The Woodworker's Journal
Vol. 12, No. 6 $3.50

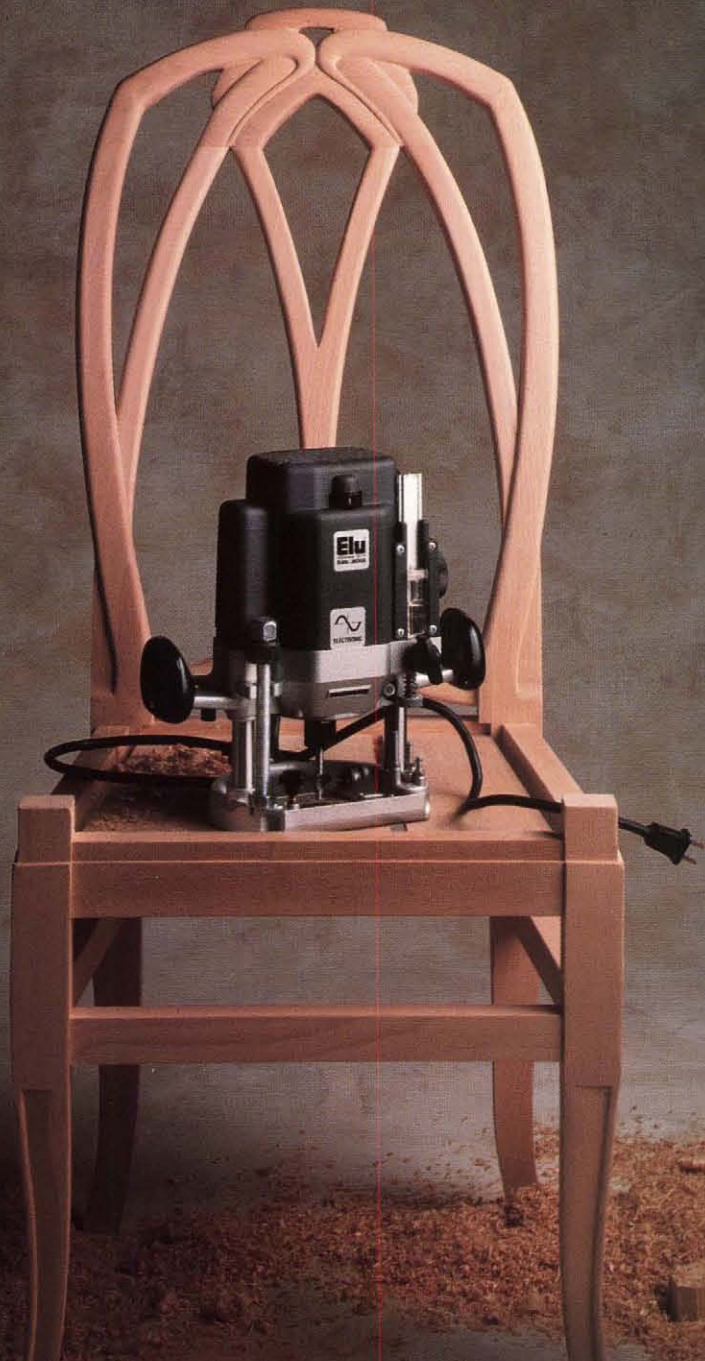
CONTEMPORARY Cradle

Included in this issue: **Shaker High Chest • Country Vegetable Bin Wall Sconce • Whale Pull Toy • Treetop Ornament Pickup Truck • Child's Carousel Lamp • Crosscut Jig**

11
73361 64856 3

November/December 1988

FOR THOSE WHO STILL TAKE THE TIME TO HANDCRAFT WOODWORK, WE MAKE HANDCRAFTED TOOLS.



If you take the time to make quality woodwork it's time you learned about Elu woodworking tools. Because for the first time ever, Black & Decker is offering its line of Elu tools in the U.S. Sanders, routers, a power planer and a jointer/spliner—all with a wide range of accessories.

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The Woodworker's Journal

NOVEMBER/DECEMBER 1988 VOLUME 12, NUMBER 6

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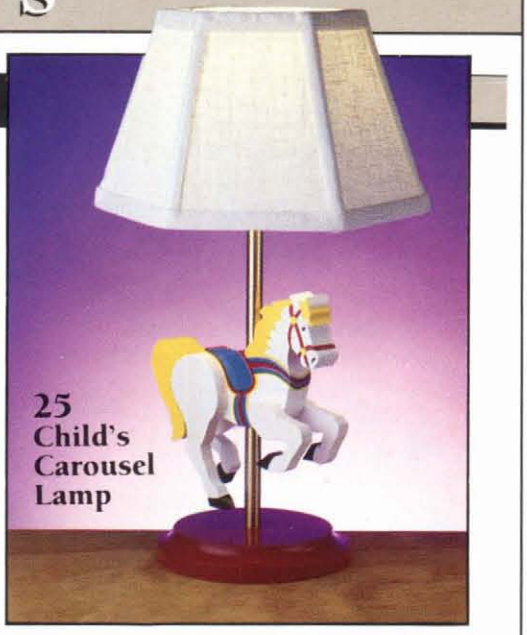
DEPARTMENTS

PROJECTS



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Shoptalk

Confessions of a Dump Picker

Years ago, on a Saturday morning, I could meet many of my neighbors at either the barber shop or town dump. Not long after the Beatles, with their long hair, descended on Shea Stadium, the barber shop closed its doors forever. The town dump also closed after the Love Canal story made the headlines. Now you actually have to pay to bring stuff to a privately owned landfill where you're not even allowed to poke through the piles for good useful junk — a social pastime known as "dump picking," or sometimes "scrounging."

Armed with a hammer and pry bar, I used to get a lot of nice ½ in. thick hardwood and thin plywood by busting up discarded furniture. There was always plenty of good, seasoned cabinet wood waiting to be salvaged (the expression "recycle" wasn't yet in vogue), and sometimes I struck it rich with a cabinet of solid mahogany or maybe bird's-eye maple. My happy days of dump picking have long since ended but old habits die hard.

Recently, I had to replace a pine exterior door. Rot had invaded far up the lower rail and stile ends, and the damage was too extensive to repair. After the new door was hung, I was faced with the problem of how to dispose of the old door.

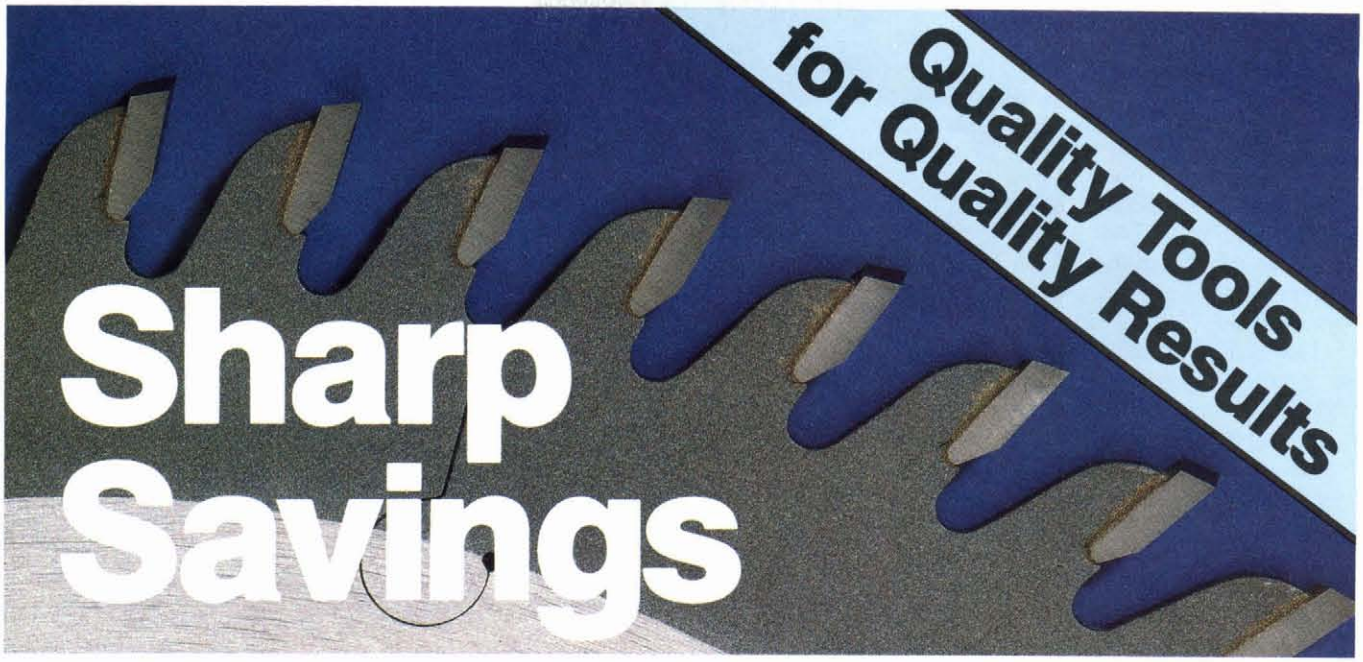
First, I pried off the moldings holding nine panes of glass in the upper half. The panes were wrapped together with masking tape and stashed in the garage (one never knows when nine 8¾ in. by 11¾ in. panes of glass will be quickly needed).

Warming up to the job, I grabbed the hammer and gave a couple of whacks to a long stile which came easily off the dowels holding it to the rails. In just a few minutes I had separated all the parts of the door. Then the rails and stiles were brought into the shop where the table saw was used to cut off the molded edges and doweled sections.

I ended up with some beautiful lengths of clear, close-grained pine of 1⅛ in. thickness. Some of it was quarter-sawn and there was enough to make the four legs of an antique washstand reproduction I've been itching to build. The rotted rail went into the trash can, and the remaining small pieces went into the kindling box. Recycling can be very satisfying.

It pays to keep your eyes peeled for discarded wood, especially hardwoods and plywood in thicknesses not generally available. Just be careful to remove all nails and other hardware before machining. Also, don't mix old lumber with new stock in a project that will not be painted as the wood colors and graining will most likely be quite different.

Jim McQuillan



...ON ADVANCED LASER-CUT BLADES!

Laser Cut Blade Bodies

Laser Technology allows Freud to produce one of the quietest running, safest, and accurate running saw blades in the world.

Expansion slots on the Freud industrial saw blade are cut with a laser and are only .003 or less wide (about the thickness of a human hair). This assures tensioning strength for a true cut. It creates a quieter blade because there are no large holes or wide expansion slots for the air to whistle through. It guarantees a safer saw blade as there are no plugs in the expansion slot that can fly out when the blade is in use.

With this advanced technology, all shoulders and gullets are identical in shape and most important strength. The arbor holes are perfectly centered and rounded by precision grinding. An extra step to guarantee a true running blade.

Special Carbide Mix

Freud produces a special mix of carbide at their own factory. It is produced from titanium and carbon using cobalt as a binder. Producing this important part of the saw blade within their own factory assures the consistency and quality needed to hold a sharp edge.

The carbide is induction brazed onto Freud's laser produced blade bodies. This process is computer controlled to guarantee uniformity of brazing. A razor edge is then put on the teeth with a 400 grit diamond wheel. This guarantees you of a blade that will provide a maximum of production hours before sharpening is needed.

Item No.	Diameter	Teeth/ Grind	General Purpose	Cross Cut Wood	Plywood	Plastic	Rip Wood	List	Sale
LM72M008	8	24 Rip						68.48	51.48
LM72M010	10	24 Rip	NR	NR	NR	NR	E	77.93	50.68
LM72M012	12	30 Rip						104.03	65.98
LU78M008	8	64 TCG						112.57	93.98
LU78M010	10	80 TCG	G	G	E	E	NR	140.63	104.48
LU78M012	12	96 TCG						169.29	135.68
LU78M014	14	108 TCG						199.80	141.98
LU84M008	8	40 Comb						85.96	59.58
LU84M009	9	40 Comb						85.31	59.58
LU84M011	10	50 Comb	E	G	G	NR	G	89.54	52.18
LU84M012	12	60 Comb						135.31	97.98
LU84M014	14	70 Comb						161.34	116.48
LU85M008	8	64 ATB						112.08	73.98
LU85M009	9	72 ATB						122.56	76.98
LU85M010	10	80 ATB	NR	E	G	G	NR	133.25	85.58
LU85M012	12	96 ATB						161.40	114.98
LU85M014	14	108 ATB						179.06	124.88

E = Excellent G = Good F = Fair NR = Not Recommended
8", 9", and 10" have 5/8" Bore.
12" and 14" saws have 1" Bore.

...ON ADVANCED LASER-CUT DADO SETS!

		Bore	List	Sale
DS306	6" set	5/8"	176.54	110.98
DS308	8" set	5/8"	216.18	118.98

Freud Carbide Tipped Dado Sets will produce a smooth and accurate groove when cutting either with or across the wood grain. Properly stressed and tensioned outside blades feature extremely sharp and steeply beveled carbide teeth that leave clean edges.

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Letters

In answer to your question in "Letters" last issue, ⅜ in. diameter test tubes for the Bud Vase project (see May/June 1988) can be ordered via mail-order from The Perfect Parts Company, One North Haven Street, P.O. Box 9935, Baltimore, MD 21224. Their ⅜ in. diameter by 3 in. long tube, called a culture tube (part no. 504), comes in a package of three. The price per package is $1.20 plus $4 for shipping and handling charges.

William L. Penney
Merrimack, NH 03504

We are included in your list of hardwood suppliers on page 10 of your September/October 1988 issue. However, we are strictly a wholesale supplier and we do not sell lumber in small quantities.

C.M. Leonard, Leonard Lumber Co.
Durham, Conn

Editor's Note: Westover Workshops, the parts source we listed for the Folk Harp project in our March/April 1988 issue, has advised us that they have had some order processing problems. Readers who have placed orders that have not been filled should write or call Harold Westover at the Westover Workshops, Box 304, Walpole, NH 03608. The telephone number is (603) 756-3670.

The September/October 1988 issue had plans for a Bird Push Toy. In the last paragraph you tell the readers that ". . . 180 degree opposition of the cams will result in alternating wing movement." That's not right. In order to get alternating wing movement the angle should be 90 degrees — not 180.

Lyle E. Bohrer
Beaumont, Tex.

On page 21 of the September/October 1988 issue is an excellent article entitled Drill Bits and Boring: The Hole Story. The article mentions that not all brad-point bits are the same, and that the best ones have two scoring points to sever the fibers around the perimeter of the hole. The result, according to the article, is an exceptionally clean hole. Can you provide me with a source for these top quality bits?

R.O. Clinton
Green Valley, Ariz.

The Frog Tool Co., 700 West Jackson Boulevard, Chicago, IL 60606 sells a set of brad-point bits that we have been very happy with. It includes 14 bits ranging in size from 3/32 in. diameter to ½ in. diameter. Their catalog lists the set as part no. 521S14. The bits can also be purchased individually.

The "Special Techniques" article (page 17) in your September/October 1988 issue includes an interesting chart. It provides a formula, a miter angle, and a constant that makes it easy to calculate the segment length of three, four, five, six, and eight sided figures, no matter what the size. Can you tell me what the constant is for 10 and 12 sided figures?

D.E. Farver
Ft. Collins, Colo.

That chart generated a lot of interest so here is an expanded version. It gives the miter angle and segment constant for figures with up to 20 sides.

Ring Segment Angles and Constants

Angle (# Sides)	Constant
18 (10 sides)	.650
15 (12 sides)	.536
12.86 (14 sides)	.454
11.25 (16 sides)	.397
10 (18 sides)	.353
9 (20 sides)	.317

Each day 75,000 to 80,000 acres are destroyed through deforestation of the tropical rain forests. Based on these estimates (given by the American Association for the Advancement of Science) an area the equivalent of the state of Virginia or Nebraska is cleared annually. Many experts blame this deforestation for the intense heat and drought conditions of the past summer. This has also resulted in the permanent loss of many animals.

My main purpose in writing is to let your readers know that tropical woods such as teak, mahogany, rosewood and boxwood come from the tropical rain forests, and their export further depletes this irreplaceable natural resource.

Please, when choosing woods for a project, consider alternating with abundant and renewable woods. Please give thought to all those thousands of acres disappearing and to animal extinction.

Myrna Susman
Astoria, N.Y.

The annual global loss of about 27 million acres of tropical rain forest should be of concern to all of us. Any meaningful action to help stem that loss is certainly more than justified. However, woodworkers aren't to blame.

Most of the tropical forest loss is not because of wood exports, but rather because farmers in the Amazon basin — home to much of the world's remaining tropical rain forests — burn off the wood to clear new farmland. In fact, a new study on the burning of Brazil's tropical rain forests has some startling figures.

In 1987, burning destroyed over 19 million acres of virgin forest in Brazil alone, according to Brazilian scientists working with U.S. satellite data. The carbon dioxide gas from that burning may account for fully 10 percent of all the man-made carbon dioxide released into the world's atmosphere every year. And it's carbon dioxide buildup that is now being blamed for the so called "greenhouse effect" that is warming the planet.

It's a complex problem and a ban on wood from the rain forests seems logical at first. But it may even be counterproductive. For example, if the market for imported wood were to dry up, Brazilians who depend on it for a living might have to become farmers. They then will start burning the logs they were harvesting.

Readers' Information Exchange

Looking for an owner's manual for an old band saw? Need a bearing for a hand-me-down table saw? Can't find a source of supply for an odd piece of hardware? Maybe our readers can help. Send along your request and we'll try to list it here — and perhaps one of our readers will have an answer for your. Due to space limitations, we'll be unable to list all requests, but we'll include as many as we can.

I'm looking for a source that makes tips for the walking sticks that I make from dried rattan vines. These can be brass or wood or whatever.

Charles Rashall
8026 Coolgrove, Houston, TX 77049

I am looking for a company that manufactures industrial equipment that cuts internal and external curves. I need well-built equipment, and not a router and guide or a template that won't stand up under production work.

Paul Ranson, Greenville High School
Greenville, IL 62246

I need a rip fence for a Delta 10 in. Unisaw. Please state price and condition.

George Kurko
432 N. 5th St., Martins Ferry, OH 43935
(614) 633-1633

I would like to find two model no. 82902.04 bases, with locking levers, for a Robert Bosch router, model no. 90150-06.

Ed Zilk
4826 S.E. 50th Ave., Portland, OR 97206

I am looking for patterns for a rocking goat, rocking bull or rocking pig.

Robert Baker
RR 1, Box 361-A, Rochester, IN 46975

I would like to find some pig cutting-board patterns. I will send a pattern in return if you request it.

Dean Feight
1306 4th Ave., S.E., Altoona, IA 50009

I have an old Shopmaster 12 in. band saw that needs new tires. There is no model number. It just says Shopmaster, Minneapolis, Minn. The approximate tire size is 12 in. diameter by ¾ in. wide by ⅛ in. thick. Please advise if you know of a source for replacement.

R.L. Wilson
6438 Red Hill Rd., Boulder, CO 80302

I am handmaking flax spinning wheels and need a source of supply for both the front wheel axle and the new spindle axle.

Jack Hays
2073 N. 63rd St., Philadelphia, PA 19151

I have a complete 18 in. Craftsman jigsaw, model no. 103.0407, plus original operating instructions and parts list. I'd like to contact somebody who might like this type of saw.

Doreen Adams
5493 Summerfield, Camerillo, CA 93010

Owner's Manuals and Parts Lists

I'm looking for an owner's manual and parts list for an 18 in. Craftsman jig/scroll saw, model no. 113.20721.

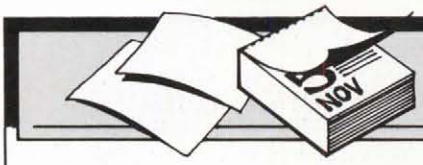
Phil O. Rogers
1045 Jamacha Rd., El Cajon, CA 92019

I'm looking for an owner's manual and parts list for a Craftsman jigsaw, model no. 103.0404.

Robert Proctor
8808 Melwood Rd., Bethesda, MD 20817

I'm looking for an owner's manual and parts list for a Craftsman 6 in. jointer, model no. 103.20620.

Richard G. Aseltine, 538 Amostown Rd.
W. Springfield, MA 01089



Events

We will gladly list as many events of interest to woodworkers as space permits. Listings are free and may include shows, fairs, competitions, workshops and demonstrations. The deadline is six weeks before publication, Nov. 15 for the Jan./Feb. '89 issue, Jan. 15 for the March/April issue. Please address announcements to the Events Department.

Alaska:

The Alaska Creative Woodworkers Association, P.O. Box 201796, Anchorage: Design — Furniture as Sculpture, Nov. 21; Stanley Tools — History and Influence, Dec. 19.

Connecticut:

Brookfield Craft Center, P.O. Box 122, 286 Whisconier Road, Brookfield: Turned and Carved Bowls, Nov. 5-6; Design for Furniture, Nov. 12-13; Holiday Craft Sale, Nov. 25-Dec. 24. South Norwalk Campus, 127 Washington St.: Fundamentals of Cabinetmaking, Nov. 5-6; Basic Birdcarving Workshop, Nov. 19-20.

Michigan:

The Woodworking Shows, Metro Detroit, Cobo Conference Center, Michigan Hall, One Washington Blvd., Detroit, Nov. 4-6.

New Jersey:

Woodworking World — The Philadelphia Area Show, Hyatt Cherry Hill, Cherry Hill, Nov. 11-13.

South Jersey Wood Carvers' Fall Woodcarving Show, Lenape High School, Medford, Nov. 19.

New York:

Woodworking World — The Central New York State Show, New York State Fairgrounds, Syracuse, Nov. 4-6.

Long Island Antique Tool Collector's Association, Epenetus Smith Tavern, 211 Jericho Turnpike, Smithtown, 7 p.m. Dec. 12.

Constantine's Woodworking Classes, 2050 Eastchester Road, Bronx: Marquetry, Nov. 2, 9; Woodturning, Nov. 5, 12; Picture Framing, Nov. 16, 23; Furniture Repair and Restoration, Nov. 26, Dec. 3; Repairing and Finishing Wood Surfaces, Dec. 10, 17.

North Carolina:

John C. Campbell Folk School, Brasstown: Woodcarving, Nov. 13-19; Woodturning Bowls, Nov. 18-20.

Oregon:

Oregon School of Arts and Crafts, 8245 S.W. Barnes Road, Portland: Stool Design and Construction, Nov. 5-6.

The Woodworking Shows, Oregon Show, Memorial Coliseum, Convention Hall, 1401 North Wheeler St., Portland, Nov. 18-20.

Pennsylvania:

The Woodworking Shows, Delaware Valley, Valley Forge Convention Center, Pennsylvania Room, 1200 First Ave., King of Prussia, Dec. 2-4.

Vermont:

Vermont State Craft Center at Frog Hollow, Middlebury: A Celebration of American Crafts, Nov. 1-Dec. 31.

Virginia:

Northern Virginia Carvers, 14th Annual Woodcarving Show, Marymount University, Arlington, Nov. 25-26.

Washington:

Northwest Carver's Association 8th Annual Woodcarving Show, Western Washington Fairgrounds, Expo Hall, 9th and Meridian, Puyallup, Nov. 12-13.

The Woodworking Shows, Western Washington, Seattle Center, Exhibition Hall, 305 Harrison St., Seattle, Nov. 11-13.

Caning and Wood Finishing Supplies

As a service to our readers, we periodically list sources of supply for various woodworking products. In this issue we've included two listings: suppliers of cane and related products and suppliers of wood finishing products.

Caning Supplies

Most of these companies also carry reed, splint, rush, rattan and related materials.

Cane & Basket Supply Company
Dept. WJ
1283 South Cochran Ave.
Los Angeles, CA 90019
Catalog $1.00 refundable on first order

The Caning Shop
926 Gilman St.
Berkeley, CA 94710
Catalog $1.00 refundable on first order

Connecticut Cane & Reed Co.
P.O. Box 762-J
Manchester, CT 06040
Catalog $1.00

The H. H. Perkins Co.
Dept. WJ
10 South Bradley Road
Woodbridge, CT 06525
Catalog $1.00

Van Dyke's Restorers
Dept. 83
P.O. Box 278
Woonsocket, SD 57385
Catalog $1.00

Wood Finishing Supplies

IA Co. The Sandpaper People
645 N. 8th St.
Reading, PA 19612
Catalog Free

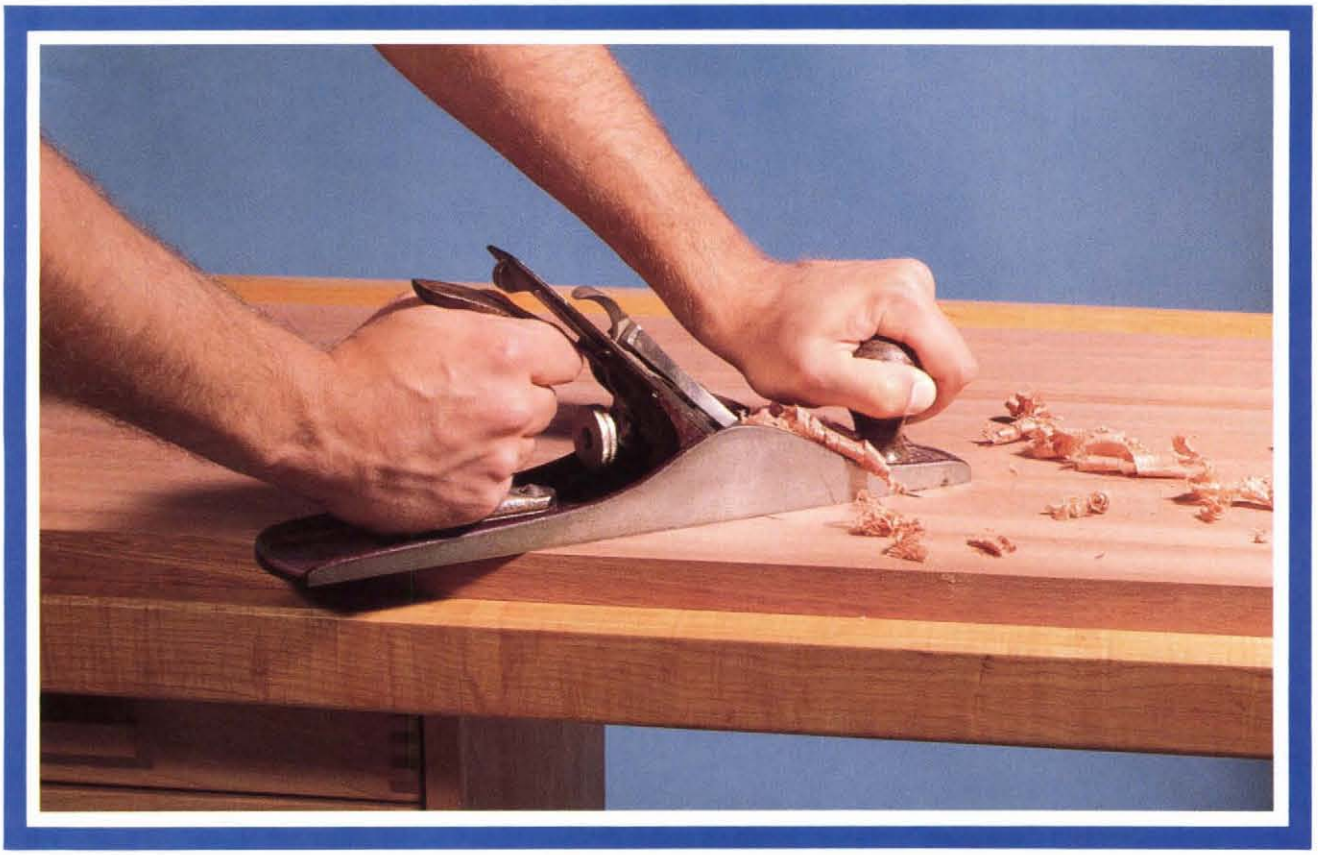
Industrial Finishing Products
465 Logan St.
Brooklyn, NY 11208
Catalog $2.50 refundable on first order

The Wise Co.
P.O. Box 118WJ
Arabi, LA 70032
Catalog $4.00

Wood Finishing Supply Co., Inc.
Dept. 78
1267 Mary Drive
Macedon, NY 14502
Catalog $2.50

Woodfinishing Enterprises
1729 N. 68th St.
Wauwatosa, WI 53213
Catalog Free

Flattening Wide Surfaces With The Hand Plane



Many woodworking projects require joining several boards to make a panel or tabletop. However, the resulting surface is rarely flat. Boards inevitably have some warp.

