INSIDE MICKEY’S WORKSHOP AT DISNEY WORLD
Page 56

SHOPSMITH vs. TOTAL SHOP
Feature-by-feature comparison of these look-alike machines

5 EASY STEPS TO A GLASS-SMOOTH TABLETOP FINISH

WINNERS ALL!
Victorian settee
Spoon/thimble wall cabinet
Monster truck

JUNE 1990 • ISSUE NO. 35
Display until June 19

4 FUN-TO-MAKE TOY WHEELS
See page 40

CUSTOM HANDSCREW CLAMPS
See page 74
A World Of Value.

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"at a real deal"

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when you purchase any of the woodworking machines shown here. After you have made your purchase, you'll receive this excellent video directly from JET! Learn set-up, adjustment and operating techniques for all of these machines. A $29.95 value FREE to the purchaser.

The JET 10" tablesaw features a 27" x 40" table, 10" blade capacity, and a 1 1/2 HP motor. The JET 14" bandsaw has a full 1 HP motor with three speeds for wood or non-ferrous metal cutting, and a 45° tilting 14" square table. The JET shaper has an 18" long table and 1 1/2" spindle capacity. The JET 6" jointer has a long 28" fence and 42 1/2" table and a three-knife cutter. The powerful JET 15" planer has a 3 HP, 1 Ph, motor which allows a maximum 1/8" full width cut. The JET portable dust collector may attach to a variety of machines and has a 2.12 C.F. capacity collector bag and a very quiet 55 D.B. noise level.

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*Offer good only on purchases of 50-655 models 22-661 and 22-665 from participating distributors in the continental U.S., Alaska and Hawaii from April 1 to June 30, 1990.
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The 212 page Catalog, regularly $4.00, is Free with any order from this ad. Or if you would just like the Catalog, send us $4.00 with your name and address. This is the one woodworking source book you shouldn't be without.

A / Our 202GF Gap Filling Glue Has Remarkable Properties
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B / Band Saw Handbook by Mark Duginske
An invaluable bench reference for any woodworker. Learn what makes your bandsaw tick. Tune-up and maintenance; blade selection, tracking and tensioning; plus cutting methods for various woods and other materials. Hundreds of tips and shortcuts. Unlock your saw's potential.

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C / Garrett Wade Has Discovered Some Very Interesting Bandsaw Blades

- 1/6" Super Narrow" Blades
  You may have never seen a blade like this. A 24tpi raker style, it produces smooth cuts while making incredibly tight turns. We strongly recommend using our "Cool Blocks" with these delicate blades, because they can be set closer to the blade without danger of overheating.

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  - 33K12.02 1/4" Cabinet $10.00
  - 33K12.03 1/2" Cabinet $10.75

- 72" Blades (Shopsmith) Saw
  - 33K13.01 1/4" Scroll $12.20
  - 33K13.02 1/4" Cabinet $9.40
  - 33K13.03 1/2" Cabinet $9.95

- 73 1/4" Blades (Inca 10 1/2"
  - 310.160 1/4" Scroll $12.80
  - 310.161 1/4" Cabinet $9.70
  - 310.162 1/2" Cabinet $10.50
  - 104" Blades (Delta w/Riser and Inca 20"
  - 710.101 1/4" Scroll $16.00
  - 710.201 1/4" Cabinet $11.95
  - 710.202 1/2" Cabinet $12.90

- 104" Blades (Delta w/Riser and Inca 20"
  - 710.101 1/4" Scroll $16.00
  - 710.201 1/4" Cabinet $11.95
  - 710.202 1/2" Cabinet $12.90

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Better Homes and Gardens.

WOOD
THE #1 MAGAZINE FOR HOME WOODWORKERS

This issue's cover wood grain: cottonwood

JUNE 1990 ISSUE NO. 35

WOOD PROFILE
Black walnut—the native aristocrat 33
Long ago, Europeans crowned oak as their favorite hardwood. But in North America, walnut continues to hold royal status.

TOOL BUYMANNSHIP
Shopsmith vs. Total Shop 35
Lathe-based multipurpose tools make a lot of sense for some woodworkers—and especially those working in cramped quarters. In this issue, our testing team examines the differences between two look-alike models.

SHOP-TESTED TECHNIQUES
4 Fun-to-make wheels 40
Everyone knows you can really dress up a full-sized car with a sharp wheel and rim. Now, put the same principles to work with your next toy project.

NOW YOU CAN BUILD IT
Fun-charged monster truck 46
Here's another great toy design from the 1989 Build-A-Toy™ competition—this pickup with huge wheels comes from a retired Oldsmobile engineer.

5 Easy steps to a finish that's glass-smooth 50
We found a couple of nifty 3M automotive products that easily adapt to woodworking. Best of all, the depth of the shine will amaze you.

CRAFTSMAN CLOSE-UP
Toys for the big boys 52
Meet Karol Fedoryshyn, a talented Manitoba woodworker who crafts realism into the ¼-scale models he builds for Canadian truck drivers.
The wonderful woodworking world of Disney 56
Fifty or so woodworkers in Orlando, Florida, have jobs most of us dream about: They work for the world's most famous mouse.

Solid-oak settee 60
Toss away the plastic lawn furniture—this outdoor project is comfortable enough for a whole day of reading and relaxing. Even better, the settee should last a lifetime, too.

Collector's showcase 68
You'll be pleased how smartly teaspoons, thimbles, and a long list of other small collectibles show off in this cherry wall-hung case.

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Mail-order products
Because so many readers buy wood, tools and supplies through catalog firms, it makes sense to review buying practices that avoid disaster.

COLLECTOR'S EDITION 74
Handscrew clamps
No, this isn't another one of those complicated handscrew projects that require incredibly involved drilling setups. We're confident you'll quickly master this laminated design.

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Available in either 7 1/4" or 10" sizes, Piranha Teflon® coated blades are ideal for building decks, porches and other outdoor projects. And they’ll also last a whole lot longer than conventional carbide blades when cutting pressure-treated lumber.

So unleash a Piranha® blade on your next job. Or better yet, unleash a whole school of them.
The Editor's Angle

'Look what Sailboat Papa Made for Erin and Me'

All of us here at WOOD® magazine love hearing from readers because your letters tell us a couple of important things. First, they let us know you appreciate all the hard work that goes into each and every issue of the magazine. And second, they allow us to hear about and sometimes even see what you have had up to.

That's why we were so happy when Georgia Cowan, from Naples, Florida, dropped us a line not long ago and shared with us a couple of photos showing some of her husband Ian's handiwork. Ian, who has been woodworking most of his life, has built everything from his own house to a 30-foot sailboat—complete with kitchen, a master bedroom, and a small bathroom. But I'm willing to bet that the strollers he built for his granddaughter, Elisa Riley, and one of Elisa's best friends, Erin Martin, won him more brownie points than any other project he's ever undertaken.

I talked to Elisa the other evening, and it's apparent to me that this 5-year-old is pretty darn impressed with "Sailboat Papa"—her name for Ian. And, with her stroller, a project that appeared in our December 1987 issue. She reports that she and Erin are having lots of fun "caring their dolls around the neighborhood."

Roscoe the Raccoon rough-out a rip-roaring success

A big "thank-you" to all of the carvers who ordered rough-outs of the Desiree Hajny raccoon carving that appeared in the June 1989 issue. And thanks to Ron Conn, the Branson, Missouri, carver who manufactured and sent out the rough-outs. As promised, we have sent more than $1,400 to the National Wildlife Federation's Backyard Wildlife Habitat Program to educate the public in how to attract birds and other wildlife to urban areas.

Best friends Elisa Riley, left, and Erin Martin show off their strollers made by "Sailboat Papa."

Larry Clayton

Photograph: Mercer Harris Photography

Wood Magazine | June 1990
ROBLAND

The Intelligent One-Man Shop

The Robland X31 features heavy duty cast iron worksurfaces with 3 individual motors of three-horsepower each. Full plywood capacity on the 10” table saw, which is equipped with a sliding table that has 50” cutting capacity. The shaper has a cast iron fence system with individually adjustable in and outfeed fences. The spindle sizes are 3/4” and 1 1/4”. The jointer is 55” long and it features a three knife cutter head. To operate the 12” thickness planer you simply fold the jointer tables out of your way. This process only takes 5 seconds. The thickness planer will accept wood 0” thick. The chuck for the mortiser will self center any bit from 0” to 50”. The X, Y, Z table is adjustable on all three axes and it will make extremely accurate quality joinery for you in seconds. No function change takes more than 30 seconds.

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TALKING BACK

We welcome comments, criticisms, suggestions, and even an occasional compliment. Send your correspondence to: Letters Editor, Better Homes and Gardens® WOOD® Magazine, P.O. Box 11454, Des Moines, IA 50336-1454.

In the states, we’re catching on
I was somewhat amused with your article in the June 1989 issue concerning square-drive screws. My father introduced me to square-drive screws and drivers in the early 1960s when I was a young boy working on my own projects. And ever since, “Robertson,” as we called them, has been the screw to use for me and my dad. I can assure your readers that once they try square-drive, they’ll be hooked.

—Carl Ambridge, Hamilton, Ontario

Children inherit ‘disease’ from woodworker’s spouse
Just received the last edition of WOOD magazine, which included my shop tip about making duplicate marks with BBs. Sure made my day! Thanks!
There is a problem in my workshop. Since you are partially the cause of it, I hope you will help a fellow woodworker get out of his dilemma. Each time your magazine arrives at our house, my wife comes down with a strange disease. I call it “I want this and this” disease. I usually can cure her by making the projects she wants. The big problem is with our five children. They have inherited the same disease from their mother. What this means is that I do not have time to design myself.

—Bernard Paunder, Baltimore, Ohio

Bernard, our research indicates this affliction can spread to grandchildren, too. We suggest you take immediate measures to rope another family member into the workshop. Then, someone else can help you “doctor” the family.

A remedy for irritating bandsaw welds
In the December 1989 issue, I found the article on bandsaw blades to be informative. I would like to comment about inspecting the welds of new blades. I have encountered a slight half-moon depression in the back edge of the blade in line with the weld. The result: a thump when the depression goes over the back-blade guides. This irritation makes for rougher cuts and shortened blade life. I try not to buy defective blades. However, when I do, I file the back of the blade to make the entry and exit of the depression less severe.

—John Walter, Columbus, Indiana

Continued on page 9
Talking Back

That would be a cap or acorn nut
As a hobbyist and do-it-yourselfer in the home and craft area most of my life, I've become an avid reader of WOOD magazine. The detail and accuracy of your articles are excellent, but even the best, on occasion, have a slip.

Such is the case in your February 1989 issue in the shop tip "easy way to install hanger bolts." What you call a cap screw is quite obviously a cap nut or sometimes called an acorn nut.

One small caution: Cap nuts usually are found in brass. As such, if the pilot hole is not properly drilled for the hanger bolt, you can force the hanger bolt out through the crown of the cap nut. Here's another solution: Jam two conventional hex nuts against each other, and then tighten with a wrench.

—Larry A. Stanley, president, Empire Bolt and Screw, Inc., Spokane, Wash.

Tell me more about guide busings
I found the article about router tricks in the February 1990 issue most interesting. Everything seems reasonably clear, except it would seem that the guide bushing for the router bit would have to be on the top of the cutter, and I can't seem to locate one. If I am missing something, I would appreciate an explanation of how to cut the circle after the template has been made.

—Don Dragon, Easton, Maryland

Don, some woodworkers confuse a router guide bushing, which attaches to the router base, with a pilot bearing, which is part of a router bit. Guide bushings cost about $7 apiece and mount to the router as shown below.

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 PRODUCTS THAT PERFORM

Jig makes bandsawed dovetail joints a snap

Few things give a look of fine craftsmanship to a project the way that precision-cut through dovetails do. In the past, I've used backsaws to hand cut such dovetails, but after testing the Jiggit bandsaw dovetail jig, I doubt that I'll ever go back to that method. The Jiggit helped me cut tight-fitting dovetails with a minimum of fuss or guesswork.

To use the jig, I placed the dovetail pin stock on one side of the roof-shaped jig, made a series of cuts for one side of the pins, then made a similar series of cuts on the other side of the jig's "roof." Doing it this way, you can cut the pins in an infinite number of sizes and spacings. After cutting the pins, you just clean them up with a chisel, trace them onto the mating piece of stock, and cut the necessary sockets with your bandsaw.

I did, however, find that I had to clamp a piece of hardboard to the "roof" to extend its support area when I made the final cuts. Because the plastic jig curves near its peak, I couldn't hold the pieces steady without the hardboard extension. So I'd like to see the jig's brief instructions include a mention of how to use such an extension, and illustrations of dovetail construction for the benefit of novice dovetailers. Gaylord Livingston of Jiggit told me he plans to expand the instructions.

—Tested by C. L. Gatzke

Jiggit bandsaw dovetail jig, $53.95 ppd. from Jiggit, Rd. 1, Box 35, Chazy, NY 12921.

Continued on page 14
Power steel wooling

This product falls under the category of those that make me wonder, "Why hasn't someone thought of this before?" Rakso's steel wool sheets attach to your 1/4- or 1/2-sheet sander, enabling you to steel-wool surfaces just as you would powersand them.

The Rakso sheets helped me quickly smooth out coats of lacquer and enamel paint on large, flat surfaces. Since the product doesn't wear unevenly like steel wool pads, one sheet lasted a surprisingly long time. An added benefit: the sheets uniformly removed the finishes, leaving no swirl marks to telegraph through to the next coat.

I also had excellent results when power-scrubbing rust off stationary machine tables. It helped to apply a solvent/lubricant such as WD-40 to the table prior to scrubbing.

—Tested by Jim Boelling

Rakso steel wool sheets, $12.95 for six 1/4 sheets (2 of each grade), $14.95 for six 1/2 sheets, from Woodworker's Supply of New Mexico, 5604 Alameda Place, NE, Albuquerque, NM 87113. Include $4.50 postage for orders under $15 or $5.50 for orders $15-$29.99, $6.75 for orders $30-$49.99 and $7.50 for orders $50-$300.
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**Sand perfect circles**

It's practically impossible to cut perfect circles for such projects as wheels or small round tables using a bandsaw or scroll saw.

**TIP:** Try a disc sander to achieve true roundness. First, from ⅜" plywood, build an auxiliary table (about twice the size of the table on your disc sander) with a ⅜"-deep slot ¾" wide. Now, fit a hardwood bar a few inches longer than the auxiliary table so it slides freely in the slot. About 1" from one end of the slide, fit a ⅛" pin that protrudes ⅜" (see drawing). Bore a ½" hole at the center of the circular workpiece, place it over the pin on the slide, and slowly advance it into the sanding disc. When you reach the scribed circumference, clamp the slide to the auxiliary table and spin the workpiece for a perfect circle.

