FAMILY WOODWORKING
Just for the Fun of It
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  2 terrific projects for kids to build
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Money Machine.

This revolutionary invention, the Paralok Table Saw Fence makes cutting at least seven times more accurate than any other fence... much faster... and is super simple to operate.

Time was. "We spent hours in the shop fighting with our rip fence and usually losing. Finally we nailed it to a corner and recut to a 1"x6" and pair of C-clamps. At least it was accurate. But crude and slow. We remembered the test cuts, measuring front, blade and rear... topoting to get everything in place, only to repeat it again for the next cut."

We set out to solve the problem. Our ideas led to the invention of the Paralok Fence. It took three years to perfect it. Now it is perfect and accurate. How accurate? Accurate in thousands of test cuts to .001" or less. This Paralok Fence saves time and materials, and that spells money. We call it the money machine.

In the two years we've been marketing the Paralok Fence nationwide, we haven't talked to one customer who doesn't agree.

How it works. The Paralok fence works on the same principle as a drafting table. Super strong aircraft cable (5/64", 49 strand) runs in a closed loop around precision ground nylon pulleys located underneath the rails. The aircraft cable is engaged by the fence in both the front and rear. Move the front end 1/8" and the back goes 1/8".

Single handed operation. Lift up the handle and slide the fence down the rails with one hand. Just the combination of the tape mounted on the front rail and the vernier cursor next to the handle to set the fence at intervals of 1/64". You can match right through your cutting list without having to stop the motor.

Both the front and rear lock. Two hefty locks, each rated at 75 pounds clamping pressure, independently lock the fence to the front and rear rails, without squeezing the rails themselves. No distortion at the rail, no kickback due to binding the material.

Owners tell us. "I'm a believer. I've had the Paralok on for a week now and we won't part company. The action is smooth, the parallelism is absolutely dead on, and it locks with a commitment to purpose that should be an inspiration to us all." G. B. Lee Baker, Redmond, Oregon.

"The fence is incredibly accurate... It has cut the time of any saw work by a measurable amount... I wish we had gotten this fence four years ago." Bill Tongate, shop supervisor, Valley Cabinet & Trim, Reddigeast, California.

More features. The Paralok is easy to install, taking about 1/2 hours or less. It can also be mounted with an auxiliary fence. The Paralok is easy to remove for cross-cuts. It gives you long precision and cutting for better control. The fence is always perfectly parallel, even when being reset for the next cut. The anodized aluminum finish is tough, wear resistant and looks great. Because of such a smooth finish, material glides right through.

Fits almost all table saws. The Paralok fits Rockwell Delta, Powermatic, General, woodworking, Walker-Turner, Oliver, Jet, Sears Craftsman, and most others.

The important dimension is the depth of your table saw from front to rear. Then select from rails in six sizes: .04", 6/8", 0.8", 1/8", 1/16", 1/32", 1/64". That is gross length. Decide how much you want to the right and left of the blade.

Standing behind our fence. We're so confident you'll be more than pleased we offer a full year warranty on parts and labor for defective material or workmanship. And, if you're not satisfied with your Paralok, send it back in 30 days for a full refund.

For more information. Give us a toll free call. We'll answer any questions and direct you to your nearest dealer (Dealer inquiries invited). If we don't have a dealer near you, we can place your order directly.

We figure the Paralok Fence makes about ten million existing fences obsolete. And the real bonus is that is pays for itself... quick.

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Better Homes and Gardens, WOOD - the magazine for home woodworkers

THE MAGAZINE FOR HOME WORKERS

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Discover the world’s oldest hobby!

Build this beautiful wooden ship model.

Wouldn’t you love to build this historic ship model? It’s a true-to-scale, 21” replica of the 2-masted schooner Swift, a Virginia pilot boat of 1805. Well, now you can! And you don’t have to be a skilled craftsman to do so.

It really isn’t hard

Even if you’ve never built a model before, you can experience the relaxing pleasure and pride of accomplishment that is offered by this fascinating hobby. You can build the Swift. The secret’s in our kit, designed especially for the first time modeler, with pre-cut parts that make assembly easy. Clear, large-scale plans and instructions that virtually take you by the hand and guide you every step of the way through hours of the most relaxing fun you’ll ever have. And when completed—a museum quality model you’ll display with pride, with gleaming brass fittings, varnished plank hull, delicate rigging—lifelike in every detail.

Quality you can see and feel

The materials in our kit may be better than those used in the original Swift. The keel section and frames are pre-cut plywood, ready for quick assembly. The Swift’s hull is planked twice; once with thick, flexible lime-wood for strength, then overlaid with planks of African walnut for lasting beauty.

You won’t have to make the fittings—we’ve done that for you. Our kit contains ready-to-use blocks and deadeyes of rare, yellow boxwood. We include eyelets, bracers and belaying pins—over 70 parts of solid brass! Even the cabin door hinges are brass, as are the 250 miniature nails you’ll use to fasten the planking to the hull and deck. And, since the original wooden Swift had no plastic parts, our kit doesn’t either—anywhere!

Creative? And how! Overwhelming? Not a bit! But be prepared for hours of the most challenging, engrossing, relaxing fun you’ve ever had.

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We want to introduce you to this great hobby, now! So we’ve made it easy for you to get started. Our special offer includes the Swift kit plus all the tools you’ll need to build her: pliers, hammer, knife, file, tweezers, sandpaper, glue, wood oil, and more. You’ll also receive a free copy of “Ship Models from Kits,” a 110 page beginner’s guide. You don’t have to buy anything else. The tools normally cost $17; the book retails for $7.95. But they’re yours, FREE when you buy the Swift kit at its regular price of $39.95 (plus $4.00 for delivery).

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I've got a confession to make. Until two weeks ago, I'd never carved anything other than a Thanksgiving turkey now and then. Not because I have anything against carving; I just thought I couldn't do it. As it turns out, I was not alone. None of the other WOOD staffers had much experience in this area, either.

That's all changed now. As part of our continuing education program, we spent a full day with woodcarver Harley Refsal learning about and doing some Scandinavian wood carving. Under Harley's able direction, each of us was able to transform a chunk of basswood into a cute little Scandinavian farmer by the end of the day. I've got to admit, though, that I had to ask Harley if he could somehow salvage the face on my carving so the farmer would look a bit less Neanderthal.

Carving has been good to me so far. And it sure made my recent stay while in Chicago on business more enjoyable. Usually, I either watch the tube or curl up with a good book or magazine. But not this time. I carved for a couple of hours before dinner, then went at it again later that night.

There is one potential problem with carving on business trips, though—getting through the airport X-ray scanners with a carving knife in your suitcase. But don't worry too much; I made it through twice! 😊

---

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<thead>
<tr>
<th>Best Cut</th>
<th>Best Price</th>
<th>Item No.</th>
<th>Description</th>
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Does The Foley-Belsaw Pay? YOU BET!

READ WHAT OWNERS SAY:

A Good Investment • Robert Sawyer, Roseburg, Oregon: "I believe that the Foley-Belsaw is the best investment I ever made. I've been a planer man for years and am now retired. The Foley-Belsaw has earned me $60,000 extra income in the past eleven years."

Pays For Itself • R.S. Clark, Springfield, Ohio: "I bought a batch of walnut in the rough, and after planing it on the Foley-Belsaw I figured up the money I saved. It was enough to pay for two-thirds the cost of the Planer. It really does a good job."

More Than Expected • Stephen Schultz, Orangeville, Penna.: "This machine pays for itself by making money out of scrap boards. It is a very well built machine and I confess it is more than I really expected for the price. It does everything you say it will."

...And Foley-Belsaw Is The Choice Of Professionals:

"I recommend Foley-Belsaw Planer-Molder-Saw as the most useful shop tool any craftsman could own. We use one every day in the Workbench model shop, and couldn't get along without it."

JAY HEDDEN — Editor WORKBENCH Magazine

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Better Homes and Gardens WOOD
THE MAGAZINE FOR HOME WOODWORKERS

AUGUST 1988
ISSUE NO. 10

WOOD PROFILE
ASH: THE HOME-RUN HARDWOOD
This sporting wood shows up in all sorts of athletic equipment, but its durability also makes it ideal for tool handles and furniture.

CRAFTSMAN CLOSE-UP
PORTRAIT OF A YOUNG CARVER
Ohio teen-ager Michelle Feasel is carving up a storm these days. Come see why her miniature wildlife figures command such attention—especially from her dad, who taught her the craft.

SHOP-TESTED TECHNIQUES
APPLYING PLASTIC LAMINATES
No, it’s not exactly “wood.” But plastic laminate is a key auxiliary material in many projects. Here’s a guide to the basics of laminate application, as well as some surefire tips for special situations.

NOW YOU CAN BUILD IT
PICTURE-PERFECT PARSONS TABLE
A single sheet of 3/8" plywood and another of high-gloss laminate join forces in this easy-as-pie project. The finished product is perfect for a conversation grouping like the one shown here. Or, adapt our design to your specific requirements.

FURNITURE PROJECT
PLEASE BE SEATED!
SOLID OAK DINING CHAIR
No project demands more attention to snug joinery and properly scaled dimensions than a chair—however simple. This sturdy oak dining chair will remain wobble-proof, eye pleasing, and comfortable for years to come.

SHARPENING YOUR SHOP TOOLS
DO WATERSTONES HAVE THE EDGE?
More and more woodworkers sure seem to think so! We think we’ve learned some of the reasons why.
TOOL BUYNMASHIP
AIR POWER! WHAT
AN AIR COMPRESSOR CAN
ADD TO YOUR WORKSHOP 50

Yes, an air compressor can indeed earn its keep in your
shop—and for more tasks than spraying finishes and
blowing dust.

YOUR WORKSHOP
5 STRATEGIES TO MAKE SMALL SHOPS WORK BIG 54

Ready to set up a shop of your own—if only you can find the space? Or maybe
you already have a small shop that seems to be contracting as your woodworking
needs expand. Use these sample layouts and tips to stretch your shop space.

TWO BRIGHT IDEAS FROM OUR SHOP
THE OLD LAMPLIGHTER REDWOOD LANTERN 58

This appealing fixture of redwood, brass, and acrylic lends distinction to any outside entry or patio. Build
one or a pair and enjoy the glow.

THREE-TIER WALNUT CEILING FIXTURE 62

You won’t find another ceiling fixture that stacks up as handsomely. It’s simply three mitered walnut
frames joined to white acrylic and a mounting frame.

FAMILY WOODWORKING
TIME OUT FOR KIDS 66

This special section focuses on woodworking as a family hobby. Learn how
to share your skills with youngsters. There’s no greater satisfaction!

SIMPLY SPECIAL WREN HOUSE 68

It’s an ideal project for a parent-child team to tackle in
an evening or two. Build our wren house soon and wel-
come the first occupants this spring.

THE RED BARON, JR., TOY AIRPLANE 70

With your supervision, a youngster can handle most
of the layout, cutting, and assembly of this high-flyin’
project—depending on his or her age and skill level,
of course.

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TALKING BACK

We welcome comments, criticisms, suggestions... even an occasional compliment. The volume of mail we receive makes it impossible to answer every letter, but we promise to do our level best. Send your correspondence to Letters Editor, Better Homes and Gardens® WOOD Magazine, Locust at 17th, Des Moines, IA 50336.

POSTSCRIPT TO A SHOP SAFETY TIP

Temporary miter gauge fence

In your December, 1985 issue (p. 10), you printed a safety tip about flicking away small scraps from the table-saw blade with the eraser end of a pencil. There's another way: What I do is screw on a piece of, say, ¼" stock just a little higher than the crosscut fence and let it extend about 2" on the blade side. Then, when I miter, I push the piece through and don't have to worry about flicking the small scrap piece into the saw blade.

—John Rendl, North Riverside, Ill.

MORE ADVICE ABOUT THE SURFACE SANDER

Few of our projects have generated as much enthusiastic response as the surface sander that appeared in our October, 1985 issue (p. 48). It sounds as if this homemade tool filled a void in a lot of workshops. Here's the latest tip we received from a reader who built one:

When using the shop-built thickness sander to sand boards 6" wide or less, wind one-half of the drum with medium paper and the other half with fine, instead of removing the sandpaper to change to a finer grit. Use stripping tape to hold paper on the drum.

Another piece of tape is used to divide the infeed table. I am now looking for pillow blocks that easily can be removed so that a set of drums with different grits of paper can be made up and changed as needed.

—Joseph C. Denefeld, San Francisco, Calif.

Continued on page 78
Meet James and the gang. They're tough customers when it comes to toys. But their little broncos pictured here are just as rugged. Hand-built from solid oak, they'll ride tough for years to come, even with this rough and tumble bunch.

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TIPS FROM YOUR SHOP (AND OURS)

In woodworking, as in life, no one knows it all. But through experience, we all discover—or stumble onto—better, safer, faster, or easier ways to do things. When we devise interesting tips or techniques, we’ll share them with you in this column. And when you send us your favorites, we’ll pay you $2.50 for each submission we publish. No shop tips can be returned. Mail your tips to:
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An eraser you'll almost never wear down
You should always carefully erase pencil marks before sanding wood projects, but laying your hands on a pencil with a "business end" on it isn't easy to do.
TIP: The cleaning stick that does such a fantastic job of dressing your abrasive belts makes just about the finest shop eraser you'll ever find. Use it for eliminating light pencil marks. It's tough and sure to last a long time.
—William Becker,
Deep River, Conn.

No soap
Yuck! You use a bar of soap to lubricate wood screws, but it's a mess keeping the soap damp. In addition, soap can cause rusting.
TIP: Someone finally has found another application for the wax gaskets used as toilet bowl seals. The wax is ideal for lubricating screws and nails and reduces the chance of breaking screws driven into hardwood. It will not attract moisture and can be purchased at your local hardware store.
—Max Beard,
Silver Spring, Md.
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TIPS FROM YOUR SHOP (AND OURS)

Continued

The chips are down

A power miter box is a slick device, but chipping and splintering can be a nuisance.

TIP: Use clamps or screws to secure a ¾"-thick birch or maple fence to the back of the vertical guide. When the slot enlarges after prolonged use, replace it with another liner. You'll find these liners particularly helpful when the face side of molding is opposite the cutting direction of the saw blade.

—From the WOOD Shop

Mirror image in half the time

Drawing half of a full-size pattern is hard enough, but matching the pattern for the other side is just as taxing.

TIP: Draw one-half of your pattern on a piece of folded paper. Fold and insert a piece of carbon paper, carbon side out, into the folded pattern. Then trace the pattern, open the paper, and unfold a full-sized pattern with identical halves. Now transfer your "perfect" pattern.

—L.E. Masters, Holloman AFB, N.M.
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Outstanding in a supporting role

If you have a basement shop, there's a good chance you've cursed the steel posts that support beams in many newer homes.

TIP: Put those posts to work in your basement workshop as a stand for a grinder or drill press. Determine the size of the stand your tool requires, and glue a stack of 2 x 4s together. Now, lay out and cut a hole the diameter of the post, less ¼" toward the rear of the table. Rip the lamination through the hole. Then "clamp" the two parts of the table around the posts with 6" lag screws.

—Gary Paine, Davison, Mich.

Shock treatment for power cords

When power-cord connectors are subjected to rain, the possibility of electrical shock increases.

TIP: An empty plastic milk jug can protect cord ends from moisture. Cut a hole in the bottom of the jug and enlarge the top if necessary to allow the male and female ends to pass through. Pull one cord entirely through the jug, connect, and suspend the connection in the middle of the jug.

—from the WOOD Shop

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TIPS FROM YOUR SHOP AND OURS

Continued from page 17
Chip-free dadoing on the table saw
It's all too easy to chip the thin veneers covering plywood when you use dado blades and a dado-blade insert on your table saw.

TIP: Make your own insert that will undergrid the plywood (or any wood, for that matter) with support and reduce chipping. With a scroll saw, band saw, or jigsaw, cut out an insert blank from the correct thickness of plywood or solid stock. After you've mounted the blades, install and secure the blank. Then raise the blades to the proper cutting height. Now you will be cutting with maximum support.

—Arnold J. Schafer, Yakima, Wash.

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On the fun side, AFA invites you to help find a national champion in its National Register of Big Trees, a list of the largest trees in about 680 native species. The Association also offers group tours of natural monuments, wildernesses, and backcountry.

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Speaking out on the issues
You could join AFA for the educational resources or just the fun. The real bond that ties together members, though, is an urgent belief that each of us has a responsibility to protect and intelligently use our forests and related resources. AFA membership gives you a voice in the future of our forestlands. Through AFA, you can make a difference on problems such as acid rain, endangered animal habitats, deforestation, soil erosion, or domestic lumber pricing.

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For more information and a membership application, write: Rita Malone, Director of Communications and Membership, The American Forestry Association, Dept. W, 1319 18th St., NW, Washington, DC 20036.

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In the woodworking classes I’ve taught over the years, it amazes me how students who know how to cook and sew have less difficulty buying project lumber than those who don’t. Maybe it’s because they’re used to thinking in terms of quantity—how many batches of cookies they can get from one pound of flour, or the pairs of curtains in six yards of 36”-wide fabric. Then again, maybe it’s because they don’t have preconceived notions about how to buy hardwood lumber.

The rest of us get all caught up in board feet. I knew one woodworker who calculated how many board feet he needed for a project, then phoned the lumberyard to have it readied for pickup. When he got there, his ten board feet were all in one large board—2” thick × 6” wide × 10’ long!

Use cutting diagrams when you buy
Like yards in a fabric store and pounds in a meat market, board feet only represent a unit of issue—the basis on which cost is calculated. More important when you shop is the ability to look at a board and see the parts you need.

Hardwoods come in random widths and lengths, so each board varies in dimension. You can’t calculate your needs in the 1 × 6s, 2 × 4s, and 1 × 2s of construction-grade lumber and expect to find hardwood in those dimensions.

