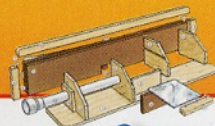


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Woodworker's Journal

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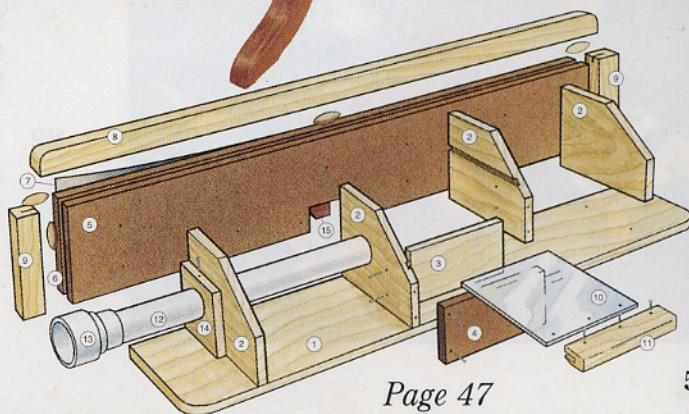
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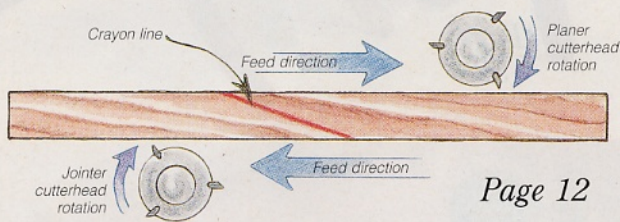
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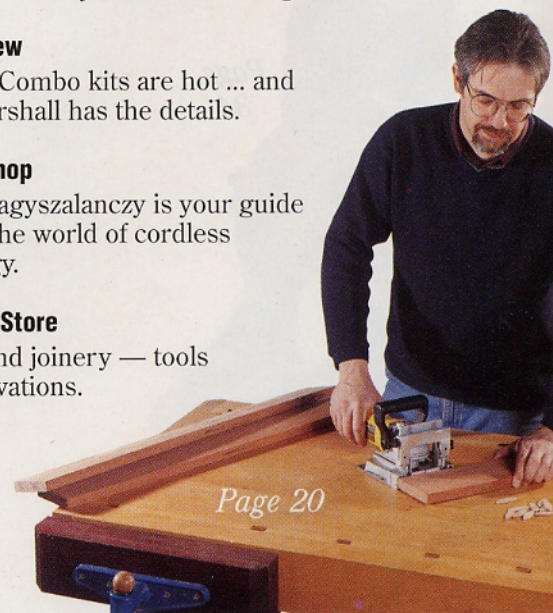
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Wood Warning from EPA

Looking through this issue, I was struck by something that doesn't ordinarily occur to me — perhaps it's too close at hand most of the time. I'm referring to the diversity of our medium. Not just your basic white oak, ash or pine (though these three species are featured in this issue's projects) ... I'm talking about the Phillip Moulthrop bowl on page 24, which features cross sections of branches embedded in a mixture of epoxy and sawdust. Or Donald Conroy's award-winning intarsia dragon featured on page 16 (shown at left), which uses no less than 10 different species of wood. Or Dan Gindling's stunning CD cabinet in that same story made of recycled urban wood — materials that were destined for the dump.



It truly is a rich pallet with which we work, stretched further by the imagination and creativity of the craftspeople who take tools to wood every day.

On the other hand, messing around with our medium can sometimes backfire. According to the terms of an agreement reached with the Environmental Protection Agency (EPA) this February, American manufacturers will no longer be using arsenic-treated wood for decks and playgrounds by the end of next year. The transition affects virtually all residential uses of wood treated with chromated copper arsenate, known as CCA. While the EPA claims they have not concluded there is unreasonable risk to the the public from these products, they do believe that "any reduction in exposure to arsenic is desirable." The EPA offers a list of guidelines at their site www.epa.gov/pesticides/citizens/cca_transition.htm, which include never burning the wood; washing hands thoroughly after contact; never allowing food to come in contact with the wood; having children who play on decks, porches, or wooden play sets made from treated wood wash their hands thoroughly before eating or using the bathroom (good luck on that one); and washing your clothes separately if you cut or sand the material.

The EPA also says that applying certain penetrating coatings (like oil-based semitransparent stains) every year or two may help reduce the migration of the chemical. For this issue, we asked finishing expert Michael Dresdner to provide readers with a primer on cleaning up and recoating decks (see page 78). And I would encourage all *Woodworker's Journal* readers to visit EPA's site and read up on this situation ... it's important.

Larry N. Stoiaken

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Defoamer — or Bug Food?



A Paint Guy's Thoughts

I just received my first subscription issue of *Woodworker's Journal* and enjoyed it very much. I did have one bit of criticism regarding the water-based finishes article (*Finishing Thoughts*, February 2002), however. While I cannot hold a candle to Michael Dresdner in finishing technique, I do know a little about formulating paint.

Mr. Dresdner recommends adding some half and half cream to a water-based polyurethane to get rid of microfoam. He is correct in that the half and half will act as a defoamer (due to the homogenized fat globules in the cream), but it may introduce other problems.

But first, I want to point out that it is much easier to prevent foam than remove it. Always stir clear finishes

gently — don't beat air into them. Overmixing can decrease the efficacy of the defoamer. Second, microfoam is a difficult problem to remove. Even some silicone-based defoamers have problems with this: I doubt the cream would completely eliminate the problem.

If the finish is for interior use, it will not contain a mildewcide. Putting the cream in your finish is putting food for fungus, mildew and algae into your coating. Over time, this may produce black or green splotches where the bugs are growing. Exterior coatings do contain a mildewcide, but all mildewcides used in clear coatings will eventually leech out of the film. It is best not to have any "bug food" in your finish.

To get rid of microfoam, I'd suggest the following: Tap the can on your bench. Lift it up an inch or so and let it drop. This will help coalesce the bubble. If you can, let the finish sit for a day or two to allow the bubbles to rise on their own. If you must add anything to the coating, try ONE of the following: a drop of mineral oil, a couple of drops of mineral spirits (probably the safest bet), or try spraying a small bit of WD-40 on the end of a paint stirrer, wipe it off, and use the stick to gently stir the finish.

The defoamer used in urethane and acrylic clear finishes is a careful choice made by the formulators. They take into account the defoamer's effect on gloss, surface tension and clarity.

In my experience, home remedies are rarely the answer for a long-term solution.

As for my qualifications, I have been in the paint and coatings industry for 16 years, formulating paint for several companies, including Benjamin Moore. I also held the position of senior research chemist for Ashland Chemical in their coatings lab, where my principal job was formulating defoamers for the paint industry. And, I sold biocides for Arch Chemical, which supplied mildewcides to the paint industry.

I have several friends who work hard inventing and tweaking these types of formulations, and they would groan to know that someone is recommending putting cream into their formulas!

Phil Peterson
Crown Point, Indiana



He's an Ian Fan

I am a novice woodworker. Really new. Still shiny. Still no finger scars. OK, a little one. I read many, many articles looking for a tutor in basic woodworking skills with hand tools. I saw Ian Kirby's instructive articles

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from other, much older publications and thought AT LAST! Someone who writes in a way that an amateur can understand! I had searched high and low for more of his works, and then I picked up a copy of *Woodworker's Journal*, and there he was ... still teaching basics. Thanks WJ ever so much for publishing Ian's work. We need periodicals that cater to the amateur as well as the accomplished woodworker. And thanks, Ian. A lot.

Ken Wood
Brantford, Ontario

WJ Responds: You might be interested to know that many experienced woodworkers have a similar reaction to Ian's articles.

Router Bit Speeds

I read your article "What's New in Router Bits" (*Tool Preview*, February 2002). At the end of the article there was a chart, which indicated what speed

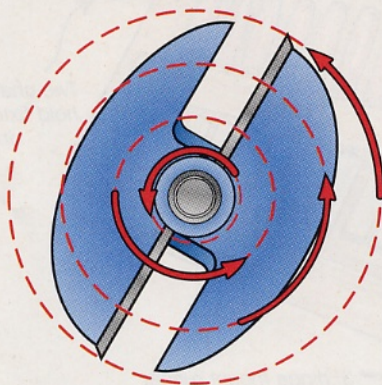
various diameter router bits would have to operate at in order to have a tip speed of 130 mph. It indicated that a 2 1/2" diameter bit running at 12,500 rpm would have a tip speed of 130 mph. I believe that number is incorrect and should be 93 mph. In order to operate at a tip speed of 130 mph, a 2 1/2" diameter bit would have to be going at 17,487 rpm.

Jack Legato
Salem, Connecticut

WJ Responds: Good eyes — and good math. The correct rpm for the 2 1/2" diameter bit when it reaches 130 mph should have been printed as 17,500.

Musical Correction

The telephone number for the American School of Lutherie was incorrect in the February 2002 issue (*Shop Talk*, "Back to Shop Class"). The correct number is 707-431-9530.



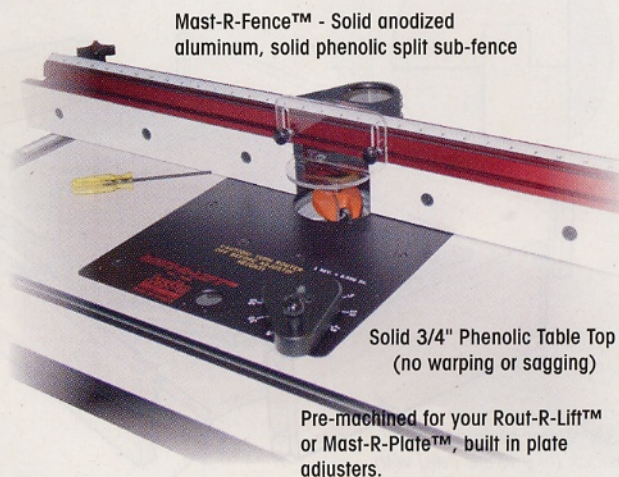
2 1/2" Dia. Bit Tip Speed
22,000 rpm = 164 mph
17,500 rpm = 130 mph
14,000 rpm = 104 mph

Safety First: Learning how to operate power and hand tools is essential for developing safe woodworking practices. For purposes of clarity, necessary guards have been removed from equipment shown in our magazine. We in no way recommend using this equipment without safety guards and urge readers to strictly follow manufacturers' instructions and safety precautions.

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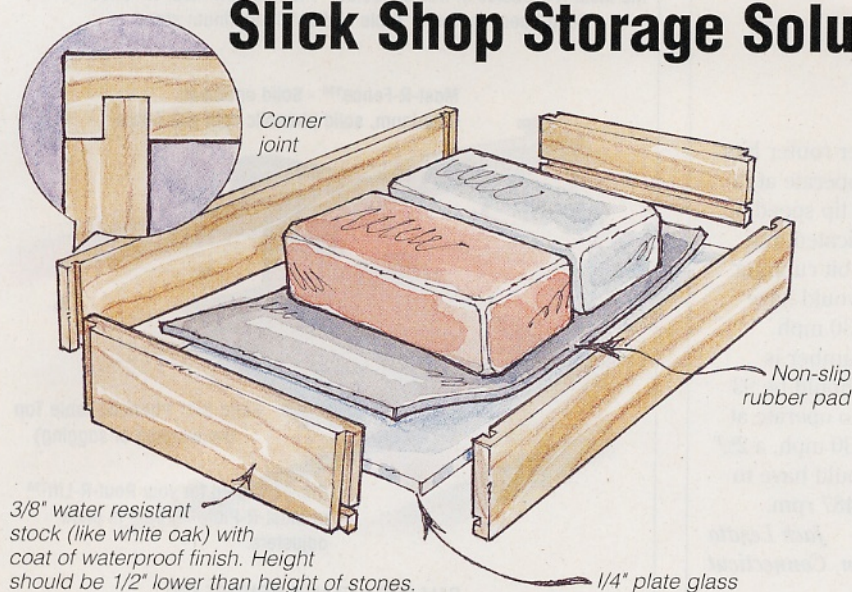
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Flattening Waterstones

Waterstones wear quickly but need to be kept flat for optimum results. I found this a messy business so I made the dual-purpose box shown in the sketch above. The box has a 1/4" plate glass bottom with a non-slip rubber pad on top and accommodates three water stones (which can be kept fully moistened in Ziploc™ bags).

When I need to flatten one or more of the stones, I empty the box, remove the pad and put a sheet of wet/dry sandpaper on the perfectly flat glass bottom. When finished, I flush the residue out with water and re-install the stones.