—Edward Hanselman, Hoosick Falls, N.Y.

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**A new wrinkle on making storage bins**

Most every woodworker accumulates an assortment of fasteners and small parts that requires systematic storage. Otherwise, clutter and chaos soon take over.

**TIP:** You can easily make storage bins of one-gallon cans used for packaging liquids such as paint thinner. Dave Wilson of Aberdeen, Wash., sent one style (shown at right, top) and it appeared in the June 1988 issue. Cutting away the corner diagonally as shown below left renders a container of a different breed. Use tin snips to do the shearing and turn over the sharp edges with a pair of pliers and a hammer. The second style creates a container you can pick up by the handle and carry without spillage.

—Clarence R. Evans, Cape May Court House, N.J.

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**Equal—but not separated**

Double-faced (carpet) tape works great for temporarily fastening pieces of stock together when making identical cuts such as finger joints. But, sometimes the adhesive works too well, making it difficult to pull apart the pieces.

**TIP:** Carefully drive a narrow wedge of softwood between the two pieces. This will force them apart without marring the workpieces. If the pieces still resist separation, splash lacquer thinner on the joint.

—From the WOOD magazine shop

(Continued on page 18)
Making your own wood projects is easier, more fun and more economical than ever, thanks to the RBI Woodplaner — actually four tools in one! It gives you the capability to create projects like fine furniture, cabinetry, ornate moldings, tongue-in-groove paneling and much more. You'll be the pride of your family and the envy of your friends. You can even use your Woodplaner to earn extra income! Try it just once and you'll see why this amazing tool is the favorite of do-it-yourself woodworkers everywhere!

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This jig makes for easy scrollsaw blade changes
Because of the small pieces involved, putting a new scrollsaw blade into its mounting clamps can be a hair-raising experience—unless you just happen to have three or four bands. With only two bands, by the time you get everything together, the alignment may be off and the set screws not tight enough to secure the blade in place.

TIP: Simplify this irksome job by building a jig that holds everything in place while you tighten the set screws. All you need is a pair of small C-clamps, two pieces of scrap wood about 8" long, and a strip of plastic laminate or thin stock to serve as a spacer. You don’t necessarily have to epoxy the C-clamps to the block, but doing so will make for quicker changes.
—John A. Henson, Lakeland, Fla.

Taped gussets simplify cutting loose box lids
Saw blades tend to bind when cutting off lids on wooden boxes, particularly when parting the final side. Consequently, kickback or sloppy cuts may result. Inserting wedges in the saw kerf helps some, but doesn’t prevent all binding.

TIP: While assembling the box, tape or hot-melt glue temporary gussets of scrap wood ¼" to ½" thick along the intended saw kerf as shown at left. Set your saw blade about ⅛" deeper than the thickness of the walls of the box. After sawing, tap loose the scrap pieces.
—Gerald Hunt, Swartz Creek, Mich.

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Quick help for accurate cuts
Measuring and marking get real old when cutting parts for a project that requires several duplicate pieces. And, it's nearly impossible to cut pieces of exactly identical lengths using a tape measure.

TIP: When you install a new fence on your radial-arm saw, draw marks at ¼" intervals on both sides of the blade. Or, buy an adhesive-backed rule. Then, you'll always have a ruler to help you instantly measure stock on the table.

To get those exact repetitive cuts, build a clamplike adjustable stop by cutting pieces of scrap as shown in the inset drawing. The middle piece should be slightly thinner than the thickness of the fence. Quarter-inch dowels keep the pieces aligned. To avoid sawdust buildup, the stop should ride on the fence and not touch the table.

—Gary R. Kenyon, Oak Creek, Wis.

Offset screwdriver reaches tight spots
Sometimes you have to drive a screw in an area where there simply isn't enough room to use a conventional screwdriver.

TIP: You can buy a bounty of screwdriver tips these days, including slotted, Phillips, square, Torx and other bits. For an offset screwdriver, insert the appropriate bit in a ¼" socket or ratchet wrench and proceed. Single-tipped bits work best.

—Ron Odegard, Appleton, Wis.

Continued on page 21

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TIPS FROM YOUR SHOP (AND OURS)

Continued from page 19
Control small pieces with a pencil
Scrollsawing parts from small pieces of stock can be tricky because the blade action tends to lift the wood off the cutting table.

TIP: Press the workpiece against the saw's table with the eraser end of a pencil as shown below to guide the workpiece. The rubber tip helps you control the part and follow the cutting line.
—Louis Moulis, Aurora, Ill.

Vinegar takes sticky epoxy off your fingers
Even the most persnickety of workers rarely avoid an oops with freshly mixed epoxy glue. Accidental drips and smears quickly show up on the materials being glued and on the worker's hands. Trying to wipe up these little messes before the epoxy sets up often falls short of the success you'd like.

TIP: Dampen a clean cloth with white vinegar (available in grocery stores) that contains 5 percent acetic acid. Then, wipe up the epoxy before it hardens.
—Walt Easley, Gladbrook, Iowa

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Handy guide for cutting thick, irregular stock
Making accurate perpendicular or angular cuts in thick timbers or odd-shaped posts can be troublesome, particularly when you can’t make a complete cut from one side. Often the second cut from the back side doesn’t match the first cut, leaving an unsightly mismatch.

TIP: Make a great cutting guide from two pieces of 1 x 1 x 14” hardwood and two 10” lengths of ¼” threaded rod, fitted with nuts and washers as shown at right. After measuring the distance between your circular-saw blade and the edge of its base plate, clamp the guide in place. Then, cut one side of the stock to a depth just more than half the stock’s thickness, flip it over and cut the opposite side. You can also angle the guide.

—Tom Xedos, Moreno Valley, Calif.

MORE TIPS FROM OUR WOODWORKING PROS
You’ll find more useful shop tips scattered throughout this issue of WOOD magazine:
- Clamping tiny parts? You can secure them with nails and a substrate covered with waxed paper as shown on page 49.
- On page 55, our featured craftsman substitutes readily available golf tees and wooden drapery rings for toy parts.
- For advice on choosing wood and fasteners for outdoor projects, see the boxed information on page 61.
- Need a jig for reinforcing miter joints? Turn to page 70.
- To avoid slippage and uneven pressure when clamping several pieces together at once, see page 75 for assistance.
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Post-hole blues
I have a lovely 8'-long turned wooden post that I would like to use as a yard light. How can I drill a center hole down the length of the post for the electrical wire?

—Robert Ward, Norfolk Va.

You're probably not going to like our answer, Bob, but here it goes anyway. You'll have to rip that post into two cross sections, rout a channel down both sides, slip an electrical wire down the middle, and then glue together the halves.

Keeping out the rain
Is there a way to seal the edges of outdoor plywood to keep seeping water from separating the plys?

—William Bosley, Beecher, Ill.

Jim Downing, our design editor, has done plenty of work with plywood on the 30' sailboat be's building. From his experience, he'd recommend sealing the plywood edges with regular-set epoxy and then sanding the edges smooth.

Grinding question: How slow?
I recently built my own grinder with a 1,725 rpm 1/2 hp motor and a 6" white wheel (soft for polishing). With belts and pulleys, I slowed the wheel to 431 rpm. Is this correct, or should the wheel run faster?

—Gerry Koertzen, Steinbach, Manitoba

Our project builder, Jim Boelling, says you can reduce the speed on your grinder to as low as 250 rpm. "You should sharpen fine steel, such as carving tools and bench chisels, at a slow speed," Jim says. "Use higher speeds for general-purpose grinding when you want to remove large amounts of steel."
## ASK WOOD

**Sound advice about door harps**

I recently started building wooden toys and wooden projects to supplement my Social Security income. I'm interested in making some door harps, but the plans and instructions I have don't specify the kind of wood to use for the front and back sounding boards. One of the WOOD magazine advertisers supplies "resonant" plywood. Can you tell me more about this?

—Gerald Grim, Mt. Airy, Md.

Our sources say resonant plywood is a misnomer, but some plywood has better resonance than others. Jerry Brown at St. Croix Kits (423 S. Main St., Stillwater, MN 55082) says that because of superior tonal quality, craftsmen use spruce-veneer sound boards when they assemble fine instruments such as pianos, guitars, and dulcimers. Three layers of solid sitka spruce veneer are laminated together for a piece of plywood measuring a little over 1/8" thick. St. Croix sells the plywood for about $7.50 a square foot. For door harps, Jerry recommends 1/4" to 1/2" baltic birch plywood, which sells for $1.25 for a piece 10 x 12". For serious instruments, the straight grain of sitka spruce sustains better vibrations than baltic birch.

## SOMETHING DOESN'T SMELL GOOD

I have built kitchen canisters from 1/2" oak plywood, and finished them on both sides. I applied Behlen's Salad Bowl Finish to the inside of the canisters, but the smell that lingers after four weeks is overwhelming! What do you suggest I use to finish the inside?

Frank Reaume, Newbury Park, Ca.

Jonathan Kemp, Behlen's national sales manager, recommends that you apply Salad Bowl Finish in light coats, in low humidity, and with good air circulation. Under normal drying conditions, their finish should dry thoroughly after three to four days. He doesn't recommend putting food in the containers until the odor disappears. If you still experience a slight odor, try lightly sanding the final coat and putting a fan near the canisters to speed the drying. "Using oxidized Salad Bowl Finish from a previously opened can is dangerous—what can has a one-year shelf life," Jonathan said. ✅

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Black WALNUT

The native aristocrat

Ancient Romans loved walnuts, and thought so highly of the meaty fruit that they planted the tree throughout south central Europe and England. Attention always focused on walnut for its nut crop, while oak prevailed as the choice for furniture.

In America, though, native black walnut has always been prime stock. While frontier families gathered walnuts to eat, city craftsmen worked the dark wood into classic pieces. Today, black walnut continues as the aristocrat of native hardwoods and the hallmark of tradition.

Wood identification

European walnut (Juglans regia) carries the names of countries and regions, such as English walnut, French walnut, and Circassian walnut from the Caucasus Mountains along the Black Sea. A walnut (Juglans neotropica) also grows in South America.

North America claims two walnuts: white walnut or butternut (Juglans cinerea), favored by carvers, and black walnut (Juglans nigra). It's black walnut, though, that woodworkers covet. Black walnut's range covers most of the eastern half of the U.S. and southern Ontario. However, prime walnut requires moist, deep, rich, well-drained soil, such as found in the upper Mississippi River valley.

In idyllic conditions, walnut reaches a height of 150' and a 6' diameter. More commonly, however, it matures at about 100' with a 3' diameter. The tree's thick, dark brown to brownish-gray bark has marked ridges.

Walnut's distinctive leaves measure 1-2' in length and carry a dozen or more leaflets. In spring, flowing catkins emerge on branch twigs. In mid-summer, nuts appear.

Walnut's heartwood varies from a purplish-brown with thin, dark veins to gray-brown and even orange-brown. The narrow sapwood tends to be white.

Unfigured walnut has straight, somewhat open grain. Figured walnut—fiddleback, burr, stump, and crotch—feels coarse-textured. A cubic foot of dry walnut weighs about 39 pounds, making it just a little heavier than cherry.

Uses in woodworking

Walnut remains a favorite for furniture, paneling, musical instruments, turned bowls, relief carvings, and sculpture. Veneer proves popular in marquetry and as furniture accents. Walnut's shock-resistance, strength, and stability, also make it perfect for shotgun and rifle stocks.

Availability

Selling from coast to coast, walnut ranks as our most expensive native hardwood at a cost of about $4 per board foot. It's also offered as plywood, furniture squares, buttons, plugs, turning blocks, and dowels. Plain veneer costs about fifty cents per square foot, but up to $3 for highly figured grades.
Machining methods
Black walnut rates as classic cabinet stock not only because of its eye-appeal, but because you get good results with either hand or power tools. It does, however, sometimes require special treatment. Our suggestions:
• Black walnut dust can irritate the eyes, so wear protective goggles, a dust mask, and have adequate ventilation or dust removal.
• Avoid any tearout by taking shallow cuts when jointing. And, try this on the planer: Run two short pieces of stock the same thickness as the walnut board through the planer at the same time—one ahead and one behind. This levels the infeed and outfeed rollers for a chip-free cut.
• In crosscutting, attach a backng board to the miter fence to act as a chip breaker.
• Walnut doesn't burn easily in routing, but shallow passes eliminate tearout.
• Any adhesive performs well with walnut, but in joining with white or yellow glues, keep glue squeeze-out to a minimum and skim off skinned-over glue. Dry glue discolors the dark wood and shows up in the finish. (Elmer's new dark glue minimizes this.)
• Straight-grained walnut generally doesn't require filling. Figured walnut—especially burls and crotch wood—has irregular, more open grain that you should fill.
• Staining walnut isn't necessary, unless color is uneven. Then, aniline dyes won't cloud the grain.
• The best finish for walnut is a clear one. Several coats of Danish oil provide clarity. For protection, add a compatible clear topcoat.

Carving comments
Walnut works best for sculptures and large figures with simple lines, or signs and relief carvings. If you do select walnut for a carving project, remember these tips:
• Deep cuts along the grain may cause the wood to pop out.
• Walnut's grain varies from very open to almost closed, depending on where it grew. Each performs differently. Open-grain walnut carves easier. Closed-grain walnut may be more difficult to carve, but it takes a finer finish.

Turning tricks
Walnut turns best at a lathe speed of 800-1,000 rpm, and requires sharp tools. Bowl turners know that walnut's pronounced end grain in the bottom of a bowl tears easily and produces a rough surface that's difficult to smooth. Here's what Arizona turner John Lea does to counter that:
• Leave a little extra thickness—about ⅛" or less—in the end grain at the bowl's bottom. Then, stop the lathe and with a power disc or flap sander, sand the grain down to a slightly lower level than the surrounding wood. Turn on the lathe and sand the remaining wood around the bottom. This method gives you a round bottom instead of the oval shape you get with the uneven sanding done with the lathe on.

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<td>Strength</td>
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<tr>
<td>Workability</td>
</tr>
<tr>
<td>Toxicity</td>
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<tr>
<td>Look-alike</td>
</tr>
</tbody>
</table>

Compiled with woodworkers Jim Boelling, Don Wipperman, Roy Kratz, carver Fern Weber, and turner John Lea.
Chances are at one time or another, you've seen a Shopsmith Mark V demonstration at a woodworker's show, state fair, or shopping mall. Pretty impressive, wasn't it? These slick demonstrations have convinced more than 500,000 woodworkers to buy a Mark V (or a predecessor model) since 1947. And, up until 11 years ago, Shopsmith was the only player in this market niche. Then, Total Shop began importing a similar machine from Taiwan, and has sold between 25,000 and 35,000 units to date.

Nowadays, we hear from plenty of readers who want to know whether they should buy a Shopsmith, or save $150–$300 by opting for a Total Shop. So, we brought both machines into the WOOD® magazine shop and put them through their paces. Although the machines look identical, we spotted significant differences under our magnifying glass.