That’s where cutting diagrams, such as those we furnish with many projects in WOOD, come in handy. Take a cutting diagram to a hardwood dealer and he’ll help you select the boards that will make the parts you need. If you have a project plan without a cutting diagram, make one.

Shop for parts, not board feet

Plan it out in units—the end panels, the top, the back, the legs, etc. When you plan to cut all the parts for one unit from a single board, all the pieces in that unit will match in grain and color.

Buy enough stock for usable waste
The biggest mistake people make in buying stock is not buying enough. If you buy sufficient wood the first trip, you won’t have to stop working to make a second. Even more importantly, if you buy enough the first time, your wood will come from the same pile. That often means the same tree, with little or no variation in figure or color.

Buying just enough stock to leave only an inch or two of cutoff in length proves to be penny-wise and pound-foolish, too. Buy your stock long and have enough left to make something later or to replace a ruined part.

You can edge-join long, narrow scraps to make up width in a future project. When you buy long, length will be there when you need it. You can’t make up length, as you can width. It doesn’t pay to be overly dollar conscious when buying stock.

Save on “discount” plywood
Most lumberyards have “scratch and dent” bins where you can save big on damaged (often only slightly) hardwood plywood. You can patch or cut off bad spots.

Remember that you can also laminate a thin, premium sheet to thicker, lesser-grade plywood, such as CDX, to make up for thickness. This works great for the sides in a chest of drawers. You’ll have a good-looking panel, and can pocket the difference between your laminating and a thicker, premium sheet.
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On the Baltic's northern shores, where ash once grew thick and tall, ancient Scandinavians called the tree Yggdrasil. Its branches were said to hold the gods, its trunk their path to earth, and its roots the way to the underworld. American Indians pounded “basket ash” to soften it for peeling into weaving strips. Canoe paddles were made from it, as well as tomahawk handles and spear shafts.

Today, the handles of many picks, shovels, rakes, and axes are made of ash. It also may be the most sporting wood around, the mainstay in laminated-wood tennis racquets, hockey sticks, and skis. Baseball bats have always been made of ash because of its ability to absorb shock, bend without breaking, and add heft without unwieldiness.

These uses, combined with its popularity with furniture makers, place ash among the commercial hardwood leaders.

Wood identification
Botanically a member of the olive family, ash grows throughout the Northern Hemisphere and numbers nearly 60 species. In North America, there are 18 species of ash. However, only a few provide commercial hardwood timber.

Foremost among them is white ash (Fraxinus americana), which grows from Nova Scotia and Maine west to Minnesota and south to Texas and Florida. Green ash (Fraxinus pennsylvanica), both smaller trees than white ash, duplicate its range and are sold under its name. Black ash (Fraxinus nigra), the Indians' basket tree, is marketed as brown ash. It likes northern climates.

Oregon ash (Fraxinus latifolia), grows on the Pacific Northwest coast from Washington through northern California. Equal in size to white ash, Oregon ash stands as one of the few commercial hardwoods in its region.

You can spot ash by the telltale gray bark with deep fissures in a diamond pattern. White ash, with its oval crown, may rise to 120' in the wild. Other ash species normally approach 60' to 80' tall.

Ash yields straight, close-grained wood that often displays a wavy figure. Its color ranges from creamy white to tan, but brown ash, as its name implies, is distinctly darker and brown in color. For the most interesting grain and figure, brown ash gets the nod.

Dry white ash weighs about 42 lbs. per cubic foot. Brown ash is slightly lighter in weight.

Working properties
Despite ash's strength and toughness, you still can work it readily with either hand or power tools. When steam-bent, it holds its shape admirably.

The wood's close grain gives it high nail- and screw-holding power. Gluing poses no problems, nor does sanding and finishing. Ash works to a beautiful natural or stained finish. Darkened, it imitates oak.

Uses in woodworking
The same abuse-resistant properties that make ash the commercial choice for tool handles make it ideal for chairs and other furniture. Because it doesn't impart any taste, ash is also perfect for food containers and cutting boards.

And don't overlook ash when it comes to lathe work. It turns exceptionally well.

Cost and availability
You can buy ash lumber and plywood nationwide at about the same price as red oak. Brown ash, when available, costs less.

You may see Japanese ash, or sen, sold as plywood. It costs less than American ash, but doesn't take stain as readily.

You'll find ash veneers available both flat and quarter-sawn.

Photographs: Hopkins Associates
Illustration: Steve Schindler
Portrait of

“I owe my father thanks for being the best teacher and dad a girl could ever want. . . . An article featuring my father and me with our hobby would be of value to many teens and parents. Thank you for your time. I am awaiting your reply in great hopes.”

Michelle Feasel
—from a letter to WOOD dated Jan. 18, 1985

Five years ago, Michelle, now 19, was carving lapel pins for high school friends. Now, she carves full time on a commission basis and for direct sale, traveling with her father, Bill Feasel, 40, to carving shows in the East and Midwest.

When Michelle isn’t carving, she enjoys the outdoors—hunting, fishing, or hiking—with her parents, brothers, and sister near their Fremont, Ohio home.

Palm-sized miniatures of shorebirds, ducks, and geese proved salable for Michelle. They also reflected her love of the outdoors. Those shown here are displayed on blocks of jelutong.
In the letter excerpted at left, Michelle told us about her budding career in carving. We just had to see for ourselves what she could do, and hear what she had to say about her work. What we found makes a great pitch for family woodworking, one of the themes of this issue (see pages 66–72).

“Michelle knows more about the workshop than she does the kitchen,” Linda Feasel remarks about her oldest daughter. You sense Linda’s pride as she continues: “Michelle is doing now what most kids never get to do, and she’s accomplished it by herself.”

At a stage in life when other youngsters are pondering jobs, higher education, and the future, Michelle seems to have found her way through the maze and is building a reputation as an artist with her wood carvings. She spends 40 to 60 hours each week in the workshop, and sells all she can produce.

Yet Michelle doesn’t view her success as an early-arriving career, or even a job. “I look at it as a paying hobby,” she says. “I still carve because I like what I’m seeing as the work progresses, and still give each piece 100 percent of my effort. I hope I never reach a point where each piece would be a duplicate of the one before. Then, that would be a job.”

In that respect, Michelle is much like her father, Bill, a carver who tutored her about wood, tools, finishes, and other aspects of the craft.

Bill describes his work as something far removed from the commercial. He’s been carving and selling in the off-hours from his position with a package delivery firm for 15 years. To Bill, carving represents more of a therapeutic release than a business.

Wildlife carving comes naturally
The buck deer spied on a hunting trip, the migrating snow geese seen from a blind, the heron spooked out of a marsh, or the salmon caught on a Lake Michigan vacation all become candidates for creation on Bill and Michelle’s workbench.

“We put into wood things we’ve seen or visualized. We both love the outdoors and want to express what we’ve seen in our carvings,” the father says.

This expression in wood of the outdoors grew from family experience. The Feasels have always found enjoyment there.

Bill, Linda,
Michelle,
Continued
brothers Michael, 17, and Mark, 15, and little sister Jackie, 11, work together weekends on 17 undeveloped acres they own a few miles from Fremont. There, in a setting "almost like Canada," they put in ponds, have built a rustic cabin, and siphon water from a crystal-clear spring for their living needs. There, too, they hunt, fish, walk the forest, and wade the streams.

together. You don't have to spark their interest—they'll manage to do it themselves."

Everybody loves a carver
Michelle's first carvings were tiny lapel pins her schoolmates ordered to wear on their blazers. They had admired some pins her father had carved, and Michelle decided to begin making them herself.

and admire them, and wish I could do as well," Michelle remembers.

At one show, a carver encouraged her to do miniature shorebirds. They were a simple start for salable work, something to build on.

Give and take: How father and daughter work together
Once Bill discovered his daughter's interest in carving was serious, he spent more and more time helping her. As her expertise grew, her own ideas flowered.

"We see things differently at times," Michelle explains, "as any two artists would. I have to make him understand occasionally how I see something. If it differs from his view, it pulls us apart temporarily from what we do together."

Despite the differences, sharing work space also fosters the sharing of new directions, as with the colorful carousel animals Michelle now focuses on.

Michelle's history teacher suggested she carve and paint a tiny carousel animal to fit a miniature carousel replica he owned. While she had never carved anything with four legs before, she liked the idea, and asked her father for help.

The first figure, a horse, stood 6" high, and was a hit right off. It resulted in orders for a giraffe and a zebra. They sold for $35 each. Carousel animals were a delightful, enchanting departure for both father and daughter.

"There's something about carousel music and the larger-than-life impressions of riding a carousel animal that stick with you all your life," says Michelle. "The animals allow me to be very creative. With wildfowl, fish, and game animals, you have to stick to the shapes and colors nature provided. And you can never carve and paint a piece better than God made it in the first place. With carousel animals, you have freedom."

Buyers also like the fantasy. A horse, similar to the one shown above, sold recently for $875.

At first it was only Bill who captured the wild in his carvings, the children watching his perceptions being re-created in wood. Then the children began to carve, too. Even young Jackie found inspiration in sanding the carvings her father made for her. Michelle, however, became totally involved with creating in wood.

She acquainted herself with the carving tools by straightening up her father's workbench, and with paints by washing out his brushes. Finally, she asked Bill to teach her his techniques.

To Bill, his oldest daughter's interest was simply a natural outgrowth of the family's penchant for doing things together: "Nowadays, it seems, so many families go off in different directions without any ties that bind. I think if children are to become interested in what one of the parents is doing, it'll happen if you have always done things
Learning to use the tools of the carving trade
Michelle thinks nothing of cutting 2” stock to pattern on the band saw, a task she once feared.

Bill works nights, and wasn’t always around when Michelle needed stock cut. So he taught her how to use the saw safely.

“Dad didn’t want to take the chance of my cutting a finger, but I told him I’d accept all the blame if anything happened. Learning how to use the band saw was something I needed to do, and he understood.”

There was a whole lot to learn. Bill taught her how to use the power carving tools to remove wood fast when roughing the patterned stock to shape. The palm gouges and knives, for cutting details, came next.

Both prefer X-acto knives over the traditional carving knife. “I don’t have the patience to put a real fine edge on a knife,” Bill admits, “with these you change blades.”

Texturing in the feathers on wildfowl or duplicating scales on game fish carvings requires a woodburning tool. The Feasels make the red-hot tip from soft metal, bending it to the shape they want to burn into the wood. A small, three-quarter circle of metal becomes a fish scale, to be embossed on the carving hundreds of times before it’s painted.

For carvings requiring lots of burned-in detail, Bill and Michelle like jelutong, which comes from Indonesia. Most of their carvings, however, begin as high grade, C-Select pine. They’ve also experimented a little with tupelo, which grows in the southern U.S.

Acrylic colors add life to the wood
For lifelike finishes on their carvings, both father and daughter apply acrylics, despite doubts about how long the colors will last.

“Acrylics haven’t been around long enough to judge how good they’ll look over the long haul,” says Bill. “You can still see the rich colors on signs that were painted with oils a hundred years ago, but we don’t yet know how long acrylics hold up.”

Michelle admits that she uses acrylics simply because they dry faster. “When you’re trying to keep up with orders, that really counts.”

To get a shiny surface, Michelle sprays lacquer or varnish over the acrylic paint, as with her carousel animals. For a dull, soft finish, like a duck or kingfisher might have on their feathers, she adds a clear matte sealer, which also protects the paint from oily fingers.

When Michelle and her father start painting for a carving show and sale, they move up to the kitchen. Taking up all available countertop space, they spread duck carvings, fish plaques, and carousel animals everywhere to take advantage of the natural light that floods the counters. Linda says it looks like a “decoy factory.”

The life of a full-time carver
Michelle believes her carving gives her a jump on an art career that’s as yet still undefined. “I know I’ll do something in the art field, but it may be fashion design or something else really different. Right now I’m still thinking about it,” she says.

At present, Michelle’s long hours fulfilling orders and stockpiling for future carving shows at times causes her to reflect on whether or not she really wants to continue carving on a money-making basis.

“I worry that if I turn into a career, and keep at it, I’ll eventually burn out. Carving is lonely. But I think about the people I’ll meet and the friends at shows that I’ll see again. And when I’m sitting there in the workshop I don’t even think if it’s worth it. I just enjoy,” Michelle says.

No matter what the young carver may do in the future, she knows she’ll never give up carving. When that future eventually includes her own family, she wants to be able to share carving with them. “My dad has shared so many things with me, I want to do the same with my children.”

Produced by Peter J. Stephano
Photographs: Jim Elder
Applying Plastic Laminates
How to Get the Job Done Right

Do "self-respecting woodworkers" use plastic laminates? You bet they do! It's never going to replace wood as the material of choice among woodworkers, but we think you'll find it an interesting surfacing option for certain projects. And, boy, is it fun to work with!

We've divided this article into two parts. "The Basics" will serve as a refresher for those of you who have some experience with plastic laminate already (and as an introduction for those who don't). In "Nifty Solutions for Special Situations," we deal with some situations and some new materials you may not have encountered yet.

Photographs: Bob Calmer
Illustration: Advertising Art Studios Inc.

With today's new solid-color surfacing materials, you can create an array of striking edging treatments. Here we combined a walnut banding with Formica-brand "pale gold" solid-color surfacing material, then routed a cove along the top edge.

The Basics
2 GOOD WAYS TO CUT LAMINATE DOWN TO SIZE

1. The score-and-snap method of cutting laminate works well with all standard laminates, but not with the new solid-core surfacing materials. Start by laying the laminate face up on a clean surface. Then mark the cutoff lines, allowing at least ¼” in both directions for overhang. Put a piece of thin scrap beneath the cutoff line, locate the straightedge so that it protects the panel you'll be using, then score along a straightedge several times with a sharp-pointed tool. We use an inexpensive carbide-tipped scoring tool we bought at a local floor-covering tool supplier. When you see the dark backing showing through the color layer the entire length of the cutoff line, you're there.

2. With your hands positioned as shown and with the laminate face up, lift up on one end of the laminate, exerting pressure until the material snaps. The photo inset shows what happens at the score line: (a) if you press down on the laminate rather than lift up; (b) if you do as we suggest; and (c) if you don't score the laminate completely.

3. In situations where you need to cut the laminate in two or more directions, lay out and mark the cutoff lines, then drill a small hole in the scrap portion where the cutoff lines intersect. Doing this prevents you from accidentally scoring too far and also lessens the chance of stress cracks developing at the corner. Score completely through the shortest dimension, then score and snap along the other.

4. We've also had good luck cutting laminate with a router fitted with a flush trimmer bit. Just mark your cutoff line, clamp a straightedge beneath the laminate, and run the router along the straightedge. You'll get a super-smooth cut.
Applying Plastic Laminates

PREPARING THE SURFACE FOR PLASTIC LAMINATE

We've used both good-quality plywood and particleboard as a substrate for laminate. Regardless of which material you use, though, fill surface voids before applying the laminate. Also true up the edges and fill voids with wood putty.

The photo, above, shows the setup we use to guarantee a smooth edge. This technique comes in handy if you plan to band the edges of a panel with wood.

When putting an edge banding on a shelf or countertop (see the photo, below), glue and nail the wood to the substrate, making sure the top edge of the banding is slightly higher than the substrate. Go back later and either plane or scrape the surfaces flush. Don't use a belt sander; it may gouge the surface or round over an edge.

APPLYING THE ADHESIVE AND LAMINATE

1. Because you want to minimize the visual impact of the joint lines, the sequence of application is every bit as important as the technique. As a general rule, cover the underside of a panel first, the back and side edges, the front edge, and finish with the top surface. Contact cement sets up quickly, so on all but very small projects we recommend using a narrow, short-napped roller. Give both mating surfaces one liberal coat of contact cement (use only the non-flammable type), then allow the adhesive to dry.

How do you know when the surfaces are ready for contact? Give them the touch test! If the adhesive sticks to your finger when you touch it, it's not ready.

2. To keep from mispositioning the laminate on the substrate, we lay venetian blind slats between the substrate and the laminate. Once we have laid the laminate into position and have checked to make sure we have excess to trim off on all edges, we withdraw the slats one at a time. Smooth the laminate with one hand as you work toward the other end.

3. If for some reason you goof, we've found that you can retrieve laminate even if it's already made contact. With a spray bottle partially full of contact cement solvent, dust a fine mist of solvent along the edge. Then, lift up the edge with a putty knife. Continue spraying and lifting, and the substrate and laminate will part company. Allow the solvent to evaporate, recoat both the laminate and substrate, and re-lay the laminate.

4. After the substrate and laminate make contact, you want to ensure a good bond between the two. Though you can accomplish this by tapping the entire surface with a scrap block and hammer, we use a rubber J-roller. With it, we can apply a lot of pressure, and we also avoid the problem of fracturing the laminate at the edges, which is a possibility with the other method.
TRIMMING AND FINISHING OFF THE EDGES

We've trimmed laminate with carbide-tipped flush-trimming router bits with ball-bearing pilots, but we can honestly say that a much less expensive solid-carbide bit with a solid pilot works just as well for us. And that's the opinion of some professionals we've talked to as well. With either type bit, you've got to be on guard against burning or scratching adjoining surfaces. We've found the two best strategies here are to keep the router moving and to apply a layer of petroleum jelly to the surface that the bearing guides against before routing off the excess. Theoretically, a router bit with a ball-bearing guide should prevent mishaps. But as you trim an edge, for example, the contact cement builds up and restricts the movement of the bearing.

