedrals" (*photo C*). Since wood tends to shrink and swell around the circumference of the rings, quartersawn stock fluctuates more in thickness than in width. You'll want to avoid it in those rare situations where seasonal thickness variation would cause more problems than movement across the width.

Moisture Meters: They Make For Fewer Surprises

If your local lumberyard has just started carrying furniture-grade hardwoods (a common circumstance, we hear), think about investing in a moisture meter and taking it along on your next visit. Dealers that specialize in building supplies have been known to stack kiln-dried hard-



Photo C: Plainsawn cherry shows dramatic pattern of annual rings in longitudinal section, nicknamed "cathedrals".

Buy Good Stock... And Then Keep It Good

1. If it's warped already, leave it in the dealer's stacks.
2. Unless you're looking for highly figured stock (and are prepared to deal with its instability), avoid irregular grain.
3. Where possible, select quartersawn stock for its greater stability.
4. Buy a good moisture meter, preferably with insulated pins, and test before you buy—especially if it's air-dried material.
5. Store stock well off the floor on flat, level supports with evenly spaced stickers between boards.
6. Reduce the moisture gradient within your home by dehumidifying your shop space (where you store and work wood) and humidifying the upper levels (where the wood usually resides after you work it).
7. After you buy, allow stock adequate time to adjust to your microclimate before you work it.

woods in outdoor sheds. Under these conditions, lumber that's been dried to 7 or 8% has a chance to reabsorb several points' worth of moisture, thus rendering it unstable for interior use. Unless you test, you won't know for sure.

To cite another common story, your uncle in Arkansas has just offered you a thousand board feet of roughsawn walnut that's been air-drying in his barn since Harry Truman took office. Before you start drooling, keep in mind that air-drying of any duration leaves much to be desired. In most parts of the country, it will reduce moisture only to 12% or more.

If you're thinking of building a hutch from this "well-seasoned" stock, consult your moisture meter first. Wood scientist Fuller recommends buying a model with longer, insulated pins. "With one of these," he points out, "you'll get a reading from just the tips of the pins. As you

Preventive Medicine

What you can do to minimize future trouble

As you begin surfacing the stock for a new project, keep in mind that you can build certain preventive measures into your work that will forestall wood-movement calamities later on. Whether you start with rough material or S4S stock (surfaced on four sides), long-term stability depends largely on equal treatment of all surfaces of a given board (or edge-joined panel). We offer the following "prescriptions" for minimizing down-the-road problems.

Plane both faces equally. Suppose you begin with rough 5/4 stock, intending to surface it to a uniform $\frac{3}{4}$ " thickness. The material has a slight cup in it, which requires that you plane both faces. After you've done the initial round of jointing to flatten the "hollow" face, concentrate on removing an equal thickness from both faces, planing them alternately until you achieve the $\frac{3}{4}$ " goal. This will help to stabilize the remaining stock.

Feel the heat. By the same token, when you belt-sand a board or panel to flatten it, try to sand an equal amount from each face. Remember, too, that belt-sanding contributes its own destabilizing factor—heat. Heat draws moisture, which may induce wood to cup or bow toward the face you're working, unless you foil this tendency by giving equal time to both faces.

Give panels room to move. If you're building a stile-and-rail door with a panel insert, allow the panel to float in its groove (without glue), and give it some room for expansion. The same holds for a drawer or box with a bottom panel that's captured on four sides in a groove. If you glue it in, you're asking for a tug of war. The panel will shrink across the grain—and prob-

ably split—if seasonal conditions become excessively dry. You can also avoid trouble by using plywood panels. The criss-crossed laminations in plywood pretty much ensure stability, regardless of climatic changes.

Allow tabletops to roam. Wherever possible, use tabletop fasteners for attaching table- or desktops. These hold the top securely to the apron, while still allowing seasonal "migration." If you must use screws, drill the shank holes a bit oversized; or, better yet, form a slightly elongated slot for each screw.

Flip-flop before edge-joining. When you edge-join plainsawn boards to create a wide panel, you may want to flip-flop alternate boards, so that the rings curve upward, downward, upward, and so on. This will thwart the possibility of a large, single expanse of cup by substituting smaller, less noticeable, alternating cups.

Finish all surfaces equally. As you apply finishes to interior pieces, stick with the same isotonic approach—do unto one surface what you do to the others. If you apply a coat of sanding sealer and three top coats to your desktop, use the same materials and procedures on its underside. Years from now, when you decide to strip and refinish your desk, follow the same approach, applying equal quantities of stripping agents to all surfaces. In some situations, whether you're putting finish on or taking it off, this may seem like an unattainable ideal—or like a foolish waste of expensive materials. However, equal treatment of all surfaces will pay off, especially over those long winter months of dry heat and low humidity.

drive the pins slowly into an old air-dried board, you can find out what kind of moisture gradient, if any, exists between the surface and interior of the wood." It's also a good idea to take readings at several different locations on each board, in case the wood has been stored in such a way as to prevent uniform drying.

If you come up with a 12 or 15% moisture reading on your Truman-era walnut, this doesn't mean that you have to scuttle the hutch. You should, however, bring your selected stock indoors to a warm, dry part of the house. Stack it with care, then let it acclimate for two or three months. This will help bring the EMC into the ballpark for interior use. (For more about moisture meters, see Sources on page 21.)

Warp: Now That You've Got It...

You've been to the local hardwood dealer, who keeps his stock in a climate-controlled showroom. You brought home some splendid cherry with "cathedrals" of perfect symmetry. You left it heaped on your damp, sloping garage floor for most of November, then brought it indoors to your shop, which competes for space with an old, poorly insulated oil furnace. A week later, you discover warp symptoms in stock that you'd swear was flat and straight when you paid (dearly) for it. Well, don't consign it to the fireplace just yet. First, calm yourself, then try one of the two strategies described below, which we'll call "less is more" and "divide and conquer."

Bow: Not What Robin Hood Had In Mind

When a board develops a lengthwise curve (along its long surface), you've got *bow* (photo D). Credit for this misfortune usually goes to improper storage, either in transit, at the dealer, or in your shop. Dealers sometimes stand long boards on end and lean them against the wall, or they stack and store boards without allowing air to circulate between them, which can cause the EMC to change unevenly.

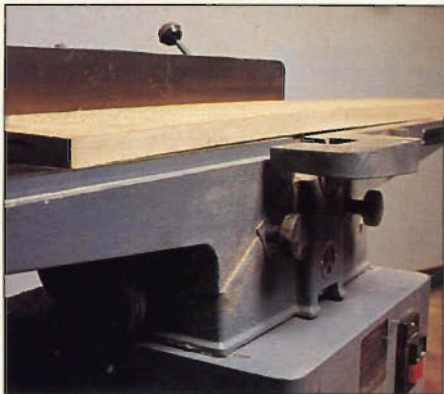


Photo D: Bow (warp along the longitudinal axis) usually results from improper stacking. To remove a slight bow, as shown in this piece of 5/4 red oak, first joint the "hollow" face flat, then plane the convex face or "crown" on your surface planer.

The "less is more" approach calls for machining out the bow, as long as this will leave you enough net thickness for the project at hand. Starting with the "hollow" face, remove stock near the ends of the board (*figure 3*). You can do this by hand using a bench plane; or, pass half of the board over the knives on your jointer, then turn the board end for end, and repeat. Remove stock gradually, in $\frac{1}{32}$ " or $\frac{1}{16}$ " increments, until you get a solid "hit line" running the full length of the workpiece and extending across at least half its width.

This "hit line" will show up clearly on "rough and fuzzy" stock. If your material has already been surfaced, cover the entire face with a uniform zig-zag scribble using chalk. This will leave little doubt as to which areas have made contact with the jointer knives.

Once you've established a predominantly flat face where there once was a "hollow," then you can move to your surface planer and flatten the "crown." Surface-plane this face, again in small increments, until you have a full-length "hit line" that covers half its width. For the final surfacing, alternate from one face to the other, removing a slight amount of stock first from the hollow, then from the crown, until you have two flat, parallel faces.

If you simply can't sacrifice any thickness, your other option is to "divide and conquer." To do this, lay out your shorter parts along the length of the board, thus dividing up the arc of the bow into smaller segments. Save your flatter stock for the longer parts.

Too Many Crooks Spoil the Project

Crook affects the edges of a board. The broad surfaces remain flat, while



Photo E: To eliminate a mild case of cup, first joint a solid end-to-end "hit line" on the hollow (concave) surface, as shown on this piece of 8/4 cherry. Move to the surface planer, plane the crown flat, then finish flattening the hollow.

the "bow" expresses itself along the edges. You can usually trace this defect to uneven drying of reaction wood, although improper stacking can cause it as well.

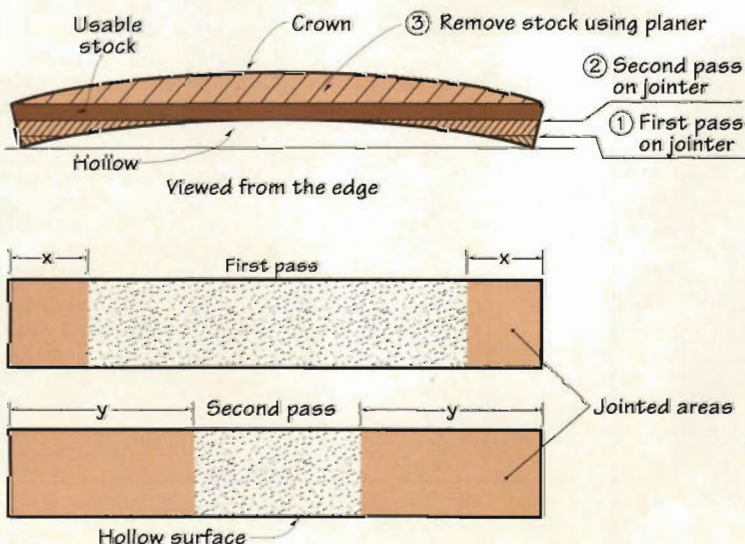
For the "less is more" approach, you'll make the best use of your crooked stock if you start machining the hollow edge of the board first. Again, use a bench plane or your jointer, removing small increments of stock from this edge until you have a solid hit line. (See *figure 4* on page 20). Then, use this straight edge and your rip fence to rip the stock to as narrow a width as necessary to yield a parallel straight edge.

The "divide and conquer" strategy calls for pretty much the same approach you used for bow. Simply crosscut your crooked stock into halves, then crosscut each half into shorter segments as necessary. You'll still probably find it necessary to joint the hollow of these shorter segments to obtain a straight edge, to which you can then square the ends.

Cup: Don't Let It Drive You To Drink

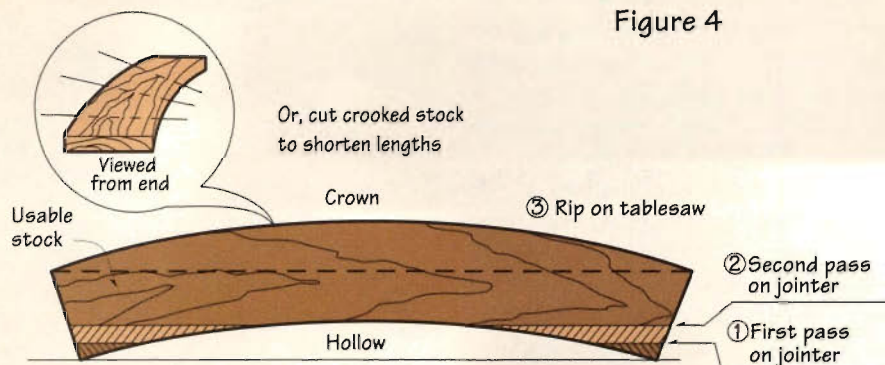
Cup, the most common form of warp you'll encounter, might be described as bow that expresses itself across the grain. (See the piece of cupped red oak in *photo A* on page 15). The "less is more" approach here pretty much duplicates the one

Figure 3



Correcting Bow Using Your Jointer and Planer

Figure 4



Straightening Crook On Your Jointer and Tablesaw

we used for bow. Start by planing the hollow face on your jointer until you get a full-length hit line across most of its surface (*photo E*). Flip the board over, then use your surface planer to plane the crown to the same degree of flatness. Now, alternate faces for the final surface-planing.

The "divide and conquer" option for cup offers more versatility than that suggested for bow. Using your

bandsaw and rip fence (for safety's sake), rip the material into narrower widths. If you've already earmarked this board for a desktop—because of its impressive grain, let's say—there's no cause for alarm. You can still joint the resulting narrower widths and then edge-join them. You'll end up with more joint lines, but you'll still have your choice grain and a more stable desktop as well.

Twist: Propeller For Sale—Cheap

Imagine, for the moment, that a creature of titanic strength has fashioned an airplane propeller by twisting the ends of a board in opposite directions. This form of distortion, usually caused by spiral grain or by stacking on a lumpy or sloping surface, is tough to rectify.

Your best bet for salvaging a twisted board is to study the symptoms carefully and apply whichever strategy seems to be called for. If the twist appears slight enough that you can plane it away without jeopardizing your net thickness requirements, then use the "less is more" approach outlined for bow and cup. If you flatten opposite corners of one face sufficiently using your jointer (*photo F*), you can then go ahead and surface-plane the opposite face flat. Where this is not feasible, try the "divide and conquer" strategy suggested for cup, i.e., bandsaw it into narrower widths. If this option still would leave you with little or no salvageable

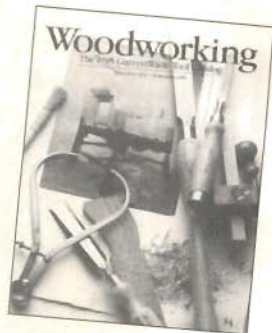
The Tool That Your Workshop Needs...

With 208 pages of full-color, our Free Catalog is the biggest in the business. We also think it's the best.

We have the high quality woodworking supplies and tools that are nearly impossible to find anymore. Everything from traditional old-style hand planes and saws to the very latest in power tools and accessories. We've got Precision Measuring tools, Chisels, Carving tools, Turning tools, Sharpening tools, plus Glues, Stains, Top Coats and much more.

Send us a post card or letter with your name and address to the address below. Or Call toll-free 800-221-2942 to receive your Free 1995 Garrett Wade Catalog.

Garrett Wade Co., Inc.
161 6th Avenue, Dept. 977
New York, NY 10013
800-221-2942



And It's Free, From Garrett Wade

Econ-Abrasives

WE MAKE ABRASIVE BELTS ANY SIZE, ANY GRIT!

Standard Abrasive Sheets

CABINET PAPER		
	50/pk	100/pk
60D	\$18.70	\$30.00C
80D	15.60	27.80C
100 thru 150C	14.60	26.60C

FINISHING PAPER

	80A	\$11.15	\$18.90C
100 thru 280A	10.00	16.20C	

NO LOAD PAPER(white)

100 thru 400A	\$12.25	\$21.25C
---------------	---------	----------

"C" = 100 SHEETS

Velcro® Vacuum Discs

8 Hole pattern for Bosch sanders

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

*Available in 5 hole pattern *

*Wide Belts*Rolls*Flap Wheels

*Pump Sleeves*PSA Discs

*Router & Wood Bits*Wood Glue

ABRASIVE BELTS

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.

OTHER SIZES ON REQUEST

HEAVY DUTY SPRING CLAMPS

Clamps come w/PVC tips and grips.



Size	Price
4"	\$1.75 ea
6"	2.25
8"	3.50

JUMBO ROUTER PAD(24" x 36")

It will not allow small blocks of wood to slip out under router or sanding applications. ROUTER PAD ONLY \$8.95ea.

JUMBO BELT CLEANING STICK

ONLY \$8.80

*MasterCard, VISA, C.O.D. or Check

*SATISFACTION GUARANTEED!!!

*CALL FOR FREE CATALOG

- TX & NV add appropriate sales tax

- Continental U. S. shipping add \$5.50

Econ-Abrasives

P.O.Box 1628

Frisco, TX 75034

(214)377-9779

TOLL-FREE ORDERING LINE (800)367-4101



Photo F: A board suffering from twist is the hardest to salvage. Start with the hollow, jointing diagonally opposite corners flat. Next, surface-plane the crown flat, then the hollow.

stock, then go with the other "divide and conquer" option—trimming it into shorter lengths. 

Woodworkers... Earn \$4,000 Per Month From Your Home With A Computer!



FREE CBSI 486 Computer

Begin part-time and still retain the security of your present position. This is a proven turnkey business an individual or couple can run. If you purchase our software and business program, we will give you the computer and printer. If you already own a computer, you may receive a discount. You do not need to own, or know how to run, a computer — we will provide free, home office training. Financing available. Learn how other woodworkers are building a lifetime income!

For free cassettes and color literature, call:

1-800-343-8014, ext. 153
(in Indiana: 317-758-4415) Or Write:

Computer Business Services, Inc.
CBSI Plaza, Ste. 153, Sheridan, IN 46069

SOURCES

Texts. An excellent discussion of wood's physical characteristics written specifically for the home woodworker can be found in R. Bruce Hoadley's *Understanding Wood* (Newtown, CT: Taunton Press, 1980). To order, contact:

The Taunton Press
Telephone: 800/888-8286

For a fine source of detailed technical information on wood's physical properties, see *The Encyclopedia of Wood* (New York: Sterling Publishing Co., 1989), which is a reprint of the 1987 edition of the *Wood Handbook: Wood As An Engineering Material*, prepared by the U.S. Forest Service's Forest Products Laboratory, Madison, Wisconsin, which operates in cooperation with the University of Wisconsin. Order from:

Woodworker's Supply, Inc.
Telephone: 800/645-9292

Moisture Meters. Several manufacturers market pocket-sized moisture meters that offer accuracy and durability sufficient for home woodworkers. A number of them offer extra-length, insulated pins as an optional attachment. Prices range from about \$90 up to \$300. For information, contact:

Coe Manufacturing, Inc.
Telephone: 503/639-3121

Lignomat USA Ltd.
Telephone: 800/227-2105

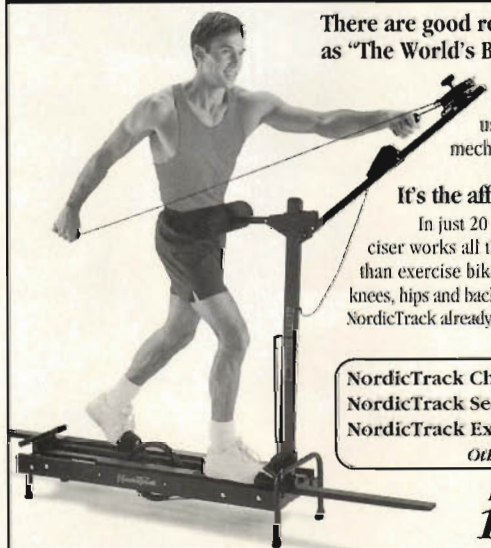
Trendlines
Telephone: 800/767-9999
(for Delmhorst meters)

Valley Products
Telephone: 717/296-8009

Veritas Tools, Inc.
Telephone: 800/667-2986

Wagner Electronic Products
Telephone: 800/944-7078

You can afford a NordicTrack. Why settle for anything less?



There are good reasons why the NordicTrack is known as "The World's Best Aerobic Exerciser®."

While lesser cross-country ski exercisers provide an awkward shuffling motion, the NordicTrack uses a patented flywheel and one-way clutch mechanism that no other ski machine can match.

It's the affordable way to meet your fitness goals.

In just 20 minutes, three times a week, a NordicTrack® exerciser works all the major muscle groups, burning more calories than exercise bikes, treadmills and stairsteppers. It's gentle on your knees, hips and back and it's easy to use. Nearly 5 million people who use NordicTrack already know that exercise just doesn't get any better.

NordicTrack Challenger™ only \$339⁹⁵!
NordicTrack Sequoia™ only \$429⁹⁵!
NordicTrack Excel™ only \$499⁹⁵!

Other models priced from \$599⁹⁵!

FREE Video and Brochure
1-800-942-1890

Ext. W2WE5

☐ Please send me a FREE video & brochure
My main fitness goal is (check one) ☐ Weight loss
☐ Shaping & toning ☐ Cardiovascular fitness ☐ Overall health

Name _____ Phone () _____

Street _____

City _____ State _____ Zip _____

Send to: NordicTrack, Dept. W2WE5, 104 Peavey Road, Chaska, MN 55108

30-day in-home trial!

NordicTrack
A CML Company

*Prices do not include shipping, handling and taxes.
© 1995 NordicTrack, Inc., A CML Company • All rights reserved.

WOODCARVING

For The Would-Be Artist *By Roger Holmes*



Years ago, for one of my first woodworking projects, I decided to tackle a hand-some little

Queen Anne footstool. By far the most difficult piece I'd attempted, its graceful cabriole legs had slipper-shod feet and, most enticing to an ambitious neophyte, its knees were embellished with the carved clam shells characteristic of high-style work of the period. I looked forward to the challenge.

Everything went well until I embarked on the carving. The drawings and photos in the project book, which had made cutting the joints and shaping the leg contours so much easier, failed to reveal the secrets of carving to me. The task of creating in three dimensions what I could see in only two on the printed page was terribly frustrating. I persevered and finished the project, but concluded that carving was meant for folks with more than my meager portion of artistic flair.

Then I discovered Texas woodworker Lynn Ford, whose wonderfully simple and striking carvings are shown on pages 26-27. Relying on a range of geometric designs, Ford's style of carving falls well within the reach of anyone who owns a straightedge and a few sharp chisels and gouges.

What attracts me in particular is the architectural character of Ford's work. I've dabbled in chip carving, which I consider great fun, but to me, chip-carved furniture too often looks like it belongs in a Swiss chalet. Ford's designs bear many similarities to traditional chip carving, but they have a bolder, less fussy appearance. Ford carved doors, screens, and decorative panels for buildings. He created large panels with one or several repeating patterns, but he also carved narrow strips and assembled them to make screens, ceilings, and wall paneling.

I think both of these approaches can be translated to furniture. For example, a narrow carved band would be effective as a frieze around the top of a chest of drawers or desk; wider panels might be used for doors or carcasses. I've found that they work at different scales, too, having used one in small scale on the sliding lid of a pencil box, another in large scale on a headboard for a bed (photo A).



Diamond and scallop patterns, adapted by the author from Ford's designs, can be carved with these simple tools.

How It's Done

A considerable part of the beauty of these carvings, for woodworkers like me anyway, lies in the ease with which they can be made. I don't mean you can expect results without much effort—chipping away lots of wood is hard work, and doing so with precision is demanding. But you'll find these shapes less intricate than acanthus leaves and clam shells, so good results will be easier to achieve.

The photo sequences on the following two pages show step by step how I carve two of my favorite patterns. The first, which I call a "scallop" pattern, I make with a gouge. The second features a series of diamonds shaped with a chisel. Once you practice a bit and get the hang of it, I hope you'll try your hand at these and some of Ford's other patterns as well. Here are a few suggestions based on my carving experiences that should help your efforts go smoothly and come out well.

Wood. Although Ford worked in a variety of woods, I suggest you start with pine or basswood. Dense but relatively soft and easy to carve, these woods hold detail well and are relatively inexpensive. As simple as these patterns appear, it takes a little practice to get them right. Save harder or more expensive material for later, after you've worked out the best way to produce the patterns you want.

Scale and Proportion. Ford's biographer, Mary Lance, reports that the man was a natural: "Co-workers say that designs just came to Lynn. They claim that he seldom used a ruler but just began marking, usually using a finger to measure." Yet, when I first tried to reproduce his designs, I was surprised at how much difficulty I had. Despite the apparent simplicity of the diamond pattern I'd chosen, it took me some time to arrive at pleasing proportions. Then, when I went to lay it out on the headboard I was making, I discovered it didn't fit the scale of the piece. After a fair bit of trial and error, I got it right—and, in the process, gained new respect for Ford's abilities as a designer.

I suspect that only experience will diminish the amount of trial and error

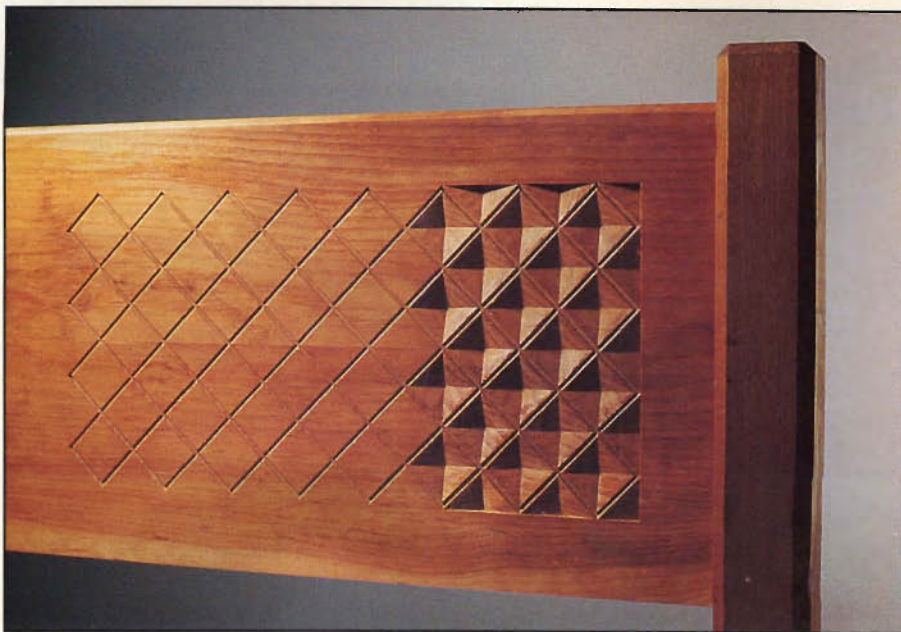


Photo A: The author proportioned his favorite diamond pattern for use on a contemporary-styled headboard for his daughter's bed. Note how repetitive extension of the less demanding V-groove across the headboard enhances the small carved area.

you'll go through to sort out a design. Unless you're a natural like Ford (and unlike me), I suggest working out your designs on full-sized drawings of the piece you intend to carve. Then, when you're happy with what's on paper, carve a sample. Since highlights and shadows bring these patterns to life, light your sample in different ways to see if the depths of any of the parts need adjusting.

Layout. Take your time laying out the design on the wood; simple repetitive patterns can look terrible if they're carelessly laid out. A marking gauge fitted with a pencil instead of a pin point comes in handy for ruling lines parallel to edges and ends. A panel gauge, if you have one, will reach in farther from the edges. Stepping off uniform distances with a set of dividers—rather than measuring—can also greatly reduce misalignments, particularly in large areas of pattern.

There's nothing terribly complicated about laying out these geometric patterns. For me, the greatest danger is impatience—it can take a while to complete a large pattern. Templates may sometimes speed layout, but they must be positioned and traced carefully.

Tools and Techniques. You'll need a few chisels and gouges to pro-

duce most of these patterns. Ford loved good tools, but he wasn't a fetishist; he pressed woodturning gouges into service when that was all he could get.

I use my bevel-edged cabinet-maker's chisels and several carving gouges, choosing the widest tool possible to make the work go faster. Where you need to remove a lot of wood, select heavier tools. When patterns call for curves, as in the scallop pattern, choose a gouge whose sweep matches the curve you desire. If you try to nibble out a curve using a tool with a different sweep, carving will proceed much more slowly.

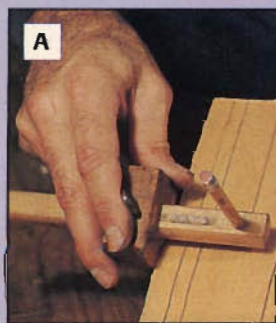
With one or two exceptions, all of the patterns consist of intersecting planes. Occasionally, Ford made these as smooth as possible using flat chisels. More frequently, however, he used very shallow gouges, which left a surface textured by tool marks. In the right light, I find these tool marks very pleasing.

While small irregularities like these may enhance the work, larger ones don't. Strive to make the repeating patterns as *uniform* as possible. Making a sample helps you work out the sequence of cuts and also develop a comfortable rhythm. This makes the work more fun as well as more precise.