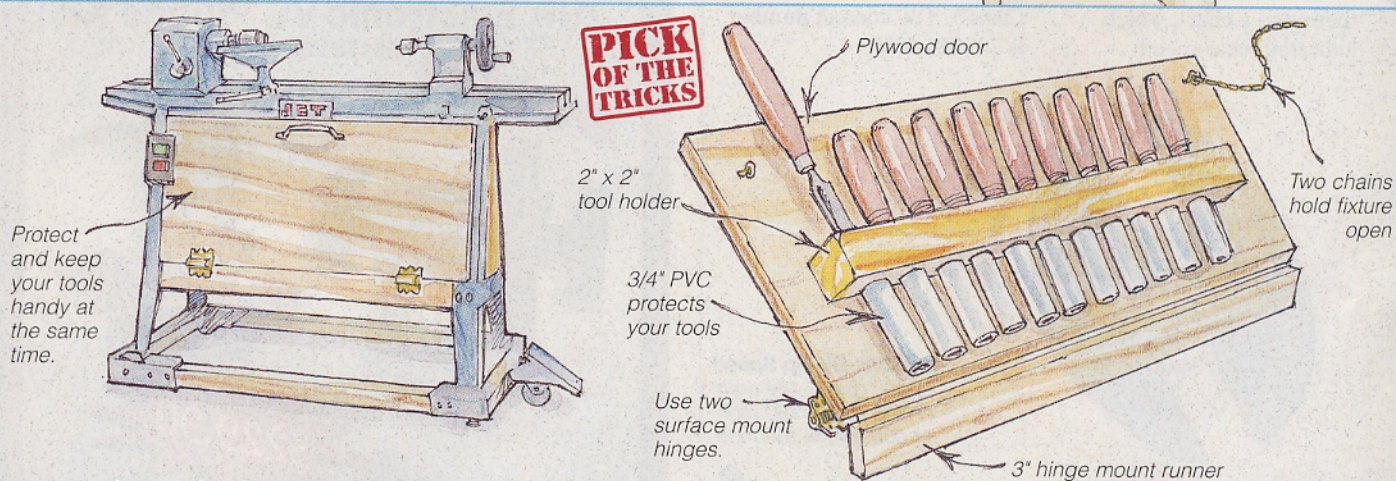
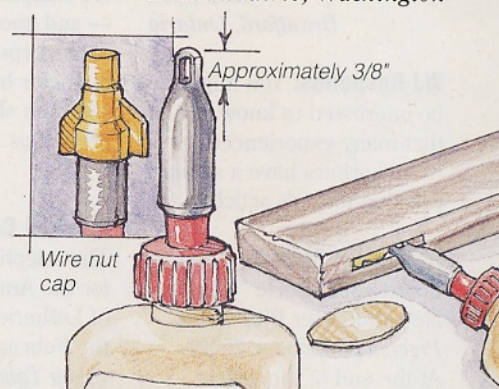
By adding handles at each end and a lid you could also have a convenient carrying case.

*John Cullen
San Francisco, California*

Biscuit Gluing Nozzle

If you use biscuits in your shop you know that gluing them can be a messy business. Making a special nozzle takes only a few minutes and will last a lifetime. Start with the cap of a ball-point pen, making sure that it fits whatever size glue bottle you use. Cut the cap as shown in the sketch so it's a loose fit in the biscuit slot. To keep the nozzle from drying out I use a large, flexible wire nut after removing the innards.

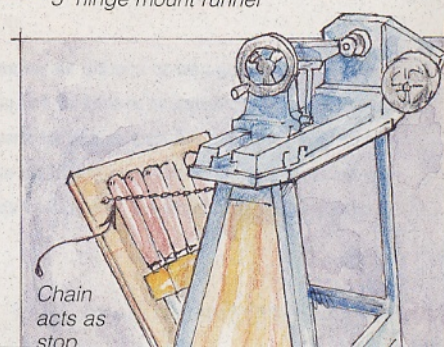
*Don Cox
Brush Prairie, Washington*

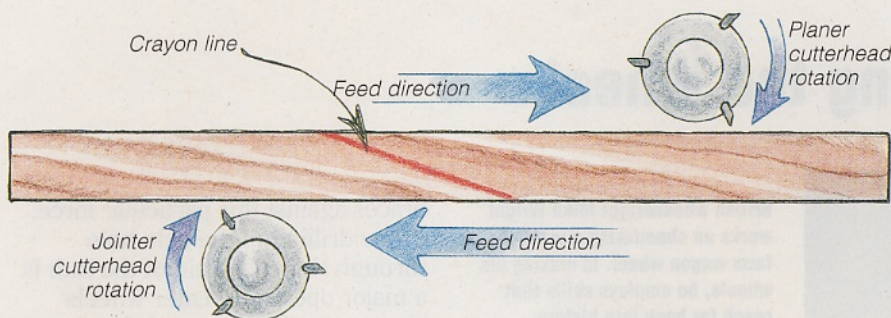


Easy Access for the Intense Turner

I find that lathe turning gets quite intense when you have gauges, scrapers and other tools half buried in shavings — all balanced on the lathe bed. The tool holder shown in the sketch is hinged at the bottom and swings out until stopped by a chain. There is room for all the usual tools as well as a drift rod, spur center and chuck key. A convenient place to hang a face plate and tool rest is at the end of the lathe frame.

*James Mossinghoff
Florissant, Missouri*





Feed Guide

When jointing and/or planing several boards I always draw a crayon line on the edge to indicate the slope of the grain. This indicates which way that particular piece should be presented to the cutterhead. I find this especially useful when making a number of passes or when dealing with an inattentive helper who may just turn boards over instead of switching them end for end.

Cindy McGaha
Russell Springs, Kentucky

Microwave Bending

When making some miniature covered wagons, I needed to bend hardwood hoops to support the canvas tops. I soaked the strips in water until they were saturated, popped them in the microwave for 20 to 30 seconds, then bent them around pre-cut forms and let them cool. This works great, but you have to work fast because such small sections cool quickly.

Bruce Harris
Fargo, North Dakota



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Reinventing the Wheel



British wheelwright Mike Wright works on chamfering a wooden farm wagon wheel. In making his wheels, he employs skills that reach far back into history.

wheels, ash is more common, because of its flexibility. Mike's were cut on a band saw, although old-time wheelwrights would seek out curved branches to make full use of uncut grain's natural strength. The felloes are connected with a 1" dowel.

The spokes were in oak, cleft and left to air dry for two years. They are tenoned into the felloes and the hub. At the felloe end they are through-mortised and securely wedged from the outer face. The tenon's shoulder is located on the inner edge of the wheel, for lateral support.

Structural timbers on wheels and wagons were beveled as much as

practicable to reduce weight while retaining strength. Because of this, mortises were tapered. The chisel for mortising out the acute corners is the bruzz, a hefty V-shaped gouge, set at about 30°.

Hubs were usually elm, because of its resistance to splitting. In the hub the spoke tenons are slightly offset from one another. This avoids the removal of too much supporting material and affords a subtle triangulation effect to brace the wheel. Another essential feature of

spoke design is the "dishing" of the wheel. Were the wheel flat, the natural side-to-side movement of a horse-drawn vehicle would quickly shatter the spokes. The inward dishing

braces against this particular force.

The drilling of the axle hole through the end grain of the hub is a major operation. Later wheels incorporated a cast steel "box" as a bearing between hub and axle; previously this was a wood against wood mechanism. The 2" to 3" hole is bored out using a device called, appropriately, the "boxing engine." A pilot hole of around 1" is made to receive the central threaded rod. The outer claw is positioned on the outside of the hub to hold the engine central. The business end, comprising four chisel edged cutters, is laboriously worked down the thread with a tommy bar to create a suitable housing for the box. Hardwood wedges are then inserted around the box to firmly fix it in position.

Woodworkers like Mike Wright have studied this process to keep alive wheelwrighting skills from the bygone era when handmade woodwork was essential to the movement of civilization.

Wheelwrighting courses are available through Herefordshire College of Technology: 44-1432-365314 (England).

— Barrie Scott

Wheelwrighting Skills

Keeping a Tradition Alive

Timber technology of the wooden wheel evolved through the centuries. Ancient efforts were solid slices of log; elegant wheels on carriages became slender, aerodynamic affairs. I caught wheelwright Mike Wright at work on a hefty farm wagon wheel at the British county of Shropshire's Acton Scott Farm Museum. He took me through some of the principles of his trade.

The six rim segments are called "felloes." Mike's are in elm. On finer

These felloes (pronounced fellies, by those in the know) — a wheel's rim segments — show the housing for the 1" dowel joinery.



The blacksmith forges a metal tire to fit the wheel. A circular fire matches the wheel size.



Northwoods Island Inspiration

Woodworker Finds His Calling in the Woods

Any attempt to separate Richard Newcom from his Flag Island surroundings, either physically or philosophically, would bring the craftsman's woodworking days to an end. "From motivation and inspiration to materials and time," reflects Newcom, "I'd have to say it never would have happened had I not come up here."

"Up here" is a remote island home in northern Minnesota. Daily existence is "do-it-yourself," and Richard's experiences, from hunting and fishing guide to carpenter and stonemason, show up in his woodcraft.

The influence of days spent laboring with the area's Native American guides is reflected in the blocky, sparse carvings that characterize his work.

Richard's wood choices reflect accessibility. A passion is cedar, scouted and selected in the fall from the low-lying swamps in the lake region. Trees must be dead, but still standing, and are marked for winter harvest when a snowmobile can be used to retrieve them.

"The cedar poses more problems than pine, for instance," points out Richard. These trees don't grow as tall and straight and they taper down more quickly, making some furniture applications a real challenge. "However, it's just that stubborn, rough character that makes people like the stuff so much."

"I didn't come up here to make furniture; I came up here to hunt and fish," Richard said. "I just fell in love with the woods and made a natural move to doing something with them. I just wish someone had told me when I was 10 years old that I'd be doing this. I would've started acquiring the skills sooner."

— Timothy Lyon



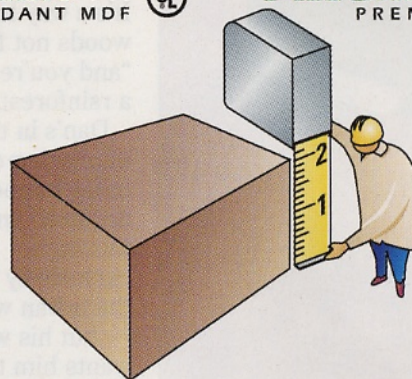
Woodcut carvings, along with rawhide and leather laced through burned cedar, reflect the influence of Ojibwe hunting guides Richard Newcom (above) has worked with over the years.



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SHOP TALK

Second Life Wood Takes First Place

Recycled Wood a Big Winner

This spring brought the fifth annual results of the Woodworker's Contest, a national event sponsored by Rockler Woodworking and Hardware. Among the winners was Dan Gindling of San Diego, California, whose beautiful CD cabinet (right) took first place in the Furniture category.

The quartersawn sycamore and walnut in the visible faces of Dan's cabinet (the drawers are oak) came from recycled urban wood: a company he works for, East-West Urban Forest Products, mills their lumber from trees downed by cities across southern California. It's a way to get some unusual woods not found in lumberyards, "and you're not cutting down a rainforest," Dan said.

Dan's in the process of phasing out the other lumber he's acquired and moving to exclusively using the urban woods — but his wife wants him to stick with the same general look because he's building things for their house.

The CD cabinet, in fact, was for his wife. "I told her this is the only CD cabinet I'm making her, so that's why it holds 700 [CDs]," Dan said. The cabinet was going into a dark corner, so Dan also added a pullout light.

The original plan was for the light to be on a walnut half-moon shaped shelf,



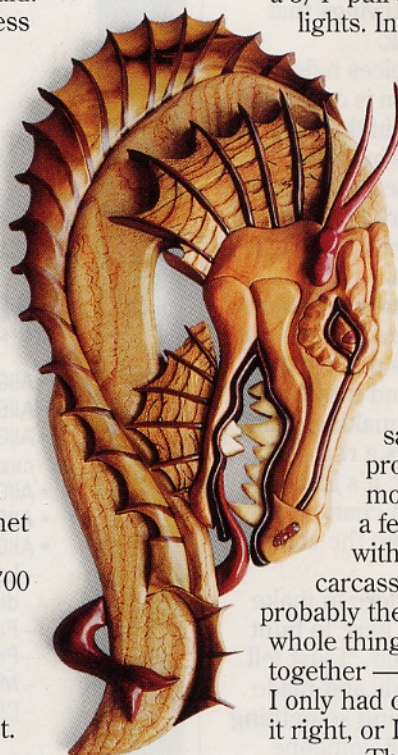
Dan Gindling's cabinet for 700 CDs was a winner — and one and a half drawers are still empty.

"but it made it look like it was a cheap add-on at the end," Dan said. He ended up shrinking each drawer enough to provide space for a 3/4" pull-out shelf with

lights. Inspiration for the curved fronts of the drawers came from a session at Dan's woodworking club, the San Diego Fine Woodworkers, presented by "Router Lady" Carol Reed. From concepting to completion, Dan said, the whole project took about six months. He called over a few neighbors to help with glue-up of the carcass. "That was

probably the scariest part of the whole thing — putting it together — because I knew I only had one chance to get it right, or I'm screwed."