MORE TIPS ON WORKING WITH LAMINATES

• Before working with plastic laminate or the new solid-color surfacing materials, allow a day or so for the material to acclimate. Also make sure that the contact cement is at room temperature before applying it.
• Be extra careful when handling and working the solid-color surfacing materials. They're even more brittle than standard laminates. They also have the habit of chipping when being cut, so use sharp, carbide-tipped cutters when cutting or shaping them. And if you glue several layers of these materials together to create decorative edge treatments, be sure to scuff up the face of the layers to which other material will be applied to ensure a good bond.
• If you apply laminate to any surface that won't be anchored securely to another assembly, always apply laminate, or the less-expensive "backing sheet," to the back side of the panel to minimize the chances of warping due to moisture.
• Always work in a well-ventilated area when applying contact cement, as its vapors can be dizzying if inhaled for too long a period. And don't work around heat or flames.
• Sometimes air bubbles form between the laminate and the substrate after application and cause the bond to break. (Usually the cause of this is laying down the laminate before the cement has "flashed off"). To correct this situation, lay a damp cloth over the area in question, then place an iron set at the cotton setting onto the cloth. Doing this reactivates the cement and allows you to press the laminate and substrate together.
• To help prevent stress cracks at inside corners, hold the contact cement back about 6" in all directions from the corner, then apply white glue to both surfaces and clamp them together.
• To keep the contact cement applicator relatively pliable between coats, wrap it in plastic to keep the solvent from escaping.

Continued
WRAPPING LAMINATE AROUND CORNERS
Ever wonder if you could wrap plastic laminate around a relatively tight radius? We were curious to find out, so one of the staffers brought in a blow dryer to see if we could do a little coaxing by heating the laminate. Nothing doing; it didn’t heat the laminate to the 313° temperature that postforming manuals specify as the correct laminate bending temperature. So we got hold of a commercial heat gun at a local rental outlet. With it, we formed the laminate around radii down to about 1”. We bent the laminate first, then applied contact cement.

WRAPPING A CYLINDER
Start by cutting the laminate to the length and width required. Be sure to allow extra for trimming. Apply contact cement to both mating surfaces, wait until the cement is dry to the touch, and apply the laminate to the substrate, except for the last 8 to 10”. Slip a piece of waxed paper beneath the laminate, then carefully mark both edges of the laminate as shown.

Carefully align one edge of a straightedge with the marks you just made, and clamp the straightedge in place as shown. Run your router along the edge.

ALIGNING GEOMETRIC-PATTERNED LAMINATES
One of the new-generation “designer” laminates, the geometrics can cause you headaches if you’re not careful. To make them look good, the surfaces you adhere them to must be square. This, combined with the fact that the patterns themselves aren’t always true, makes aligning these laminates difficult. To make things easier on ourselves, we cut four like-sized wood scraps, and use them as shown. We make any needed adjustments, then apply contact cement to both of the surfaces and then lower the laminate down onto the substrate.

PICTURE-PERFECT JOINT LINES
When you want a perfect joint line between two pieces of laminate that butt end-to-end or edge-to-edge, try this technique: Clamp two pieces of scrap to your workbench with a small space between them, then butt the two pieces of laminate together. Now secure the pieces of laminate with two more scrap lumber cleats. One pass with your router fitted with a carbide trimming bit, and you’ve got it made. Hold the router against one of the guides, and don’t rotate the base of the router because many bases are not perfectly round.

HIDING UNSIGHTLY SEAM LINES AND DEFECTS
What if you end up with a less-than-perfect joint line or need to repair a defect of some sort? We decided to try a product called Kampel SEAMFIL from a local laminate retailer. We color-mixed some according to the directions and forced it into a seam. It worked as advertised, although we didn’t have quite a time getting a color match. If we used the product again, we’d pay to have the factory color-match the product for us so as to guarantee good results.

FINISH-SANDING WOODEN EDGE BANDING
When you choose the option of dressing up the edge of a shelf or counter with a wood banding, getting the wood perfectly flush with the top of the laminate is tricky. When we apply the banding, we try to make sure the wood projects a bit above the laminate. Then we mask off the laminate and use a sanding block to bring the two surfaces flush. When we begin to see scuff marks on the masking tape, we call it quits.
DRESSING UP THE EDGES OF TEXTURED LAMINATES
You can trim the edges of textured laminates as you do other laminates, but the bearing or pilot will follow all of the depressions and other irregularities in the material along the way. We dress the edge by working a triangular file carefully as shown here. A time-consuming technique to be sure, but necessary when working with these kinds of textured patterns.

THREE COMMON COUNTERTOP PROBLEMS
Countertop installations give most people fits, mainly because the walls countertops fit up against are irregular. But scribing to fit allows you to compensate for those imperfections. In the instance shown at left, we used a thin piece of scrap material and a pencil to scribe the irregularities of both walls onto the laminate.

Most laminate-trimming routers can’t trim laminate right up to the wall. To trim the remainder of the excess material, we guide our scoring tool along a straightedge several times until we work our way through the material. The we put the finishing touches on with a file.

Here’s a tip for those situations when you install a sink in a countertop. We mark the cutoff lines, then bore a ¼” hole in each corner of the cutout. These holes do two things. First, they provide a radius at each inside corner, which helps to prevent stress cracking. And they also prevent you from accidentally scoring surrounding laminate. We score along each of the cutoff lines, then use a jigsaw with a metal-cutting blade to cut out the top. (This blade reduces chip-out.)

For more information on what’s available in plastic laminates, how they’re sold, and where to purchase them, please turn to the article on page 76.
BUILDING THE PLYWOOD FRAME

1 Lay out all the parts of the frame on the face side of the plywood, as shown in the Cutting Diagram. Then, with a table saw (and helper if you can find one), cut the top (A) to size.

2 Using the Cutting Diagram as reference, rough-cut the table legs (B, C) with a jigsaw. Then trim the exterior edges and the leg bottoms with the table saw.

3 To make the interior cuts on B and C easier to cut perfectly straight, attach a long wooden auxiliary fence to your table saw fence. Unplug the table saw, raise the blade to its full height, and position the fence against the blade. Slide a piece of wood along the fence until it comes into contact with the blade, and mark the maximum length of the blade cut on the wooden fence, as shown in the drawing, left. Extend these lines up the side of the wooden fence so that they will be visible when you cut the plywood.

4 Using a straightedge, mark start and stop lines on each A and B, as shown in the Cutting Diagram. Now, move the table saw fence 2¼" away from the inside edge of the blade. Lower the blade below the surface of the table, and set one of the B legs on the surface of the saw. Line up the start and stop lines on B with those on the wooden fence, and clamp start and stop blocks to the fence at those points (see the photo, left).

5 With one of the Bs against the auxiliary fence and the start block, plug the table saw in, turn it on. Slowly raise the rotating blade up through the ¾" plywood stock until the blade is extended upward to its full cutting height. Not only is the blade at its full cutting height, it is at its full cutting length as measured in Step 3.

**Warning:** When raising the moving blade through the plywood, be sure to hold the plywood firmly against the table, but do not put your hand near the area where the blade will protrude.

Continued
Cutting Diagram

Start line
Stop line
Stop line

1st cut
20½"

2nd & 3rd cuts

Cut along dotted lines with a jigsaw

3¼x48x96" Plywood

36"
41"

Bill of Materials

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<th>Qty.</th>
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<tr>
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<td>plywood</td>
<td>2</td>
</tr>
<tr>
<td>C*</td>
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<td>plywood</td>
<td>2</td>
</tr>
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<td>D</td>
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<td>4</td>
</tr>
<tr>
<td>F</td>
<td>3/4&quot; 1½&quot; 1½&quot;</td>
<td>plywood</td>
<td>4</td>
</tr>
</tbody>
</table>

*These parts are cut larger initially, then trimmed to finished size. Please read the instructions before cutting.

Supplies: #8x1¼" flathead wood screws, wood filler, contact cement, plastic laminate, black paint, petroleum jelly, permanent black felt-tipped marker.
6 Push the leg along the fence until you meet the stop block at the other end of the fence (see the photo, right). Holding B in place, shut off the saw and wait until it comes to a complete stop before removing the piece. Lower the blade, place the other B in position, raise the blade through it, and cut it in the same manner. To cut the C legs (they are ¾" narrower), you will need to move each stop block toward the center by ¾".

7 To make the cuts along the legs of B, move the fence 3" from the inside edge of the blade. Position a stop block on the fence, and cut both inside cuts on each B as shown in the drawing, right. Move the fence 2 ¼" from the blade, and make both cuts on the inside edge of each C using the same stop block. You will need to use a handsaw to square up the cuts, as the blade leaves an arc shaped cut.

8 Dry-clamp the leg assemblies (B-C) together, and check for a proper fit of all the parts. Trim if necessary. Then, glue and clamp the leg assemblies together, checking for square. Be careful not to round-over or dent the square edges when clamping. To reinforce the joints, drill pilot holes and drive #8 x 1 ¼" flathead wood screws where shown in the Exploded-View Drawing. Make sure the head of each screw rests flush with the surface of the plywood (otherwise they will show through when you apply the laminate).

9 Glue and clamp the tabletop onto the leg assembly, and secure it with screws.

10 Cut the plywood parts D, E, and F to the sizes given in the Bill of Materials for the inner legs. Glue up one D, one E, and one F for each inner leg. Secure the pieces together with #8 x 1 ¼" flathead wood screws.

11 Glue and screw the inner-leg assemblies to the table assembly to form the completed carcass.

12 After the glue dries, fill all voids and holes with filler. Sand the carcass assembly smooth, being extremely careful not to round-over any edges.

**APPLYING THE LAMINATE**

*Note: If you don’t have any experience with applying plastic laminate, or you’re a little rusty, read the preceding techniques article, “Applying Plastic Laminate,” for some helpful hints.*

1 Using the Laminating Sequence Drawing as a guide, cut and apply laminate to the inner edges of each leg (see Steps A and B).

2 Lower the table onto the face side of the laminate, and trace the outline of the legs and tabletop with a colored grease pencil. Allow at least ½" in all directions when cutting for overlap, as it will be trimmed with a router later. Apply the laminate to the plywood legs as shown in Steps C and D, then to the tabletop, and then to the bottom of the legs (Step E). Trim after each step with a router fitted with a flush-cutting bit. (We rubbed petroleum jelly along the path of the bit’s pilot to prevent it from marring the already-applied laminate. The pilot may dog with glue and burn the laminate.)

3 To minimize the seam lines of the laminate, “stain” the exposed laminate edges with a permanent black felt-tipped marker. Wipe off the excess with a clean rag.

4 Mask off the laminate and paint the remaining exposed plywood on the bottom side of the table black.

**Buying Guide**

- **Plastic laminate.** 4 x 10' sheet Nevamar Black S-6-1G “Glossie” Finish. For the distributor nearest you, write Nevamar Corp., 8339 Telegraph Rd., Odenton, MD 21113, or call Nevamar at 301-569-5000 and ask for ext. 394 (customer service). 

Project Design: James Downing
Photographs: Hopkins Associates
Illustrations: Kim Downing; Bill Zaun
This chair complements the oak dining table that appeared in the February, 1986 issue of WOOD (page 64).
B E S E A T E D!

Solid Oak Dining Chair

Note: The instructions explain how to make one chair, and the Bill of Materials gives the number of pieces required for one chair. You will need to determine how many chairs you want, then cut and machine as many parts as necessary. When making four or six chairs, cut all identical pieces at the same time. We tried upholstering our own chairs with mixed results; you may be better off having a professional do the upholstering for you.

FORMING THE LEGS

1. Cut the front legs (A) to size. (You can use 1 1/2" stock or laminate two 3/4" pieces together.)

2. To make the back legs (B), start by cutting two 1 1/4" x 3/4" thick pieces 4 1/2" wide by 36" long. Using the drawing shown below, lay out and mark the shape of just one of the back legs. With a helper, use a flexible thin strip of wood to mark the curved lines.

3. Lay out and mark the position of the mortises on the front and back legs as dimensioned in the Leg-Rail Assembly Drawing, below, and as shown in the Back/Leg Drawing.

Note: Remember that you are working in pairs (pairs of front legs and pairs of back legs). You'll want to mark the mortises on each pair before cutting to ensure that you machine the correct side of each part. (We marked one right leg and one left leg and used these as templates to mark the rest of the legs.) We also taped the pairs together after each marking and machining procedure.

4. To form the mortises in the front legs, use a drill press with a 3/8" flat-bottomed bit, and drill out the stock within the marked mortise lines 3/4" deep, as shown in photo A, p. 43. You can drill one of the
mortises in each front leg with the setup shown. You must then move and re-clamp the stop block to the other side of the bit, and drill the other mortises in each leg. Marking the mortise locations earlier sure prevents confusion here. We used a back fence and stop to ensure that all the mortises were consistent in size and location. And we set the stop on the drill press to make sure that all holes were drilled to the same depth.

5. Drill the mortises in the front of the back legs the same way the front ones were drilled. However, note that you will need to construct a longer fence with stops for your drill press table.

6. Using a double fence (shown in photo B) on the router table to ensure a perfectly straight routed groove, and a \( \frac{3}{8} \)" straight bit, rout the mortises clean in each front leg as shown in the photo. Use a stop to ensure a consistent mortise length. You'll be able to rout one mortise on each leg front with the setup shown. Move and re-clamp the stop block to the other side of the bit, and rout the other drilled mortises clean.

7. Use the same double fence on the router table and the same \( \frac{3}{8} \)" bit \( \frac{1}{2} \)" above the surface of the table. Adjust the fences and stops and rout the mortises clean (\( 1 \frac{1}{8} \)" deep) in the front edge of each back leg, as shown in photo C. Make at least two passes to achieve the \( 1 \frac{1}{8} \)" depth and not strain the bit.

(As shown in the photo, we marked the length of the mortise on the side of each rear leg, and marked the location of the router bit on the front fence. The marks on the fence indicate the exact position of the \( \frac{3}{8} \)" bit. This enabled us to rout the mortise to exact size, despite the fact that this is a "blind-routing" operation. Using the marks, you can eliminate the use of a long back fence and stops.)

Photo D shows the routed mortise.

8. Drill the mortise in the inside face of each leg. Then move back to the router table, adjust the fence, stops, and depth of cut, and rout the mortises clean.

9. Use a sharp chisel and a mallet to square the rounded ends of each routed mortise.

10. With a band saw, cut the previously marked back leg to shape, cutting just slightly outside the line drawn. Now, sand the leg to the marked line. Using this leg as a template, mark the shape of the other back leg. Then cut and sand it to shape. (Accurately shaping the first leg ensures a good template for tracing the other legs.)

2. Cut the ends of each rail to form tenons as dimensioned in the Leg/Rail Assembly Drawing. (We did ours on the radial-arm saw using a dado blade. We cut our tenons \( \frac{3}{8} \)" less than the depth of the mortise to allow for glue pocketing. We test-cut scrap material first and checked the fit of the test tenon into the mortises previously machined in the legs.)
A Drilling the Marked Mortise

B Routing the Front Leg Mortise

C Routing the Mortise in the Back Leg

D The Completed Back-Leg Mortise

Continued
SOLID OAK DINING CHAIR

3 Cut the backrest rails (F, G) to size. (Use the drawing, below, as a guide to mark and cut the shallow recess on the front edge of G.)

4 Using the drawings of the rails (C, D, and E) and the upper backrest shown below, lay out and mark the location of the $\frac{3}{8}$" ogee cuts. Also lay out the $\frac{1}{4}$" groove you'll be cutting in the bottom of the upper backrest rail (F). Fit your table-mounted router with a $\frac{1}{4}$"-point cutting ogee bit, and set up a fence to guide the cut as shown in photo E. Rout the decorative groove in the rails (C, D, E) and upper backrest (F).

5 To cut the groove in the bottom edge of F, start by fitting your table saw with a dado blade. Move the fence $\frac{1}{4}$" from the inside edge of the blade. The first cut should be $\frac{1}{4}$" wide by $\frac{1}{4}$" deep along the bottom edge of F. For the second cut, switch back to a $\frac{1}{4}$" blade set $\frac{1}{4}$" above the surface of the table with the outside edge of the blade $\frac{1}{4}$" from the fence.

6 To round-over the top and bottom edges of the upper backrest (F), use the point-cutting ogee and a fence on your router table. Using a $\frac{3}{8}$" round-over bit, round-over the edges of the front and side rails (C, D), and the rear rail (E), as indicated in the Rails Drawing.

7 Using the same $\frac{3}{8}$" round-over bit, rout the front outside and top outside edges of the front legs, as indicated in the Exploded-View Drawing. Rout a $\frac{1}{4}$" round-over on the bottom of all legs.

8 Using a doweling jig, drill $\frac{1}{4}$" holes $1\frac{3}{8}$" deep in the ends of the back rails (F, G), as indicated in the Upper- and Lower-Backrest Drawings.

ASSEMBLY (THE FUN PART!)

1 Glue and clamp the two mating chair sides together, as shown in the drawing, right, checking for square.

2 After the glue dries, remove the clamps and excess glue. Chisel the remaining mortises in the back legs to their original $\frac{3}{8}$ depth. The mortises have been partially filled in by the tenon of the side rails (C).

3 Dry-clamp the front and back rails (D, E) to join the two chair sides together. Check the fit of pieces (F, G) between the back legs. (Part G should be positioned flush with the back edge of B.)

---

**LOWER BACKREST**

- $1\frac{1}{4}$"
- $\frac{1}{4}$" holes $1\frac{3}{8}$" deep
- $\frac{3}{8}$"
- $\frac{1}{4}$"
4 Loosen the clamps slightly. Using 
1/4" dowel centers (you'll need to 
buy two sets of dowel centers for 
this project) in the ends of F, cor-
rectly position F between the back 
legs. Once positioned, compress the 
back legs together to transfer the 
dowel center's mark into the back 
legs. Repeat this process for the 
lower backrest (G).

5 Remove the clamps, and drill 1/4" 
holes 1/2" deep at the marks on the 
back legs. A doweling jig helps 
ensure correct hole location.

6 Glue and insert the dowels, then 
glue and clamp the two chair sides 
withgether with the front and back 
rails (D, E), and upper-back rails (F, 
G). Check that the rails are square 
with the legs. Make sure that the 
chair is sitting on a perfectly flat 
surface while clamping.

7 Cut the corner braces (H and I) 
to size. (We found that a couple of 
corner braces didn't fit, as the chair 
was a bit out of square. To correct 
this, we cut the braces slightly larger, 
scribed the angles needed, then 
recut the pieces for an exact fit.)