Large cabinet shops have big jointers, thickness planers and sanders to true the surface. Most hobbyists don't. Light-duty thickness planers aren't wide enough for a tabletop, and aren't designed to remove cup or twist anyway. The rollers press the board flat for planing, but the warp springs back.

For surfacing wide panels, the age-old hand plane may still be the best solution. Essentially unchanged since antiquity, the tool is more versatile than the powered planers designed to replace it. When used properly, it leaves as smooth a surface as you could want, although often at the cost of a few blisters.

The skill is basic, but many standard woodworking texts gloss over it. If you don't have the good fortune to absorb the craft from a master, you're forced to learn by trial and error, and that process can be confusing. What plane do you use? Should you plane with or across the grain? How do you check for flatness? Where do you start?

The Visual Inspection

The place to start is with your eyes. There are many devices designed to help gauge whether a panel is flat, true and square, but there is no substitute for the practiced eye. Before you start, carefully scrutinize the surface you want to plane. Look for the high and low points, examine the grain for direction and evenness. Is there severe, moderate or minimal cupping? Do the joined boards fit fairly flush or do their edges protrude? Bend down and sight the surface from several angles. Do you see any pronounced twisting? Which edges are straight? Examine the end grain. Notice how it flows into the surface. If the curve of the end grain is unruly, chances are the surface follows suit, and you may hit areas where the plane iron catches the wood fibers and tears them.

A Closer Look

A close visual inspection will, with practice, allow you to tell before you start if you can plane right across a surface, or if you must change direction to allow for some unruly grain. It'll tell you whether you have to eliminate twist, also called wind (as in wind a watch), where the four corners of the surface aren't on the same plane.

(continued on next page)

After the initial inspection, you can start planing. But, once you remove the more obvious deformities, you need some aids to determine whether the surface is truly flat.

Some Helpful Tools

The essential tools here are straightedges. You'll need one longer than the panel or top, and you'll need a matched set wider than the surface. The long straightedge is ½ in. thick by 2 in. wide. It's used to insure the surface is straight along the width, length and various diagonals. If you can see light underneath, there's more planing ahead.

The matched set of straightedges (called winding sticks) determines whether the surface has any twist or wind. Place them at the two ends as shown (Fig. 1A). Bend down and sight from one stick to the other. Any twist will show up, with the rear stick protruding (Fig. 1B). The rule of thumb is:

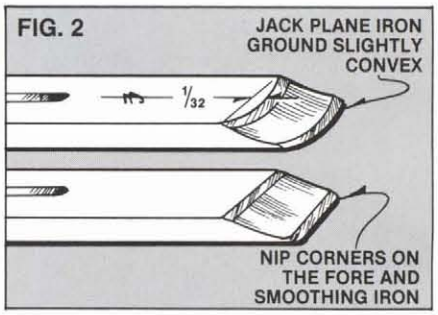
remove half the amount of twist from each high corner. If the rear stick is about ⅛ in. higher than the forward stick, remove 1/16 in. from each corner.

The winding sticks have to be identical and should be cut flat and true. It's best to use quarter-sawn lumber as it's less likely to warp. It helps to make one stick from a light colored wood, and the other stick from a dark colored wood. The contrast makes it easier to gauge the degree of twist.

If the long straightedge shows no light, no matter what direction you lay it, and the winding sticks reveal no twist, the top is flat.

Choosing the Plane

For rough planing of the surface use a jack plane, which is about 14 in. long. The iron should be ground slightly convex (Fig. 2) and set for a fairly thick shaving. The convex iron will



leave ridges between the passes, but it cuts faster than a perfectly straight iron.

The smoothing plane, about 9 in. long, follows the jack plane, and removes the ridges left in the surface. The iron is ground straight across, but the corners are nipped so they don't dig in.

Finish with a fore plane, about 18 in. long. The iron is ground the same as the smoothing plane. This plane should take an even shaving across the entire length of the surface.

Of course, many woodworkers manage to do excellent work without all three planes. If you own only a jack plane, grind the iron like the smoothing plane. It won't cut as fast, but it will leave an acceptable surface.

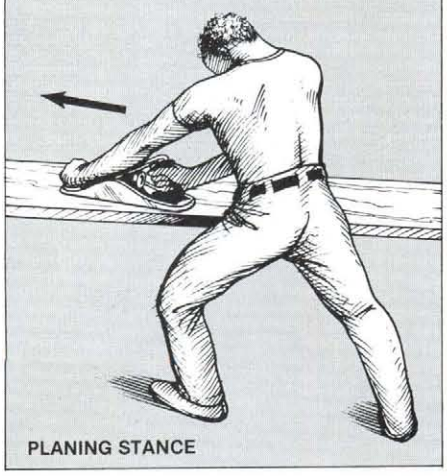
Remember, the time spent sharpening and tuning each of the planes will speed the work. It also helps to apply paste wax to the sole of the plane, so it rides over the surface more easily.

Making Shavings

The planing itself is much easier if you try to minimize awkward lunges and weight shifts as you operate the tool. It should be rhythmic and even pleasurable. (If it's a real effort, tune up the plane, wax the sole or take a shallower cut.) Stand so you can easily transfer your weight from one foot to the other, and at the same time transfer the pressure on the plane (Fig. 3).

At the beginning of a planing pass,

FIG. 3
STAND SO YOU CAN EASILY TRANSFER YOUR WEIGHT FROM ONE FOOT TO THE OTHER WHILE PLANING

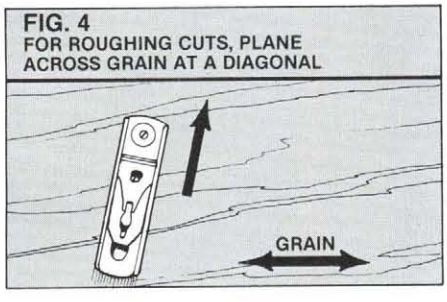


PLANING STANCE

press firmly on the front of the plane, but transfer most of the pressure to the rear handle once you're into the wood. When you finish a pass the pressure should all be on the rear handle.

For roughing down the surface, it's often easier to plane across the grain to start. But don't try to push the plane straight across. Always work at a slight angle (Fig. 4). For the smoothing cuts with the grain, hold the plane slightly skewed to the direction of cut (Fig. 5).

FIG. 4
FOR ROUGHING CUTS, PLANE ACROSS GRAIN AT A DIAGONAL



If the plane starts to tear the wood, you may be able to alleviate the situation by reversing direction. However, sometimes the grain is so convoluted that you just have to plane through it. A good sharp plane is invaluable here.

When planing, always try to be aware of the contours of the wood. You closely inspected the surface so you'd know where the high spots are. Don't just make shavings without paying attention to how those contours change. Use the straightedge and winding sticks often. The key is to always work for maximum effect, and that won't happen if you're removing wood from a low section.

The plane itself often tells you when you're working away in the wrong spot. If you get only a sliver of a shaving, or a skipping shaving or just have to work too hard, it's likely you're not planing the high spots.

The plane also tells you when you have a relatively smooth surface. If you can run the plane from one end of the surface to the other, and take an even shaving, that section is as flat as that plane will get it. The longer fore plane will follow the surface contours less and make a flatter surface than the jack or smooth plane.

Checking Your Work

When you get an even shaving right across the surface, check it with the straightedge and winding sticks. If it's true and flat, mark it as shown in Fig. 6. The face side is then used as the reference for trueing and squaring the four edges, which can now easily be done with a circular saw or by hand. The last surface, away from the face

FIG. 5
ALSO SKEW PLANE WHILE CUTTING WITH GRAIN

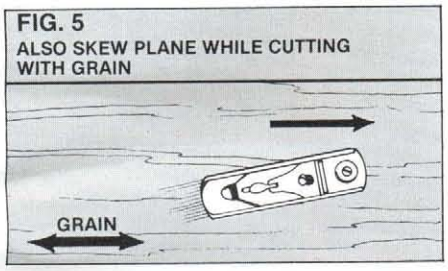
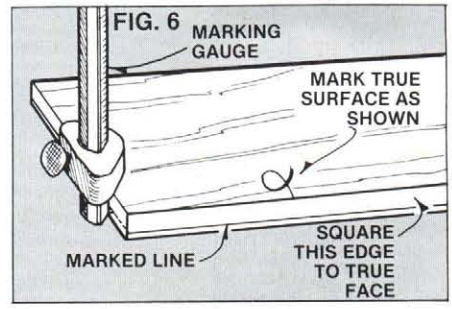


FIG. 6



side, is gauged from the true face. Use a marking gauge to scribe all along the four edges (Fig. 6), and then turn the panel or top over and plane to the line. Often, however, you'll only need one absolutely true face. Depending on the use, you can leave the other surface rough, just remove the saw marks, or plane and smooth it true.

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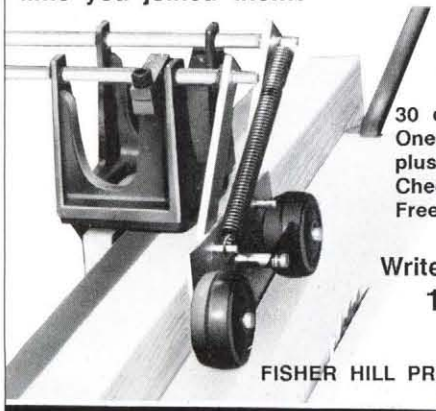

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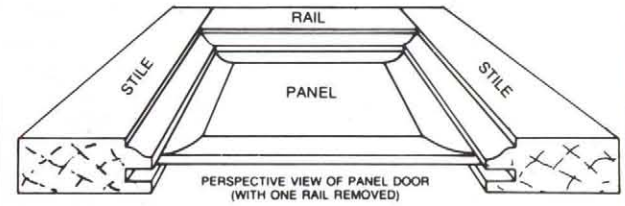

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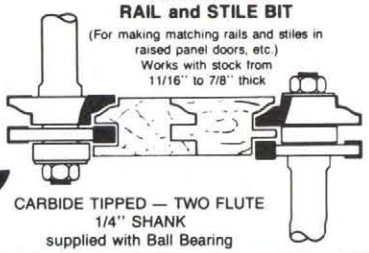

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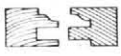
SY 1283 
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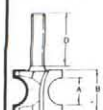

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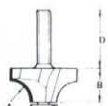

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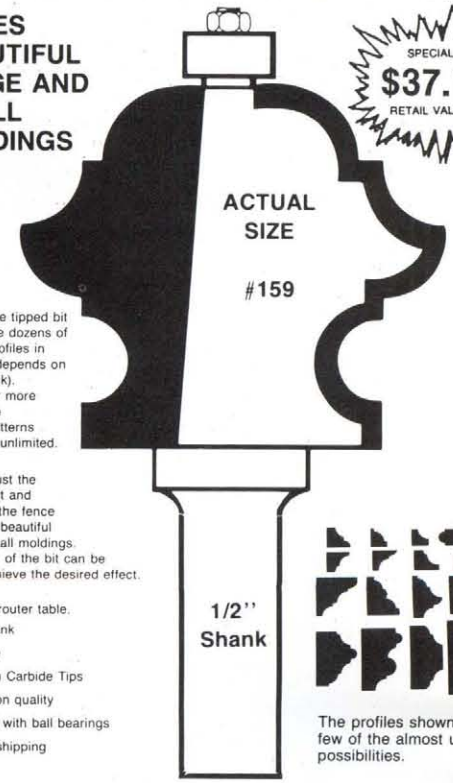

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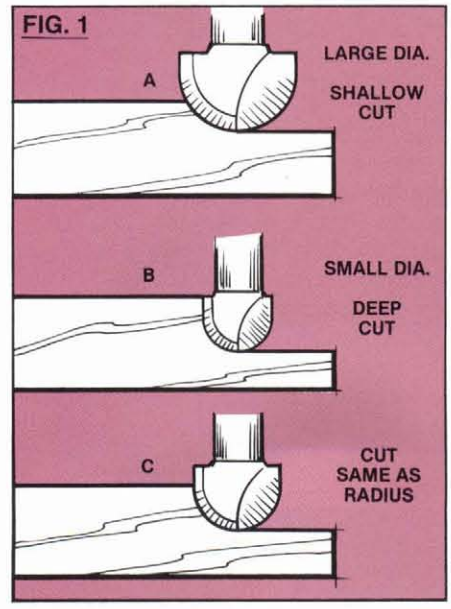
Making A Cove-Edged Raised Panel: *Core-Box Bit Method*

The cove-edged panel is an elegant variation of traditional raised panel construction. It works particularly well with contemporary designs like the Cradle on page 48. It's also easy to make using a core-box bit and our special technique.

Raised panel cutters for the router or shaper are expensive, and using the table saw to cut a beveled panel results in a panel that fits either too tight or too loose as the panel expands or contracts depending on the season. By contrast, the core-box bit method creates a panel without the beveled edge that can bind in frame grooves. The frame and panel parts assemble easily and the panel is free to expand and contract without restriction.

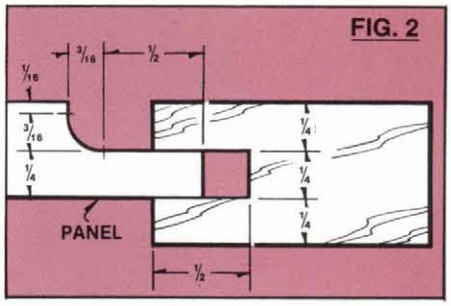
The size of the core-box bit and the depth of cut will determine the profile of the cove edge. As shown in Fig. 1A, a large diameter bit, set for a shallow cut, will produce a different look than a smaller bit set for a deep cut (Fig. 1B). The most common profile will have the bit set to cut a full radius (Fig. 1C). The thickness of the panel determines whether it is flush, proud, or recessed in relation to the frame.

Begin by selecting flat, clear, well-seasoned lumber for your panel stock.

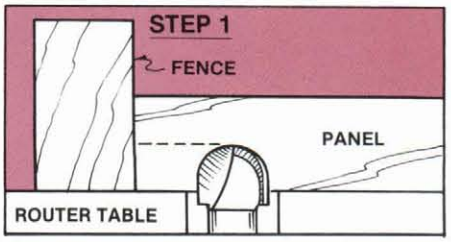


Glue up the panels, surface them and cut the panels to final size before establishing the cove. The panel we show in steps 1, 2, and 3 is used in the Contemporary Cradle project. We made the grooves in the stiles ½ in. deep to allow the panel freedom to expand and contract, but sized the grooves in the rails only ¼ in. deep. This should keep an even reveal all around the four sides of the panel.

Most frames have panel grooves that are ¼ in. wide. We used a ⅜ in. diameter core-box bit and our fence setting was ½ in. from the center of the core-box bit, which left about ¼ in. reveal all around after the frame-and-panel was assembled (Fig. 2). The height of the core-box bit is set to leave a ¼ in. thick lip. After final sanding, this lip should slide easily into the grooves in the frame. Since the ⅜ in. diameter bit is set to make a ¼ in. deep cut, there will be a 1/16 in. flat at the end of the radius.



Step 1: As illustrated, the core-box bit is mounted in the router table, the panel faces down and the fence setting determines the width of the lip. The thickness of the panel, the fence setting and the depth of cut must be calculated to produce a lip that fits into the grooves in the frame. Make the cuts across the grain first, followed by the cuts with the grain. This reduces the likelihood of chipping where the cuts meet. You should be able to reach nearly full depth with a single pass and then use a light pass to clean up the cut.

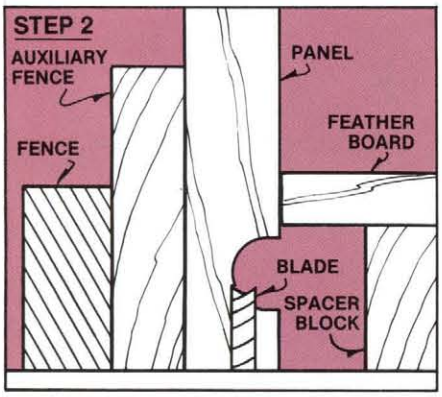


Step 2: Next you'll use the table saw to remove the waste. Clamp a high auxiliary fence to the regular fence and also locate a feather board as shown. The feather board will help insure that the panel does not kick into the blade, which could ruin the panel lip. The feather board is clamped to a spacer block in order to raise it above the level

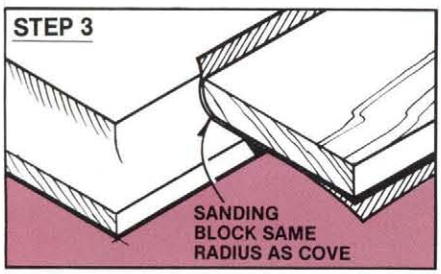
(continued on next page)

of the core-box cut. Note that the height of the blade is set to remove the waste but not cut into the cove. In practice it's best to set the blade height a little under the centerpoint of the cove. It's easier to sand out a small ridge than to remove a groove.

You can also use the router equipped with a straight bit to clean the waste, but we found the table saw method to be most efficient.



Step 3: Sand well. You'll need a sanding block custom-made to match the radius of the cove. Since the raised panel for the cradle had a 3/16 in. radius cove, we applied a matching 3/16 in. radius round over to a block of scrap. Wrapped in sandpaper, the sanding block was the perfect tool for sanding the profile.

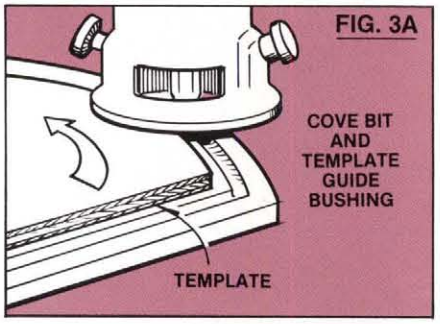


Curved Panel Method

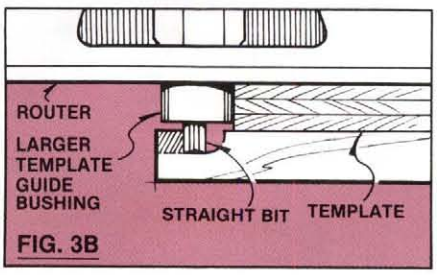
The same basic technique can also be used to create curved panels. You'll need to use the router and make a template matching the profile of the raised panel. The template must be sized so the router template guide bushing will gauge off it and produce the cove at the proper distance from the panel edge.

Fasten the template to the panel with double-faced tape, which is a better choice than clamps since clamps get in the way of the router and must be moved. Moving them might lead to the template shifting slightly, and the cove would then be a little uneven.

Once the template is secured, establish the cove as shown in Fig. 3A. Guide the router counterclockwise around the template. For a smoother cut you may want to use two passes to establish the cove. Even if your router is capable of cutting the cove in a single pass, you'll find that less sanding will be necessary if you remove most of the stock with the initial pass and then readjust the core-box bit to the final depth for a clean-up pass.

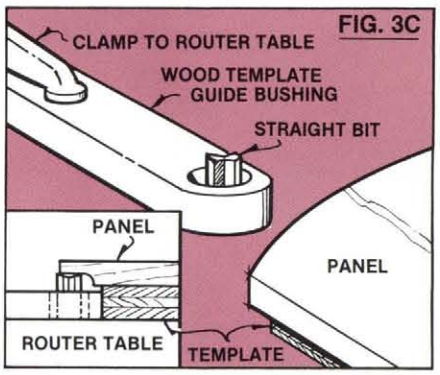


The next step is to clean up the waste between the cove and the panel edge. Use the router and a straight cutter. A large diameter straight cutter will remove the waste stock with fewer passes than a smaller bit. You'll also need to switch to a larger template guide bushing on the router, because the cutter must clear the cove that you just established (Fig. 3B). If you use the same diameter bushing, the straight cutter will cut into the panel cove.

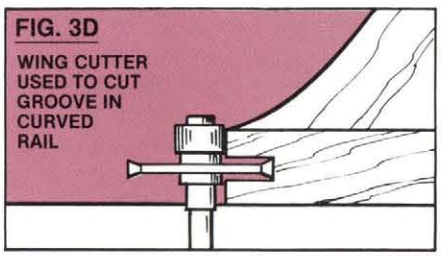


After making the initial cleanup pass around the panel with the template guide bushing gauging against the template, clean the remaining waste by guiding the router freehand. Note that the first cleanup pass should have the router moving in a clockwise direction around the template. The cutting edge would catch and run if you guided the router in the counterclockwise direction that you employed for the cove cut. Be careful to keep the router level for these cleanup passes. If you tip the router base, the bit will dig into the panel and make sanding very difficult.

If you don't feel confident about keeping the router level, use the router table and a shop-made template guide bushing to keep the bit the proper distance away from the cove (Fig. 3C). You'll eliminate the potential problem of the bit gouging because the template will bear off the flat surface of the router table. If you have a large enough straight cutter the cleanout cut can be made in one pass.



The curved rail of the frame must match the profile of the panel and be grooved to accept it. You'll need a bearing-guided wing cutter in the router table for this operation (Fig. 3D).



The important thing to remember when cutting a curved frame-and-panel is that the cutters, template guide bushings and templates must all be sized properly so that after machining the various parts fit together as intended. Plan each operation carefully before beginning. The template method can be used to create just about any shape panel, including those with reverse curves.

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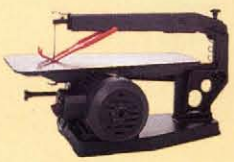

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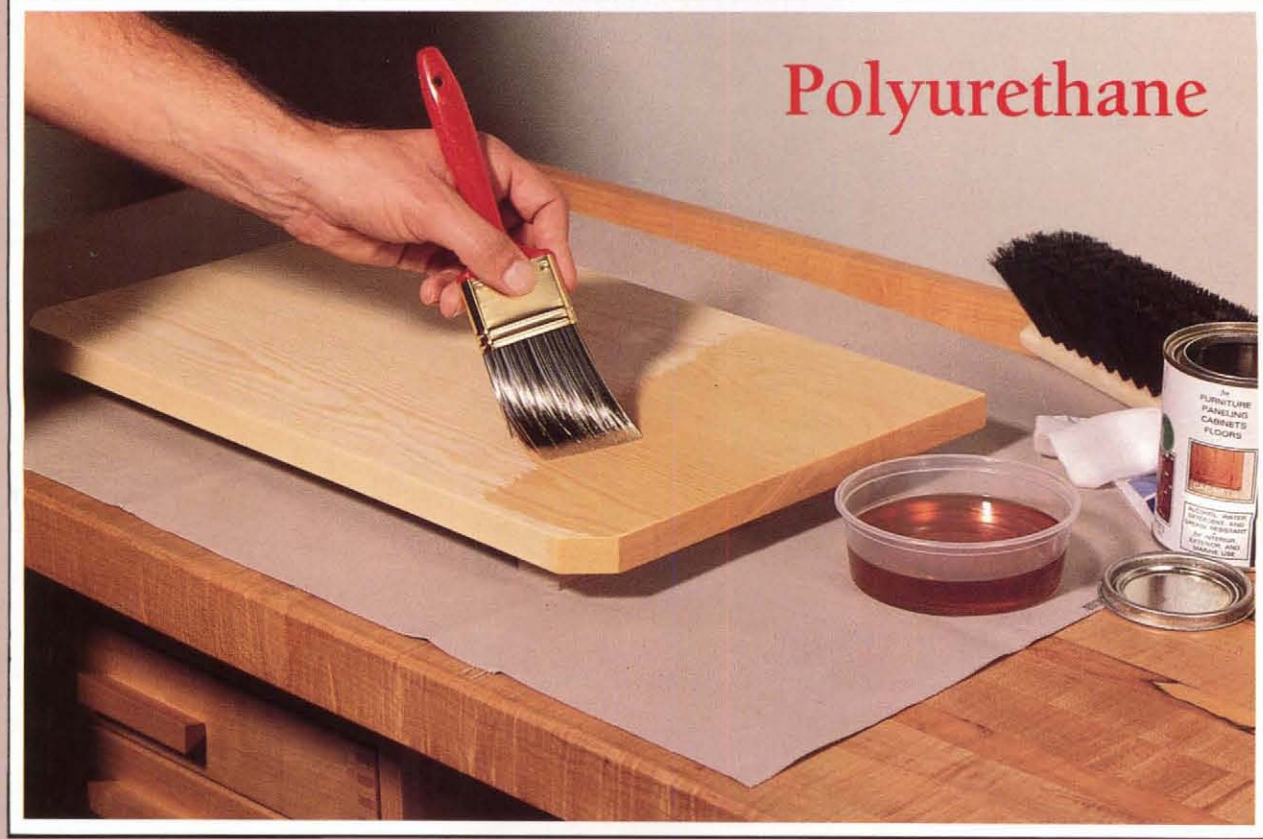


There's no disputing that polyurethane is the most durable clear finish available for wood. Polyurethane is also among the easiest of the clear finishes to apply. Yet a world of difference exists between a slapped-on polyurethane finish, and one that is carefully applied following a specific procedure. Carelessly applied, polyurethane looks cheap, plastic, and unprofessional. Conversely, a properly applied polyurethane finish will show off the quality of the project, in addition to protecting the wood surfaces.