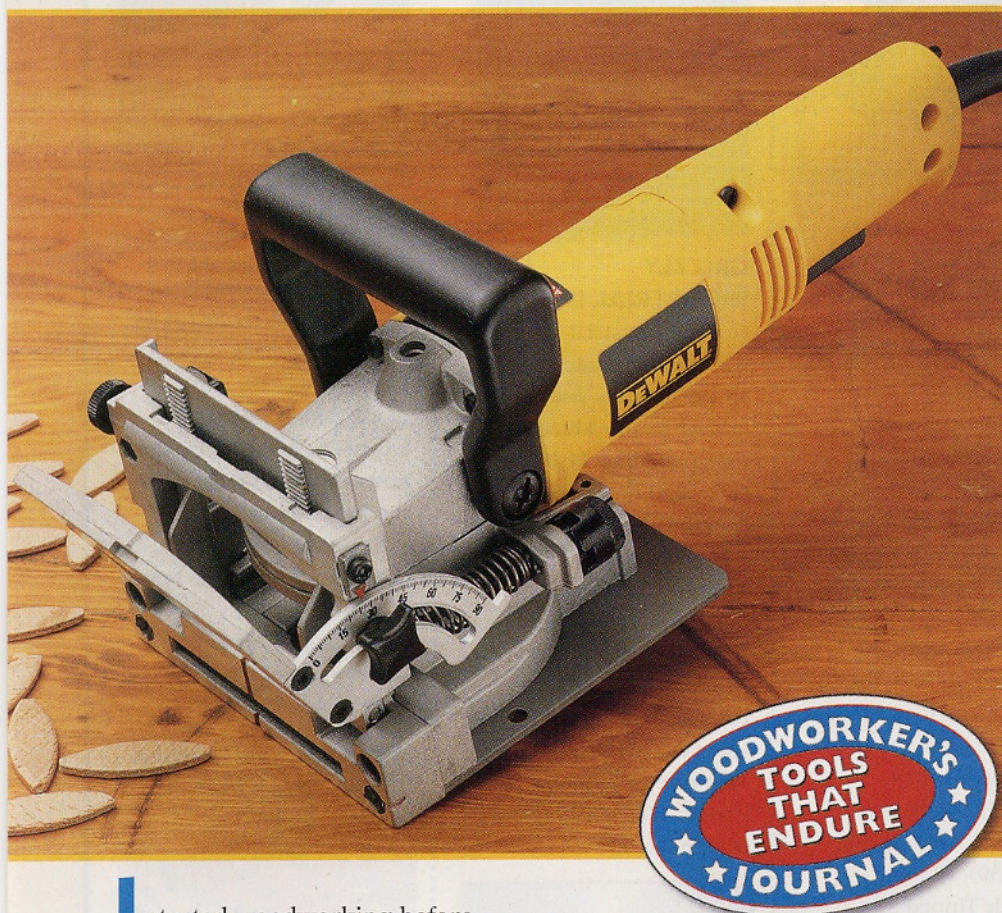
The judges of the Rockler contest decided he did get it right. For more on the winners, and details of next year's contest, visit rockler.com.



Donald Conroy of Bedford, Ohio, was an honorable mention winner in the Scroll Saw/Intarsia category for his dragon made of 94 pieces of 10 types of wood.

DeWalt's DW682K Biscuit Joiner

By Rob Johnstone



As one of a crowded field in our December 2000 Biscuit Joiner Roundup, the DW682K stood second to its newly introduced cordless cousin (the DW932K) in our review. It lacked the “NEW” hot button. But in the intervening year and a half of heavy-duty work, quality has shown its value over the cool new idea of the moment. Durability, accuracy and elegant simplicity have earned the DW682K its selection as a *Woodworker's Journal* Tool that Endures.

I started woodworking before there were biscuit joiners. And, while it is a bit embarrassing to admit my early penchant for curmudgeonly behavior, I was an early and vocal critic of the invention. To me, it seemed the woodworking equivalent of the electric can opener. Sure, it did what it was designed to do ... but so what. It accurately aligned pieces of wood while you were gluing them up. I knew about 50 tricks to get my laminated stock to line up. I also knew a few for what to do when I couldn't quite get that to happen. If you were making face frames, my double-headed Newton horizontal borer (\$1,500.00 at the local industrial woodworking supply wholesaler) was obviously a better choice. Then I moved out of my father's cabinet shop and had

to start woodworking like most of the planet does. All of a sudden, a good sturdy biscuit joiner seemed to be a much better and more practical tool than I had previously thought. Still, I kept my new appreciation tightly held ... due to my previous proclamations.

Small Shop Stand-By

The DW682K is a tool that the small shop person will find to be the answer to many woodworking questions. One of the things I like about it is that, while DeWalt does provide a manual with the tool, I have never had to read it to use the tool. (This is a confession of fact, not a recommended style of use ... it is *always* best to read the documentation provided with any

new tool.) Its use is intuitive and the dials, adjustment knobs and other features are well located and easy to use. The machine is also not finicky. Pull it off the shelf (somehow I never quite get it back into its handy carrying case), blow the dust off, and you're ready to slice some slots for biscuits.

You do need to take a moment and decide what size wafers to use and where to place them in your stock ... but that is hardly rocket science. And that, I suspect, was the real reason for my initial skepticism. If biscuit joiners were so useful, how could they also be so simple? Well, due to my biscuit joiner I don't need nearly as many tricks these days to align my stock. And without access to a double-

WOODWORKER'S TOOLS THAT ENDURE JOURNAL

Woodworker's Journal's

"Tools that Endure"

have undergone serious

hard use in the shop

and have stood

the test of time.

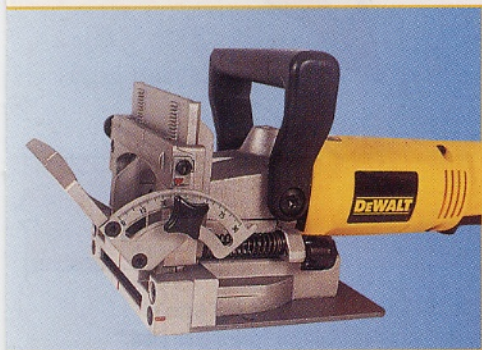
We congratulate winners

of this award for

producing tools of

superior **quality** and

lasting **craftsmanship**.



DeWalt's rack and pinion fence and D-handle are two features that add control and accuracy when using this joiner.



An easy to use control knob sets the depth for different size biscuits. In front of the knob is the single heavy-duty return spring.



A dust collection bag comes standard with the DW682K. The author was positively impressed with how well it gathered dust.

headed borer, biscuits are such an elegant and easy way to join a face frame, that I find myself reaching for my DW682K biscuit joiner more and more often.

Miter joints are another place where this DeWalt tool shines. Its adjustable fence makes putting biscuits exactly where you want them on a mitered corner a simple task. (The biscuits make assembling the miter joint a whole lot easier.) Cutting biscuit slots into mitered corners is one task where the D-handle of the DeWalt is particularly useful, because it provides added control. For most other operations, the barrel-handle is very much my preferred grip.

The D-handle and rack and pinion fence are just a couple of examples of

the practical features of the joiner. The two-fingers-wide switch is properly placed so it's easy to activate with no loss of control. And, to my surprise, the dust collection bag actually does a good job of collecting sawdust (I haven't entirely given up my curmudgeonly nature). I also like the fact that the base is large enough to clamp (or screw) to a worktop for production work.

Accurate and well engineered yet without silly frills, dependable under real world conditions and very easy to use: For these reasons I am pleased to recommend the DeWalt DW682K biscuit joiner as a *Woodworker's Journal* "Tool that Endures."



Despite his early misconceptions and prejudiced opinions, the DW682 has become a mainstay in woodworking tasks undertaken by editor Rob Johnstone.



A Simple Tradition: Paper Joinery

THIS ISSUE'S EXPERTS

Ian Kirby is a master furniture maker and contributing editor to *Woodworker's Journal*.

Michael Dresdner is a nationally known finishing expert and author of *The New Wood Finishing Book* from Taunton Press.

Rob Johnstone is the editor of *Woodworker's Journal*.

Contact us by writing to "Q&A", *Woodworker's Journal*, 4365 Willow Drive, Medina, MN 55340, by faxing us at (763) 478-8396 or by e-mailing us at: Q&A@woodworkersjournal.com.

Please include your home address, phone number and e-mail address (if you have one) with your question.

Q I have some European woodworking books and their "lingo" is quite different from what I am used to. What exactly is a "paper glue joint"? How would one go about making one? As best I can tell, it is meant to be a temporary means of attaching something.

Cindy McGaha
Russell Springs, Kentucky

A The case of two nations divided by a common language! You are correct in thinking that it is a "temporary" attachment. It's a very clever use of "yesterday's" technology. It relies on Scotch glue (English "lingo" for "animal glue") and kraft paper — the thick brown paper in which they used to wrap parcels (the best is shiny on two sides).

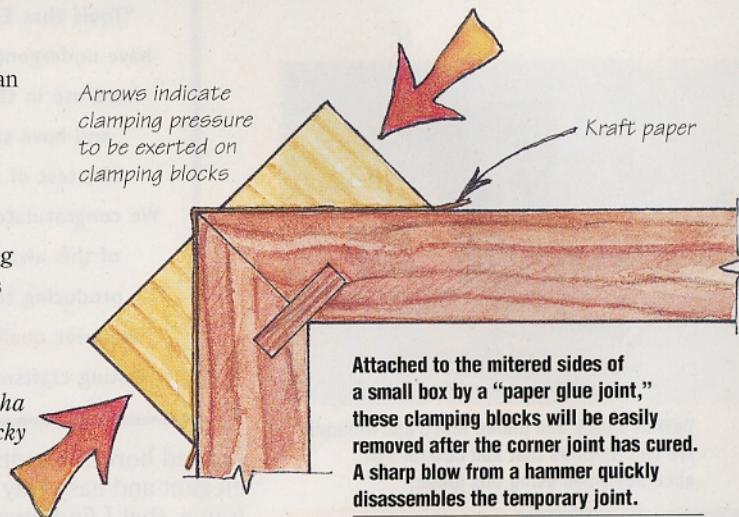
The hot glue is brushed onto each wood surface; the paper put between and the parts pressed together by rubbing until the glue "gels" and stiffens (no clamps). When you want to separate the parts a sharp hammer blow to one of them splits the paper, leaving half on each surface.

It doesn't have a lot of application. I've used it to glue clamping blocks onto mitered corners for frames and carcasses (wide board boxes).

— Ian Kirby

Q I recently tried a stain and polyurethane in one product on some craft and furniture projects, but the results are not very satisfying. I cannot get it to brush out very well, using

Arrows indicate clamping pressure to be exerted on clamping blocks



Attached to the mitered sides of a small box by a "paper glue joint," these clamping blocks will be easily removed after the corner joint has cured. A sharp blow from a hammer quickly disassembles the temporary joint.

either those cheap foam applicators or expensive bristle brushes. The appearance is nowhere near as good as the nice finish I get when I apply stain and polyurethane separately. What is the best way to use this product?

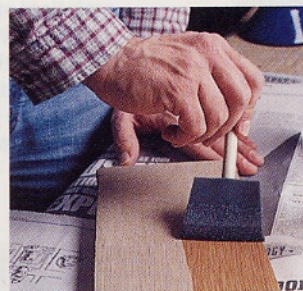
Ryan Vogt
Urich, Missouri

A As you've discovered, it is usually best to apply stain and polyurethane separately. Trying to do two finishing operations in one can be as foolhardy as trying to shower and dress simultaneously. Techniques that work well for stain application are different than those that work best

for brushing on clear finishes, and separating the two steps gives you more control over each operation.

However, there are times when these tinted coatings are just the ticket. One of the common techniques for darkening an existing finish (or for making already stained and sealed wood look both darker and more uniform) is to use a tinted varnish. Like the product you described, a tinted varnish has some small amount of color added to it. If you brush it on very evenly, it will act as if you have stretched a piece of translucent colored film over the wood. The key, though, is to apply it very evenly, and admittedly, that requires quite a bit of skill with a brush.

— Michael Dresdner



Successful application of one-step stain/polyurethane finish comes with perfectly even application, which is very difficult.

Q I recently saw a turned bowl where the surface consisted of 2" - 3" naturally round stained wood sections. The infill space consisted of what appeared to be black plastic.

continues on page 24 ...

The composite system was highly polished. I would like to attempt to replicate this on the lathe. Does one of your experts know how it's done?

*Dr. H. James Schroeer
Orange Park, Florida*

A I was privileged to attend the "Wood Turning in North America since 1930" exhibit last fall. In that collection was a bowl created by Philip Moulthrop that matches your description exactly. According to the literature for the show, Mr. Moulthrop first turns a spheroid shape and then covers it with a layer of black



Epoxy and sawdust are keys to creating turnings like this one.

epoxy mixed with sawdust. He then embeds cross sections of branches into the epoxy mixture. After the cross section, epoxy and sawdust layer has cured, he

returns it to the lathe and turns the piece to its final shape. This includes some ultra-fine sanding and polishing.

— Rob Johnstone

*Photo from the Wood Turning Center Library, Philadelphia, PA, USA.
Philip C. Moulthrop;
Mosaic Bowl, 1994;
White pine cross sections, epoxy, sawdust, H 11 x Diam 19 1/2; Collection of Yale University Art Gallery, Gift of Ruth and David Waterbury, BA 1958, in honor of Patricia E. Kane, 2000.93.1; Photo by John Cariano.*



WINNER! For simply sending in his question on turning, H. James Schroeer of Orange Park, Florida wins a **Bosch 1640 VSK fine cut saw**. Each issue we toss new questions into a hat and draw a winner.