8 Clamp the corner braces in position 
as shown in the Exploded-View 
Drawing. Then drill the pilot 
holes, and glue and screw the cor-
ner braces (H) in place. Follow the 
same procedure to mount the lower 
braces (I). Fasten H to I with a 
#8 x 1 1/2" wood screw.

NEXT, THE CUSHIONS

1 Cut the plywood seat (J) to size. 
Radius the front corners, and notch 
the back corners, as shown in the 
drawing, right. Bore 1/8" vent holes 
through the plywood. Sand or rout 
a slight round-over on the top and 
bottom edges of the plywood.

2 Cut two pieces of 1/4"-thick foam 
padding to the same size as the ply-
wood seat. Cover the seat (J) and 
foam with fabric.

3 Cut the backrest panel (K) and 
pine staple cleats (L) to size. Bevel 
the top end and radius the bottom 
end of each cleat as shown in the 
drawing, right.

4 Glue and clamp the pine cleats 
to the hardboard panel flush with 
the bottom and outside edges.

5 Cut two pieces of 1/4"-thick foam 
padding—the first to fit between 
the cleats and the second to overlap 
the cleats. Attach the fabric to the 
panel and cleat assembly as shown 
in the Seat-Back Drawing.

YOU'RE ALMOST THERE! 
FINISHING AND 
FINAL ASSEMBLY

1 Sand the entire chair assembly 
smooth, breaking any sharp edges 
with sandpaper. Finish the chair as 
desired. (We used several coats of 
polyurethane.)

2 After the finish is completely 
dry, turn the chair upside down on 
a clean work surface. Drill pilot 
holes and fasten the seat-cushion 
assembly to the corner braces.

3 To achieve the curve in the 
lower part of the backrest, make a 
small cut (1/8" long) in the fabric 
along the bottom edge of the uphol-
stered back, just in front of the 
hardboard. Then slip the top part 
of the upholstered back into the 
groove in the upper backrest. Press 
the hardboard back against the 
lower curved backrest (G) and 
clamp in position.

Insert a metal corner brace in the 
cut and in front of the hardboard as 
shown in the Seat-Back Drawing. 
Then screw the brace to the bottom 
side of G to secure the hardboard 
firmly against the backrest. (While 
we used the metal braces in the 
chairs we upholstered, an uphol-
sterer used brads to fasten and bend 
the hardboard to the curved-lower 
backrest, eliminating the need for a 
metal brace.)

BUYING GUIDE

• 1/4" Point-cutting ogee bit. Stock 
no. 9GT25583. $7.49 from Sears.

• Dowel-center set. Accurately 
locates matching dowel holes. Two 
centers each; 1/4", 3/8", 1/2", 1/2"-diams-
ters. Stock no. 9GT4184. $3.99 
per set from Sears.

Produced by Marlen Kemmet
Project Design: David Ashe, Blueprint 
Workshop Company
Photographs: Hopkins Associates
Illustrations: Bill Zahn; Randall Foshee
Just a decade ago, only a handful of U.S. woodworkers knew anything at all about Japanese waterstones—except for the obvious fact that you use water, not oil, to lubricate them. Then, about five years ago, woodworking suppliers made waterstones available in the U.S. on a big scale. The stones caught the fancy of woodworking pros and now are intriguing home woodworkers.

Why all the fuss about these man-made sharpening stones (like natural oilstones, high-quality natural waterstones are disappearing fast—some now cost as much as $2,000!). In part, the stones' popularity reflects Americans' increasing fascination with Japanese woodworking methods and tools: The Japanese traditionally have preferred softer, finer waterstones for sharpening the hard steel used in their tools.

But other factors, such as speed of sharpening and grit consistency, also are selling waterstones for sharpening any tool that demands a finely honed edge.

### WHAT WATERSTONES CAN OFFER YOU
Speed tops the list of waterstone attributes. All the woodworkers we talked to who use waterstones reported that they sharpen much faster than oilstones—“up to 10 times as fast,” according to enthusiast Leonard Lee, president of Lee Valley Tools, a Canadian supplier.

It’s not just that you spend less time getting a keen edge. Lee explains: “You can concentrate on controlling the exact shape of an edge. You make fewer mistakes.”

### WATERSTONE COMPARISON CHART

<table>
<thead>
<tr>
<th>GRADE</th>
<th>JAPANESE NAME</th>
<th>GRIT</th>
<th>USES</th>
<th>HINTS &amp; WARNINGS</th>
<th>AVERAGE COST*</th>
</tr>
</thead>
<tbody>
<tr>
<td>VERY COARSE</td>
<td>kongōsha-do</td>
<td>80x to 220x</td>
<td>Part of complete sharpening system; removes maximum amount of metal. Takes out nicks and breaks, leaves cleaner edge on damaged blades, sets the bevel.</td>
<td>The coarse scratches it leaves need to be removed with finer-grit stones. Constant splashing with water required to flush the metal particles.</td>
<td>$9–20</td>
</tr>
<tr>
<td>COARSE</td>
<td>are-to</td>
<td>700x, 800x</td>
<td>Removes small nicks, refines badly dulled edges, establishes bevels. Also helps clean edges scratched by VERY COARSE stones.</td>
<td>Raises burrs and leaves light scratches, which are removed by finer stones. Many bladed tools do not come presharpened: They have grind marks on the back and on the machine-ground basic bevel. COARSE and/or MEDIUM stones remove them.</td>
<td>$10</td>
</tr>
<tr>
<td>MEDIUM</td>
<td>naka-to</td>
<td>1000x, 1200x, 1500x</td>
<td>Sharpens knives, finishes carpentry tools, removes scratches caused by stones coarser than 1000x.</td>
<td>Raises burrs.</td>
<td>$10–20</td>
</tr>
<tr>
<td>FINISHING</td>
<td>awase-do</td>
<td>4000x, 6000x, 8000x</td>
<td>For fine honing, polishing, burr removal, etc. Use on both sides of blade to produce a fine edge.</td>
<td>Hones backs of blades until they are flat. Letting swarf (mud) accumulate and using less pressure as you finish honing will increase polishing action and produce mirror-bright finishes.</td>
<td>4000x: $15  6000x: $15  8000x: $25</td>
</tr>
<tr>
<td>COMBINATION</td>
<td>various combinations (see right)</td>
<td>100x/220x handles rough work; 180x/600x sharpens axes, drawknives, shears, sickles, etc.; 250x/1000x shapes and finishes blade for carpentry. With 1000x/6000x, the 1000x side takes out scratches, sharpens knives; 6000x side provides very good sharpness for finer work.</td>
<td>The 1000x/6000x is an excellent introductory waterstone. Along with a coarser stone, it makes a good basic sharpening system.</td>
<td>$5–25</td>
<td></td>
</tr>
</tbody>
</table>

*Varies by size; thicker deluxe stones cost more.
HAVE THE EDGE?
SURE SEEM TO THINK SO!

Lee Valley Tools stocks both oilstones and waterstones and has researched the topic of sharpening stones extensively—even examining stones and sharpened chisels under the electron microscope in a procedure called photomicroscopy.

Their research confirmed manufacturers' claims that waterstone technology is superior in controlling at least two critical factors that determine the quality of a stone—consistent size of the particles bound together in the stone, and fewer hidden impurities that can ruin even the best natural stones for sharpening. And you get all this at a price that's competitive with comparable oilstones.

SOUND TOO GOOD TO BE TRUE?
Make no mistake—there are some disadvantages. Because they wear faster, waterstones show chips, gouges, and unevenness more quickly than oilstones. Depending on how much you use them, they may wear out faster than oilstones, although they still last many years. (You'll probably drop and fracture one before you have to buy a new one.) Another potential frustration has been eliminated, since you now can obtain waterstones in a variety of unusual shapes and forms for sharpening curved edges, just as you can oilstones.

In the view of most woodworkers we talked to, the pros definitely outweigh the cons. A typical comment came from David Jordan, Editor of our parent publication, Better Homes and Gardens, and an avid woodworker. David has used waterstones for two years. "They cut fast, and you can really feel the bevel on the stone when you're sharpening," David says. "I'd pay five times as much for them. I still have my oilstones, but now I rarely use them."

What do the oilstone folks have to say about their new rivals from across the Pacific—competitors like Matsunaga Stone Co., Ltd., (King brand)? It's no surprise that they are taking note.

Bruce Anderson is product manager for Norton Pike Sharpening Stones, which markets both man-made and natural oilstones. "The Japanese do indeed have an excellent man-made stone. Their waterstones sharpen quickly and produce an edge comparable to that of our finest natural oilstones."

Watch for innovations from the oilstone manufacturers in the next few years. "We're working on a finer, harder man-made stone that you can use with oil, using technology that already exists in our industrial grinding wheels."

SOME NOTES FROM OUR SHOP
You never know till you try for yourself! We turned a couple of our editors loose in the shop one afternoon with Project Builder Jim Boelling and some very dull, nicked plane irons and chisels.

No doubt about it, the waterstones did the job faster than the oilstones we tried. We noticed cutting action immediately with the waterstones. The oilstones required several strokes before they really started to cut.

The oilstones we used had to be clamped in a vise during sharpening, which wasn't necessary with the waterstones (many come with their own wooden bases). Tip: The key to using most waterstones is to soak them for about 5 minutes before use; save time by storing larger stones in water.

We paid just over $50 for the 220-, 1,000-, and 6,000-grit waterstones we used (a combination stone would have saved us some money). Comparable grits in oilstones cost us about $40.

Written with Richard MacRae
Photograph: Hopkins Associates
Here we show off more examples of your handiwork, from the purely decorative to the decoratively functional: a minutely detailed clock, a painstakingly reproduced Victorian table, a whimsical child's door, and an intricately carved Polish eagle emblem. Once again, your projects demonstrate the many turns that woodworking takes.

A. All in good time
James Q. Buffenmyer, 65
Lombard, Ill.
Industrial model maker, retired
Jim set the hands of time in motion with this unique, interpolated, wall-hung timepiece. An inlaid mother of pearl dot on the moving dome marks the minutes while the inlay in the rotating star tracks the hours.

Think of the 12-pointed star as a large, glued-up sandwich of various woods. Jim first slices the wood at 45° on a table saw with a fine-tooth blade. Then he reslices the pieces at 60°. Finally, he reassembles the 1"-long, pointed pieces.

Making the star required a challenging 48 separate cuts, but as a former model maker for the Atomic Energy Commission, Jim had the experience. He's learned a few things, too. When working with small pieces, Jim uses the eraser end of a pencil to guide the tiny wood shapes through the table saw.

Jim mounted the dome on the minute-hand spindle of a battery-powered clock movement and used the hour-hand spindle to rotate the 8"-diameter star.

B. It all began with a jigsaw
Bill Kern, 40
Des Moines, Iowa
Photographer
Bill traces his woodworking activity back to a simple $9 jigsaw he bought to install a fireplace 8 years ago. That successful venture into the world of do-it-yourself piqued his interest to the point that the jigsaw now has been joined by a full complement of woodworking tools, many of which he used in crafting this 24"-high walnut Victorian table.

From a photograph in a furniture book, Bill drew his authentic design and working plans. To support the Italian marble top, he made a 2¾" apron from laminated walnut. The legs were rough-cut on a band saw, then routed to shape. Supporting spindles were lathe-turned, as was the large, globe-shaped finial in the center. Bill shaped the flutes on the sphere by hand with carving chisels.

"I spend a lot of time on the finish because I'm very particular about what I put on the wood," Bill says. To begin with, Bill uses Victorian-type aniline dyes rather than stain to even out the color. Then he progressively sands with up to 220-grit paper. Next, he applies a sanding sealer and goes over it with wet/dry 220 paper. Two coats of sprayed-on satin varnish get sanded in between with 320-grit.

Bill, you're a stickler for a fine finish—and it really shows. Great work!
C. Eagle eye for detail

James J. McMahon, 61
Easthampton, Mass.
Chief petty officer, USN, retired

Jim’s work reflects his travels. While in the Navy, he carved at sea what he recalled from many ports around the world. In Poland, the national eagle caught Jim’s eye, but he waited for retirement to carve it. Eight-five hours of carving went into this uniquely personal memento.

His 22”-wide by 24”-high Polish eagle took three types of wood. New England “pumpkin” pine forms the body and head. To lessen the chance for breakage, Jim used hard maple for the legs, feet, and claws. Ash fit the bill for a pliable wood to fashion into curved tail feathers. Jim soaked and steamed the ash, then bent it into shape. All parts were first carved, then glued up.

For a finish, Jim applied artist’s oils, dulled first with clear matte to knock down the sheen.

The carver says ready-made carving tools often don’t allow him to shape every nook and cranny his eye perceives. So, he sometimes forges his own—a fast-shaving 4”-wide chisel, for instance. Now, that’s complete talent!

D. A spline in time

Lynn Yapa, 40
Grass Valley, Ca.
Printer/part-time cabinetmaker

Lynn didn’t have to hover over a drafting board sketching out ideas for his child’s bedroom door. The design came naturally when a friend gave him the “Winnie the Pooh” stained glass.

He completed the entire door in two days, but a good deal of that time was taken up by the window molding. A square or circular molding would have made life easy, but the elliptical molding proved a tough cut to make. Lynn rabbed the door panel to accept the window. Then, he also rabbed the molding so that it would fit into the door and help hold the window in place.

In a departure from typical door construction techniques, Lynn used splines and mortises to join the redwood stiles and rails of the frame.

“The spline gives you more gluing surface so the door is stronger than with dowel construction,” he explains. Lynn cut the 5½”-long x 3¾”-deep mortises with a plunge router to control the cut. He finished the door with lacquer.

To submit your projects...

Send a 35-mm color slide, with the project as the focal point and a simple background—no people. Include a capsule description—materials, special joinery, finish, and dimensions, for example. WOOD will pay $25 for published projects. Slides cannot be returned unless you enclose a self-addressed, stamped envelope.

Project Showcase
Better Homes & Gardens®
WOOD magazine
Locust at 17th
Des Moines, IA 50336
If you think the only thing you can do with an air compressor is inflate tires, think again. Compressors make many shop chores easier, and accessories can replace conventional power tools. But they don’t come cheap, and noise and moisture can pose problems.

Until we set up the workshop at WOOD, most of us on the staff thought of an air compressor as a nice but expensive luxury. Now, we use it consistently for blowing sawdust off workbenches, machinery, and ourselves, as well as for spraying finishes. Our compressor has become a handy, efficient, and very nearly indispensable tool.

While we are just experimenting with other air-powered tools, at least one woodworker we’ve come to know quite well—industrial arts professor and cabinetmaker Roger Cliffe—finds pneumatic tools essential in his custom cabinet shop. Before you rush out and buy an air compressor, though, there’s plenty to consider to ensure that you make the best choice.

HOW AIR COMPRESSORS WORK

Basically, an air compressor uses an electric motor or gasoline combustion engine to power a pump (for safety’s sake, gas engines shouldn’t be used in the shop). The pump itself, similar to a small engine, has a piston, connecting rod, crankshaft, flywheel, head, and valves.

While running, the pump draws air in through a thin metal valve in the head and compresses it with a piston.
Compressed air exits the pump through another valve for storage in the receiver, or tank. This pumping process continues until enough pressure builds up to trip the sensitive pressure switch, which then shuts off the power source. As the air is used up and the supply is depleted, pressure drops and the switch restarts the pump for another cycle.

An air compressor also requires a regulator, mounted on the tank, to control the pressure at which air is delivered to the tool you’re using. You can adjust the regulator for more or less pressure as required. A safety valve, also tank-mounted, will open and relieve pressure should a malfunction fail to shut off the compressor motor. All air compressors must have this valve.

**Compressor options**

If you added another cylinder with a piston to the compressor pump just described, you would have a twin-cylinder compressor. It pumps and compresses air twice as fast as one with a single cylinder, but can run on the same size motor. Of course, it also costs more.

**Two-stage** compressors add another pumping chamber to the process already described. These units take in air and compress it in one pumping cycle, or stage, then further compress it in a second stage to a higher pressure. For practical purposes, a two-stage compressor delivers air at a higher pressure than a single-stage unit; the air supply lasts longer, and the motor won’t run as often. Most commercial and industrial compressors are two-stage units.

**Direct-drive** or “oil-less” compressors operate similarly to a single-stage model, but the motor directly drives the pump without benefit of flywheel and pulley. Because of this arrangement, they have less power and capacity.

**WHAT YOU CAN DO WITH A COMPRESSOR**

**Spray surface finishes**

Jim Boelling, our project builder, has switched completely to spraying for surface finishes. Why? “Until now, finishing has always been a real chore. Using the compressor to spray on a finish is not only fast and easy, it gives a super result because you can control the amount of material being applied and the pattern,” Jim says.

That’s because an air compressor-powered spray gun emits the finishing material in an extremely fine mist that lays down exceptionally smoothly. Preparing a surface for finishing also becomes a snap with air power. You simply blow the surface clean.

**Power pneumatic tools**

Nail guns, glue guns, chisels, sanders, screwdrivers, saws, and even routers are available for compressors nowadays. Roger Cliffe, in his cabinet work, uses two air-powered nailers that shoot fasteners from ¾” to 2½” long for 90 percent of his fastening. Together, the nailers cost more than $700. “They’re fast, they have enough impact that you don’t have to drill pilot holes, and they’re long-lived,” he notes. “You do have to oil their seals regularly with a special lubricant or they harden.”

According to Cliffe, air tools are insensitive to abuse and dirt—except in the air line itself—and they don’t often break down. “When they do, they’re inexpensive to fix.”
Air tools generally weigh less than conventional electric tools, since they use a small, turbine-type motor or an air cylinder rather than the metal windings and housing of an electric motor. They won’t get hot after prolonged use, or lose power in tough work. However, air tools cost more than a comparable electric tool, and many of them require a large-output commercial compressor.