Now Try Your Hand At Two Lynn Ford Patterns

The Scallop Pattern

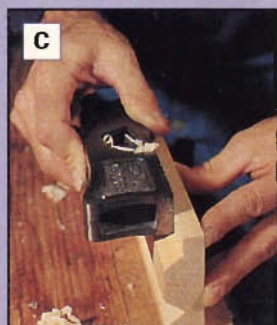
Ford carved "scallops" similar to these in doors and screens, usually making them in single or double rows. Figure 1 illustrates the layout and two section views for the double-row version shown in the example on page 22. I carved the design using a $\frac{3}{8}$ "-wide #5 gouge. Remember, the work will go a lot faster if the gouge and top curve of the scallop match.



Scribe the pattern lines parallel to the board's edge. A pencil-point marking gauge like the one shown comes in handy for laying out the lines.



Set in the curved top of each scallop with a couple of sharp raps on the gouge. Use a gouge with an arc that matches that of the scallop.



Clean up the saw marks from the rabbets and center "V" with one or two passes of a shoulder plane.



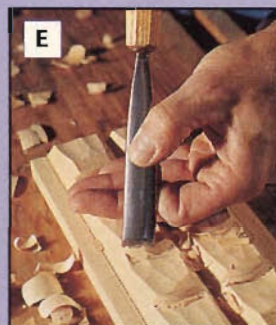
With your table saw, form the rabbets along the edges and the centered V-groove. Test blade angle and elevation on a same-sized piece of scrap first.



When halfway to the finished depth, begin to pare back the top ends of the scallops as profiled in section B-B' on figure 1. A few downward slicing cuts should clean up the ends nicely.

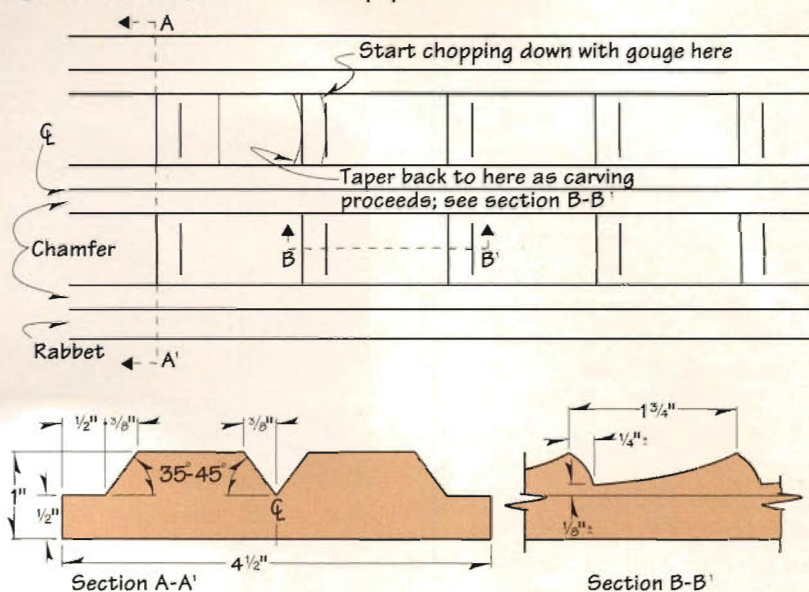


Continue shaping the faces of the scallops and clearing the waste from the ends. Control these final cuts carefully so you don't mar the ends of the faces.



Using the gouge, remove waste from the faces of each scallop. You'll need to deepen the set-in at the top end several times so the chips come away cleanly.

Figure 1: Laying out a scallop pattern

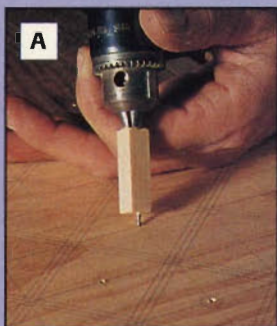
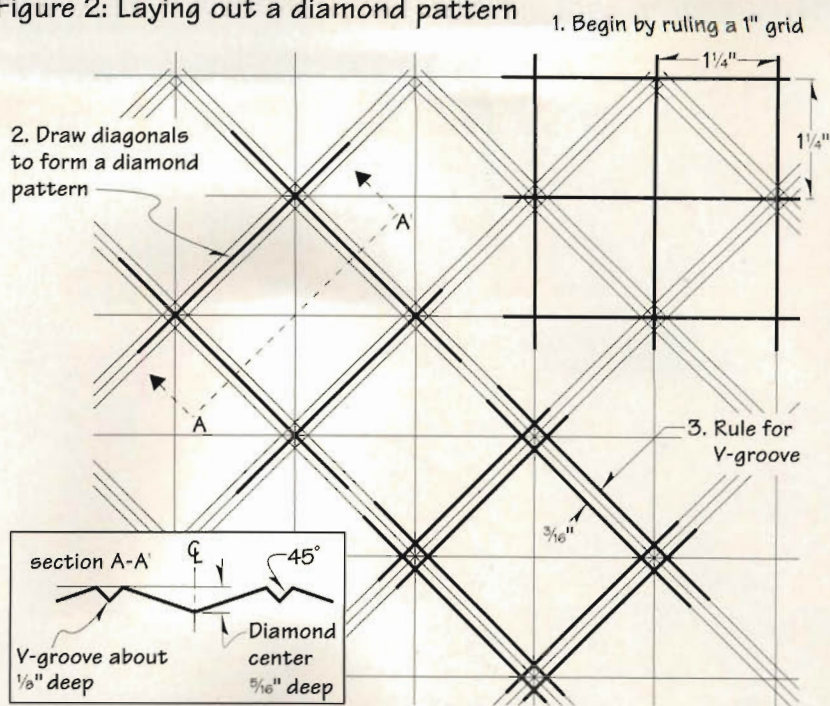


The Diamond Pattern

I think this is one of Ford's most striking and versatile designs. He ran a number of variations on it using diamonds, squares, and rectangles, some of them with the V-groove surrounds and some without.

The technique shown below need be modified only slightly to carve many of Ford's other patterns. Figure 2 shows how to lay out the pattern; the cross-sectional view shows the approximate depths for the carved areas. I carved this pattern using a 1"-wide bevel-edged cabinetmaker's chisel.

Figure 2: Laying out a diamond pattern



Drill a small 5/16"-deep hole at the center of each diamond to establish carving depth. I use a simple wooden stop on the bit to control the depth.



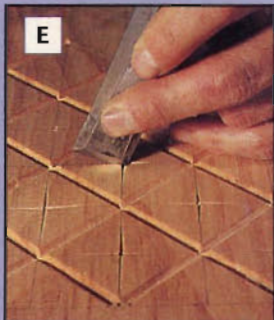
Using the same tools and technique, turn the piece and cut all of the V-grooves running perpendicular to those you cut previously.



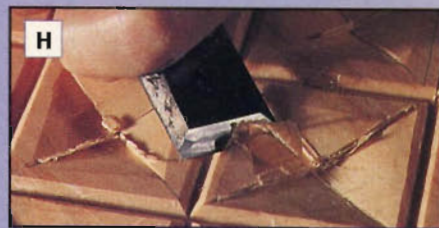
As you deepen the diamond's center, move back to the perimeter line with small, successive cuts. Work to the depth of the drilled hole.



Score the centerline of the V-grooves with a thin-bladed knife like the chip-carving knife I use. Scoring helps prevent tear-out and makes carving the grooves easier.



Working out from the center of each diamond, set in cuts along the diagonals. These cuts will make clearing the waste much easier.



At the perimeter, take a fine shaving to create a sharp arris where the V-grooves meet each slanting face of the diamond. Deepen and flatten the facets to final depth at the center.



Holding a wide chisel at 40 to 45°, set in one side of the V-grooves, then the other. Work across the panel, cutting all the grooves oriented in the same direction.



Working with the grain, cut toward the center diagonal to clear waste. Angle the chisel as shown to cut deeper at the diamond's center.



Half-diamonds make up the pattern's perimeter. To form these, make vertical, angled cuts with your chisel.

Lynn Ford

A Texas Original

By Roger Holmes

Lynn Ford, who died in 1978 at age 70, was a self-taught craftsman, a gifted seat-of-the-pants designer, and a considerable character. He didn't care much for publicity, so his work is little known outside Texas. I first learned about the man from Mary Lance's book *Lynn Ford: Texas Artist and Craftsman*, published by Trinity University Press shortly after his death (and now out of print).

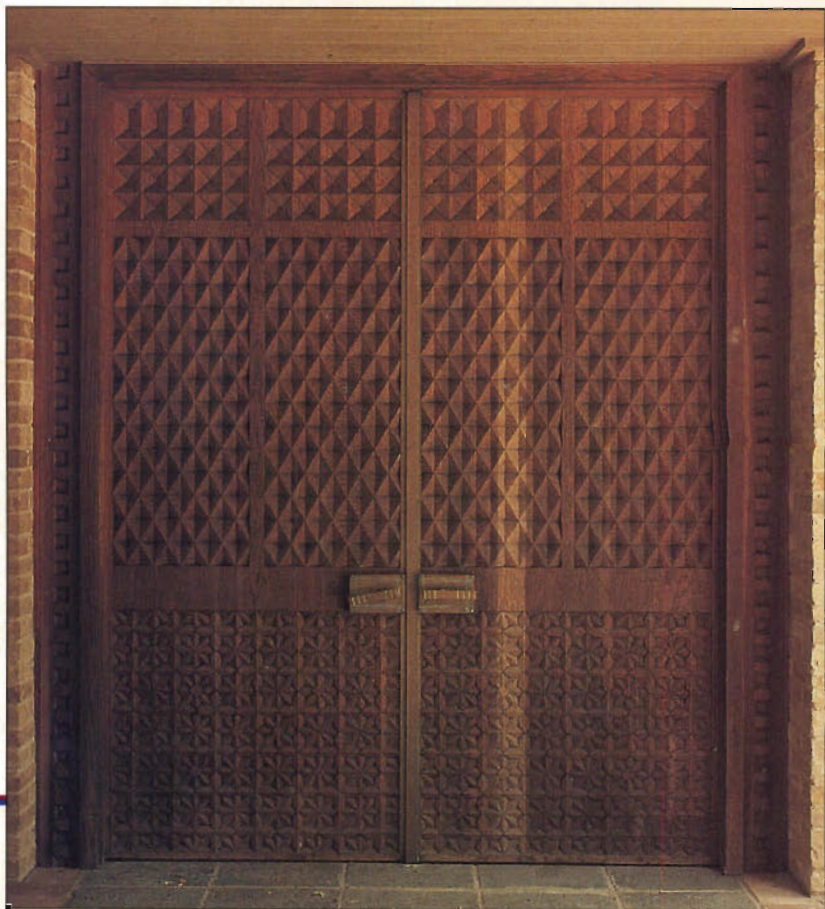
A life-long Texan, Ford worked for almost 30 years in San Antonio, employing a small number of workers in cluttered surroundings. Attended by a menagerie of animals, they had Ford's continual storytelling to keep them entertained. Much of their work was commissioned by architects, among them Ford's brother O'Neil, who headed a prominent San Antonio firm.

Author Lance, a neighbor, friend, and sometime co-worker of Ford, offers a thumbnail portrait of the man and his work in the opening pages of her book. "He considered himself a woodcarver, a cabinet-maker, and a master builder," Lance recalls. "He built houses, made furniture, carved wooden beams, panels, and doors; he worked in copper, brass, lead, ceramics, and cast babbitt, a lead alloy. He was a rebel, but one who did his work in a steady line for sixty years. He once said, 'Certain people for a certain length of time will remember me as a character. But when they're all dead, I'll still have things for people to look at.'"

I suspect Lynn Ford would be pleased that the things he made are still being looked at, still inspiring other woodworkers.



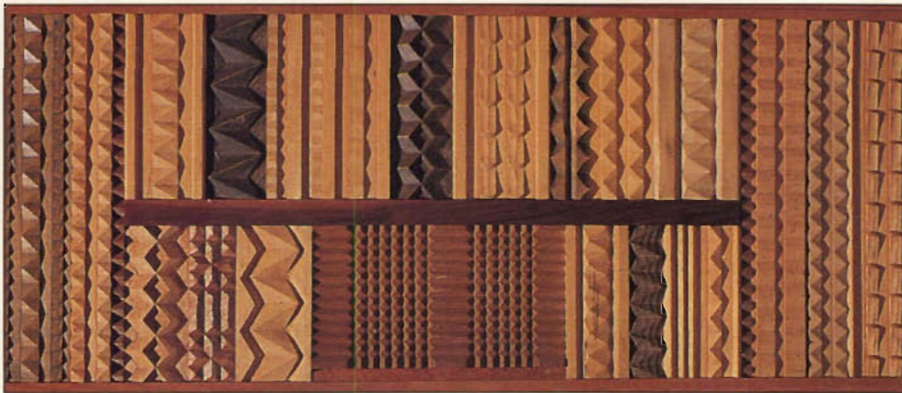
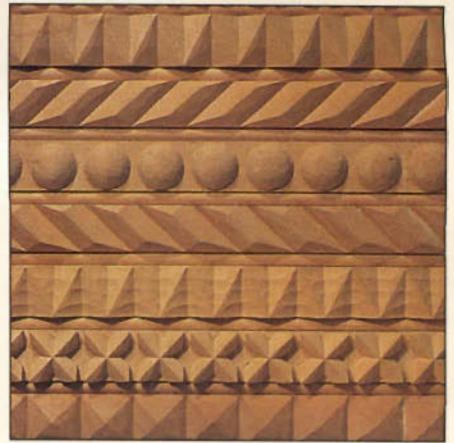
These two sets of doors show Ford's great skill at manipulating a small number of design elements to achieve striking and quite different results.



Photographs: Michael J. Smith



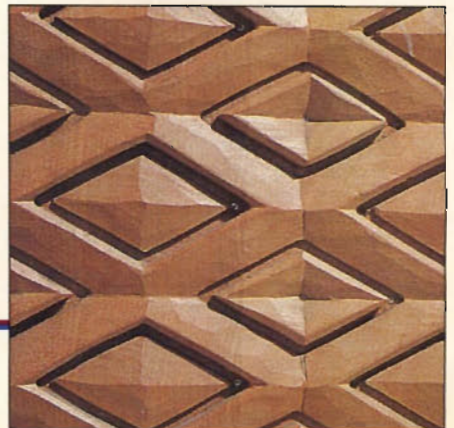
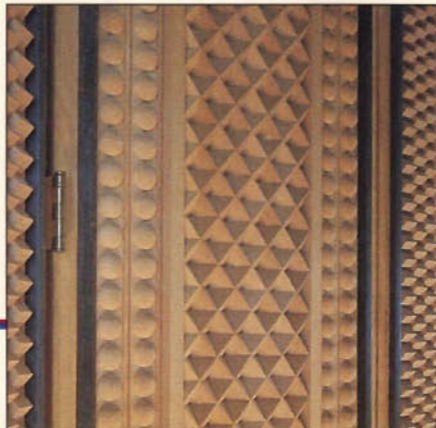
Assembled from numerous narrow carved boards, this 11 1/2 x 15' ceiling must have kept Ford and his workers busy for weeks.



A sample board developed by Ford in 1969 offers a trove of pattern ideas for any carver or woodworker inspired by the craftsman's work.



These examples show the wide range of carved textures Ford created and how he integrated them into his work.



A High Fence for your Tablesaw

If you do a lot of tablesaw work, you'll eventually want a dedicated high fence that can be clamped to your existing rip fence. For jobs like panel-raising and tenon-cutting, a high fence provides safe stock support that even the best aftermarket rip fences can't match.

But there's more to safe stock support than just a perpendicular face. To complete the package, we've designed a twin featherboard holder that clamps independently to the saw table. You can mount featherboards on a tablesaw any number of ways, but having a sturdy, adjustable holder like this hanging on your shop wall will save lots of setup time.

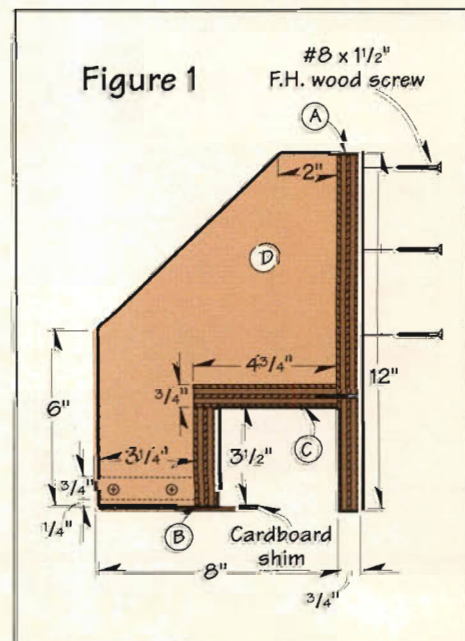


First, Size the Jig To Your Tablesaw

This combination was originally designed to fit a General 350 tablesaw, but you can easily adapt it, with a few modifications, to fit any tablesaw.

As shown *above*, our high fence fits over the saw's rip fence. If your rip fence measures more than 3" wide, increase the width of the opening about 1" so you'll still have room for the stoppers. They'll protect your fence from the eyebolts.

Tailor the jig's length to fit your saw's table. On a small benchtop tablesaw, for example, you won't need the 36" length shown. As a rule, making the fence more than 10" longer than your saw table is overkill.



Next, Prepare the Fence Parts

We made our fence from $\frac{3}{4}$ "-thick cabinet-grade plywood. Melamine, particleboard, or sink cutouts would be suitable alternatives. We suggest you avoid construction-grade plywood for jigs like this because its quality won't be consistent enough to provide the accuracy you need.

Before you start, collect all of the required hardware, which you should be able to find at a well-stocked hardware store. If you have trouble finding the knobs that we show, wing nuts will suffice. (Or, see our list of sources on *page 31* for mail-ordering information.)

Step 1. First, cut a 36x48" piece of $\frac{3}{4}$ " plywood. This will give you enough material for the fence parts (A, B, C, D, E) plus some leftover to use as shims (I) on the featherboard holder.

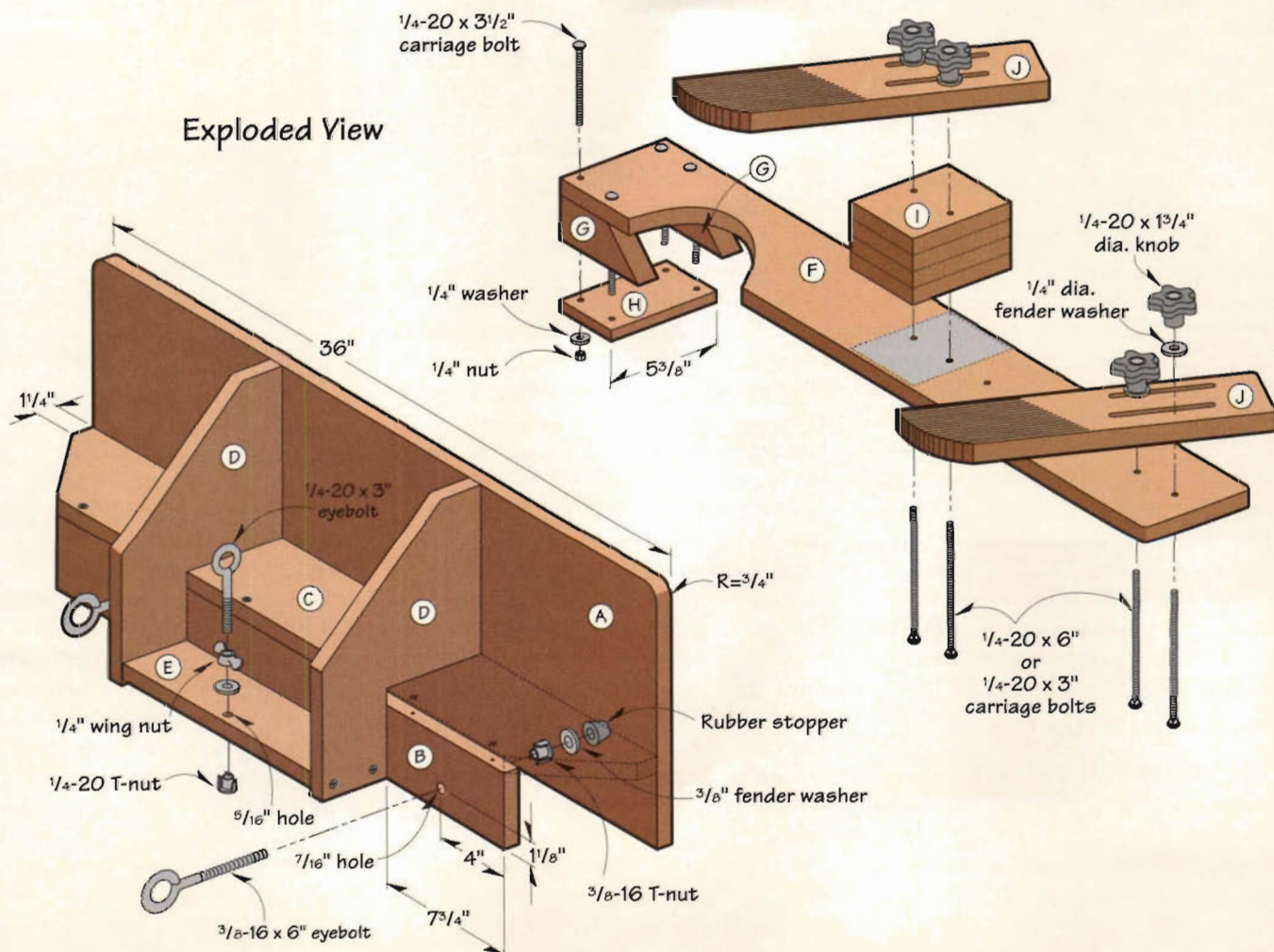
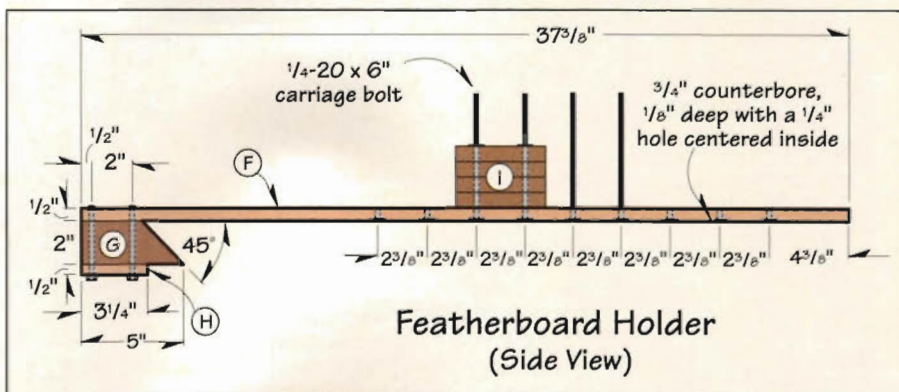
Step 2. Cut the fence parts (A, B, C, D, E) to length and width. Next, lay out and cut the notches in the braces as dimensioned in figure 1 *opposite*. Lay out and cut the corners on the cap (C) and braces (D), and round the upper two corners of the face (A).

Step 3. Drill a $\frac{3}{16}$ " hole through the shoe (E) where marked for the $\frac{1}{4}$ " T-nut, and two $\frac{7}{16}$ " holes through the back (B) for the $\frac{3}{8}$ " T-nuts. Mount the T-nuts, then sand the edges smooth on all parts.

Assemble the Fence

Note: Follow these steps in sequence. Otherwise, some of the screw locations will be inaccessible after assembly. Also, pilot-drill and countersink all screw holes.

Step 1. Position and attach the shoe (E) $\frac{1}{4}$ " up from the bottom end of the braces (D). (We assembled the parts on our saw table and clamped them to right-angle forms to ensure squareness before drilling pilot holes and driving screws.)



BILL OF MATERIALS

FENCE

PART	T	W	L	MAT.	QTY.
A Face	3/4"	12"	36"	PW	1
B Back	3/4"	3 1/2"	28"	PW	1
C Cap	3/4"	4 3/4"	36"	PW	1
D Braces	3/4"	8"	11 15/16"	PW	2
E Shoe	3/4"	3 3/16"	12"	PW	1

FEATHERBOARD HOLDER

F Base	1/2"	5 3/8"	37 3/8"	PW/O	1
G Hook cleat	1"	2"	5"	O	2
H Tie	1/2"	3 1/4"	5 3/8"	O	1
I Shims	3/4"	4"	5"	PW	4*
J Featherboards	7/8"	3 1/2"	14 1/2"	O	2

*Or as required.

MATERIALS LIST

PW—plywood
O—oak or other
hardwoods

SUPPLIES

4—1/4-20 star knobs, 5—1/4" fender washers, 2—3/8" fender washers, 4—1/4" flat washers, 4—1/4-20x6" carriage bolts (or 2—1/4-20x3" carriage bolts), 4—1/4-20x3 1/2" carriage bolts, 1—1/4-20x3" eyebolt, 2—3/8-16x6" eyebolts, 1—1/4-20 T-nut, 2—3/8-16 T-nuts, 1—1/4-20 wing nut, #8x1 1/2" flat-head wood screws, 2—1x1" rubber stoppers.

Step 2. Glue and screw the back (B) and cap (C) together. Next, attach these parts to the brace/shoe assembly, screwing through the back (B) and cap (C) into the braces (D) and shoe (E).

Step 3. Attach the face (A) to the other parts. To do this, first place a 1/16" cardboard shim under the assembled parts to bring the top ends of the 11 15/16"-long braces into alignment with the top edge of the 12"-wide face (figure 1). Then, glue and screw the face to the braces. Note: This offsets the fence slightly from a true 90°, which will allow you to "zero" it using the eyebolt set in the shoe.

Step 4. Drill a centered 3/8" hole 1/2" deep into the wide end of each stopper. Then, assemble the eyebolts, flat washers, and stoppers as shown.

Now, Make the Featherboard Holder

The featherboard will fit most tablesaws equipped with a tubular fence-rail system such as found on the Sears, Grizzly, General, and some Delta models, among others. If

your saw has tubular rails, make the board with the V-hook as shown on the Featherboard Holder and Exploded View drawings on page 29. When the V-hook engages the front tubular rail, you need to clamp only the end nearest you.

If your saw doesn't have tubular rails, modify the holder to fit your saw table. For example, since our saw has an aftermarket rip fence that uses steel angles for rails, we omitted the hook assembly and added cleats to build up both ends so it fits flat on the table and the steel angles. (With this arrangement, we have to clamp the base to the saw table at both ends.)

To build the featherboard holder as shown on the drawing, you'll need 1/2"- or 3/4"-thick solid stock or plywood for the base (F) and tie (H), 1"-thick hardwood for the cleats (G), and 3/4" or 7/8"-thick hardwood for the featherboards (J).