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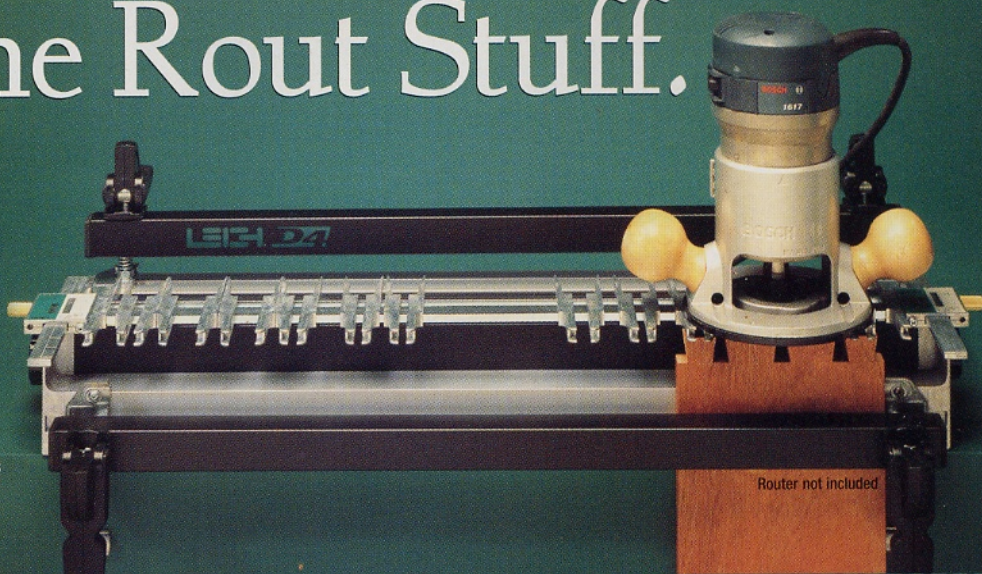
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Table Saw Basics

By Ian Kirby

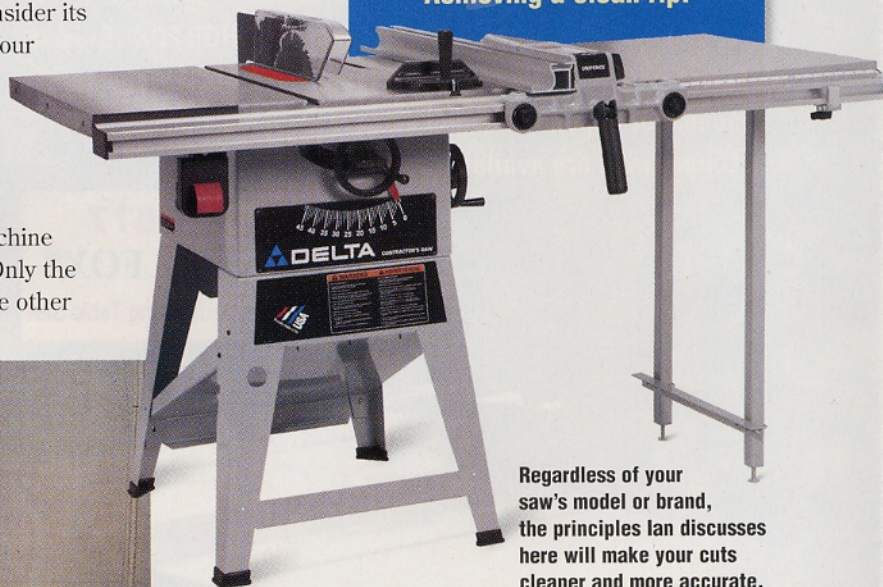
In most woodworking shops you will probably find a table saw operating as one of the essential workhorses. That's not surprising when you consider its impressive versatility. A table saw can perform four operations:

- rip solid wood,
- crosscut solid wood,
- cut manufactured sheet material (MSM),
- and shape solid wood and MSM.

The four operations require four different machine setups and four different operator techniques. Only the first operation will be covered in this article. The other three will be covered later.

In this installment
Ian discusses the following:

- Setting up your saw for precision cutting.
- What to look for in an effective fence.
- The importance of using a splitter.
- Are safety guards safe?
- Essential push sticks.
- Achieving a clean rip.



Regardless of your saw's model or brand, the principles Ian discusses here will make your cuts cleaner and more accurate.

In the Beginning ...

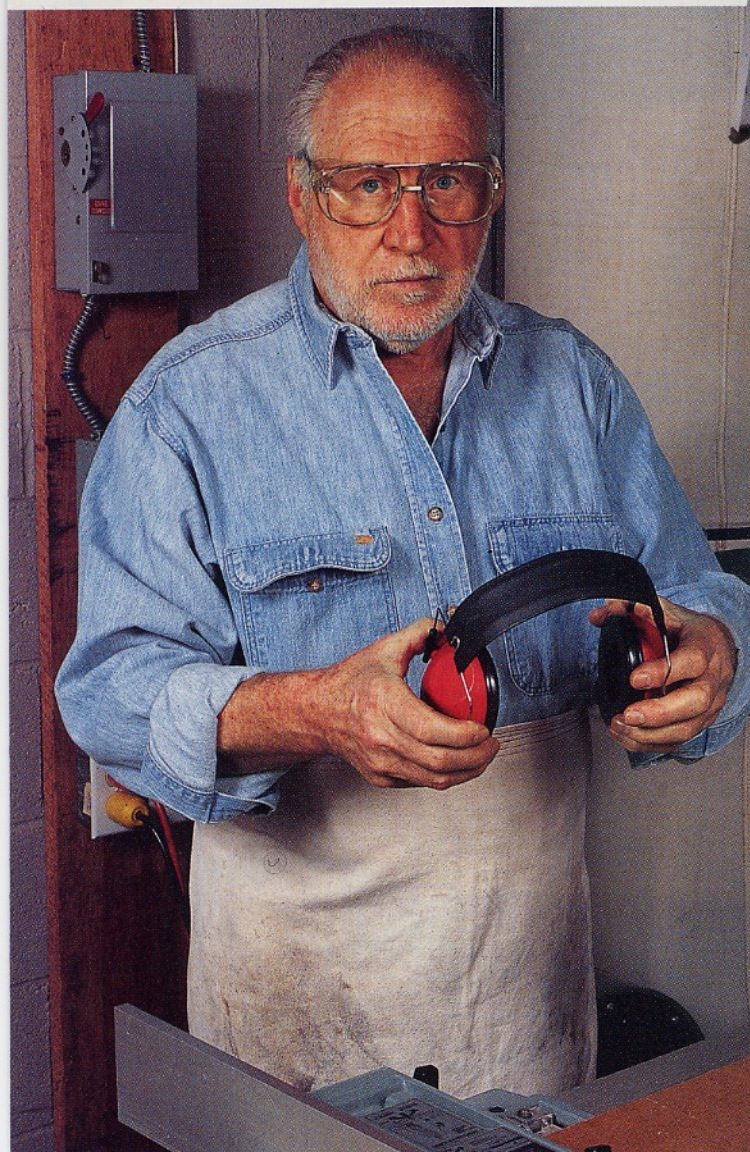
Early table saws were made of massive cast iron parts and had large diameter blades. They were industrial machines built and perfected for one purpose: to rip solid wood parts into smaller parts.

Over the past 50 years, various manufacturers have offered smaller and less expensive models to satisfy the demands of amateur and small shop professionals. The outcome is the three models most widely available today: benchtop saw, contractor's saw, and cabinet saw.

Aligning the Arbor and Table Slots

The miter fence runs in one of two slots milled across the table. You cannot make an accurate crosscut unless the slots are parallel to the blade and at right angles to the arbor. Before starting any check involving the blade, *unplug the machine from the power source*. It's unsafe to rely on the on-off switch. Tighten a blade onto the arbor and raise it to full height. Next, lay a straightedge tight to the blade, avoiding contact with the teeth. You may have to lower the blade slightly to accomplish this. Using a vernier caliper, check the

Master woodworker Ian Kirby offers sage advice for getting the best from your table saw while protecting your eyes, ears, lungs and fingers.



distance from the straightedge to the slot edge at each end of the slot. If the blade and slots aren't aligned, check the factory manual to see what procedure is required for your saw. This is a one-time adjustment.

I'll now introduce the five table saw parts that require close attention if you are to get the best results from your machine.

The Arbor

The arbor must be dead straight. If it's bent, the blade will wobble as it revolves. Deviation from perfect rotation is called runout. A bent arbor is most unusual and is best solved by a factory replacement. Runout may also occur if:

- the blade is distorted,
- the bearings are worn,
- or the shoulder of the arbor is not perpendicular to the axis of the arbor (check for burrs).

Table Insert

The table has an aperture fitted with a slotted insert through which the blade rises and falls and the splitter projects. The insert must fit snugly in the aperture, sit level with the table surface, and resist deflection. Check for level with a straightedge and, if necessary, adjust the four screws which sit on the lugs cast into the insert opening.

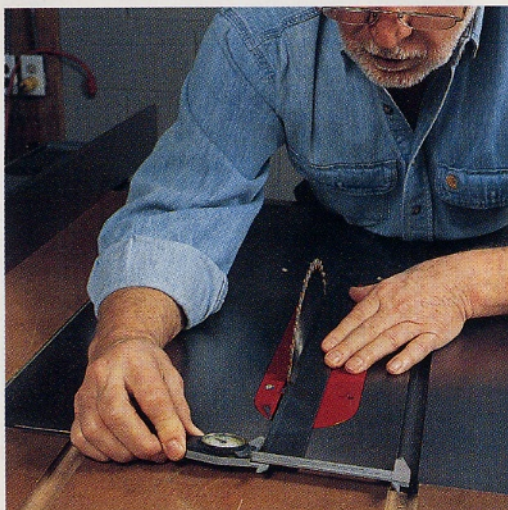
Fence

Other than blades, the fence is the most frequently purchased after-market part on a table saw. It should have these characteristics:

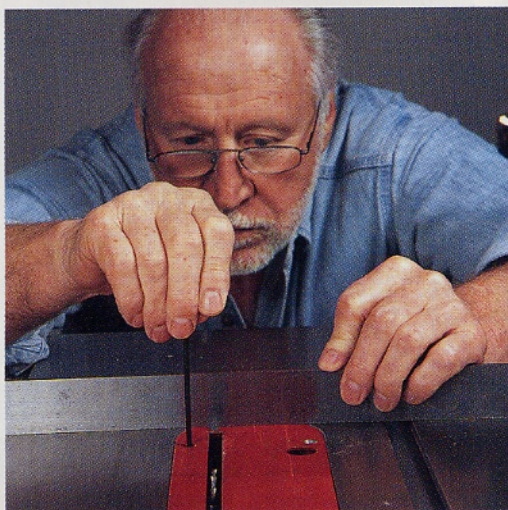
- it should be easily moveable up to and away from the blade,
- it should be parallel to the blade and at a right angle to the table surface when locked,
- it should not deflect from its locked position during sawing,



The first step in checking the alignment of the blade with the miter slots is to lay a straightedge tight to the blade. Avoid contact with the teeth.



Check the distance from the straightedge to the slot with a vernier caliper at each end of the slot. Note the unplugged red power cord in the background.



To ensure that the insert is level with the table surface, measure with a straightedge and adjust the leveling screws as necessary.

- it should be able to slide "fore and aft" so that it can be locked fully or half-way across the table.

These characteristics were achieved on older machines by using big heavy castings with large handwheels and gears. Modern machines have achieved them by gradually improved engineering design.

An especially good feature on some after-market fences is the ability to easily adjust them parallel to the blade. Some woodworkers advocate "toe-out," which means setting the gap between blade and fence wider at the back edge of the blade than at the front edge. Although alleged to reduce "kickback," toe-out in fact increases the risk because it allows the back edge of the blade to contact the falling board — if you don't use a splitter. Other results of "toe-out" are a ragged sawn surface and an inaccurate cut.

Splitter

The best protection against kickback is the splitter. The old industrial machines had the design down cold. The splitter was the thickness of the kerf. It was curved to follow the arc of the blade and it could be set to within 1/4" of the teeth. Best of all, it was part of the rise and fall mechanism, so it moved up and down with the blade. When the splitter is mounted separately, the distance between it and the blade increases as the blade is lowered — not the ideal arrangement.

With the splitter correctly placed, it's practically impossible to induce a kickback. For kickback to occur, the wood must distort so that it is thrust into the rear blade teeth as they rise from the bed.

The blade will lift the wood from the table, carry it to the top of the arc of the blade, and kick it back at the operator. Since the tooth speed of a typical 10" saw blade is 120 mph, that generates enough power to convert a piece of wood into a dangerous projectile. Kickback cannot happen, however, if the back edge of the blade is guarded by the splitter.

Television and video stars and trade show demonstrators regularly work without a splitter in place. The usual explanation is that the *guards have been removed* to show the operation more clearly. A more accurate way to describe the practice is that the *blade has been exposed* to more clearly show how dangerous the operation is.

On many machines the splitter and the top guard are part of the same assembly. It's a clumsy design with unsatisfactory performance, so many woodworkers remove them, citing the nuisance of remounting.

Table Saws Are Hazardous

Danger has two components: hazard and exposure.

A hazard has the potential to cause injury. Exposure is the likelihood of coming into contact with the hazard.

An unguarded spinning blade poses a serious hazard.

Note that "experience" or a declaration to "be careful" in no way reduce danger.

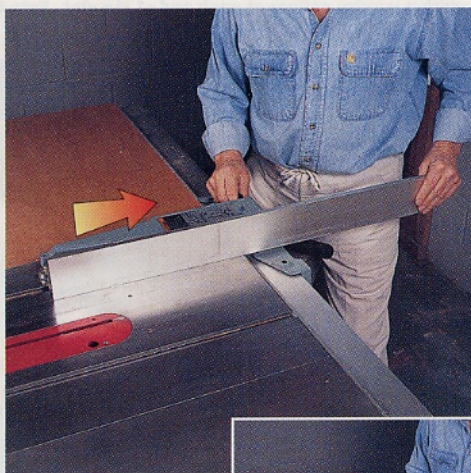
Twenty years of injury-free cutting with an unguarded blade offers no protection if the wood suddenly distorts, you are startled by a loud noise, or you suffer a dizzy spell. Guard the blade!