HOW TO CHOOSE AN AIR COMPRESSOR

Shop for capacity
Home centers, large hardware stores, major retail department stores, and mail-order woodworking tool suppliers all sell air compressors. So do local suppliers to the building and construction industry. You can find businesses specializing in their sales and service in the Yellow Pages under “compressors.”

Wherever you decide to buy, shop for capacity. Know what air tools you want to use and their compressed-air requirements, then match your needs to a compressor with that capability. Delivery capacity simply means the amount of compressed air the unit will provide, the pressure at which the air gets delivered, and how long that air supply will last during use.

Understand air delivery requirements for different uses
“In choosing an air compressor,” advises Nick Antoncich of Campbell Hausfeld, a manufacturer of air compressors for home use, “have in mind what you want to do with it. Each tool requires a certain air delivery rate stated in cubic feet of air per minute (c.f.m.) at pressures ranging from 40 to 90 pounds per square inch (p.s.i.). Look for an air compressor that fits your tools’ needs, in both c.f.m. and p.s.i.”

If, for instance, you plan only on doing some spraying and pneumatic fastening, you can get by with a much smaller compressor than if you want to do much sanding, since sanders require a greater amount of air. With too small a compressor, you’ll always be playing “catch-up”—waiting for it to build up enough air for you to continue working.

Many manufacturers place a chart decal right on their compressors that lists which air tools the compressor will handle.

Horsepower doesn’t always tell the story
While home-type electric air compressors (normally 2 hp. and under) carry a motor horsepower rating, the size of the motor isn’t as important as the amount of air it will deliver and at what pressure. Because of differences in pump design, two compressors of equal horsepower made by different manufacturers may not have the same air-delivery performance. (Refer to chart, above.)

Remember, too, that motors 2 hp. and under normally run on 115 volts; those over 2 hp. (and some 2 hp. models) require 230-volt operation. Your shop wiring could limit your compressor choices.

Air storage—think big!
Henry P. Van Ormer of Compair Kellogg, maker of Kellogg-American air compressors, suggests that it’s also important to buy air-storage capacity. “The homeowner is looking at a choice of 10-, 12-, 20-, 30-gal., and even larger tanks. I’d recommend the largest you can afford, since the cheapest thing you can buy when you’re talking air compressors is storage.” We’ve found that a 20-gal. tank proves more than adequate, at least for a portable unit.

Stationary compressors, which you can’t easily move around the shop, normally are equipped with larger (and thus heavier) tanks. They also have larger motors—usually 3 hp. or more.

While your storage capacity options in a portable compressor may be limited at the top end by tank weight, portables get the nod for versatility. If you’re going to use a compressor both in and out of the shop, you won’t want a heavier tank than you can push or pull with little effort.

Whatever size tank you choose, remember not all like-sized tanks are created equal, however. Better-quality tanks carry a plate that says they meet the code set by the American Society of Mechanical Engineers (ASME). And tanks should have a drain valve so you can empty them of condensation.

WHAT AIR POWER COSTS
Simply put, the more cubic feet of air per minute that a compressor can deliver at a given p.s.i., the more it will cost. You can buy a 1/2 hp. air compressor suitable for spray finishing, non-production fastening, and shop cleaning for under $200. For one that will handle about any air power chore in the home workshop, you’ll pay up to $600. And commercial, two-stage units that can run pneumatic routers and other high-power air tools start around $1,000.

Used units occasionally turn up in the classifieds. You can save big this way, buying larger commercial units originally owned by service stations, farms, and auto body shops.

MAINTENANCE GUIDELINES
Compared to many other tools, standard air compressors are reliable and trouble free, if you maintain them. (Oil-less types are totally maintenance free.) This means checking the oil level in the sight glass and cleaning or chang-
Air tools, a woodworking option. Shown above: 1) Bostitch brad tacker, requires 4.7 c.f.m. at 80 p.s.i. for 100 nails per minute, $43.95; 2) Binks production spray gun, 6.5 c.f.m. at 40 p.s.i., $70; 3) Allied Pneumatic 1/4" air drill, 4 c.f.m. at 90 p.s.i., $60; 4) Rockwell industrial router, a hungry 50 c.f.m. at 90 p.s.i., $75; 5) Powerdyne orbital sander, 6 c.f.m. at 60 p.s.i., $30; 6) Speedaire blower, all pressures, $5.

ing the air intake filter. "When you don't, the suction and discharge valves will clog, burn, and have to be replaced," says Russ Morine, a repair specialist at AirMac, a compressor sales and service company in Des Moines.

Roger Cliffe looks late air compressors as if they were cars: "You feed them oil and change filters, then run them until they're due again."

Both Morine and Cliffe agree that moisture which condenses out of compressed air can be a problem. It can ruin a sprayed-on finish or rust a tank. They recommend draining air lines and tank both before and after use, especially in high humidity. This eliminates oil in the lines, too.

Short air lines with moisture traps at the end of runs help a lot, too, because the hot compressed air won't have as much time to cool off and let the water vapor condense out. When water does collect, it's easily emptied.

WHAT ABOUT NOISE AND HEAT?
An air compressor's on-again, off-again recycling can be bothersome to others, and to you. Cliffe suggests situating a compressor outside the shop, if at all possible, to reduce the noise level. This also keeps a unit sawdust free.

Morine solves the noise problem by retrofitting even a home compressor with an industrial-type inlet filter/silencer. The cost: about $30.

Besides creating noise, compressors create heat. In normal operation they may reach over 200 degrees F. Insulated heat shields, found on many compressors, make a sensible feature. Compressors without shields should be placed to reduce the possibility of burns or damage from heat.

AIR COMPRESSOR CAUTIONS
- Wear eye protection when cleaning with compressed air. Harmless wood chips can become sharp.
- A compressor constantly running close by could damage hearing, so wear ear plugs or muffs.
- Spray in a well-ventilated area. Keep overspray off surfaces by setting aside a place for finishing.
- Unplug the motor before any maintenance. A drop in pressure could suddenly trigger the unit.

For more information on air compressors for the home workshop, write the following major manufacturers:
American I.M.C., P.O. Box 7582, Charlotte, NC 28217
Atlas Copco Standard Pneumatic, 4070 W. 150th, Cleveland, OH 44135
W.R. Brown, 2701 N. Normandy Ave., Chicago, IL 60635
Campbell Hausfeld, 100 Production Dr., Harrison, OH 45030
Champion Pneumatic Machinery Co., 1301 N. Euclid, Princeton, IL 61565
Dayton Electric Manufacturing Co., 5996 W. Howard St., Chicago, IL 60648
Ingersoll-Rand Co., P.O. Box 241154, Charlotte, NC 28224
Kallog-American Inc., P.O. Box 159, Rt. 125, Kingston, NH 03848-0159
Sanborn Manufacturing Co., P.O. Box 206, Springfield, MN 56087
Sears Roebuck & Co., Sears Tower, Chicago, IL 60606
Sofragnel Uniflex Inc., 2520 Electronic Lane, Suite 804, Dallas, TX 75220
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Written with Gregory C. Erickson
Photographs: Bill Kern; Hopkins Associates: Perry Struse
Illustration: Jim Stevenson
5 STRATEGIES TO MAKE

Ready to set up a shop of your own—if you could find the space? Or maybe you have a small shop that seems to be getting smaller as your woodworking expands. Whatever situation you find yourself in, here’s help. We mapped out three typical small-space shops, then came up with surefire strategies to beat the space squeeze.

1. CHOOSE YOUR TOOLS THOUGHTFULLY
Which tools do you have to have? Admittedly, in tight quarters your options are limited. Thousands of craftsmen in such situations turn to a multi-purpose tool that saws, drills, bores, turns, and sands.

The other approach is task-oriented tools. Here’s where you must focus and select the stationary power tools you really need to do the work you want to do. Perhaps a table saw, or radial arm, and some portable power and hand tools will fill the bill. But most of us either have—or would like to have—a greater selection. Our model shop layouts on the following spread indicate how you can fit them in.

How do you choose? Look at what the tool can do for you. A band saw, for instance, cuts thicker stock faster and makes smoother curves than a scroll saw. A scroll saw cuts a tighter curve, can remove the center from a pattern, and the blades cost less.

Have you ever considered what you can do with a power miterbox? This tool solves the problem of how to cut off long stock in short spaces where the table saw would be hindered. A radial arm does that, too, but it takes up more than its share of space in a shop that already has a table saw. The power miterbox, on the other hand, is space efficient.

No matter which tools you elect to have in your shop, keep their quality in mind. You can’t do first-rate work with second-rate tools, or those not designed for the job.

2. MAKE YOUR EQUIPMENT DO DOUBLE DUTY
A workbench acts as the hub of any workshop. For small spaces, select a workbench 4’ to 5’ long and 24” wide. If you make it the same height as your table saw top, it can also support sheet goods when ripping. In our drawing, top right, we added storage for portable power tools and bins for supplies below a table-type bench.

A good-quality 8” or 9” table saw, properly adjusted and fitted with a sharp carbide-tipped blade, can cut accurately enough to do much jointer work. For an extension, equip it with a plastic laminate-covered plywood router table. Also consider making a lift-off top, as shown, top far right, and you have extra bench space.

Too cramped for a table saw? Opt for a radial arm against a wall, as in our long, narrow shop plan. With a little cabinet work, you can transform the space it occupies into a real work center, with bench and storage above and below (see the drawing, above right).
The drill press, considered essential in many shops, easily fits into a corner. If you have a floor model, fit it with a plywood table and use an accessory drum sander for maximum versatility.

Ladders can do double duty, too. Attach a table to the bed, mount a sanding disk to the head stock, and you'll have a two-in-one tool. You can even call on the lathe stand for needed support when cutting long stock on the miterbox, as in our basement shop plan on the following page, by slipping in a "stool" under the stock to gain height. Our close-up view, above right, shows the customized lathe.

**A note about lighting:** Use 4' or 8' 80-watt fluorescent fixtures or 150-watt bulbs on a separate lighting circuit. Check for proper intensity by setting a block of wood at different places around the shop—if it doesn't cast a shadow, your lighting is bright enough. Paint, too, brightens a small shop situation. Paint all walls, and even the ceiling where possible, stark white. It makes the room seem larger.

3 **PLAN YOUR WORK IN STAGES**

In small shops you can't afford clutter. Organize your work into stages, or steps, and cleanup after each session so there's enough room to get each step completed. Here's how it's done:

**Step 1.** Rip and cut off stock into manageable parts, so you won't have to handle large pieces in the middle of the project.

**Step 2.** Complete cuts, joinery, and assembly necessary for all sub-assemblies.

Continued
MAKE SMALL SHOPS WORK BIG!

Step 3. Use your assembly bench to join the sub-assemblies.
Step 4. Apply finish in the assembly area, but use only those finishes in the shop that don’t require a dust-free atmosphere. Spray outside or in a separate area.

4 KEEP MATERIAL NEATLY AT HAND
Boards and other long stock such as molding should nestle against the ceiling or along a wall. You can make a simple overhead rack of 2 x 4s, then hang it from the rafters. On the wall, use shelf brackets.
You have two ways to go with 4 x 8’ plywood panels. To take up the least amount of floor space, stand them on end, if you have enough head room. This works well in a garage.
You can also store plywood on edge behind a partition, but this requires one end of the space adjacent to a doorway for access, such as in our basement shop plan.
Another alternative is the fold-down sheet-goods rack shown in the drawing, right; it allows you to remove panels from the front. This is a real space-saver. It’s used in our long, narrow shop layout.

Then, there’s always the garage if you lack space. Use a portable circular saw to rip sheets before moving them to your shop.

5 GO FOR EFFICIENT SHOP LAYOUT
Just as in your kitchen, getting things done efficiently depends largely on shop layout. Where you position your equipment determines how workable your shop will be, and how comfortable it will be.
Situate your stationary power tools according to your working patterns, and the shape of the space. Do allow for certain minimum passageways and areas. For guidelines, we figure on 18” to 24” walkways between benches and machinery or between stationary tools. To work between benches and equipment, rather than just walk, you need 30” to 36”.
At the bottom of this page and on the next page are workable, efficient shops in three typical configurations—one of which may be just like the space you have or want to create.

MAKE YOUR STRATEGIES PAY OFF
By combining your tools with an efficient plan, you can make your small space shop work big, as the three examples show. If you’re fortunate enough to already have a big shop, you’ll find that adopting some of our ideas can help you, too.
Have an idea of your own on how to make small space work better? Jot it down and send it to us! Include a snapshot or sketch to help explain, if you like. We’ll pay you $25 if we publish your idea. Sorry, your material cannot be returned unless you enclose a self-addressed, stamped envelope. Send your ideas to: Small-Space Shop Strategies, Better Homes & Gardens® WOOD Magazine, Locust at 17th, Des Moines, IA 50336.

• TYPICAL 10 x 12’ BASEMENT SHOP
A table saw centered in the room at a diagonal accommodates long ripping chores. If you cap the saw with a lift-off table, you add a centralized assembly bench.
Note how the power miterbox nestles on the end of the L-shaped workbench to leave plenty of room for cutoff. You can even use a “stool” on the lathe bed for extra support of long pieces. Tucked out of the way under the bench next to the miterbox is a trash bin. Above and below the bench there’s storage for tools and supplies. For ripping support, the bench is the same height as the table saw.
Across the room, the drill press and band saw are set diagonally to allow clearance for workpieces.
THE 11×22' GARAGE SHOP
This space could be in a single-car garage or in one-half of a double garage. In either case, we've assumed you have to share space with a vehicle. Here mobility plays a prominent role.
Casters on the table saw, band saw, and the assembly bench allow you to easily push them out of the way. Since concrete floors tend to be uneven, use heavy, wide casters equipped with locking devices.
At the back of the garage, ahead of the parking area, you'll see the permanent part of the shop. An electrical cord with a rubber-clad outlet hangs from the rafters as a reminder of where to park. It nudges the windshield when it's time to stop, and provides electricity to the assembly bench.
We kept the height of the assembly bench the same as the table saw for panel support while ripping. When you're not using the bench, it tucks away beneath the other.

THE 8×16' LONG, NARROW SHOP
Because this type of space lacks the all-around clearance a table saw needs, we chose a radial arm and tucked it against a wall in its own work center. Now, workpieces run the length of the room for cutoff; the blade changes direction for rip and miter operations.
Convenient to the saw, the workbench is just a few steps across the room. Tools hang over it and other tools and supplies go below.
The lathe fits nicely in a corner at one end of the bench. Sheets go on edge in a fold-down rack. 

Illustrations: Jim Stevenson; Bill Zaun
The Old Lamplighter
REDWOOD LANTERN

An exterior light fixture must not only look distinctive—it also has to withstand the elements. We think this appealing fixture of redwood, brass, and acrylic fits the bill on both counts. Build one or a pair for your entry or patio.

BUILDING THE LANTERN CARCASS
1 Rip, then crosscut the stiles (A), rails (B, C), and mounting-frame members (D, E) to the sizes listed in the Bill of Materials. Letter each piece for future ease in assembling.

2 With a table saw and dado blade or a table-mounted router fitted

2 Bright Ideas
Nifty Light Cover-Ups from Our Shop

3-tier WALNUT CEILING FIXTURE

You won't find another lighting project that stacks up as handsomely as this one does. It's simply three mitered walnut frames joined to white acrylic and a mounting frame.
with a ¾" rabbeting bit, cut ¾" rabbets ¼" deep along one edge of the stiles (A) and rails (B, C). Turn the rails (B, C) over, and cut the same-sized rabbets on both ends. Test-fit the rails and stiles together, adjust the rabbet depth if necessary so the faces are flush. (We cut the rabbets along the edges of the stiles and rails on a table saw fitted with a dado blade and an auxiliary wood fence. We then switched to a miter gauge when rabbeting the ends of the rails.)

5 Glue and clamp the front and side frames together, as shown in the Band-Clamping Drawing, left, using waxed paper to keep the glue from sticking to the band clamps. [We used the mounting frame (D-E) as a spacer; it's not glued in place.]

**CONSTRUCTING THE ROOF**

*Note:* You've probably already learned that cutting compound angles can be confusing. To guarantee a tight fit, read the instructions and study the drawings carefully, then make test cuts in scrap before sawing into your redwood stock.

1 Lay out and mark the angles and notches on the redwood roof supports (F, G) as dimensioned in the drawing on the next page, then cut F and G to shape, as shown.

*Continued on next page*

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**BUILDING THE WALNUT FRAMES**

*Note:* We designed this fixture to cover up a round fluorescent light fixture. Measure your existing fixture and adapt our dimensions to fit your light if necessary.

1 Resaw ¾" stock from ¾" walnut stock. Rip 12 frame members (A) to width and crosscut them to 17½" long from the ¾" stock. Miter-cut all frame members, as shown in the Frame-Member Drawing, to a finished length of 16½". (We cut scrap material first to ensure an accurate 45° miter.)

2 Using miter clamps as shown in the photo, right, glue and clamp the three walnut-frame assemblies together. Sand the mitered joints smooth and rout a ¼" round-over on all outside edges.

3 Finish-sand the three frame assemblies and finish with several coats of polyurethane.

*Note:* If you plan to use the cover-up over an incandescent or other high-heat generating light, cut ventilation slots. Start by marking their position, then drill ¼" holes at each end of the marked slots. Use a router with a ¼" straight bit to rout the acrylic between the drilled holes. You'll also need at least 1" clearance between the incandescent bulb and the bottom acrylic panel (C). To meet the 1" requirement, cut the acrylic panels (B) wider.

**ASSEMBLING THE COVER-UP**

1 Using a table saw fitted with a sharp blade, preferably carbide, cut the acrylic side panels (B) to size plus ¾" to ½" in width and length. With a sanding block, hand-sand

*Continued on page 62*
2 Glue F and G together, then glue and nail this assembly to the carcass with 1" brads. (We dulled the points of our brads to prevent them from splitting the grain when driven into place.)