Step 1. Cut the parts to the sizes listed in the Bill of Materials. Cut the 45° angle on one end of each cleat, and round the corners on the base. The drawing shows four shims, but you'll probably want to make more to

Featherboard Detail

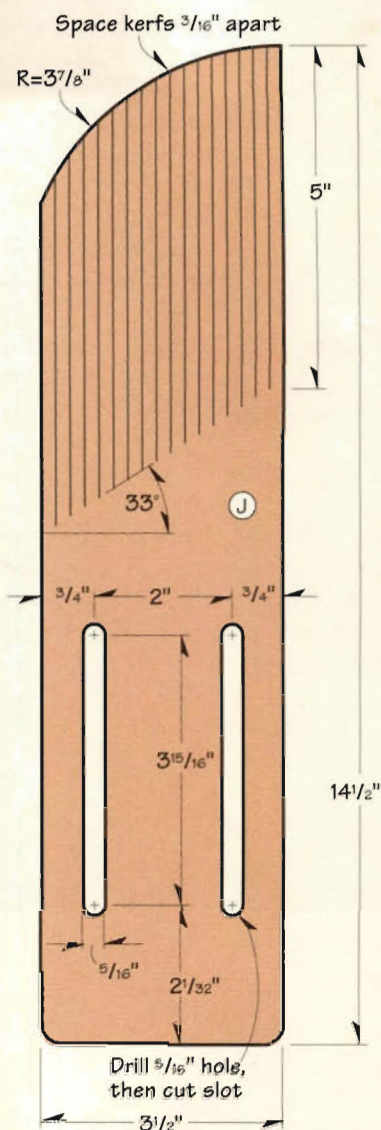


Figure 2

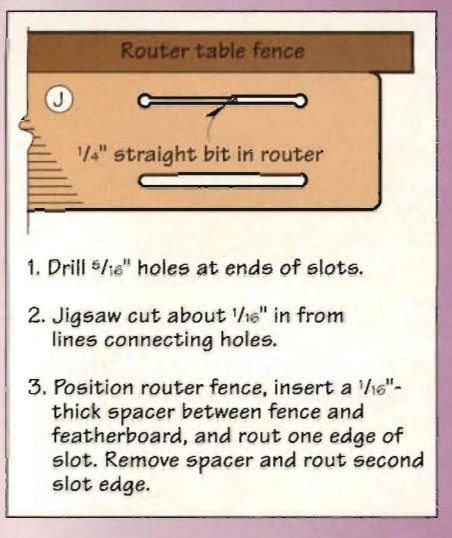
elevate the featherboard still higher to hold those very tall workpieces.

Step 2. Using the dimensions shown on figure 2, lay out center-points for the holes at both ends of the slots on the two featherboards. Then, form the slots. (See the Pro Tip opposite for help with this operation.)

Step 3. Scribe the arc and the 33° angle across both boards where dimensioned. Mark lengthwise lines every 3/16" across the board's width, then center the bandsaw blade on each line and saw to the 33° line. (We used the fence to ensure straight

PRO TIP

To make clean, well-formed slots, first drill correctly sized holes ($\frac{5}{16}$ " at both ends of each slot. Next, scribe lines to connect each pair of holes. Scrollsaw away most of the stock between the holes, cutting to within $\frac{1}{16}$ " of the connecting lines. Then, using your router, a fence, a $\frac{1}{16}$ "-thick spacer, and a $\frac{1}{4}$ " straight bit, trim the slot edges to the line as shown.



1. Drill $\frac{5}{16}$ " holes at ends of slots.
2. Jigsaw cut about $\frac{1}{16}$ " in from lines connecting holes.
3. Position router fence, insert a $\frac{1}{16}$ "-thick spacer between fence and featherboard, and rout one edge of slot. Remove spacer and rout second slot edge.

cuts.) Note: The number of kerfs isn't critical—you just need to form fingers with enough flexibility to compress slightly and apply pressure to the workpiece. Now, bandsaw both boards to shape, and finish-sand them.

Step 4. Lay out, drill, and counterbore all holes in the base, cleats, tie, and shims where shown on the Featherboard Holder drawing.

Step 5. Assemble the featherboard holder as shown on the Exploded View. In the photo, you'll notice we used shorter carriage bolts to secure the "low" featherboard. However, we've specified 6"-long carriage bolts for both boards, which allows you the flexibility of shimming both of them if the situation calls for it. When you don't wish to elevate the front featherboard, use the shorter carriage bolts. We suggest you keep both short and long $\frac{1}{4}$ " bolts on hand for this.

Step 6. Apply a clear finish to all surfaces of the high fence. Then, apply a coat of paste wax to the outboard side of the face to minimize friction. Do not finish the featherboards—they need friction to work properly.

It Doesn't Take an Engineering Degree To Use the Fence

Each time you set up, "zero" the high fence to make it truly perpendicular to the table. To do this, place the high fence over your rip fence. Hold a

framing square against the fence and saw table, then turn the small eyebolt until the high fence face squares with the table. Next, lock the eyebolt's setting by tightening the wing nut and washer down against the shoe. Now, tighten the two large eyebolts to clamp the fence to the rip fence, and recheck that the fence remains square to the saw table.

Position and lock the rip fence where needed. Next, clamp the featherboard holder to the saw table. With the workpiece in position against the fence, set both featherboards to a 40°

to 50° angle, and tight enough to apply pressure against the workpiece. In this position, the featherboards will hold the workpiece firmly against the fence and help prevent it from kicking back. As with any tablesaw operation, test all of your settings before starting on your project stock. 

Writer: David F. Peters

Designer: Dennis Preston

Photograph: Kevin May

SOURCES

Phenolic knobs. $\frac{1}{4}$ -20 four-star knobs with through holes. Black phenolic with brass insert. Catalog no. DK-81, \$1.05 each. Order from:

Reid Tool Supply Company
Telephone: 800/253-0421

Nylon knobs. $\frac{1}{4}$ -20, five-star knobs with through holes. Black nylon with steel insert. Catalog no. 23804, \$3.40/set of four plus shipping/handling. Order from:

The Woodworker's Store
Telephone: 800-279-4441



EXCEL
POLYURETHANE WOOD GLUE

You Can Pay More,
But You Can't Buy Better.

- Fully Guaranteed
- No Mixing
- Can be Stained & Painted
- Strength of Epoxy
- Sands & Scrapes Like Wood
- Exterior / Interior
- Waterproof
- Expands as it Dries
- 30 Minute Working Time

The AmBel Corporation, P.O. Box 819,
125 Cottonport Ave., Cottonport, LA 71327
Tel: (318) 876-2495 Toll Free: 1-800-779-3935

Trout Net

by Bob Colpetzer

Craig Brown's net design is world-class, but he reports that it will still work fine for landing even small to average-sized trout.



First, Make the Gluing Form

Step 1. Enlarge the grided Template half-pattern shown on *page 33* to full size. If you wish to make a full pattern, transfer the pattern to a large sheet of paper folded in half. Cut out the half-pattern profile, then unfold the paper for a full pattern. Next, cut a 12x24" piece of 1/4"-thick, void-free plywood, and scribe a lengthwise centerline on



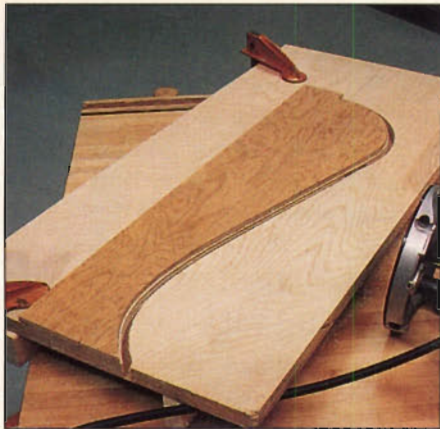


Photo A: Rout the gluing form to shape using template, guide bushing, and straight bit.

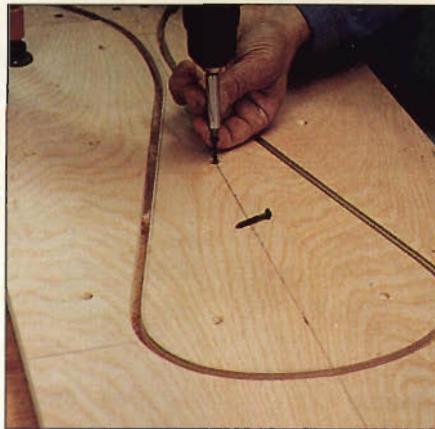


Photo B: Before separating routed gluing form parts, screw forms to base to establish position.



Photo C: Separate the center form from the router form, then flush-trim the form edges with your router.

one face. Transfer the half- or full-pattern outline to this face, aligning the centerlines.

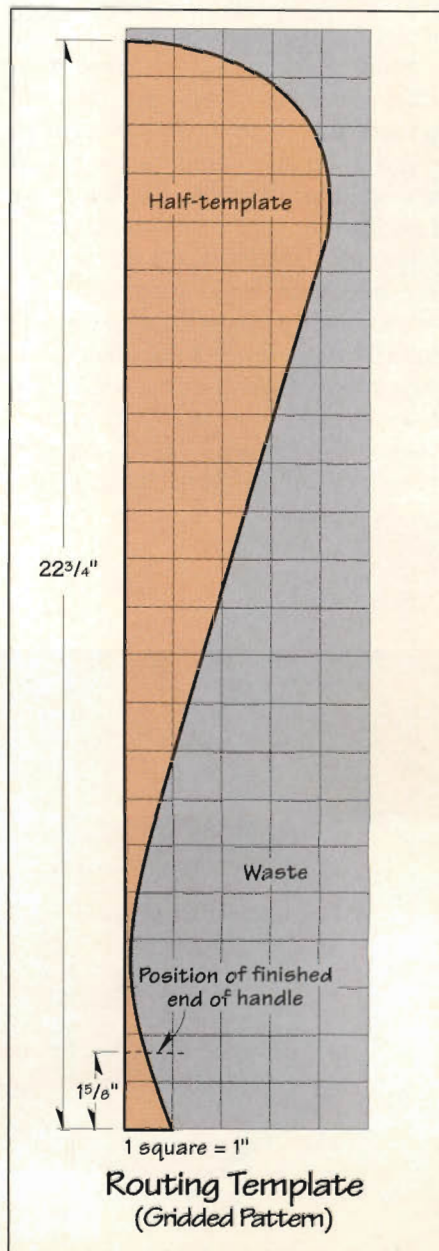
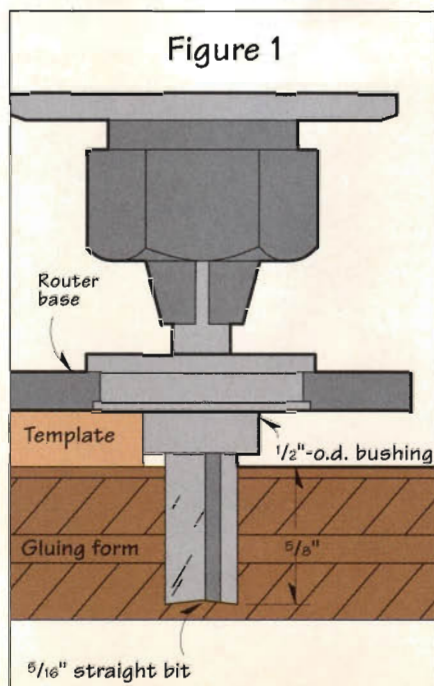
Step 2. Bandsaw the template to shape, keeping your blade outside the line. Now, carefully sand or file to the line. Note: Be precise in making this template, since any irregularity in it will transfer to the form and then to the finished frame.

Step 3. To make the actual form, first cut a 15x30" piece of $\frac{3}{4}$ " void-free birch plywood. Scribe a lengthwise centerline on one face as well as the other reference lines ($1\frac{5}{8}$ " and $20\frac{7}{16}$ " from the bottom end) shown on the Gluing Form drawing on *page 34*. Then, using $\frac{3}{4}$ " wire brads, attach the template to the plywood, aligning the two centerlines. Make sure the template base aligns flush with one end of the plywood.

Step 4. To rout the gluing form to shape, fit your router's base plate with a $\frac{1}{2}$ "-o.d. guide bushing and mount a $\frac{5}{16}$ " straight bit (*figure 1*). For the first pass, set the bit to cut $\frac{1}{4}$ " deep, and hold the bushing firmly against the template as you rout. Next, rout around the curved, outside edge of the template. For subsequent passes, increase the depth by $\frac{1}{8}$ " increments to a final setting of $\frac{5}{8}$ " (*photo A*). Note: Remove all chips and sawdust between cuts—a buildup can get between the bushing and pattern and change the profile being cut. Remove the template, flip it over, and reattach it to the form on the opposite side of the centerline. Now, using the same procedure, rout around the other half of the form.

Step 5. From $\frac{5}{8}$ "-thick particle-board or $\frac{3}{4}$ "-thick plywood, cut a 13x31 $\frac{1}{2}$ " piece for the base, and scribe a lengthwise centerline on one face. From the same stock, cut a 2x12" piece for the base block. Set your tablesaw miter gauge to 40° from perpendicular, and miter-cut the base block into three pieces as dimensioned on the Gluing Form drawing.

Step 6. Position and screw the three blocks to the end of the base as shown on the Gluing Form drawing. Remove the template from the gluing form. Next, butt the form against the blocks, centering it over the base, and screw it to the base (*photo B*). This establishes the form position on the base, which will be needed later.



PRO TIP

Rather than trying to make a narrow push stick to rip these narrow strips, cut an 8" length of 4x4 and use it as a push block. Simply push the block across the blade until the strip has been completely cut. Then, shut off the saw, back out the block, and repeat the process.

apply a finish and a heavy coat of paste wax to form surfaces.

Prepare the Laminating Strips

Note: To rip the thin laminating strips, use a zero-clearance insert and splitter on your tablesaw. (If you don't have them, see "Making a Zero-Clearance Insert With Splitter" on page 63.)

Step 1. To make the long frame strips, first cut a $\frac{3}{4} \times 2 \times 60$ " piece of hard maple stock, and joint both edges. (I also tried ash and red oak and had success with all three woods.) Rip a $\frac{3}{64}$ "-thick strip from each edge, using a push block to safely clear the piece from the blade and to prevent kickback. (See the Pro Tip at left.) Joint and rip both edges again, and repeat this process until you have eight strips. (You'll use seven, but eight will leave you a spare. The thickness of your seven strips should total $\frac{7}{16}$ ".)

Step 2. To rip the yoke strips, reset the fence to slightly less than $\frac{1}{32}$ " (.023" if you have a micrometer caliper or feeler gauge). Start with a $\frac{3}{4} \times 3 \times 15$ " blank of maple (or ash or oak) and one of walnut, and rip a total of 10 strips from the first blank and 12 from the second. This will provide 11

strips for each of the two $\frac{1}{4}$ "-thick yoke laminations. Note: If cutting to this thickness proves to be beyond the limits of your tablesaw, reset to a feasible dimension, and simply reduce the number of strips making up the $\frac{1}{4}$ " laminations.

Laminate the Frame and Yoke

Note: As with any glue-up, I suggest making a dry run to familiarize yourself with the process and eliminate as many surprises as possible. I used polyurethane glue throughout this project. For an introduction to these glues, read my shoptest on pages 64-65 first.

Step 1. Before you laminate, line the form with waxed paper so that no glue will come in contact with it. Apply glue to one face of each $\frac{3}{64}$ "-thick frame strip using a brush or roller, then bend each one around the center form while inserting the ends in the slots between the base blocks. Slide the head form against the lamination and clamp using one pipe clamp underneath the form and base. Now, slide the two side forms against the lamination and clamp using three pipe clamps across the top (photo D).

Step 2. After the glue has cured, unclamp the assembly, and scrape off the squeeze-out on the edges and inside face of the frame. Remove the center form, then screw the side forms in place using the same screw holes that initially held these forms to the base.

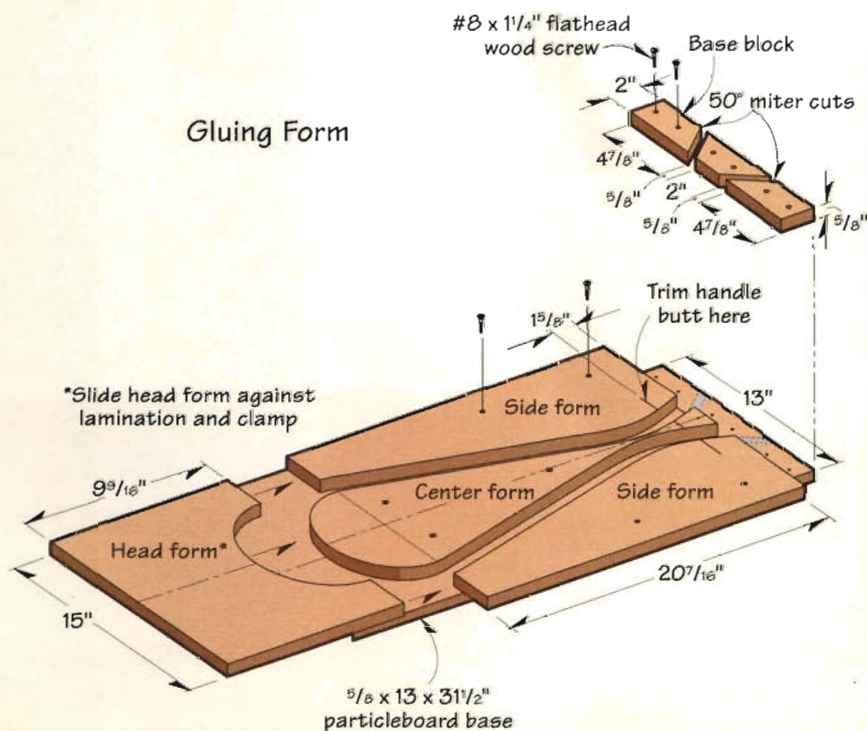
Step 3. Using the center form as a template, lay out the shape of the handle insert on a $\frac{3}{4} \times 2\frac{1}{2} \times 4$ " piece of walnut. Bandsaw the insert to rough shape, keeping the blade $\frac{1}{8}$ " outside the line. Adhere the bandsawn blank to the center form with double-faced tape, and rout the blank to finished shape using a flush-trim bit in your table-mounted router (photo E).

Step 4. To make the wedge you'll need for clamping the yoke laminations, first measure the angle of taper formed by the centerline of your gluing form and the side forms. (Ours measured 17°. We used our tablesaw blade-setting gauge.) Then, lay out and cut the taper jig shown in the drawing on page 36. Note: If the angle of taper

from the base. Using a scroll- or bandsaw, cut along the bottom of the routed groove to separate the net-shaped piece from the rest of the form. Note: This needn't be a precise cut—just keep the blade roughly centered in the groove.

Step 8. Fit your table-mounted router with a flush-trim bit, and remove the $\frac{1}{8}$ "-thick lip of waste that remains on the edges of the center and side forms (photo C). Next, reattach just the center form to the base. Using your tablesaw, cut the remaining outer section along the $20\frac{7}{16}$ " reference line (perpendicular to the centerline). This divides the outer piece into a head form and two side forms. Note: When gluing up the lamination later, I suggest using waxed paper to keep glue off the form. If you prefer,

Gluing Form



on your form deviates from the 17° shown on the drawing (and as used on the Template pattern), adjust the angle on your taper jig to match that angle.

Step 5. Using the taper jig, cut a clamping wedge from a $\frac{3}{4} \times 7\frac{1}{4} \times 12$ " piece of maple. To do this, first set the rip fence 10" from the blade, then insert the hardwood blank into the jig, and place the jig against the fence. Then, cut a 17° taper along one edge of the blank, flip the blank edge for edge in the jig, and cut the other edge.

Step 6. Arrange the 22 yoke laminating strips into two groups of 11, alternating maple and walnut. Next, dry-assemble the laminated frame, walnut handle insert, two bundles of strips, and wedge into the gluing form. Clamp the pieces in place to check for fit (*photo F*). Shim any minor gaps as shown. To correct large gaps, you'll need to change the angle or shape of the wedge. Note: Don't worry too much about gaps where the walnut insert, the strips, and the wedge meet. The handle caps will conceal this area, and such gaps pose no threat to the frame's structural integrity.

Step 7. Once everything fits, remove the parts and line the form with waxed paper. Then, apply glue to the mating surfaces, reassemble, and clamp.

Next, Size the Frame

Step 1. After the glue has dried, unclamp the assembly and scrape off the excess glue using a hand scraper. Next, lay out the end of the handle where dimensioned on

the Template pattern, and bandsaw it to length.

Step 2. Reduce the frame to a uniform $\frac{1}{2}$ " thickness using your tablesaw. To do this, first make the simple trimming jig shown on *page 36*, then attach it to the waste part of the wedge with screws where dimensioned. Elevate your tablesaw blade to 2 $\frac{3}{4}$ ", stand the jig on each edge, and remove $\frac{1}{8}$ " of thickness

(*photo G*). Next, stand the jig on end to trim the wide end of the frame. Now, remove the frame, attach it to the other face of the jig, and repeat the procedure to remove $\frac{1}{8}$ " from the opposite frame edge.

Step 3. Lay out the full-sized Yoke pattern (shown in *figure 4* on *page 36* as part of the net-stringing diagram) on the wedge. Then, scroll-saw the yoke to shape. Note: If you



Photo D: Line the gluing form with waxed paper before laminating. Clamp the lamination as shown with pipe clamps.



Photo E: Use center gluing form as template to shape handle insert, then flush-trim on router.



Photo F: Dry-clamp yoke/wedge lamination, and shim any small gaps around form.

BILL OF MATERIALS

TEMPLATE AND GLUING FORM

PART	T	W	L	MAT.	QTY.
A Template	$\frac{1}{4}$ "	12"	24"	VFP	1
B Form	$\frac{3}{4}$ "	15"	30"	VFP	1
C Base	$\frac{5}{8}$ "	13"	30 $\frac{1}{2}$ "	PB	1
D Base blocks	$\frac{5}{8}$ "	2"	12"	PB	1

LAMINATING STRIPS

F Net frame*	$\frac{3}{64}$ "	$\frac{3}{4}$ "	60"	M	7
G Yoke 1*	$\frac{1}{32}$ "	$\frac{3}{4}$ "	15"	M	10
H Yoke 2*	$\frac{1}{32}$ "	$\frac{3}{4}$ "	15"	W	12

OTHER NET PARTS

F Handle insert	$\frac{3}{4}$ "	2"	4"	W	1
G Yoke wedge	$\frac{3}{4}$ "	7 $\frac{1}{4}$ "	12"	M	1
H Handle caps	$\frac{3}{16}$ "	6 $\frac{1}{4}$ "	12"	BEM	2

*Initial dimensions. Cut part to size during construction.

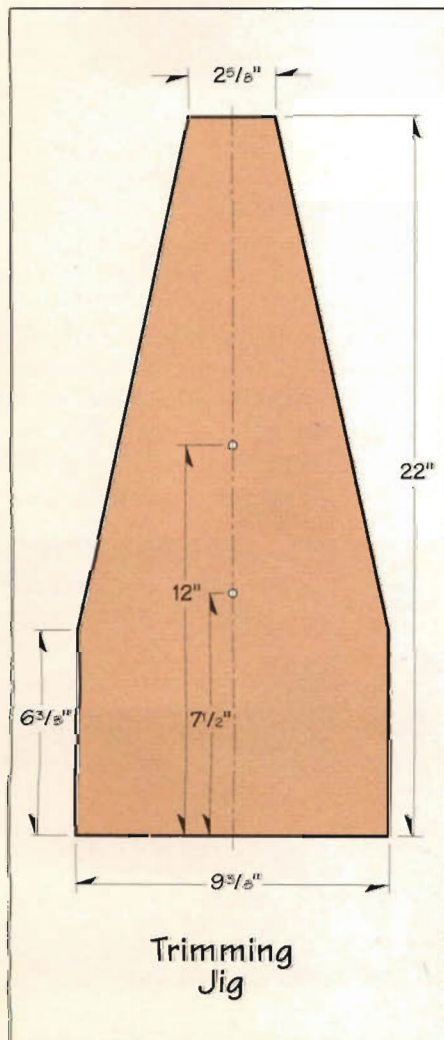
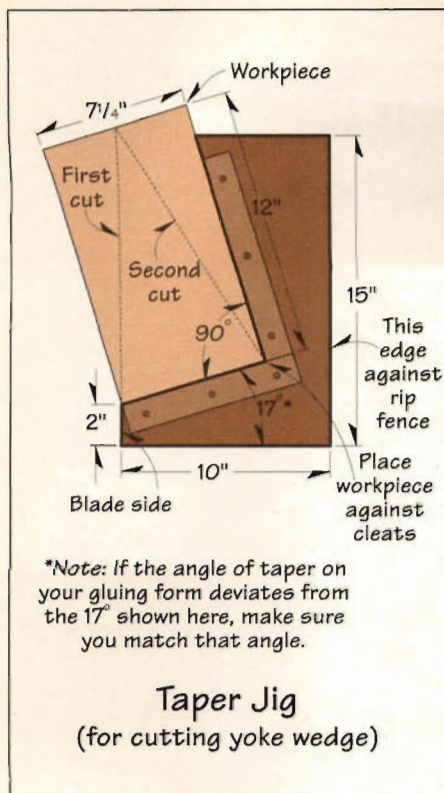
**Actual thickness should be .023", or slightly less than $\frac{1}{32}$ ".

MATERIALS LIST

VFP—void-free plywood;
PB—particleboard; M—hard maple;
W—walnut; BEM—bird's-eye maple.

SUPPLIES

Polyurethane glue (Excel or Gorilla Glue); water-resistant marine finish (wipe-on type). See Sources for other required items.



own a 1 3/4" multi-spur or Forstner bit or holesaw, you can use it to form the radius before finishing the cut with your scrollsaw. Now, file, scrape, and sand a smooth transition from the yoke to the hoop.

Step 4. Install a flush-trim V-notching bit in your table router, and rout a centered V-groove along the outside edge of the frame hoop (*photo H*). Start and stop the V-groove 1" below the centerpoint of the yoke radius. Then, switch to a 1/4" round-over bit, and rout both inside edges of the hoop. Stop the round-over where shown on the Final Assembly drawing *opposite*. Note: Don't round the outside edges of the hoop.

Add the Handle Caps

Step 1. To make the handle caps, plane or resaw enough bird's-eye maple stock for two 3/16 x 6 1/4 x 12" blanks. Stack the blanks using double-faced tape, then center the handle and yoke of the frame over the top blank and trace the outline onto the face. Now, bandsaw the blanks to rough shape, keeping the blade at least 1/8" outside the line, and separate them.

Step 2. Apply glue to both faces of the handle and yoke, then center and clamp the two caps in position. Make sure that each cap has sufficient overhang at all points to allow for flush-trimming. After the glue has dried, use your table-mounted router and a flush-trim bit to rout the caps flush with the handle and yoke edges.

Step 3. Lay out a 3/8" radius on both corners of the handle end, then bandsaw and sand the corners to shape. Switch to a 1/4" round-over bit on your table-mounted router, and rout the edges of the handle and yoke. Note: On the outside of the frame, start and stop the round-over 8" (measured vertically) from the end of the handle.

Step 4. Using a spokeshave or 1" belt sander, taper the thickness of the handle caps to make a smooth transition to the 1/2" thickness of the hoop (*photo I*). To do this, start at the bottom of the yoke and shave toward the hoop. Then, blend the cap edges to the yoke and hoop using a file and sandpaper.