The author does not recommend "toe-out" at the back end of the fence. Lay a straightedge tight to the blade and adjust the fence until it is parallel.



Using a try square, adjust the fence so that it is at right angles to the table surface. Both adjustments are especially easy on a Delta Unifence.



Being able to adjust the fence fore and aft is a major advantage when ripping solid wood. If your fence is fixed, attach a wooden auxiliary fence.



You must replace them, either by making your own or buying an after-market model. Biesemeyer makes a separate splitter, complete with anti-kickback pawls which fit most saws.

Pawls are a relatively recent addition on U.S.-made machines; they are not found on European saws. The pawls present a number of difficulties. You can't withdraw the workpiece once it has started to pass under them. Pawls mounted on the splitter prevent designing a splitter that rises and falls with the blade. The pawls press upon the surface of the wood and sooner or later will hang up on a knot, crack or narrow falling board. And finally, if you are making a tapered board parallel, the triangular falling board gets jammed between splitter and pawl. I prefer a plain splitter, without pawls, that rises and falls with the blade.

Top Guard

It's a lot easier to describe what is required of a top guard than to design one that has all the answers. Unfortunately, guards without the answers tend to get removed.

The guard should cover the blade but allow the operator a clear view of, and easy access to, the work. It must be robust enough not to deflect or break under pressure or impact. It must allow the use of push sticks. I prefer a guard that doesn't touch the workpiece because sooner or later it will get hung up on it. Since most top guards are attached to the splitter, removal multiplies the danger because not only have you exposed the blade, you have also removed the kickback control offered by the splitter.

After-market guards are available in two basic types: a metal basket or plastic cowl that encloses the blade; a square plastic plate that sits above the blade. Both types offer various mounting options: left and right of

Crucial Safety

- Protect hands and fingers from contact with the saw blade by guarding the blade with a top guard and using push sticks.
- Prevent kickback by proper machine setup, correct operator technique and guarding the blade with a splitter.

Recommended Safety

- Hearing: guard your hearing with earmuffs.
- Vision: guard your eyes against flying debris with safety goggles.
- Breathing: guard your lungs with a dust exhaust system or face mask.

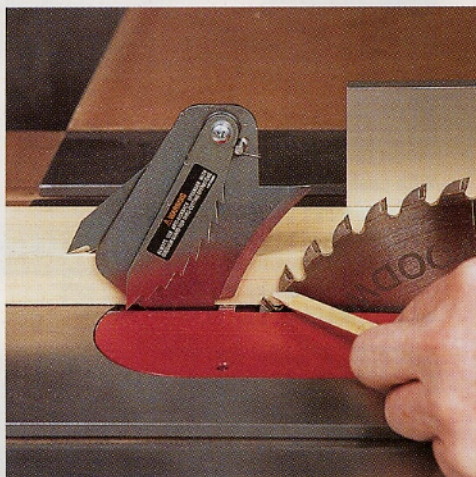
the table, cantilevered, and ceiling-mounting if your shop space and practice makes that a practical solution.

Push Sticks

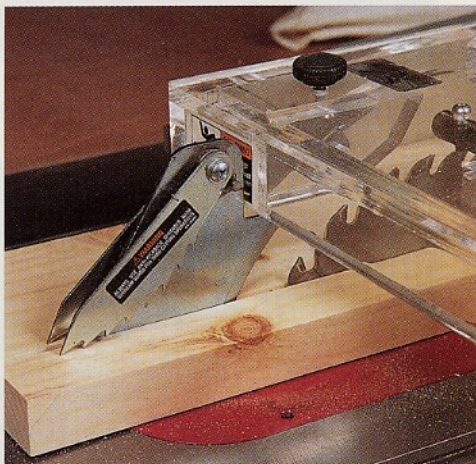
Wooden push sticks are an essential but expendable shop-made accessory. A push stick is an extension of your hand that allows you to both advance the work and hold it down while keeping your hands 6 - 9" away from the blade. You should always have a pair ready to use on the saw table, one on the right and one on the left. Whenever you feel the urge to touch a piece of scrap that's anywhere near the blade, train yourself to pick up a push stick instead. Designs abound, but it's pointless to make anything but the simplest kind because they are sure to get chewed up and need replacement.

Ripping Solid Wood

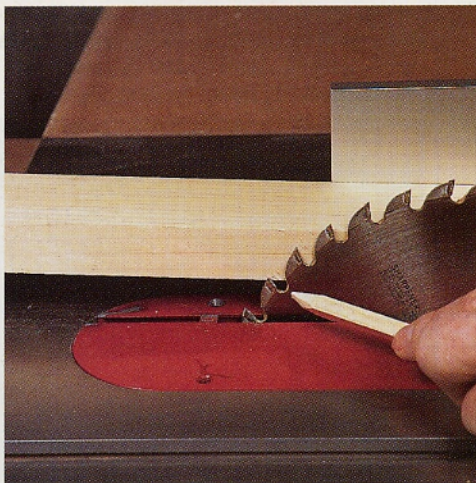
The expression "flat as a board" must have been coined by someone examining a board after a woodworker



This after-market splitter made by Biesemeyer prevents the work from being thrust into the rear blade teeth. Available for many saw models, it offers the additional convenience of being easily mounted and removed.



Pawls can hang up on the work, as shown here, when the falling board is narrower than the gap between pawl and splitter.



How kickback starts: the absence of a splitter allows the rising rear teeth to lift the work from the table saw surface.

had made it so because few boards come flat. Let's assume, however, that the one you are about to rip has a face side and a face edge and that you are going to cut it accurately to width. A face side is flat in length, flat in width, and out of winding. A face edge is flat in length, flat in width, out of winding, and square to the face side. (See *Marking Up for Success*, *Woodworker's Journal*, February 2001.) I'll deal with "breaking down" wood without a face side and a face edge in a subsequent article.

The Setup for Ripping

Fence – Set the fence to the width of the cut required. Set its fore and aft position so that it extends from the front edge of the table to the back edge of the blade. This allows the wood to distort outward, as it often does when ripped. A fence that extends all the way across the saw table acts as a barrier. If the work distorts towards the fence, it's forced into the blade.

Splitter – The splitter is essential when ripping solid wood.

Top guard – The top guard is essential when ripping solid wood.

Starting the Cut

Stand comfortably in front of the saw but left of the line of cut. Locate yourself by touching the base or leg with your left foot. This habit enables you to return to the same position for all cuts. Anchor your body and keep your balance by pressing your hip or midriff against the edge of the table. Begin ripping with the face side down and the face edge tight against the fence. Advance the wood with your right hand while pushing it against the fence and down on the table with your left hand.

Keep your eyes mainly on the contact line between workpiece and fence while checking other critical points: that the path is clear after the

cut, the wood is clearing the splitter, the wood isn't distorting after the cut. The least important check is the saw cut. That will take care of itself.

Normally you begin the cut with the board flat on the table. However, it's OK to have the tail end lifted, especially if the board is long or heavy. Not OK is to advance the board so that its front end is above the table. The revolving blade will slam the board down hard on the table. If you've got a finger under it — ouch.

Feed rate — If you burn the wood with a sharp blade, you are feeding it too slowly. A slow feed rate increases heat due to friction. You are feeding too fast if the motor starts to labor, although this is less likely than burning. Feed the wood at a steady rate without stopping. You make a score mark on the cut face every time you stop.

The End Game

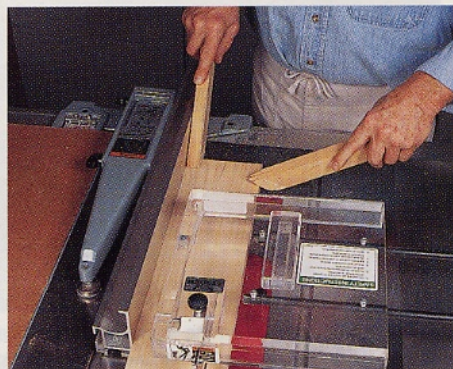
No matter how long the work, operator practice is the same every time the trailing edge reaches the front edge of the saw table. Let go with your right hand and pick up the push stick — which you positioned at the start of the cut — while maintaining forward motion with your left hand to avoid a score mark. Continue a comfortable push rate with the right-hand push stick while picking up the left-hand push stick. As the remaining uncut portion gets shorter, gradually turn the left-hand stick until it's at right angles near the end of the cut to ensure continued close contact between workpiece and fence. At the end of the cut, advance the completed workpiece beyond the blade and splitter with the right push stick. With the workpiece clear, withdraw your right hand and use the left push stick to move the falling board to the left of the table. The splitter prevents it from contacting the



With push sticks at the ready, advance the work slowly at the start, then at a faster pace without stopping. Push sticks are essential to safe operator practice, easy to make, and disposable.



When the trailing edge of the work reaches the front edge of the table, that's your signal to call your push sticks into action.



As the cut reaches the trailing edge of the work, maintain contact against the fence with the left-hand push stick. The Brett-Guard, favored by the author, allows a clear view of your work and convenient passage for push sticks.



At the end of the cut, remove the left-hand push stick and advance the work through the saw with the right-hand push stick.

back of the blade. Retrieve the workpiece by walking around the table. Never pick it up by leaning over the table surface from the front.

Results are What Matter

Check and measure the results of the cut. Woodworkers often assume that an accurate machine setup guarantees accurate results. It doesn't work that way. Even if the machine is right, you are working with solid wood and feeding it by hand. Different feed rates, tension within the wood, stops and starts — these and other variables are reflected in the cut surface. Industry achieves consistency by using power rollers mounted in front of and behind the blade.

Begin by checking at each end of the workpiece that the sawn edge is square to the face side — the side that was down on the table. If it's not square, check with winding sticks that the workpiece didn't go into twist — it happens.

Check for straightness with a straightedge. Check the width at each end with a vernier caliper.

Now inspect the sawn face. If the saw is correctly aligned, it will be smooth and unblemished. A burned face is nearly always the result of feeding too slowly. Another culprit is resin buildup on the teeth.

If any of the edges are ragged, chances are the edge is being brushed by the rising back teeth. The usual cause is an out-of-parallel fence. A single saw mark and a slight burn near the end of the board is probably where you stopped to pick up the push stick. You may slow down at this point, but don't stop.

Ian Kirby is a master of the British Arts & Crafts tradition and author of "The Accurate Table Saw — Simple Jigs and Safe Setups."

HOOSIER STEP STOOL

By Ralph Bagnall

Many of us are familiar with Hoosier style baking cabinets, but only a few know that the manufacturers of these cabinets also made a wide range of accessories to outfit the modern kitchen of 1920. A few months ago, my wife came across one such accessory listed on eBay. It was a dual-purpose piece of kitchen furniture — a classic stool design that Bobby Knight would never dream of tossing across a basketball court floor. This Hoosier Step Saver was a nice enough looking seat, but it turned out that the stool concept was only half the story: flip the piece over and the three good sized stretchers became rubber covered steps to help the vertically challenged reach that elusive pan on the top cabinet shelf.

On a lark, I contacted the online seller, Dave Broker of Hutchinson, Kansas, and he was kind enough to provide details on the dimensions and construction of his stool.

Mollie Hinderaker takes a break between kitchen tasks as she helps cook another fine meal for the Hinderaker clan.



With strong and sturdy joinery, ash lumber and a nod to the past, our author builds a kitchen classic poised for a good old down-home revival.

Getting Started

Although the original stool was made from oak, I chose ash for this reproduction. Modern red oak tends to be a bit porous for my taste, and ash can easily be finished to closely resemble antique oak. All of the parts are $\frac{3}{4}$ " thick, so there is no problem if you need to purchase stock from your local home center, and at a grand total of seven board feet to complete the project, it won't break the bank.

Begin by ripping the stock for the legs and stretchers (pieces 1 and 2). See the *Material List* on the following page for the complete bill of materials. The legs and stretchers are all cut from $\frac{3}{4}$ " x $1\frac{1}{2}$ " stock. See the *Cutting Diagram* at the top of page 36. The steps and top (pieces 3 and 4) are made up of 5" wide stock, so take a few minutes and rip the bulk of the stool's parts to their proper width. With that task done, crosscut all the main parts to their final dimension. The only exception I made was to cut the parts for the top to $14\frac{1}{2}$ " long (just a little oversized) to make the glue-up an easier task. To keep the process

Evoking the thrifty Midwestern economy of effort, the *Hoosier Step Saver* did dual duty in 1920s kitchens across the country.