Times were lean in 1937 when Dr. Hans Goldschmidt packed his engineering degree and fled Nazi Germany. He eventually landed a job as a foreman in a California woodworking shop, and it was here that he started dreaming about a multipurpose woodworking machine.

A few prototypes later, he and a handful of partners formed Magna Engineering Company and began producing Shopsmiths at a Berkeley lumberyard. By 1950, Magna was a nationwide success and in 1958 merged with Yuba Consolidated Industries. The parent company, however, ran into financial difficulties and stopped making Shopsmiths in the 1960s.

In 1971, John Folketh, then a stockbroker, breathed new life into the Shopsmith line when he visited the closed factory in search of parts for his Shopsmith radial-arm saw. He not only found the parts, but all the molds, dies, and jigs necessary to build multipurpose machines. Within two years, the Shopsmith Mark V was back in production in Dayton, Ohio, and Folketh was in charge of the new firm.
SHOPSMITH vs. TOTAL SHOP

How these machines work
As you can see by the photos below, the Shopsmith Mark V and Total Shop multipurpose machines appear nearly identical until you add a few options.

At the heart of these versatile performers sits a headstock that slides along two tubular ways. The headstock's motor drives an adjustable-pulley system that allows you to dial up variable speeds from 700 to 5200 rpm on the Shopsmith and 850 to 5200 on the Total Shop. As shown in the drawing at right, a spring-activated lower pulley changes size as you adjust the size of the upper pulley by turning the speed dial. Both machines have two fixed-work spindles on the left end of their headstocks and a movable quill assembly on the right ends of the headstocks.

Jim Berkeley of Shopsmith's engineering department pointed out to us that a major selling point of his company's machine is its stainless-steel motor shaft. "Stainless steel will not rust, so the motor shaft will not freeze up if the machine is stored in a damp area for a long time." Total Shop's motor shaft is made of steel—not a problem so long as you keep it lubricated.

Both machines convert into a 10" tablesaw, 12" disc sander, lathe, drill press, or horizontal borer. From either company, you can purchase an optional 11" bandsaw, 4" jointer, 6" belt sander, scroll saw, or plate joiner. Shopsmith also offers a 1" strip sander, 12" thickness planer, and lathe duplicator.

The multipurpose-tool advantage
Few woodworking machines pack as much versatility into a 2'×6' floor space as these tools do. And, that can be a mighty important consideration if you're restricted to a small work area.

SHOPSMITH MARK V MODEL 510 MULTIPURPOSE MACHINE

QUILL-ADJUSTMENT HANDLE
TABLESAW ATTACHMENT
MODEL 510 EXTENSION TABLE
HEADSTOCK
SPEED DIAL
WAY TUBES
OPTIONAL CASTERS
Although these machines will save you some space, they won't necessarily save you a lot of money. For example, you could buy a stand-alone table saw, lathe, and drill press of moderate quality for slightly more than the cost of one multipurpose machine. And, the bandsaw, jointer, scroll saw, and belt sander attachments from either company cost no less than some stand-alone, Taiwanese-made units.

However, both of these multipurpose machines perform some feats that no stand-alone tool can. For example, the variable-speed dial makes speed changes a snap compared to the manual pulley changes required by most lathes and drill presses. When it comes to the disc sander, we don't know of any machine, at any price, that rivals this component. As shown at right, the disc attaches to the drill-press quill, which increases your control when you feed the spinning disc into a clamped workpiece. And, because the disc-sander table also serves as the tablesaw top, you can precisely sand compound angles.

Initially, we thought that changing the machines from one function to another would be a big hassle. But, after making all the initial installation adjustments on each tool, most of the changeovers took no more than two minutes.

**Quality considerations**

As with most Taiwanese-made machines, you'll save dollars by buying the Total Shop, but you'll find a slightly rougher fit and finish on most parts. For example, we found that the cranks and handles fit better on the Shopsmith than on the Total Shop. These differences will not prevent you from doing quality work on the Total Shop, but if you want a product with smooth-fitting parts right out of the box, then go for the Shopsmith.

With the units switched ON, the Shopsmith speed-control dial turned easily with one finger curled around its peg, but we had to firmly grasp the Total Shop control with a full hand and put more effort into turning it. As we went through the different speeds, we noticed that the Shopsmith produced slightly less vibration and belt and motor noise.

*Continued*
COMPARISON OF 3 MAJOR TOOLS

- **Drill press**
  
  With the headstock and upper tubes in their normal, horizontal position, these machines make precise horizontal borer. You’ll especially appreciate this capability for drilling dowel holes. To convert the machines to a drill press, you simply rotate the headstock 90° by pivoting the upper tubes from a horizontal to vertical position. Both machines work well in this respect, but neither turn slow enough for many drilling operations. Since the Shopsmith has a low speed of 700 rpm, and the Total Shop turns no slower than 850 rpm, both machines can damage larger drill bits, especially in hardwoods. In response to this problem, Shopsmith manufactures a speed reducer that slows the spindle speed to 100 rpm. Price: $199. Shopsmith tells us this speed reducer will fit Total Shop machines as well.

- **Lathe**
  
  We’ve heard people refer to these machines as being “lathe based,” and it’s easy to see why. They look more like a lathe than any other stationary machine. Both machines work well as a lathe, but because of their 3/8” spindles (small by lathe standards) you’ll experience vibration with larger turnings such as bowl blanks more than 8” in diameter and 4” in thickness.

  As we did some test turnings, it didn’t take long to discover a problem with the Total Shop tool rest. Even when locked into position, the tool rest pivoted more than 1” as shown in the double-exposure photo at right. This shortcoming could prove dangerous to you and your project.

- **Tablesaw**
  
  Although these machines excel at certain operations, their tablesaws disappointed us. The reason: Both tabletops seem undersized in our opinion. The tops measure about 14” wide by 18” deep, with only 6” of surface in front of the blade. We spoke with several Shopsmith owners, and they agreed that crosscutting wider pieces challenged them. And, since the blade doesn’t tilt, sheet goods can be nearly impossible to handle on the tilted tabletop. Because of these limitations, it didn’t surprise us when several of the Shopsmith owners told us they owned stand-alone tablesaws, but really enjoy using the other functions. Shopsmith addressed these shortcomings with the larger (17½" x 22") table and extensions of the model 510, which has about 8" of tabletop in front of the blade.

  We found the lighter cast-aluminum top on the Shopsmith considerably easier to lift into position than the cast-iron Total Shop table. But once in place, we preferred the cast-iron surface because it proved smoother and more durable than the Shopsmith table.

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![Even when locked in place, Total Shop's tool rest pivots more than 1"—something to consider if you're a turner.](image-url)
MORE BUYING POINTS TO THINK ABOUT

- **Major accessories**
  We found the jointer and belt sander accessories similar in most respects, but the companies have taken different routes in manufacturing their bandsaws. The biggest difference: Shopsmith builds an auto-tracking mechanism into this accessory, whereas the Total Shop has the standard adjustments for blade tracking. We found the auto-tracking control hard to adjust for different blade types and sizes.

  The bandsaws also proved to be the bulkiest and most difficult accessories to lift into place, so Shopsmith’s use of plastic for the housing cover makes good sense. Both machines have cast-aluminum housings, but Total Shop also has a cast-aluminum cover that helps add 11 pounds to the accessory.

  Shopsmith manufactures a wider line of additional accessories, large and small. Although the patent on the Mark V has long since expired, company representatives say they hope to obtain patents on new accessories such as the plate joiner and speed reducer.

- **Customer service**
  To their credit, both companies offer a 1-year warranty, a 30-day full-refund period, and a toll-free customer service number. However, the headstock-repair programs have some significant differences.

  Shopsmith has 45 stores in the U.S., and three in Canada, that you can take your machine to for service. Shopsmith will loan you a headstock during the repair period, and will pay freight to and from the factory for both your headstock and the loaner if you’re not near a Shopsmith store.

  Total Shop doesn’t have a repair network, but Wayne Preston of Total Shop told us that doesn’t pose a problem because “Ninety-nine percent of the time, an owner can make a repair after we supply him with the parts. We also repair headstocks here, and provide loaners, but we haven’t had to send out a loaner in three years.” If you can’t make a headstock repair, Total Shop most often will arrange to have a local motor shop make the repair. On any repair shipment you make to Total Shop, you pay for the freight to them, and they pay the return freight.

- **Owner’s manual and other little extras**
  Both machines have the kind of extensive owner’s manuals (about 100 pages each) that we would like to see included with all woodworking machines.

  Shopsmith also includes the 360-page book *Power Tool Woodworking for Everyone*, a self-study guide, and a video tape on setting up and adjusting the Mark V. You’ll also receive three “Heirloom Projects” packages. One package covers woodworking fundamentals. The other two contain plans, instructions, and a video covering any one of 12 different projects of your choice. If you can get to a Shopsmith store, the company offers a free one-day seminar on operating their machine.

- **The bottom line: price**
  It’s not surprising that most of these machines sell at demonstrations—you really need to see them in operation to appreciate their many talents. To learn the site of the next demonstration in your area, call each company at the toll-free numbers listed on page 38. You’ll not only save money on either machine by buying it at a show, but you’ll also save freight charges.

  The Total Shop machine lists for $1,495, and sells for $1,059 with additional discounts or free merchandise at shows. Shopsmith lists its machine at $1,599, but gives you between $250 and $400 off that price in merchandise or cash discounts at demonstrations.

Written by Bill Krier
Technical consultant: George Granath
Photographs: John Hetherington
Illustrations: Kim Downing, Bill Zorn
A SIMPLE WHEEL WITH AERODYNAMIC STYLING

To get things rolling, we'll walk you through the procedure for the easy-to-make wheel shown above. You can fashion this little gem in a matter of minutes, then mount it on anything from simple pull toys to airplanes.

**Give the wheel character with a modified spade bit**

You can add a fancy touch to most any wheel by modifying an old spade bit. To shape a 1\(\frac{1}{4}\)" spade bit to the profile shown below, first lower one side of the bit about 1/4" on a grinder. Then, tightly clamp the bit in a machinist's vise and create the curved side with a rattle file. Next, restore the cutting edge to about a 10° angle with flat and rattle files.

These modified spade bits tend to tear the grain of some softwoods, but we had good results in 1\(\frac{1}{4}\)"-thick hardwoods such as red oak, walnut, maple and Honduras mahogany. To keep this grain tearing to a minimum, ease the bit slowly into the wood as you approach the final depth.

To make the best use of your time, mark all the wheel centers, then perform the following operations on all of the wheels before moving onto the next step. For these 1\(\frac{1}{4}\)"-diameter wheels, we suggest you space the centers 2\(\frac{1}{4}\)" apart. With your drill press set to 1,500 rpm, slowly lower the spade bit into scrap wood to a depth that leaves a full bead (about 1\(\frac{1}{4}\")), according to the wheel cross-section view at left. Once you're satisfied with the depth of the cut, set the depth gauge on your drill press.

Using the illustration at right as a guide, set your circle cutter for a 3/8" radius, reduce the drill-press speed to 500 rpm or less, and cut the outside perimeter of the wheels as shown on the opposite page. When using a circle cutter, remember to clamp the workpiece to the drill-press table.
YOUR PROJECTS WILL TRAVEL IN STYLE ON THESE WHEELS

Car manufacturers have known for years that a great-looking set of tires and rims can transform a ho-hum auto into a real standout. Now, you can perform the same magic on your next project.

We always knew that WOOD magazine's design editor, Jim Downing, is a big wheel in the woodworking shop. So, it didn’t surprise us when he responded to our request for a few great wheel ideas. We also tapped the expertise of loyal reader Ed Dohm of White Cloud, Michigan. Ed was one of more than 400 readers who sent a toy into our first-ever Design-A-Toy competition in 1989. His monster truck didn't win a prize, but we were so impressed with his heavy-duty tires that we just had to find a way to share them with you. In case you're interested in building Ed's truck, you'll find the complete plans on page 46.

Here's how to true and shape the wheel

To get started, make a work arbor similar to the one shown below from a 3/4 x 3"-4" bolt. Place the wheel between the two washers, tighten the nuts, and chuck the nonthreaded end of the arbor into your drill press. Now, set your press for 750 rpm, and shape the outside of the wheel with a rasp. Remember to move the rasp continuously for a smooth, rounded wheel.

After sanding the tire smooth, burn in the three tread lines with a hacksaw blade as shown at left. To do this, grip the ends of a full blade and hold the non-toothed, back edge of the blade against the tire as it turns as fast as your drill press allows. (We set our drill press at 4,700 rpm.) Consider each tread line done when you see a small puff of smoke.

Use the back edge of an old hacksaw blade to burn in the tread lines.

Keep your hands at a safe distance when using a circle cutter.

EASY-TO-MAKE WORK ARBOR

Chuck this end into your drill press

Cut off bolt head

Continued
CUT INTRICATE WHEELS WITH YOUR

Old-time vehicles just cry out for spoked wheels, but making them with dowels can be tricky and time-consuming work. With a minimum of fuss, your scrollsaw can help you cut wheels like the one shown on the 1928 Mack stake-bed truck at left.

How to cut four rims at once
As you can see by the exploded-view drawing at right, these wheels consist of a scrollsawed plywood rim inside a solid-wood tire. To cut four rims at once, stack together four \( 3 \times 3'' \) layers of \( \frac{1}{8}'' \) birch plywood. Place double-faced tape between each layer to hold the stack together. Then, transfer one of the full-sized rim patterns shown above right to the top of the stack. Drill the \( \frac{1}{4}'' \) axle hole. Now, carefully cut on the pattern lines, going along the outside diameter last. As you cut, be sure you're resists being prised apart, soak it in lacquer thinner and try again.

RETURN TO THE '50s WITH THESE WHITEWALLS

Jim Downing must have been daydreaming about his first car—a '57 Chevy— when he came up with this wheel. Jim made the tire shown on the opposite page out of \( \frac{3}{4}'' \) and \( \frac{3}{8}'' \) walnut and \( \frac{3}{8}'' \) maple.

Seven simple steps and you're done
With a little bit of patience and the step-by-step instructions shown below, you can turn out a set of these wheels in about the time it takes to watch one rerun of "Happy Days." As you go through the steps, keep these tips in mind:

- To cut plugs that fit perfectly every time, make test plugs from scrap stock. If you don't have access to \( \frac{3}{8}'' \) stock, insert \( \frac{3}{8}'' \)-thick plugs and saw them off to within \( \frac{1}{8}'' \) of the stock surface.
- When gluing the plugs in place, apply adhesive to only the walls of the plugs. This allows you to cut away and remove the centers later, as we're doing at right.
- After step 7, mount the wheel on a work arbor, and shape it according to the Section View shown at right. Then, drill a \( \frac{1}{2}'' \) hole, \( \frac{3}{16}'' \)-deep, in the center of the wheel to

Glue only the walls of the plugs so you can cut and remove their centers with a circle cutter.