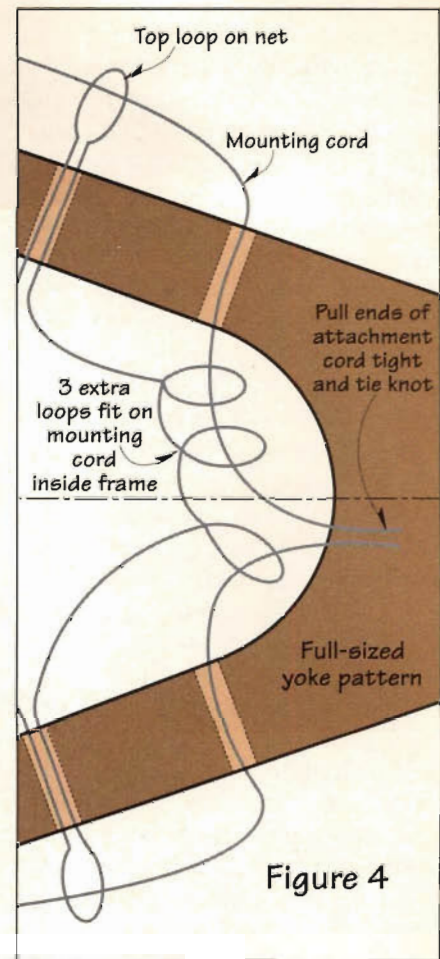


Figure 4

Drill the Net Holes, Then Apply Finish

Step 1. Locate a centerpoint on the top edge of the hoop, and mark its position in the V-groove. Next, lay out 20 equally spaced points on each side of the centerpoint. Note: A pair of dividers set at 7/8" should give the correct spacing, but check it to

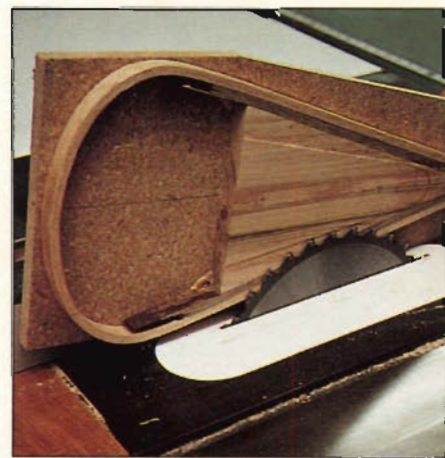
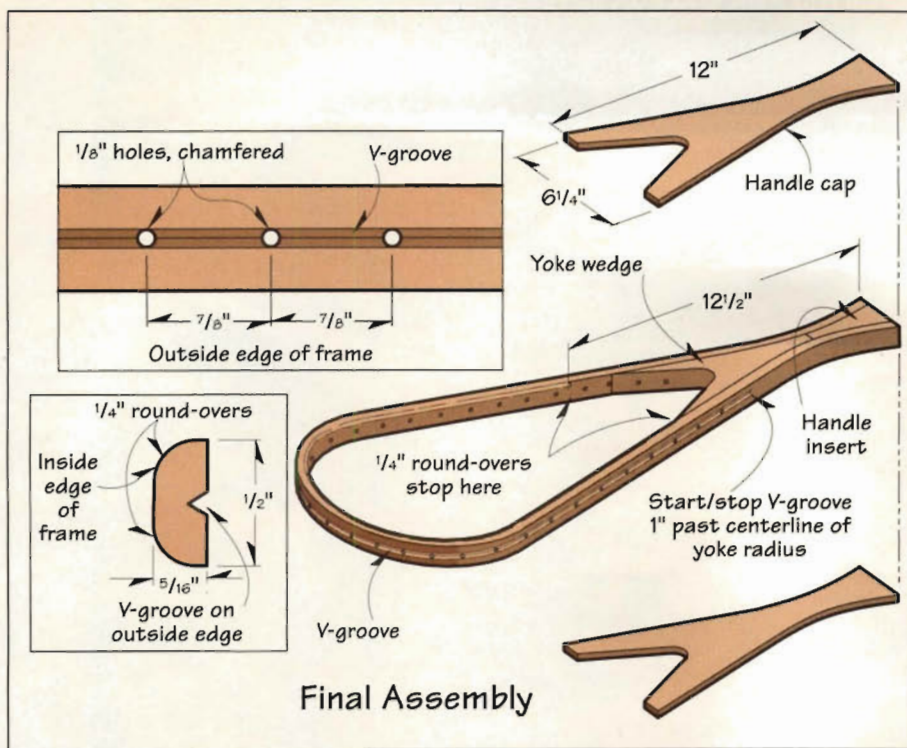


Photo G: Attach frame to trimming jig, stand on edge, and trim frame to 1/2" thickness.



PRO TIP

To pull the net loops easily through the frames holes, cut a 4" length of nylon monofilament fishing line. Bend it double around the net loop, push the ends through the hole, and pull the net loop through the hole.

the loose filaments will get into the frame holes and contaminate the next coat of finish. Wipe down the frame with a tack cloth.

Step 7. Coat the holes with a second coat of finish, then wipe on a wet (but not runny) coat over the rest of the frame. This time, allow the finish to dry without wiping off the excess.

Step 8. Repeat steps 6 and 7 until you've obtained the desired finish buildup. Four coats will usually provide adequate protection. After the final coat has dried, level the finish with synthetic wool, but don't rub out all of the sheen.

Attach the Net and Brass Ring

Step 1. Locate the top loops in the net. (See the Sources on page 63 to order a net.) Starting at the top center hole, pass each loop in turn through a frame hole, working down one side and then the other. (For an easy way to do this, see the Pro Tip above.) As you work, thread the mounting cord

Continued on page 63

make sure it works on your frame. Then, punch each point with a scratch awl.

Step 2. Drill the 41 holes using a $\frac{5}{64}$ " twist bit (photo J). (I started with a small bit to make angle correction easier. I clamped the frame into my bench vise and used a backing block to minimize tear-out.) Enlarge the holes to $\frac{1}{8}$ ", then lightly chamfer them on the outside edge with a couple of twists from a hand-held countersink.

Step 3. Sand the entire frame, starting with 80-grit and working up to 220-grit sandpaper. Be careful to remove any cross-grain scratches. Vacuum or blow the dust from the

frame, then check the surface preparation under a bright crosslight.

Step 4. Locate a centerpoint on the handle butt. Drill a shallow $\frac{5}{64}$ " hole, and temporarily drive a screw eye into the handle butt to use for hanging the frame while the finish dries.

Step 5. Apply a waterproof marine finish using a soft, lint-free cloth. (I used Waterlox Marine Finish.) To coat the inside of the net holes, use a pipe cleaner. Allow the finish to penetrate for 10 minutes, then wipe off the excess. Now, hang the frame and let the finish dry overnight.

Step 6. Scuff-sand the frame with 0000 synthetic wool or 400-grit sandpaper. Note: Avoid steel wool, since

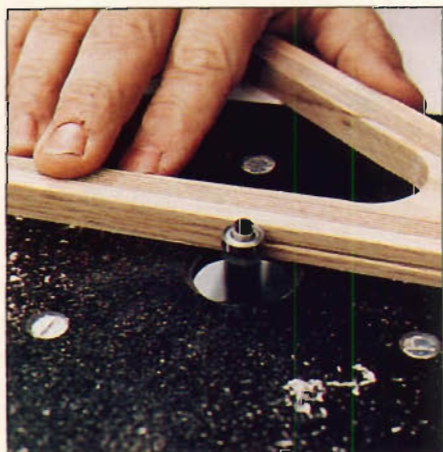


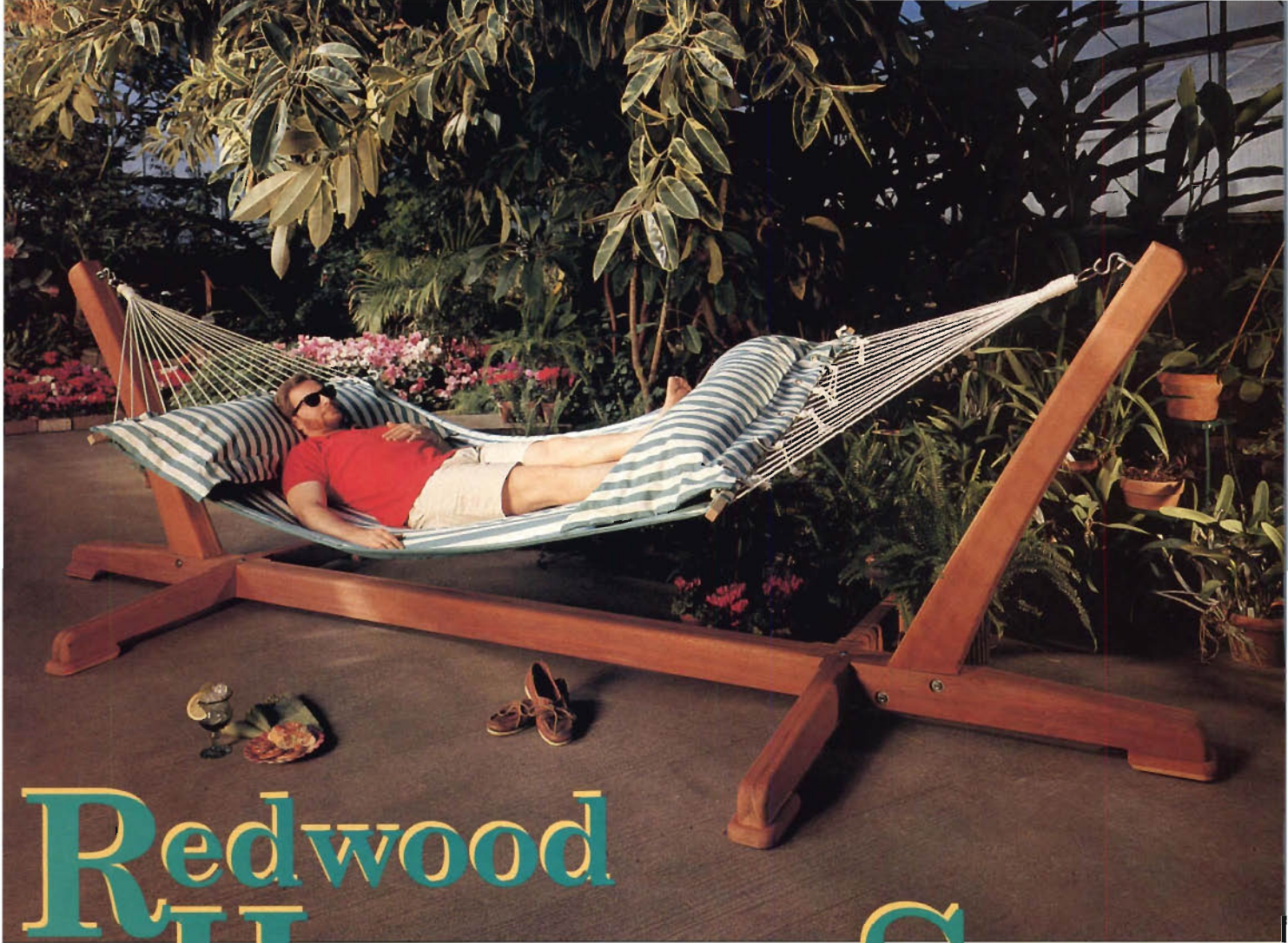
Photo H: Rout a V-groove on frame edge using flush-trim V-notching bit.



Photo I: Use spokeshave to taper thickness of handle cap down to hoop thickness.



Photo J: To drill net holes, start with a $\frac{5}{64}$ " bit for angle correction, then enlarge with a $\frac{1}{8}$ " bit.



Redwood Hammock Stand

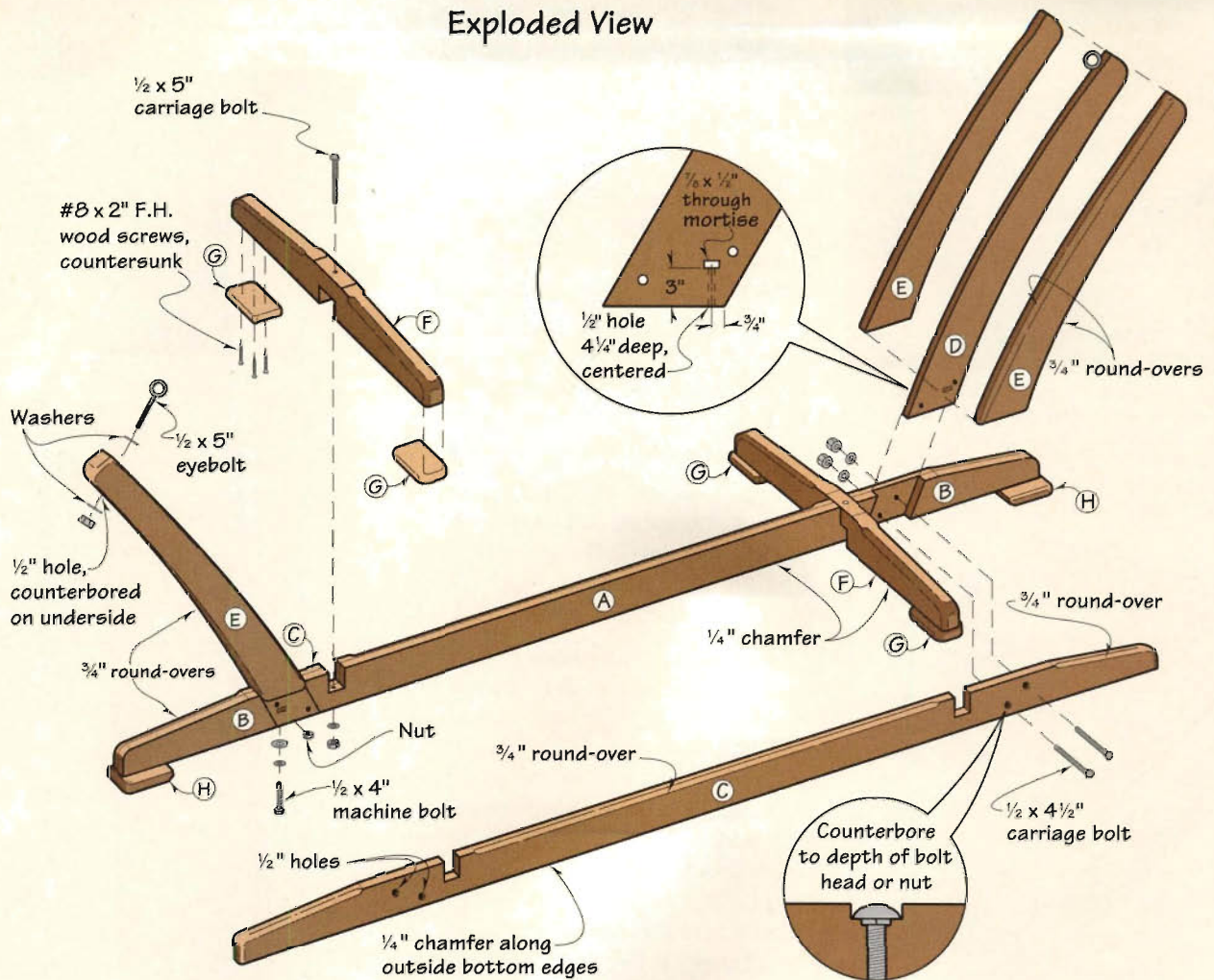
A Firm Foundation For the Ultimate Comfort Machine

No matter where you live, nothing says relaxation quite like a lazy snooze under your favorite shade tree on a summer's afternoon. And you'll feel especially deserving if you're sprawled in a hammock you crafted yourself. So, follow along as we first show you how to build the sturdy stand and then tell you where to get inexpensive instructions for making the luxury-sized hammock and pillows. Later on, when those first chill breezes of winter rudely awaken you, the stand will disassemble easily for off-season storage.

Before You Start

We recommend clear redwood heartwood for the hammock stand. (As a less costly alternative, ask for clear flat-grain redwood. You'll get the same quality, but flat-grain stock will have more sapwood.) Redwood offers excellent weatherability, has a good strength-to-weight ratio, and requires minimal upkeep. If you select straight, knot-free stock, you can make the entire stand from three 14'-long 2x6s, two 10'-long 2x6s, and three 10'-long 2x8s. With this combination of boards, we had minimal waste.

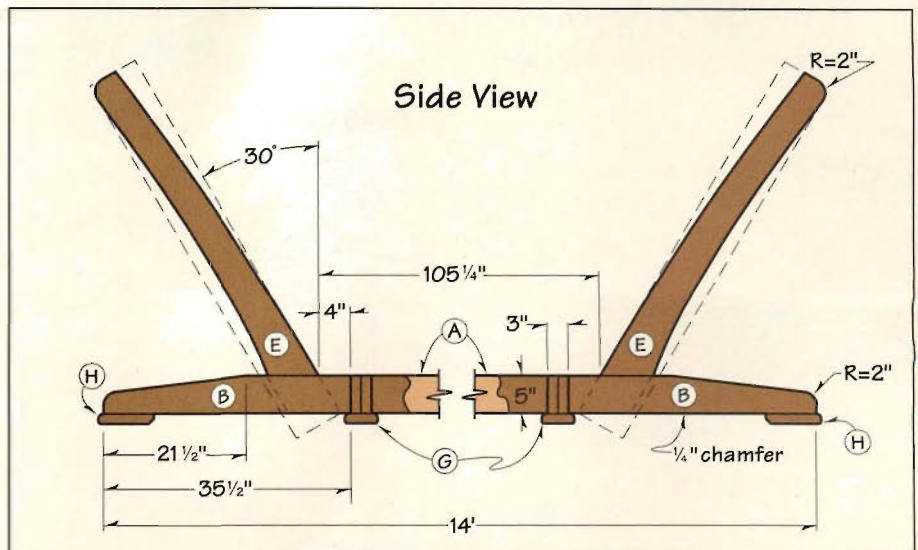
Exploded View



Start By Making the Center Beam

Step 1. Select one of the 14'-long 2x6s for the beam center (A). Joint one edge, then rip it to 5" wide. Miter-cut a 30° angle at one end, then measure over 105 1/4" and miter-cut a second 30° angle. The Side View drawing at right shows the details. (We used our circular saw and the simple jig shown in figure 1 on page 40 to make these cuts. Also see photo A.) Set the cutoff aside—you'll make the two beam ends (B) from it later.

Step 2. For the beam sides (C), joint or rip one edge of the two remaining 14'-long 2x6s, then rip both boards to 5 1/8" wide. If your 2x6s measure longer than 14', trim them to 14'. Now, find the lengthwise center on all three beam pieces, and mark it on the bottom edges.



Step 3. Lay one beam side on a level surface, then glue, nail, and clamp the beam center to it. Note: Align the centerlines of both pieces and make the bottom edges flush.

(We used a liberal amount of Titebond II water-resistant glue and drove several 2"-long finishing nails through the beam center and into the beam side to keep the pieces

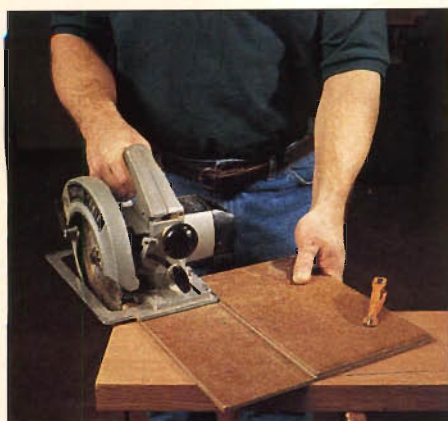


Photo A: Using the jig and circular saw to make precise miter- and crosscuts.

Make width equal to distance from saw blade to edge of saw's base plate plus 1", then saw to size

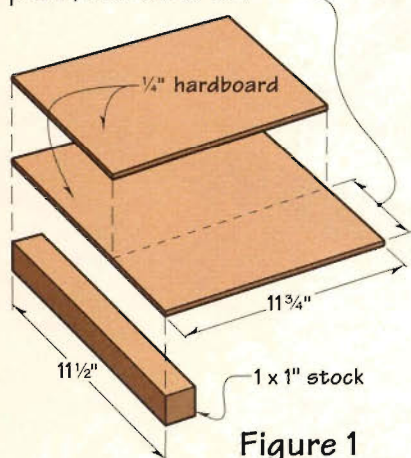


Figure 1

from slipping out of alignment during clamping. We also used clamp pads to avoid marring the soft redwood.)

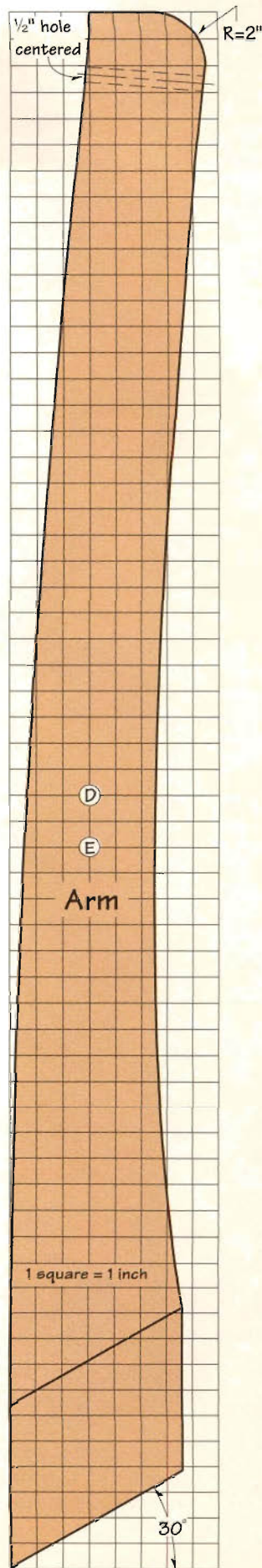
Next, Make the Arms

Step 1. On each of the three 10'-long 2x8s, mark a line 60" from one end. Lay out a 30° angle at this point, and miter-cut the three boards in two using the jig and your circular saw.

Step 2. Using the gridded Arm pattern at right as a guide, lay out a center arm board (D) on one of the 60"-long 2x8s. (For help with this step, see the Pro Tip on page 42.)

Step 3. Rough-cut the arm center. (We used a jigsaw and kept the blade outside the line.) Then, finish shaping the part using a block plane, spokeshave, or sander.

Step 4. Make an identical arm center. To do this, clamp the part you just made to a second 60"-long 2x8. Using a 2"-long flush-trim bit in your hand-held router, rout around the periphery of the center to shape the second one. (We added a second bearing to the bit to avoid marring the soft wood.) Note: Redwood splinters easily. In areas where the router bit rotates into and may lift the grain, try nibbling



BILL OF MATERIALS

CENTER BEAM

PART	T	W	L	MAT.	QTY.
A Center*	1 1/2"	5"	105 1/4"	R	1
B Ends*	1 1/2"	5"	26 1/2"	R	2
C Sides	1 1/2"	5"	168"	R	2

ARMS AND LEGS

D Center*	1 1/2"	6 5/8"	60"	R	2
E Sides*	1 1/2"	6 5/8"	54"	R	4
F Legs*	1 1/2"	5"	49 1/2"	R	4
G Pads	1 1/2"	4 3/4"	8"	R	4
H Pads	1 1/2"	6 1/4"	8"	R	2

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

MATERIALS LIST

R—redwood

SUPPLIES

4—1/2 x 4 1/2" carriage bolts; 2—1/2 x 5" carriage bolts; 2—1/2 x 4" machine bolts; 2—1/2 x 5" eye bolts; 12—1/2" flat washers; 2—7/8" washers (2" o.d.); #8 x 2" flathead wood screws; galvanized finish nails.

away small amounts of the stock first, or precut it close to final profile with a jigsaw or bandsaw. Then, finish by sanding it with an orbital sander.

Step 5. Lay out the $\frac{1}{2}$ " hole and through mortise on the arm center tenons where shown on the detail that accompanies the Exploded View. Center each hole in the tenon end and bore it $\frac{1}{4}$ " deep and perpendicular to the end. Note: The bit will tend to wander as you drill into end grain, so use a brad-point bit, doweling jig, or drill guide to keep it centered. Now, form the through mortises. (We first drilled out most of the area, then squared the hole with a chisel.)

Step 6. Scribe a line across both arm centers 5" up from the angled bottom and parallel to it. Note: This forms a second 30° line parallel to the first. Next, align straightedges with these lines and tack them in place. (We used 12" lengths of 1x1.)

Step 7. Place a 2x8 blank on top of each arm center with the angled end against the straightedge. Glue, nail, and clamp both pairs. Next, flush-trim the arm side to shape each pair. Now, repeat these steps to add the second side to each arm.

Continue Assembling the Beam

Step 1. Using the Beam End pattern shown at *right*, lay out one beam end (B) on the 2x6 off-cut you put aside earlier. Saw and trim the piece to final shape. Then, clamp it face to face with the remaining 2x6 piece, and flush-trim the second end to shape.

Step 2. Lay the partially assembled center beam on its side with the center beam facing up. Next, place the arms in position on the beam where shown on the Exploded View. Press the arm tenons firmly against the angled beam center ends, and mark the width of each tenon on the beam side. Make the resulting mortises fit the tenons as tightly as possible. Note: With the parts still assembled, mark the mating tenons and mortises A and B so you'll always be able to reassemble them the same way.

Step 3. Remove the arms. Next, tack straightedges to the beam along the inside of the tenon lines you just marked to act as supports. Then, glue, nail, and clamp the beam ends (B) to the beam side, placing their leading edges against these supports.

Step 4. Glue, nail, and clamp the second beam side (C) to the beam center (A). Note: Apply glue only to the beam center and end pieces so you won't risk getting glue inside the mortises. As before, align the centerlines and bottom edges. Set all exposed nails, and fill the holes with a mixture of glue and redwood sawdust.

Step 5. Remove the clamps, then flush-trim both beam sides to match the beam center and beam ends. Note: Be careful not to run the bit into the mortise.

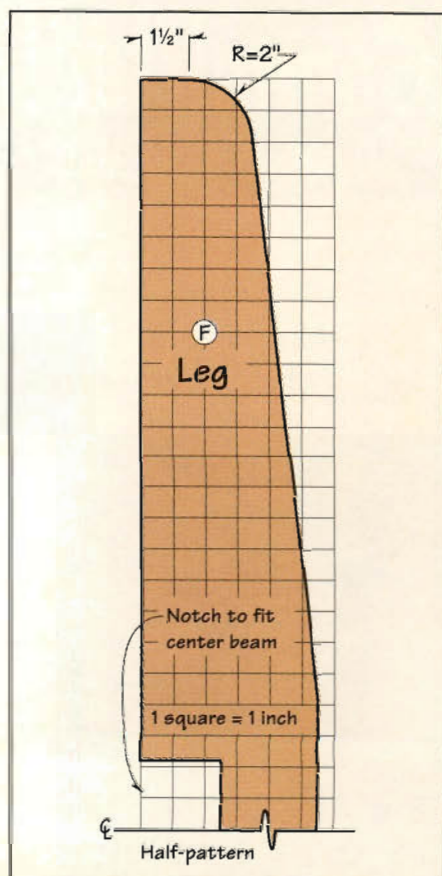
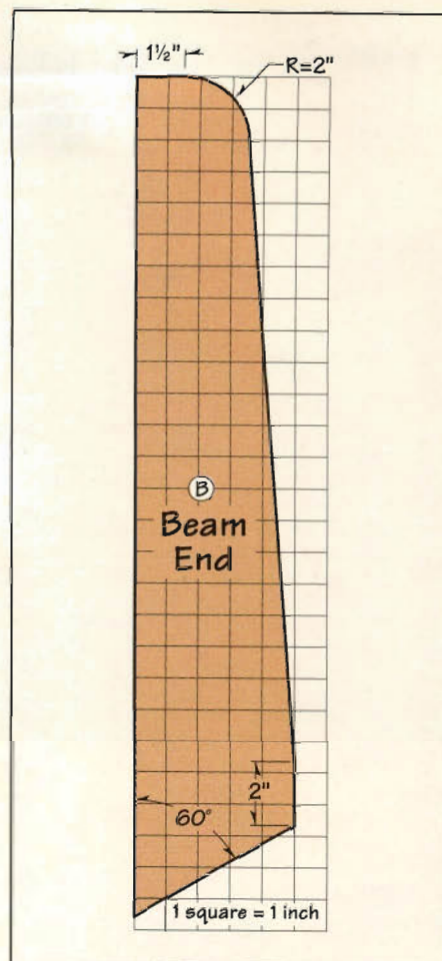
Now, Construct the Legs

Step 1. Using the Leg half-pattern *below right* as a guide, lay out two legs (F) along one 10'-long 2x6. Saw the parts to rough shape, then plane and belt-sand them to final profile. Note: Do not cut the half-lap notch yet. Next, glue a leg blank to each of the shaped legs, then rout both to shape with your router and flush-trim bit.

Step 2. Using the dimensions shown on the Side View drawing, lay out the lap joints on the top edge of the beam and the bottom edges of both legs. Mark the parts carefully to ensure snug-fitting joints.

Step 3. Cut the lap joints. Test-fit them as you work, and adjust the notches as needed for a snug fit. (We cut ours using the circular saw and jig, chopped away the waste with a chisel, then cut to final depth with a handsaw.)

Step 4. Make four narrow foot pads (G) and two wide pads (H) from left-over stock, using the dimensions shown in *figure 2* on *page 42*. (We laid out one pad of each size, cut them to shape, and then used these as templates to shape the others.) Next, rout the $\frac{1}{4}$ " chamfer and $\frac{3}{4}$ " round-over along the edges where shown. Now, cut the $\frac{3}{4}$ " end chamfer on the tablesaw.



Woodworking Skills on Video!