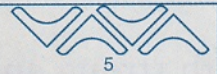
Cutting Diagrams

1	1	2	2	2	2
1	1	2	2	2	2

3/4" x 4" stock

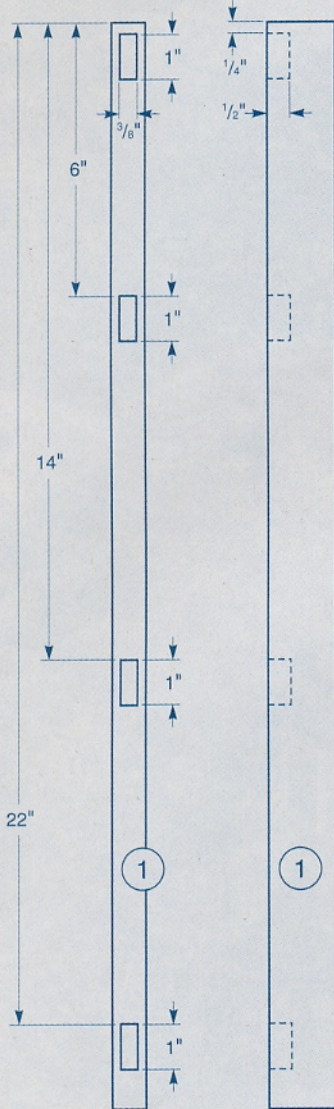
3	3	3	4	4	4
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3/4" x 6" stock

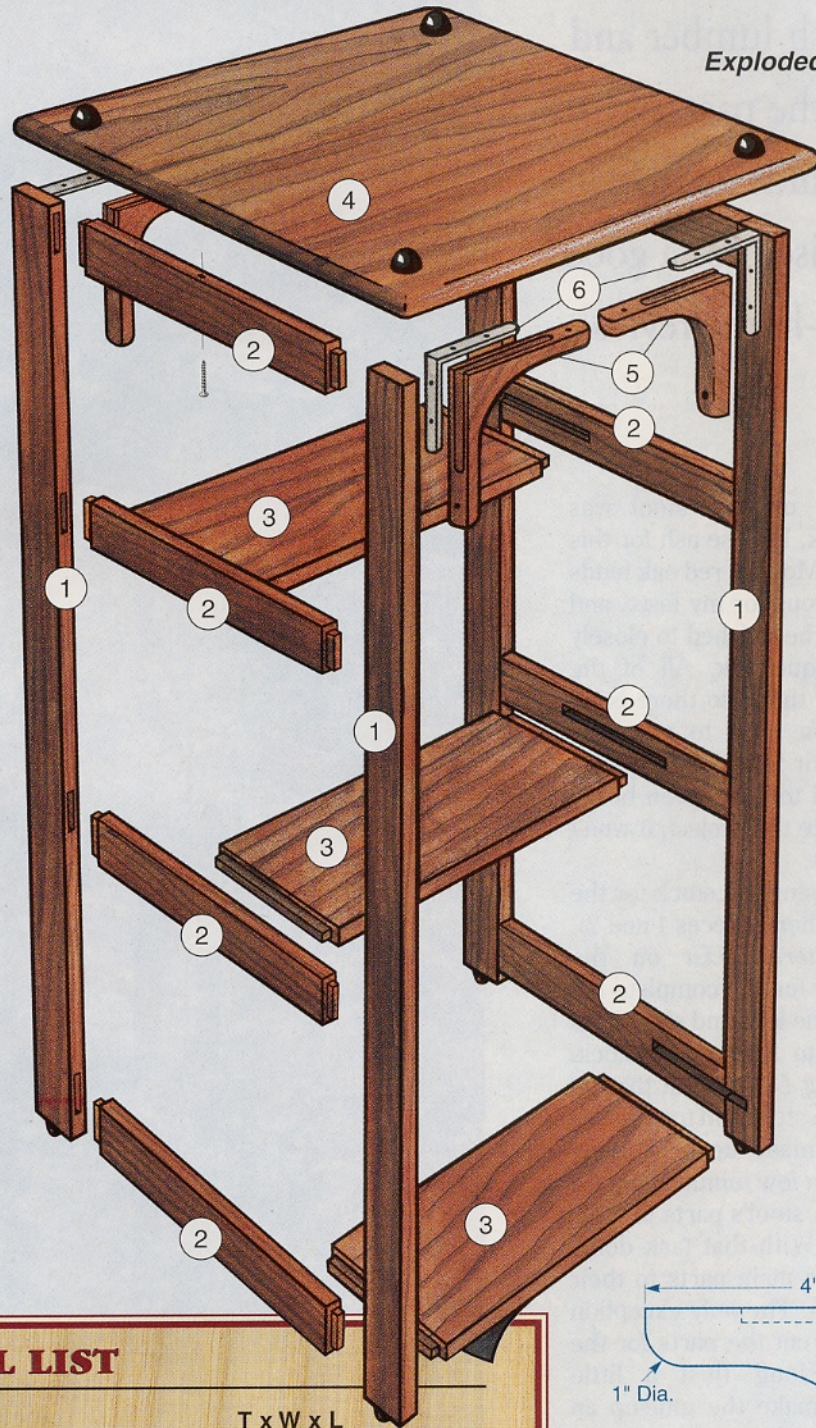


Legs

(Inside and Side View)

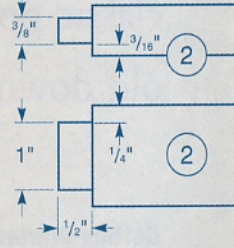


Exploded View



Stretcher

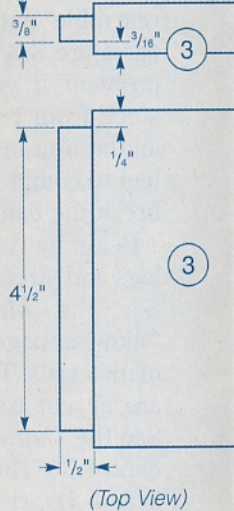
(Top View)



(Face View)

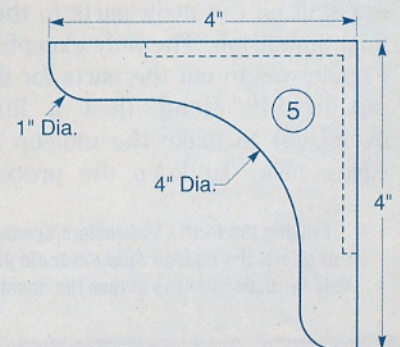
Step

(Front View)



Brace

(Front View)



MATERIAL LIST

	T x W x L
1 Legs (4)	3/4" x 1 1/2" x 23 7/8"
2 Stretchers (8)	3/4" x 1 1/2" x 10"
3 Steps (3)	3/4" x 5" x 11 1/2"
4 Seat (1)	3/4" x 14" x 14"
5 Braces (4)	3/4" x 4" x 4"
6 L-Brackets (4)	Steel

The original Hoosier step stool was among the products produced by the **Hoosier Manufacturing Company** of New Castle, Indiana. Hoosier was the leader among more than 40 companies — almost all of them based in Indiana — that made kitchen furniture in the early 20th century.



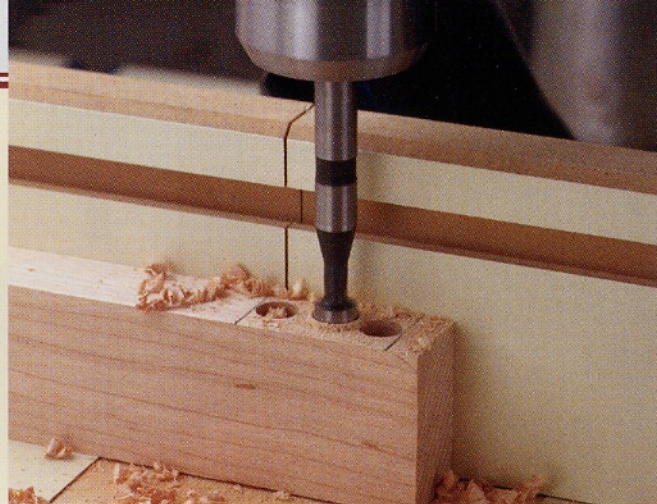
moving smoothly, glue the three seat parts together to make the seat blank and set them aside for now.

Machining Details

Like many woodworkers, I find it easier to cut my mortises first and then make my tenons to fit them. To remove the bulk of the waste I used a 3/8" Forstner bit chucked into my drill press and laid out all the mortises with a simple center line and cross marks to indicate the ends of the mortises. The logical next step is to square them up with a chisel. This is another place where the choice of ash over oak is a benefit. If your chisel is sharp, it will cut through ash like a hot knife through butter. Taking time and being accurate with this step will ease a lot of the sanding after assembly.

Begin making the mortises by boring out the waste using a sharp Forstner bit.

All you need to locate the mortise is a center line and two cross marks indicating the ends of the mortise.



Pare the walls of the mortise with a couple of sharp chisels. Like most woodworkers, the author creates his mortises and then forms the tenons to fit the openings.



Ash lumber is easier to pare than oak, and is more than sufficiently strong for this step stool's rigorous daily tasks.



The tenons are easy to form since they can all be cut from a single setup on the table saw. The shoulders and cheeks are all 3/8" wide. Set up a stacked dado blade with a sacrificial board fastened tight to the rip fence. Use some scrap wood (cut to the same dimension as your project stock) to fine tune your setup until the tenons fit snug — but not overly tight — then cut tenons on all of the stretchers and steps.

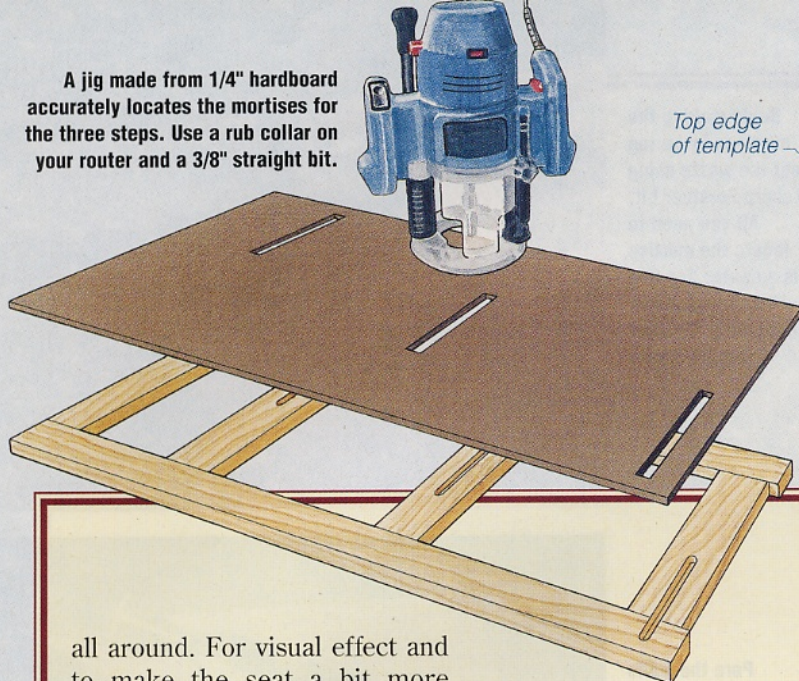
You will need pre-drilled holes in the top stretcher to mount the seat. Refer to the *Drawings* at left. After assembly, a conventional drill will not fit between the stretchers, so I used my drill press to bore a 3/16" hole through in the exact center of the 3/4" face. Finish up these holes with an appropriate countersink.

Beginning Assembly

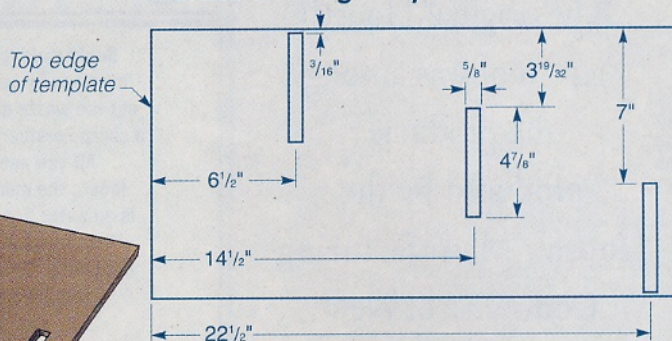
Assembling the stool is pretty much woodworking by the numbers, but you don't want to get ahead of yourself. Start by gluing up the two side assemblies, checking that all of the faces are as flush as possible and that the countersinks in the top stretchers are on the inside of the frame, facing up. Clamp them up, check them for square and set them aside and allow the glue to cure.

While you have a moment, it is a good time to cut the seat to final size and radius the corners to 1" and sand the edge smooth

A jig made from 1/4" hardboard accurately locates the mortises for the three steps. Use a rub collar on your router and a 3/8" straight bit.



Mortise Routing Template



all around. For visual effect and to make the seat a bit more comfortable, the top edge is milled with a 1/2" roundover bit, and the bottom edge with a 1/4" roundover. All that remains to do for the seat is a final sanding and, of course, the finish.

Once the side assemblies are dry, they each need three mortises cut to accommodate the steps. You can either carefully mark out and hand cut these, or make up a template as shown above and mill them with a router. Be sure to flip the template over when doing the second side assembly. They must be mirror images of each other.

Clever Corners

The original unit had oak corner braces to help mount the seat. I made mine (piece 5) from the remainder of the 6" board as shown in the *Cutting Diagram* on page 36. The braces are rounded over, sanded, and mounting holes are drilled and countersunk. Because of the hard use this stool will take, I wanted to add steel corner braces (pieces 6) to reinforce the joint, but I didn't want them to show. The solution is to undercut or rout out the inside edges of the brackets and screw them in place over the steel braces. I did this on my router table as shown in the photo at left.

With the pieces prepared for final assembly, I chose to pre-finish the parts. All of the corners and possible glue lines could be difficult to work with if I stained it after assembly. I mixed a red mahogany stain in Danish oil. With a couple of tries, I got a very close color match to the original. Be sure to mask off the tenons and mortises or your joints

will not glue well.