Success with polyurethane does not depend so much on one's skill or experience, as it does on knowing what steps to follow and what techniques to use. The following steps should serve as a hands-on guide, though you may need to adapt them to a particular piece.

Surface Preparation

We can't stress enough that the final finish on wood can only be as good as the surface preparation of the stock before that finish is applied. No clear finish will obscure deep cross-grain scratches caused by using sandpaper that's too coarse. Sand thoroughly with progressively finer grits, up through at least 220-grit. For a detailed step-by-step procedure on surface preparation, refer to the "Finishing" feature in our November/December 1987 issue.

Stain

Stain is applied before the finish. Although polyurethane products with stain mixed in are now available, it's best to apply stain and polyurethane as separate operations. One has greater control, and can be assured of more predictable results by maintaining the separate operations. Polyurethane/stain combinations might be an option you would consider, but only when pressed for time.

The Environment

Equally important as surface preparation is the need for a dust-free environment in which to apply polyurethane. Sweep up all excess dust and chips (and allow the dust to settle), wear clean clothing that does not shed lint, place a cap over your hair, and if possible work in a finishing or spray booth. At the very least, suspend a plastic drop cloth over the work area to prevent some of the inevitable dust fall-out. Some woodworkers like to apply polyurethane first thing in the morning, before any activities stir up dust.

To understand just how important a clean dust-free finishing environment is, one only has to have one bad experience where dust specks, flying insects, or hairs have contaminated a just-applied polyurethane surface. It is a good deal less work eliminating the cause of the trouble, than try-

ing to repair the damage once it occurs.

The temperature of your workplace, and the temperature of the polyurethane are also critical. About 70-75 degrees Fahrenheit is optimum, so don't work if the temperature of either the surrounding air or the finish is below 60 degrees. Also, be sure that you wear an organic solvent respirator, since the fumes are harmful.

The Sealer Coat

Wipe the surface first with a clean cloth, or better yet a tack rag, to remove any dust. Although some polyurethanes can be thinned for an initial sealer coat in order to obtain greater penetration into the wood, you should pay close attention to the instructions on the can. If the instructions don't recommend thinning, then don't. If permissible, we prefer a 10-20 percent thinning with mineral spirits for the sealer coat. Don't try using shellac as a sealer coat, since polyurethane and shellac are incompatible.

Finish Coats

Second, third, and subsequent coats should be applied full-strength, unless one is spraying the material on, where thinning is first required.

Brush Technique

Stir, don't shake the polyurethane. Shaking causes minute bubbles to form that will appear as defects in the finish. After loading the brush, don't wipe it off on the edge of the can, as this too can cause minute bubbles. Instead, tap the brush lightly on both sides, on the inside of the can. Obviously, if you're starting with a new can you'll need to first pour about half off. Properly loaded, the brush should hold as much material as possible without dripping.

Work on one section at a time, brushing with the grain. If you are doing a tabletop, for example, apply the finish to an 18 in. long corner, then to the adjoining section, and so on, until about one third of the table is covered. Overlapping the sections, next work on the center third of the table, and finally on the last third. Edges should be done as the adjoining sections are completed.

Don't work the polyurethane in with the brush; rather just flow it on. Use a very light stroke, overlap the adjoining strokes, and then tip off each section with a light, long brush stroke before going on to the next section. If you must wipe the brush off hard to clean it, use a spare can, since wiping hard against the edge of the can with the polyurethane in it will cause contamination.

Most importantly, don't overwork the surface and don't go back over sections once the polyurethane has started to tack. This will almost certainly cause unsightly brush strokes and unevenness. It's better to sand the coat level after it has dried, and then apply another coat.

Between coats, you'll need to scuff-sand the surface with a 600-grit sandpaper, since the individual layers bond only through mechanical adhesion when dry. Polyurethane, unlike some other finishes, will not dissolve the layer below to form a chemical bond. Generally you'll have a better bond if the previous coat has not completely cured, but be careful that you don't sand while the previous coat is still tacky, since it will ball up. When spraying however, and where contamination from dust particles is not a problem, subsequent coats may be applied before the previous coat is dry. No matter what method you use to apply polyurethane, remember that many thin coats are always better than one or two thick coats. With overly thick coats one risks puddling in corners or other spots that might cause wrinkling, a condition where the polyurethane skins over before the material below dries.

If you prefer a sprayed finish, but don't have the necessary equipment, consider using aerosol spray cans. Although expensive and therefore impractical for large projects, aerosol cans do provide a quick, sure, no-mess way to finish smaller projects professionally with polyurethane.

Rubbing Out

After building up the desired coats of polyurethane (three coats are best), you may want to rub out the finish using pumice and rottenstone. Rubbing out adds a fair amount of work to the finishing process, but the results of the pumice and rottenstone method justify the time spent. Your reward is a level, transparent, high gloss finish that you may think isn't possible with polyurethane. If you can't find it locally, pumice and rottenstone can be purchased from the Garrett-Wade Co., 161 Avenue of the Americas, New York, NY 10013.

First, smooth the surface of the polyurethane with a 400-grit wet-or-dry sandpaper and water. Then sprinkle some fine pumice over the surface. Add enough linseed oil to create a slurry, and rub out with a soft cotton rag. Work in a circular motion.

To check your progress, wipe a small section clean. The pumice should have dulled the polyurethane to a soft, milky haze. Glossy spots are areas that still need rubbing. Once the entire surface has an even haze, wipe off the slurry.

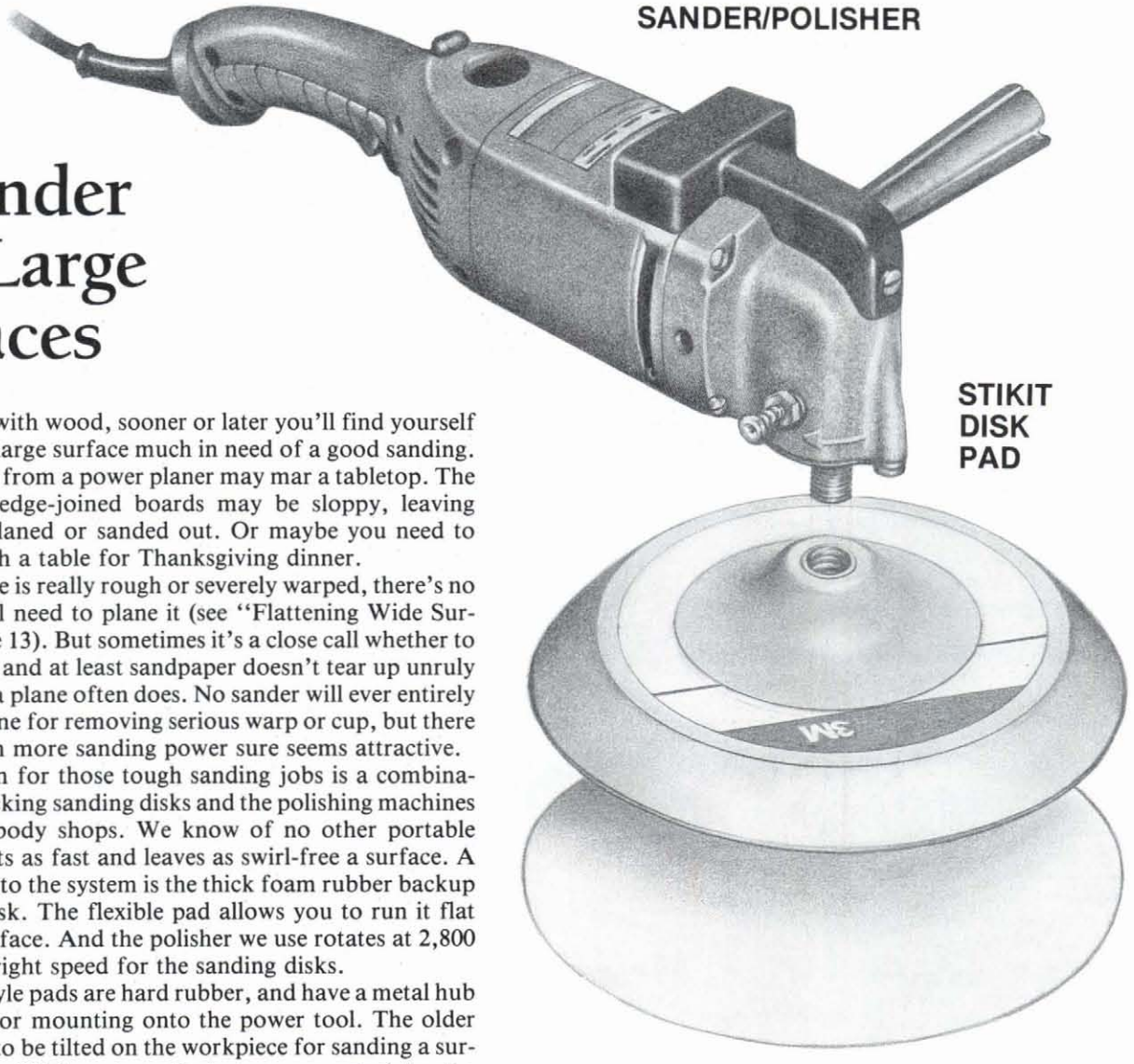
Now repeat the process, using rottenstone instead of pumice. Sprinkle the rottenstone over the surface and add enough linseed oil to create the slurry. As you work the slurry, using the circular motion, you should notice the dull haze gradually become transparent. Don't be afraid to use plenty of elbow grease. As before, check periodically to mark your progress. When finished, wipe the slurry off with a clean, dry rag.

A New Approach

If you haven't tried it before, you might be pleasantly surprised with the results of wiping on polyurethane. We know that at least one manufacturer, Formby, makes a specially formulated wiping polyurethane that performs something like a penetrating oil, in that it penetrates into the wood. Several coats provide a very nice finish that looks similar to a multi-layer tung or penetrating oil finish, or a light coat of spray lacquer.

We also tried wiping on regular polyurethane, with a rag, straight from the can. Although it went on a little thicker than Formby's formula, and did not seem to penetrate as much, the end result was nearly identical. Several wiped-on coats of gloss polyurethane looked like a cross between a highly buffed tung oil finish and a spray lacquer, and the satin polyurethane produced the same result, but with less shine.

A Sander For Large Surfaces



If you work with wood, sooner or later you'll find yourself staring at a large surface much in need of a good sanding. Chatter marks from a power planer may mar a tabletop. The alignment of edge-joined boards may be sloppy, leaving ridges to be planed or sanded out. Or maybe you need to quickly refinish a table for Thanksgiving dinner.

If the surface is really rough or severely warped, there's no question you'll need to plane it (see "Flattening Wide Surfaces" on page 13). But sometimes it's a close call whether to plane or sand, and at least sandpaper doesn't tear up unruly grain the way a plane often does. No sander will ever entirely replace the plane for removing serious warp or cup, but there are times when more sanding power sure seems attractive.

One solution for those tough sanding jobs is a combination of self-sticking sanding disks and the polishing machines used in auto body shops. We know of no other portable sander that cuts as fast and leaves as swirl-free a surface. A key ingredient to the system is the thick foam rubber backup pad for the disk. The flexible pad allows you to run it flat against the surface. And the polisher we use rotates at 2,800 rpm, just the right speed for the sanding disks.

The older style pads are hard rubber, and have a metal hub at the center for mounting onto the power tool. The older pads also had to be tilted on the workpiece for sanding a surface. The 3M Stikit pad vastly improves control by the elimination of the center hub, as well as the addition of the soft pad. The Stikit pad screws directly onto a ⅝ in. diameter work arbor.

We like the system so much we wonder why the combination isn't marketed more aggressively to woodworkers. At present, this equipment must be purchased from auto body supply stores.

The polisher we use is a Milwaukee 7 in. lightweight polisher. Don't mistake it for a grinder, which looks similar, but rotates much faster, about 5,000 rpm. Mounted on the polisher is an 8 in. 3M Stikit disk pad. We use 3M Stikit 8 in. sandpaper disks on the pads. The disks have adhesive on the back and come in a roll. In practice, you peel your old disk off the pad, rip a new one off the roll, and press it onto the pad. You don't need a tube of glue. And you won't need to replace the disks constantly because they seem to last longer than sanding belts.

The key point to remember when using the system is that the whole pad should be flat on the surface, even when starting the machine. After you gain some experience with the sander, you may want to tip the disk to feather out digs, or to lightly sand a corner. But do so with care. The feathering capacity gives the disks an advantage over a belt sander, which has an essentially flat bottom and can't flow into contours when desired.

With practice, the pads allow very precise control, and are even capable of delicate sanding on veneer.

When running the machine, use a sweeping motion across the surface. Don't push the disks into the surface, but let the machine do the work. With a light touch, swirl marks are hardly noticeable. Start with 80-grit paper and finish with 220-grit paper. With the finer paper you shouldn't be able to detect any swirl. However, you may want to finish up with a light sanding with the grain, either by hand or with an orbital sander.

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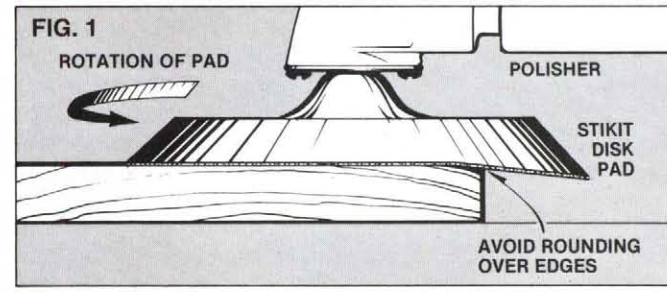
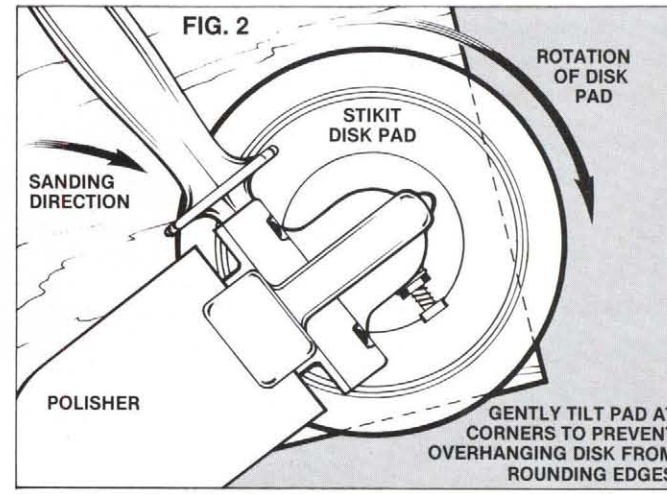
In The Shop
Continued



The large surface areas are the strong point of this disk sanding method. Edges and corners pose a problem. The soft disk tends to round over edges (Fig. 1), so it's a good idea to keep as much of the disk as possible inboard of the edge. On corners, some of the disk inevitably will fall over the edge. To compensate, gently tilt the sander away from the corner (Fig. 2). That will cut down on round-over and make the disk easier to control near corners. The overhanging disk tends to grab and dig.



The disk is also very hard to control on small surfaces. We don't recommend using it for small parts. Also be careful when sanding into closed corners. The pads are easily damaged and will catch and tear against a vertical surface.

Another disadvantage of the system is the amount of dust it raises. We strongly recommend wearing a good dust mask and using the system with adequate ventilation.

Although the disk sanding system isn't for everyone, it's certainly a handy tool to have around when you work with large surfaces.

The model 5535 Milwaukee polisher we use can be ordered from any dealer that handles Milwaukee tools. It cost us about $175. Other companies make similar machines. Look for a polisher or sander/polisher that runs about 3,000 rpm, the maximum recommended for the pad, and draws about 10 amps. The amperage is important because you want a motor powerful enough to drive the hefty pad.

The Stikit products, disks and pad, are available at auto body supply stores. The part number for the 8 in. pad is 05579. The paper we used is the 3M Stikit Gold 8 in. disks, which come in various grit sizes from 80 to 400. The pads and disks also come in 5 and 6 in. diameters, but those disks don't screw onto a $\frac{5}{8}$ in. arbor.

Child's Carousel Lamp

This lamp is the perfect Christmas gift for a child or grandchild. Fantasies of the gaily painted carousel pony will dance on long after the light has been turned off.

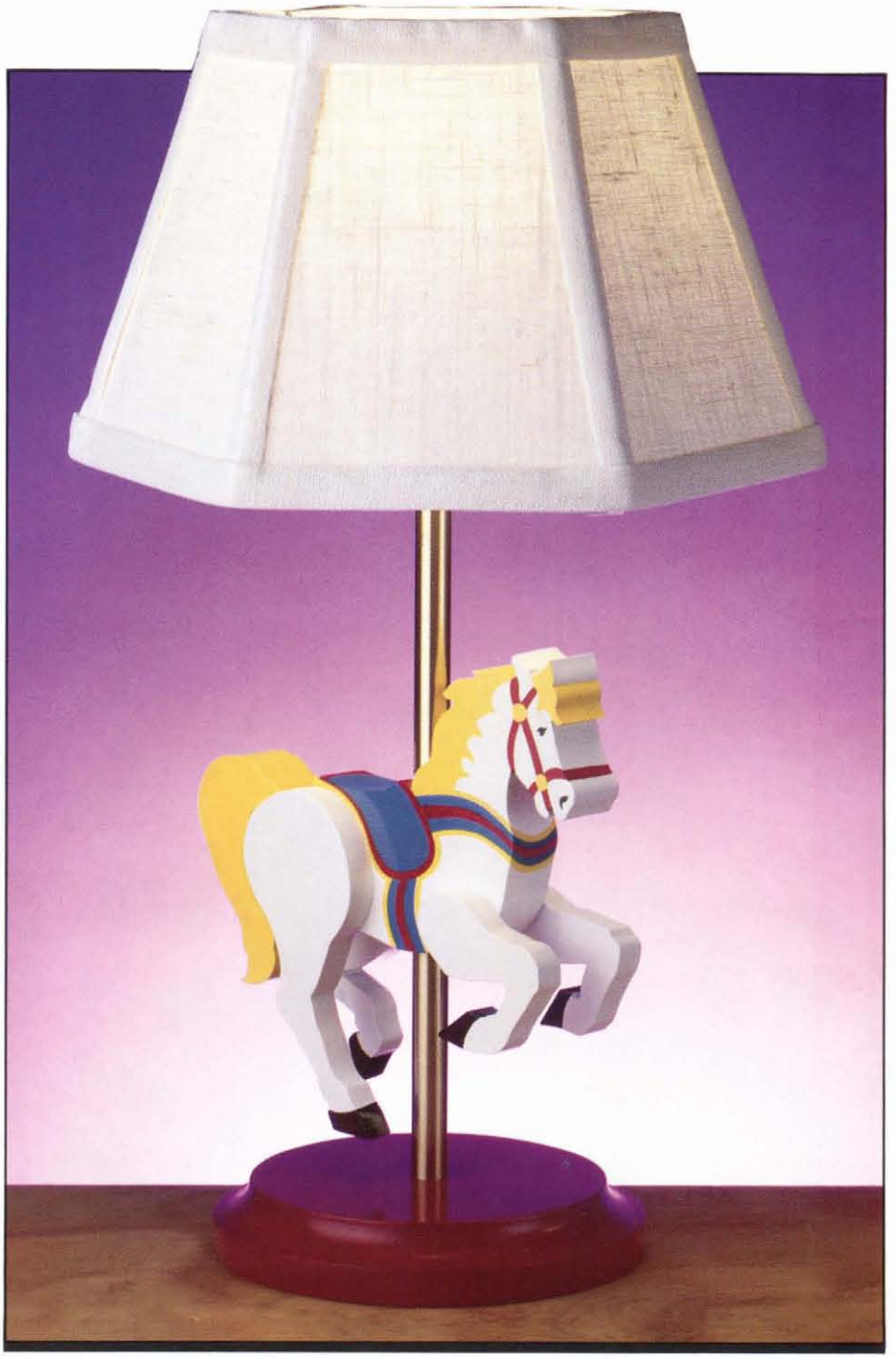
We used clear pine, 1 in. thick for the base (A) and body (B) and ½ in. thick for the legs (C, D, E). The 1 in. thick stock can be planed, and the ½ in. thick stock resawn from 1¼ in. stock, available at most lumberyards. The lamp hardware (parts F-M), and the shade (N) are available from a mail-order company (see Bill of Materials), if you can't find the parts locally.

If you can buy surfaced stock, a 1 in. thick board 6 in. wide by 14 in. long will yield the base and body, and a ½ in. thick board 6 in. wide by 10 in. long will yield all the leg parts. The two front legs are made from the same pattern. While you could trace the patterns, it's easier if you photocopy the full-size patterns, and paste them onto the stock with rubber cement or spray adhesive.

Cut the 1 in. thick stock into the sections for the base and body. Drill the hole through the body for the brass tubing (F), and drill the hole through the base for the cord (J). Also drill the holes in the base for the brass tubing and threaded lamp pipe (G), as well as the larger hole that allows access to the washers (K, L) and nut (M). Make the large diameter holes first, and then the ⅜ in. hole (See Base Detail). The scroll saw is used to cut out the round base and the body. Use the disk sander to clean up the base, and apply the cove detail with a ½ in. radius cove bit. A dowel wrapped with sandpaper can be used to sand the cove.

Sand thoroughly to remove the pattern paper and the rough edges from the scroll saw cuts. Once sanded, countersink the end of the cord hole in the base. Next, mark the locations of the legs on the body and label the legs so you don't get them confused. Once marked, they can be glued in place.

When the glue is dry, use spray enamel to paint the white on the horse, and the red on the base. Several light primer coats will make the finish more even. When dry, paint the details as shown in the full-size pattern. We used yellow for the mane and tail, red and yellow for the bridle, red, yellow and blue for the saddle, and black for the eyes, nostrils, and hooves.



Polish the brass tubing with 400-grit sandpaper, and coat it with clear lacquer or enamel. Be careful not to touch the brass tubing with your fingers after polishing it, or fingerprints will show under the lacquer. Then assemble the lamp as shown, roughing a small area on the tubing where it will be epoxied into the horse. Apply the epoxy to the tubing and slide the horse into position. Thread the cord through the base, hex nut (M), lock washer (L) and flat washer (K). Continue feeding it up the threaded rod (G) inside the tubing, then add the check ring (H) and the lamp socket (I). The threaded lamp pipe should be about 10⅞ in. long, but it's best to measure and cut exactly the length you need. File the ends after cutting to remove any burrs. Be sure to tighten the assembly before attaching the wire leads, so the cord will not twist.

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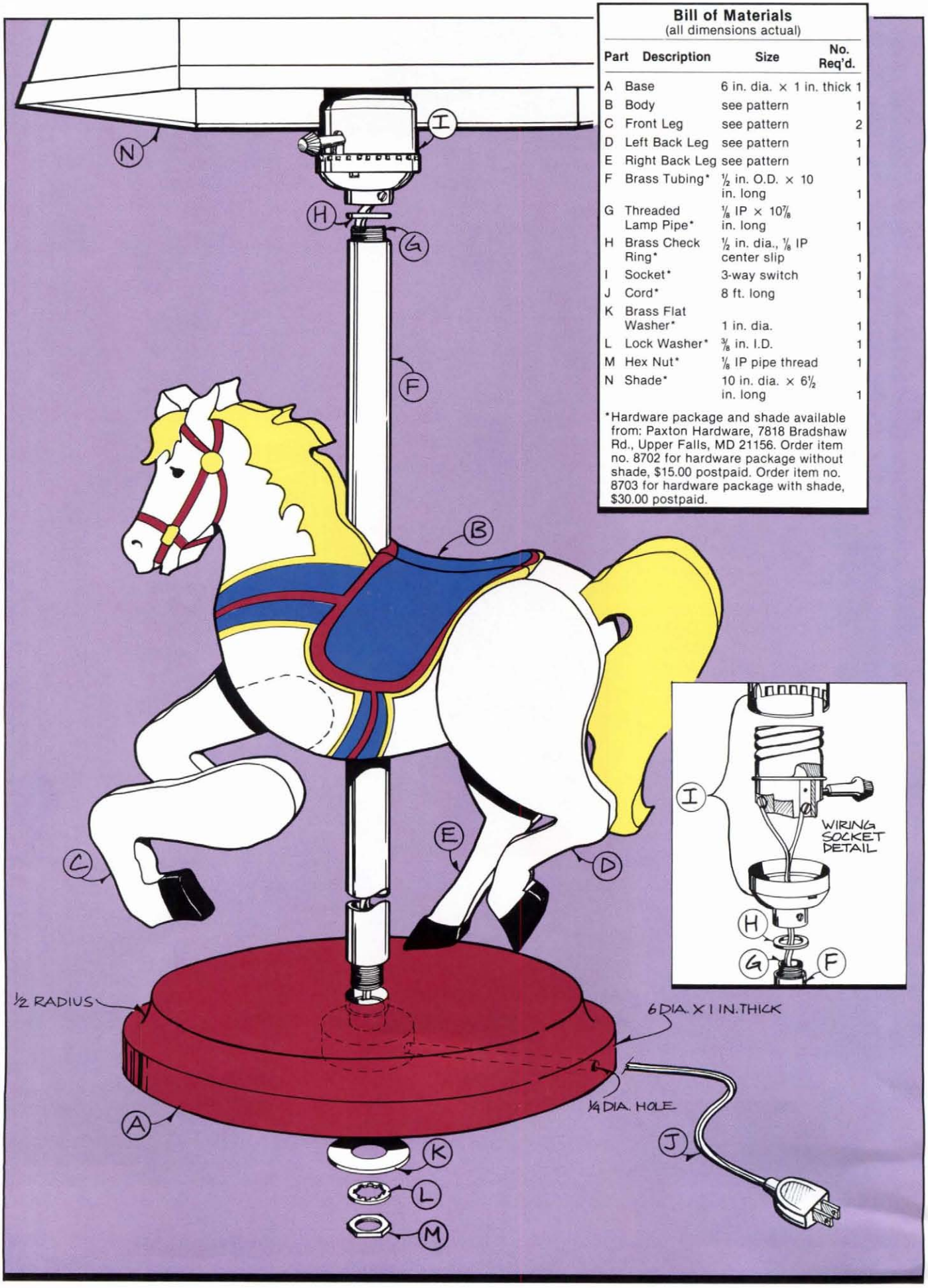
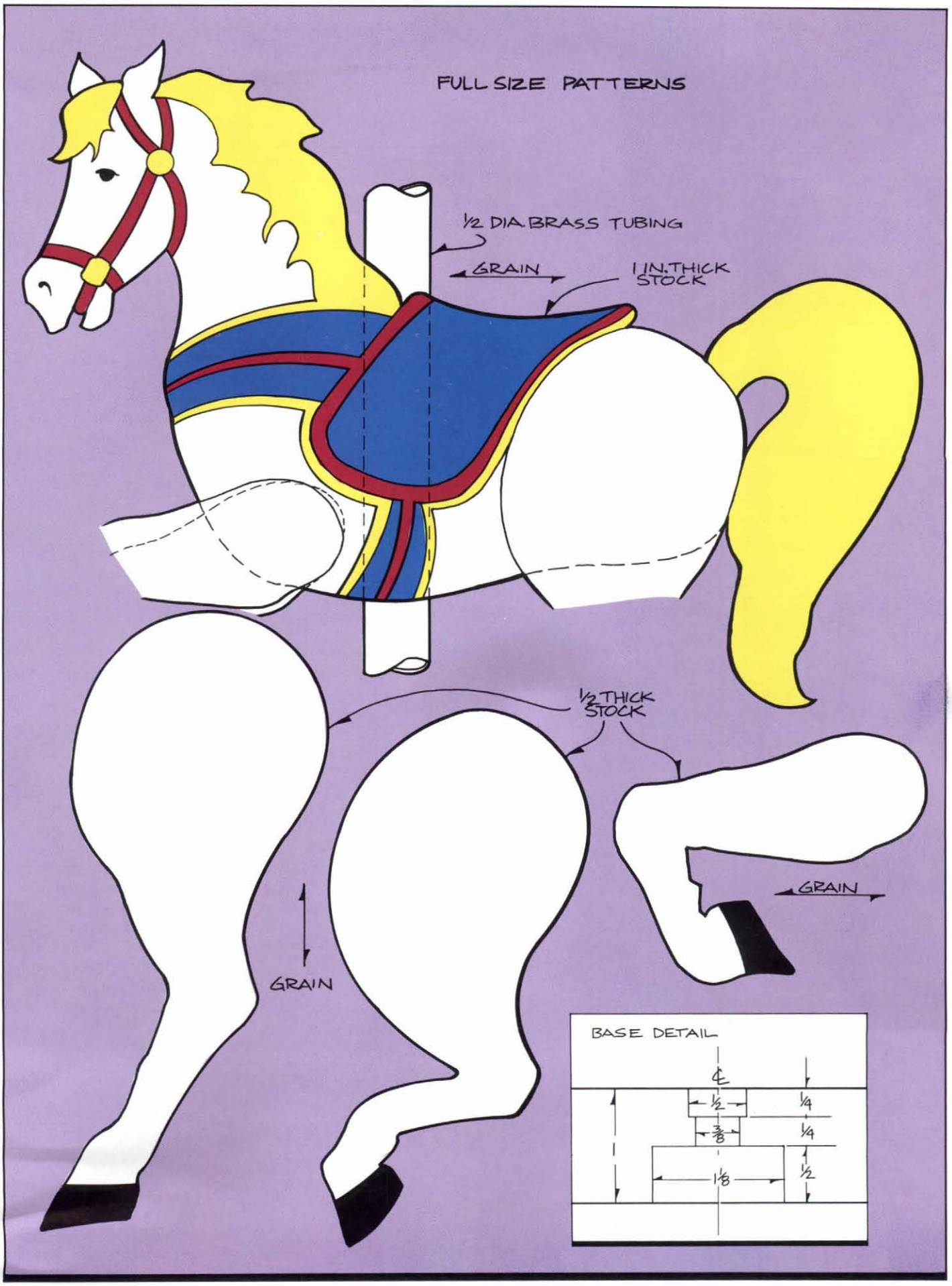