HOW TO MANUFACTURE YOUR OWN WHITEWALL TIRES

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Using a Forstner bit, bore a ( \frac{1}{2}'' ) hole, ( \frac{1}{4}'' ) deep, into the ( \frac{3}{4}'' ) walnut stock.</td>
</tr>
<tr>
<td>2</td>
<td>Cut a plug from ( \frac{3}{8}'' ) maple stock to fit the ( \frac{1}{8}'' ) hole. We used a circle cutter.</td>
</tr>
<tr>
<td>3</td>
<td>With a circle cutter, bore a ( \frac{1}{8}'' ) hole, ( \frac{3}{8}'' ) deep, in the center of the glued-in-place maple plug.</td>
</tr>
<tr>
<td>4</td>
<td>Cut a ( \frac{3}{8}'' )-thick walnut plug to fit the ( \frac{1}{8}'' ) hole.</td>
</tr>
<tr>
<td>5</td>
<td>With the circle cutter set as shown, out the rim bead.</td>
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WOOD MAGAZINE  JUNE 1990
SCROLLSAW

Make a balloon tire for old time's sake

A spoked rim deserves an appropriate tire, so let's make a balloon tire from 3/8" walnut.

First, mark a series of centerpoints, spaced at least 2 1/2" apart, on the backside of the walnut. With a compass, draw a 2 1/4"-diameter circle at each mark. Then, at each centerpoint, cut 1/4"-deep holes with a 1 3/4" Forstner bit. Center a 1 3/4" Forstner bit in the holes you just made and bore clear through the wood. Moving over to your scrollsaw, cut along the outside of the tires, being careful not to creep inside the line. Now, glue the rims into the tires. After the glue sets, mount the tire on a 1/4" work arbor and round over the edges. Finally, clean up any scrollsaw boo-boos on the rim as shown at right.

Small riffler files help you clean up scrollsaw cuts, even in the tightest spots between the wheel spokes.

accommodate a baby-moon hubcap. You can either shape your own hubcaps from dowel stock, or buy 1/4" birch mushroom-head screw-hole plugs.

SECTION VIEW

STEP 6: Rotate the cutter and cut the center from the rim

STEP 7: Rotate the cutter again and cut the wheel free from walnut block.
BUILD YOURSELF A SET OF MONSTER TIRES

For heavy-haulin' vehicles such as the dump truck shown opposite, or the monster pickup truck on page 46, you just can't top these big wheels. And, after you build the two simple jigs required, you can turn out these wheels lickety-split.

Get the wheel into the round

As you can see by the illustration below, this wheel consists of two halves, each cut from 1½" stock. For each wheel, draw two 3½"-diameter circles on the stock. Within one of those circles, use the same centerpoint to draw a 1¾" circle. (This will be the outside half of the wheel.) Now, cut out the two wheel halves on your bandsaw, staying just outside the 3½" circles. Then, build the simple sanding jig shown on page 16. Drill a 3¼" hole in the center of both halves and sand the wheels round as shown at right. Next, rout a ¼" round-over around the outside diameter of each wheel on the sides previously marked with a pencil.

To make the angled kerf-cutting jig shown opposite, cut a piece of ¾" plywood to 3½ x 16". Then, center this piece on your miter gauge and attach it with screws. With you miter gauge set at 15° according to the kerf-cutting drawings on the opposite page, cut two saw kerfs through the jig with your miter gauge set to the left and then to the right of the blade. Add 3¼" dowels and reference marks to the jig as indicated in the drawing on the opposite page.

Set the sanding jig's stop for the correct wheel diameter, then turn the wheel into roundness with a disc sander.

Let's add those earth-hugging treads

Before you cut the kerfed treads, you need to make a kerf-marking platform by inserting a 2"-long, ¾" dowel into the center of a 5" x 5" piece of stock. Center the full-sized kerf pattern shown below on the platform, and mark the kerf positions on the unrounded edges of each wheel half as shown in the photo below. Write "0" above one kerf mark on each wheel half.

Transfer each kerf mark from the pattern to the wheel and write a "0" at the first wheel mark.

FULL-SIZED KERF PATTERN

SECTION VIEW

1¼ saw kerfs, ¼" deep

1¼" roundover

1¼" bead

3½" dowel hole

3½" axle

3½" bead
Now, slip each of the wheel halves (unrounded side first) over one of the jig’s dowels according to the instructions given on the illustration at bottom. Starting with the “0” mark aligned with the jig’s reference mark, cut one ¼”-deep kerf after another as shown below. Stop making cuts when the “0” goes all the way around the wheel and again reaches the reference mark.

Now, assemble your wheels
Here’s a trick for avoiding glue squeezeout that you can use on other similar projects. Before gluing together the wheels, cut a ¼”-deep trough just inside the treads on the facing edges of the wheel halves as shown below. After applying the glue, place a ½” dowel through the two wheel halves for alignment, clamp the halves together, then withdraw the dowel so it doesn’t become glued in place. Bore a 1½” hole, 1¼” deep into the outside of the wheels where marked previously. Then, add a ¼” bead as shown on the opposite page. That’s it—you’ve created a monster! ✽

Written by Bill Krier with Jim Downing. Illustrations: Bill Zaun; Mike Harrington; Jim Stevenson. Photographs: Hopkins Assoc.
FUN-CHARGED

MONSTER

Making vehicles and jigs is nothing new to Edward Dohm of White Cloud, Michigan. A retired Oldsmobile production engineer, he spent less than an hour concocting the jig to kerf the hefty wheels on his monster truck. With a quality project like this, it's easy to see why this retiree enjoys spending more than 30 hours a week in his woodshop. In fact, Ed and his wife, Janice, market their wood projects at more than 10 craft shows a year in western and southern Michigan.

Note: To form the large wheels, refer to our wheel-making techniques article starting on page 44. You'll also need some thin pine for this project. You can either resaw or plane thicker stock to size.

Cut and join the cab and body parts

1. Cut the pickup bed (A) to the size listed in the Bill of Materials on page 49. (We planed a piece of 3/4" thick stock to 3/8" thick.)
2. Cut the hood (B) to size. With the front ends and edges flush, glue and clamp the hood to the bed. (When clamping together the pine pieces to make this project, we used clamp blocks to prevent the jaws from denting the soft pine.)
3. Cut a piece of 1/4"-thick pine to 2 1/2" wide by 3 3/8" long for the cab blank (C). Transfer the full-sized cab bottom-view pattern to the bottom surface of the cab blank. Tilt your bandsaw table 30° from horizontal. With the bottom surface of the cab blank facing up, follow the marked line to cut the cab front (windshield) to shape, as photographed below.

Transfer the pattern to the bottom of the cab blank, angle the bandsaw table, and cut the cab front to shape.
by 7¾" long for the fenders (D). Using double-faced tape, stick together the two pieces, with the edges and ends flush. Now, transfer the full-sized fender pattern to one of the pieces. Cut the wheel openings to shape. Splash a bit of lacquer thinner on the taped joint, and pry apart the pieces (we used a wooden wedge, because a screwdriver tends to dent the pine).

5 Glue and clamp the fenders (D) to the bed-hood assembly (A, B), with the top edges and ends flush. See the Body Assembly Drawing for reference. With the back edge of the cab (C) flush with the back edge of the hood (B), glue and clamp the cab to the hood.

Here's an easy way to assemble the grille

1 Cut the grille parts (E, F, G, H) to the sizes listed in the Bill of Materials from ¼" pine stock.
2 Tape a piece of waxed paper onto a piece of flat stock. (The waxed paper keeps the grille parts from sticking to the substrate.) Spread glue on the mating surfaces and hold the parts together with nails, spacing the parts with dimes as shown in the photo below.
3 After the glue dries, pull the nails and remove the grille from the substrate. Referring to the Parts View Drawing for locations, drill the headlight and parking light holes. Sand both surfaces of the grille. With the top of the grille flush with the top of the hood, glue the grille to the front of the cab assembly.

Tailgate, bumpers, and lights add a flashy look

1 Cut the tailgate (I) and bumpers (J) to size.
2 Cut a ½" saw kerf ½" deep in the tailgate where shown on the Parts View Drawing. (We used a dovetail saw to cut the kerfs.)
3 With a brad-point bit, drill the holes in the tailgate where shown on the Parts View Drawing. Sand the tailgate smooth.
4 From ¼" and ⅝" dowel stock, cut the headlights, taillights, brake lights, and parking lights for the grille and tailgate to length. Glue the dowels in place.
5 With the top of the tailgate flush with the top of the fenders, glue the tailgate to the truck body.
6 Using the two-step drawing above for reference, bevel-rip both sides of the pickup body.
7 Glue and clamp the bumpers to the front and back of the truck.

The wheels and drive-train assembly come next

Note: For details on how to make the oversized wheels (M), see the instructions on page 44.

1 Laminate three pieces of ¾" x 2¾" x 6½" pine face to face, and cut the axle blocks (K) to shape from the lamination (see the Parts View for the full-sized pattern).
2 Drill a ¾" hole through each axle block where marked. Cut the axles to 5¾" long from 3¾" dowel.

Continued
MONSTER TRUCK

3 Using the full-sized pattern at right as a guide, cut the transfer case (L) to shape and sand smooth. Glue and clamp the transfer case and axle blocks to the bottom of the bed, centered from side to side where shown on the Section View Drawing on the opposite page.

Now, form the spacers and mount the tires

1 Cut a piece of 1/4" pine stock to 2 x 12" (we resawed thicker stock to 1/8" thick). Using a circle cutter, set to cut a 1" outside diameter, cut the four spacers (N). You could also cut the round spacers on the bandsaw. With a 7/16" bit, enlarge the pilot hole in the center of each spacer. See the spacer on the Parts View Drawing at right for reference. (To complement the pine truck, we preferred making our own spacers instead of using 3/8" metal washers.)

2 Glue an axle to one wheel so 3/8" of the axle protrudes in the counterbore of the wheel. Add a wood spacer onto the axle dowel on the inside face of the wheel. Slide the axle through the axle block, add another spacer, and glue the axle to another wheel. Repeat for the other axle assembly.

3 From 1/4" dowel stock, miter-cut the drive-shaft dowels to the length shown on the Parts View Drawing. Glue pieces in place (we used instant glue). You may need to sand the beveled ends for a gap-free fit between the transfer case and axle blocks.

Add the finish and fuel it up

1 Finish-sand the pickup and wheels. Add a clear finish. (We used polyurethane. We do not recommend an oil finish on toys; it tends to “attract” dirt from young hands and the finished project soon looks dirty.)

Produced by Marlen Kemmet
Project Design: J. Edward Dohm
Photographs: Hopkins Associates
Illustrations: Kim Downing; Mike Henry
BODY ASSEMBLY

BILL OF MATERIALS

<table>
<thead>
<tr>
<th>Part</th>
<th>Finished Size*</th>
<th>T</th>
<th>W</th>
<th>L</th>
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</thead>
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<td>P</td>
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<td></td>
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<tr>
<td>B</td>
<td>hood 3/4&quot; 2 1/2&quot;</td>
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<tr>
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<td></td>
<td></td>
</tr>
<tr>
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*Initially cut parts marked with an * oversized. Then, trim each to finished size according to the how-to instructions.

Material Key:
P = pine, LP = laminated pine

Supplies: double-faced tape, 1/4" and 3/4" dowel stock, clear finish.
EASY STEPS TO A FINISH THAT’S GLASS-SMOOTH

1. For starters, sand the wood surface smooth with 150-grit paper. If you plan to stain the piece, sand it again with 220-grit paper. If you used an orbital sander, be sure to closely inspect the surface under sidelighting and sand away any swirl marks.

Now, carefully remove the sawdust from the surface with compressed air. Otherwise, vacuum the surface and clean it with a tack rag. If you prefer a stained surface, apply an oil-based stain and allow it to dry for 24 hours.

2. Coat the end grain of the surface with polyurethane, and allow it to saturate the pores fully before applying any finish to the tabletop. After a couple of minutes, and 2–4 applications, the end grain will stop absorbing polyurethane. Now, coat the top by brushing the polyurethane across the grain as shown below, then brush with the grain to completely fill the wood pores. If you stained the piece, allow this coat to dry completely before proceeding.

For unstained wood, immediately wipe away the excess polyurethane with a 6–8” squeegee as shown below. The squeegee helps drive the material down into the wood pores, and leaves almost no finish on the high grain.

After the first coat of polyurethane dries (on either the stained or unstained piece), lightly smooth the surface with 150-grit sandpaper, being careful not to sand through the finish of the stained piece. With a fast-drying polyurethane (we used Varathane's Professional Clear Finish), you can apply your second coat after 12 hours. For slower-drying polyurethanes, wait 24 hours between coats.

Apply and squeegee a second coat to the stained or unstained piece. After this coat dries, inspect the surface in a strong sidelight to see if the grain has filled to your satisfaction. If not, sand with 150-
One morning not long ago, Design Editor Jim Downing marched into the WOOD\textsuperscript{e} magazine shop carrying a smooth-as-glass tabletop that he had made for the galley of his 30\textquoteleft sailboat. Not surprisingly, it brought on a chorus of “ooohs” and “aahs” as staffers rushed to run their fingers across it. Right away we knew that Jim’s polyurethane-finish technique was too good to keep a secret from our faithful readers.

The key supplies for Jim’s glass-smooth finish include 1,500-grit sandpaper and two finishing compounds formulated for auto finishes. In case you can’t find a local auto-supply dealer that carries these products, we’ve arranged for a mail-order source. And, you won’t need any special tools—just some patience and a little elbow grease.

grit paper and repeat the process. Sand the final coat with 150- and 220-grit papers. For the porous red oak end table in this story, we applied and sanded four coats to completely fill the grain.

3 Next, spray a heavy, flowing coat of polyurethane onto the surface. Apply three more coats, and sand between them with 220-grit paper. (Aerosol cans work fine if you don’t own a spray gun.)

After the final coat dries, apply a few ounces of water and wet-sand the surface with a 3M No. 20 wet or dry sponge pad and 1,500-grit paper as shown below left. Check for glossy spots and resand any missed areas. You can purchase the pad, 1,500-grit paper, and finishing compounds through the Buying Guide below right.

4 Build that glowing finish with 3M’s Finesse-it II Finishing Material. Squirt an ounce or two of the liquid onto the surface and rub it in with a clean, soft rag as shown below left. Bear down hard as you rub the entire surface. Then, wipe the surface clean, and if you see any dull areas that you missed, redo them.

5 For the final luster, repeat Step 4 with 3M’s Imperial Hand Glaze. Be careful to use separate, clean rags for steps 4 and 5.