Finally, the stool begins to take shape. Glue the steps in place and clamp the frame together. I did

this with the unit standing on my table saw top so that the four feet would be on a dead-even surface.

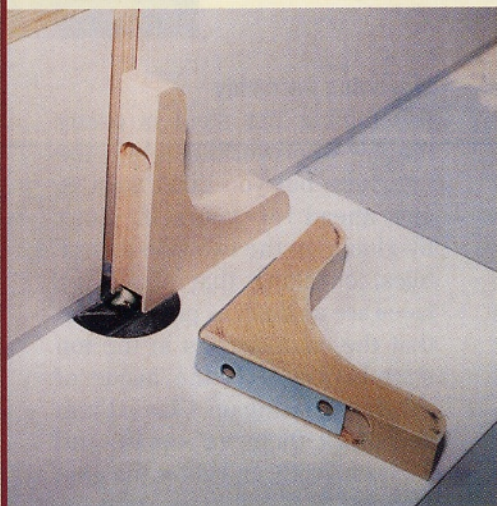
Set the seat face down on the workbench and center the frame on top. Secure the frame with 2" black finish screws and attach the steel brackets with screws as well. Lastly, mount the wooden braces, effectively hiding the steel brackets.

Kitchen-safe Finish

With the stool assembled, apply your top coat. I used two coats of polyurethane with a wax follow-up. Once the finish is fully cured, the rubber treads (rubber carpet runners trimmed to size) can be added to the steps. Cut them to size and apply them with contact adhesive. Then add the feet. The original used steel pronged feet, but I substituted rubber (available from Rockler Woodworking and Hardware) for the sake of safety. Attach one to each corner of the top about 1" in from the edges, and one to the center of each foot.

This is a fun project to build. Its simple traditional joinery and basic cut list make it an excellent project for beginner and expert alike. Oh, and the original on eBay? It sold for a bit over \$300.00!

Ralph Bagnall is a New England woodworker and frequent contributor to Woodworker's Journal and the Women in Woodworking web site.



To be sure his stool would stand up to the rigors of everyday use, the author mounted steel L-braces to the seat and legs. He cleverly hid the apocryphal hardware in wooden corner brackets by routing a pocket.

Portable Outdoor Chairs

By Rick White



Look behind
the centerspread
for step-by-step
instructions!

Fun to make, comfortable to sit in and surprisingly lightweight, these outdoor chairs will be a welcome addition to your backyard. Made from white oak, they'll provide years of service.



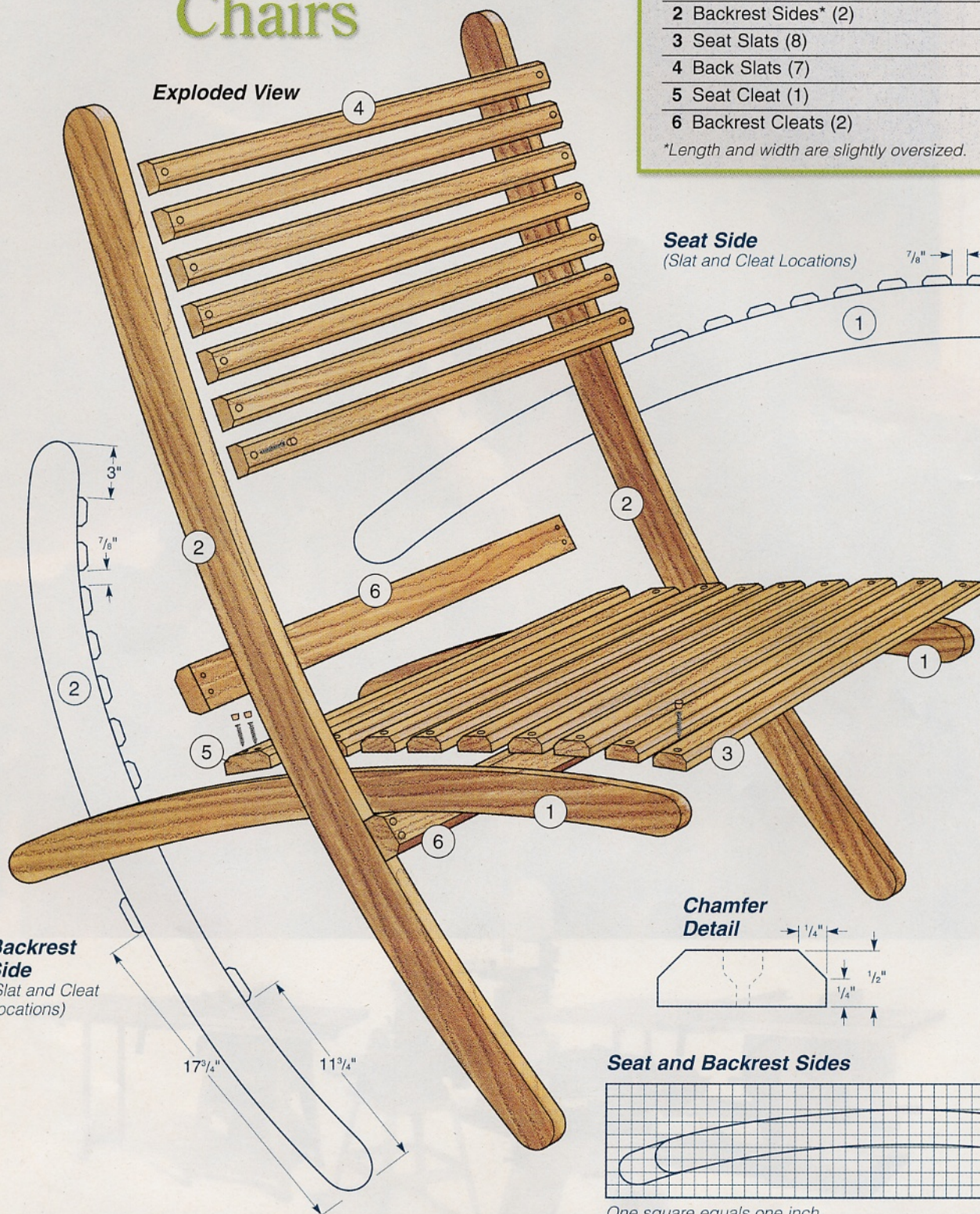
Portable Outdoor Chairs

MATERIAL LIST

	T x
1 Seat Sides* (2)	3/4" x 6
2 Backrest Sides* (2)	3/4" x 6
3 Seat Slats (8)	1/2" x 7
4 Back Slats (7)	1/2" x 7
5 Seat Cleat (1)	3/4" x 2
6 Backrest Cleats (2)	3/4" x 2

*Length and width are slightly oversized.

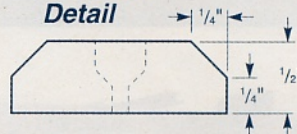
Exploded View



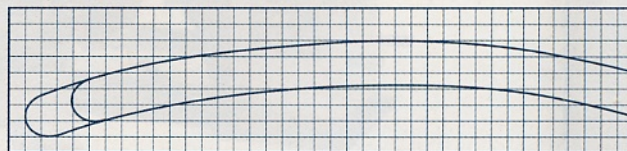
Seat Side

(Slat and Cleat Locations)

Chamfer Detail



Seat and Backrest Sides



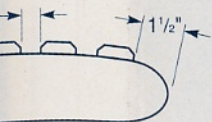
One square equals one inch.



Since 1919, Delta has been making serious

T x W x L
3/4" x 6 1/2" x 44"
3/4" x 6 1/2" x 41"
1/2" x 1 1/2" x 17 3/8"
1/2" x 1 1/2" x 18 15/16"
3/4" x 2" x 17 3/8"
3/4" x 2" x 18 15/16"

zed.

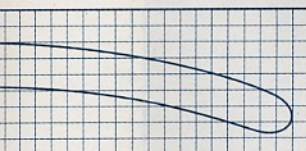


With perfectly-sized templates completed, the author transfers the shapes onto the seat and backrest stock. Then he band saws the pieces to shape, keeping just outside his pencil lines.



Whether you're sitting around a warm fire after a day in the boat, cooling your heels at camp after chasing upland game, or just leaning back and soaking up a couple of cold ones after you mow the lawn, it's nice to have a comfortable place to take a load off. These slide-together outdoor chairs are not a new idea; in fact, the inspiration for this updated white oak version was rolled out 18 years ago in the May/June 1984 issue of *Woodworker's Journal*. I did spruce up the design a bit (with some help from my cohorts here at the *Journal*) by making them more compact when they are nested together for storage. We also added a few strategically placed double-screwed cleats, to eliminate the chance of racking.

I chose white oak for my material because it's so durable and because these chairs really don't eat up a lot of material ... there are only about 12 board feet in each one, and I raided my scrap bin for some of that.



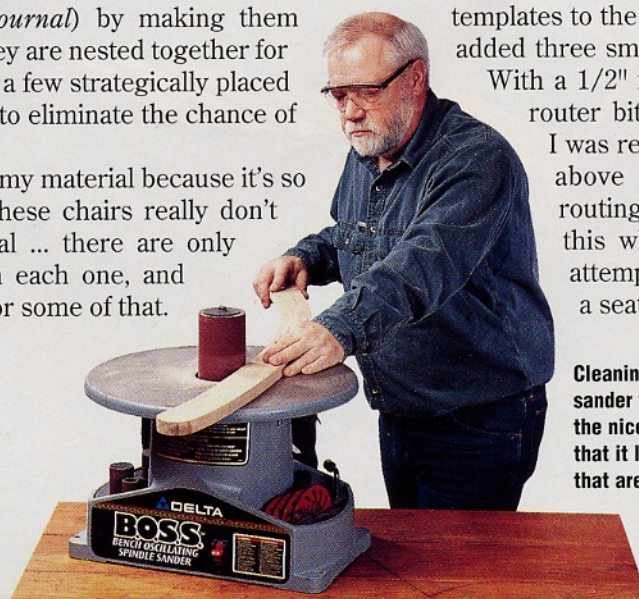
At a little over \$3.00 a board foot, these chairs come in at a very reasonable price. Spanish cedar or cypress would also work well.

Getting Started With a Pair of Templates

I wanted to make a few of these chairs, and the thought of making all the curved side pieces one at a time was out of the question. Instead, I made a couple of perfectly-sized templates (see *Scaled Drawings*, below left) and traced around them to lay out a series of paired seat and backrest sides (pieces 1 and 2) on my hardwood stock. Then I carefully cut these pieces to shape on the band saw (see *photo* above), staying just a hair outside of the pencil line.

I used double sided carpet tape to attach the templates to the stock for template routing and added three small brads — just for insurance.

With a 1/2" flush-trimming bearing guided router bit mounted in my router table, I was ready to rout. Check the sidebar above for a few tips on template routing. The only problem I had with this whole project was when I first attempted to trim a rounded end of a seat side. With my template firmly



Cleaning up your edges on a spindle sander takes just a few minutes. One of the nice things about template routing is that it leaves just a few machining marks that are a snap to remove.

serious woodworking tools for the home shop, workshop



Begin the template routing sequence by using your template to trace the shape of the piece onto the hardwood stock. Step to the band saw and cut out the piece, staying just outside the line.



Attach the template to the stock with double-sided carpet tape. The author also used three small brads driven through the template to ensure that they were firmly secured to the hardwood.

in place, I started to trim across the grain at the end of the part. In the wink of an eye the bit caught and shattered the stock. It was like the wood exploded! My second and third attempts (on scrap wood) ended in the same dramatic fashion. After a little more experimenting, I came up with a successful technique for this task. The key is to band saw your stock, particularly at the ends, so that you leave just the barest bit to be trimmed away by the flush trim cutter. Equally important, go slow and hang on tight! If your bit creates a bit of a burn on the ends, don't worry, it sands off easily. I sanded the edges on a oscillating spindle sander. Go ahead and make all the shaped parts at one time.

Moving on to the Seat and Back Slats

The seat and back slats (pieces 3 and 4) have the same thickness and width, but differ in length. Rip a sufficient quantity of slat stock and then cut them to their appropriate lengths. Again, if like me you are making more than one chair, set up and cut them in groups. (Maybe even make one or two extra in case of a machining error ... not that I've ever had that sort of problem!) I drilled counterbored holes centered at each end of the slats (one setup works for both types of slats). Later these holes would be plugged to hide the screws.

As long as you are ripping and drilling, go ahead and make the seat and backrest cleats

(pieces 5 and 6) from 3/4" stock. The cleats are wider than the slats and have two screws in each end. They keeps the backrest and seat assemblies from racking, although their main function is locking the chair securely in each of the various seat positions possible with this design. Cut them to size and bore the screw holes. Now grab the slats and cleats and move over to your router table. Chuck a chamfering bit in the router and get busy easing the edges of the combined slats and cleats. (And if you happen to be unlucky and machine the wrong side of one of the slats ... don't worry; remember you made extra ... I wish I had.)



Drilling the counterbored screw holes in both the slats and the cleats gets you ready for the final assembly step.

and professional shop. So the next time you're shopping



Great care must be used when routing around the ends of a template. The end grain is susceptible to fracturing (as shown in the illustration at right) and rushing a cut can ruin your piece.

A flush-trimming, bearing-guided router bit follows the shape of the template exactly.



Deadly Combo: Router Bits and End Grain

Using a flush-trimming, bearing-guided router bit to cut across end grain can lead to big trouble. Limiting the depth of the cut (thus reducing the penetration of the cutter's blade) will greatly reduce your chance of splitting the wood.