The Video College of Woodworking, introduces *The FUNdamentals of Modern Woodworking*, a 90-minute videotape, work book and plans that cover:

- Selection and use of materials and tools . . . cuts frustration
- Project design, construction and finishing . . . reveals trade secrets
- Bringing it all together . . . smooths the learning curve

Order now for just \$29.95
(plus \$4.95 shipping & handling, U.S. Dollars)
and we'll also send a set of
Project Planning Worksheets.

1-800-354-9663-Dept. W

Video College of Woodworking
Attn: Dept. W•P.O. Box 261026•Lakewood, CO 80226-9026

Money Back Guarantee
Allow 4-6 weeks for delivery, VHS format only.

Committed! To AMERICAN QUALITY

As a serious woodworker, you know the difference between cheap cutting tools & Top Quality American Made cutting tools.

... Eagle America knows the difference too.



For FREE catalog call:
1-800-872-2511

PRO TIP

To lay out the arm without making a pattern, first mark several critical points on the gridded pattern, then plot these same points on the arm blank. Since the precise curvature of the piece isn't crucial, you can simply mark one point where the curve starts, one about halfway, and one at the end. To simplify this, select points where the pattern lines intersect



After selecting several key points on the gridded pattern and plotting them on the blank, flex a thin wood strip around these points and scribe a line following the strip's edge.

with grid lines. Plot these points on the blank by measuring in the same distance from the end and edge as the grid points.

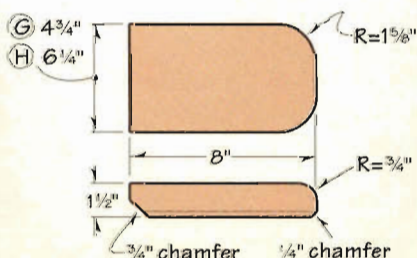
Rip a $\frac{3}{16}$ "-thick strip from a length of pine or other flexible wood. Next, drive a small finishing nail at each point, and flex the strip around the nails to produce the desired curve. Then, scribe a line following the bent strip's curvature.

Add the Final Touches

Step 1. Lay out and bore a centered $\frac{1}{2}$ " hole near the top of each arm for the eyebolt. Then, counter-bore the holes on the underside.

Step 2. Rout a $\frac{3}{4}$ " round-over along the top edges of the beam and the legs. (For locations, see the Exploded View drawing.)

Figure 2



How To Sew Your Own Hammock

For instructions on making a hammock specially designed to fit this stand, send a self-addressed, stamped envelope and \$1 for handling to:

Sewing Decor Hammock
News Plaza, Box 1790
Peoria, IL 61656

Step 3. Insert the $\frac{1}{2}$ " machine bolts into the holes in the ends of the arm tenons. Slip the nuts into the through mortises, thread them onto the bolts, then tighten the bolts so the nuts compress into the redwood. (This will hold the nuts in position during "blind" assembly.) Now, remove the bolts.

Step 4. Place the arm tenons into the beam mortises. Slip the washers over the machine bolts, then insert the bolts into the holes in the ends of the arms. Center the washers, then tighten the bolts to draw down the arms.

Step 5. Lay out, bore, and counter-bore the $\frac{1}{2}$ " holes through the beam where shown on the Exploded View. Note: Do not oversize these holes—the bolts should fit tightly. Now, mark the centerpoint on each leg, and bore a $\frac{1}{2}$ " hole down through the leg and beam. Insert all bolts, add washers, thread on the nuts, and tighten.

Step 6. Round-over all edges of the arms. Next, screw the foot pads to the beam and legs. Rout a $\frac{1}{4}$ " chamfer along the bottom edges of the beam and legs. Now, finish-sand all surfaces.

Step 7. Apply your choice of finish. (We applied two coats of Thompson Waterseal Ultra according to the manufacturer's instructions. If you prefer, you may leave the redwood unfinished. It will weather to a light gray color over time.) Now, install the eyebolts, attach the hammock, and you're ready to take that well-earned break. **W&J**

Photos: Kevin May

Bringing the hardwoods of the world right to your doorstep.

Hardwood Showcase

Special Mail-Order Section

Call or write to these fine companies for prices and information to suit your hardwood needs. Then, just phone in your orders and they'll ship right to your door. Shopping for wood has never been so easy!

Please allow 4 - 6 weeks for delivery. For information on HARDWOOD SHOWCASE contact Jim VanGilder or Joe Tarell at phone numbers below.



Hardwoods • Mouldings • Treads
Stair parts • Plywood • Wood Veneers
Rare Exotic Hardwoods
Cedar Closet Lining
Glue • Wood Finishes
Maple Counter Tops
Tool & Supply Catalog available

Mon. - Fri. 8-5 • Sat - 9-3

Send \$2.00 for catalog
510-843-4390 / 9378 FAX
930 Ashby Ave..
Berkeley, CA 94710

CHERRY ■ MAPLE ■ OAK ■ WALNUT ■ BUTTERNUT

QUALITY HARDWOODS

HEAVY STOCK FOR
TURNERS AND CARVERS

LUMBER SIZES: 4/4-16/4
CALL FOR FREE PRICE LIST

BUFFALO FOREST PRODUCTS

4949 Main Street, Amherst, NY 14226

800-727-1196

716-839-0380

WALNUT ■ CHERRY ■ BUTTERNUT ■ POPLAR

LUMBER PAK

20 board foot bundles • All clear KD lumber •
3-7' lengths, 4-11" wide

Ash	\$ 65	Purpleheart	\$111
Birch	64	Red Oak	67
Cherry	87	White Oak	64
Hard Maple	65	Walnut	88
Hickory	60		

UPS delivery included.
Western states add \$10.

All clear kiln dried lumber • \$25 to 13/16" • Finest quality delivered to your door • Ready to ship today • 100% MONEY BACK GUARANTEE

Call 1-800-849-9174 or 1-515-849-9174

Serving home craftsmen and professional cabinetmakers throughout the US since 1988

A division of The Hardwood Store
1695 Dalton Dr., New Carlisle, OH 45344
Prices are subject to change • Please call!

Open 7 days!

Shop the Hardwood Showcase for great buys on...

- Quality domestic and imported hardwoods
- Hard-to-find exotic specialties
- Veneer and turning stocks

These fine companies are eager to meet your hardwood needs.

Contact them today for prices and information!

Woodworker's Journal

To advertise in this special section, call

Jim VanGilder or Joe Tarell
214-392-1892

GILMER WOOD COMPANY

2211 N.W. St. Helens Road
Portland, Oregon 97210

Ph. (503) 274-1271 Fax (503) 274-9839

Domestics & Exotics-Alder to Ziricote

• HUGE SELECTION •

WOODS FOR:
Boxes, Carving,
Furniture, Models,
Turning, Flooring,
Paneling, Archery
Bows, Millwork,
Pens and Pencils,
Guitars, Jewelry,
Boats, Canes,
Tools, and Veneer

WE STOCK:
Lumber 1"-6"
Squares to 12x12
Thin Woods
Logs and Burls
Instrument Parts
Knife Blanks
Carving Blocks
Sample Sets
Assortments

LUMBER BY THE BOARD OR BY THE UNIT

YOU DESERVE QUALITY HARDWOODS

Order an advantage pack today!

25 Board ft., 30"-60" long, 4"-10" wide,
surfaced 2 sides to 13/16", clear one face

Cherry	\$79	Poplar	\$56
Red Oak	\$78	Hard Maple	\$76
Walnut	\$98	Mixed	\$79

Thin Stock Packs Also Available

We pay UPS shipping to most destinations in the Eastern time zone, other areas slightly higher.

Discover, Visa/MC Accepted. Free catalog w/order.

Bristol Valley Hardwoods
4054 Rt. 64, Canandaigua, NY 14424
1-800-724-0132 (ext. 395)



SERVING THE DISCRIMINATING WOODWORKER

REDDI-CUTT

APPALACHIAN HARDWOODS

DIMENSIONAL SERVICES

THIN HARDWOODS

SATISFACTION GUARANTEED

UPS TO YOUR DOOR

SMALL ORDERS WELCOME

RD#1, Box 14J

Driftwood, PA 15832

Call for a
FREE
catalog:

1-800-874-5455

PROJECT-PAK®

The New Alternative

"CUT N' BUILD" Material Packages

WOODWORKER'S JOURNAL PROJECTS:

NOV/DEC 93	BIROSEY JEWELRY BOX (WJ6932)	\$ 29.95
NOV/DEC 93	NOAH'S ARK (WJ6933)	\$ 32.95
JAN/FEB 94	KATCHINA BOOKENDS (WJ1941)	\$ 34.95
MAR/APR 94	SEASCAPE CLOCK (WJ2941)	\$ 19.95
MAR/APR 94	BOWED PSALTERY (WJ2942)	\$ 79.95
MAY/JUN 94	COLLAPSABLE BASKET (WJ3941)	\$ 12.95

Our Catalog contains over 30 more projects featured in Woodworker's Journal. Plus many more!

TOLL FREE (800) 524-4184

call for details!



205 NORTH CASCADE, FERGUS FALLS, MN 56537
FAX: (218) 739-5798



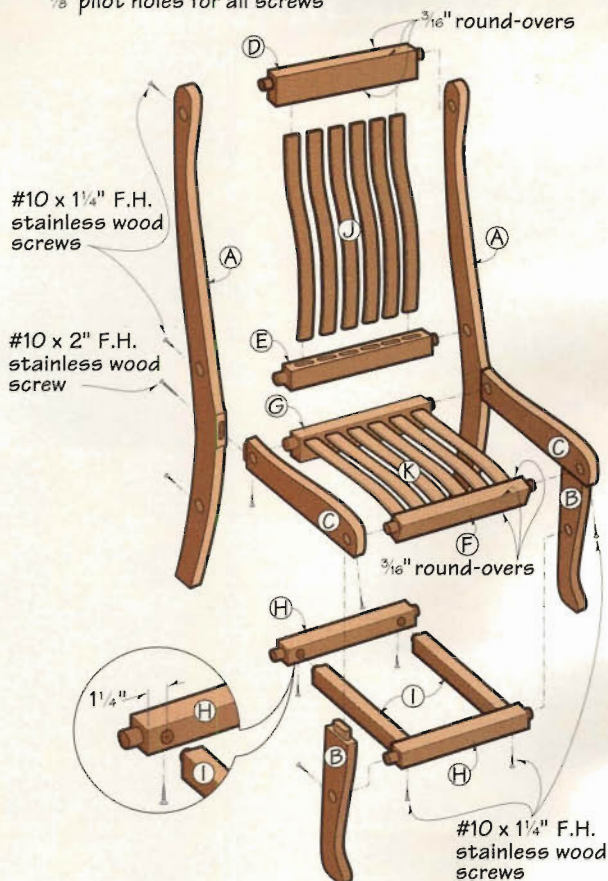
“Front Porch” Breakfast Table and Chairs

*Elegant enough for the
front porch—or even
your kitchen—
but built to handle
the weather*

Rick West of Munford, Alabama, designed this furniture with an eye on weatherability. In his part of the country, the wide ranges of temperature and humidity can punish outdoor furniture. So, he starts with Honduras mahogany—famous for its stability and rot resistance—and allows the wood

plenty of elbow room for seasonal expansion and contraction. The joinery is all mortise-and-tenon, but Rick uses no glue, reinforcing the joints with stainless screws. You can even take these handsome pieces indoors and subject them to dry heat or air conditioning. (For more about Rick, see “Meet the Designer” on page 51.)

Note: Drill $\frac{3}{16}$ " shank holes,
 $\frac{1}{8}$ " pilot holes for all screws



Chair Exploded View

First, Machine the Chair Legs

Step 1. From $1\frac{3}{8}$ "-thick stock, cut two 6x42" blanks for the back legs (A) and stack them using double-faced tape. (We started with 6/4 roughsawn Honduras mahogany and planed it to this thickness.) Enlarge the gridded Chair Back Leg pattern shown at *right* and transfer the outline and hole centerpoints to the top blank, aligning the flat edge on the pattern with one edge.

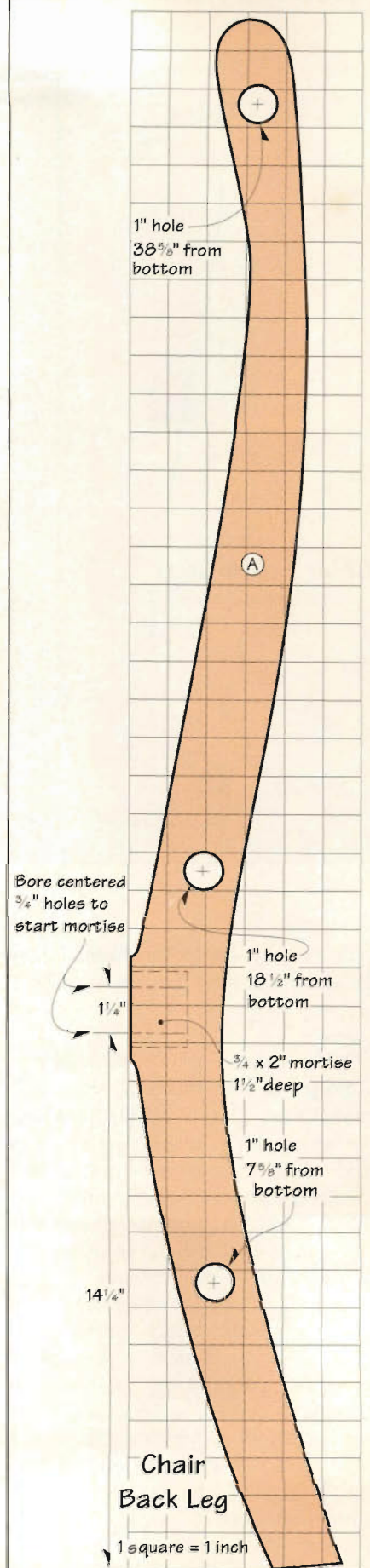
Step 2. Lay out and bore the rounded mortise for the seat side on the edge of each leg blank. To do this, first transfer the hole centerpoints shown on the pattern to the edge. (For help with the mortising, see the Pro Tip on *page 49*.) Note: For this project, we'll use both rounded and round tenons. Please note the difference.

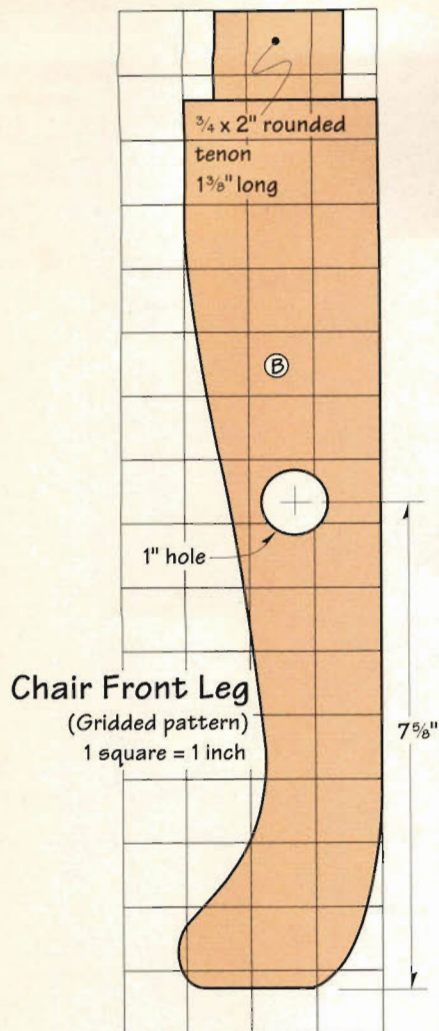
Step 3. Using a $\frac{1}{4}$ " or $\frac{3}{8}$ " blade, bandsaw the back legs to shape, keep-

ing the blade wide of the line. Then, sand to the line, and separate the legs.

Step 4. To make the front legs (B), rip and crosscut two 3x16" blanks from $1\frac{3}{8}$ "-thick stock. Lay out and cut a rounded tenon on one end of each where dimensioned on the gridded Front Leg pattern on *page 46*. To cut the shoulders accurately, use an extension on your tablesaw miter gauge and clamp a stopblock to it. For safety reasons, use your bandsaw and rip fence to cut the tenon to width and thickness.) To round the tenon corners, fit your table-mounted router with a $\frac{3}{8}$ " round-over bit and use a fence and stopblock. Note: Make sure you feed the stock from right to left, against the rotation of the bit. (For help with this, see "Cutting a Round Tenon" on *page 48*.) Now, clean up the corners at the shoulder using a dovetail saw and chisel.

Step 5. Enlarge the Chair Front Leg pattern, and transfer the outline and





Chair Front Leg

(Gridded pattern)

1 square = 1 inch

hole centerpoint to the blanks. Now, bandsaw and sand the legs to shape.

Next, Make the Seat Sides

Step 1. For the seat sides (C), first cut two 3½x19" blanks from your 1¾"-thick stock. Set your miter gauge and extension to 6° from perpendicular (in a counterclockwise direction). Then, using a stopblock, angle-cut one end of each blank, removing only as much stock as necessary.

Step 2. Cut a tenon on the end of each seat side where dimensioned on the gridded Seat Side pattern *opposite*. To do this, elevate your tablesaw blade to cut ⅝" deep, and set the rip fence 1½" from the blade. Now, rest the angle-cut end of each blank against the fence, and use your miter gauge (with the same setting but with the extension removed) to support the piece. Cut

the angled shoulder kerf on one face, then flip the piece edge for edge, and again rest the angle-cut end firmly against the fence. Reset the miter gauge to support it at this angle, and kerf the other face.

Step 3. Switch to a ¾" dado head, and cut both faces of each seat side tenon to thickness, making several passes as necessary. Use your miter gauge as in the previous step to support the workpiece. Be careful to keep the blade away from the shoulder.

Step 4. Stack the two blanks using double-faced tape, making sure that the tenon ends align. Next, lay out the tenon width as dimensioned on the pattern. Attach a tall (6") extension to your miter gauge, stand the blanks flat on their angled tenon ends, and clamp them to the extension. Elevate the blade to slightly less than 1½"—just enough to cut through to the shoulder kerf—and cut the tenons to 2" wide.

Step 5. Enlarge the gridded Seat Side pattern, and transfer it (including the hole centerpoints) to the top face of the stacked blanks, aligning the bottom edges and tenons. Next, lay out and bore a rounded mortise for the front leg centered on the bottom edge of each blank. (For location and dimensions, see the pattern.) Now, bandsaw and sand the seat sides to shape.

Step 6. Separate the stacked legs and seat sides. Temporarily assemble the front leg tenons into the seat side mortises, and adjust for fit as necessary. Next, bore two 1" holes (for the front and back seat rails) through each pair of parts where marked on the Seat Side pattern. Note: The front hole will cut through part of the front leg tenon. (We used a Forstner bit and clamped the parts to a backing board to minimize tear-out on the bottom faces.) Then, bore

BILL OF MATERIALS

TABLE

PART	T	W	L	MAT.	QTY.
A Back Legs	1⅝"	2⅝"	40⅞"	M	2
B Front Legs	1⅝"	3"	15⅞"	M	2
C Seat sides	1⅝"	3¼"	17⅞"	M	2
D Crest rail	1⅝"	3"	18½"	M	1
E Back base rail*	1⅝"	1⅝"	18½"	M	1
F Seat front rail*	1⅝"	2⅝"	18½"	M	1
G Seat back rail*	1⅝"	2⅝"	18½"	M	1
H Side-side stretchers*	1⅝"	1⅝"	18½"	M	2
I Front-back stretchers*	1⅝"	1⅝"	58¾"	M	2
J Back slats	7/16"	1⅝"	18½"	M	6
K Seat slats	1⅝"	1⅝"	14⅜"	M	6

DRAWERS

L Legs	1⅝"	3"	28½"	M	4
M Side rails	1⅝"	2½"	45⅞"	M	2
N End rails	1⅝"	2"	23⅞"	M	2
O Slats	¾"	2"	22⅞"	M	14
P Side aprons	¾"	2"	40¼"	M	2
Q End aprons	¾"	2"	23⅞"	M	2

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

MATERIALS LIST

M—Honduras mahogany

SUPPLIES

#10x1", 1¼", 1½", and 2" stainless flathead screws; oil finish.

STOCK REQUIRED

6/4x6x120" for each chair; 6/4x7x60", 6/4x6x72", 4/4x7x96", and 4/4x5x96" for each table.

Cutting a Round Tenon

To make tenons on the rails and stretchers (D, E, F, G, and H), we'll use the crest rail (D) as an example, since it's a bit more complex than the other parts. First, raise your tablesaw blade to $\frac{3}{16}$ ". Attach an extension to your miter gauge, set a stopblock, and cut the shoulder kerf (on both faces) $1\frac{1}{16}$ " from the end. Note: The final tenon length will be $1\frac{3}{8}$ ", but we're allowing an extra $\frac{1}{16}$ " on each end for trimming to length after assembly.

Elevate the blade to $\frac{1}{2}$ ". Stand the part on its top edge, and cut the tenon to width using the same stopblock setup. Next, flip the rail edge for edge, and finish the shoulder by cutting at a height of $1\frac{1}{2}$ " (photo A). For the other parts with round tenons, adjust the blade height on these cuts to position the tenon where shown on the drawings.

Bandsaw the tenon to width and thickness using a $\frac{3}{8}$ " (or wider) blade and a rip fence (photo B). You should now have a 1"-square tenon on each end $\frac{1}{2}$ " from the top edge. Next, fit your table-mounted router with a $\frac{1}{2}$ " round-over bit and a fence set flush with the pilot bearing on the bit. Position and clamp a stopblock to the fence that will stop the cut just as the base of the cutting surface reaches the tenon shoulder (photo C).

For safety's sake, always feed stock from right to left, against the counter-clockwise rotation of the bit. You'll need to change your fence and stopblock settings a couple of times to do this. On some edges, you'll start by resting the workpiece against the stopblock, pushing it toward the fence to engage the bit, then routing from the shoulder out to the end of the tenon (photo D). On the other edges, you'll start by resting the piece against the fence, then feeding it into the bit until it makes contact with the stopblock, i.e., routing from the end of the tenon toward the shoulder.

Route all four sides of each tenon this way. Since the bit won't cut the full quarter-round profile all the way to the shoulder, use a dovetail saw to cut down to the 1" diameter at the shoulder. Then, trim to the saw cuts with a sharp chisel (photo E), and use a file to finish rounding the tenon.

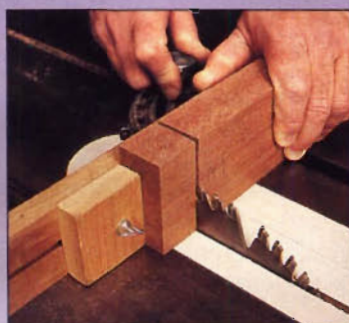


Photo A: Cut the tenon shoulders on your tablesaw.

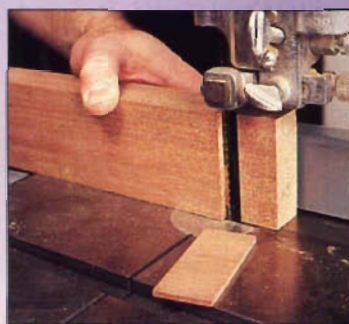


Photo B: Bandsaw the tenon to width and thickness using the rip fence.



Photo C: Use a couple of different fence and stopblock settings to rout the tenon round.



Photo D: On some tenon edges, you'll rout from the shoulder out to the end of the tenon.



Photo E: Remove the waste left at the shoulders using a dovetail saw and chisel.

assembles it entirely without glue to permit expansion and contraction. He locks each joint with an inconspicuously placed stainless-steel screw. The slats simply float in their mortises without screws.

Step 1. Finish-sand all chair parts. Then, brush on a liberal coat of marine oil finish. (Rick uses Penofin, which provides ultraviolet protection to help prevent graying.) Wipe off the excess, allow the finish to dry, then repeat. Allow the second coat to dry overnight before assembling the parts. Note: Apply an additional coat at least annually.

Step 2. Insert the back slats into their mortises in the back base rail and crest rail. Next, insert the tenons on this assembly into the through mortises on the back legs. At the same time, assemble one of the side-to-side stretchers into its back-leg mortises. Clamp the assembly, then drill countersunk shank and pilot holes through the back edge of each part into the 1"-diameter tenons (not including the slat tenons) where shown on the Chair Exploded View. Now, drive #10x1 $\frac{1}{4}$ " stainless flathead screws. Note: #10 screws require a $\frac{3}{16}$ " shank hole and $\frac{1}{8}$ " pilot hole.

Step 3. Assemble the seat slats into the front and back seat rails, then add the seat sides. Again, clamp the assembly before reinforcing the joints with screws. Next, assemble the seat side tenons into the blind mortises on the back legs. Drill shank and pilot holes through the back edges of the legs and into these tenons, then lock the joints using #10x2" stainless screws.

Step 4. Assemble the remaining side-to-side stretcher to the two front legs. Next, assemble the front-to-back stretchers to both side-to-side stretchers, and then insert the front leg tenons into the seat mortises. Clamp this assembly, then drill holes and drive #10x1 $\frac{1}{4}$ " screws as before.

To Build the Matching Table, Start With the Legs

Step 1. To make the four table legs (L), first cut four 3x28 $\frac{1}{2}$ " blanks

from 1 $\frac{3}{4}$ "-thick stock. Lay out and bore a mortise (for the end-apron tenon) in the face of each blank. (For dimensions, see the gridded Table Leg pattern on *page 51*.) Then, bore a mortise (for the side-apron tenon) on the adjacent edge, making sure that you orient it correctly with respect to the other mortise.

Step 2. Cut a rounded tenon on the end of each leg blank as dimensioned on the pattern. To do this, follow the same approach you used for the front chair leg tenon. (See Step 3 in the first section.)

Step 3. Enlarge the gridded Table Leg pattern, and transfer it to the appropriate face of each blank. Note: Be careful to orient the pattern correctly with respect to the mortises. Bandsaw each leg to shape, keeping your blade outside the line. Then, sand to the line.

Make the Rails, Slats, and Aprons

Step 1. Rip and crosscut two side rails (M) and two end rails (N) to size. Lay out and cut mortises in the side rails where dimensioned on the detail that accompanies the Table Exploded View on *page 50*. Next, cut rounded mortises in each side rail for the legs as you did for similar mortises in the chair parts. Then, cut a rounded tenon on both ends of each end rail, using the approach you followed for the front chair leg tenon. (For mortise and tenon dimensions, see the details that accompany the Table Exploded View.)

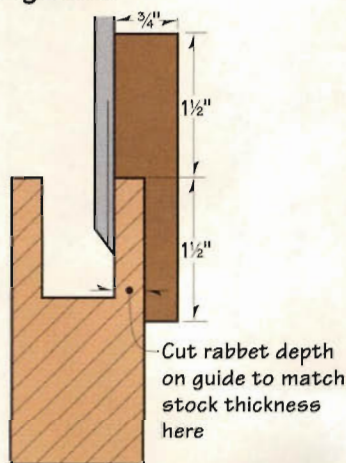
Step 2. Lay out and cut 14 mortises for slats on the inside edge of each side rail (M) as dimensioned on the Tabletop drawing. To do this, use the approach described in the Pro Tip *above right*.

Step 3. From $\frac{3}{4}$ "-thick stock, rip and crosscut 14 slats (O) to size. To create the 1"-long tenons, fit your table-mounted router with a $\frac{3}{8}$ " round-over bit, and rout the edges at each end. (See the detail shown with the Table Exploded View drawing. We used a fence and clamped a stop-block to it to limit the length of the rout.) Now, finish-sand the slats.

PRO TIP

If you don't have a mortising machine, we suggest the following approach. First, clamp a fence to your drill-press table to position the mortise on the top leg blank edge. Using a Forstner bit, bore a $\frac{3}{4}$ " hole at each end of the mortise layout to establish length. (Don't forget to set the quill on the drill press to exact depth.) Then, bore three more overlapping holes between these holes to rough out the mortise.