From beginning to end, we spent five days finishing the end table’s oak surface. Less-porous woods, such as cherry, maple, or walnut, require about half that much time.

**Buying Guide**
- **Glass-smooth finishing kit.** Quart-size bottles of 3M Finesse-it II Finishing Material and Imperial Hand Glaze, 50 sheets of 1,500-grit sandpaper, and No. 20 wet or dry sponge pad, $44.62 (U.S.) ppd. Hawkeye Auto Supply, 417 12th St., Des Moines, IA 50309.

Written by Bill Krier with James R. Downing Photographs: John Heffington, Hopkins Associates
When Phil Vander Ploeg, president of Toys and Joys in Lynden, Washington, mentioned that he knew a man in Manitoba who made lots of neat trucks, we checked out his tip. Sure enough, Phil, one of our 1989 Design-A-Toy judges, recognizes a craftsman when he sees one.

At East Braintree, in eastern Manitoba, we found Karol (say Carl) Fedoryshyn at work on his model trucks. He and his wife, Mabel, made us feel at home.

Karol also took us to the weigh station where he's employed so we could see firsthand how he does his research. There, we met several swell Canadians who make their living on the open road. And, after watching us photograph some of Karol's trucks, the drivers even placed orders for their own models.

Trans-Canada Highway 1 spans 2,500 kilometers from its oceanside beginning at Vancouver, British Columbia, to its dilution into several routes near lake-dotted Kenora, Ontario. To truckers, names like Kamloops, Medicine Hat, Moose Jaw, and Portage-la-Prairie become landmarks on a cross-country road that slices through soaring mountains, flat grain fields, and dense timberland.

Long-haul drivers know every inch of Trans-Canada 1—particularly the weigh stations at provincial borders. To weight or safety violators, these mandatory stops can represent delays, fines, hassles. Most truckers, though, look on them as oases on the long, paved ribbon.
BIG BOYS

custom cedar semis for the provinces.

Manitoba's West Hawk scales, at the Ontario border, has an added attraction. To hundreds of Canadian truckers, it's where "the model guy works."

**Fords, Freightliners, Macks, Petes, Whites, and wolves**

Karlo Fedoryshyn has worked at the West Hawk scales long enough to have seniority, and learn a lot about semis. He studies them for his job, and for the models he knows he'll eventually build. Since he began building them five years ago, Karol has made at least 400 truckers happy with 1/2-scale copies of their rigs. His models sell for about $200 (Canadian) and have found their way to England, New Zealand, Ireland, East Germany, as well as the States. Karol has made small and big trucks—one rig had 52 wheels and stretched 5'7". No matter the size, though, count on realism.

"That's a Ford L9000," Karol says after glancing at a truck just coming onto the off ramp. "Fords, Freightliners, Macks, Peterbuilts—the radiator gives them away," he notes from his desk.

With a twinkle in his eye to rival St. Nick's, Karol mentions the basic truck body styles of cabover and sleeper, then spells out how each manufacturer adds distinctive features. With knowledge that goes below the surface, he doesn't hesitate to explain tridem axles and engines to boot.

Karlo notes the nuances from truck to truck because he has to.

▲ Near the West Hawk scales, a cabover Freightliner hauling livestock parks behind Karol's 1/2-scale version.

"My models must be accurate," he explains. "Two truckers may each own the same tractor, but they'll never be exactly alike. They customize them, eh.

"So, when someone wants me to make a model of his tractor, he'll point out what he's added," Karol continues. "Then, I take a photograph that shows all the details, and build from that."

Studying trucks has become second nature to this craftsman as watching for wildlife has to long-haul drivers on Canadian highways. During his shifts at the scales, Karol scans each semi as it's weighed and thinks about Continued
TOYS FOR BIG BOYS

how he can copy some aspect of it in wood. "Sometimes, I get an idea for a new way to make a part," he notes. "Like where the exhaust stacks curve to go beneath the cab body. I used to make them from dowels that I bent with a series of cuts, then glued. But they never looked quite right. Then, I thought of wooden drapery rings. A cut-off section of the radius worked perfectly. That's what I went to."

Closely observing trucks at the scales has brought some surprises, too. Such as the time Karol spotted the wolf.

"We're so far out in the bush," he says in setting the scene, "it's not unusual to see a bear or a moose amble down the highway. But, one winter night, I was watching a driver walk around his truck to thunk tires—and there was a timber wolf following him! Just interested, you know, in what the man was doing. The trucker, he didn't see him, eh. Just kept walking. He wouldn't believe it happened."

Eighteen wheelers at 40 degrees below

Around sparsely settled Falcon Lake, box numbers replace house numbers. And, after years spent in bustling Winnipeg, Karol likes the solitude of his 20-acre parcel adjoining the Boggy River. Even the double-garage-turned-shop touches the woods.

"Here's where I block my wood to size," Karol explains as he opens the overhead door. In the walkways between the racks and stacks of stored wood stand some dusty stationary machines. "I started 10 years ago with a used jointer and a 10" tablesaw. But, the planer I got has turned out to be a godsend. Before, I had to do a lot of sanding to get the wood to the proper thickness after resawing. Now, I send it through the planer and it comes out exactly ¼" or whatever I want."

Karol pauses, surveys his machines, then reflects, "My Dad bought me my first saw when I was six. He was a butcher by trade, but he learned woodworking in the Old Country—Czechoslovakia—where they built a workbench or other projects without any fasteners. He'd use pegs and slotted joints. No power tools. I learned a lot from him."

Karol continues the train of thought. "In high school, my wood shop teacher, Mr. Burnside, made us do everything with hand tools the first year. We called him 'Face-Side and Face-Edge Burnside' because he'd give us a rough piece of lumber and we'd have to plane the face side of it flat. Then, he'd check it with a square, and the face edge had to be exactly 90°. If it wasn't right, you had to scrap it and start over again. A lot of kids now," he says, tugging at an ear, "they're lost without an electric power tool and an extension cord."

Karol walks over to a door in

the dividing wall and opens it to reveal a second shop. "This room is where I do all the parts-sawing, sanding, and assembly. It's insulated to 40° below," he says proudly. The assembly shop isn't filled with bank after bank of stationary power tools, only the necessities.

Karol, for the most part, makes do with what he has. "That tablesaw is 30 years old. I bought it at Sears," he explains. "It's a 'National' and it has a 4" jointer. With the stand, motor and everything, it cost $125. I remodeled the fence, though, and rebuilt the arbor."
Production for the parts bins

Karol hasn’t yet made all the rigs he sees go through the scales. But he’s made enough to know that there’s lots of identical parts on the road. That means inventory. “Cutting the parts and assembling the trucks take about equal time,” Karol notes. “I’d say I average about 10 hours per truck. And that’s because I try to save time where I can.”

For instance, Karol buys ready-made hardwood wheels by mail order. The inside wheels that don’t show, he turns in his shop from maple. “I just chuck a long square on the lathe, turn it round, define each wheel, and cut them apart,” he says. (See photo, left.)

“I use the router for the radiators,” Karol adds. “When I turn out the radiators [grills], I do them 50 at a time, with templates. I cut the rough block out twice as thick as the radiator will be and press it into the template that acts as a router guide. After I rout out the grill area on one side, I turn the block around and do the other. Then I cut it into two radiators, leave them rough, and stack them in my parts bin. When I make a vehicle, I sand them.”

An inspection of Karol’s parts department reveals carefully separated containers full of unfinished golf tees for air horns, hardwood plugs and buttons for head- and taillights, dowels and wooden drapery rings for exhaust pipes, turned barrels for tanks, and stack after stack of thin-sawed material for mudflaps, mirrors, and trailer sides. The crowded bins with their labels identifying model designations present a factorylike appearance to one wall of the shop. Everywhere else, there’s wood.

Apparently, the near-wilderness setting develops resourcefulness because Karol admits he not only doesn’t throw away much wood, he acquires it as inexpensively as possible. “I only use white cedar

for my models,” Karol says, “and it’s expensive. The last time I bought some, in Kenora, it was $1,300 a thousand [board feet]. Some people around here seem to waste a lot of wood, maybe because it’s so plentiful.”

Trips to the landfill, for instance, prove profitable for Karol. “The contractors who build lake cottages, if they make a mistake, they tear the new stuff out and go to the dump with it,” he says.

Trucks for display, not play

Trucks represent the bulk of Karol’s production, but he also makes old-fashioned, stake-side pickup trucks, sedans, and other vehicles. A few years ago, he even made a replica of Winnipeg’s Paddle Wheel Queen, a boat that took 1,000 pieces of cedar to complete.

For the occasional model he builds of hardwood, Karol assembles with yellow glue. The white cedar pieces for most of his vehicles, though, go together with a hot-glue gun. “It’s fast, not messy, and it holds up,” Karol says. “I’ve only had to repair one. The man said it fell off the mantle, but I suspect it had a rough go.”

Karol’s also a bit unconventional about finishing. He refuses to “We seem to be at a time now when people prefer natural wood,” Karol says. “I had a guy who showed me pictures of plastic model trucks his son made. He said, ‘I want you to make me one out of wood. They’re totally different.’ The wood seems to bring something out in the truck. If I even put a clear finish on it, I lose all that. Besides, they may be big boys’ toys, but they end up on display.”

To contact Karol, write:
Karol Fedoryshyn, Falcon Lake
Post Office, Falcon Lake, Manitoba R0E 0N0 Canada

Written by Peter J. Stephano
Photographs: Brian Gould/IMAGE 2

Karol does all his resawing on the little bench-type saw. He makes crosscuts on the radial-arm saw—when its table isn’t littered with sketches and plans. “That’s where I do all my drawings,” he says, clearing away the jumble of rolled and folded papers.
At Florida’s Walt Disney World, the show must go on, and to a select group of craftsmen, that means living a fantasy.

The Magic Kingdom. Epcot Center. Disney-MGM Studios. It’s all Walt Disney World. And, without a doubt, it’s really a world apart.

Sprawling across 27,000 acres—that’s 43 square miles—Walt Disney World covers a land mass about twice as big as New York’s Manhattan Island. For population, would you believe 31,000 employees, a number surpassing many Chicago-area suburbs? And, guess what? Just as in any place with that many people, there are a goodly number of woodworkers, too.

Hi ho, hi ho, it’s off to work we go

Behind the characters, castles, exhibits, glitter, parades, restaurants, rides, and thrills that the Disney corporation created in central Florida’s piney woods, we found some hardworking craftsmen. Even a hot summer sun, humidity, or a blustery day can’t dim the enthusiasm of the 40-man crew that makes up Walt Disney World’s mill shop.

Above the din of saws and shapers, there’s occasional laughter. And why not? The Disney brand of woodworking happens to be fun.

Where else but at Disney World could a woodworker—in a week—carve a car from Styrofoam, mend Cinderella’s carriage and castle, cut out 300 plywood palm leaves, repair a century-old carousel horse, and craft cabinetry for a foreign exhibition? At Disney World, these tasks are a matter of course.

“We’re not really a production shop, we’re a specialty shop,” explains Cephas Goodman, 56, mill shop superintendent and a Disney employee for two decades. “One day, a worker could be making a real fancy cabinet, the next he could be making a crate.”

In the Wonderful World of Disney, who can tell when the boss might drop in to lend a hand? Mickey shows Carlos Bocero how to fasten a spindle.

WOOD® ON THE ROAD

Did you know that Mickey Mouse likes woodworking, too? And, boy, does he ever have a great shop with lots of tools!

Last August I got to see first-hand what it’s like to be a behind-the-scenes woodworker at Walt Disney World. For the better part of two days, I met and talked with the craftsmen you’ll meet in this article and their fellow workers. I saw their work, too, and from cabinetry to stage sets, it’s all first class. And you know what? I can’t recall a happier bunch. Maybe it’s because they know their work makes others happy. Thanks for the experience, Mickey and friends.

—Peter J. Stephano, Features editor
Whatever happens to be on the daily agenda, however, it won’t be made or repaired in a slipshod manner. The sign on the side of the massive Central Shops building that encompasses the mill shop says it all: **CENTRAL SHOPS, Dedicated to Excellence.**

“Big manufacturing companies and even cabinet shops can’t afford to take the time to do things like Disney does,” says Cephas. “Like building Mickey Mouse’s car for Mickey’s Birthday Land. Carl Reynolds (see photo below) probably spent four weeks on it, besides his other work. He carved it out of foam from nothing but a rough-drawn sketch.”

Then again, Cephas often sees to it that some things get done quickly. For unlike Mary Poppins, Cephas’ crew can’t get the work done magically. “Sometimes, we have to turn jobs around pretty fast, and a lot of work becomes overtime because Disney always wants the show to go on.”

Carver Carl Reynolds, a former Detroit auto-industry model maker, fashioned Mickey’s car from Styrofoam with a chainsaw and a bread knife.

**A workshop fantasia**
Walt Disney World’s Central Shops covers 180,000 square feet—that’s about four football fields—and serves the entire Disney empire. From within its walls emerge everything from paddlewheelers to mechanical animals, destined not only for the Florida kingdom, but California’s Disneyland, the theme park outside Tokyo, the facility under construction near Paris, and even non-Disney enterprises. “For example, we built a dozen small ride boats for a Hyatt hotel in Hawaii,” Cephas points out.

As part of Central Shops, Cephas Goodman’s mill shop claims a floor area equal to 48 double-car garages (23,000 square feet). And, that gigantic shop houses a host of equipment: seven jointers, nine radial-arm saws, nine 10” tablesaws, seven bandsaws, a huge resawing bandsaw, a straight-line rip-saw, three planers, a profile sander, an overhead router, an inverted router with vacuum template, five shapers, a pair of doweling machines, four chop saws, eight disc sanders, five spindle sanders, a 6’-bed lathe, and a huge lathe with a 27’ bed. And probably 101 hammers.

The mill shop even has an in-house millwright, Bobby Fultz. What does a millwright do? Sharpen blades, weld bandsaw blades from roll stock, and create special blades—such as the 700 shaper knives with profiles unique to Disney World—on a $20,000 profile knife grinder.

With all those woodworkers working and tools machining, Cephas’ crew naturally goes through a lot of wood, even in a week. That’s why the lumberyard across the way carries enough stock to service a small city.

**Wood by the train-car load**
Tiki Parks, the mill shop’s planned-work specialist, tracks the running inventory of wood in the lumberyard. Her daily tallying indicates

Continued
that more than several train-car loads pass through the shop each year. "The lumber warehouse, in an average year, issues 39,000 board feet of South American mahogany, 12,000 board feet of hard maple, about 49,000 board feet of select, structural, vertical-grain Douglas fir, 261,000 board feet of construction-grade spruce, 125,000 board feet of pressure-treated pine, 11,000 board feet of oak, and a mixture of others—cherry, poplar, cedar," she says after a quick glance at her computer. "Then, there's the plywood. Fir plywood alone runs over 16,000 sheets. And, we special-order other woods as needed."