Bill of Materials
(all dimensions actual)

Part	Description	Size	No. Req'd.
A	Base	6 in. dia. × 1 in. thick	1
B	Body	see pattern	1
C	Front Leg	see pattern	2
D	Left Back Leg	see pattern	1
E	Right Back Leg	see pattern	1
F	Brass Tubing*	½ in. O.D. × 10 in. long	1
G	Threaded Lamp Pipe*	⅛ IP × 10⅞ in. long	1
H	Brass Check Ring*	½ in. dia., ⅛ IP center slip	1
I	Socket*	3-way switch	1
J	Cord*	8 ft. long	1
K	Brass Flat Washer*	1 in. dia.	1
L	Lock Washer*	⅜ in. I.D.	1
M	Hex Nut*	⅛ IP pipe thread	1
N	Shade*	10 in. dia. × 6½ in. long	1

*Hardware package and shade available from: Paxton Hardware, 7818 Bradshaw Rd., Upper Falls, MD 21156. Order item no. 8702 for hardware package without shade, $15.00 postpaid. Order item no. 8703 for hardware package with shade, $30.00 postpaid.


FULL SIZE PATTERNS
½ DIA. BRASS TUBING
GRAIN
1 IN. THICK STOCK
½ THICK STOCK
GRAIN
GRAIN
BASE DETAIL
℄
½
¼
⅜
¼
1⅛
½

SHAKER HIGH CHEST

This high chest, in butternut with walnut pulls, exemplifies the best in the spare and dignified Shaker style. Massachusetts woodworker Gene Cosloy tells us the chest isn't a direct copy of any particular Shaker piece, but draws on similar high chests for its layout and proportions.

Although the look of the chest is clearly Shaker, we've made a number of changes to simplify construction. Most importantly, a plywood back and plywood drawer bottoms replace the solid stock that the Shakers would have used. As some students of Shaker design have noted, the Shakers were quick to recognize the value of new ideas and more efficient methods. If they had plywood they would have probably used it. Designer Cosloy used a frame-and-panel back for the upper section, with tongue-and-groove boards behind the drawers, an alternative you may want to consider since a 4 ft. by 8 ft. sheet of walnut plywood costs well over $100.

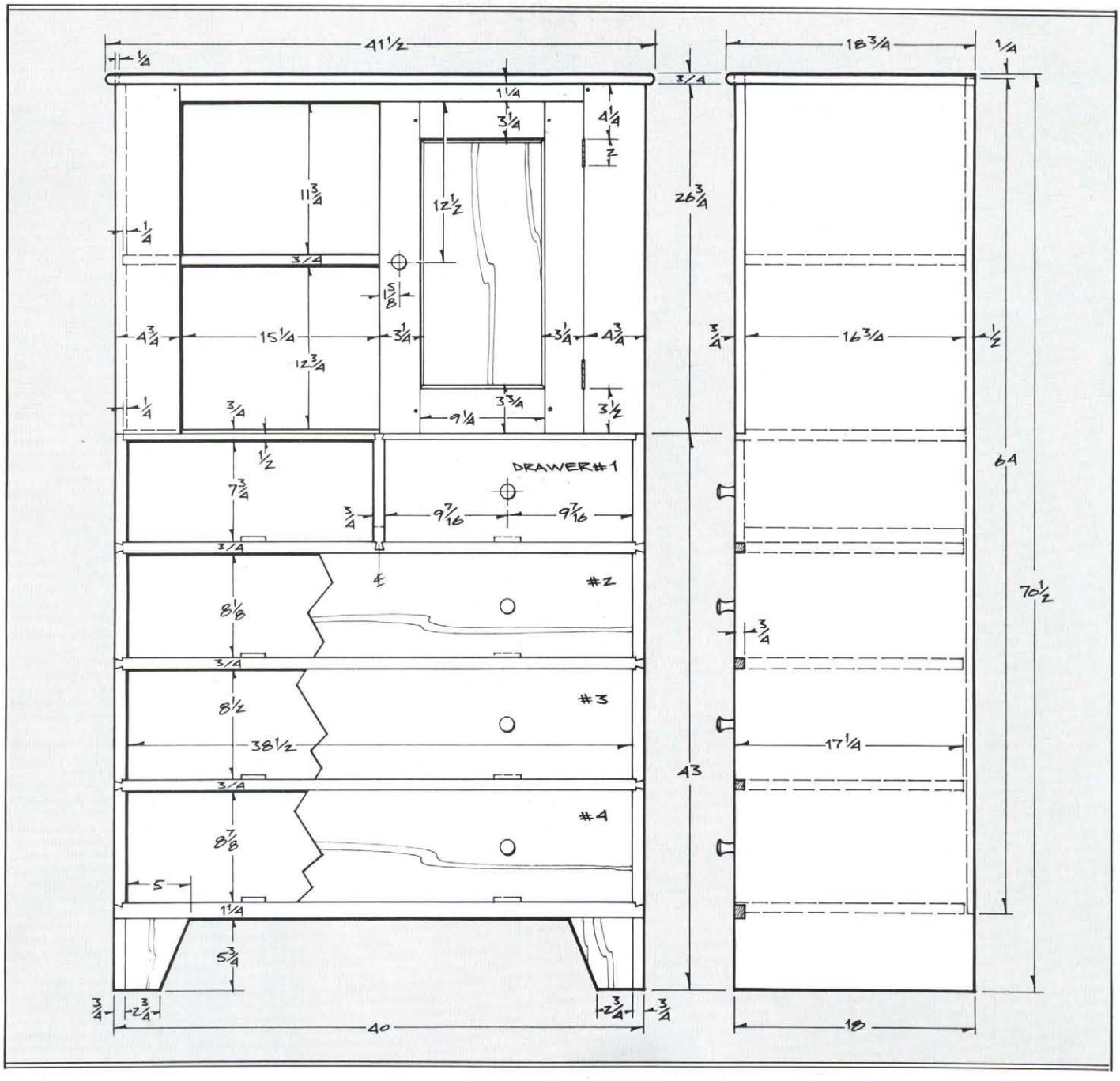
Two other changes simplify the carcase construction and allow for wood movement. First, similar Shaker case pieces typically show the sides (A) dovetailed into the top (B), but since the dovetails are concealed by a molding (P) and wouldn't be visible, we opted to rabbet and screw the top and sides. Second, in order to permit the case to expand and contract with changes in humidity, the drawer frames are sized ¼ in. shorter than the back-to-front span inside the case. Also, the frames feature slotted holes to direct any movement of the sides toward the back. This arrangement keeps all parts flush at the front of the chest, even if the width of the chest sides varies from season to season.

A good place to begin construction is to mill and edge-glue stock for the sides, top, and two shelves (C, D). If you don't have wide enough stock, you'll also need to edge-glue stock for the door panels (U). While you're waiting for these panels to dry, cut stock for the face frames (E, F), divider (G), drawer guide (H) and drawer frames (I, J, K, L, and M).

After cutting the sides, top, and shelves to length, use the router to establish the rabbets in the sides for the top and back, as well as the dadoes in the sides for the shelves and drawer frames. Notch the upper front edge of the sides to accept the face frame.

Next, lay out and cut the dovetail mortises for the drawer frame edge parts (J, M). Although you could cut these dovetail mortises and then make the dovetails to match, it's easier to first cut the dovetails and then scribe for the mortises using the dovetails as a template.

Before assembling the case, make the four drawer frames. As shown in the exploded view, the drawer frames are identical except for the center divider in the topmost frame. Refer to the detail for the construction of these drawer frames, and don't forget that the depth of the frames allows a ¼ in. space between them and the back. Bore the slotted screw holes in the drawer frame sides before gluing up the frames, and check each frame carefully for squareness. The dovetails on the divider (G), in the shelf (C), and in the topmost drawer frame edge are also cut before assembling the case. Be sure to rabbet the shelf along the front edge before cutting the dovetail into it. That allows you to establish the dovetail sides with a dovetail saw.



Assemble the sides, top, and shelves first. Then add the drawer frame edges, which are glued in place, and the drawer frames, which are glued where they meet the frame edges, but not along the sides. Use very little glue, to avoid a mess from squeeze-out, and wipe any excess off with a damp cloth before it dries. Use clamps to hold the frame and frame edges tight, and waxed clamp blocks to keep them flush. Screw the frames into the sides, and then add the divider and drawer guide, which are also clamped in place. Note that the screws you use to secure the drawer frames should be no longer than 1½ in., otherwise they can break through the sides of the chest.

For the back (O), select an attractively grained hardwood plywood. Walnut, perhaps with a bookmatched figure, would provide a nice detail for the cabinet interior. Screw the plywood into the sides, and shelves, but not into the drawer frames.

After making and installing the face frame, apply the side (P) and front (Q) bullnose molding. Although the front molding is glued in place, the side molding is anchored only with finishing nails. Glue is used only at the miters. Set the finishing nails and fill the holes with colored wood putty. Also add the feet (N), which are glued to the sides and screwed through the lower drawer frame edge, as shown. While we did not add blocks and levelers, you should consider them if your floors are very uneven.

Like other projects featured in *The Woodworker's Journal,* the drawer parts and door parts as listed in the Bill of Materials are sized for an exact fit based on the chest dimensions. In practice, always take your measurements directly from the piece, and then cut doors and drawers to fit, allowing a little space for clearance.

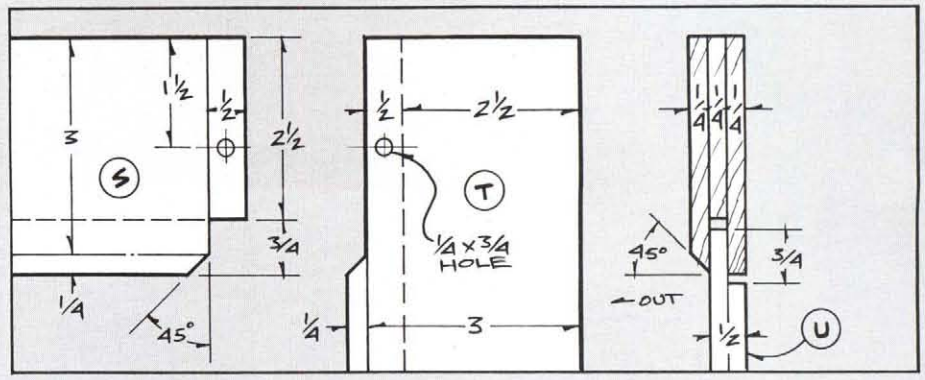
As shown in the door detail, the stiles and rails feature a 45-degree bevel edge around the panel perimeter (see Special Techniques, November/December 1986 for similar frame-and-panel). The bevels are mitered where they meet. If you prefer, a traditional frame and raised panel would also be

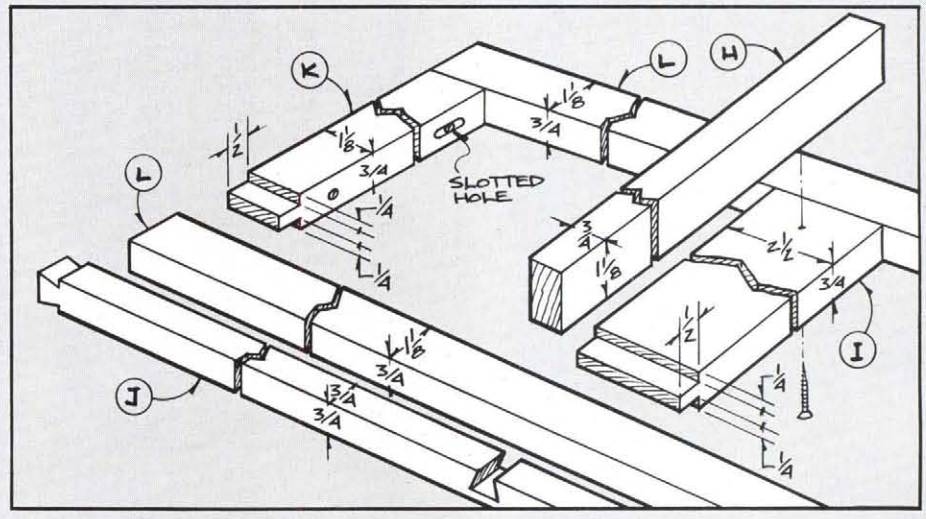
(continued on next page)

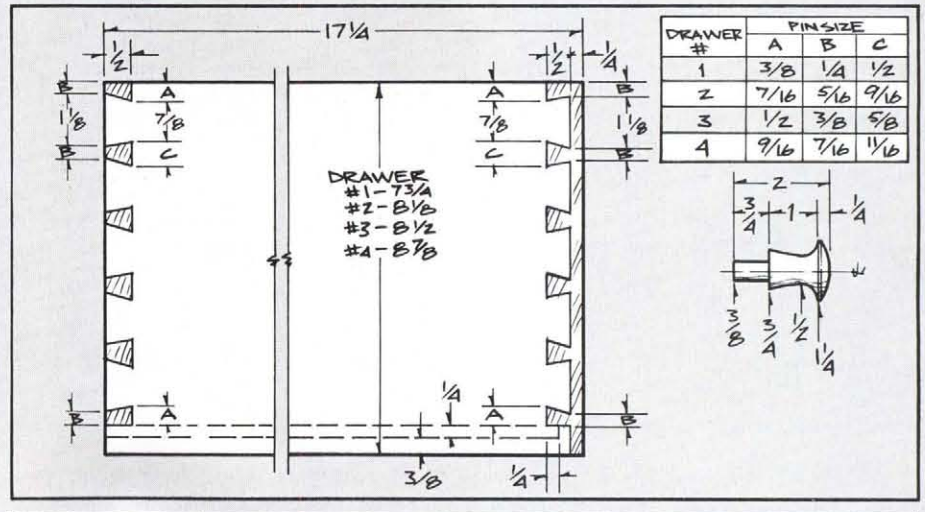
Bill of Materials
(all dimensions actual)

Part	Description	Size	No. Req'd.
A	Side	¾ × 18 × 70½	2
B	Top	¾ × 17¼ × 39½	1
C	Shelf	¾ × 17½ × 39	1
D	Upper Shelf	¾ × 16¾ × 39	1
E	Face Frame Rail	¾ × 2 × 31½	1
F	Face Frame Stile	¾ × 4¾ × 27½	2
G	Divider	¾ × ¾ × 8¾	1
H	Drawer Guide	¾ × 1⅛ × 16½	1
I	Drawer Frame Divider	¾ × 2½ × 15¼	1
J	Drawer Frame Edge	¾ × ¾ × 40	3
K	Drawer Frame Side	¾ × 1⅛ × 15¼	8
L	Drawer Frame Front/Back	¾ × 1⅛ × 39	8
M	Lower Drawer Frame Edge	¾ × 1¼ × 40	1
N	Foot	¾ × 5 × 5¾	2
O	Back	½ × 39½ × 64	1
P	Side Bullnose Molding	¾ × ¾ × 18¾	2
Q	Front Bullnose Molding	¾ × ¾ × 41½	1
R	Lower Door Rail	¾ × 3¾ × 10¼	2
S	Upper Door Rail	¾ × 3¼ × 10¼	2
T	Door Stile	¾ × 3¼ × 25½	4
U	Door Panel	½ × 10 × 19⅞	2
V	Drawer Stop	⅜ × 1 × 2	8
W	Knob*	See Detail	10
X	Hinge*	1½ × 2 Solid Brass Ball Tip	4
Y	Ball Catch*	Solid Brass Double Ball	2

*Knob (Part no. E4302, birch only), Hinge (Part no. D1911), and Ball Catch (Part no. D3910) can be mail-ordered from: The Woodworkers' Store, 21801 Industrial Blvd., Rogers, MN 55374.







DRAWER #	PIN SIZE A	B	C
1	⅜	¼	½
2	7/16	5/16	9/16
3	½	⅜	⅝
4	9/16	7/16	11/16

Drawers

Part	Description	No. Req'd. Per Drawer	Drawer 1	Drawer 2	Drawer 3	Drawer 4
Z	Side	2	½ × 7¾ × 17	½ × 8⅛ × 17	½ × 8½ × 17	½ × 8⅞ × 17
AA	Back	1	½ × 7⅛ × 18⅞	½ × 7½ × 38½	½ × 7⅞ × 38½	½ × 8¼ × 38½
BB	Front	1	¾ × 7¾ × 18⅞	¾ × 8⅛ × 38½	¾ × 8½ × 38½	¾ × 8⅞ × 38½
CC	Bottom	1	¼ × 16¾ × 18⅜	¼ × 16¾ × 38	¼ × 16¾ × 38	¼ × 16¾ × 38

acceptable. Note that the panels are sized to allow ⅛ in. on either side for wood movement, and are pinned at the center, both top and bottom. The knobs (W), solid brass hinges (X), and brass ball catches (Y) complete the cabinet assembly. Turn the walnut knobs as shown, or stain birch knobs a walnut color.

Like many Shaker case pieces, this cabinet features drawers that differ in size. Refer to the drawer chart for the dimensions of the parts for each of the drawers. We've also included a chart that should help simplify the dovetail layout. Note that the pins are slightly larger for each drawer. If you have a dovetail cutter and prefer to use a router rather than cut them by hand, you could increase the dimensions of the tails instead of the pins. The ¼ in. thick plywood drawer bottoms should be screwed securely into the bottom edge of the drawer backs. The weight of a full drawer could bend the plywood if it is not supported on all four sides. Don't forget to glue the drawer stops (V) in place. They keep the drawer fronts flush with the front of the chest and prevent the drawers from hitting the plywood back.

A chest such as this looks best with a satin oil finish. We've had excellent results with tung oil, applying three coats. Rub out the first two coats with steel wool, after they dry. For the final coat, wipe on and then wipe off the tung oil while wet.

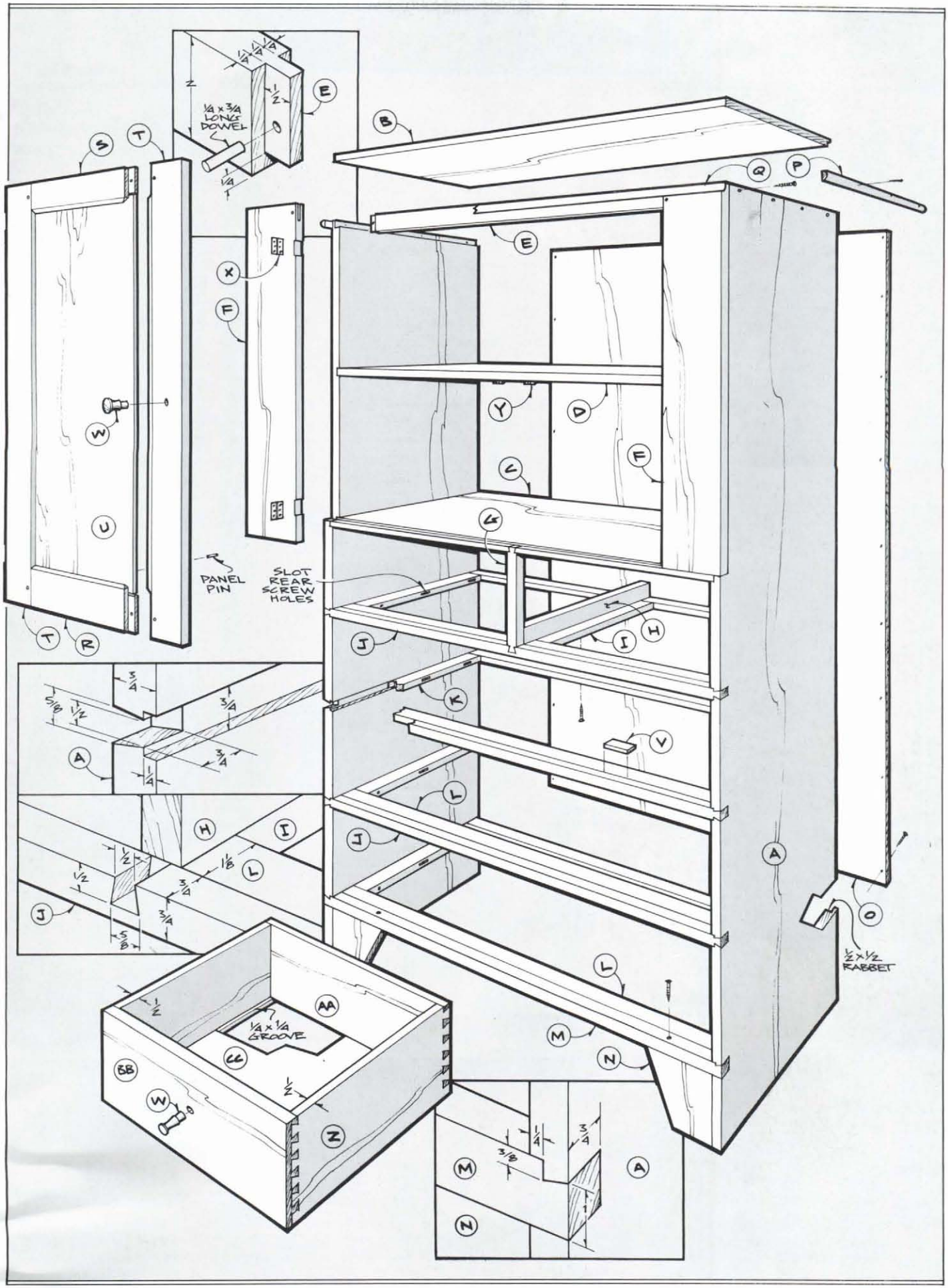

1/4 x 3/4 LONG DOWEL
PANEL PIN
SLOT REAR SCREW HOLES
1/2 x 1/2 RABBET
1/4 x 1/4 GROOVE

TABLE SAW CROSSCUT BOX

Whenever you require an accurate 90-degree crosscut, or when you need to cut a number of parts to identical length, there's no more efficient way to get the job done quickly than with a crosscut box.

We've incorporated extensions on our crosscut box to accommodate longer stock, and we sized the extensions to accept the Miter Gauge Stop featured in our May/June 1988 issue. The stop is particularly handy when making repetitive cuts.