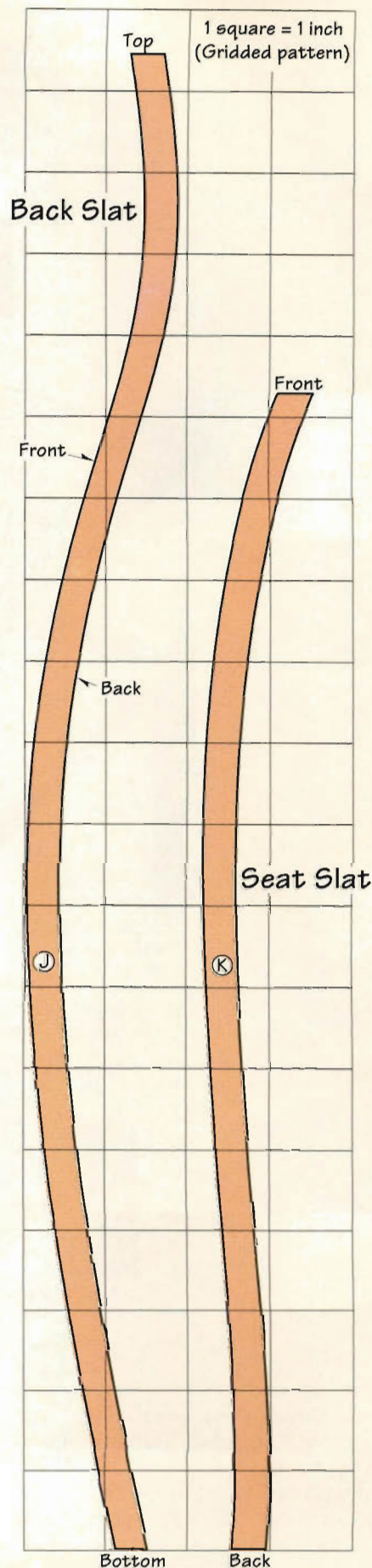
Figure 1

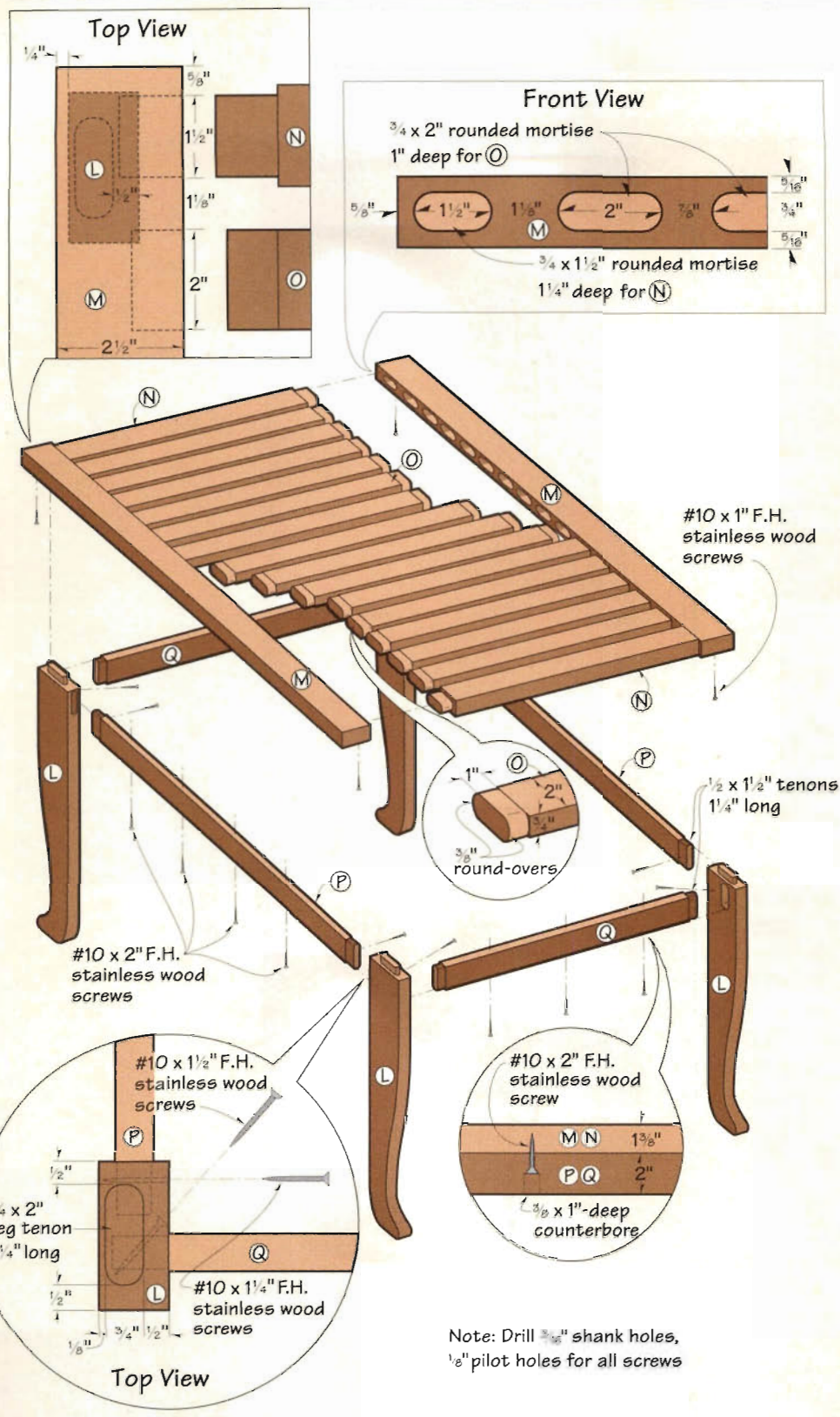


Using Chisel Guide to Clean Out Mortise

To clean the waste from the mortise walls, first make a chiseling guide from a $\frac{3}{4}$ x 3 x 12" hardwood blank (*figure 1*). Cut a 1 $\frac{1}{2}$ "-wide rabbet along one edge that matches (in depth) the distance from the mortise to the edge of the workpiece. Next, crosscut the guide to 5" long from this blank, then clamp it to the workpiece so that its face aligns flush with the side of the mortise. Now, pare the mortise sides flat using a sharp chisel.

Step 4. Rip and crosscut two side aprons (P) and two end aprons (Q) from $\frac{3}{4}$ "-thick stock. Cut tenons on the ends as dimensioned on the Table Exploded View drawing. Next, lay out and drill $\frac{3}{8}$ " counterbores 1" deep





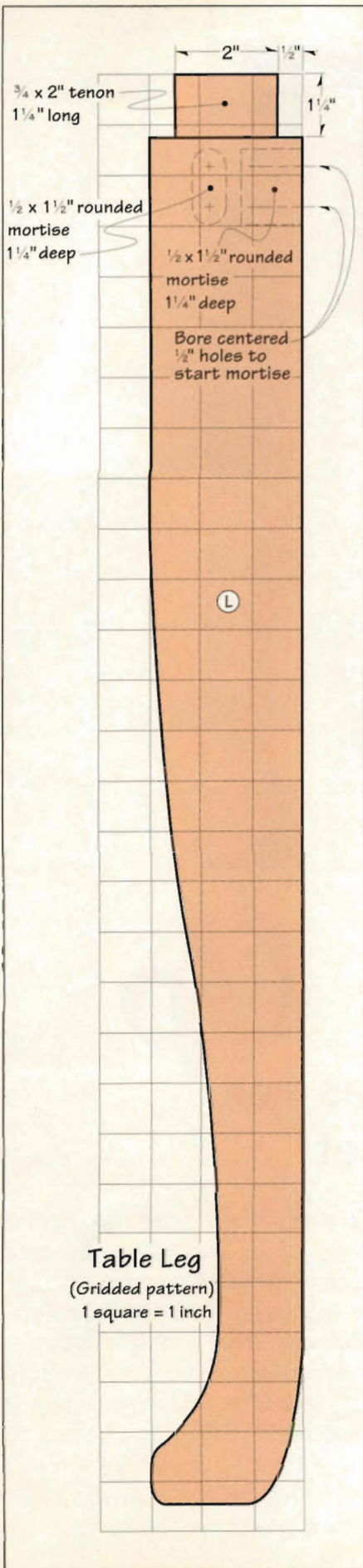
into the bottom edge of the four aprons. (See the Table Exploded View for locations.) Then, drill countersunk $\frac{3}{16}"$ shank holes and $\frac{1}{8}"$ pilot holes centered in the counterbores. Finish-sand the aprons.

Now, Finish and Assemble Your Table

Step 1. Temporarily assemble the tabletop (rails and slats) upside down. Then, add the legs and aprons, check

for fit, and adjust parts as necessary. Disassemble, and finish-sand any parts that still need it. Then, apply finish as you did to the chair, and allow it to dry.

Step 2. Assemble and clamp the tabletop (side rails, end rails, and

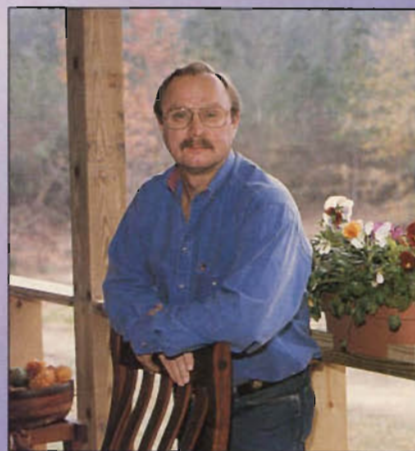


Meet the Designer

A completely self-taught woodworker, Rick West offers a line of coordinated outdoor furniture, including gliders, rockers, swings, and several tables. We think he's justified in claiming that his all-mahogany furniture "blends gracefully with any landscaping or architecture." Aside from this, his main line of business, Rick does a fair amount of carving and sculpting, and has had several pieces placed in museums throughout the country.

The most satisfying part of his profession for Rick is coming up with new designs. "I actually do most of it in my head, when I'm supposed to be asleep," he admits. "I'll think about a piece every night until I'm finished. Then, when I go to the shop to build it, I know all the measurements, curves, whatever. I don't know exactly how I do this, but my son tells me he can do it as well."

Rick exhibits his furniture at five shows annually—one in the Minneapolis area, three in Florida, and one in the Smoky Mountains. He's picked up numerous awards for both furniture and sculpture, including the Director's Choice award at the South Florida Fair in West Palm Beach for the last five years running.



slats), then reinforce the rail joints by installing #10x1" screws on the undersides. (For screw locations, see the Table Exploded View drawing.)

Step 3. Insert the end aprons into the leg mortises, then add the side aprons and assemble the legs to the tabletop. Clamp the aprons to the rails. Using the counterbored shank holes as guides, drill pilot holes into the undersides of the side and end rails. Next, install #10x2" flathead

stainless screws. To reinforce the end apron joints, drill angled, counterbored holes through the legs into the end apron tenons where shown on the Exploded View detail, and install #10x1 1/2 "pocket screws." To reinforce the side apron joints, drill perpendicular holes and install #10x1 1/4 " screws. 

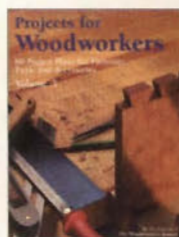
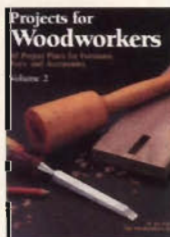
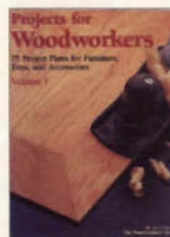
Project design: Rick West

Lead Photo: Lloyd Andrews

Other photos: Kevin May

Project Books from Woodworker's Journal

Three volumes of woodworking fun!



Check out a large variety of projects, complete with plans, illustrations, and photographs. Perfect for all skill levels.

To Order CALL 1-800-768-5878 or Mail check or money order to:

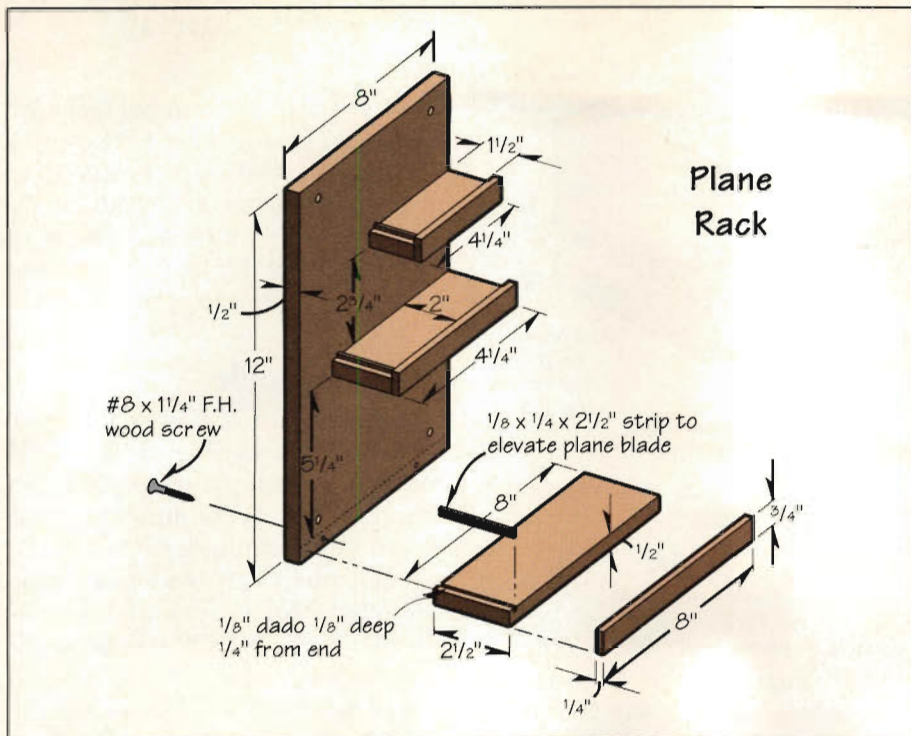
Symbol of Excellence

405 Riverhills Business Park, Birmingham, AL 35242

Shipping/handling \$2.50 for 1st book/ \$1.00 each additional • IL res. add 6.25% tax • AL res. add 4% tax • Canada res. 7% GST

ONLY
\$12.95
EACH

E5375



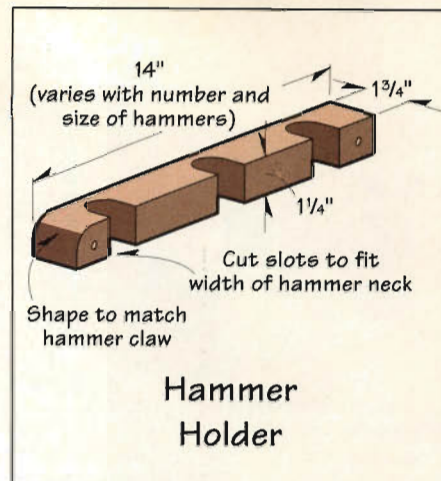
Plane Rack

To make a three-plane rack, cut an 8x12" piece of 1/2"-thick birch plywood for the backboard. Next, cut shelves from 1/2"-thick hard maple to fit your planes. (See the Plane Rack drawing above.) Cut a dado across one end of each where shown, then glue a strip of maple in each dado to elevate the plane off its blade. To make retaining strips, cut some 1/4 x 3/4" maple stock, then trim the strips to length and glue them in place. Now, lay out shelf posi-

tions to fit your planes, then glue and screw the shelves to the backboard.

Hammer Holder

Inventory your hammers, then cut a 1 3/4"-wide strip of 1 1/4"-thick maple long enough to accommodate them, as shown on the Hammer Holder drawing above right. For each tool, lay out and bandsaw a slot slightly wider than the neck of the handle just below the head. For your claw hammer, shape one end (both ends if you have more than one) of the holder as shown to match the contour of the claws. Note: For heavy



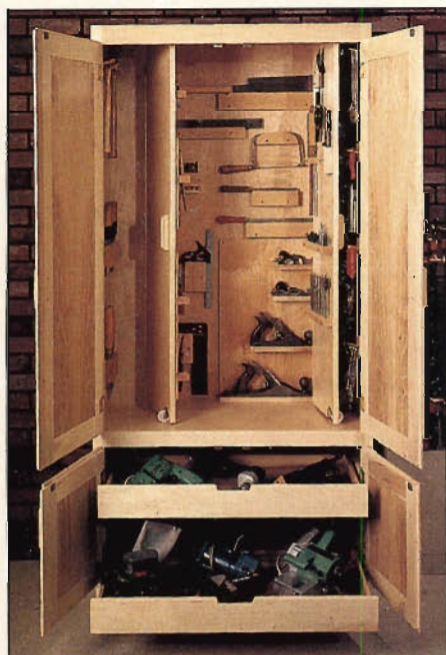
tools such as hammers, attach the holders to one of the cabinet walls rather than to the doors.

Chisel Rack

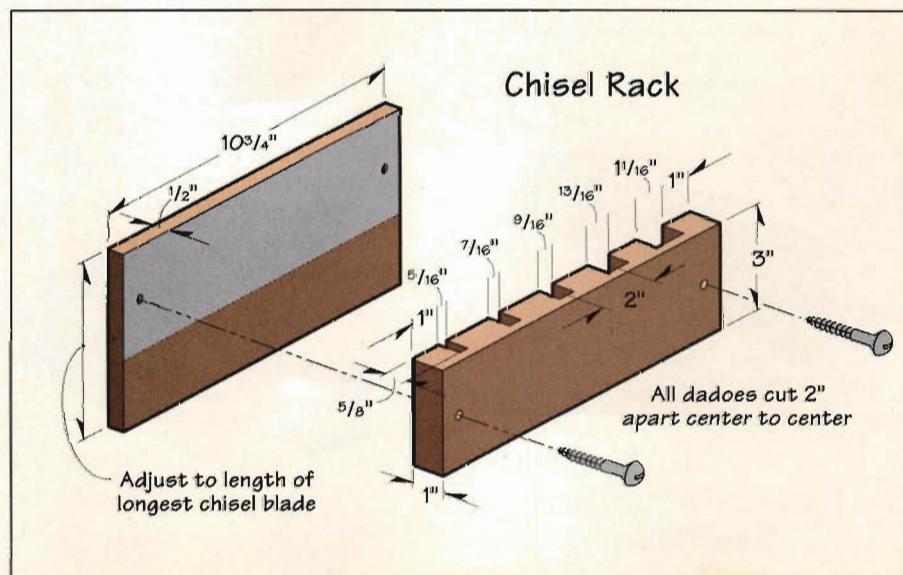
To handle a basic five-chisel set (1/4" to 1" widths), first measure the length of the longest chisel and add 1/4". From 1/2"-thick maple, cut a 10 3/4"-long backboard to this width. (See the Chisel Rack drawing below.) Next, cut a 3"-wide piece of 1"-thick maple to the same length. Cut five dados 5/8" deep across the back face as dimensioned on the drawing. Then, glue and clamp the piece to the backboard, aligning the top edges.

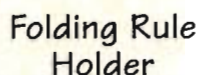
Folding Rule Holder

Rip and crosscut a 5 3/4 x 12" piece of 1 1/4"-thick maple. Mount a 3/4" dado head on your tablesaw, and cut three dados where shown on the



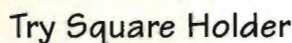
Colpetzer's cabinet in our March/April '95 issue





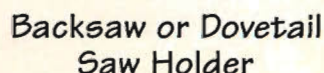
As shown on the drawing *below left*, make the holder from 1¼"-thick hard maple, and cut a groove deep enough to match the width of the blade. For use with a backsaw, trace the contour of the handle along one end, and bandsaw to shape.

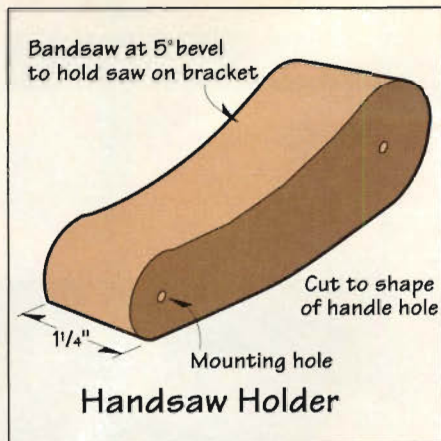
To take care of nail sets, center punches, and the like, cut a 3"-wide piece of 1"-thick maple to whatever length will accommodate your tools. Bore centered, $\frac{1}{2}$ " holes $2\frac{1}{4}$ " deep in one edge as shown on the Nail Set Holder drawing at *left*. Next, cut a $\frac{1}{2}$ "-wide groove $\frac{3}{4}$ " deep where shown. Note: This will open the bottom ends of the $\frac{1}{2}$ " holes, allowing you to see the tip of each set or punch.



drawing *above left*. Next, crosscut two 3" lengths of this piece for the two holder halves. Using your band-saw, cut a 6" strip of $\frac{1}{4} \times \frac{1}{4}$ " maple, then cut six $\frac{3}{4}$ " lengths for cleats. Glue and clamp a cleat into the bottom of each dado. Now, glue and clamp the two halves as shown.

For screwdrivers, carving tools, scratch awls—almost any tool that has a handle of greater diameter than its blade—first rip and crosscut a 2"-wide strip of 1"-thick maple stock long enough to suit your needs. Lay out centerpoints 1½" apart, then drill counterbores and holes large enough for a loose but not sloppy fit of the tools in question. Now, lay out and bandsaw a slot from the edge to each hole as shown *below*.





Handsaw Holder

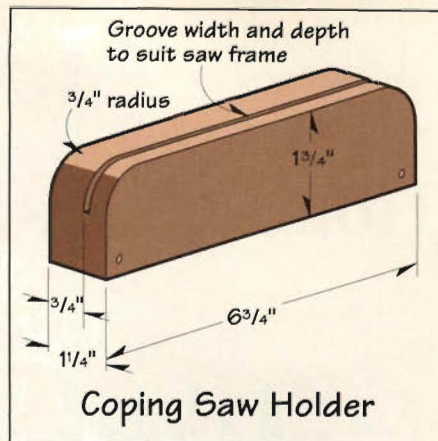
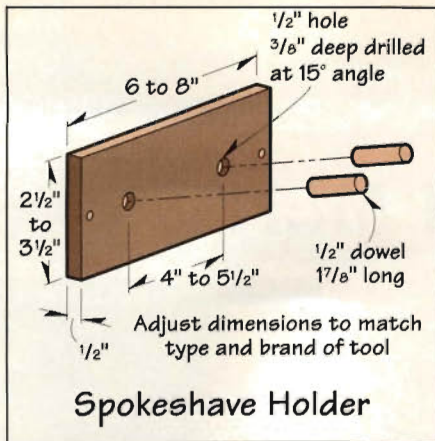
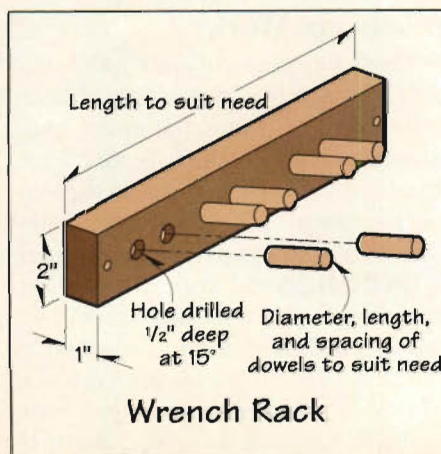
Trace the handle hole of each handsaw onto 1 1/4"-thick maple stock. (See the drawing *above*.) Tilt your bandsaw table to 5° from horizontal, and bandsaw the holder to shape, keeping the blade on the waste side of the line. Sand the edges to the line, being careful not to sand away the bevel.

Spokeshave Holder

For each spokeshave and cabinet scraper, first measure each tool's handles, and adjust the dimensions shown in the drawing *above center* as necessary. Cut a backboard from 1/2"-thick maple stock, then lay out and drill a pair of 1/2" dowel holes 3/8" deep at a 15° angle (tilting upward). Cut two hardwood dowels long enough to securely support the tool, and glue them into the holes.

Coping Saw Holder

Measure the frame of your coping saw, then cut a 1 1/4 x 1 3/4" piece of maple stock slightly shorter than the frame's



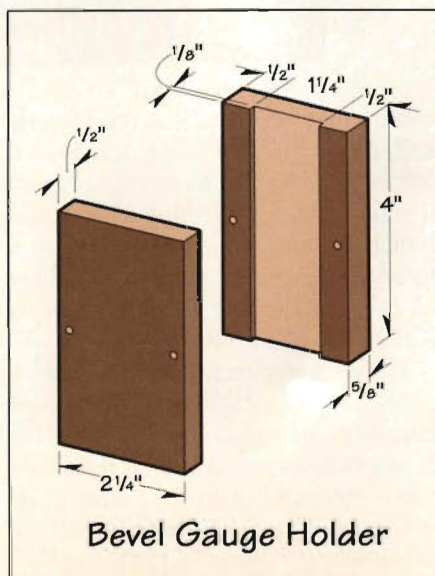
width. Next, cut a groove in the top edge where shown on the drawing *above right* to fit the saw's frame. Now, lay out and bandsaw a 3/4" radius at each top corner, then sand the edge smooth.

Wrench Rack

To hold wrenches, shears, and other miscellaneous tools, first cut a suitable length of 1x2" maple. As with the spokeshave holders, lay out dowel holes to accommodate each tool, and drill them at a 15° upward angle. The drawing *below left* shows 1/2" dowels, but adjust the dowel diameter to fit your tools.

Bevel Gauge Holder

For your bevel gauge, cut a 4x6" piece of 1 1/4"-thick maple, then re-saw it into two pieces of 5/8" and 1/2" thickness. (See the drawing *below center*.) Cut a centered, 1 1/4"-wide groove 1/8" deep in the 5/8"-thick piece.

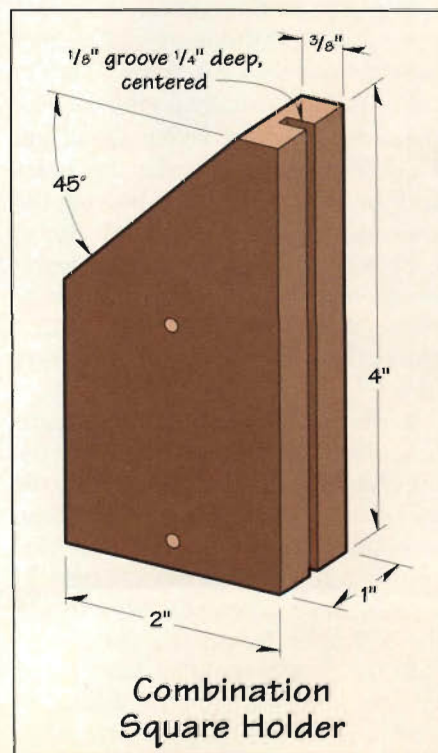


Laminate the two pieces to form an enclosed slot for the blade. After the glue has dried, rip and crosscut both edges and ends of the lamination to a 2 1/4 x 4" finished size, keeping the slot centered between the edges.

Combination Square Holder

To hold a combination square (one that requires a 45° support), first cut a 2x12" blank from 1"-thick maple. Cut a centered 1/8" groove for the blade 1/4" deep along one edge as shown on the drawing *below*. Miter-cut one end at 45°, then crosscut 3/8" from this end to flatten the sharp point. Now, crosscut the other end to a 4" finished length. 

Photos: Kevin May





Hollow-Chisel Mortisers

Benchtop Mortising Machines

by Jim Barrett

We test six compact and affordable units plus three other interesting finds

For me, cutting precise mortises rates as one of the more challenging jobs in woodworking. When I have to make them, I usually go the conventional route. After laying them out, I'll bore a series of overlapping holes with my drill press, then hog out the waste and pare the sides and ends of each with a chisel. Some woodworkers prefer to form them with a plunge router and clean up the ends with a chisel. Either way, the process eats up a lot of time and energy.

If you don't like cutting square holes by hand, you can bolt a mortising attachment to your drill press for about \$35. (See page 62.) These attachments work, but they also take considerable time to set up (and to remove later, when you need to use the drill press for other tasks).