3 Rip and crosscut enough stock to glue up the front roof section (H), then edge-join the pieces, and trim H to 9% x 8%". Bevel-cut the bottom of H at 23°, then bevel-cut the top at 34°, as shown in the Roof Parts Drawing.

4 Mark the location of the two required cuts on both sides of H. Using the saw setup shown, right, position the miter gauge in the right-hand slot. With the already-cut end bevels facing down, cut one side of H.

Move the miter gauge to the left-hand slot and, with the end bevels facing up, cut the other side of H as indicated.

5 To form the side roof sections (I, J), rip, then crosscut a piece of redwood stock to 7 x 15". Using the saw setup shown in the drawing, far right, bevel-cut one I and one J.

6 Test-fit the roof assembly (H-I-J) over the lantern carcass and make adjustment cuts as necessary. Spread glue on the surfaces to be joined and hold the roof assembly together with masking tape until the glue dries. (Masking tape works well when clamping irregular surfaces and other clamps just won’t do. Use wide masking tape and make sure the two surfaces to be taped are clean for good adhesion.)

7 Drill pilot holes through the roof assembly, then use 4d finishing nails and glue to attach the roof assembly to the carcass. (When drilling pilot holes for nails, cut the head off of the size nail you intend to use. Tighten the nail in the
### Bill of Materials

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<td>J</td>
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*Some parts are cut larger initially, then trimmed to finished size. Please read the instructions before cutting.

**Supplies:** ⅝" bronze brazing rod (4 pieces 9" long, 2 pieces 8" long, 4 pieces 6" long) from your local auto parts store or welding shop, ⅛"x⅛" roundhead wood screws, 1" brads, ⅛" brads, glazier's push points, wood filler, finish.

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**CUTTING THE FRONT SECTION OF THE ROOF**

1. **FIRST CUT**
   - Miter gauge set at 23°
   - Marked cutlines
   - Auxiliary wood fence

2. **SECOND CUT**
   - Miter gauge hold-down clamp
   - Set blade at 30°
   - Marked cutline

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**FINISHING TOUCHES AND INSTALLATION**

1. Set all nails and fill the holes. Sand the completed lantern. If you want to prevent the redwood from graying with age, apply an exterior finish or clear waterproofing.

2. Cut the bronze brazing rods to size, as indicated in the supplies list. With a locking-grip pliers or a metal vise, bend ¾" of each rod end at a 90° angle. Using the bent rods as guides, mark the location of the mounting holes on the carcass (see the Exploded-View Drawing for positioning the rods). With a drill and an ⅛" bit, drill the mounting holes ½" deep. Put a drop of epoxy in each hole and install the rods.

3. Using the table saw and a sharp blade, preferably carbide tipped, cut the ⅜"-acrylic panels (K, L) to size. Install glazier's push points to hold the acrylic panels in the rabbits.

4. Clamp the mounting frame (D-E) inside the lantern. Drill ⅛" pilot holes through the lantern and into the mounting frame. Remove the mounting frame for the lantern. Drill ⅛" pilot holes through the frame, and attach it to the siding over the light fixture. Now, fasten the lantern to the mounting frame, switch on the lights, and step back and admire your work.

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Project Design: David Ashe, Workshop Blueprint Co.
Photographs: Hopkins Associates
Illustrations: Bill Zaun, Randall Foshee
Walnut Ceiling Fixture

Continued from page 59

the panels to the finished size as indicated in the Bill of Materials. (Acrylic chips slightly when sawn, and a power sander tends to melt the edges. That's why we cut the panels slightly oversized and used a sanding block.)

2 Referring to the Acrylic-Side Drawing as a guide, mark the location of the screw holes that you will use to fasten the acrylic to the walnut frames. (We used a grease pencil so we wouldn't mar or stain the acrylic.) With a sharp brad-point bit, drill the ¼" holes.

3 From ¼" scrap, cut eight 1 x 13" spacers. Lay one of the frame assemblies on a flat surface, and set four spacers on top of it. Stack the
additional frames and spacers atop the first, and clamp the entire assembly together as shown in the photo, far left.

One at a time, position and screw the side panels (B) to the frames as shown in the photo. Position the acrylic panels to leave \( \frac{3}{8} \)" of the bottom frame exposed to accommodate the bottom panel (C), as shown in the Acrylic-Side Drawing.

4 Cut the bottom acrylic panel (C) slightly oversized and hand-sand the edges for a snug fit inside the bottom frame. Once it fits correctly, use masking tape to secure it in place. Tape the entire length of all four edges of the bottom panel to the bottom frame. This will hold the pieces tightly together for fusing with the acrylic solvent in the next step and prevent the solvent from seeping through.

5 To bond the bottom panel in place, apply acrylic solvent with a syringe to the mating edges, as shown in the photo, left. (The solvent temporarily melts the acrylic, fusing the adjoining edges. Beware of drips, which create small depressions in the acrylic. While we used the solvent, epoxy would also work.) Wait about 15 minutes before removing the tape from the acrylic panel and walnut frame.

6 Rip and miter-cut the mounting-frame members (D) to size as listed in the Bill of Materials. Glue and clamp the mounting frame together, checking for square. (We again used the four miter clamps to hold the frame pieces together.)

7 Sand and, if necessary, plane the mounting-frame joints flush and check for a good fit inside the cover-up. (The mounting frame should fit inside the cover-up without forcing the acrylic apart. Our mounting frame was a bit too large to fit inside the cover-up. We set the jointer for a very shallow cut and jointed the frame to the correct size.) Mark and drill the holes for attaching the cover-up to the mounting frame; then mark and drill the holes for fastening the mounting frame to the ceiling.

8 Using screws (if you can hit ceiling joists) or toggle bolts (for drywall), fasten the mounting frame to the ceiling. Attach the cover-up to the mounting frame with \( \#4 \times \frac{1}{8} \)" roundhead wood screws. (The walnut and acrylic cover-up can be easily taken off the mounting frame by loosening both \( \#4 \) screws to replace light bulbs or for cleaning.) Stand back, flip the switch, and enjoy a revitalized light that didn't cost an arm and a leg.

Project Design: James Downing
Photographs: Hopkins Associates
Illustrations: Bill Zaur; Randall Foshee
Vertical-table drum sander

Simplify sanding of concave surfaces with our variable-speed multi-machine and this detachable sanding table and drum. Mounted to the cabinet, the sanding table provides a firm base for sanding and supports the piece being sanded square (90°) with the sanding drum.

1. Lay out the 16"-diameter circle on a piece of particleboard to form the sanding table (A). Using the same centerpoint, mark a 3" diameter hole in the center of the circle. Cut along both marks to shape the table. Sand cut edges smooth.

2. Apply plastic laminate to both faces of A. Trim the edges of the laminate flush. Drill a hole through to the center hole on both sides; then trim the laminate flush.

3. Cut two pieces of ¼" particleboard to 8 x 11". Glue and clamp them together with the edges flush. Using the dimensions in the Exploded-View Drawing, lay out and mark the shape of the supports (B). (The radiuses match those of A, and the 12° bevels match those of the cabinet sides.) Cut B to shape.

4. Clamp the support (B) onto the sanding table. Drill pilot holes, and fasten the two together with four #8 x 2" wood screws.

5. Drill two ½" holes through the cabinet side, where dimensioned in the drawing.

6. Mount the sanding drum onto the right-hand threaded end of the shaft. Center the sanding table (A, B) over the sanding drum. From the inside of the cabinet, transfer the location of the two ½" holes already drilled in the cabinet side onto the sanding table. Drill the two ½" holes through the table.

7. Mask the laminate and paint the exposed particleboard to match the cabinet. Let the paint dry. Fasten the sanding table to the cabinet with two 5/8 x 3" flathead machine screws, and two ⅛" T-nuts on the inside of the cabinet.

Wet-sharpening wheel

This nifty attachment allows you to put a sharp edge on chisels, plane irons, and other cutting tools quickly—without fear of ruining the temper of the steel. Just set your multi-machine on its lowest speed, and add water to the plastic trough to keep the steel cool while the abrasive wheel is doing its work.

1. Using the Side-View Drawing as a guide, mark the shape of the main support (A). Cut the support to shape. Drill the two ½" holes for the tool rest supports (C) and drill the 1" hole for the arbor shaft. Cut the two supports (B) to size and glue and clamp them to the back side of the main support.

2. To make the tool rests (C), start by bevel-ripping a piece of ¼" pine 2⅛" wide and 10" long. Round-over the opposite edges, and cut the two C's to length. Drill a ¼" hole lengthwise through each. The tool rests allow you to stand in front of the cabinet and sharpen with the wheel turning towards you or stand behind it and sharpen with the wheel turning away from you.

3. Using a tin snips, cut a piece of sheet metal (D) to the size listed in the Bill of Materials. Fold over the top and bottom edges as shown in the drawings. Bend the bottom to hold and support the water tray.

4. Paint parts A, B, and C. Fasten the tool rests and sheet metal (D) to the main support, and slip this assembly (A-B-C-D) over the arbor shaft. Drill a ¼" hole down through each B and the top of the cabinet. Attach the assembly to the cabinet with two ⅛" x 1 1/2" machine screws and ⅛" T-nuts.

5. Fasten the sharpening wheel to the arbor shaft, and attach the water tray to the main support. We epoxied a spacer strip (E) to the water tray to hold it level. Fill the tray, soak the stone, and you're ready to sharpen.

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**Bill of Materials**

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Supplies: 2-¼ x 1½" roundhead machine screws, 2-¼" T-nuts, 2-⅛" wing nuts, 2-⅛" lock washers, 4-⅛" flat washers, 3-⅛" x ⅛" sheet metal screws, 2-⅛" x 3½" roundhead machine screws, 1" wide x 6" diameter sharpening wheel (fine grit)
THAT ADD VERSATILITY

Bill of Materials

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Supplies: plastic laminate, paint, 4 - 8 x 2" flathead wood screws, 2 - 3/8 x 3" flathead machine screws, contact cement

BUYING GUIDE
- Sanding drum. 2-1/4" diameter, 3" face, for 1/2-20 threaded ends. Sears catalog no. 9GT25246, $9.49. Sanding sleeves: 9GT25222, fine grit; 9GT25222, medium grit; 9GT25223, coarse grit; $1.29 each from Sears.

BUYING GUIDE
- Water tray. Our tray is a Rubbermaid "Instant Drawer Organizer," item no. 2915. We bought it at a grocery store; it's usually available wherever Rubbermaid products are sold.

Continued on page 80
What do woodworkers and kids have in common? They’re both crazy about building things with wood. And you know something else? With your guidance and encouragement, a youngster can develop skills—and a very special relationship with you—that can last a lifetime.

Jim Woodruff, a retired Air Force colonel living in Arvada, Colo., firmly believes in working with kids, as his grandfather did. “If it hadn’t been for his interest in a darn ornery kid—letting me work in the shop—I could have ended up in trouble,” Jim says. “I was orphaned and hated the world until he took me in and built up my confidence.”

Because his service career kept him moving around, Jim’s own kids grew up before he could set up a permanent shop. But now, Jim’s six grandchildren often congregate in his double-garage workshop. They range in age from 4 to 10, and he’s sold on the idea.

Other child-oriented woodworkers we talked to are just as positive as Jim regarding children in the shop. They told us about the special approaches they use, and the benefits that result.

WHAT WOODWORKING TEACHES A CHILD

Besides the confidence that comes from showing a youngster how to use his hands as well as his head, there are other advantages: nurturing their creativity, a sense of accomplishment, patience, and persistence.

“They find a whole new direction,” comments Chicagoan Joe Veracka, a national demonstrator for Black & Decker’s woodworking tools. Joe has guided kids through projects for the last dozen years. “It changes their lives when they end up being excellent craftpersons instead of klutzes.”

Mike McPherson, who works in Des Moines’ public schools, has a woodworking business as a family sideline. Mike, his wife, his dad, and his two pre-school daughters often spend evenings and weekends in the shop working on their “Home Tweet Home” wren houses. “Our girls see us having fun together as a family,” Mike says.

In Tempe, Ariz., Paul McClure has often seen his own and his foster kids’ reaction to an accomplishment in the shop. “When they can say ‘I did it myself’ their pride just bursts forth.”

WHEN TO START YOUNGSTERS IN THE SHOP

Ages 6 through 12 seem the prime time to introduce kids to the workshop, yet Jim Woodruff’s most enthusiastic little woodworker is his 3-year-old grandson, Chad. And Mike McPherson’s daughters Evie, 4½, and Christie, 3, have their own workbench amidst the activity where they sand wood and pound nails.

Teens present more of a challenge, mainly because they have so many outside interests. Still, a woodworking interest fostered earlier probably will continue. Paul McClure’s children—son Sean, 13, daughters Angiie, 14, and Tess, 17—regularly turn out projects which include elaborate chessboards and marquetry from exotic woods.

DECIDING WHICH TOOLS KIDS CAN USE

The tools kids can use depends on the individual child’s maturity level. Preschoolers may not need tools at all—water-soluble glue, wood scraps, and sandpaper will be fine. Starting about age 7, they can usually manage some hand tools, such as hammers, pliers, hand planes, and a small twist drill.

Jim Woodruff hesitates to let youngsters this age work with sharp tools; he prefers to make necessary cuts himself. At age 10 or 11 he introduces them to the portable jigsaw, which he feels is about the safest.

Graduating kids to power tools requires some individualized judgment. Paul McClure looks at the child’s strength, height, and maturity. His son used the lathe at 8 years, but couldn’t use a router until he was age 13. Joe Veracka has found that kids from 12 to 15 might be old enough for the
Above—Paul McClure, Tempe, Ariz.: "If my kids finish a project, I pay for materials. If not, they pay."

Left—Mike McPherson, Des Moines, Ia.: "We have a little work area just for the girls where they can watch us and we watch them."

Right—Jim Woodruff, Arvada, Colo.: "I always answer a question with a question—they learn to think."

radial-arm saw, band saw, or drill press. "Some kids at 10 are more mature than others at 16," Joe says. "Even then, they have to be taught respect. I tell them 'These tools can bite you, and you can't bite them back.'"

SUREFIRE TIPS FOR WORKING WITH KIDS IN THE SHOP
Many youngsters have a short attention span, easily become discouraged, or rebel at being told exactly what to do. That's why it takes a special sensitivity to work with them. Our woodworkers shared these suggestions:

● Make kids comfortable in your shop. Paul McClure and Mike McPherson assembled pint-sized workbenches. But just a special space on your workbench will do.

● Don't push. Forcing kids into a project takes the fun out—fast. If kids get bored, let them take a break.

● Encourage originality. Should they insist on copying a design, have them alter it so it becomes their own.

● Ask for drawings. Drawing out what they want to build develops communication and thinking skills.

● Let kids set the pace. Hurrying kids turns them off. "Work with them as an equal, not just as a teacher," suggests Joe Veracka.

● Avoid criticizing. Help youngsters see their mistakes as learning opportunities—not as excuses for quitting. "If they say it's a table, then, by golly, it's a table," Jim Woodruff advises.

● Make sure they complete projects. Kids, like adults, take pride in accomplishment. That means seeing a project through to the finish, even if it's not perfectly executed. Paul McClure handles it this way: He pays for all materials in projects his kids complete; if they leave something half done, they pay for it themselves.

WOODWORKING HELPS KIDS FIND THEMSELVES
Along with the very special feeling you'll get from working with youngsters, you'll watch them develop their own aptitudes and abilities as they design and build with wood. And as kids discover what they can do, they build confidence in their own woodworking abilities.

"Kids not only feel good about themselves, they learn to appreciate others' work," Jim Woodruff observes.

If you're not yet involved with a son, daughter, grandson, granddaughter, or the kid down the street needing attention, invite them in next time! You'll both grow from the experience.

5 SAFETY RULES FOR KIDS
In the shop, kids require guidelines like these from Jim Woodruff:

1. Tools are on loan for their proper use only. "Tools aren't toys, and they don't argue over them."

2. No throwing, running, or rapid movement allowed in the shop. "Rough-housing belongs outside, but no tools go out the shop door."

3. Don't touch or turn switches. "Switches are off limits, but I show them how power tools work, their danger, and where it's safe to stand when I'm using them."

4. Follow the code words TAKE IT EASY. "If they work too fast or rough, I remind them what the code words are."

5. Don't use new tools without asking. "I have to make sure they work properly first."

Paul McClure offers some additional power-tool rules. In his shop, kids under 16 can't use power tools unless supervised. Eye protection is required, as are short sleeves and tucked-in shirttails.

Produced by Peter J. Stephano with Gene Schnase
Photographs: Bob Calmer; Ed Sargeant; Steve Neumnum
SIMPLY SPECIAL WREN HOUSE

Being parents ourselves, we tried to find just the right projects for this special Family Woodworking Section. For instance, you and your youngster can tackle this redwood birdhouse in just a couple of hours. Build it soon, and watch its feathered inhabitants set up housekeeping this spring.

START BY CUTTING THE PIECES
1. Form the front and rear panels (A), by ripping a redwood board to 5 3/4" wide. Then, crosscut two pieces to 5 3/4" long.

2. Transfer the shape of the front panel (A) onto the redwood, using the gridded Front Half-View Drawing as a guide. Using a jigsaw or band saw, cut it to shape as shown in the photo, below. Sand all the edges smooth. With the front panel as a template, trace the outline onto the rear panel, and cut it to shape.

Note: We chose redwood for this project, but you also could use pine or western red cedar. Do not apply paint or preservatives; wrens prefer to live in homes with no finish.

3. Clamp the front panel firmly in a vise and bore a 1" entrance hole in it as shown in the photo, above right. Then drill three 3/4" ventilation holes in the rear panel. Place a scrap board beneath each panel when drilling to prevent chipout.