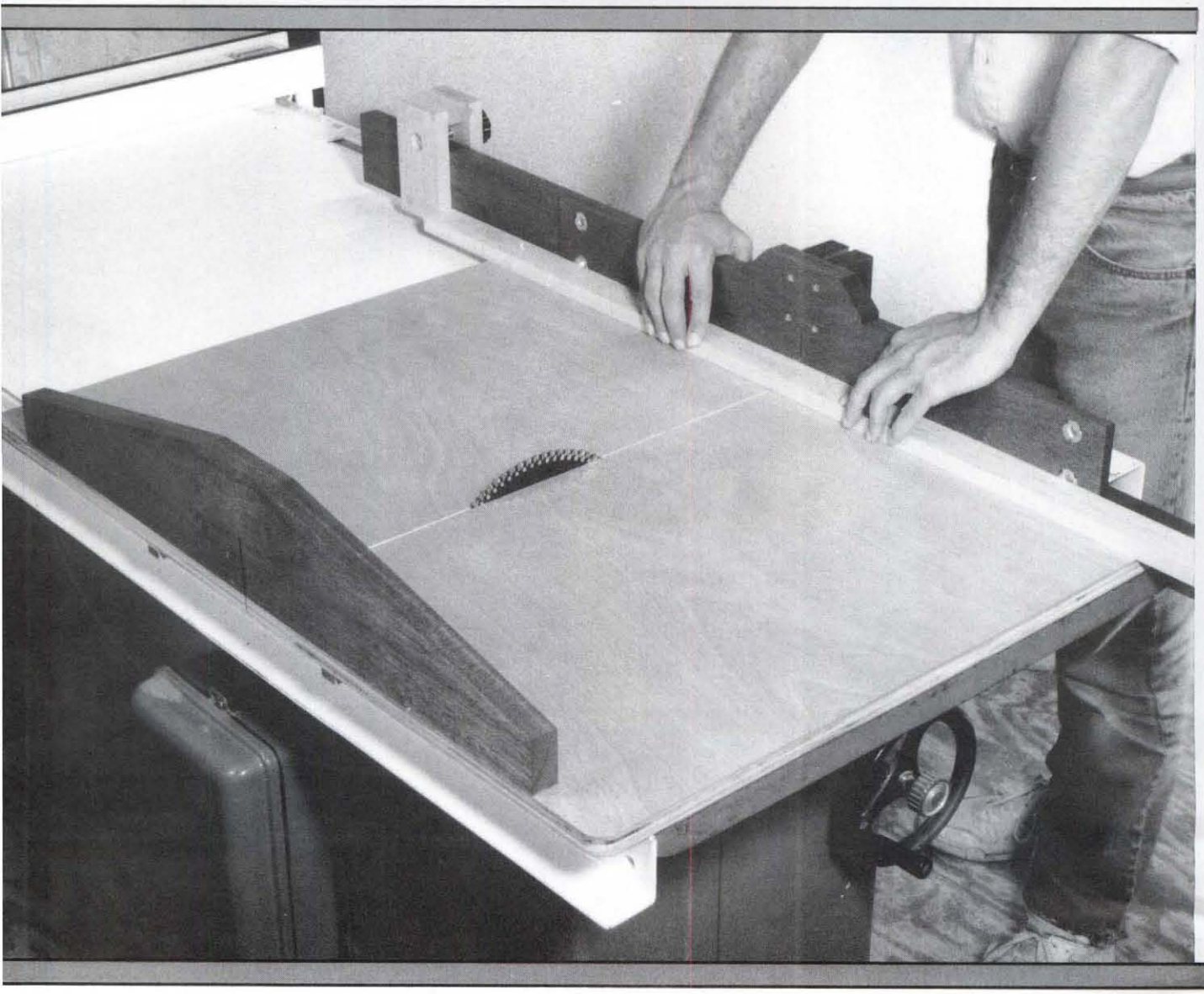
The box should be sized to fit your saw table, and since our table measures 27 in. by 36 in., that was the size we made the crosscut box. Although the crosscut box can overhang the sides of the saw table, don't make it any deeper than the table. Too deep a box can tip off the table, possibly causing an accident.

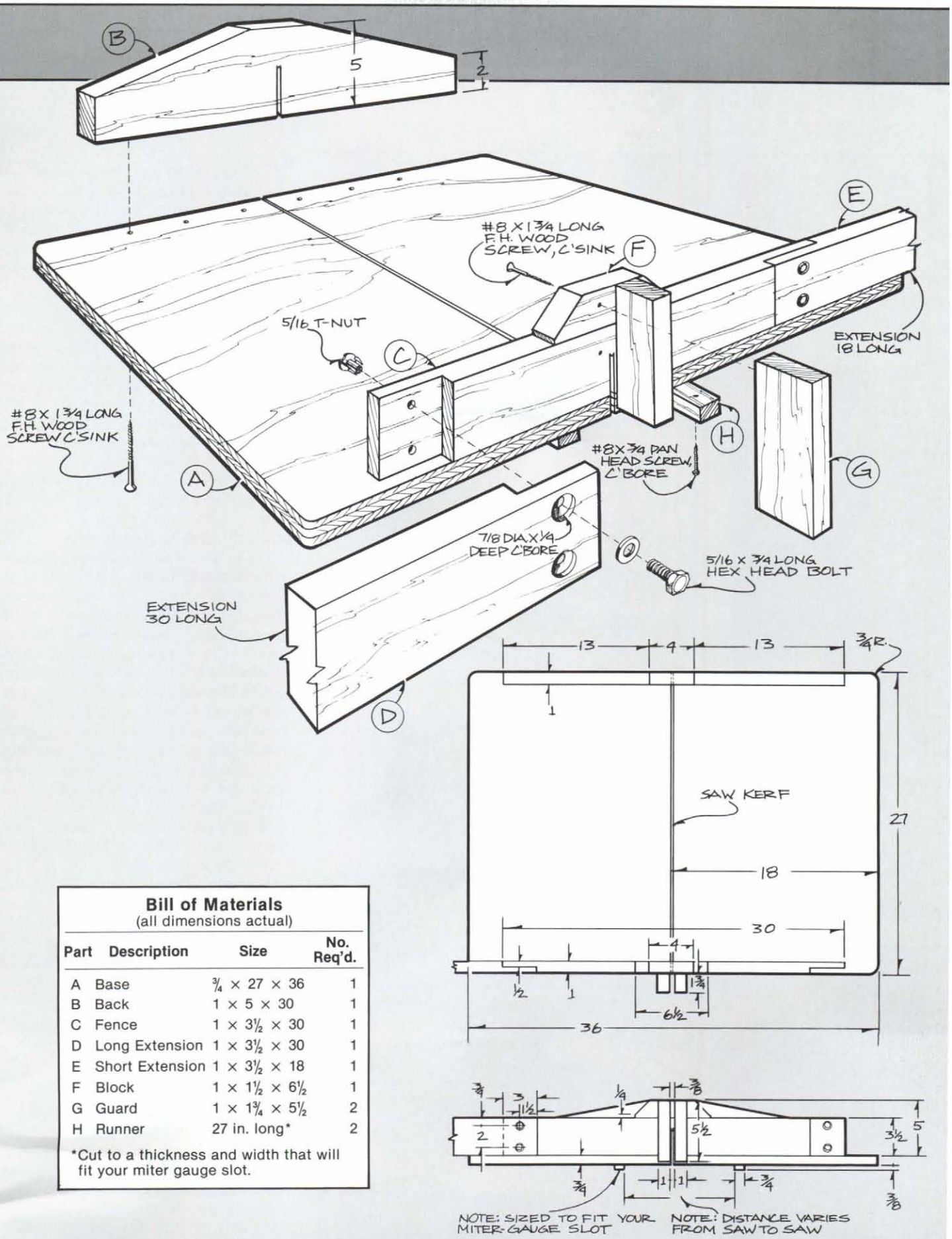
We used ¾ in. thick birch plywood for the base (A), and mahogany for all the remaining parts except the runners (H), which are maple. Maple wears exceptionally well, which makes it a good choice for the runners.

Cut the base to size, and form a radius on the corners as shown. Then cut the back and fence (B, C), the two extensions (D, E), and the block and guard parts (F, G) to size. Counterbore both fence extensions as shown, using a Forstner bit, then half-lap the fence and extensions, and bore through both for the hex head bolts. These bolts and the tee-nuts are sold at most hardware stores.

Assemble the base, back, fence, block and guards, and rip stock for the runners, which must be sized to fit your miter gauge slots. The runners should fit snugly yet slide easily in the slots. If too tight, they may bind during humid weather. After drilling and counterboring for the screws through the runners, use a framing square to locate the position of the runners at 90 degrees to the fence. Mark their positions, and screw them in place.

You should use a good quality crosscut blade to cut the kerf. Always use that same blade when using the box.





Bill of Materials
(all dimensions actual)

Part	Description	Size	No. Req'd.
A	Base	3/4 × 27 × 36	1
B	Back	1 × 5 × 30	1
C	Fence	1 × 3½ × 30	1
D	Long Extension	1 × 3½ × 30	1
E	Short Extension	1 × 3½ × 18	1
F	Block	1 × 1½ × 6½	1
G	Guard	1 × 1¾ × 5½	2
H	Runner	27 in. long*	2

*Cut to a thickness and width that will fit your miter gauge slot.

Country VEGETABLE BIN

The varnished top and punched tin panels add the right spice to this barn red vegetable bin. The potatoes, onions and summer squash won't taste any different, but the friendly cabinet may make you reach for the vegetables more often.

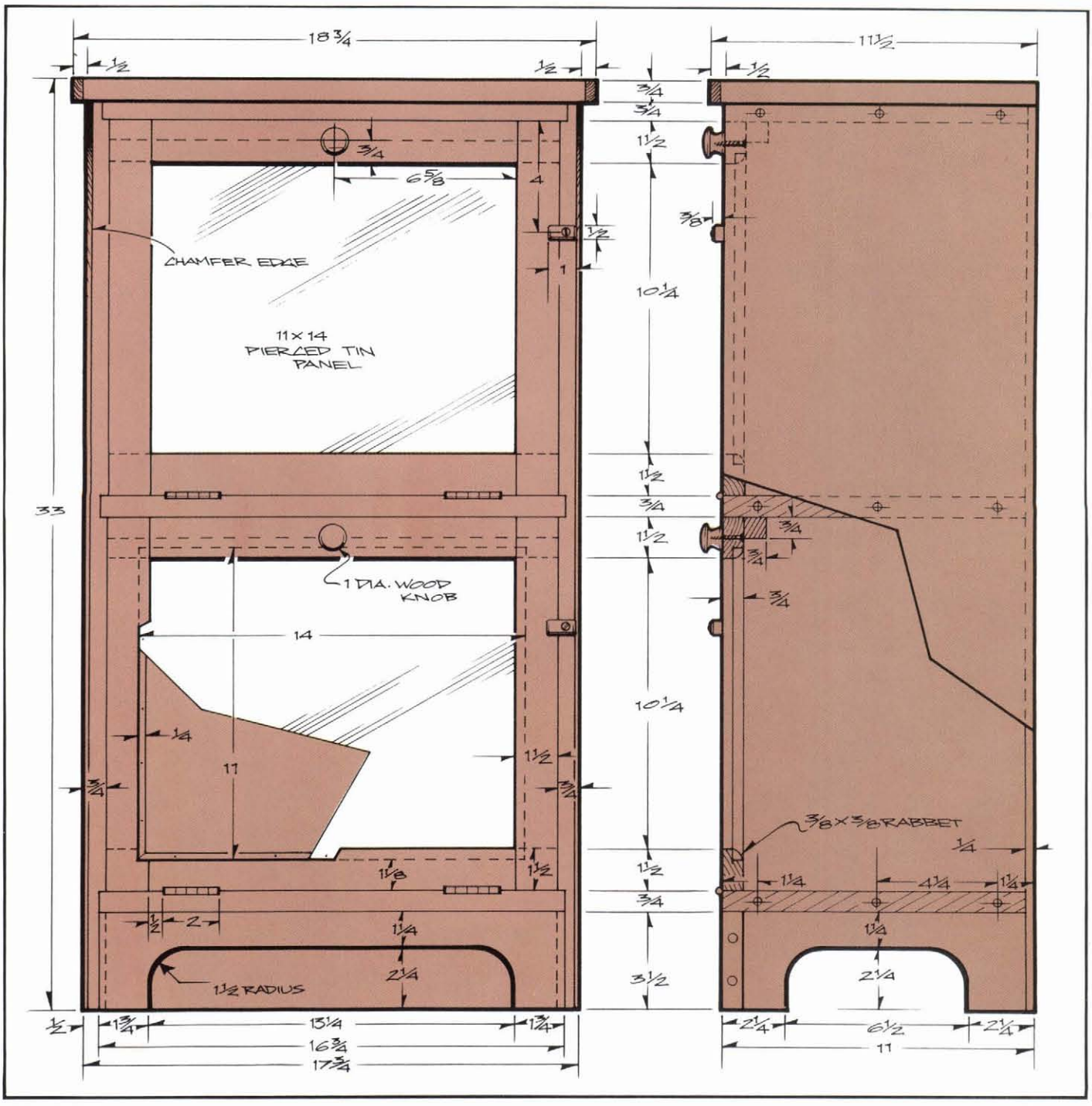
This small cabinet is also good practice in basic woodworking skills. The flush-mounted doors don't have lips to hide small size variations, so make sure to take extra care with the fit of the doors and cabinet. Also, the slip joints at the corners must be cut with precision for the doors to look right.

Begin by cutting the lumber to the sizes shown in the Bill of Materials. Cut all the parts except the top (A), back (E) and doors (G, H). You'll probably need to join boards for the top, and trim it to size afterward. The back is cut to fit after the cabinet is assembled. Doors are always made after the case is completed. With nominal 1 by 12 stock, you'll be able to get the 11 in. wide sides (B) and the 10¾ in. wide shelves (C) from single boards.

Next cut the radii on the sides and bottom rail (D), using a band saw or hand-held jigsaw. Then cut the grooves and dadoes in the sides, using a router or a dado blade. The dadoes across the grain are cut through for all three shelves. The rabbet for the bottom rail runs through to the shelf dado. And the rabbet for the back runs from top to bottom on both sides.

If you're using a router to cut the dadoes, clamp a straightedge across the sides to serve as a guide. It also helps to lay the two workpieces side-by-side and cut the dadoes in one router pass. Arrange the boards so that the two front edges butt together. That way, the router bit won't tear a chip from the finished edge.

After cutting the dadoes, mark the location of the screw holes as shown. Then drill and counterbore for the screws, which will be hidden by ⅜ in. diameter plugs. Before assembling the case, thoroughly sand all the parts you've made so far. It's easier to do the sanding now before the parts are assembled. Also dry-fit the parts to insure they fit, then measure for, and cut, the

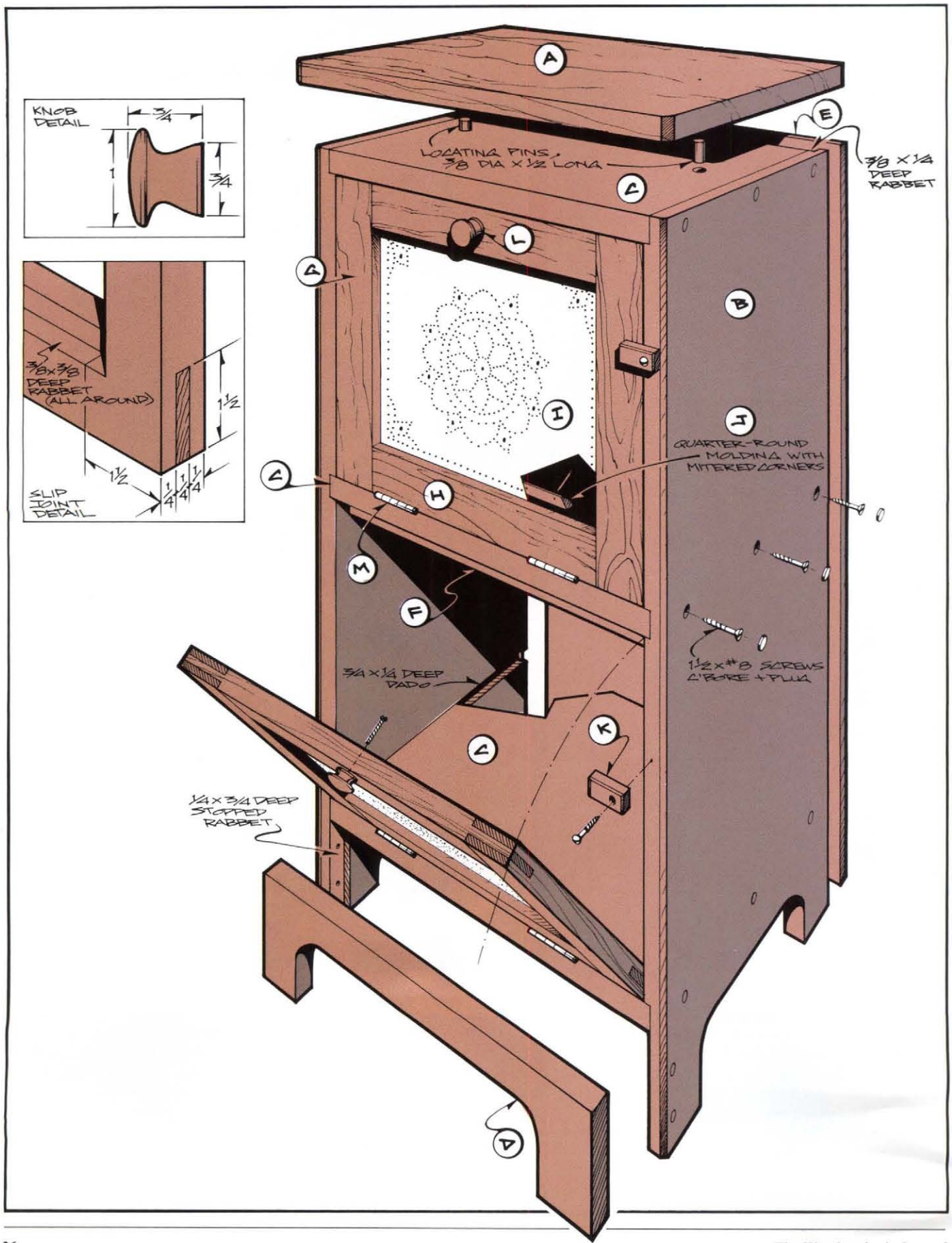


plywood back. When assembling, use glue sparingly to prevent it from squeezing out onto the wood surface. Pull the case together with screws and add the back, which should square up the piece. You don't need clamps as the screws will hold the shelves and bottom rail snugly in place while the glue dries. Before setting the case off to the side, carefully check it to make sure it's square. If the diagonals from corner to corner measure the same, then it's square.

Next, take the measurements for the doors, which should be about 1/16 in. smaller than the opening. Carefully cut the stiles and rails to length trying for as clean a cut as possible. Pine chips easily, so sandwich the workpiece with scrap wood for each cut. A good crosscut blade is very helpful here.

For accurate slip joints it's best to use a table saw. Cut the mortised portion first and then size the tongue to fit. We used a tenon jig to cut both parts of the joint. The jig gives you added stability so you can safely cut the frame parts on end. Note that the initial shoulder cut for the tongue is cut with the miter gauge. Also note that you should always keep the same faces against the fence. Don't flip the pieces

(continued on next page)


KNOB DETAIL
3/4
1
3/4
3/8 x 3/8 DEEP RABBET (ALL AROUND)
1 1/2
1 1/2
1/4
1/4
1/4
SLIP JOINT DETAIL
A
LOCATING PINS, 3/8 DIA x 1/2 LONG
E
3/8 x 1/4 DEEP RABBET
C
L
G
B
I
J
QUARTER-ROUND MOLDING WITH MITERED CORNERS
C
H
M
F
1 1/2 x #8 SCREWS C'BORE + PLUG
3/4 x 1/4 DEEP DADO
C
K
1/4 x 3/4 DEEP STOPPED RABBET
D

over for successive cuts; instead turn them end for end.

After gluing up the doors, cut the rabbet for the tin (I) with a router and a $\frac{3}{8}$ in. rabbeting bit. Square off the rounded corners with a chisel. For the retainer strips (J), we used quarter-round molding.

Finally, chamfer the front edges of the cabinet with a hand plane, nip the corners of the top to match, and mortise for the hinges (M) in the doors and shelves. Note that for the doors to work smoothly, the hinges must be carefully mortised into the frames and the case. Now plug the screw holes with $\frac{3}{8}$ in. diameter plugs. Cut the plugs off close to the cabinet after the glue dries. Thoroughly sand the cabinet and doors.

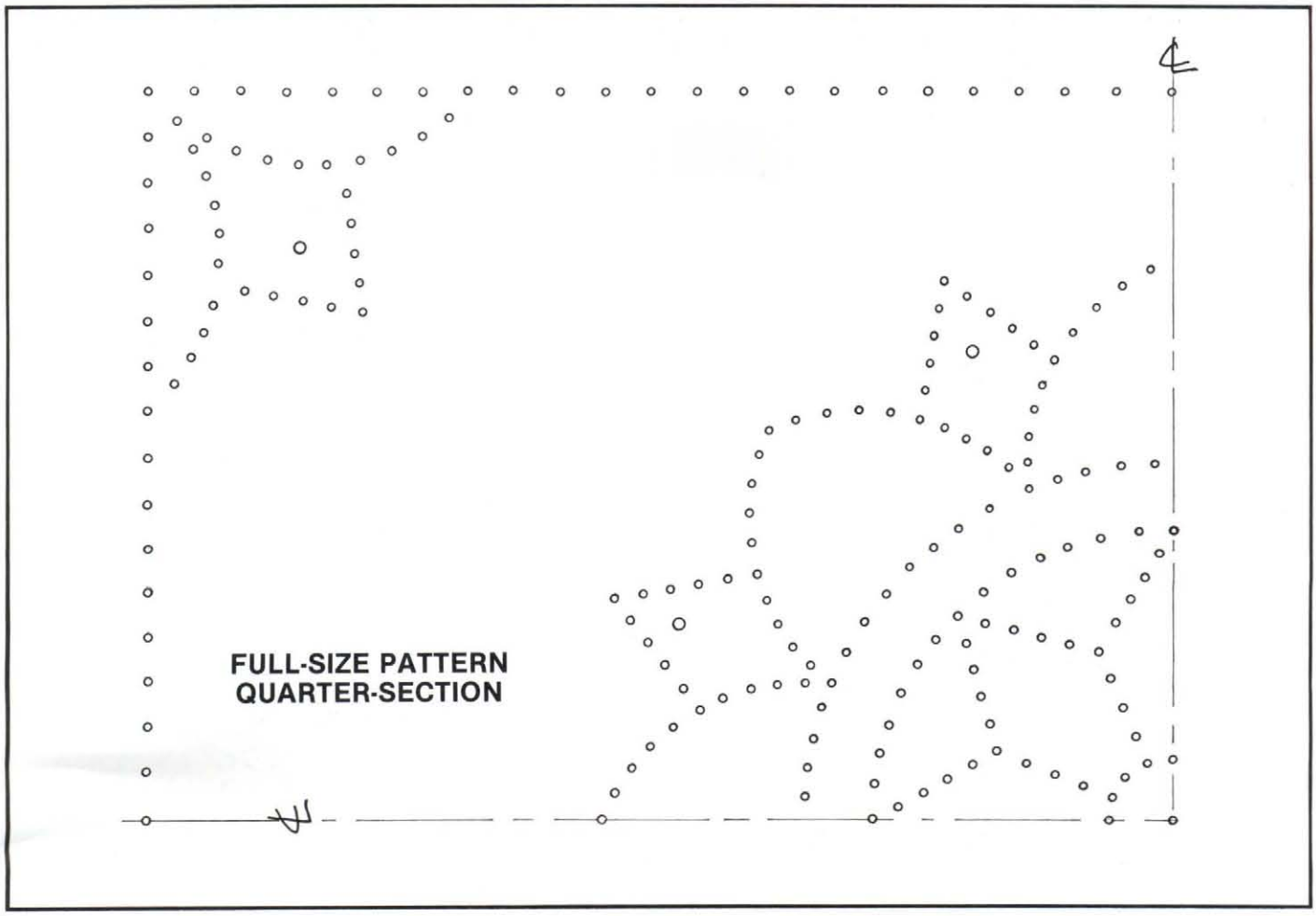
To punch the tin, make a template from our full-size pattern. The pattern is symmetrical so you can use the quarter-section we supply to make the whole template. Lay the paper template over the tin and punch through it to form the holes. Use a $\frac{1}{32}$ in. nail set for the small holes, and a $\frac{3}{32}$ in. nail set for the larger holes. Or, you can use regular tin punches if you have them. Be careful to keep all the holes uniform. We used Pie Safe Tin available from Country Accents, P.O. Box 437, Montoursville, PA 17754. Be careful handling the tin; fingerprints can etch it. For more on tin punching refer to the "Special Techniques" article in our January/February 1988 issue.

Bill of Materials
(all dimensions actual)

Part	Description	Size	No. Req'd.
A	Top	$\frac{3}{4} \times 11\frac{1}{2} \times 18\frac{3}{4}$	1
B	Side	$\frac{3}{4} \times 11 \times 32\frac{1}{4}$	2
C	Shelf	$\frac{3}{4} \times 10\frac{3}{4} \times 16\frac{3}{4}$	3
D	Bottom Rail	$\frac{3}{4} \times 3\frac{1}{2} \times 16\frac{3}{4}$	1
E	Back	$\frac{1}{4} \times 17 \times 32\frac{1}{4}$	1
F	Door Stop	$\frac{3}{4} \times \frac{3}{4} \times 16\frac{1}{4}$	2
G	Door Stile	$\frac{3}{4} \times 1\frac{1}{2} \times 13\frac{1}{4}$	4
H	Door Rail	$\frac{3}{4} \times 1\frac{1}{2} \times 16\frac{1}{4}$	4
I	Door Panel	11 × 14 tin	2
J	Retainer	$\frac{1}{4}$ in. quarter round	as req'd.
K	Turnbutton	$\frac{3}{8} \times \frac{1}{2} \times 1$	2
L	Knob	see detail	2
M	Hinge	$1\frac{1}{2} \times 2$	4

Finish the top and doors separately from the cabinet so you don't get paint on the varnished surfaces. Screw or glue the top to the case after you've finished painting and varnishing. We used polyurethane for the top and doors and barn red milk paint for the case. The milk paint is available from The Old Fashioned Milk Paint Co., P.O. Box 222, Groton, MA 01450.

Finally, mount the doors and add the knobs (L) and turnbuttons (K). The turnbuttons are made from scrap, and screwed into the case with $\frac{1}{2}$ in. by no. 4 screws. You can also add lid supports, available at most hardware stores, to keep the doors from resting on the knobs when open.



Whale Pull Toy

Our whale on wheels may just deliver your little Jonah from the oceans of plastic Rambos littering toy stores at Christmas time.

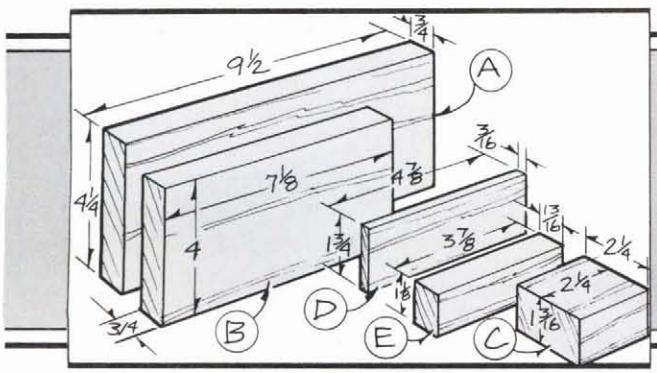
The birch and mahogany give the toy a rich texture and lasting appeal. Toymaker Skip Arthur designed this pull toy with an offset axle hole in the wheels so a toddler's eager pull opens the jaw as the body lurches along. The jaw opens because the wheels raise the body off the floor.