In the past, you didn't have much choice, unless you were willing to shell out the \$1,000-plus for a dedi-

cated mortising machine (commonly called a hollow-chisel mortiser). Recently, however, a number of manufacturers have introduced compact benchtop versions that won't bore a large hole in your pocketbook. Five of the machines I tested currently sell for less than \$300.

These new benchtop units require little shop space, yet have ample capacity for most mortising jobs. Best of all, they're always at the ready when you need them, requiring minimal setup time. That leaves your drill press free for doing its routine jobs.



How Hollow-Chisel Mortisers Work

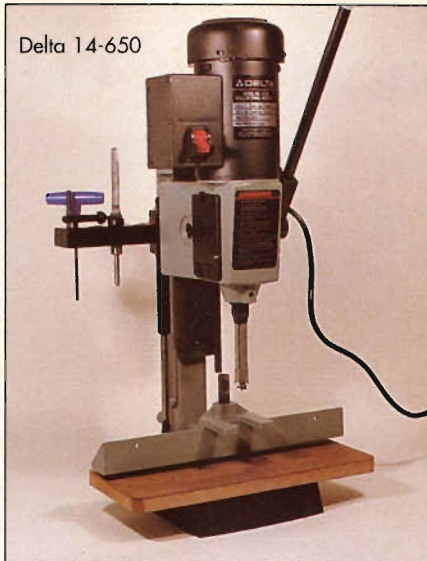
These machines operate much like a drill press, but with a few obvious differences. For one, the entire head assembly (also called a mortising head) moves up and down on the support column by means of a handle-operated rack-and-pinion mechanism.

On the Delta and Multico machines, for example, the head slides on a dovetail way and toothed rack attached to the front of a square support column. The AMT, Grizzly, and Woodtek have a single, notched tubular column to

AMT 5131



Delta 14-650



Grizzly G-3183



which the rack is attached. On the Reliant, the head assembly rides on dual support posts; one post serves as the rack for the pinion gear, while the other supports a return spring for the head. All of the machines except the Reliant have gibs or column guides that can be adjusted to compensate for wear.

To operate the mortisers, you pull down on the lever-type handle attached to a large pinion gear. On the AMT, Delta, Grizzly, and Woodtek, this handle can be repositioned at different points on the pinion shaft for better leverage, convenience, and accessibility. The Reliant has only a fixed-position handle. The Multico handle has two positions, but you use the second position only with the machine mounted horizontally for end-drilling.

I prefer Delta's spring-loaded handle because you can simply pull it out sideways and set it in the desired notch on the pinion shaft to get the best working angle. On the AMT, Grizzly, and Woodtek, you must loosen a large nut on the pinion shaft to change the handle position.

The Reliant has springs that assist in returning the head to its highest position after making a cut. The others rely on a gas-filled stabilizer to counterbalance the head and assist with the return (*photo A*). These stabilizers work like those used on the rear windows of many hatchback-type cars. I found the mortisers with the stabilizers more convenient to use. They allowed me to raise the chisel just enough to clear the workpiece—I didn't have to return it all the way to the top after each cutting stroke. This

made it easier and faster to align the chisel with my layout marks when making repetitive cuts.

One question, however, did cross my mind: Just how long would the small stabilizers last? The one on the Delta seemed more substantial than those on the AMT, Grizzly, Multico, or Woodtek.

Mounting and Positioning the Stock

The machines all have a fixed particleboard work table mounted on a cast-iron base. Holes in the base enable you to secure it to your bench, which I recommend, because these machines will tip over in use if not secured. If you require portability, you can fasten the base to a piece of $\frac{3}{4}$ " plywood, then clamp the plywood to your bench.

Multico PM-12



Reliant DD-136



Woodtek 876-775



Specifications: Hollow-Chisel Mortisers

MAKE	AMT	DELTA	GRIZZLY	MULTICO	RELIANT	RYOBI	WOODTEK
MODEL	5131	14-650	G-3183	PM-12	DD-136	DM-25A	876-775
Motor	HP	1/2	1/2	1/2	1/2	—	1/2
	Amps	6.0	4.8	6.0	5.2	8.0	12.0
	No-Load Speed (RPM)	3,400	3,400	3,400	3,460	3,400	1,400
	Type (1)	I	I	I	I	U	I
Chuck Capacity (in)	3/8	3/8	3/8	3/8	1/2	1/2	3/8
Chisel Capacity (in) (2)	5/8, 3/4	5/8	5/8, 3/4	5/8	5/8	1 1/8	5/8, 3/4
Head Stroke (in) (3)		4 3/4	5	4 3/4	4 3/4	4 3/4	5 29/32 4 3/4
Max. Stock Thickness (in)	4 1/4	4	4 1/4	3 1/4	5	see note 6	4 1/4
Chisel Center to Fence (in) (4)	2 5/8	2 3/8	3 1/4	4	3 1/2	3 9/16	3 1/4
Fence Size (in)	1 9/16 x 13 3/4	1 9/16 x 13 3/4	1 9/16 x 13 3/4	1 1/8 x 13 3/4	1 9/16 x 13 3/8	—	1 9/16 x 13 3/4
Table Size (in)	5 7/8 x 13 3/8	6 x 13 1/2	5 7/8 x 13 5/8	6 x 13 3/8	5 7/8 x 13 3/8	—	5 7/8 x 13 5/8
Overall Dimensions H X W X D (in)	30 1/4 x 13 3/4 x 13 3/8	31 1/2 x 13 1/2 x 14	30 1/4 x 13 3/4 x 13 3/8	22 5/8 x 13 5/8 x 10 5/8	25 7/8 x 13 3/8 x 13 1/2	23 1/4 x 15 3/4 x 17 5/16	30 1/4 x 13 3/4 x 13 3/8
Chisel Sizes (in)	1/4 to 1/2	1/4 to 1/2	1/4 to 1/2	1/4 to 1/2	1/4 to 1/2	1/4 to 3/16	1/4 to 1/2
Net Wt. (lbs)	44.8	47	44.8	44	45	48.6	44.8
Price (5)	249	299	225	389	200	750	240

Notes:

1. I = induction (brushless) T.E.F.C. (totally-enclosed, fan-cooled) motor; U = Universal (brush-type) motor.
2. Diameter of chisel shank (corresponding chisel bushing required).
3. Vertical head travel (highest position to lowest position).
4. Distance equals 1/2 width of widest board on which you can center a mortise. See text.
5. Average selling price or catalog price.
6. Ryobi mortiser can be mounted on timbers of any thickness and from 2 3/4" to 7 1/4" wide. See text.

All of the machines (except the Ryobi, which I discuss separately on page 61) have a sliding fence at the back of the work table for positioning the stock under the chisel. When you want to cut a mortise wider than the chisel's width, you have to reset the fence.

A hold-down foot attached to the fence (or, in the case of the Multico, to the support column) keeps the stock from lifting off the table as you raise the bit. To cut long mortises, I found it best to lock the hold-down just a hair above the stock. This way, you can slide the stock along underneath it without having to loosen and tighten it for every cut.

Curiously, the tables and fences on all of the machines tested have nearly identical dimensions. (See the specifications chart above.) The Reliant and

Multico are fitted with aluminum fences; the rest have cast-iron fences. Delta added a nice touch by drilling two holes through theirs for attaching an auxiliary wooden fence and/or stopblocks. I'm surprised that the other tools don't offer this feature as well, although it would be easy enough to drill holes in the fence for this purpose.

To mortise the end of a long workpiece (such as a table leg), you'll need to prop up the free end so the part will stay flat on these short tables. I prefer the hold-down foot on the Reliant for two reasons: It adjusts easily with a large plastic knob, and the foot can be dropped below the top edge of the fence for mortising thin stock. To mortise pieces thinner than the fence on the others, you must prop up the workpiece with enough

scrap wood so that the foot can make contact with it.

To set depth of cut, all of the machines except the Reliant use a depth-stop rod. Once set, this rod limits the downward travel of the head. The Reliant uses a large depth-stop collar on the right-hand support post. I found Reliant's collar easier to set than the rods.

Using the fence, a stop, and the depth stop, you can set up these mortisers to make identical repetitive cuts. If you're making four identical frame and panel doors, for example, you need to lay out the complete mortise on only one of the eight frame stiles. Use this one set of marks to choose the appropriate chisel size, position the fence, and determine the depth of cut. On the remaining stiles, you need mark only

the working face and mortise ends. Just place the same face against the fence and stop, and all of the mortises will be uniformly cut.

Tool Capacities Almost Identical

These benchtop machines have roughly the same capacities, give or take an inch. The maximum stock thickness you can mortise, measured from the chisel point to the work table, depends not only on the length of the chisel but also on the distance between the hold-down foot and the table.

On all machines except the Multico and Reliant, the hold-down foot must be mounted upside down to accept the maximum stock thickness (about 4 1/4"). The Reliant handles stock up to 5" thick, while the Multico accepts a thickness of 3 1/4" with the foot in normal position (it can't be flipped). While the manufacturers generally state maximum thickness under the hold-down, you may find the actual capacity reduced if you use longer chisels. You can buy an optional riser block for the Delta and AMT machines that fits between the column and the base to increase this capacity—from 4" to 5 3/4" on the Delta, and from 4 3/4" to 6 1/2" or 7 1/4" on the AMT. (The AMT riser blocks will also work on the Grizzly and Woodtek machines.)

On all machines except the Reliant, you can turn the mortising head and support column 180° and remount them on the base for "off-the-bench" mortising. For these jobs, you simply position the machine so the chisel extends beyond the front edge of your workbench. In this position, you can mortise the edges of extra wide stock, such as a door clamped vertically to the front of the bench.

The *throat depth* of the mortiser (measured from the center of the chisel to the fence) determines the greatest width of stock that can be center-mortised. For example, a chisel-to-fence distance of 2 3/8" allows centering a mortise in stock up to 5 1/4" wide. (On the chart *opposite*, you'll find throat-depth specifications in the "chisel center to fence" line.)

Head stroke refers to the distance the head travels from highest to lowest position. Head stroke on these machines ranged from 4 3/4" to 5", which allows lowering the chisel points all the way to the tabletop (using the supplied chisels). On the Reliant, the tips of the smaller chisels don't quite touch the table. However, since you'd place a backing board under the workpiece anyway to avoid tear-out on a through mortise, this does not create a problem.

Chisel length, not head travel, establishes the actual depth of cut. Chisel cutting depths vary, depending on their size: a 1/4" chisel cuts about 2" deep; a 1/2" chisel, about 3". All of the machines tested offer adequate head stroke for most woodworking applications.

Chisels and Bits— The Working End

The term "hollow-chisel mortiser" comes from the configuration of the chisel assembly. An auger bit, spinning inside the hollow, four-sided square chisel, cuts and removes the wood chips. The cutting edges on each face of

the chisel cut the hole sides (*figure 1*). To form a mortise, you simply reposition the stock after each cut to make a row of square holes.

The hollow chisels have beveled cutting edges to increase penetration through the wood and chamfered corners along their side opening to exhaust the chips. The single-twist bits have one spur, a cutting edge, and a lead point.

On all machines except the Ryobi, the chisel bit mounts into a Jacobs-type chuck located inside the mortising head (*photo B*). The Reliant has a

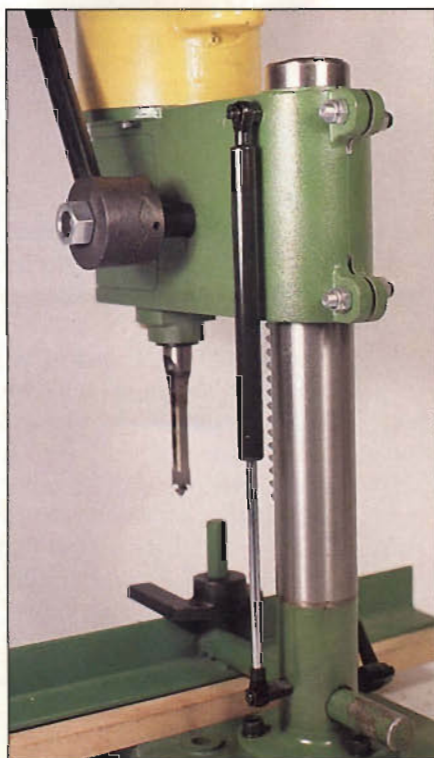
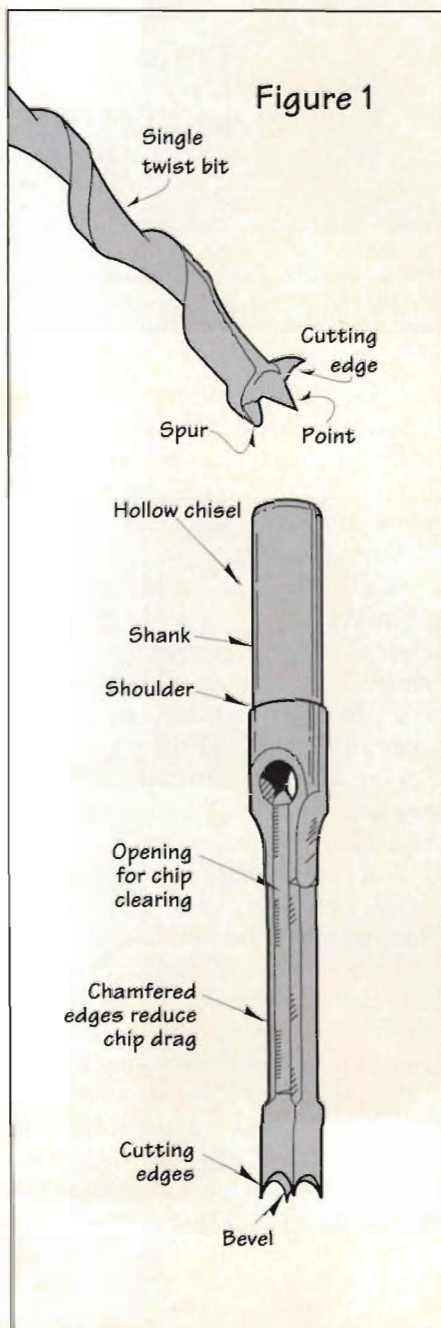


Photo A: The AMT, Delta, Grizzly, Multico, and Woodtek (shown) use a gas-filled head stabilizer to counterbalance the downward head movement and aid the return stroke.



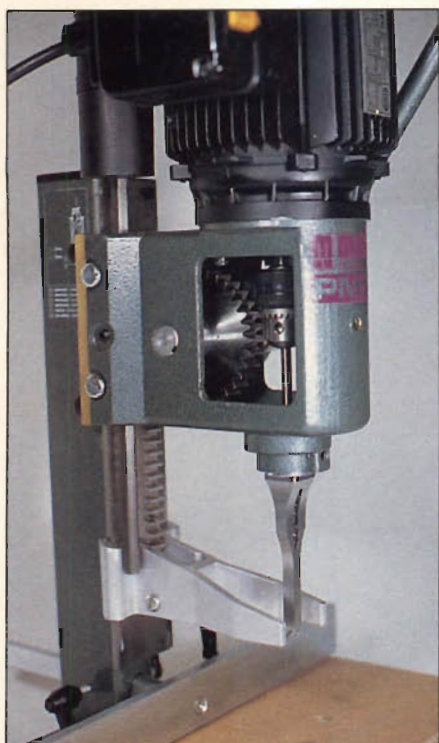


Photo B: A look inside the Multico shows the pinion gear used to move the head assembly on the column. Also note the Jacobs-type chuck used to hold and drive the drill bits.

$\frac{1}{2}$ " chuck; the rest have $\frac{3}{8}$ " chucks. The chisel shank fits into a bushing inserted into the bottom end of the head below the chuck. The machines come with bushings for $\frac{5}{8}$ "- and $\frac{3}{4}$ "-shank chisels.

Available chisel and bit sizes range from $\frac{1}{4} \times \frac{1}{4}$ " to $\frac{1}{2} \times \frac{1}{2}$ " in $\frac{1}{8}$ " increments. When mounting the bit and chisel, you need to allow clearance ($\frac{1}{16}$ " to $\frac{3}{16}$ ") between the cutting edge of the bit and the chisel point (figure 2). This clearance aids chip ejection and helps keep the chisel and bit from overheating.

Will one company's chisels fit another company's machine? Yes and no. I was able to interchange chisels and bits between all machines except the Reliant and Ryobi. With the Ryobi, you must use bits and chisels made for it. The Reliant uses slightly longer bits than those supplied with the other benchtop machines. To make them work on the other machines, you'd have to grind or cut off the top end so they wouldn't project too far below the chisel's cutting edges. While interchanging chisels, I also noticed that the bushings were milled to slightly different toler-

ances; for example, the $\frac{5}{8}$ " bushing on the Woodtek needed a bit of sanding and a few squirts of oil to make the chisels fit.

For best fit, buy chisels from the same manufacturer that makes the mortiser. As with other bits and accessories, expect differences in quality between different hollow chisels and bits. A chisel and bit set can cost anywhere from under \$10 to \$100—the price reflecting size, metal quality, and machining.

As a rule, you'll pay more for chisels at a local tool dealer, but there are advantages to buying locally. You can inspect the items before you buy, and you'll have an easier time returning the merchandise if you're not satisfied. If you shop by mail-order and want more information than the catalogs provide, phone the customer service departments and ask your questions. Make sure the chisels fit your machine before you order.

Motors and Muscle

All of the machines except the Ryobi use a $\frac{1}{2}$ -hp, direct-drive, induction motor. The chucks attach directly to the motor shaft and operate at a fixed speed of 3,400 rpm (or, in the case of the Multico, 3,460 rpm). While the motors may look undersized compared to those on other woodworking machines, all had plenty of power to drive the largest ($\frac{1}{2}$ ") bit easily into the hardest of woods.

The chisel you must drive into the workpiece with your own muscle power. To bore the first hole for a mortise, you really have to bear down on the handle. The remaining cuts are easier, since only three sides of the chisel have to cut.

On several occasions, the wood started smoking when I lowered the chisel into it. At first I suspected that the bits must be dull. Later, however, I concluded that smoke was caused by friction as the bit augers loose chips up through the chisel, and is just part of hollow-chisel mortising.

Few Accessories Available

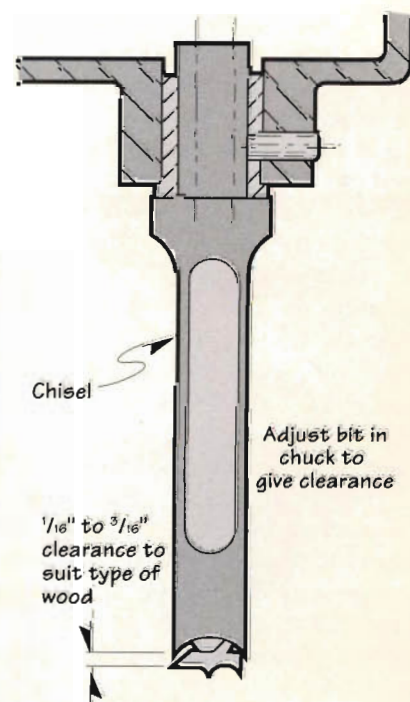
Other than chisels, you won't find many accessories for these machines. As mentioned, AMT and

Delta offer optional riser blocks that mount between the column and base to increase cutting height under the chisel. The Delta comes with a handy tool holder mounted on the side of the column for keeping the chuck key, wrench, and chisels close by. AMT, Delta, Grizzly, and Woodtek provide spindle extensions that fit between the chuck and motor spindle to accommodate shorter drill bit shanks. Multico offers several optional accessories that extend the tool's capabilities.

The Verdict

I found all of these machines easy to set up and operate. All supplied ample power to do the job. The British-made Multico was the quietest and best-machined (but also most expensive) tool of the lot. (The Ryobi costs more, but it doesn't really fit in the benchtop category). The Multico also has less clearance between the chisel and table than the others, and the handle, as described earlier, can only be mounted in two

Figure 2



The Ryobi DM-25A:

A Compact Machine For Big Jobs

The Ryobi DM-25A looks and works differently than the other benchtop mortisers I tested. It's been designed primarily for mortising large posts and beams in timber-frame construction. I include the unit in this review for those of you who may need a larger-capacity machine.

To position a workpiece on the Ryobi, you clamp it between vise-like jaws built into its base. Dual fixed jaws on the right-hand side of the machine hold one side of the stock; a large moveable jaw on the left side secures the other side (by means of a large clamp lever).

Boards or timbers less than 3" thick can be slid underneath the base as the machine sits on a bench or other flat surface. You feed the stock from front to back (while facing the machine) rather than from side to side as you do with the others. Because of this, you may find the machine cumbersome to use in a small shop, especially if your workbench sits against a wall.

To work thicker stock (timbers for example), you mount the machine on the workpiece itself. Rollers attached to the underside of the base enable you to push or pull the machine along the length of the stock.

A two-way sliding carriage built into the base enables you to position the head assembly across the width of the workpiece (to cut mortises up to 4 3/4" wide) and along its length (to cut mortises up to 5 3/4" long, using the largest chisel and not moving the machine). However, the clamp jaws won't close to less than 2 3/4" wide. To mortise narrower stock, you must place spacer blocks between the workpiece and the jaws.

The head assembly rides on dual support posts attached to the movable carriage, both of which have return springs. The rack is attached to the movable head, while the pinion-gear assembly and handle remain stationary in a housing fixed to the top of the support columns. You can change the gear ratio of the handle on the rack and pinion. The "high speed" setting takes fewer turns of the handle to achieve the same amount of downward or upward movement. I preferred the lower speed (feed rate) because it gave me more leverage and control when using large chisels and when muscling the chisel through dense, hard woods. A high feed rate speeds things along when using

smaller chisels or when making cuts in softer materials that require less leverage.

The mortiser comes with a 30mm (1 1/16") chisel already mounted when you take it out of the box. Other chisel sizes, from 4 mm to 24 mm (1/4" to 13/16"), may be purchased. The chisels attach to a collet-style chuck, and a setscrew holds them in place. Smaller sizes require insert bushings. The chisel housing rotates up to 24° right or left, so it can make straight, dovetailed, or tapered holes.

Like many other Ryobi benchtop tools, this one has a universal (brush-type) motor that's attached to a set of reduction gears to produce a constant 1,400-rpm spindle speed. Universal motors typically operate at much higher speeds than induction motors but with lower torque. The reduction gears provide the necessary torque to maintain a constant speed under varying load conditions. In my tests, the Ryobi supplied plenty of power for digging into the stock, even with the largest (1 1/16") chisel installed.

While you can't beat this machine for boring large mortises in timbers or other large stock, it's really a bit too much tool for most in-shop mortising applications. It also carries a hefty \$750 price tag to match its large capacity. (See the specifications chart on page 58).



Ryobi DM-25A

positions. However, if you factor in its several optional accessories, it offers more versatility than the other units tested.

The Delta and Reliant also hummed right along, while the AMT, Grizzly, and Woodtek were a bit noisier. I attribute the noise to a slight amount of runout in the

chuck, causing the bits to "rattle" inside the chisels. The noise didn't seem to affect performance.

As you've probably gathered from the photos, the AMT, Grizzly, and Woodtek are nearly identical machines. All are apparently made by the same Taiwanese company. The AMT sports a few "extras," such as a knurled brass

knob for adjusting the hold-down foot (replacing the Allen screw supplied by the others). However, this brass knob interferes with full retraction of the fence and reduces the chisel-to-fence capacity.

All of these machines performed adequately. If I were to take my pick today, it would likely be a toss-up

Attachments For Your Drill Press

If you don't want to buy a dedicated mortiser, consider converting your drill press. Various catalog suppliers and tool companies, including AMT, Delta, Grizzly, Reliant (Trendlines), and Woodworker's Supply offer mortising attachments for drill presses. (See the Sources list.) For this review, I tested units from AMT (photo C) and Reliant (photo D).



Photo C: The AMT drill-press mortising attachment can be fitted to almost any brand of drill press. This model accepts chisels with 3/4"-diameter shanks.

When I received the tools, my suspicions were confirmed. Aside from differences in color and handle shape, the two units appeared to be cast from the same mold, probably at the same Taiwanese factory. Moreover, they looked nearly identical to those I've seen in other tool catalogs.

Both work basically the same way. A heavy, cast-iron yoke slips over the drill-press quill; you tighten the yoke's split collar by turning a bolt at the top of the unit. Depending on your drill press, you may have to remove the chuck temporarily to install the yoke. A hollow chisel slides into the yoke and secures in place by means of a thumbscrew. Shoulders on the chisel butt against the bottom of the yoke, preventing the chisel from sliding up during the cut. As with the dedicated machines, the bit fits up into the chisel from the bottom and seats in the chuck.

A wood or plastic fence attaches to a metal frame, which in turn bolts onto the drill-press table. The hold-downs consist of a heavy cast-iron foot and two large hooks. The adjustable foot works like those on dedicated machines to keep the stock from lifting when you withdraw the chisel. The hooks hold the stock against the fence, although I found it just as easy to use my free hand for this purpose.

Even though these devices may appear identical, certain critical dimensions of the various components differ from one manufacturer to the next, so you should pay special attention when ordering. First, the yoke must fit the quill on your drill press snugly. Some manufacturers, such as AMT, offer a variety of sizes; others, such as Reliant, provide adaptor bushings to fit "most" drill presses. When you order a unit, tell the supplier the brand and model number of your drill press and the machine's actual quill-shaft diameter.

When ordering chisels for the attachment, make sure the shanks fit the yoke (3/4" or 1/2"). The AMT takes 3/4"-shank chisels; the Reliant, 1/2"-shank. To be assured of a proper fit in the attachment, it's best to order your chisels at the same time from the same supplier.

In my tests, both attachments worked nearly as well as the dedicated tools on a relatively new, well-tuned drill press.



Photo D: The Reliant attachment accepts only chisels with 1/2" shanks. It comes with two sets of bushings to fit quill shafts on most drill presses.

If you're using an older drill press with a worn quill or loose bearings, the results probably won't be as satisfactory. You may find yourself fiddling with the attachment frequently in order to make it work properly.

Most drill-press handles don't provide as much leverage as the single handles on dedicated mortisers, so you'll usually have to use a bit more muscle to drive the chisel into the stock. Although these attachments take considerably more setup time than a dedicated machine, they still beat cutting mortises by hand.

between the Delta and Reliant. Both operate smoothly, have good mortising capacity, and are reasonably priced. I like the handle setup, quality chisels, and nifty tool holder on the Delta. I like the Reliant for its easy-to-adjust fence, hold-down, and depth stop. 

Lead Photograph: Kevin May

Other Photographs: The author

SOURCES

AMT*

Fourth Ave & Spring St.
P.O. Box 70
Royersford, PA 19468
Telephone: 215/948-3800

Delta International Machinery Corp.*

246 Alpha Drive
Pittsburgh, PA 15238
Telephone: 412/963-2425

Grizzly Imports*

West of the Mississippi
P.O. Box 2069
Bellingham, WA 98227
Telephone: 800/541-5537

East of the Mississippi
2406 Reach Road
Williamsport, PA 17701
Telephone: 800/523-4777

Multico

Garrett Wade Company, Inc.
161 Avenue of the Americas
New York, NY 10013
Telephone: 800/221-2942

Reliant*

Trendlines
375 Beacham St.
Chelsea, MA 02150
Telephone: 800/767-9999

Ryobi America Corp.*

1424 Pearman Dairy Rd.
Anderson, SC 29625
Telephone: 800/323-4615

Woodtek*

Woodworker's Supply, Inc.

East of Rockies:
1 Woodworker's Way
Seabrook, NH 03874
Telephone: 800/431-3726

West of Rockies
5604 Alameda Pl. NE
Albuquerque, NM 87113
Telephone: 800/231-2748

*These companies also sell drill-press mortising attachments.

through each loop to keep it from pulling back out of the hole.

Step 2. Once you've worked your way down to the yoke, thread the mounting cord (instead of a loop) through the last hole on each side (figure 4). String the three remaining loops onto the cord, then pull the cord as tight as possible and knot it. Check to see that all loops are threaded correctly and that the net hangs properly. Then, trim and carefully singe the ends of the cord. Apply two drops of cyanoacrylate glue to the knot to make it permanent.