To most WOOD magazine readers, that's more than a cat's nine lives' worth of stock. Where does it all go? "Mahogany and vertical-grain Douglas fir hold up the best for outdoor moldings, doors, trim, and the like," says Cephah. "In California, redwood held up beautifully when they built Disneyland, and we used a lot of it here when we originally built the park. But, in this damp climate it didn't last, so we don't use any redwood at all now. And, mahogany here costs about the same as vertical-grain fir, and," he adds, "they're both cheaper than pine. We use maple inside for turnings for stair rails and balusters, and it's good to paint. Mahogany also goes into cabinets."

Pressure-treated southern pine ends up as Disney World fences and decking. "For decking," Cephah notes, "we use only 2-by or 3-by stock, dovetail it every inch, then put a Carborundum material in the grooves to hold up to traffic. Otherwise, the planks would wear out too soon and we'd have safety problems."

Plywood sheets become the material for stage floors, backdrops, and props, such as the palm trees that will eventually decorate the...
entrance hall of Disney World's brand-spanking-new Dolphin and Swan Resort Hotel. In other construction at that facility, mill-shop employees constructed a 54 x 46 foot scallop shell with ribbing made from 400 sheets of 34" plywood, steel framing, and a fiberglass covering (see photo, left). Complete, it weighs 75,000 pounds. Held in place at the hotel entrance by a trio of fiberglass dolphins, it will serve as the basin for a massive cascading fountain that visitors drive their cars beneath.

**Only experienced woodworkers need apply**

Cephas attempts to hire only people who have worked in cabinet or millwork shops, or have extensive home-building experience. “A lot of people have worked in different shops, but we find that no one has ever worked in a shop like Disney’s,” he notes. “We do things here that you just don’t do in other places.”

The superintendent spent nearly 20 years as a cabinetmaker in northern Florida before migrating to Orlando and the magic of Disney World. And his employees can cite similar backgrounds. Carlos Boreo, 40, one of Cephas’ foremen, grew up in Argentina where he began his woodworking as a young teen with a Cinderella job sweeping out a cabinet shop. Carl Reynolds, the in-house carver, claims 30 years of his 50 in woodworking, including a fun stint making model cars in Detroit. There’s also a craftsman who once focused his skills on piano-making; a young man who previously customized private airplane cabins with cabinetry; and a former U.S. Navy submariner who picked up skills in his spare time at base woodshops. Throughout the mill shop runs the common thread of woodworking experience, and for Cephas and Disney World, it pays off in big dividends.

**Job tickets from scratch**

“We do a little bit of everything,” explains Cephas. “I don’t really keep track of the categories, but a lot is maintenance—maybe 60 percent—such as repairing doors or cabinets, or even carousel horses. New work might be 40 percent. It’s really hard to break down, it varies so much.” Vary it does, and that’s why Carl, the carver, loves it.

One goofy week, he carved Mickey’s car from Styrofoam—complete with dashboard, steering wheel, and seat. The next week he blocked out intricate signs in oak with palm gouges. “There’s no pressure, and there’s always plenty of time allowed to do the job from start to completion,” says Carl.

And, when a project starts from scratch, the woodworker making it follows it through. “When I carve a sign in relief,” Carl notes, “I select the wood, cut it, and surface it, too. The only thing we don’t do is finishing. For that, it goes down the line to the paint department.”

Turner Harold Headlee, 56, has worn the Magic Kingdom patch on his snow-white shirt for nearly 10 years. At his lathe, he shapes the spindles for railings, ship’s wheels, and chairs. On the 27’-bed lathe—yes, longer than most garages—he’s turned mass for sailing ships and pillars for plantations. “The most fun I’ve had, though, was turning the balusters for the front porch on Mickey’s house. They were made of Styrofoam, like his car!”

Carousel horses, carriages, cabinets, doors, displays, parade floats, paddlewheelers, signs, spindles, ship’s wheels, and trams to move people, they’re all on the job tickets at Walt Disney World, a woodworker’s fantasyland. In fact, Cephas and his craftsmen will attempt practically anything. “Except,” says the head man with a sigh, “wagon wheels. We found out it’s cheaper to buy them.”

**Note:** Back-lot tours of Walt Disney World are not available to the general public.
Last summer when I was doing some rough drawings for an outdoor settee, I opened an envelope sent in by Luis Elizondo, a reader from Houston, Texas. I was so impressed with Luis's settee design, I suggested we present his project. And am I ever pleased with the results. Since then, we've built two settees to verify the full-sized patterns, dimensions, and joinery, and they've both turned out beautifully. Come on, dive into this project—you'll be glad you did.

Note: For your convenience, we've listed a source in the Buying Guide for full-sized patterns for the settee. Or, if you just can't wait to get started, enlarge the gridded patterns shown on pages 64 and 65. Our cost for this project, including the white oak, stainless-steel screws, and finish, totaled less than $175.

How we chose the wood and fasteners for our settee

After weighing the merits of several types of lumber for this project, we selected white oak. Native to the eastern United States and Canada, white oak ranks as one of the heaviest, strongest, and hardest of all the oaks. The pores of this species contain tyloses—bubblike structures that form in the vessels of certain hardwoods and resist liquids from penetrating. This attribute makes white oak a perfect material for liquid containers and barrels, and an excellent candidate for our settee.

If you have trouble locating white oak or you wish to cut costs, you could substitute fir or pine pressure-treated deck material. You'll need to plane the pressure-treated stock to the thickness listed in the Bill of Materials.

What's the best fastener to use in this case? We recommend either stainless-steel or galvanized deck and machine screws. The tannic acid in white oak along with Mother Nature causes ordinary screws to rust and discolor the wood.

Enlarge the patterns and make the templates

1. To enlarge the gridded patterns, draw 1" grids on large pieces of paper to match the 1" patterns on pages 64 and 65. Using the gridded patterns as guides, lay out the shape of parts on the gridded paper. To do this, mark the points where the pattern outline crosses each grid line. Draw lines to connect the points. Now, mark the screw-hole centerpoints and reference lines on each pattern.

2. Coat the back face of each pattern with spray-on adhesive. With a helper, start at one end and work to the other, laying the patterns flat onto ½" or ¾" hardboard. Keep the patterns as flat as possible and be sure to flatten any air bubbles.

3. Bandsaw each template to shape, cutting just outside the marked line. Then, sand to the line for the finished shape. Don't forget to bandsaw the notches in the center support templates (E).

4. Drill ½" holes through the templates at each marked centerpoint.

5. Position the templates (except for part P) and trace their outlines and hole centerpoints onto the stock. See the Cutting Diagram for reference and layout.

Machine the parts and construct the seat frame

1. Cut the seat rails (A, B) and legs (C) to the sizes listed in the Bill of Materials on page 63.

2. Bandsaw the end supports (D), center supports (E), and armrest supports (F) to the shape traced from the templates.

3. Cut the notches in the front rail (B) where shown on the Seat Frame Drawing. (We cut ours on the radial-arm saw.)

4. Rout a ¼" round-over along the edges of the pieces where shown on the Seat Frame Drawing on the next page. Do not round over the seat rails (A, B), center supports (E), or the top ends of the leg parts (C, F). Sand the seat-frame members (A through F) smooth.

5. Clamp together the seat members (A, B, E), checking for square. Drill and counterbore the mounting holes, and fasten the parts together with stainless-steel or galvanized deck screws.

6. Using bar clamps, clamp the end supports (D) to the seat assembly (A, B, E). Drill the counterbore holes for the plugs in the end supports where marked. Then, drill a ½" pilot hole through the middle of the counterbore and 1¼" into the ends of the seat rails (A, B). Now, enlarge the pilot holes in the end supports to 3/16" to form shank holes for the screws. See the Screw Hole Detail accompanying the Seat Frame Drawing for reference. Fasten the end supports to the rails.

Continued
7 Drill the holes, and screw one armrest support (F) to each leg (C). Plug the holes in parts C and D as described in Step 1 below.
8 Now, drill the 1/4" holes, and fasten each leg to the seat assembly with a stainless-steel 1/4" x 2 1/2" machine screw. Set the seat-frame assembly on a flat surface, check that the front legs are square with the floor, and then add the two wood screws to fasten each leg to its mating end support.

Here's how to plug screw-hole counterbores
1 It's necessary to plug the screw-hole counterbores as you go. If you wait until the very end of construction, several of the holes are impossible to get at. To plug the holes, cut 3/8"- and 1/2"-diameter plugs from oak stock. (We used a plug cutter and took the time to closely match the plug grain with each settee part.)
2 Glue the plugs into the counterbores, with the grain of the plug going in the same direction as the grain of the piece being plugged (we used woodworker's glue).

Now, move on to the rear support and slats
1 Bandsaw the rear support (G) to shape. Transfer the two reference lines from the template to the top back edge of the support. Rout a 1/4" round-over along the edges of the support. Cut a 1 1/4" dado 5/8" deep on each end of the support.
2 With the front edge of G 1/4" ahead of the front face of A, clamp the rear support in position. See the Section View Detail accompanying the Seat Back Assembly Drawing on page 66 for reference.
3 Drill mounting holes, and fasten the rear support to the seat frame.
4 Cut the 14 seat slats (H) to size. Rout a 1/4" round-over along all edges of each slat. Drill and counterbore the mounting holes in each slat. See the Seat Slat Detail accompanying the Slat Assembly Drawing for hole locations.
5 Cut the pieces and build four ¼" spacers and four ⅜" spacers like those shown in the drawing below.

6 Position the ⅜" spacers between the rear support (G) and the first seat slat where shown in the photo below. Now, as shown, screw the seat slat to the end and center supports (D, E). Repeat the process with the ⅜" spacers to space and fasten the next seven slats to the seat frame. Then, switch to the ¼" spacers for the next four slats that go around the curve. Finally, switch back to the ⅜" spacers to add the final two slats to the frame.

With the spacers in place, clamp a seat slat to the rear support, and screw the slat to the support pieces.

Continued
FULL-SIZED PATTERNS

Garden settee patterns (model 102), complete with screw-hole centerpoints and reference lines, $7.99 ppd. Luis A. Elizondo, 910 West 35th, Houston, TX 77018.
Add the contoured seat back assembly next

1. Cut the rear-slat support (I) and the armrests (J) to shape. Transfer the two reference lines from the template to the top surface of the rear-slat support. Rout a 1/4" round-over along all edges of each (I, J). Drill the mounting holes, and bolt the pieces together with 1/4" x 1 1/2" machine screws and nuts.

2. Using just one screw per armrest, fasten the armrests to the armrest supports (F). (Later, you'll add two screws per arm.)

3. To get the bottom edges of the backrest slats flush, cut a temporary support from 3/4"-thick stock to 3" wide by 5 1/2" long. Fasten the support to the bottom of the rear support (G) where shown on the Section View Detail at right.

4. Bandsaw the seat back slats (K, L, M, N) to shape from 3/4" stock. Mark the screw-hole centerpoints on the slats. Rout a 1/4" round-over along all edges of each. Transfer the centerline onto both surfaces of both middle slats (K).

5. Position the middle slats (K) on the temporary spacer with the centerline on the middle slats aligned with the reference lines on the rear support (G) and rear-slat support (I) where shown in the photo below. Clamp the middle slat in position, and check that the marked screw-hole centerpoints center over the rear-slat support. Drill the mounting holes. See the Section View Detail for reference before drilling the angled hole through the slat and into the rear support.

6. Fasten the center slats (K) to the rear support and rear-slat support. When fastening each backrest slat, drive the bottom screw partway and then drive the top screw partway, continue until each screw is snug. For ease in attaching the slats, do not insert one screw all the way before inserting the other.

7. With the assembly square, drive the remaining two screws through each armrest (J), and into the leg tops.

8. Using the 3/4" spacers, position the backrest slats, drill the mounting holes, and fasten the slats to the settle frame.

9. Cut the upper-slat supports (O) to shape, and rout a 1/4" round-over along their edges. Center and clamp one upper-slat support in place against the seat-back slats. Drill the holes and screw the support to the slats. Plug the holes.

Now, fashion and install the decorative center piece

1. From 1 1/8" oak stock, cut two pieces 6" wide by 22" long. Joint or plane one edge of each piece and then edge-join the pieces together to form the center piece (P). Transfer the full-sized pattern outline and heart opening from the template to the center-piece blank.

2. Cut or rout a 1 1/2" rabbet 1/4" deep along the bottom front edge of the center piece where shown on the Final Assembly Drawing on the opposite page.
3 Bandsaw the center-piece outline to shape. Using a ¾" blade on your bandsaw, start at the bottom of the center piece, cut through the joint line to the heart outline, and then cut the heart opening to shape.

4 Raise your tablesaw blade 2½" above the saw surface and tilt it 10° from vertical. Using the drawing at right for reference, bevel-rip the edges of the center piece.

5 Sand a ¾" round-over along the front outside edges (except at the rabbet) on the center piece.

6 With a belt sander and then a palm sander, form a smooth curve on the front of the center piece.

7 Clamp the center piece between the slats. Drill four holes through the center piece and into part G. Mark the hole locations and drill two holes through the center piece and into the rear-slat support (I). Screw the center piece in place.

2 Position the top end of one brace against the rear-slat support (I), and center the lower end on the supports (D) where shown on the Brace Detail above left. You'll need to move the brace around until no gap exists between the ends of the brace and the mating surfaces (D, I). Once positioned, tape the brace in place, drill the mounting holes, and fasten it to parts D and I. Repeat the procedure to position and secure the remaining brace.

3 Plug the remaining counterbores. Sand the settee smooth. Finish the settee as desired. (We brushed on several coats of clear Olympic Wood Preservative.)

Produced by Marlen Kemmet
Project Design: Luis A. Elizondo
Photographs: Hopkins Associates
Jim Kascoutsas
Illustrations: Kim Downing
Mike Henry
Construct the case to get the ball rolling
1 Rip and crosscut the case sides (A) and top and bottom (B) to the sizes listed in the Bill of Materials.
2 Follow the two-step drawing below to rout the front edge and ends of the top and bottom pieces (B).

3 Mark the dowel-hole centerpoints on the ends of each case side where shown on the Hole Detail at right. Using a doweling jig, drill 3/8" holes 3/8" deep.
4 Place dowel centers in the holes just drilled. Center the sides (A) between the top and bottom (B) where shown on the Exploded-View Drawing. Clamp together the pieces to transfer the hole locations to the top and bottom pieces. (Depending on how many dowel centers you have, you might have to do one joint at a time.) Transfer the 3/8" bit to your drill press, and drill 3/8" holes 3/8" deep where marked.
5 Sand the four pieces. Using 3/8" dowel pins 1" long, glue, dowel, and clamp the sides between the top and bottom pieces, checking for square. Immediately remove excess glue with a damp cloth.
6 To house the back (C), rout a 3/8" rabbet 3/8" deep along the back inside edge of the case frame (A, B). Square the corners with a chisel.
7 Cut the back (C) to size. Drill the mounting holes in the back and case, and screw the back in place.