We show a band saw technique for making the whale, but you could just as easily use all hand tools. The power tools do save a lot of time, however, if you're going to turn out a school of whales for Christmas presents.

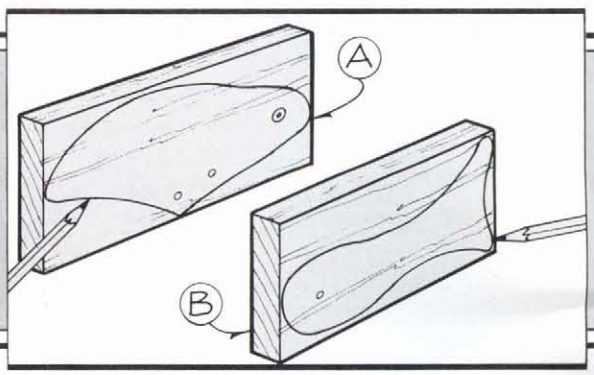
One tricky part of the construction is getting the tail to pivot freely on the body. A flathead screw holds the two parts together, with the shank serving as a bearing. It's tricky because the screw must be snug enough to hold the parts together, but loose enough to allow them to pivot freely. To get the right fit, cut a 1 in. by no. 10 screw down to ¾ in., and drill the holes in the tail and body as shown. You may need to adjust the screw length with a file.

If you're making the whale for a young child, omit the ball on the end of the string. It may present a choking hazard.

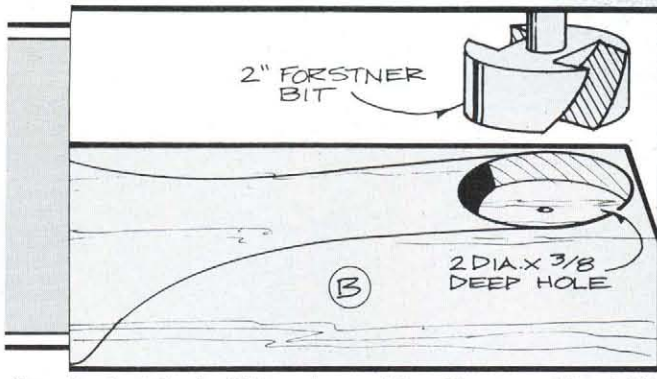
We prefer not to finish toys. If you choose to add one to the whale, make sure it's non-toxic.



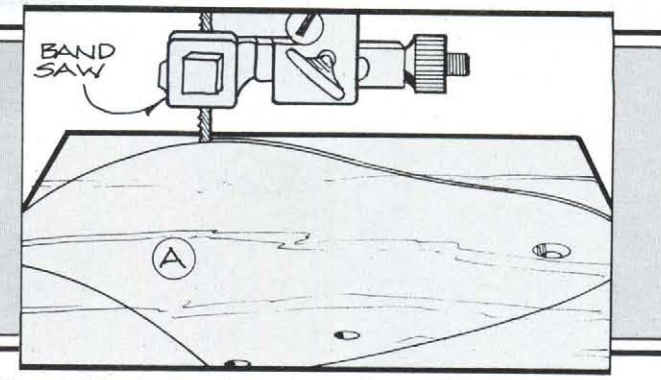
Step 1: Cut the seven blanks to size (there are two each of parts C and D). Parts A, B, C, and E are made from birch, parts D are mahogany.



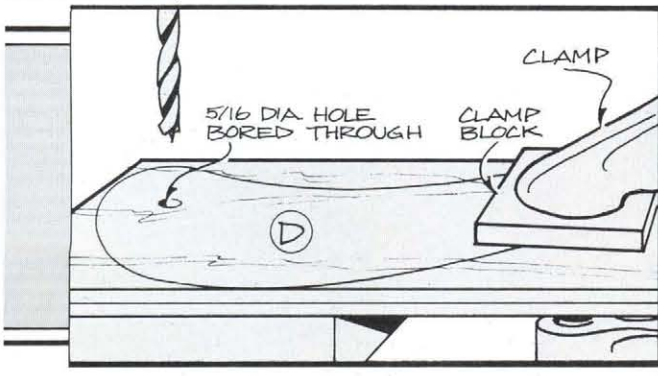
Step 2: Using the full-size patterns provided, lay out the body (A) and tail (B) profiles and mark the location of the holes.



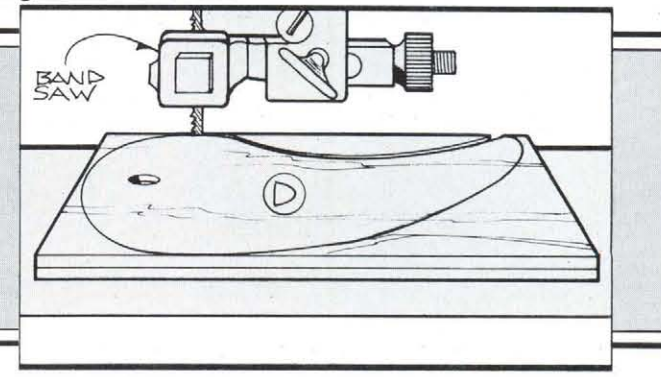
Step 3: Cut the half-lap pivot with a Forstner bit, drilling from one side on the body, and from the other side on the tail. Also drill for the axle, jaw pin and string hole, and the tail screw hole, which is countersunk.



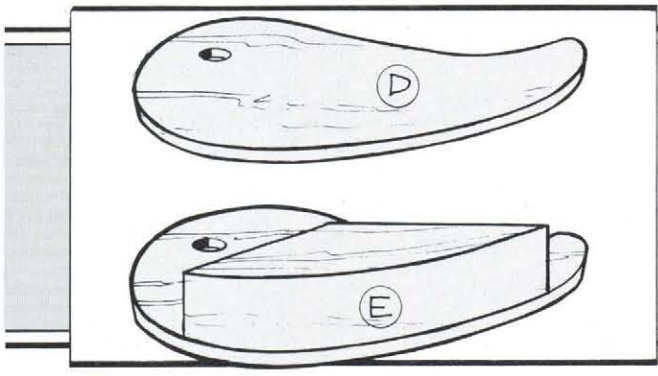
Step 4: Use the band saw to cut the profiles on the body and tail. Soften the edges using a router with ¼ in. round-over bit. Use files where the stock is too thin to support the bearing of the router bit.



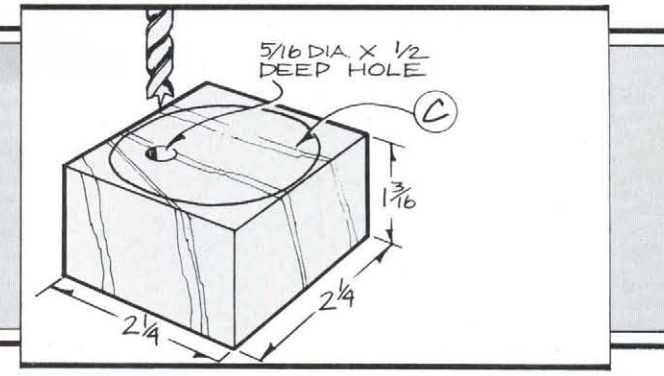
Step 5: Use the full-size pattern to lay out the profiles on parts D and E. Drill the 5/16 in. diameter jaw pin hole with parts D clamped together.



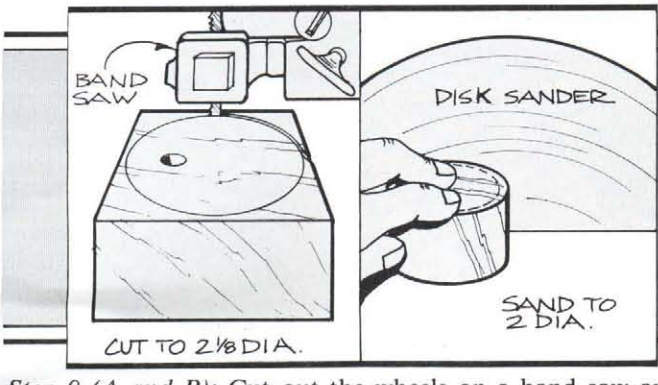
Step 6: Use the band saw to cut parts D and E. Use double-faced tape or a dab of hot glue to hold parts D together while cutting.



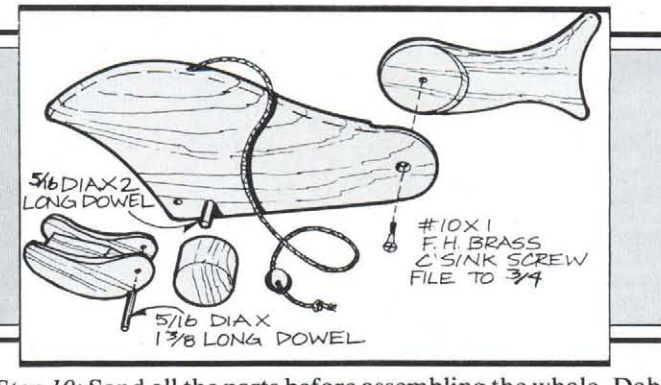
Step 7: Position parts D and E, then glue and clamp. The dotted line on the full-size pattern shows the position of E on D. Sand the edges flush if necessary.



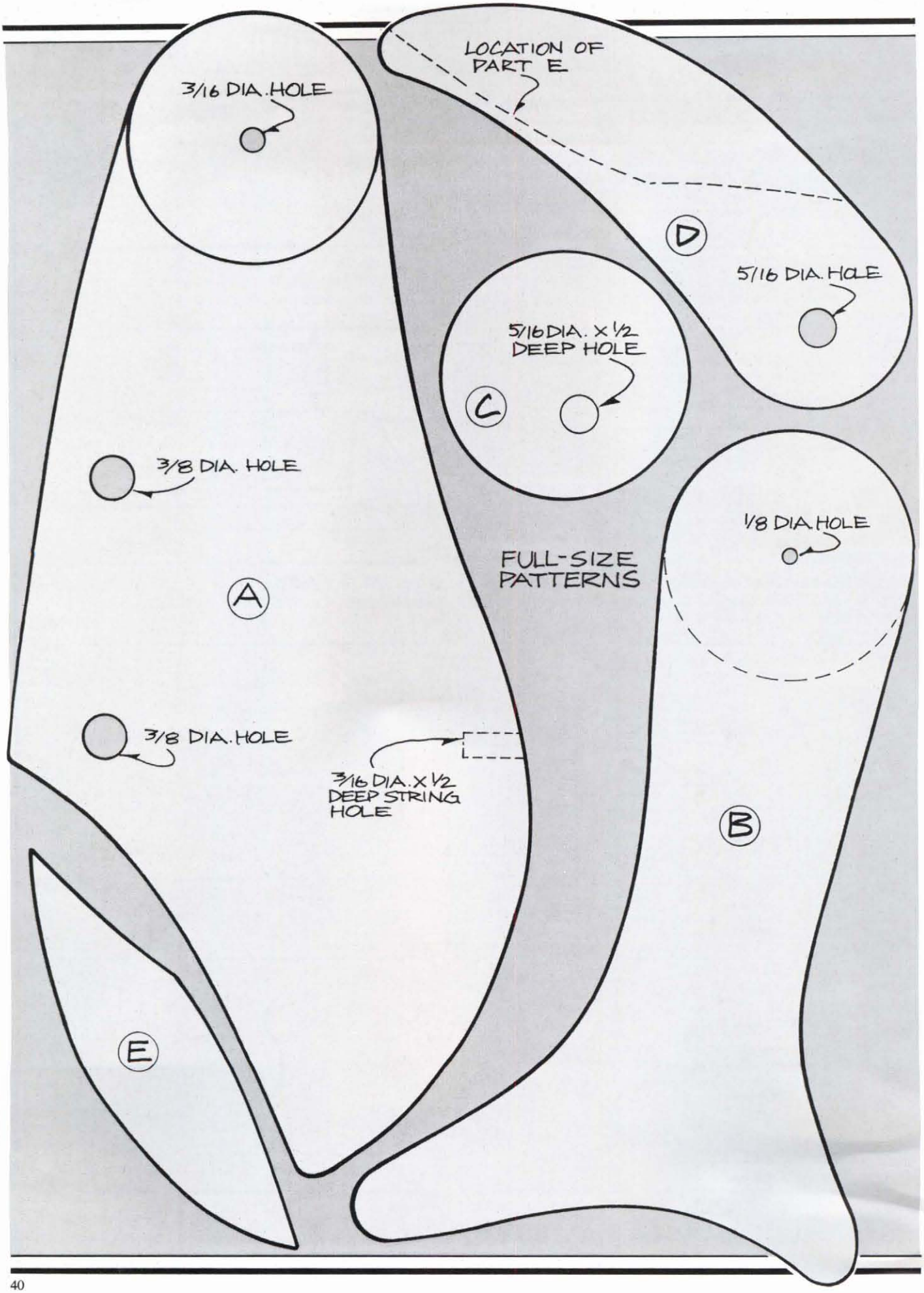
Step 8: Lay out the wheels (C) on the blocks and drill the offset axle holes as shown in the full-size pattern.



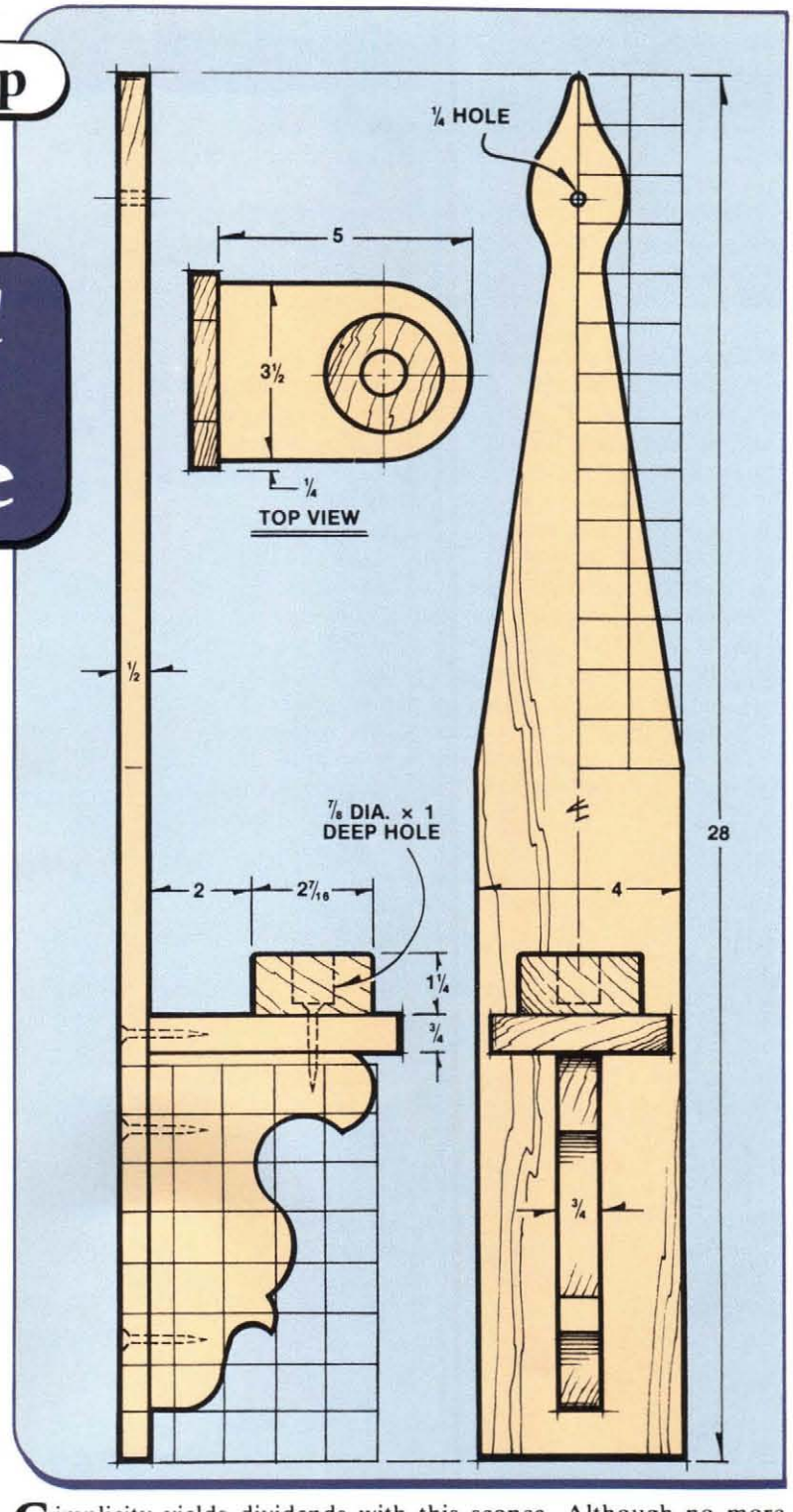
Step 9 (A and B): Cut out the wheels on a band saw and finish shape on a disk sander. Round over the edges. Also whittle a ½ in. diameter ball or disk from scrap, and drill a ⅛ in. diameter hole in it for the string.



Step 10: Sand all the parts before assembling the whale. Dabs of glue hold the dowels onto the wheels and jaw. But the dowels should pivot freely through the holes in the body.


LOCATION OF PART E
3/16 DIA. HOLE
D
5/16 DIA. HOLE
5/16 DIA. X 1/2 DEEP HOLE
C
3/8 DIA. HOLE
1/8 DIA. HOLE
FULL-SIZE PATTERNS
A
3/8 DIA. HOLE
3/16 DIA. X 1/2 DEEP STRING HOLE
B
E

Colonial Wall Sconce



Simplicity yields dividends with this sconce. Although no more than a shaped bracket to hold a candle, the piece adds a pleasing accent to any wall.

We used ½ in. thick pine for the back, ¾ in. thick pine for the shelf and bracket, and 1¼ in. thick pine for the glass-chimney holder. Cut the profiles with a scroll saw or band saw. When cutting the circle for the chimney holder, stay a little outside the line and then sand to the final size. The diameter of the holder must be exact so it matches the opening of the chimney.

The four parts are screwed together as shown. For a finish, we used Minwax Ipswich Pine stain followed by two coats of tung oil. The 2½ in. by 10 in. glass chimney can be ordered from Paxton Hardware, 7818 Bradshaw Road, Upper Falls, MD 21156. Order part no. 8701. The price is $6 postpaid.

The Gift Shop

Treetop Christmas Ornament

This delicate scroll saw project will add a nice touch to your collection of Christmas ornaments.

You can probably complete the project in an afternoon or two. And all you need for wood is a few scraps of pine and a short piece of leftover dowel stock.

Dress some pine to a ⅛ in. thickness. Use clear pine, as any knots will make the ornament too fragile. Then transfer the full-size pattern to paper. There are five parts. Make two copies of each of the two small half circles.

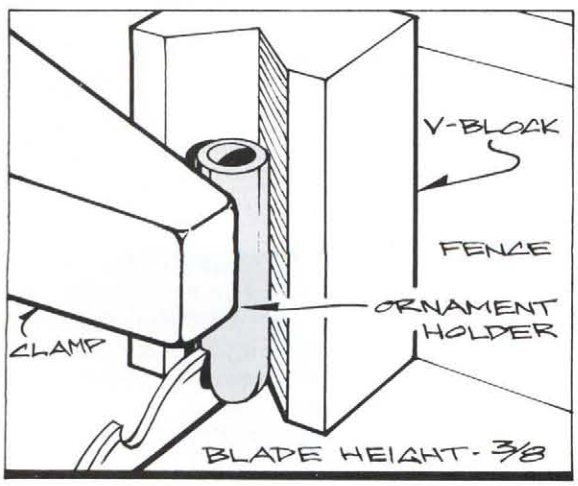
Attach the patterns to the pine with rubber cement (or spray adhesive) and carefully cut out the ornament parts with a scroll saw. Don't use a handheld jigsaw; the pieces are too delicate. Be as accurate as possible, especially on the tabs and cutouts where the sections join. After cutting them out, test fit the parts, and shape them as needed with files and sandpaper. Also sand off the paper and rubber cement from the workpieces.

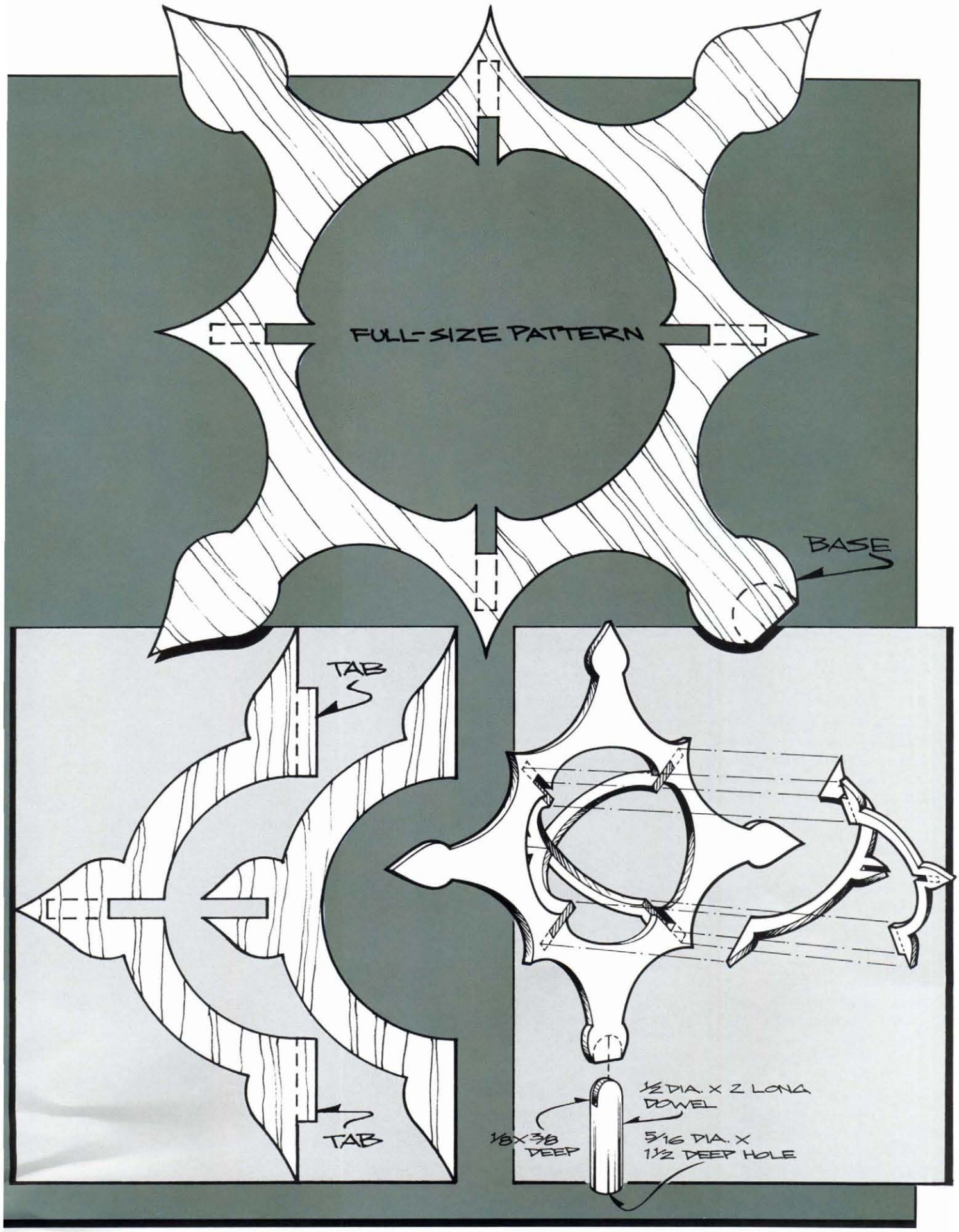
When assembling, note that the circle halves without tabs meet the circle halves with tabs, and that the parts come together at the cutouts in the larger circle. Glue the ornament parts together using four thin rubber bands as clamps. We used rubber bands 2½ in. long and ran them from point to point.

For the ornament holder use a ½ in. diameter by 2 in. long dowel. Use a V-block and hand screw to hold it steady on a drill press while boring the 5/16 in. hole in the center. The hole in the dowel is 1½ in. deep. To round the end of the dowel, chuck it lightly in the drill press and use a sanding block against the turning workpiece.

To make the ⅜ in. deep kerf cut in the rounded portion, use the V-block again. Clamp the V-block and dowel to a miter gauge fence with a hand screw clamp, and cut the kerf with the table saw (See Detail). If your saw-blade kerf is less than ⅛ in., you may need two passes. Use a dab of glue to hold the ornament in the dowel holder.

You can either varnish the ornament or paint it. For the painted version, we used red enamel on the outside edges and white for a base coat. Note that you may need to trim the tree top spire to fit inside the holder.




FULL-SIZE PATTERN
BASE
TAB
TAB
½ DIA. X 2 LONG DOWEL
⅛ X ⅜ DEEP
5/16 DIA. X 1½ DEEP HOLE

CLASSIC PICKUP TRUCK

The Gift Shop

We found this handsome pickup truck at the American Crafts Council (ACC) Fair in Springfield, Massachusetts. Designed and built by Kansas woodworkers Fred Cairns and Kathy Dawson, this truck is built to take a beating. Cairns said that to demonstrate their durability, he has actually stood on them.

The truck shown is constructed of oak and padauk. Although you could build it in pine, the truck will be more durable if you use hardwoods. The choice of the contrasting woods will make it a project you'll be proud to display on the desk or mantle.

Although not hard to build, details make the truck seem more complicated than it actually is. Start by getting out and cutting stock for parts A through L. Only the cab top (F), seat parts (I, J) and fenders (K) are padauk. The remaining parts are oak, except for the wheels, pegs, and dowels, which are maple or birch. We've arranged with a toy-parts supplier to provide a package kit that includes all the turned parts, except the gear shift, steering column, and dowels. The kit does not include the wood you'll need to build the truck. Ordering information, including price, is listed in the Bill of Materials.

After cutting the chassis (A), cab front (D), cab back (E), cab top (F), bed (G), bed side (H), and seat parts, apply a $\frac{3}{16}$ in. radius to the front end of the chassis. This will be a router table operation. Note that you'll also need to cut a bevel on the front end of the cab top. While you could establish this bevel with the table saw, it's easier to just take a small block plane and cut it by hand.