Step 3. Remove the screw eye from the handle, then enlarge the hole slightly to accept the screw mount on the brass ring. (For ordering information, see the list of sources.) Insert some polyurethane glue or epoxy in the hole, and install the ring. 

Project design: Craig Brown

Lead Photo: Studio Alex

Illustrations: Cad Art

How-to photos: Bob Colpetzer

SOURCES

Net. Specify trout replacement net no. JN-30 and braided mounting cord. \$5.00 plus \$2.00 shipping/handling. Check or money order, no credit card orders, please. Order from:

Ed Cummings, Inc.
2305 Branch Rd.
P.O. Box 90118
Flint, MI 48509

Solid Brass Ring Pull. $\frac{5}{8}$ "-diameter ring with $\frac{1}{2}$ "-long screw mount, catalog no. 68528, \$6.50/pair ppd. 1"-diameter ring with same mount, catalog no. 68551, \$7.50/pair ppd. Order from:

The Woodworker's Store
21801 Industrial Blvd.
Rogers, MN 55374-9514
Telephone: 800/279-4441

Making a Zero-Clearance Insert With Splitter

You may already have a zero-clearance insert for your tablesaw, but a splitter, combined with the insert, is essential for cutting thin stock (photo K). With a correctly tuned saw and blade, you can rip feather-thin strips without having them rub against, or vibrate into, the turning blade.

To make an insert and splitter, first measure the thickness of the metal insert (and leveling screws if used) that came with your saw. Plane a piece of stable stock to match this thickness, then trace the outline of the factory insert onto one face. Bandsaw the piece to shape, keeping your blade clear of the line.

Fit your table router with a flush-trim bit. Double-face tape (or drive small screws through the insert's slot into the new insert) the metal insert to your insert, and rout it to finished shape, allowing the pilot bearing to ride against the factory insert. Separate the two inserts, and remove the tape. Your new insert should fit the recess with little, or no, hand-trimming.

Install the blade that you intend to use for ripping the strips, and lower it below table surface. (I used a 10", thin-kerf, 32-tooth Black & Decker Piranha blade.) Place the new insert in the opening, and lock the rip fence over it, making sure that it's not in the blade's path. Turn on the saw and slowly raise the blade, cutting through the insert. Elevate the blade to its full height before turning off the saw. Note: If your saw does not allow the blade to be lowered enough to clear the insert, backcut the underside of the insert so it clears the blade.

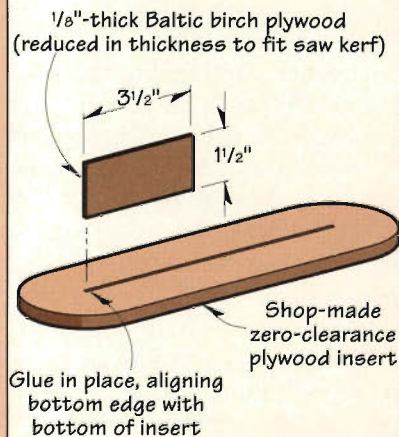
To make the splitter, start with a piece of $\frac{1}{8}$ "-thick Baltic birch plywood, sanding it if necessary to fit the kerf in your new insert. Then, cut a piece to $1\frac{1}{2} \times 3\frac{1}{2}$ ", and



glue the long edge into the back end of the kerf and align it flush with the bottom face of the insert (figure 2).

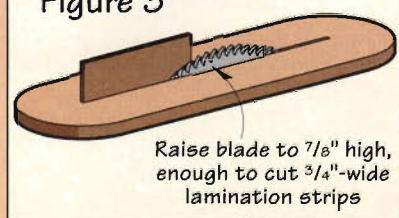
After the glue has dried, lower the blade, install the insert, and again lock the rip fence over it. Turn on the saw, and slowly elevate the blade to about $\frac{7}{8}$ " above the table, cutting an arc in the

Figure 2



leading edge of the splitter (figure 3). Now, sand a taper along the leading edge so that the ripped strips will separate smoothly from the stock.

Figure 3



SHOP TEST

Polyurethane Glues: We Test the Newest Adhesives For Woodworking

by Bob Colpetzer

Woodworker's Journal reported on the introduction of Excel into the United States by the AmBel Corporation in the Nov./Dec. 1993 issue. Shortly thereafter, the Gorilla Group followed with its U.S. release of Gorilla Glue.

What's In the Bottle

Both products come packaged as liquid, single-component, ready-to-use adhesives. Isocyanates, the activating or catalyzing agents in these glues, react with moisture in the materials being glued to develop a high-strength bond.

The manufacturers formulate their respective products a bit differently. Excel contains a small percentage of solvents (less than 5%), while Gorilla Glue consists of 100% solids. Both report an open time of 20 to 30 minutes. Curing time ranges from 45 minutes to 4 hours, with full strength achieved after 24 hours.

Uncured squeeze-out can be cleaned up with thinner or denatured alcohol. Or, you can let it dry and then scrape or sand it off. Both firms claim that their product stores safely at extremely low temperatures and has a shelf life of 6 to 12 months.



The glues work under the same range of shop conditions as other adhesives. Both claim to be non-thermoplastic (they won't expand or contract in the joint), 100% waterproof, and safe for both interior and exterior applications. (For additional information, see "Tips For Using Polyurethane Glues" *opposite*.)

What I Did

Having read the literature from the glue importers, I was curious to find out how good they really are. I purchased both, then put together what I consider a good series of tests for gauging an adhesive's performance. Later, I "field-tested" the two glues on projects that I'd normally reserve for epoxy.

First, I glued up five pairs of $\frac{3}{4}$ x 2 x 6" pieces—including teak, red oak, cherry, poplar, and pine—with each glue. This gave me a chance to spread, assemble, clamp, and otherwise see and feel the products. After labeling the 10 samples, I set them aside to cure for seven days, then used these samples for my waterproofness test.

Surviving My "Scrub" Test

At the end of a week, I loaded the samples into the dishwasher. (Yes, I asked my wife's permission first.)

Then, I set the machine to "Pot Scrubber" and ran them through the wash and dry cycles.

Polyurethane glues were initially developed to be used in epoxy-type applications. The author found them to be a suitable epoxy substitute for gluing up turned stave bowls, although they lack epoxy's gap-filling capability.

All samples survived the first scrubbing, so I followed with two more runs. After three runs, I removed the samples and attempted to shear each one along the glue line. In all samples, the wood broke near the glue line—but in no sample did the joint itself fail.

Next, I edge-joined some oak and walnut to check the color and visibility of the glue line. As you can see in *photo A*, once you've scraped away the squeeze-out, the glue line becomes almost invisible.



Photo A: Excess glue squeezed from a joint foams as it absorbs moisture from the air and cures. Once cured, the excess can be scraped. Note the nearly invisible glue line between the two pieces of unfinished walnut.

While applying the glue, I discovered that the instructions were correct—you need apply only a thin coat to one of the mating surfaces. I also observed that the glue expands as it cures, forcing itself into the wood pores under clamping pressure. The squeeze-out becomes quite visible because it foams up during curing. Once it had completely cured, I found it easy to scrape or cut off the excess. Unlike epoxy, the dried adhesive did not dull cutting or scraping tools or clog abrasive papers. When sanded, it produced a fine, dry dust.

Stainable? Not Exactly

Both companies claim that their product accepts stain. To test this, I made up some samples and wiped on random splotches of glue. I allowed the glue to cure, then sanded the sam-

ples lightly to simulate the treatment I'd give a glue stain that I'd missed during my pre-finishing examination.

After trying water-, spirit-, and oil-based stains on the samples, I concluded that polyurethane glue does not accept stain any better than any other glue I have used. However, because it expands as it cures, this type of glue does not penetrate deeply into the wood cells except under clamping pressure. I found I could easily remove cured squeeze-out by lightly scraping with a hand scraper, and then restain.

To test the claim that these adhesives can be used for applications that typically require epoxy, I selected a turned stave bowl project that I often make and sell. I normally use epoxy for these bowls because I make them from two or more woods (with different expansion-contraction rates) and often find it necessary to join end grain to end grain. Also, the non-toxic, vegetable-oil finish I apply provides little protection against the treatment they must endure on a daily basis. The glue joints sustain constant stress from the moisture changes taking place in the wood, and the adhesive must be strong, waterproof, and free of creep if the bowls are to survive.

Polyurethane glues reportedly possess these qualities, so I made several bowls using both Gorilla and Excel. (See the photo *opposite*.) I have to say I'm impressed with the results. I even subjected one of the bowls to the dishwasher test and could find no evidence of joint failure.

Gap-Filling? Not Exactly

Unlike epoxy resins, polyurethane glues will not contribute any structural strength to poorly fitting joints. Although the glue expands as it cures, thus filling some gaps and voids, it will not shore up a sloppy joint. Excel claims some gap-filling properties, but

their literature specifies that "gaps in structural bonding should not exceed 0.1mm." Gorilla Glue makes no claim to any gap-filling qualities, stating that all joints should fit tightly.

Gorilla Glue claims the ability to bond a variety of materials to wood, including stone, cleaned brass, aluminum, iron, and plastics. I didn't experiment with all of these, but I did successfully glue brass and ceramic pieces to wood. I also was able to glue the handle back onto my favorite coffee mug by first wetting the ceramic pieces (to provide curing moisture) and then clamping the parts until the glue had cured.

My Conclusions

I found Excel and Gorilla to be excellent adhesives when used as directed. Both appear to be waterproof, and I found them much easier to use than two-part resorcinol products. I like the way these glues expand as they cure, which seems to force adhesive into the wood under clamping pressure.

In my tests, I saw no evidence of creep or other signs of instability. The generous open time (20 to 30 minutes) makes these products ideal for those large or complicated glue-ups that require lots of assembly time.

The price tags on Gorilla and Excel might, at first glance, cool your new-product enthusiasm. Bear in mind, however, that these adhesives need be applied to one surface only, that you'll use about one-third the quantity per joint that you would with aliphatic resin, and that using these glues involves little if any waste. Once you factor in these advantages, polyurethane glue starts to look like a cost-effective alternative.

During my tests, I kept an eye out for any subtle differences in performance between the Excel and Gorilla products. I'll call it a dead heat on every point of comparison; they performed equally well for me. 

Tips For Using Polyurethane Glues

1. Prepare clean, dust-free, and tight-fitting joints.
2. Wear disposable gloves and provide adequate ventilation when handling, spreading, and using polyurethanes. Because this glue reacts with moisture, you'll want to avoid any contact with delicate skin tissue.
3. Spread a thin, uniform layer of glue on one of the surfaces to be joined using a brush, roller, or spatula.
4. Clamp your work in the usual manner. Allow 1 to 4 hours of clamp time, depending on temperature, ambient humidity, and moisture content of the wood.
5. Remove the uncured squeeze-out with lacquer thinner or denatured alcohol, or let it dry and then scrape or sand it off.
6. These adhesives work best on wood with a moisture content of 8% to 20%. To bond woods with less than 8% or to accelerate curing, dampen the mating (non-glue) surfaces.
7. Cleanup uncured glue, tools, and brushes with lacquer thinner, denatured alcohol, or other suitable solvents. Dispose of all cleaning materials as recommended by the manufacturer.

SOURCES

Excel Glue

For mail-order sources and additional product information, call:

AmBel Corporation

Telephone: 800/779-3935

Gorilla Glue

Order from:

Albert Constantine & Son
Telephone: 800/223-8087

Gorilla Group
Telephone: 800/966-3458

Woodcraft
Telephone: 800/535-4482

The Woodworker's Store
Telephone: 800/279-4441



THE WOODWORKERS MARKETPLACE

STURDY CLASSIC BARN

Unique Gift Idea!

Hours of fun for both Boys and Girls!

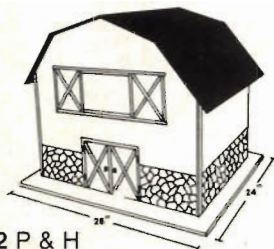
- Interior has hay loft & trusses
- Windows & doors open
- Front wall removable

Complete instructions, cutting guide, materials list.

\$10 plus \$2 P & H

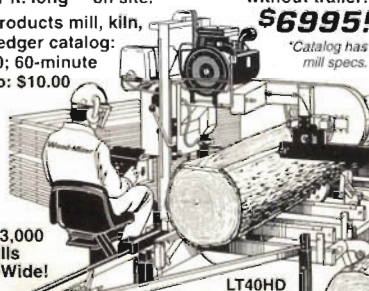
PARADOX CREATIONS

Dept. 4J
Suite 385, 4222 1-75,
Sault Saint Marie, Michigan 49783



Own A Wood-Mizer® PORTABLE SAWMILL

- Saw trees up to 36" diameter by 21 ft. long—on site.
- All-products mill, kiln, and edger catalog: \$2.00; 60-minute video: \$10.00
- LT25 mills without trailer: **\$6995!** *Catalog has mill specs.



Over 13,000
Sawmills
World-Wide!

LT40HD

1-800-553-0219

Wood-Mizer Products, Inc.
8180 West 10th Street Dept. MM28
Indianapolis, IN 46214-2400

THE AMERICAN COASTER

7106 Lake Road, Dept. WJ5, Montrose, MI 48457

- 5 sheets each set (18" x 24")
- Money back guarantee \$12.95—1 plan
- \$21.95—2 plans (includes S&H)



Removable sides

14" H x 15" W x 42" L

16" H x 14" W x 34" L

1890 to 1930

Miniature Farm Wagon

28" H x 18" W x 40" L

6 sheets each set (30" x 36")

\$29.95

Plan #8

Plan #3

Plan #1

Easy-to-read full-scale blueprints

1890 to 1930

Miniature Farm Wagon

28" H x 18" W x 40" L

6 sheets each set (30" x 36")

\$29.95

Plan #8

Plan #3

Plan #1

Easy-to-read full-scale blueprints

1890 to 1930

Miniature Farm Wagon

28" H x 18" W x 40" L

6 sheets each set (30" x 36")

\$29.95

Plan #8

Plan #3

Plan #1

Easy-to-read full-scale blueprints

1890 to 1930

Miniature Farm Wagon

28" H x 18" W x 40" L

6 sheets each set (30" x 36")

\$29.95

Plan #8

Plan #3

Plan #1

Easy-to-read full-scale blueprints

1890 to 1930

Miniature Farm Wagon

28" H x 18" W x 40" L

6 sheets each set (30" x 36")

\$29.95

Plan #8

Plan #3

Plan #1

Easy-to-read full-scale blueprints

1890 to 1930

Miniature Farm Wagon

28" H x 18" W x 40" L

6 sheets each set (30" x 36")

\$29.95

Plan #8

Plan #3

Plan #1

Easy-to-read full-scale blueprints

1890 to 1930

Miniature Farm Wagon

28" H x 18" W x 40" L

6 sheets each set (30" x 36")

\$29.95

Plan #8

Plan #3

Plan #1

Easy-to-read full-scale blueprints

1890 to 1930

Miniature Farm Wagon

28" H x 18" W x 40" L

6 sheets each set (30" x 36")

\$29.95

Plan #8

Plan #3

Plan #1

Easy-to-read full-scale blueprints

1890 to 1930

Miniature Farm Wagon

28" H x 18" W x 40" L

6 sheets each set (30" x 36")

\$29.95

Plan #8

Plan #3

Plan #1

Easy-to-read full-scale blueprints

1890 to 1930

Miniature Farm Wagon

28" H x 18" W x 40" L

6 sheets each set (30" x 36")

\$29.95

Plan #8

Plan #3

Plan #1

Easy-to-read full-scale blueprints

1890 to 1930

Miniature Farm Wagon

28" H x 18" W x 40" L

6 sheets each set (30" x 36")

\$29.95

Plan #8

Plan #3

Plan #1

Easy-to-read full-scale blueprints

1890 to 1930

Miniature Farm Wagon

28" H x 18" W x 40" L

6 sheets each set (30" x 36")

\$29.95

Plan #8

Plan #3

Plan #1

Easy-to-read full-scale blueprints

1890 to 1930

Miniature Farm Wagon

28" H x 18" W x 40" L

6 sheets each set (30" x 36")

\$29.95

Plan #8

Plan #3

Plan #1

Easy-to-read full-scale blueprints

1890 to 1930

Miniature Farm Wagon

28" H x 18" W x 40" L

6 sheets each set (30" x 36")

\$29.95

Plan #8

Plan #3

Plan #1

Easy-to-read full-scale blueprints

1890 to 1930

Miniature Farm Wagon

28" H x 18" W x 40" L

6 sheets each set (30" x 36")

\$29.95

Plan #8

Plan #3

Plan #1

Easy-to-read full-scale blueprints

1890 to 1930

Miniature Farm Wagon

28" H x 18" W x 40" L

6 sheets each set (30" x 36")

\$29.95

Plan #8

Plan #3

Plan #1

Easy-to-read full-scale blueprints

1890 to 1930

Miniature Farm Wagon

28" H x 18" W x 40" L

6 sheets each set (30" x 36")

\$29.95

Plan #8

Plan #3

Plan #1

Easy-to-read full-scale blueprints

1890 to 1930

Miniature Farm Wagon

28" H x 18" W x 40" L

6 sheets each set (30" x 36")

\$29.95

Plan #8

Plan #3

Plan #1

Easy-to-read full-scale blueprints

1890 to 1930

Miniature Farm Wagon

28" H x 18" W x 40" L

6 sheets each set (30" x 36")

\$29.95

Plan #8

Plan #3

Plan #1

Easy-to-read full-scale blueprints

1890 to 1930

Miniature Farm Wagon

28" H x 18" W x 40" L

6 sheets each set (30" x 36")

\$29.95

Plan #8

Plan #3

Plan #1

Easy-to-read full-scale blueprints

1890 to 1930

Miniature Farm Wagon

28" H x 18" W x 40" L

6 sheets each set (30" x 36")

\$29.95

Plan #8

Plan #3

Plan #1

Easy-to-read full-scale blueprints

1890 to 1930

Miniature Farm Wagon

28" H x 18" W x 40" L

6 sheets each set (30" x 36")

\$29.95

Plan #8

Plan #3

Plan #1

Easy-to-read full-scale blueprints

1890 to 1930

Miniature Farm Wagon

28" H x 18" W x 40" L

6 sheets each set (30" x 36")

\$29.95

Plan #8

Plan #3

Plan #1

Easy-to-read full-scale blueprints

1890 to 1930

Miniature Farm Wagon

28" H x 18" W x 40" L

6 sheets each set (30" x 36")

\$29.95

Plan #8

Plan #3

Plan #1

Easy-to-read full-scale blueprints

1890 to 1930

Miniature Farm Wagon

28" H x 18" W x 40" L

6 sheets each set (30" x 36")

\$29.95

Plan #8

Plan #3

Plan #1

Easy-to-read full-scale blueprints

1890 to 1930

Miniature Farm Wagon

28" H x 18" W x 40" L

6 sheets each set (30" x 36")

\$29.95

Plan #8

Plan #3

Plan #1

Easy-to-read full-scale blueprints

1890 to 1930

Miniature Farm Wagon

28" H x 18" W x 40" L

6 sheets each set (30" x 36")

\$29.95

Plan #8

Plan #3

Plan #1

Easy-to-read full-scale blueprints



CLASSIFIEDS

Rate: \$2.50/word (20-word/\$50 minimum). All caps add .20/word. Boldface (standard or all caps) add .50/word. Payment must accompany order. Send copy and check/money order payable to Woodworker's Journal or Fax copy to 309-682-7394 and use VISA/MasterCard. For classified discount program, write or call Woodworker's Journal, Carmen Martin, Classified Advertising Manager, PO Box 1790, Peoria, IL 61656; 309-679-5017. Display advertising kit available on request. Deadline for next issue: April 20

LUMBER/VENEERS

CATALPA BEAUTIFULLY grained kiln dried lumber. \$1.00 for sample and details. PAC, 3505 32nd Street W., Bradenton, FL 34205; 813-756-5754.

TOOLS/EQUIPMENT

SAVE \$ building your own woodworking tools and machinery! Call for complete list of plans, prices, and ordering. 803-881-9911 MC/VISA.

YOUR ROUTER + Joint A-billi-T equals perfect joints on your glued up projects, guaranteed. Free info. Gudeman Enterprises, Box 126, Goodfield, IL 61742; 309-965-2183.

WOODEN PARTS/SUPPLIES

CHAIR CANING and basketweaving supplies. Large selection weaving materials, shaker tape, books, handles, tools, etc. Retail. Wholesale. Catalog \$2.00. Royalwood Ltd., 517-WJ, Woodville Road, Mansfield, OH 44907; 419-526-1630.

WHOLESALE WOOD products, spindles, wheels, hardware, hinges, sanding belt, discs, etc. Clockworks and accessories. Howee's, Rt. 7, Box 633WJ, Joplin, MO 64801; 417-623-0656.

HARDWARE

FREE HARDWARE AND SUPPLY CATALOG, GIFT, EXTRA DISCOUNT COUPON. Featuring: Wood Parts, Screws, Bolts, Hinges, Drill Bits, Glues, More! Professional Discount Hardware: 1-800-248-1919.

HORTON BRASSES: High quality authentic reproduction furniture hardware. Always in stock. Brass, wood, iron. Manufactured in Connecticut. Catalog: \$4.00. Nooks Hill Road Dept. WJ, Cromwell, CT 06416; 203-635-4400.

CARVING PLANS/SUPPLIES

CARVERS SUPPLY. Carousel horses, books, tools, cutouts. Kiln dried lumber. SASE: PAC, 3505 32nd Street W., Bradenton, FL 34205; 813-756-5754.

PLANS/KITS

ROUND TOP WOODEN TRUNK many uses. For plans send \$3.75 to Sir Forms, PO Box 595, Hudson, OH 44236.

HUGE PROFITS with Buffalo Barrels! Plans gained worldwide acclaim on the Internet! Barrels, POB 158, White Sulphur Springs, WV 24986.

KALEIDOSCOPE PLANS: Beautiful parlor-scope gear operated plans provide option of making wooden gears or buying commercial gears \$22 ppd. O&S Plans, 1122 Wimbeldon, Raleigh, NC 27609.

MINI GAZEBO, just the right, size for yard or garden, 4' hexagon 6' high. Easy to follow directions, complete material list - \$20. Step By Step, 284 River Road, Warren, PA 16365.

ADVANCED SCROLL SAW PATTERNS. Send \$1.00 for Brochure "E" fretwork shelves, clocks, toys, mirrors. NELSON DESIGNS, Box 422, Dublin, NH 03444-0422.

40 PLANS for crafts or gifts.

Adirondack chair, benches, birdhouses, cabinet, doghouse, picnic table, swing, shelves, etc. Check or money order \$6.95. Pinecraft Patterns, PO Box 13186, Green Bay, WI 54307.

PLANS TO build 700+ tools, machines & accessories for your wood and metal shop. Catalog \$1.00. Wood-Met WWJ, 3314 W. Shoff Cir., Peoria, IL 61604-5964.

WOODENTOY PARTS, patterns, books. Catalog \$1.00. Catalog and two patterns \$4.00. Woodentoy, Box 40344 WWJ, Grand Junction, CO 81504.

MUSICAL INSTRUMENT PLANS/SUPPLIES

MUSICAL INSTRUMENT woods for dulcimers and other projects requiring high quality thin hardwoods. Precision milled and sanded. Cherry, walnut, mahogany, padauk, rosewood, purpleheart, bubinga, wenge, curly maple, butternut, quartersawn spruce and W.R. cedar. Related hardware, strings and accessories also available. Instrument kits too! Catalog \$1.00. Folkcraft Instruments, Box 807-W, Winsted, CT 06098; 203-379-9857.

STEEL BUILDINGS

STEEL BUILDING Manufacturer. Buy Factory Direct and save thousands. All sizes available, with easy do-it-yourself construction. From back yard shops to large commercial applications. Call for free brochure. 1-800-526-1110. Global Steelmaster Buildings, Inc.

BOOKS/CATALOGS

BLUEPRINTS...90 Gorgeous Barns, Garages, Workshops, Minibarns. Catalog \$5.00 (refundable). Ashlandbarns, 990-WJ Butlercreek, Ashland, OR 97520.

BUILD, RESTORE, REPAIR, Refinish! Carvings, Moldings, Brass, Hardwoods, Veneers, Upholstery, Caning, Lamps. \$1.00 for unique wholesale catalog. Van Dyke's, Dept. 83, Box 278, Woonsocket, SD 57385.

If you have something to sell, or you're looking for something special, place your ad in the

WOODWORKER'S Classified Section

A solid value at an incredibly LOW COST. Contact Carmen Martin, Classified Advertising Manager, at (309)679-5017.



SOFTWARE/VIDEOS

WOODWORKING INDEXES, software/printed - Locate information for better use of woodworking magazines. Yearly updates. DOS, windows, \$54.45. Printed, \$24.95. FREE brochure. WOODFIND, Box 2703J, Lynnwood, WA 98036.

BUSINESS OPPORTUNITIES

GREAT EXCELLENT INCOME assembling simple woodcrafts and more at home. Easy & fun! Program is guaranteed! Call: 1-800-377-6000 Ext. 6670.

\$200 DAILY Woodworking at home. Discover the secret of this unusual opportunity. Send stamp. Pine/WJ, 897-3 Mammoth, Manchester, NH 03104-4521.

LET THE Government Finance your woodworking-related small business. Grants/loans to \$500,000. Free recorded messages: 707-449-8600. (KX9)

MISCELLANEOUS

BUILD YOUR own 22" thickness drum sander, save hundreds of dollars. \$10.00 to Moritz Designs, PO Box 3583, Victoria, TX 77903.

MOLDBAKING CASTING guidebooks. Complete techniques, sources. Rubber, resins, metals, more. Mold, duplicate, repair. Free information: Moldmaker, Box 16586(WJ5), Memphis, TN 38186-0586.

SPRAY-ON SUEDE. Free brochure, sample enclosed. Inexpensive NEW MINI FLOCKER. DonJer Products, Ilene Court, Bldg. 8R, Belmead, NJ 08502; 800-336-6537.

SHEET PLASTIC FOR PATTERNS. Send SASE with request for sample and price to J.W. Enterprises, 3653 Jacob Road, Graff Lake, MI 49240.

POST OFFICE Box Bronze Doors: No. 1 \$8.00, No. 2 \$9.00, No. 3 \$10.00. Add \$1.00 each shipping. SASE: Hubbert Woodcrafts, PO Box 1415, Fletcher, NC 28732. Orders only 800-920-0099. Visa/Discover.

PROOF THAT THE APPLE DOESN'T FALL FAR FROM THE TREE.

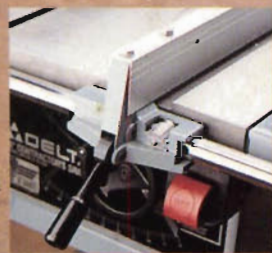


We've never set out to copy our Unisaw. But we've certainly learned a lot from it over the years. Most importantly, how to build a quality saw to fit the needs of its owner. Which is why we build more types and sizes of saws than any other company in the business. All with the heft and precision we put into our professional saws.

Take our new 10" Contractor's Saw II™, for instance. Built with a massive cast iron carriage and trunnion assembly, topped off with a 20"x27" cast iron table and solid steel extension wings. Its powerful 1½ HP motor and Jet-Lock® rip fence give you accuracy and capacity

enough for the long haul.

Admittedly, we have an advantage when it comes to making and selling saws. All those years of building tools for professionals would seem to say that Delta would be a pretty good place to start, if you're in the market for a good bench saw or a cabinet saw or any saw in between. We figure you shouldn't have to be a professional in order to work like one.



**THE
POWER
OF THE
PROS**

DELTA
WOODWORKING MACHINERY
A Pentair Company

For the name of the nearest dealer, home center or hardware store carrying Delta Tools, call Delta International Machinery Corp., 800-438-2486. In Canada, 519-836-2840.

Delta funds these national PBS programs.

The New Yankee Workshop with Norm Abram.

The American Woodshop with Scott Phillips.