It's your choice:
Spoon or thimble shelves
1 Cut the shelves (D) to size from 1/2" stock (we resawed 3/4" stock to size). You'll need three shelves for spoons or five for thimbles.

Continued
** Cherished Treasures Showcase **

** Cutting Diagram **

*Plane or resaw splines to 1/8" thick and shelves to 1/2" thick.

A 1/4" X 24" X 24" Cherry Plywood

** Bill of Materials **

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<tr>
<td>C back</td>
<td>1/4&quot;</td>
</tr>
<tr>
<td>D shelves</td>
<td>1/2&quot;</td>
</tr>
<tr>
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<td></td>
</tr>
<tr>
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</tr>
<tr>
<td>F* rails</td>
<td>3/4&quot;</td>
</tr>
</tbody>
</table>

*Initally cut parts marked with an * oversized. Then, trim each to finished size according to the how-to instructions.

Material Key: C-cherry, CP-cherry plywood

** HOLE DETAIL **

- 3/8" hole 1/8" deep
- 1/4" hole for mounting
- 8 1/4" centerlines
- 3" centerlines
- 1/4" hole 1/8" deep (mating hole the same size)
- 3/8" dowel pin 1" long

** DOOR FRAME DETAIL **

- 1/4" rabbet 3/8" deep
- 1/4" round-over 1/8" deep
- 1/4" glass cut to fit
- Overall dimensions 3 3/4" x 16" x 20"

Spline
2 For the spoon shelves, mark the hole centerpoints where dimensioned on the Shelves Drawing. Drill and countersink a 1/4" hole at each centerpoint (see the Hole Detail on the drawing for reference). Flip over the piece and countersink the holes on the opposite surface.

3 With a combination square, mark the kerf locations centered on the holes just drilled. Attach an auxiliary fence to your miter gauge. Raise your blade 1/4" above the saw table, and cut the kerfs where marked as shown in the photo at right.

4 To build the thimble shelves, mark the dowel-hole centerpoints on five shelves where shown on the Shelves Drawing. Using a brad-point or Forstner bit, drill twelve 1/4" holes 3/8" deep where marked in each shelf. (To ensure consistent hole depths, we set the depth stop on our drill press. And, to keep the holes in a straight line, we clamped a fence to our drill-press table.)

5 Cut sixty 1/4" dowels 1" long for the thimble posts. Finish-sand each shelf smooth, and then sand a slight chamfer on both ends of each dowel. Place a drop of glue in each hole, and tap the dowels into place. Immediately wipe off excess glue with a damp cloth.

6 Using double-faced tape, adhere the shelves in position in the case. Drill the 7/8" shank holes through the back (C) and 5/8" pilot hole 1/2" deep into the shelves where shown on the Exploded-View Drawing. Remove the shelves and double-faced tape. (We attached the shelves to the back after staining.) Now, drill a pair of 1/4" holes through the case back where shown on the Exploded-View Drawing for mounting the completed case to a wall later.

**Now, build the door**

1 Cut two pieces of 3/4"-thick cherry to 1" wide by 20" long for the door stiles (E) and two pieces 1" wide by 16" long for the rails (F).

2 Using the Door Frame Detail accompanying the Exploded-View Drawing for reference, rout a 1/4" round-over along the front inside edge of each door piece. Cut or rout a 1/4" rabbet 3/8" deep along the back inside edge to house the glass.

3 Miter-cut the stiles (E) and rails (F) to the lengths listed in the Bill of Materials. (For extra support, we attached an auxiliary fence to our miter gauge and mitered the pieces to length on the tablesaw.)

4 With the surfaces flush, glue and clamp together the door frame, checking for square.

5 Build a spline jig to the dimensions shown on the drawing above. Raise the blade 2" above the table saw surface. Now, as pictured above right, cut a 1/8" kerf 1" deep in each corner of the door frame.

6 Cut a piece of 3/8" cherry (we resawed a thicker piece) to 1 3/4" wide by 12" long. Next, cut four slip-feather splines to 21/2" long. Glue a spline in each kerfed corner of the frame. When dry, trim or sand off the protruding spline, being careful not to cut or sand the door frame.
Attach the hardware
1 Mark the hinge locations on the right side piece (A) where shown on the Exploded-View Drawing. Using double-faced tape, adhere the hinges to the side piece. With an awl, poke through the tape and screw holes in the hinge and into the side piece. Next, drill the hinge mounting holes.
2 With a hobby knife, score the outline of the hinges. Remove the hinges and tape. Using a sharp chisel, form a pair of \( \frac{1}{2} \)-deep mortises in the side piece (A), cutting to the scored outlines. Screw the hinges to the side piece.
3 Repeat the process in steps 1 and 2 above to form a pair of \( \frac{3}{16} \)-deep mortises in the door.
4 Drill the mounting hole for the magnetic catch where shown on the Exploded-View Drawing. To fasten the strike plate to the mating location on the back side of the door, drill a \( \frac{3}{8} \) hole \( \frac{3}{16} \) deep with a \( \frac{3}{16} \) pilot hole centered inside.
5 Drill the \( \frac{1}{8} \) mounting hole, and attach the knob where shown on the Exploded-View Drawing.

Remove the hardware and apply the finish
1 Remove the hinges, magnetic catch and strike plate, and knob. Finish-sand all the parts.
2 Wipe on the stain. Using \( \frac{3}{4} \) wood screws, fasten the shelves to the plywood back. Apply the finish.
3 Have a piece of \( \frac{3}{8} \) glass cut to fit the door. (We secured the glass in the door frame with a fine bead of clear silicone sealant.)
4 Attach the hardware and door. Place the case back into the rabbeted opening, drill the holes, and then screw the back in place. Level and fasten the case to the wall.

Buying Guide
- Hardware kit. \( 1\frac{3}{4} \times 1\frac{3}{4} \) solid-brass butt hinges; \( \frac{3}{4} \)-diameter polished knob, magnetic catch. Kit no. 71042, $5 ppd. Klockit, P.O. Box 636, Lake Geneva, WI 53147. Or, call 800-556-2548 to order. ♦

The woodworker's survival
MAIL-ORDER

CHOOSING THE RIGHT CATALOG

Before I buy anything, I like to know something about the people I'm dealing with. So, I called several mail-order firms. Eagerly, the people at the other end ticked off the advantages of mail order. A few; large selection (even hard-to-find tools), at-home convenience, and it's easy to compare prices.

Still, I was uneasy. So, I talked to Roger F. Campbell of the Council of Better Business Bureaus in Arlington, Virginia. "One way to check out a mail-order business is to call the Chamber of Commerce or Better Business Bureau in their hometown and ask if customers have complained about them," Roger suggested.

Chett Ray of Woodworkers Supply of New Mexico advised that you ask the catalog company lots of questions: "Do you have such and such a tool in stock? How soon will you ship my order? Is packing and shipping included in the price? If I have problems with the product, do you have someone who can answer my questions? Do you accept credit cards? If I don't like the merchandise, can I return it for a full refund? If I want to, can I talk to the president of the company?"

David Draves of Woodcraft Supply suggested that you ask the supplier when they will charge your credit-card account. "Like most mail-order firms, we process a check as soon as we receive it. We have to take checks as if they're cash so that we can fulfill the order within 48 hours. But, we never charge the customer's credit card until the item is shipped."

"It also makes sense to ask the company how long they've been in business," David continued. "And don't forget to ask your friends if they've ever ordered from the company you have in mind."

PAYING THE BILL

Once you decide to make a purchase, keep a record of the transaction. If you fill out an order blank, make a photocopy of it. If you order by phone, jot down all the pertinent details, including the date, credit card used, items ordered, prices, order number, name of the customer-service representative, and so on. Then, ask the representative to repeat the order.

Before you hang up the phone, let the company know whether you want your name made available to other mail-order firms. "If customers don't like receiving a lot of catalogs in the mail, they have the right to ask that their name not be sold to other businesses," David Draves advised.

"Never send cash with your order," Chet Dalzell of the Direct Marketing Association in New York told me. "If you pay by personal check, jot the check number on your copy of the order."

Besides its convenience, a credit card offers you the greatest protection in the event you don't receive the goods you ordered. I called the banker who issued my MasterCard, and he explained that the rules and regulations of VISA and MasterCard solidly protect the cardholder.
OCCASIONALLY, A BAD APPLE

Although the vast majority of mail-order houses deal reputedly, every now and then a consumer gets burned by a less-than-honorable firm. Lou Howard of Amityville, New York, knows the meaning of these words all too well.

Lou sent off a bank draft for $3,410 to Tools-To-Go, a Miami-based mail-order firm. He ordered a Scheppach woodturning lathe, a copying attachment, and a planer. When the equipment failed to arrive, Lou tried to call Tools-To-Go, and learned that its phone had been disconnected.

So, imagine Lou’s surprise when he found representatives of the firm exhibiting at a weekend woodworking show near his hometown. Seizing the opportunity, he bored in with questions, and they had pat answers every time.

As it turned out, that was the last time he had contact with anyone from that operation. Tools-To-Go vanished. To make a long story short, Lou eventually received his tools from the West German company at manufacturer’s cost. (See page 14 of the February 1990 issue of WOOD magazine for more details.)

“Two things I would say about this,” Lou remarked. “What were Ben Franklin’s words? ‘Experience teaches a dear school, but the fool will learn in none other.’ Also, I’ll never send off for anything again unless I charge it to a credit card or insist on C.O.D.”

DEALING WITH DISAPPOINTMENT

At one time or another, we’ve all bought something that left us unhappy. Or maybe the product arrived damaged. What’s next?

If the product arrives in a damaged container, you can refuse the shipment and save yourself some freight charges. Even if you accept the package, note the damage on the shipping list before signing.

Most dealers accept returns, but they may assess a restocking fee (normally about 10 percent) to recover some of the shipping costs incurred when filling the order and taking it back.

When you talk to a mail-order dealer about returning goods, try not to unload your anger. “If you act reasonable, the dealer may waive the restocking charge as a goodwill gesture,” Shiraz Balolia of Grizzly Imports told me.

“Also, if the tool needs minor repairs that you can make and the dealer has the parts, negotiate a compromise rather than insisting on a new one. You’ll both come out better,” Balolia added.

Finally, if you can’t settle a mail-order dispute, write to the Direct Marketing Association’s Mail Order Action Line at: 11 West 42nd St., P.O. Box 3861, New York, NY 10163. Remember to include documentation of the transaction and a description of your problem. The organization will contact the mail-order firm and attempt to resolve the problem. You can also file a report with the local Better Business Bureau, the U.S. Postal Service, and the state attorney general’s office.

Editor’s Note: By the way, I finally ordered that doweling jig and a nice set of drill bits to go with it. My package arrived in five days.

Photograph: Hopkins Associates Illustrations: Jim Stevenson
If you're like most woodworkers we know, you could stand having a few more handscrew clamps around your shop. Now you can—quickly and inexpensively. Our instructions tell how to build 8" handscrew clamps. Be sure to see the Buying Guide for our source of the hardware for this and the other sizes of clamps available. And, don't forget to order the brass "Collector's-Edition" emblem we've had computer-engraved for this project. It really sets these clamps apart from the rest.

Note: You'll need 1/2"-thick walnut and maple for the clamp jaws. Either resaw or plane thicker stock to size. (We positioned the tablesaw fence 1/8" from the blade and resawed 3/4"-thick stock to 1/2" thick.)

First, machine the jaw parts
1. Cut four pieces of 1/2"-thick maple and two pieces of 1/2"-thick walnut to 1 3/4" wide by 8" long.
2. Using double-faced tape, stick together two pieces of maple face to face, with the edges and ends flush. Repeat with the two remaining maple pieces and then with the two walnut pieces.
3. Using carbon paper or photocopies and spray adhesive, transfer the full-sized patterns (A, B, C, D) at right to each lamination. Cut the walnut pieces (B, C, D) to shape.
Next, laminate the jaws

1. With a 9/32" bit chucked in a drill press, bore two holes through each pair of maple pieces where located on the patterns. (For smooth operation of the pivot nuts in the holes, we recommend a Brad-point bit.)

2. Taper the fronts of each maple lamination on a bandsaw. Pry apart all the taped-together pieces, remove the tape, and clean off the sticky residue with lacquer thinner.

3. Using the pivot nuts for alignment and the walnut pieces spaced apart where shown on the full-sized pattern, glue and clamp together each clamp jaw as shown in the photo on the following page. (For even clamping pressure, and to prevent denting the maple, we used plywood scraps as clamp blocks. We adhered the plywood to the maple pieces with double-faced tape.) Also, to keep the walnut pieces from sliding around, let the glue get a bit tacky before clamping. Check for slippage after clamping. Remove any excess glue from the openings with a chisel.

Continued
CLAMPS

4 Later, remove the pivot nuts and scrape off the excess glue. Rout 3/8" round-overs along the edges of each jaw where shown on the Exploded-View Drawing. Sand smooth.

5 Drill a 1 1/4" hole 1/2" deep where shown on the full-sized pattern for the engraved WOOD "Collector's-Edition" emblem. (We used a Forstner bit, but a spade bit would also work.) For better adhesion, sand the back of the emblem, and epoxy it into the hole.

Add our customized handles, if desired

Note: The kit comes with turned handles. Our handles, though, give you a firmer grip and look better than the turned ones.

1 Start with a piece of walnut 1 1/4" square by 12" long. (We laminated 3/8" stock, and then jointed both faces to keep the joint line centered.) Crosscut two pieces 3 3/4" long from the 12" length.

2 Mark diagonals on one end of each 3 3/4"-long handle blank (E) to find center. Drill a 3/8" hole 1" deep centered in the end of each.

3 Now, stick a 12" length of 3/8" dowel into each of the walnut handles to act as a temporary grip.

4 Transfer the full-sized handle pattern to one face of each handle blank and bandsaw along the marked handle lines. Using double-faced tape, stick the waste pieces back to the edges from which they were cut. Now, transfer the handle outline to an adjacent surface and cut it shape as shown in the photo above right.

5 Still using the dowel handles as grips, use a stationary belt sander to remove the saw marks from the handles. With a palm sander, sand 1/4" round-overs along the edges and sand the handles smooth.

Apply the finish, and install the clamp hardware kit

1 Remove the dowel handles. Apply an oil finish to each part (we used Watco Natural Oil).

2 Thread the rods through the pivot nuts as described in steps 7, 8, and 9 of the instructions supplied with the clamp hardware. Close the clamps until the jaws are flush against each other. Now, grind or file the handle end of each threaded rod to the shape shown on the Taper Detail.