Next cut stock for the upper hood (B) and lower hood (C). After cutting these parts, use the table saw to establish the vertical louvers, as shown in the lower hood detail. First mark the location of the slots on either side of the lower hood. Then, with the table saw blade set for a $\frac{1}{8}$ in. depth of cut, remove the area between your marks. Now reset the blade for a $\frac{1}{4}$ in. deep cut, and establish the five slots. Just line the blade up with your marks for each of the slots. You need not be too precise here. Use the miter gauge fence to guide the stock through the blade, and keep your hands up high, away from the blade. Assemble the upper hood to the lower hood, and round the upper hood using the band saw. After sanding, use the router table with a $\frac{3}{16}$ in. radius bearing-guided round-over bit to detail the front of the hood assembly.

Now join the chassis, hood assembly, cab front, cab back, cab top, bed and bed sides. The dowels that join the chassis, cab front, cab back, and cab top add some mechanical strength, and also serve to locate the parts during assembly. Note that with the hood, chassis, and cab front assembled — but before adding the cab back, cab top, and bed parts — you'll need to drill the holes for the foot pedals (P), steering column (T), and gear shift (U). It's important to drill these holes now, since there's no room for a drill inside the cab once the assembly is complete. Glue the steering wheel (O) and steering column, foot pedals, and gear shift

in place. When dry, sand the truck chassis/hood/cab assembly flush on the sides. A disk sander, if you have one, comes in handy here.

Next, use the 3/16 in. radius bearing-guided round-over bit, mounted in the router table as shown in Fig. 1 to establish the round-over detail. This detail runs around the cab and down the bed sides. Note that the bit height is set so that a small shoulder is established. The round-over detail stops short of the hood, and the chassis, and is flush with the bed. Use files and sandpaper to round the edges of the windshield and back window.

Now drill for the axle pegs (N), parking light pegs (Q), and radiator cap (S). Take extra care when drilling the holes for the axle pegs. Find the centerline of the chassis, mark their locations as shown on the side elevation, and use the drill press to get a good, straight hole. This way you'll be sure that all four wheels will be evenly positioned on the same plane. The bumper (L) should be in position when you drill for the front parking light pegs, which help secure it. Note the slight chamfer around the front edges of the bumper. Glue up the two seat parts, and set aside to dry.

To make the fenders, first lay out a 1/2 in. grid pattern on one of the two fender blanks. If you have access to a copy machine with the capacity to enlarge, this is a quick way to make a full-size pattern. Transfer the fender profile, then temporarily join the two 3/4 in. thick fender blanks with hot glue, and cut out the fender profile with the band saw. Sand the fenders, then round the edges, either by hand or with a 1/8 in. radius round-over bit on the router table. Then separate the fenders and glue them in place on the truck.

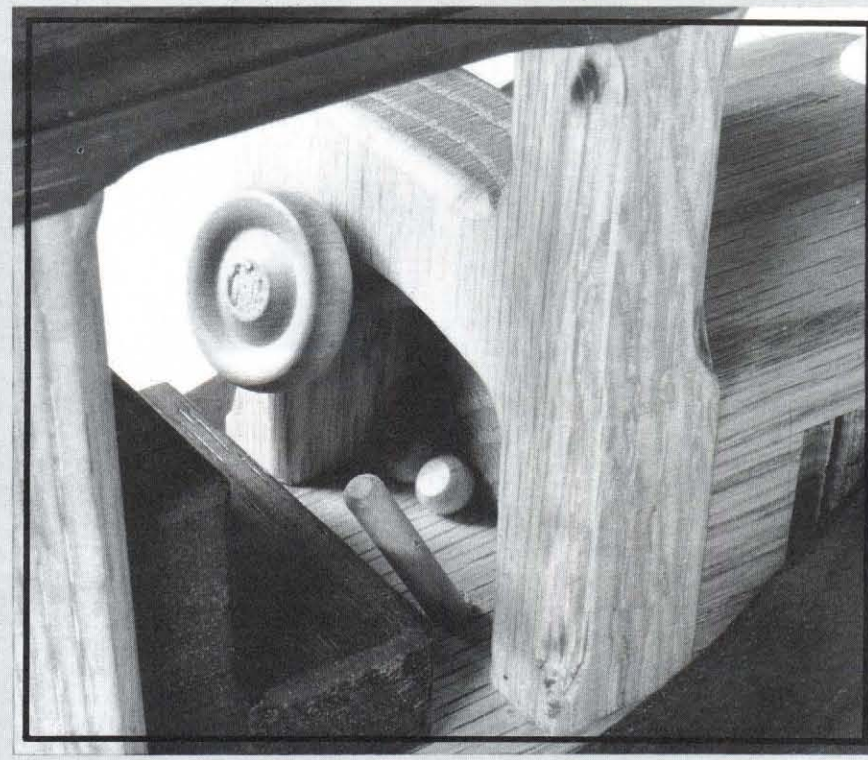
Lastly, add the wheels, headlights, radiator cap, and seat. When inserting the axle pegs, use very little glue to avoid any glue squeezing out. It is difficult to remove excess glue from behind the wheels. The edges of the seat are rounded with the 1/8 in. round-over bit, or by hand, before it is mounted.

It's best to keep toys such as this away from children under 3 years old, since small parts that break off could present a choking hazard. We don't usually recommend a finish for toys, however a non-toxic salad bowl finish, such as Behlen's, will help to show off the character of the wood.

Bill of Materials
(all dimensions actual)

Part	Description	Size	No. Req'd.
A	Chassis	3/4 × 3 × 11 1/2	1
B	Upper Hood	3/4 × 3 × 2 3/4	1
C	Lower Hood	1 1/4 × 3 × 2 3/4	1
D	Cab Front	3/4 × 3 × 3 1/2	1
E	Cab Back	3/4 × 3 × 3 1/2	1
F	Cab Top	1/2 × 3 × 4 1/8	1
G	Bed	3/4 × 3 × 5	1
H	Bed Side	1/2 × 1 1/4 × 5	2
I	Seat Bottom	3/4 × 1 × 2 1/2	1
J	Seat Back	1/2 × 2 × 2 1/2	1
K	Fender	see pattern	2
L	Bumper	3/8 × 3/4 × 4 1/2	1
M	Wheel*	2 dia. × 3/4 thick	5
N	Axle Peg*	see detail	4
O	Steering Wheel*	1 dia. × 5/16 thick	1
P	Foot Pedal Peg*	see detail	2
Q	Parking Light Peg*	see detail	4
R	Headlight*	3/4 dia. × 7/32 long	2
S	Radiator Cap*	see detail	1
T	Steering Column	1/4 dia. × 1 3/4 long	1
U	Gear Shift	3/16 dia. × 1 1/2 long	1

*These parts included in kit. Order "Classic Pickup Truck" kit ($7.50 postpaid) from Cherry Tree Toys, P.O. Box 369, Belmont, OH 43718.



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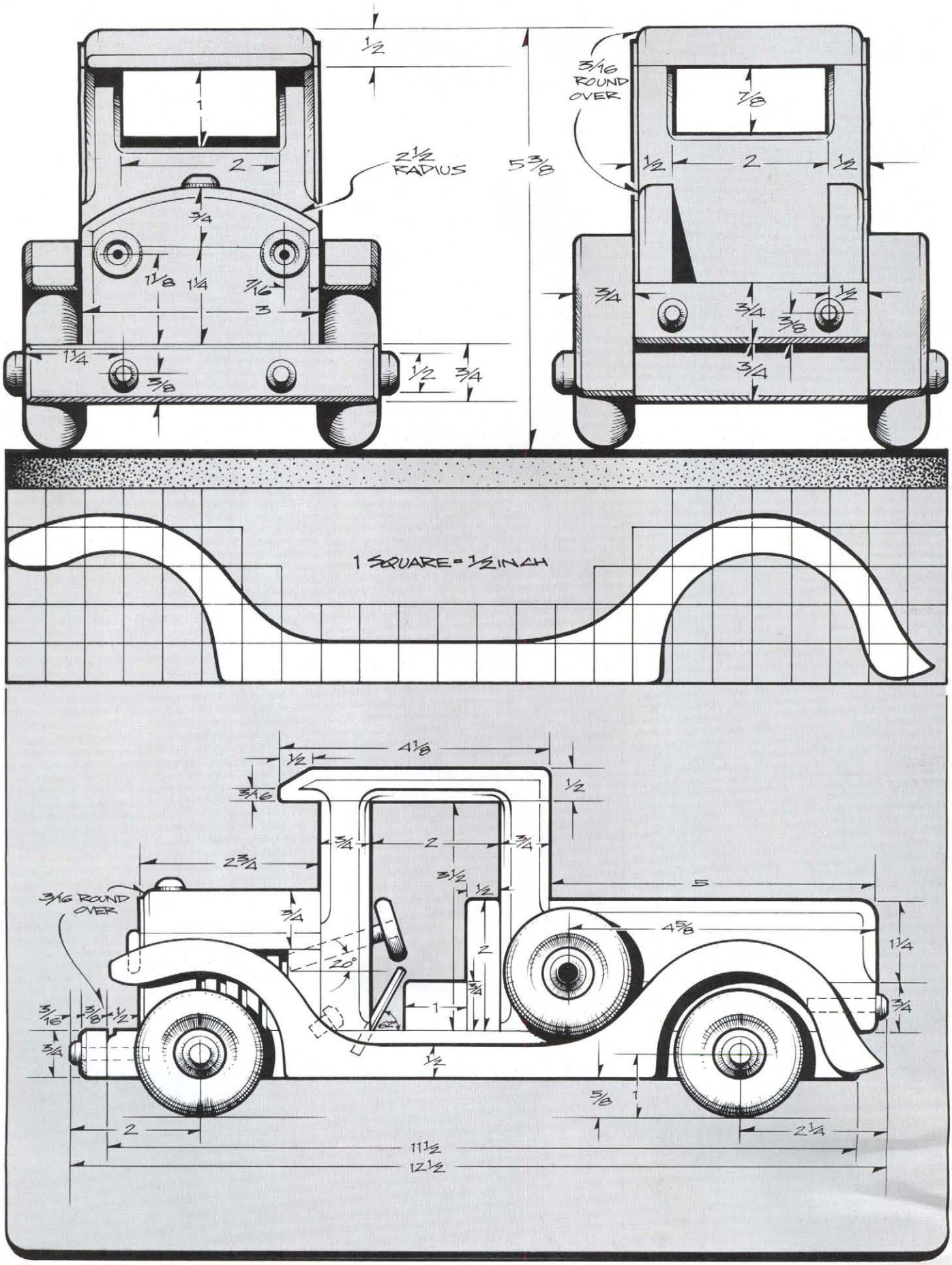
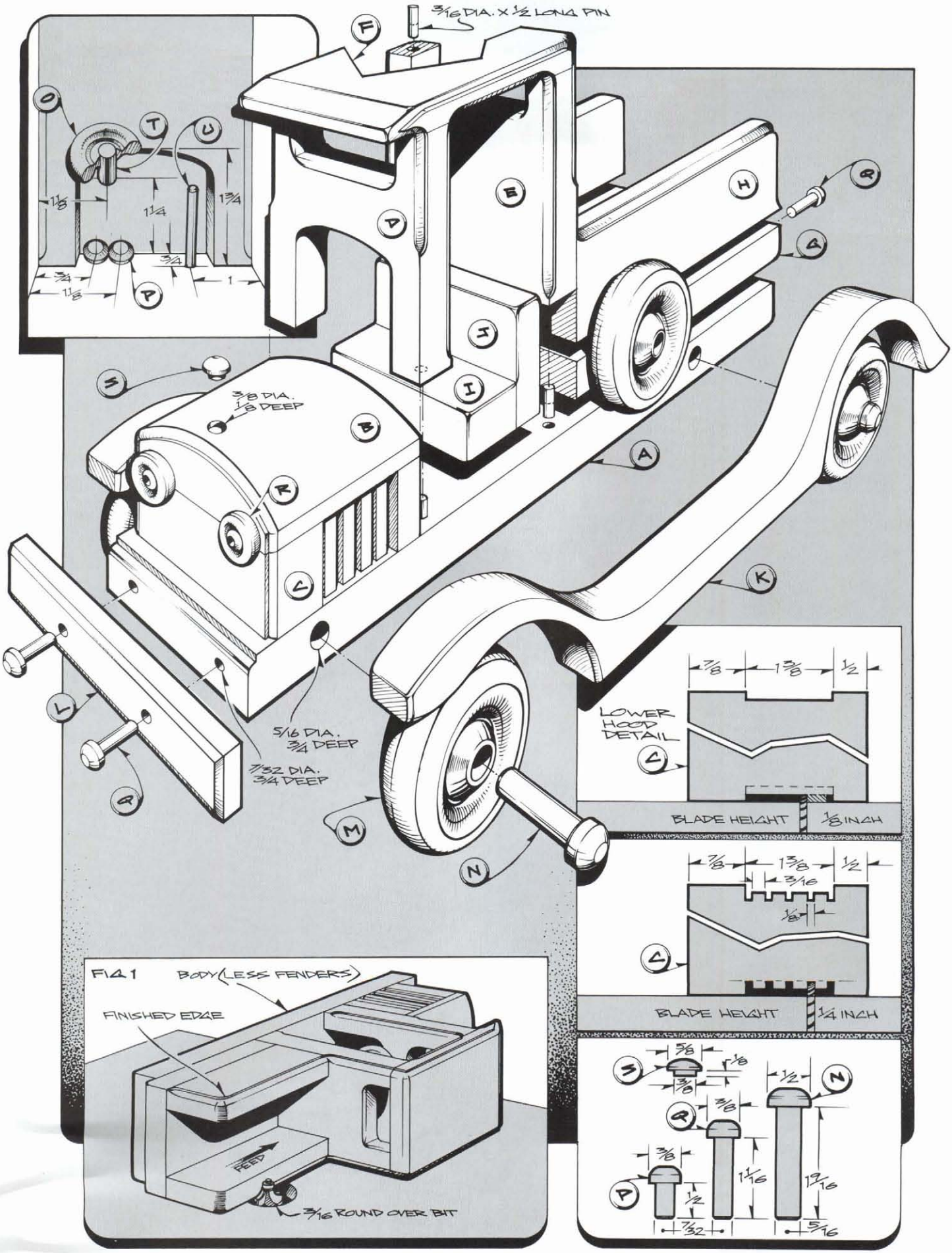

1/2
1
2
2 1/2 RADIUS
5 3/8
3/4
1 1/8
1 1/4
3/16
3
1 1/4
3/8
1/2
3/4
3/16 ROUND OVER
7/8
1/2
2
1/2
3/4
3/4
3/8
1/2
3/4
1 SQUARE = 1/2 INCH
4 1/8
1/2
3/16
1/2
3/4
2
3/4
2 3/4
3 1/2
1/2
5
3/16 ROUND OVER
3/4
4 5/8
1 1/4
20°
2
3/4
3/16
3/8
1/2
3/4
1
6°
1/2
3/4
5/8
2
2 1/4
11 1/2
12 1/2


3/16 DIA. X 1/2 LONG PIN
F
O
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U
1 1/8
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1 1/8
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P
E
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S
3/8 DIA.
1/8 DEEP
B
A
R
C
K
L
Q
5/16 DIA.
3/4 DEEP
7/32 DIA.
3/4 DEEP
M
N
LOWER HOOD DETAIL
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1 3/8
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C
BLADE HEIGHT
1/8 INCH
3/16
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BLADE HEIGHT
1/4 INCH
5/8
1/8
1/8
1/2
3/8
1 1/16
1 9/16
1/2
7/32
5/16
FIG 1
BODY (LESS FENDERS)
FINISHED EDGE
FEED
3/16 ROUND OVER BIT

CONTEMPORARY *Cradle*

New arrivals usually sleep soundly no matter what their first bed looks like. But when they grow up a little, this cradle may make them feel a little special, if only for the love's labor spent in the fashioning.

The simple lines and contrasting walnut and ash give this cradle a lot of life. Its knockdown fasteners make it easy to set up and take down and, as cradles go, the project isn't that difficult to build. We've tried to minimize the angles used in construction, and

replaced the commonly used turned spindles with slats. The cove details in the slats can easily be shaped on a router table.

To save stock, the legs are each made from five pieces of walnut joined together. That way you can cut the profile with the band saw and only lose a few scraps of the expensive walnut.

To help clean up the band-saw cuts, which can be rather rough, we used a router technique. A template serves as a guide for a flush trimming router bit. The bearing of the bit rides against the template, fastened over the workpiece, so that you get a crisp edge. We also used the technique for the top of the panel frame, also cut on the band saw.

Begin by dressing some walnut stock to 1 in. thick for the legs (A) and ¾ in. thick for the stretchers (B), panel frame parts (C, D, E), basket rails (H) and cleats (J). Also prepare ½ in. thick ash for the panels (F) and slats (I).

Cut the five pieces for each of the legs to size, as shown in Fig. 1. Glue up the legs in two steps using waxed blocks to keep the parts flush. Also use pencil lines to properly align the pieces as shown.

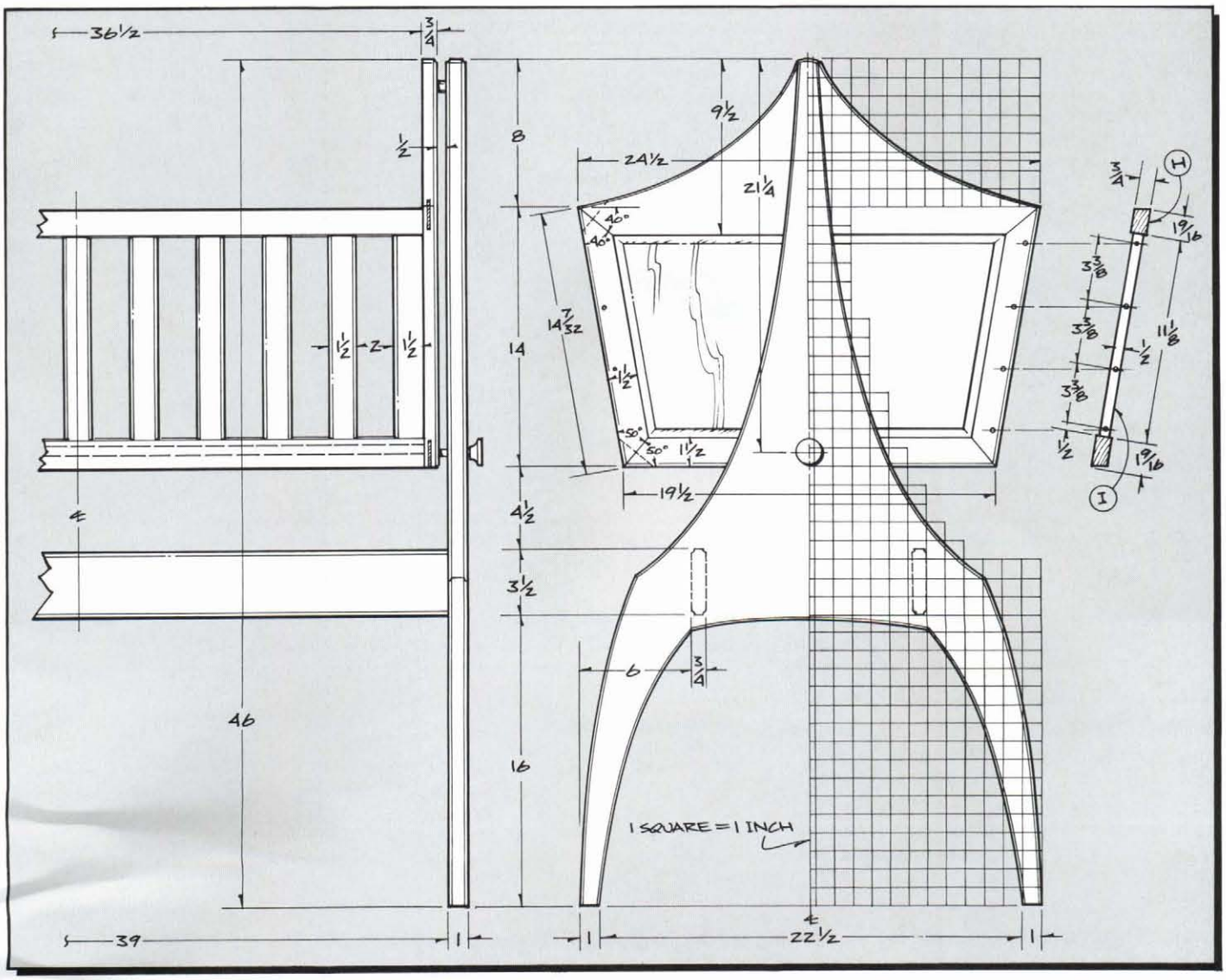
Next, glue up the ash panels using four waxed blocks clamped across the grain to keep the boards aligned and flat.

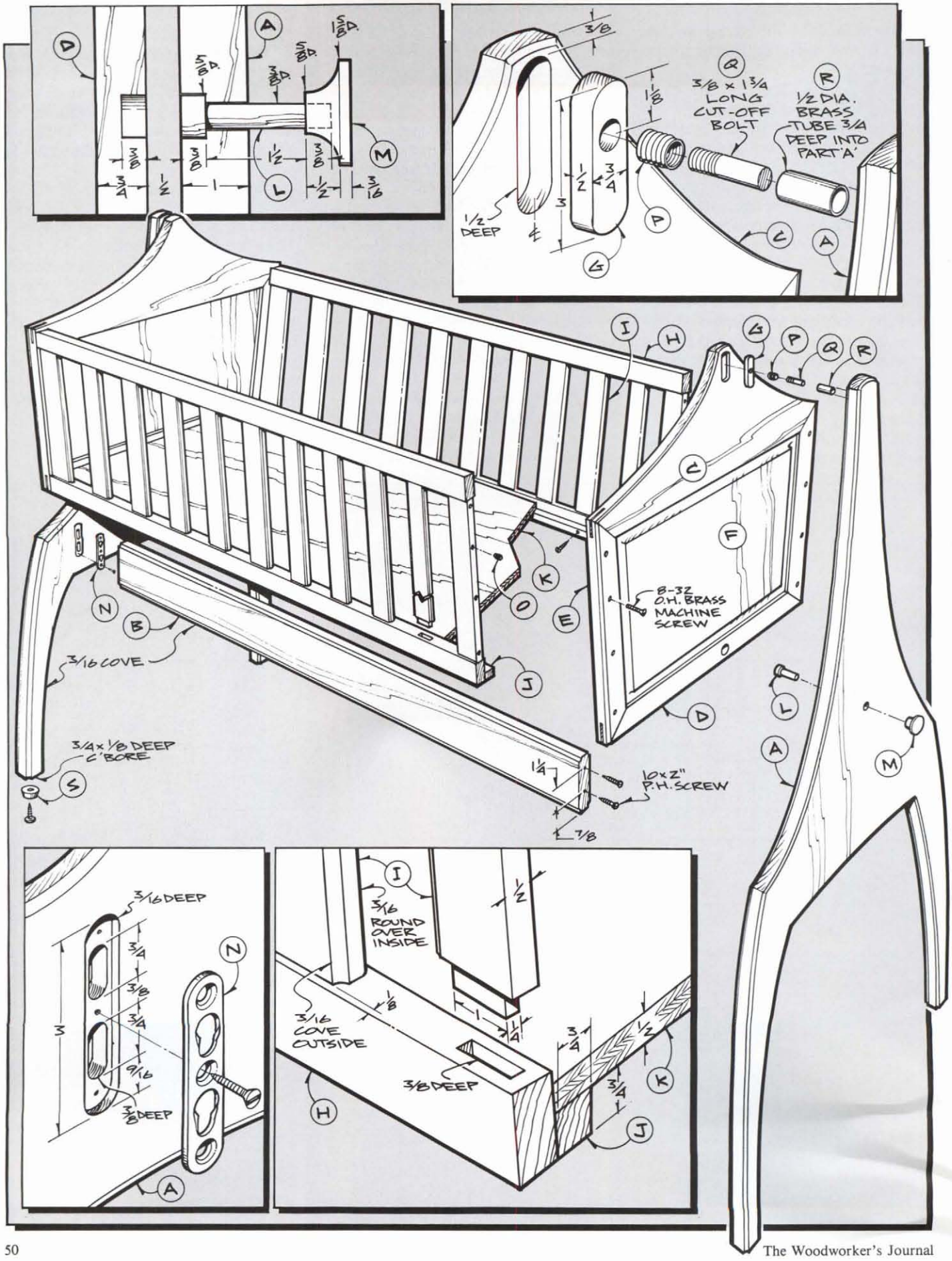
Lay out the one-half template for the legs using ½ in. thick plywood or hardboard. Don't use particleboard; the edges aren't smooth enough for a template. The template matches the profile of the finished leg, so take your time making it. Mark the center lines on both the template and the glued-up legs. Also mark the faces of the two legs.

Carefully shape the template and locate the screw holes for attaching it to the legs (Fig. 2). There are three screws in each leg: one at the pivot point, one at the knock-down fastener and one in waste stock. The screws allow you to securely attach the template to the workpiece and not mar any finished surfaces. The secure hold is needed because the template serves as a guide for the router. Equipped with a flush-trimming bit, the router is used to clean up the band-saw cut on the edges of the legs.

Locate the template on the legs and trace the outlines for all four halves. Then remove the template and cut the rough shape of the legs with the band saw. Stay outside the line. Then replace the template and make the finish cut with the trimming bit in the router (Fig. 2). Use the same screw holes for each half of the leg. Just flip the template over. Note that the bearing rides on the template. After trimming both legs, sand the edges smooth with a drum sander.