4. Cut the bottom panels (B, C) and roof panels (D, E) to size.

NOW, PUT THE HOUSE TOGETHER
1. Clamp the bottom panels (B, C) together as shown in the Exploded-View Drawing, and drill two 3/8" pilot holes through B and 3/8" into C. Then fasten the two pieces together with two #8 × 1 1/4" flathead wood screws. The redwood is soft enough that the screws will countersink themselves for a flush fit. Remove the clamps.

2. Drill a 1/4" drain hole at the bottom edge of C, as shown in the Exploded-View Drawing.

3. Clamp the roof panels (D, E) together. Drill 3/8" pilot holes, and screw the parts together, as indicated in Step 1.

4. Clamp the B–C assembly between the front and rear panels, keeping the top edges of B and C flush with the edges of both A's. Drill pilot holes, and screw the
Note: Wrens prefer low branches with the opening facing away from prevailing winds. And be sure you locate the house in an area that is partially lit, yet out of the hot afternoon sun.

5 Position and clamp the roof (D, E) to the house, making sure that it overhangs the front and back panels equally. Drill pilot holes, and screw the roof to the rest of the house. By removing the six screws from D, you can lift this piece off and clean out old nests.

6 Sand the entire wren house smooth. Install two screw eyes for hanging. Hang from a branch, and post a vacancy sign.

Project Design: James Downing
Photographs: Hopkins Associates
Illustrations: Bill Zaus; Kim Downing

Bill of Materials

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<th>Part</th>
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<td>Supplies: #8 x 1 1/2&quot; brass flathead wood screws, 2-1&quot; screw eyes</td>
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With your supervision, a youngster probably can handle most of the layout, cutting, and assembly of this high-flyin' project—depending, of course, on his or her skill level and age.
FIRST YOU MAKE THE FUSELAGE, WING, AND STABILIZER

1 Rip a piece of pine to 1½" square. Measure 5½" from one end and cut the fuselage (A) to length.

2 Using the Full-Sized Patterns on page 75 and the drawing, below, drill ½" deep into the front of the fuselage (A).

5 Using the pattern on page 75 as a guide, mark the taper on the tail end of the fuselage. Cut the taper to shape with a band saw or jigsaw. Now, round-over the square edges the length of the fuselage with a block plane or wood rasp.

6 Using tracing paper, transfer the shape of the rudder (B), elevator (C), and wing (D) onto ¼" stock. Remember to trace the notches and the strut holes. Cut the parts to shape, then cut the notches in B and C. (We resawed ¾" pine and walnut to form the ¼" thick stock.)

7 To form the strut holes, drill two ¼" holes side by side. Cut the rectangular holes to shape with a mallet and chisel as shown in the photo, below.

8 Sand all curves smooth, and sand a slight chamfer on any sharp edges. Test the fit of B and C into the notches in the fuselage. (Some filing and sanding may be necessary for a good fit.)

NOW YOU CUT THE PROPELLER PARTS

1 Using a circle cutter on the drill press, cut the motor (E) and nose cone (F) to shape. Sand a slight round-over on the front edge of both. [To sand the round-over and other round parts smooth, we mounted the parts (E, F, I) on ¼" dowel stock. Then we mounted the dowel in the chuck on our drill press, turned the drill on at a low speed, and sanded the parts smooth.]

2 Using tracing paper, transfer the shape of the propeller (G) to ¼" stock, and cut to shape. Drill a ½" hole through the center of the prop, and ¼" holes through the center of the motor and nose cone.

3 Cut the prop shaft to length (1¼") from ¼" dowel stock.

HERE'S HOW TO GUARANTEE A SMOOTH LANDING

1 Once again using the Full-Sized Patterns, transfer the shape of both struts (H) onto ¼" stock. Cut the struts to shape, stick them together with double-faced tape, and drill a ¼" hole through both for the axles. Check for a tight fit of the struts through the strut holes in the wings, and sand if necessary.

2 Use a small-diameter rasp or a ¼" dowel with sandpaper wrapped around it to form the groove for the guns on the top end of the struts as shown in the photo, below.

Continued
3 Using a circle cutter, cut the two wheels (l) to size (1½" diameter). Drill a ¼" hole in the center of each. You can also buy 1¾"-diameter wooden toy wheels, which also have ¼" axle holes.

4 Cut the wheel axle to length (4¼") from ¾" dowel stock. Using the same size of dowel stock, cut the two guns to length. Drill a ¼" hole ½" deep centered in the front end of each gun.

YOU'RE ALMOST READY FOR TAKEOFF

1 Sand all the parts smooth, sand all sharp edges. (While most projects are sanded after completion, it is much easier to sand this one before gluing. It takes more time to try and sand around all the parts, especially the moving ones, later.)

2 Glue the rudder, then the elevator in the tail end of the fuselage. Glue and clamp the wing to the underside of the fuselage.

3 Attach the motor (E), propeller (G), and then the nose cone (F) to the fuselage (A) with the ¾"-walnut dowel. Glue the motor to the body, and glue the nose cone to the dowel. (Be careful not to get any glue on the prop so that it can spin freely on the ¾" dowel.)

TOY AIRPLANE

4 Glue the wheels (l) in place on the axle. After the glue dries, fit, but don't glue, the struts (H) onto the axle. Position and glue the struts in place through the wings. Finally, glue the guns into the coves on top of the struts.

5 If you want your airplane to look exactly like ours, attach colored tape and decals. (We found the colored tape at a local hardware store and decals at a hobby shop.)

6 Finish the entire airplane (we used several coats of tung oil), and you're ready to fly. ✈️

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**Supplies:** ¾" walnut dowel, ¾" birch dowel, tung oil, pilot figure (you can use a Fisher-Price Air Pilot or order a wood "person" from most toy-part catalogs), adhesive-backed decals and colored tape.

Project Design: Kim Downing
Photographs: Hopkins Associates
Illustrations: Kim Downing; Bill Zauf

Full-Sized Patterns on page 75
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TIPS ON CHOOSING & BUYING PLASTIC LAMINATES

Plastic laminate has changed its face for the Eighties. From pinstripes to geometricals and metal look-alikes to pastels with the color solid to the core, your choices have never been more varied. To help you through the selection process, following is a rundown of what's available and what you need to know about this versatile material.

PICK THE LOOK YOU LIKE
Despite tough-guy characteristics, plastic laminates have often trailed other materials as the choice when it came to up-to-date looks. But wait just a minute. Something new has been added to the mix.

Solid-to-the-core surfacing materials: Solid-core surfacing materials eliminate the unsightly, dark seam lines you have with standard laminates. Scratches and dents show up less, too, because the dings cut into a backing of the same color. With these solids, you can build up layers of varying colors for some spectacular design effects. Trade names include products such as Formica's Classic-Core®, Wilsonart's Solicor®, and Pioneer Plastics' MelCor™.

Metal laminates: Anodized or epoxy-coated aluminum and urethane-coated copper take on the look of bronze, gold, brass, steel, and other metals. Finishing touches can produce a look as slick as a mirror or as soft as a textured brush effect. With embossing, the metals offer a variety of designs.

Better mimics: Woodworkers will be pleased that the plastics that have masqueraded as wood look more like the real thing, thanks to improvements in printing techniques. Other look-alikes—linens, leathers, canes, slate, marble, and stone look good, too.

Designer patterns and textures: Thus far, you won't find a Calvin Klein laminate. You may believe that designer names can't be far away, though, with the current array of patterns and textures—pinstripes, geometric patterns, graphs, embossed surfaces, and patterns that give a three-dimensional quality.

WHAT GRADE LAMINATE DO YOU NEED?

● Horizontal, general-purpose laminates stand up to the most pressure, impact, and wear with a thickness of roughly ⅛". As the name implies, these laminates make the best choice for flat surfaces such as countertops or furniture tops.

● Vertical, general-purpose laminates are thinner, less-costly surfacing materials at roughly ⅛" thick. They won't take the abuse of their thicker counterpart, but they work well on walls, cabinet doors, and other similar applications. Often, you can save some money by using both horizontal- and vertical-grade sheets on a project.

● Banding, or edge strips, give your project an edge and save you the trouble of cutting strips. Banding comes in varying widths, but one common size measures ¼"×12′ long. Some banding is sold in foot-long strips; others, in long rolls.

● Backing sheets add dimensional stability to panels that aren't supported by another assembly such as a base. Ideally, the decorative plastic laminate and backing sheet should be as close in thickness as possible. The thicker the backing sheet, the greater the dimensional stability and resistance to cracking. In practice, most people cover the backs or bottoms of panels with "backing sheet," a thin, inexpensive laminate without a decorative face.
**BUYMANSHIP BASICS**

- Cabinet liners are less expensive than general-purpose laminates and work well inside cabinets and other casework. The liners come in limited stock colors.

- Specialty laminates include laminates that are fire-retardant, impervious to certain chemicals, have antistatic properties, or take more wear.

**MAKING THE PURCHASE**

**Where to purchase:** Retail outlets such as home centers and lumberyards handle only a few standard sizes and designs. But they all have samples of the various patterns, so you can order from these. The largest manufacturers have distribution centers in most states, so the shipping distance may not be far. Delivery can be as short as a day or two, though some lines may take from 10 days to two weeks. In a large city, you may be able to buy directly from the manufacturer's distribution center.

**Pricing:** Plastic laminates are sold by the square foot. Standard patterns and wood grains typically cost between $1 and $2 a square foot. Specialty items, such as metal or solid-core colors, may cost from just under $5 to almost $7 a square foot. Price may vary according to finish. A basic matte or satin finish generally is the least expensive; higher gloss or raised finishes may cost slightly more. And, in general, backing sheets and cabinet liners cost about half what standard patterns go for.

**Sizes:** Standard nominal widths include 18", 24", 30", 36", 48", and 60". Standard nominal lengths are 48", 60", 72", 96", 120", and 144". Manufacturers cut sheets slightly wider and longer than stated to allow for trimming or for cutting more than one piece from a sheet. Not all products come in all widths and lengths. More specialized products may be sold in only one size sheet.

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Continued from page 10

MAIL-ORDER SOURCE FOR GRAINGER PARTS

Several of your recent projects have included W.W. Grainger parts. Grainger is one of America’s larger wholesale houses and does not sell retail, so readers may face a challenge in finding sources for these parts. WOOD readers who want to buy Grainger parts may do so from me, at wholesale prices (Grainger’s “net cash” price). Their purchases will be shipped from their local Grainger warehouse.

Readers should send me a stamped, self-addressed, no. 10 envelope and specify the month, issue number, and page of the project they want to order the parts for. All queries should be addressed to: SBISCO, Dept. BHW, P.O. Box 479W, Hollister, CA 95024. Parts delivery normally is within 14 days of the date the order was mailed.

—Edward W. Stollery II, SBISCO, Hollister, Calif.

WHERE TO BUY BELT-BUCKLE HARDWARE

While reading “Found Wood” (October, 1985, p. 66), I wondered how many times in past years I have tripped over good wood. The spalted-maple belt buckle caught my eye in particular. I have been wanting to make my own buckles for some times. Can you help me find a source for the hardware?

—Albert Swelbar, Cadiz, Ohio

Wooden belt buckles make nifty gifts—especially when you can turn them out in a hurry. Our own Features Editor Peter Stefano made the buckle you saw in the October, 1985 issue. Buy the hardware at your local Tandy Leather store, or from their catalog. Hook and ring no. 1601 fits 1” to 1½” buckles; no. 1602, 1½” to 1¾” buckles. Cost: 79 cents each (Texas residents add 4 cents sales tax for each buckle), plus $1.75 postage and handling per order. To order by mail, write: Tandy Leather Co., P.O. Box 2934, Dept. WM, Fort Worth, TX 76113.

OLD-TIME TOOL EXPERT NEEDED

In the December issue, the article on “The Christmas Wagon” (p. 78) mentions the felling of a tree with a one-man crosscut saw. I have somewhat restored my father’s one-man crosscut saw that he used in Wisconsin until the early 1930s. It is a saw that grasps the trunk or log to be cut, applies downward pressure to the saw blade, and can be adjusted for horizontal or vertical sawing. I don’t know how rare this tool is, but I would be willing to donate it to an appropriate historical society in my father’s name. I would also appreciate any information your readers can supply on this unique tool.

—Kermitt L. Jones, Security, Colo.

Can any of you readers help out? If so, please send your correspondence to the Letters Editor here at WOOD, and we’ll pass it along to Kermitt. ♦

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4 GREAT ACCESSORIES

Continued from page 65

Drill-chuck attachment

Mounting a drill chuck lets you perform several more tasks on the multi-machine. (See the Buying Guide at right for a few items we used.) Be sure to wear safety goggles when using attachments!

BUYING GUIDE

• Drill chuck. Hardened steel, nickel-chrome alloy jaws. Holds bits with $\frac{\pi}{4}$"- to $\frac{1}{2}$"-diam. shanks. Fits $\frac{1}{2}$-20 threaded shaft. Sears stock no. 9GT2980, $11.

• Pneumatic sanding drum. 1×6", in-

Grinding wheel and guard

For general-purpose sharpening or for removing lots of steel fast, you can't beat this attachment. Set your multi-machine to the proper speed, adjust the tool rest angle, position the eye shield, and let the sparks fly.

<table>
<thead>
<tr>
<th>Bill of Materials</th>
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</thead>
<tbody>
<tr>
<td>Part</td>
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<tr>
<td>T</td>
</tr>
<tr>
<td>A</td>
</tr>
<tr>
<td>B</td>
</tr>
<tr>
<td>C</td>
</tr>
</tbody>
</table>

Supplies: 1—$\frac{3}{4}$" flat washer, 1—$\frac{3}{4}$× $\frac{1}{2}$" flathead machine screw, 1—$\frac{3}{16}$" wing nut, 1—$\frac{3}{16}$×2$\frac{1}{2}$" hex head machine screw, 1—$\frac{3}{16}$×1$\frac{1}{4}$" hex head machine screw, 1—$\frac{3}{4}$" T-nut, 1—$\frac{3}{16}$×$\frac{1}{2}$" brass pin 1" long (we bought $\frac{1}{4}$" brass rod at a hobby shop; it's also available at welding supply shops).

1 Cut parts A, B, and C to the size listed in the Bill of Materials.
2 Using the Grid Patterns shown, transfer the shape of A, B, and C onto the appropriate stock (don't forget to mark hole positions). Then, cut the pieces (A, B, C) to shape. Clamp, but do not glue, the pieces together. Mount the grinding wheel to the arbor shaft, and test-fit the clamped-up guard over the wheel. With the guard positioned over the grinding wheel, mark the location of the $\frac{3}{4}$" hole needed in A through the previously drilled hole in the cabinet side. Drill a $\frac{3}{4}$" hole through A to match the hole in the cabinet. Remove the

![Diagram of grinding wheel and guard setup.](image)

FRONT VIEW

GRIDDED SIDE VIEWS Each square=1/8"
flatable, stock no. E-Z106, $115. Sold by North West Carving Supplies, P.O. Box 5211, Bozeman, MT 59715.

- **Heavy-duty contour sander.** Includes a wheel with a 1/2" reducer bushing, an abrasive collar, and eight brushes. Sears stock no. 9GT64861, $14.

- **Strip 'n Sand Mini Stripper Kit.** Kit includes five flexible wheels plus quick-change mandrel and shank. Each wheel (1 x 2 1/2" diam.) has dozens of abrasive flaps. Sears stock no. 9GT25246, $17.

3 Clamps and countersink the 3/8" hole in guard piece A.
4 Drill a 3/8" hole through A for the brass pin. (The pin rests on top of the multi-machine's side panel as shown in the Front-View Drawing.) Cut a piece of 1/4" brass rod to 1" long, and epoxy it in the hole. (The pin should protrude at least 1/4" on the cabinet side of A and should not protrude on the inside of the guard where it could strike the grinding wheel when in use.)

5 Notch out areas on the front sides of the guard for mounting of the plastic eye shield. Drill a 3/8" hole through the notched area. Attach the eye shield to the guard and the guard itself to the multi-machine. (The eye shield should swing back and forth in the notch.)

6 Hold the tool rest against the cabinet as shown in the photo on p. 65: mark the location of its mounting hole. Drill the hole and mount the tool rest. With the machine unplugged, spin the wheel by hand, checking that it does not touch the guard or tool rest.

7 Remove the guard from the cabinet, and remove the eye shield from the guard. Paint the guard.

8 Reattach the eye shield to the guard, and guard to the cabinet.

**BUYING GUIDE**

- **Aluminum-oxide grinding wheels.** 6" size fits 1/2" shaft. Fine, 100 grit, 6 x 1/2"—no. 9GT64319, $6.19. Medium-fine, 60 grit, 6 x 1/2"—no. 9GT68209, $6.19. Medium-coarse, 36 grit, 6 x 1/2"—no. 9GT64352, $6.19. Sears.

- **Tool rest and arm.** Parts from a Sears Industrial Grinder. L.H. tool rest—Sears stock no. 4656, $1.99. Tool rest arm—Sears stock no. 521935, $2.99.

- **Eye Shield.** From a Sears Industrial Grinder. Stock no. 497778, $3.99.

*Project Designs: James Downing
Photographs: Hopkins Associates
Illustrations: Kim Downing; Bill Zanu*
Whether your woodworker's license reads "Beginner," "Intermediate," or "Expert," you're bound to have a few questions about your favorite hobby. We can help. Each issue, we'll consult our experts for answers to your most-asked questions. Send your questions to:
Ask WOOD
Better Homes and Gardens®
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Locust at 17th
Des Moines, IA 50336
Letters selected for use will be edited for publication.

THE NITTY-GRITTY OF SANDING

Q. What's the normal progression of sandpaper to use for finishing a flat surface? I never seem to get as smooth a finish as I want.

—Helen Clark, Ft. Lauderdale, Fla.

A. To prepare the surface for finishing, we advise you to start with a 60-grit garnet paper. Follow up with 80-grit, 100-grit, and 150- or 220-grit paper. After applying the first sealer coat, sand lightly with 220- or 320-grit. From that point—and until you're satisfied with the finish—use 320-grit between coats. This may sound like a lot of grits, but a truly fine finish requires elbow grease! There's no magic involved. Remember: From rough-sanding to final finishing, always use a sanding block or pad to prevent leaving any finger marks and streaking. You'll be much happier with the results.