3 Epoxy the handles onto the tapered end of each threaded rod where shown on the Exploded-View Drawing. Immediately wipe off any excess epoxy on the rods.

4 If the handles turn a bit rough, put a drop or two of oil (we used WD-40) on each threaded rod. Then, open and close each clamp a few times.

Brush glue onto the mating surfaces and clamp the jaw parts together with the edges and ends flush.

Use a temporary dowel handle for stability when bandsawing the walnut handle to shape.

Supplies: double-faced tape, epoxy, spray adhesive or carbon paper, finish.

Buying Guide

• 5" handscrew clamp kit. Two threaded rods, four pivot nuts, two turned handles. Catalog no. WMS71597, $3.99 (U.S.) per clamp kit, add $2.95 postage and handling per order (not per kit). Leichtung Workshops, 4944 Commerce Parkway, Cleveland, OH 44128. Or, call 800-321-6840 to order.

We've provided Leichtung with full-sized patterns for building 6", 10", 12", and 14" handscrew clamps. All sizes of patterns will be included with each clamp hardware kit. Call Leichtung for prices of the additional clamp sizes.

• Computer-enameled brass emblem. To order, send $1 (U.S.) per emblem along with a self-addressed stamped envelope to Custom Awards, 1427 NW 81st St., Des Moines, IA 50311. Foreign readers: Please include an international reply coupon.

Produced by Marlen Kemmet
Photographs: Hopkins Associates; Bob Calmer
Illustrations: Kim Downing; Bill Zaun; Mike Henry
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NEW COMPLETE RANGE FREE CATALOG AVAILABLE ON REQUEST

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WOOD MAGAZINE JUNE 1990
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Marlen Kemmet How-to Editor
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Father’s Day Gift List

Father’s Day is June 17. Check the items you want, tear out this section and casually leave it where your family can find it. They’ll get the hint!
Hexagonal Picnic Table – plans, $16.95. This 3 legged table automatically levels itself. Walk through seating for 6 people. Designed to accept an umbrella. SPECIALTY FURNITURE, 797 West Remus, Mt. Pleasant, MI 48858. Visa/MC accepted. MI residents add 4%.

Now you can cut precision angles without changing your radial arm or table saw setting from 0°. The Eze-Anglioguide makes 160 different angles with eight precisely-cut templates. Sticky-back sandpaper prevents movement. Free directions to make outline and table/side. Kit contains complete instructions & angle-chart, $24.95 + $2.40 handling. STEUSSY CREATIONS, 334 Atheron Ave., Novato, CA 94945.

Bravo Designs offers new plans for a unique folding wooden patio chair. The Cradle Chair, based on an ancient Mayan design, conforms comfortably to natural body lines. This great one day project for intermediate craftsmen requires only basic hand tools. Packet contains plans, materials list, exploded views, assembly techniques. Send $12.50 + $2.50 p&h for Plan #130. BRAVO DESIGNS, P.O. Box 451-F, Brick, NJ 08723.

Make the Father's Day gift that lasts forever. Build the Continental Kit pool table and save hundreds of dollars while creating an heirloom. We sell complete kits, individual components and accessories. Factory direct. Send $1.00 for complete information. CONTINENTAL BILLIARDS, 2005-B Peachtree Industrial Blvd., Buford, GA 30518, 404-271-1824.

We feature the finest northern kiln dried hardwoods. Our large inventory has been carefully selected to ensure quality. Wood, with strips of wood. Part of the experience and personal assistance can quickly help you satisfy your hardwood needs. We carry all sizes of domestic hardwood needs with no minimum or maximum order required. Send $1 for catalog. NATIVE AMERICAN HARDWOODS, LTD., 3070 Gower Lane, Succom, CA 94945, 1-800-660-7551.

Portable Drafting Kit with graduated protractor, straight edge and side scales. Professional quality W. German tool with durable plastic softboard. Send $82.70 p&h for free catalog. GARRET WADIE, 1618 Ash Ave., New York, NY 10031 or 1-800-221-2942.

Build along with Norm Abram! Build American country furniture step-by-step with Master woodworker Norm Abram in his new book, The New Yankee Workshop. Learn Norm's shop secrets while creating authentic reproductions of Yankee craftsmanship. To order your copy and save $5 off the retail price send $24.95 to RODALE BOOKS, P.O. Box 24696, Emmaus, PA 18049.

The New Super Max combines the proven features of the Performax S/ST Sander and the infinitely variable 0-20° minute Power Feed with a HP motor and heavy-duty stand for even greater power, precision, and speed. New brochure includes new accessories for the Performax Component Sander. For free catalog send to: PERFORMAX PRODUCTS INC., 1231 Woodlake Dr., Burrsville, MN 55332, 1-800-334-4910.

Solid cherry commode table $169. Ready to assemble, 20° x 27° x 22° high. Also available in walnut, oak and mahogany with matching coffee table. shipped from stock. Free brochure. ADAMS WOOD PRODUCTS, INC., 974 Forest Dr., Morristown, TN 37814. Or call 615-587-2942.

Mooserrack – full size pattern with step-by-step suggestions. A unique design for one of a kind coat rack. Makes a great gift for children or adults. A fun, easy project. $5.95. JOSBROCK INC, Weave 13, 17813 Brooks Blvd, Bothall, WA 98012.

Keep your shop clean and safe from sawdust with this large capacity, commercial style system. The DC-1 Dust Collector features 1 HP motor, 610 cfm air flow and 20 gallon bags. Price is $189.95 + $20 UPS shipping. Includes $15 free accessories. Order from PENN STATE INDUSTRIES, 2850 Cowley Rd, Philadelphia, PA 19154, or call 1-800-282-7297.
The Dupli-Carver is a wood duplicating machine that can reproduce three-dimensional carving in wood. The machine uses a stylus (tracer) to follow the contours of a statue or plaque. Two models starting at $359. WOOD-MIZER, 8180 W 10th St., Dept. CQ29, Indianapolis, IN 46214, 1-800-633-0310, IN 317-271-1542.

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30 lbs. of assorted hardwoods. Excellent for small crafts and tools. Random species and thicknesses. All surfaced 2 sides, 1" x 2" thick, 3" x 10" wide and 6" x 24" long. Shipped UPS prepaid, $2.50. STEVE H. WALL, LUMBER CO., Rt. 1, Box 287, Mayodan, NC 27027, 1-800-633-4062 or 919-427-0637.

Elegantly designed, Emperor's new solid cherry Chippendale Writing Desk will flatter home or office decor. Our do-it-yourself kit includes beautiful fretwork and brass hardware, demonstrating quality to last a lifetime. Send $1.00 for catalog to EMPEROR CLOCK COMPANY, Dept. 3597, Emperor Industrial Park, Fairhope, AL 36532.

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Lawn swing on wheels. Plans and patterns - $7.95. Suspension kit - $5.95. Kit includes 4 wheels - 6" diameter, 2 axles - 3/4" diameter, 4 nylon bearings, 8 aluminum washers and 6 fixtures for benches. VIET TOOLS, P.O. Box 250, Isle-Verte, Quebec, Canada G6L 1K0.

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Gramma & Gramps yard sign welcomes friends, displays wood shop name or street address. This 44" tall plywood cutout is sure to get lots of smiles! Full size pattern, painting instructions & catalog of over 850 fun woodcraft projects only $7.00. THE WINFIELD COLLECTION, Dept. FD3, 12044 Parkway Lane, Fenton, MI 48430.

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ROUTER BITS-SHAPERS, CUTTERS, CARBIDE AND CARBIDE TIPPED—Thick heavy-duty industrial grade. Router bits available in either 1/4" or 1/2" diameter shafts. Cutters are 1/8" bore supplied with 1/4" bushings. Forstner bits 1/4 to 2" diameter. Save up to 50% on wholesale prices. No minimum order. Write now for our illustrated catalog, comes with $3 coupon good on first order. SKY-CROFT TOOLS INC. $1.00. Circle No. 1372.

HARDWARE/WOOD PARTS

INCOME OPPORTUNITIES

OUR READY TO ASSEMBLE KITS—for Queen Anne chairs and occasional tables make it easy for you to make professional looking furniture. We also carry the famous queen Anne legs for every project. Complete information in our extensive brochure. ADAMS WOOD PRODUCTS: 601 CIRCLE No. 1401.

TO ENSURE PROMPT HANDLING OF YOUR ORDER FOLLOW THESE INSTRUCTIONS:

- Send coupon and remittance to addressed box below.
- Allow 4-6 weeks for delivery.
- Coupon expires June 12, 1991

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1. A 1-year WOOD subscription (6 issues) for $18.00 (U.S. price) — a $3.00 savings off newsstand rate. Allow 6-8 weeks for first issue. Canadian price $24.00. Be sure to include payment with total below. NO FOREIGN ORDERS ACCEPTED ON THIS COUPON; please contact Subscription Dept. directly.

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PRICED LITERATURE

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MISCELLANEOUS

FOLEY-BELSIS INSTITUTES' NEW WOODWORKING CORRESPONDENCE COURSE—for people with or without the desire to work with wood for a hobby or as a profession. Send for details. FOLEY-BELSIS INSTITUTE. Free. Circle No. 1390.

LEARN ALL THE SKILLS—of professional upholstery and cabinetmaking. Complete your own home. The Foley-Belsis Institute system of "hands on" training provides qualified step-by-step instructions in the use of tools and materials on actual furniture. "...all included with the complete course. Complete your back guarantees. Send for details. FOLEY-BELSIS INSTITUTE. Free. Circle No. 1390.

CUSHION CONTOUR PADDER—a new concept in pneumatic drum sanding. Sanding sleeves are slid over the air bag (inflated with a hand pump) on an arbor to mount all of the tools on a drum. Two effective, independent padders are available. On profiles, curves, and bevels practically eliminating flat spots. The 1-1/2" marker is MADE IN U.S.A. $1 (refunded with first order). Circle No. 1978.

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UNIQUE GREENHOUSE/SCREENHOUSE IDEA-A garden with a unique greenhouse screen room during the summer months. That's the concept behind the versatile new Sun-Porch. This two-in-one sunspace features sturdy aluminum framing, 1" shatter-resistant glazing, do-it-yourself assembly, and mounts readily on any existing landscape. Colors include: cream, egg shell, and black. Includes molded prices, sent first class mail. VEGETABLE FACTORY, INC. $2.00. Circle No. 2078.

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DECAY AND WOOD CARVERS WISDOM—499-page catalog features wide selection of tools and supplies for decaying, refine, and build wood carvers. Chisels, gouges, sharpening stones, precision grinding tools, fore tools, brush burnishers, pneumatic sanders, glass eyes, pearl eyes, pattern carving, etc. Leader in the selection of books, PANS, ENGLISH, INC. $1.00. Circle No. 2115.

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WOOD MAGAZINE JUNE 1990
FINISHING TOUCHES

Hugo's harvest
Hurricane Hugo's sweep through South Carolina last September left behind a staggering woodpile. The storm's 125-mph winds damaged 36 percent of the state's standing timber. Forest industry estimates set the destroyed timber at 6.7 million board feet, or about a three-years' harvest—enough lumber to house the people of Philadelphia.

Detroit oak
It all started with some clear plastic tubing that reminded Paul Wilson of engine cylinders. By the time he was done, the 54-year-old high school shop teacher from Beaver Falls, Pennsylvania, had built an automobile engine out of wood. Powered by a battery and an electric motor, the parts of Paul's creation move just like a real four-cylinder engine. The fan spins, the crankshaft rotates, and the four pistons slide up and down in plastic tubes. He relied on red oak for most of the engine, and some hard maple. In all, the wooden power plant boasts several hundred parts.

“They're fun to make, and to watch in operation,” Paul says of the all-wood engine. “I'm sure I'll be building more of them sometime in the future.”

In fact, for woodworkers with loads of patience and the same mechanical bent, he has put together a set of drawings, extensive instructions, and how-to tips covering all one needs to know to build a four-cylinder engine like his. For more information about his building plans, contact Paul at Wilson Creations, 121 Pinebrook Drive, Beaver Falls, PA 15010. Telephone 412/843-3178.

City chainsaw murders
The editors of American Forests magazine surveyed 20 cities from Boston to San Diego to find out what shape our urban forests are in. They found bad news.

On the average, four trees die or are removed for each new tree planted. In some, it’s as high as 10 to one. Around Atlanta, for instance, about 50 acres of trees are converted to urban use each day. Chicago had the best ratio of healthy trees to tree spaces.

It grows in Brooklyn
The Tree of Heaven (Ailanthus altissima), a native of China, grows rapidly in poorer-than-average conditions. Brought here in the 1920s and 1930s to provide quick shade, the tree now proliferates east of the Rocky Mountains. In fact, it has become a weed tree, competing with more desirable native species. The wood looks somewhat like ash, yet because it doesn't compete in size, strength, or hardness, it goes unworked. Strangely enough, the persevering pest was the species referred to in the popular book and subsequent movie A Tree Grows in Brooklyn.

Of fungus and plywood
Indonesia exported about $2.5 billion worth of plywood in 1989. And most of it was made from meranti (Shorea spp.), a tropical hardwood.

To ensure future supplies, Indonesian foresters set out on a major replanting. But, the seedlings wouldn't grow! Now, researchers have found out that the species requires a fungus on its roots to live. With the fungus' help, the land can again produce the tree.♣

Illustrations:
Jim Stevenson
WORK THIS GOOD DESERVES TO BE FRAMED AND HUNG.

The kind of work you use a router for is the kind of work you can't hide. Use a Ryobi Router and you won't want to.

Each of our fourteen different models, from our lightweight laminate Trimmer to our extra heavy-duty plunge routers, lets you put the finishing touches to your projects with confidence. Design features like clearly visible cutting bits and non-marring bases ensure results you'll be proud to display. And there's real power behind the delicate touch: high efficiency motors that deliver up to 3 HP.

Visit your professional power tool dealer for a first-hand look at Ryobi quality. Remember: when the work looks good, so do you.

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THE RIGHT TOOL FOR THE JOB.
Is a trouble-free polyurethane too much to ask?

With Scotchgard™ Wipe On Poly Finish from 3M, you get a smooth, beautiful, more protective polyurethane finish without bubbles and brushmarks.

Because with Scotchgard™ Wipe On Poly Finish, you don't even use a brush. Go on. Try it. Just wipe it on. Scotchgard™ Wipe On Poly Finish actually penetrates the surface of the wood to provide protection that's harder and more resistant to spills and stains than brush-on polyurethanes.

Apply it straight from the easy-to-handle bottle. Its clear formulation won't yellow your wood like other polyurethanes. Over bare wood or with stain, it accents the beauty of the wood.

You ask a lot of yourself when you begin a project. Now it's time to ask more of your finish. Try Scotchgard™ Wipe On Poly Finish.

It's part of the wood refinishing system from 3M.

*Not for use with whitewash or paints.