(continued on next page)

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A
5/8 DIA.
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3/8
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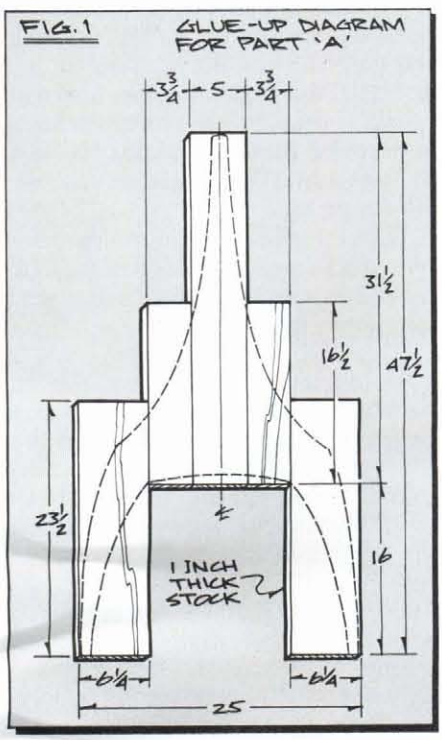
1
1/2
3/8
3/16
L
M
3/8
Q
3/8 x 1 3/4 LONG CUT-OFF BOLT
R
1/2 DIA. BRASS TUBE 3/4 DEEP INTO PART 'A'
1/2 DEEP
1/8
1/2
3/4
3
P
G
C
A
I
H
G
P
Q
R
C
F
K
O
E
N
B
3/16 COVE
J
8-32 O.H. BRASS MACHINE SCREW
D
L
A
M
3/4 x 1/8 DEEP C'BORE
S
1 1/4
10 x 2" P.H. SCREW
7/8
3/16 DEEP
3/4
3/8
3/4
9/16
3/8 DEEP
3
N
A
I
1/2
3/16 ROUND OVER INSIDE
1/8
3/16 COVE OUTSIDE
1
1 1/4
3/4
1/2
3/8 DEEP
K
H
3/4
J

Bill of Materials
(all dimensions actual)

Part	Description	Size	No. Req'd.
A	Leg	1 × 24½ × 46	2
B	Stretcher	¾ × 3½ × 39	2
C	Frame Top	¾ × 9½ × 24½	2
D	Frame Rail	¾ × 1½ × 19½	2
E	Frame Stile	¾ × 1½ × 14 7/32	4
F	Panel	½ × 21 7/16 × 11 7/16	2
G	Insert	½ × ¾ × 3	2
H	Basket Rail	¾ × 1 9/16 × 36½	4
I	Basket Slat	½ × 1½ × 11⅞	22
J	Cleat	¾ × ¾ × 36½	2
K	Bottom	½ × 18¼ × 36½	1
L	Locking Pin	see detail	1
M	Locking Knob	see detail	1
N	Double Keyhole Fitting	9/16 × 3*	4
O	Side Threaded Insert	8-32 brass**	16
P	Panel Threaded Insert	⅜-16 brass*	2
Q	Pivot Pin	1¾ × ⅜-16 cut-off bolt	2
R	Pivot Bushing	1⅛ × ½ O.D. brass lamp pipe	2
S	Bumber Foot	¾ dia.*	4

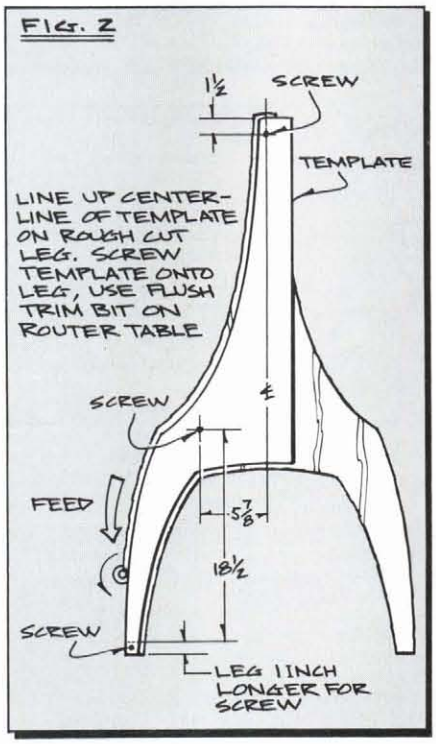
*Available from The Woodworkers' Store, 21801 Industrial Blvd., Rogers, MN 55374.

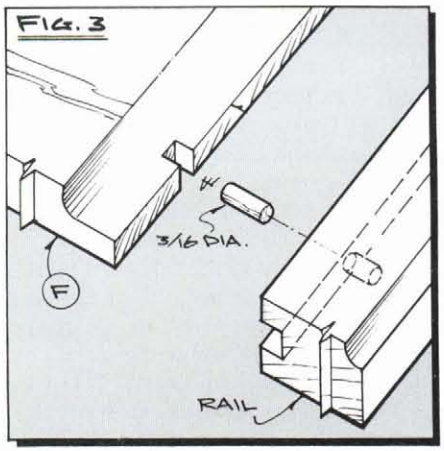
**Available from Woodworker's Supply of New Mexico, 5604 Alameda Place NE, Albuquerque, NM 87113.



Next cut the mortise for the double keyhole fitting (N) with the router (See Detail). The keyhole fitting is a knockdown fastener that locks onto screws in the ends of the stretchers. Clamp a straightedge on the leg to use as a router guide. Also clamp stop blocks at the top and bottom of the cuts. The mortises are set 3/16 in. deeper at the fastener keyholes to allow clearance for the screw heads that fit into the fastener. Trace the outline of the deeper section from the fastener itself. You'll need to flip it over to get both top and bottom because of the keyhole shape. Drill pilot holes for the fasteners and install them with ¾ in. by no. 8 screws.

Next drill the ½ in. diameter holes in the legs for the pivot bushing (R), as well as the ⅜ in. holes for the locking pin (L) and knob (M). The locking-pin holes have a ⅝ in. counterbore toward the inside of the cradle. That allows the head of the pin to fit flush with the legs, away from the swinging basket. Drill the counterbored portion before the ⅜ in. hole. Later, you'll use the holes in the legs to locate the matching holes in the panels.





Then rout the 3/16 in. cove on all the leg edges except the bottoms. Use either a hand-held router or a router table with a bearing-guided bit.

With the legs fabricated, start on the swinging basket. First rip the panel frame parts to size. Be exact and cut all the parts of the same size at the same table saw setting.

On the frame tops (C), inlay a ½ in. thick by ¾ in. wide walnut insert (G) across the grain as shown. Don't skip this step. It's important because the insert strengthens the short section of cross-grain walnut at the top. Use a router with a ¾ in. diameter cutter to form the groove and then shape the insert to fit.

Next, cut out the profile on the frame tops using the same template method used for the legs. You won't need to locate the template with wood screws. You can use double-faced tape to hold it in place. Also drill the ½ in. diameter by ½ in. deep holes in parts G for the threaded inserts (P) that will hold the pivot pins (Q). The inserts will stand ⅛ in. proud of the frame.

The next step, cutting the miters for the frame, requires extreme accuracy. We recommend using pairs of test pieces to insure that your saw is set for the right angles — 40 degrees at the top and 50 degrees at the bottom — and using stopblocks so that identical parts are cut to the same length.

The procedure is: cut the pieces to rough length plus several inches; lay the pieces out the way they will go and mark the direction of the miters; miter one end of all the pieces; set up a stopblock and miter the other ends. Note that the profile of the top frame member must meet the other members for the stopblocks to work properly.

Use a table saw or a router to cut the grooves in the frame that will hold the panels. The grooves are ¼ in. deep in the frame top and bottom rail, but ½ in. deep in the stiles. The extra depth allows more room for the panels to expand or contract across the grain, where wood moves most during changes in humidity. Keep the same

(continued on next page)

faces toward the fence while cutting to insure that the grooves line up. Finish sand the grooved edges.

Now make the raised panels as described in "Special Techniques" on page 17. Apply the finish before assembling them in the frames.

Next, notch the panels and drill holes in the rail and frame top grooves for the panel locating pins (Fig. 3). The pins center the panels in the frame so that expansion is directed equally to both sides. Make sure to glue the pins in the rails.

Now glue up the frames around the panels using the clamping blocks shown in Fig. 4. After the glue dries, cut the spline grooves on the table saw (Fig. 5) with a high fence. Note that a board is clamped to the panel and rests on the top of the rip fence. Position the board and panel so that the saw kerf for the splines is perpendicular as shown. Next, make the ash splines to fit the kerf, glue them in place, trim them and sand them flush. Finish the panels by routing a 3/16 in. cove around the outside edges, using the same procedure as with the legs.

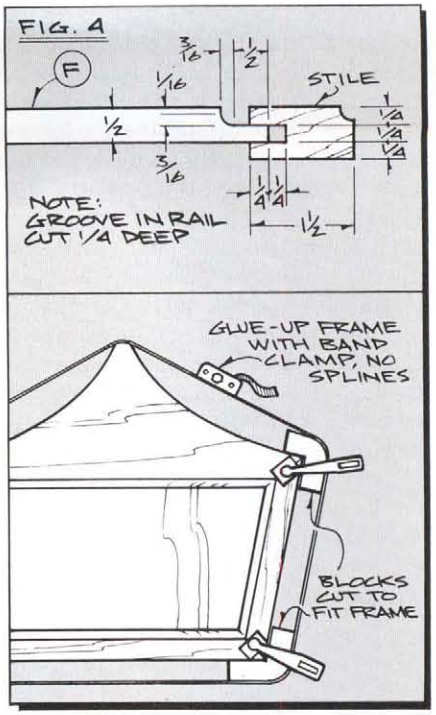
After finishing the panels, cut the blanks for the basket slats (I) and rails (H). The rails are left about ½ in. wide of the finished size. The bevel on top and bottom is cut after the side assemblies are glued and clamped. Cut the mortises for the slats in the rails using a drill press with a fence. Take care to lay out the mortises exactly and to keep the rail faces in the same direction for all the cuts. You should be able to adjust the fence so the drill bit hits the center of one rail, and then drill all 22 mortises without changing the fence location. Just keep sliding the rail down the fence for successive cuts. Drill two or three holes for each of the mortises and remove the remaining waste with a chisel.

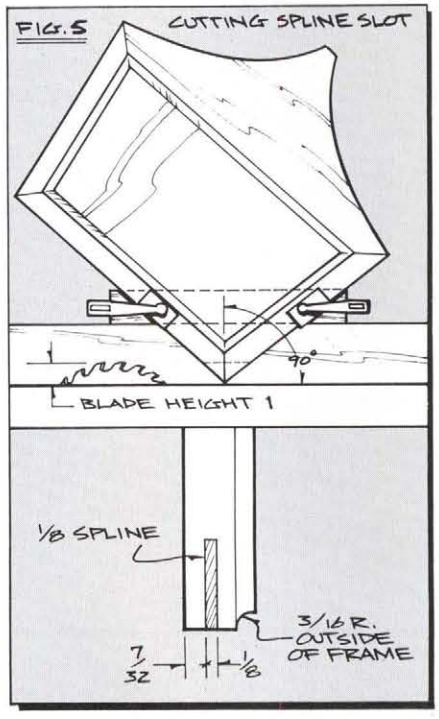
Cut the matching tenons with a table saw and tenon jig. First cut the shoulder in all the slats using the miter gauge. Then remove the waste with the tenon jig, which holds the pieces steady while you cut them on end. Make test cuts on some scrap so you can set the jig exactly.

Now rout the 3/16 in. radius coves and roundovers in the slats. Use the router table and a fence for speed and accuracy. Remember: the four end slats are coved and rounded on one edge only.

Drill the ¼ in. holes for the threaded inserts (O) in the end slats using a drill press with fence and stops. This insures that all the holes are identical so you can switch the sides of the cradle if you wish. Also install the threaded inserts, using wax on the threads to ease entry. See "Shop Tips" on page 53 for an easy way to install the threaded inserts.

Next, sand the slats and the mortised edges of the rails. Wrap sandpaper around a ⅜ in. dowel to sand the cove details. Then glue up the sides. Use the glue sparingly to cut down on squeeze-out.





Now rip one rail of each side to the proper angle, 80 degrees, and joint the edge smooth. Reset the saw and rip the opposite edge. Be sure to make the sides so the 80-degree cuts are oriented correctly. You want the coves facing out. Joint the other edge smooth.

Position the sides against the panel frame and transfer the threaded insert centers onto the frame with a sliding bevel set to 80 degrees. Drill the 3/16 in. holes in the panel frames and countersink for the 1 in. by 8-32 oval head brass machine screws, which screw into the threaded inserts.

Cut the stretchers (B) to size and rout the cove detail. Then drill the ⅛ in. holes and install the 2 in. long by no. 10 pan head screws. The ends of the stretchers must be exactly 90 degrees. Also cut the plywood bottom (K) to size. It can be walnut, ash or birch plywood.

Next, cut the bottom cleats (J) and rip one side of each to 80 degrees. Attach them to the stretchers with 1¼ in. by no. 8 brass wood screws. Sand the parts before screwing them together.

Turn the two parts of the locking pin (L) and knob (M) as shown, and sand. Also counterbore for the four rubber feet (S) in the legs.

With fabrication complete, sand all the parts. Then, using epoxy glue, install the bushings (R) into the legs and the threaded insert (P) into the inlayed portion of the panel frame. Be careful with the epoxy; don't get any on the brass that will show. Spread it into the sides and bottom of the bushing hole and press the bushing in. Now cut a ⅜ in. bolt to the size shown and, also with epoxy, screw it into the threaded insert in the panel frame. The epoxy is needed to prevent the parts from unscrewing during use.

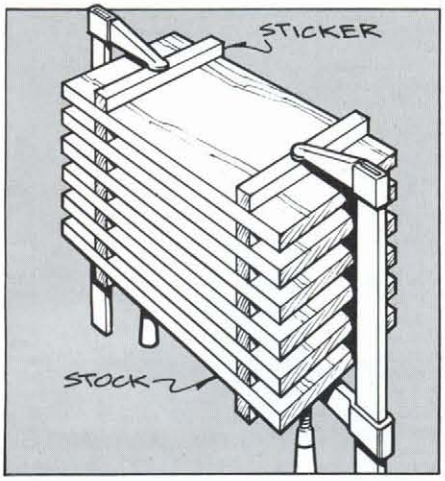
Before finishing, tape off the pivot pins and an area on the end of the locking pin that will be glued, and place a dowel into the knob hole.

Finish all parts with three coats of clear lacquer or shellac, and rub out with 0000 steel wool. The lacquer gives better protection against moisture, but the shellac is non-toxic. Glue the knob to the locking pin through the leg and insert the stretcher screws for the double keyhole fitting. You'll have to adjust them in or out for a tight fit. It's important to eliminate any play in the joint where the stretchers and legs meet.

Assemble the cradle carefully so you don't mar the finish.

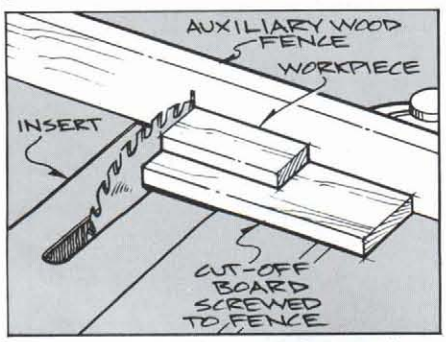
Shop Tips

A piece of wood that is resawn or thickness planed will often tend to cup when the newly exposed surfaces dry out. To reduce the chance of cupping, it's a good idea to clamp the stock between stickers (usually just flat stock



that measures about 1 in. by 1 in. square) for a couple of days. If you have several pieces of stock, sticker them together as shown. The stickers not only help keep the stock flat, they permit air to circulate to all surfaces so the wood will dry evenly.

Few table saw inserts are perfectly flush with the top surface of the saw table. Usually, the insert is slightly below the surface and, for most operations, this does not present a problem. However, if you are crosscutting small parts, the uneven surface around the

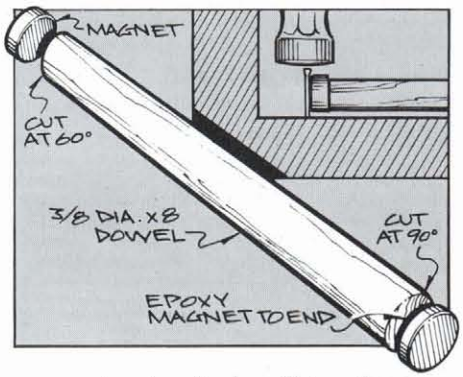


insert can cause the workpiece to tip or rock slightly, and that makes it hard to get accurate crosscuts. A simple jig will solve the problem. Screw an auxiliary wood fence to the miter gauge, then screw a short cutoff board to the auxiliary wood fence. The cutoff board, which extends right up to the saw blade, provides a flat surface for the workpiece.

I like to place a 1 in. thick foam pad on my shop floor just inside the table saw base. If the blade should drop while I'm changing it, the pad will cushion the blow and, hopefully, save an expensive resharpening job.

M. Squezello, Vestal, N.Y.

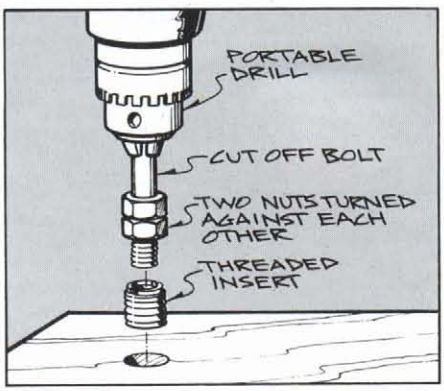
When working in tight spots, it can be difficult to hold a brad while tacking it in place. A homemade brad holder will help. To make one, cut a $\frac{3}{8}$ in. diameter dowel to an 8 in. length, then cut one end to 60 degrees and the other square. (The 60-degree end makes it easier to hold the brad at odd angles). To complete the holder, use



epoxy glue to attach a $\frac{1}{2}$ in. diameter by $\frac{3}{16}$ in. thick magnet to each end. The magnets are sold by many Radio Shack stores.

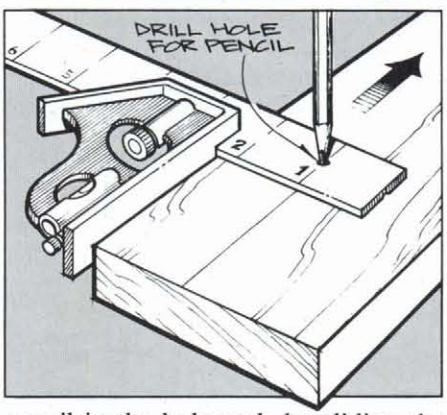
George Harenberg, Chineoteague, Va.

A threaded insert (sometimes called a Rosan nut) can be difficult to install. It requires a wide bladed screwdriver and a lot of turning force. Oftentimes, the result is a tired hand and a slot that



is pretty well chewed up. Also, unless you're careful, the insert may go in crooked. Here's an easier method — one that's especially useful if you need to install a lot of inserts. First, cut the head off a bolt (the threads must match the inside threads of the insert), then chuck the bolt in a $\frac{3}{8}$ in. variable speed reversible drill. Thread two nuts on the bolt and tighten them one against another. The exposed thread length on the bolt should be less than the threaded insert length. Now thread the insert on the bolt and use the drill to drive the insert. You'll find that the drill drives it faster and easier, and the slot won't get chewed up. Also, the insert is less likely to be crooked since the drill makes it easier to judge squareness. To remove the bolt, simply reverse the drill.

I drilled a $\frac{1}{16}$ in. diameter hole in the blade of my combination square at the 1 in. mark. Now I can insert the tip of a



pencil in the hole and, by sliding the square along the workpiece, get a line that is perfectly parallel to the edge.

James Gates, Hermitage, Tenn.

An old leather glove, the oilier the better, makes a handy place to store some of your tools. It can be hung on the wall so that the handles of the tools are in clear view.

B. Beck, New York, N.Y.

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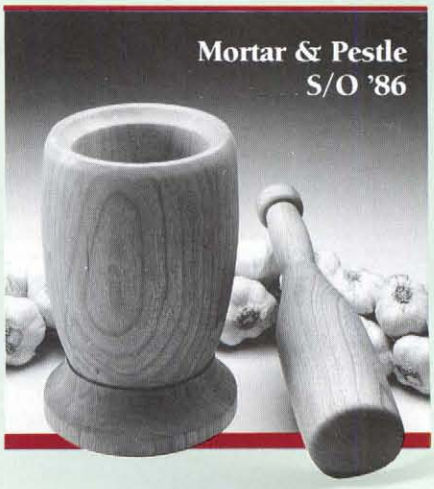

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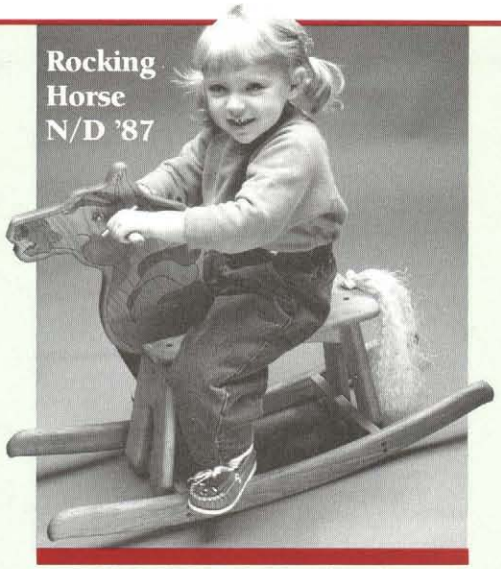

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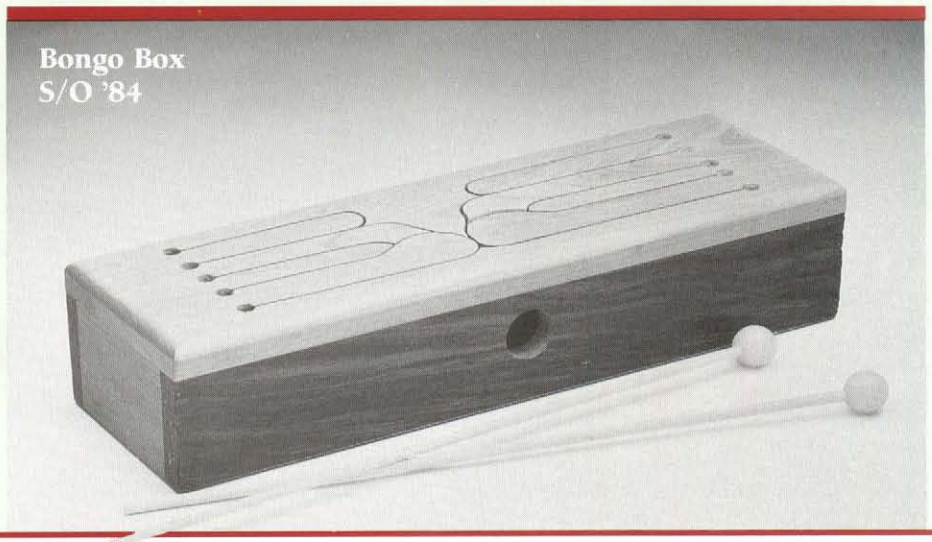

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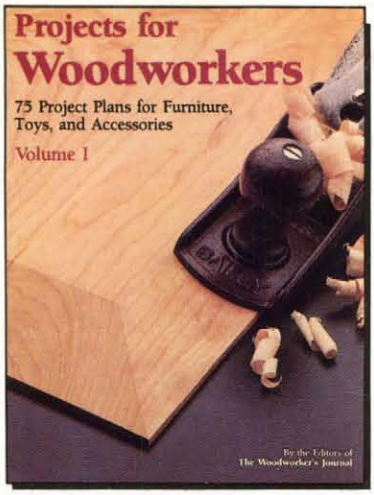

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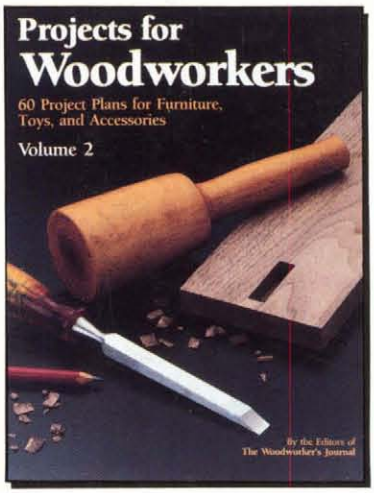

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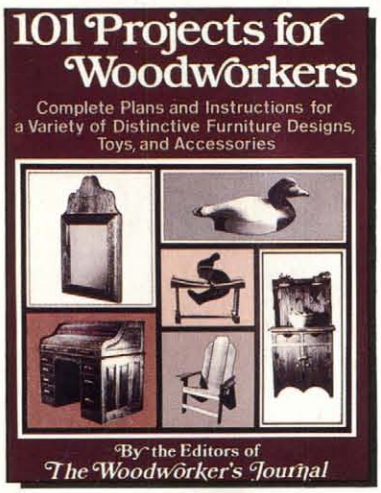

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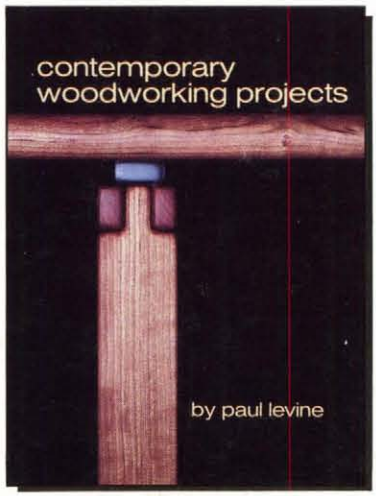


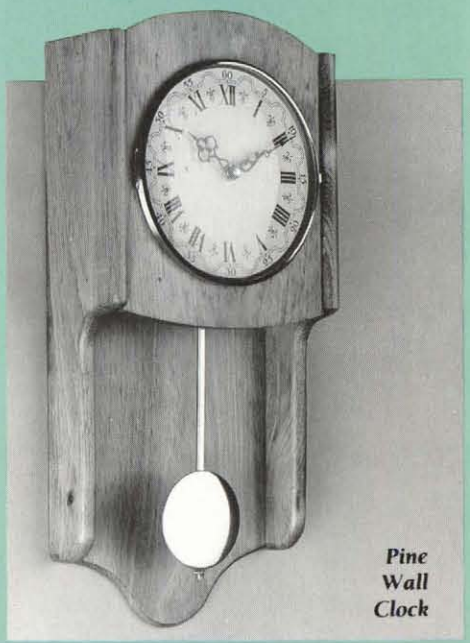
Contemporary Woodworking Projects

The author guides woodworkers of all skill levels through room-by-room chapters of coordinated furniture and accessories. The graceful lines, clean angles, sturdy joinery and special techniques are made easy to master with step-by-step instructions and illustrations.

You'll find the handy order form for these books bound between pages 30 and 31.

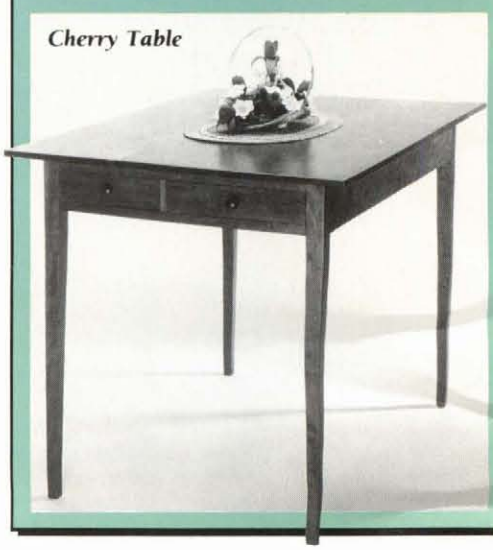
Next Issue . . .

is already taking shape in our shop. Here are just three of the projects you'll get: traditional Pine Wall Clock, Rock and Roll Toy and classic Cherry Table. Plus, you'll find more projects for all levels of woodworkers, with the down-to-earth instructions and clear illustrations you need to build them.



Pine Wall Clock

Rock and Roll Toy



Cherry Table