STRAIGHT FACTS ABOUT WARP

Q. The only board I have left to finish a project is badly warped. Is it possible to take the warp out of a board so I can still use it?

—Dick Howard, San Diego, Calif.

A. Unfortunately, once a board has warped—even slightly—you rarely can restore it to its original shape. Even if you forced it "straight," say, by screwing it in place as the side of a cabinet, the pulling strength of the warp would probably cause the whole cabinet to rack. Unless you have enough margin to correct the distortion on the planer, the only solution is to replace the board.

However, all is not lost. Even a severely warped board is too valuable to toss on your scrap pile. Save what you can by cutting out smaller sections of the board for future projects.

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GETTING TO THE CENTER OF THINGS

Q. I know I should remember this from high school geometry, but how do I find the exact center of a round tabletop (or any circle)?

—R.A. Dickelman, West Des Moines, Iowa

A. Here’s how it’s done: From any two points (A) on the circumference of your table, use trammel points to mark equidistant points (B and C) on both sides of both starting points. Then open up the distance on your trammel points a bit, and arc from each of the second pair of points (B and C) to determine two interior points (D and E).

Use a straightedge to connect your two starting points (A) with the interior points (D and E). Now you have it. The center (F) will be the point where those two lines (A-D and A-E) meet.

GLUE TIGHT!

Q. How much glue space should I allow for in a joint?

—Ralph Hendrickson, Geneva, Ill.

A. In a word, none. The strength of any glued joint depends on a solid mating of the surfaces forming the joint, and the glue you use. Measuring carefully before you cut is the key to a good joint. Because white glue thickness should be only about .001" (believe it or not) after clamping the joint, white glue won’t even take up the slack in a cut that’s just slightly off. ♠

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<thead>
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<th>EXCALIBUR II</th>
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STRAIGHT BIT TWO FLUTE

<table>
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<th>PART #</th>
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CORNER RD BIT TWO FLUTE

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ROMAN Ogee BIT TWO FLUTE

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COVE BIT TWO FLUTE

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A box full of molding combinations
You can produce several different moldings by using varying combinations of the four router bits in this set. (We used three of the bits on our router table to make the molding shown in the photograph.) Two of the bits are carbide-tipped and two are steel; all have ¼" shanks. The set also includes a plastic case for safe storage and an instruction sheet diagramming seven moldings to get you started. Crown Molding Bit Set (no. 21255), $40 in the 1985/86 Sears Tool Catalog and at larger Sears stores.

Spray-on suede lining
Spray a soft touch on any project—the inside of a jewelry box, the outside of a child's toy, or the bottoms of bookends—without having to cut and paste odd-shaped pieces of felt. The starter kit includes everything necessary to cover 30 square feet of surface; brown and green fibers come with the kit, but 22 other colors are also available. An adhesive undercoat is provided. Suede-Tex Kit (catalog no. 115), $46.50 postpaid. Donfer Products Company, 55D Alder St., Dept. W, West Babylon, NY 11704.

The story of the boards and the bees
A traditional polishing wax made from beeswax and turpentine (the latter makes application easier), this paste goes on smoothly, dries quickly, and produces a natural shine after a light buffing. According to the manufacturer, the wax is suitable for oak, pine, and any stripped or dried-out woods; our tests on dark walnut and light oak produced excellent results. Beeswax Polish Paste, $5.60 postpaid. Available from Liberon Waxes, Inc., P.O. Box 1750, Dept. W, Mendocino, CA 95460.
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One of the biggest problems with picture-frame clamps is that it takes forever to adjust them. This rig has the solution: brass thumb nuts that slide freely along the threaded rods until you lock them against the corner blocks. An extension set (with four threaded rods and four coupling nuts) is available. Picture Frame Clamp (catalog no. 47F01.01), $19.50 postpaid. We ordered ours from Garrett Wade Co., 161 Avenue of the Americas, Dept. W, New York, NY 10013. In Canada, send $21.75 (Canadian) to Lee Valley Tools Ltd., Dept. W, 2680 Queensview Drive, Ottawa, ON K2B 8H6, Canada.

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The Door Shop™
The original Ogee Door Shop™ as featured in Wood Magazine (May/June 85) is complete with stile & rail, slot & panel raising bits for the 1/4" chuck router. Bits are carbide tipped & BB & will make 3/4" thru 2 1/4" thick raised panel doors. Door Shop™ & Manual $89.50 ppd. The 1/2" shank Door Shop™ now available.

The 35 page Door Shop™ Manual is clearly written and beautifully illustrated with over 156 detailed drawings covering the complete process of door building. Each section covers proper methods and exact set ups for the router, including how to recognize and correct for errors. There are sections covering Design, Lumber selection, Measuring, Panel Raising, curved & straight Rail and Stile cutting & fitting, Guides, Clamping, Gluing and Finishing. This is the most comprehensive manual out today. When purchasing the Door Shop™ manual for $5.00 you also receive Zac's 32 page Router bit and Shaper cutter catalog free. $5.00 rebated with purchase of our Door Shop™ or Panel Raiser™ bits.

Zac's carbide tipped Panel Raiser™ router bits come in 3 styles; Ogee, Cove, & Provincial. All 1/2" shank bits are 3 1/2" in diam., with BB & give a full 1 1/2" raised panel. $99.50 @ ppd. All 1/4" shank bits are 2 1/4" in diam. & give a 1" or larger raised panel cut. $65 @ ppd.

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Idea Portfolio

Gallery-Quality Plant Pedestals

All too often, greenery and other special display items go unnoticed for want of a place to show them off. You can change all that with these impressive, easy-to-build pedestals.

While they're really nothing more than basic boxes built with the simplest of all joinery techniques—butt joints—these pastel-colored pedestals will earn their keep in many a contemporary decor. We used %" particleboard to frame up the cubes, all of which measure 8" square and range in height from 8" up to 36" (4%" plywood would also work fine). Then, we covered the sides, front and back, and finally the top of each with Solicore®, a new solid-color surfacing material from Wilsonart. (Several other companies have this same product under other trade names.) The chief advantage of using a product with color all the way through is that with it you can minimize the visual impact of the seam lines.

A word to the wise when working with these new solid-color materials: Handle them with extreme care, as they are much more brittle than plastic laminate. And be sure you work them with carbide-tipped cutters when cutting on your table saw and trimming with your router.

Design: James R. Downing  Photograph: Perry Struse
SLEEK AND SIMPLE
END TABLE CUBE

With today's generation of designer plastic laminates, even the simplest of designs can become a feast for the eyes. The muted geometric pattern laminate used here speaks softly but distinctively of your good taste.

One of the most intriguing things about cubes is that they're so versatile. Here we built ourselves an 18" square plywood cube that stands 18" tall. Then we covered it with Formica-brand Burgundy Maxi Graph plastic laminate. But we could have just as easily altered the dimensions of the cube and made it into a coffee table, nightstand or even a sofa table. And by adding doors and/or drawers, we could have built additional function into the unit.

When applying any of the new patterned laminates, you need to pay careful attention to alignment of the pattern. Otherwise, when you trim off the excess laminate, the pattern may run unevenly along the edges of the item you're building. A few extra minutes spent aligning will solve this problem. You also need to take special pains to square up the corners of the project when assembling the carcass. (For more information about what's available in plastic laminates, please turn to the article on page 76.)

Design: James R. Downing Photograph: Perry Struse
WOODWORKING VIDEOS
The Next Best Thing to Being There?

Superman, Darth Vader, and old movie classics have a new foe competing for home video stardom—woodworking instruction. Here's a report from WOOD Magazine's How-To Editor Marlen Kemmet, who previewed a score of videos for us in recent weeks.

The video boom has arrived on the home woodworking scene in a big way. Two years ago, you would have been lucky to find one evening's worth of instructional woodworking video material. Today, though, you could take a week off work, end up blurry-eyed, and still have a few videos left to watch.

For years, the home woodworker has relied heavily on books and magazines for help with techniques. But with the advent of videotapes, hobbyists can now add an important new medium to their collection of reference materials.

Expert woodworkers are sharing their secrets for all to see in an expanding variety of quality video releases. Techniques range from carving to sharpening and deck-building to bowl-turning in videos that usually last 1/2 to 2 hours.

Videos aren't cheap. Almost all fall into the $40 to $70 range. Fortunately for the cost-conscious woodworker, a few sources have adopted a mail-order rental policy.

You don't have your own video-cassette recorder (VCR)? No problem! Video shops that rent both movie videos and VCRs have sprung up on many a street corner. Hooking up one of them to your television set won't take long, either. Usually, you simply fasten a wire or two to the back of the set.

Beware, though: Watching a video can be like going to a new movie you haven't heard much about. Sometimes you really enjoy it, and sometimes you don't. Whether you buy a video or rent one, make sure you get your money's worth by learning as much as you can in advance.

WHAT TO LOOK FOR IN A WOODWORKING VIDEO

1 Level of instruction. Most videos are geared for beginning to intermediate woodworkers. Shopsmith's "Making Bowls," for instance, is aimed at the beginner, while Taunton Press' "Bowl Turning with Del Stubbs" focuses on advanced techniques.

2 Authority of the instructor. Is the instructor a professional woodworker? Anything less, and you're probably wasting your time. All the videos we viewed had top-notch woodworkers doing the teaching.

3 The approach: No-nonsense or entertaining. James Krenov and his students from the College of the Redwoods take a no-nonsense approach to building fine hand planes. Roy Underhill from the Woodwright's Shop is as entertain-

ing as he is educational when he talks about and demonstrates the use of great-granddad's tools. Decide what style suits you best.

4 Return policy. What happens if the videotape won't work or if you don't like the subject matter? You can return defective videos for a refund or new tape. But if the content fails to meet your expectations, most suppliers will charge you a rental fee, or will refund only part of your deposit.

5 VHS vs. Beta. Videos and players come in two basic types, VHS and Beta. Like eight-track tapes and cassettes, one won't work in a machine built for the other. Most rental shops carry both, but check to make sure before ordering or renting a videotape or player.

VIDEO INFORMATION GUIDE

Interested? Then use the listing below to obtain specific information about buying or renting a woodworking video.

Fine Tool Shops Inc., P.O. Box 1262, 20 Backus Ave., Danbury, CT 06810, 800-243-1037. If you're wondering how to choose the proper hand plane or how to adjust and tune it for perfect shavings, check out "How To Work With Hand Planes: The Bench Plane." The Fine Tool Shops do not have a rental policy per se, but if you are not satisfied and return a video within 30 days, you pay a $15 rental fee and are credited the difference. Four different videos are priced at $39.95 each.

Georgetowne, Inc. Video Productions, P.O. Box 625, Bethel Park, PA 15102, 412-854-1887. The three videos we reviewed, titled "World Championship Video Series," show award-winning decoy carver Pat Godin carving and painting a...
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• Fine tune your plane for a perfect shaving

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• How to shape a perfect dovetail joint
• Chisel, saw, marking gauges—all the tools you need!

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• Using dowels for quick, professional results
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Continued
canvasback decoy. The three videos focus on forming the feather
groups, creating the feathers, and
how to paint the decoy. Videos
No. 1 and 3 are $59.95, and video
No. 2 is $39.95, or order the set
for $149.95. No rental policy.

Mahogany Masterpieces, RFD 1, Wing Rd., Suncook, NH 03275.
Four videos on Japanese master
toolmakers. Prices range from $30
to $50. The video rent for one
week at $20–$25, plus a $2.5
deposit. (No videos were available
for previewing.)

National Carvers Museum,
Woodcarver Road, Monument,
CO 80132. 303-481-2656.
"Carve the Cowboy Head" with
Claude Bolton shows how to carve
both a cowboy's head and a bust
for mounting. Twelve videos on
carving also include "Bird in
Flight" and "Fantasy Faces." Pur-
chase price: $39.95 each; $20
rental fee for two weeks.

Osmose Great Plans Videos in-
clude "Great Decks," "Great
Fences," and "Great Gazebos." The
"Great Decks" video gives step-by-
step instructions on building a
deck. These videos, which sell for
just $15.95 each, are available
from dealers with the Osmose
point-of-purchase display in their
stores. Or call 800-522-9663.

Punkin Hollow Video Library
consists of a seven-videotape
woodworking series. The "Mortise
and Tenon/Dadoes" video repres-
ents a complete guide for anyone
interested in cutting one of the
strongest joints, the mortise and
tenon, completely by hand. You
can buy (at $59.95 to $69.95
each) or rent them from The
Woodworker's Supply of New
Mexico.

Shopsmith, Inc., 6640 Eoe Ave.,
Dayton, OH 45414-2591. 800-
543-7586. Their three videos

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and power tools FREE!}\]
include “Making Bowls,” which turned out (if you’ll excuse the pun) to be a good video for the beginning turner. The video offers easy-to-understand instructions on preparing stock and use of the roundnose in the scraping process. Prices run from $29.95 to $49.95, with no rental policy.

**Taunton Press, P.O. Box 355, Newtown, CT 06470. 800-243-7252.** Taunton Press produces videos for the advanced woodworker. Four of their five programs run 110 minutes or longer, and five more videos are in the making. Their present tapes include “Dovetail a Drawer,” “Wood Finishing,” and “Radial Arm Saw Joinery.” Del Stubbs shows how to cut (not scrape) paper-thin bowls in his two hour video, “Bowl Turning.” The videos are priced from $49.95 to $59.95, with no rental policy.

**With The Grain (WTG) Videos, Box 1329, Mendocino, CA 95460. 707-937-0600.** “Wooden Planes and Cabinet Scrapers” comes from California’s College of the Redwoods, directed by master craftsman James Krenov. The video, along with plan drawings, explains how to build and use a wooden plane and how to use a cabinet scraper. WTG Videos also carries 13 programs from Roy Underhill’s popular PBS series “The Woodwright’s Shop” on Early American woodcraft, available in a four-volume video set. The videos sell for $59.95 each, and rent for $20 for 30 days.

**Woodworker’s Supply of New Mexico, 5604 Alameda N.E., Albuquerque, NM 87113. 505-821-0500.** A selection of 13 videos includes a seven-video Punkin Hollow Series, the five videos by Taunton Press, and R. J. De Cristoforo’s “Table Saw Expertise.” The latter explains in layman’s terms how to miter, taper, kerf, and build several table-saw jigs. Videos range from $39.95 to $69.95, with a rental policy of $19.90 per video for 30 days.

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WOOD MAGAZINE APRIL 1986

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ROY UNDERHILL: MASTER CRAFTSMAN OF THE OLD HAND WAYS

He’s the author of WOOD Magazine’s “Old Hand Ways” column, several books, and star of the Public Broadcasting System’s national television series, The Woodwright’s Shop. At age 35, Roy Underhill may already have spent more time working wood with traditional hand methods than many a woodwright did back in the 1700s.

A hands-on historian of technology, Roy daily displays his multitude of skills as Master Housewright at Colonial Williamsburg in Virginia. An admiring public continually marvels at how things were done centuries ago.

Roy probably came by his skills naturally. In 1597, his ancestor, a joiner named William Underhill, sold William Shakespeare a house at Stratford on Avon, England. Another forebear, a wheelwright, was one of the first settlers on the Virginia Colony’s York River in 1690.

Roy inherited an inclination toward the old hand ways, but he learned their application during graduate study at Duke University. From there, Roy applied his skills to museum restoration projects, until he was hired for a rebuilding program that was under way at Colonial Williamsburg.

To Roy, the public’s growing interest in handcraftsmanship is a response to our complex, technological society. “We’re so high tech we need more high touch,” and traditional woodworking provides that,” says Roy. “The process is simple, using materials organic and infinitely different, and it produces a tangible product that comes from our hands.”

Communicating that handcrafting process has become Roy’s priority. Soon, he’ll be sharing his knowledge of those techniques in a new television series, but from behind the camera this time rather than in front of it. He’s directing several stories about the trades of Colonial Williamsburg.

When Roy goes home to his wife, Jane, and daughters Rachel, 7, and Eleanor, 4, you might expect him to relax by building a Windsor chair with hand tools. Instead, he leaves the old hand ways in the past. Says Roy, “When I get home I don’t want to see anything old. I want to sit in front of my computer.”

START A WOOD COLLECTION—BY MAIL

Members of the International Wood Collectors Society collect wood—from all over the world and often in staggering amounts. One member, Alan B. Curtis, of Eugene, Oreg., has collected enough samples collected that he sells spares.

Alan, a professional forester and botanist, set out years ago to personally find, identify, and collect samples of all 680 native American woods. In this ongoing process, he has also managed to gather an assortment from far-off lands. Now, for lack of storage, he has to part with some.

For as little as 35 cents you can buy a 5x3x6” piece of incense cedar or sassafrass. For a sale list of Alan’s samples and their origins, send a stamped, self-addressed, business-sized envelope to Alan B. Curtis, 2370 Douglas Dr., #1132, Eugene, OR 97405.

CHAMPION CARVERS CONVERGE

For the past 15 years, Ocean City, Md., has been the place for carvers to be at the end of April. There, in Convention Hall, top wildfowl carvers from all over the United States and many foreign countries converge for the Ward Foundation’s World Championship Wildfowl Carving Competition.

In 1985, 217 professionals, 219 amateurs, and 361 novice carvers competed for nearly $90,000 in prize money and purchase awards, ribbons, and recognition. More than 20,000 people paid to view the entries in the 3-day event, and participate in the auction of world-class decorative decoys.

Competition is tough. Minor anatomical flaws detected by experienced judges can drop months of work from the top of the class. The great gray owl with prey at left failed to capture a world-class ribbon because the mouse in its beak appeared too stiff.

This year’s competition is April 25-27. For more information, write: Knute Bartrig, 707 Eastern Shore Dr., Salisbury, MD 21801.
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