Template not shown for clarity.

Putting it All Together

If you have two drill/drivers, get them ready. First make a 7/8" x 7/8" x 20" spacer. Start attaching the seat and back slats as shown in the *Elevation Drawings* at left, and use the spacer to locate each successive slat. Drill a pilot hole with the first drill and then drive it home with the second. When you place the final seat slat, use the spacer again to locate the seat cleat. Make sure you square up the assembly before you drive these screws home. Simple as pie. When you've placed the last back slat, you need to go to the *Elevation Drawings* once more to locate the backrest cleats.

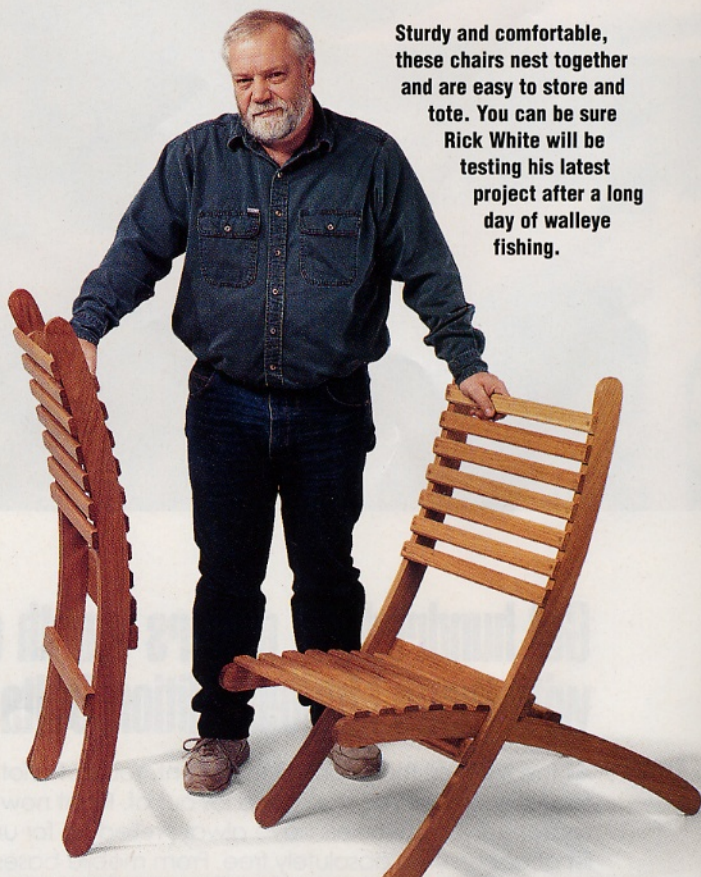
Plug the screw holes (use a water resistant glue), and after the glue has cured, give the chair assemblies a complete sanding. You are almost ready to sit back and make yourself comfortable.

Finish and Upkeep

I thought through a few finishing options for my chairs, but settled on an easily applied outdoor oil finish. I think an exterior grade polyurethane or spar varnish would look great on these white oak beauties ... but it would scratch and chip with the use I had in mind for them. I like the oil for many reasons: it is easy to get into nooks and crannies formed by the slats and cleats, it looks great and, most important to me, it is simple to touch up and renew. You will need to reapply the finish on any piece of outdoor furniture, and oil is the easiest way to go, in my opinion. A good cleaning and then

a quick rubdown with a coat of oil, and your chairs will be ready for another season of outdoor adventures. Whether that would include a trip to the Boundary Waters Canoe Area or setting them up in your outdoor Brew Area, is entirely up to you.

Sturdy and comfortable, these chairs nest together and are easy to store and tote. You can be sure Rick White will be testing his latest project after a long day of walleye fishing.



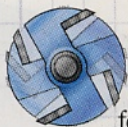
shopping for quality tools, look to Delta.



DELTA

Dust Collecting Router Table Fence

By Chris Marshall



Over time I've inhaled and swallowed enough wood dust to qualify it as a fifth food group. Thank goodness this dust-collecting router table fence (with replaceable bit inserts) finally put me on the dust-free diet I needed.

Nothing beats a router for versatility, but it scores no points for air quality. I put up with the dust and chips for years until I started working with more MDF and particleboard, which produce intolerable amounts of fine dust. My solution to cleaner air came while shopping for plumbing supplies. I found a PVC reducing fitting that fits like a drum inside a 4" dust collector hose. It inspired me to build this router fence. If you don't own a dust collector, experiment with other fittings to find one that fits your shop vacuum hose instead.

Making the Base Parts

Start by cutting the base, braces, divider and back (pieces 1 through 4) to size and shape. I made the back from particleboard and the rest from yellow poplar. You'll find dimensions for all the parts in the *Material List* on the following page. The *Exploded View Drawing* as well as the *Elevation Drawings* on pages 48 and 49 provide machining details and assembly relationships.

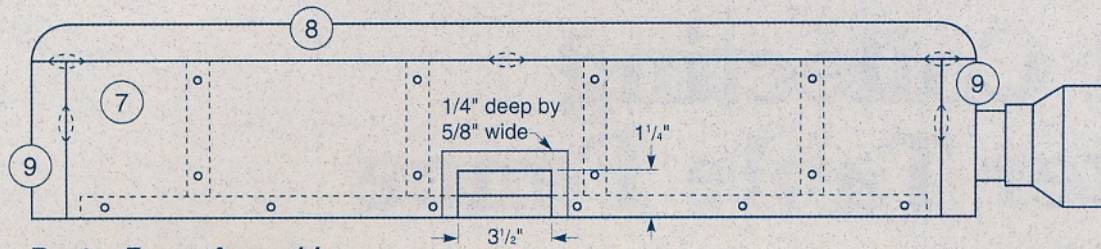
With the first pieces cut to size, it's time to start machining. Start by milling round openings to accept the PVC tubing in two of the braces. Plow dadoes across the inside face of the two center braces for the lid to slide in. Build the dust chamber by assembling the center braces, divider and back with screws. Screw the dust chamber and the other two braces to the base.

A Built-Up Fence

The fence is a sandwich composed of doubled-up particleboard with a plastic laminate face. Cut the subfence and fence parts (pieces 5 and 6) to size, and then form the router bit opening in both pieces. Mount an oversized piece of plastic laminate (piece 7) to the fence next with contact adhesive. Use a flush-trim bit and router to trim the laminate neatly to size. Finish the fence piece by routing the rabbet around the bit opening that will house the replaceable hardboard inserts. Square up the rabbet's corners with a sharp chisel.

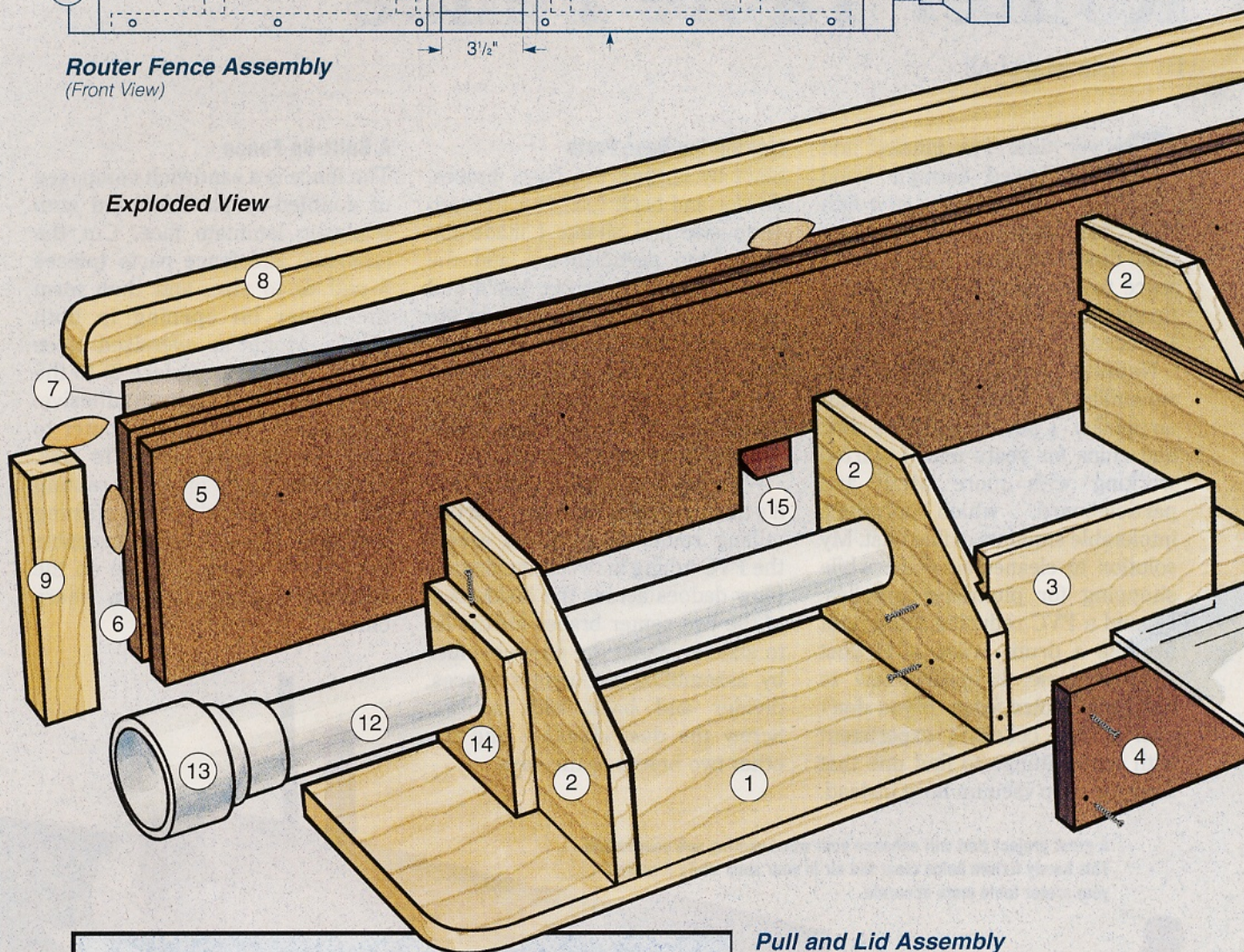
A great project that will enhance your woodworking and your health. This handy fixture helps clear the air in your shop while it makes your router table more accurate.





Router Fence Assembly
(Front View)

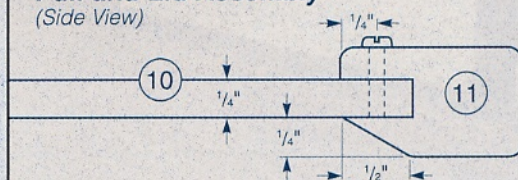
Exploded View



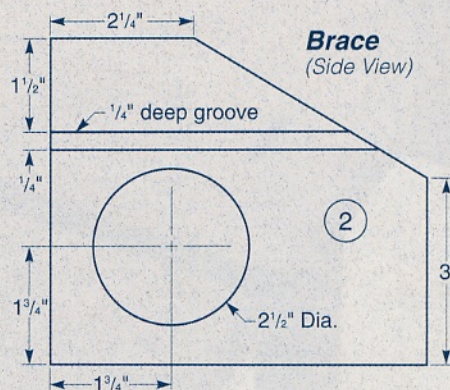
MATERIAL LIST

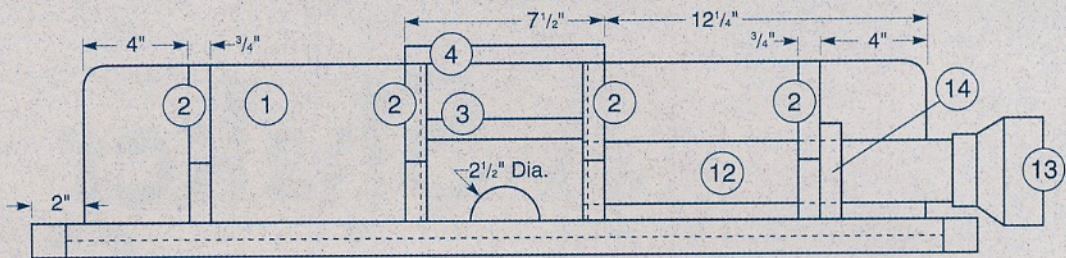
	T x W x L
1 Base (1)	3/4" x 6" x 32"
2 Braces (4)	3/4" x 5 1/4" x 6"
3 Divider (1)	3/4" x 3 3/8" x 6"
4 Back (1)	5/8" x 3 3/4" x 7 1/2"
5 Subfence (1)	5/8" x 6" x 33 3/8"
6 Fence (1)	5/8" x 6" x 33 3/8"
7 Plastic Laminate	1/16" x 6" x 33 3/8"
8 Top Edging (1)	1 5/16" x 1 5/16" x 36"
9 End Edging (2)	1 5/16" x 1 5/16" x 6"
10 Lid (1)	1/4" x 6 1/4" x 5 7/8"
11 Lid Pull (1)	3/4" x 1 1/4" x 6 1/4"
12 PVC Tubing (1)	2" Dia. x 16"
13 Reducing Coupling (1)	3" Dia. x 2" Dia.
14 Collar (1)	3/4" x 3 5/8" x 3 5/8"
15 Replaceable Inserts (10)	1/4" x 2 3/8" x 4 3/4"

Pull and Lid Assembly
(Side View)

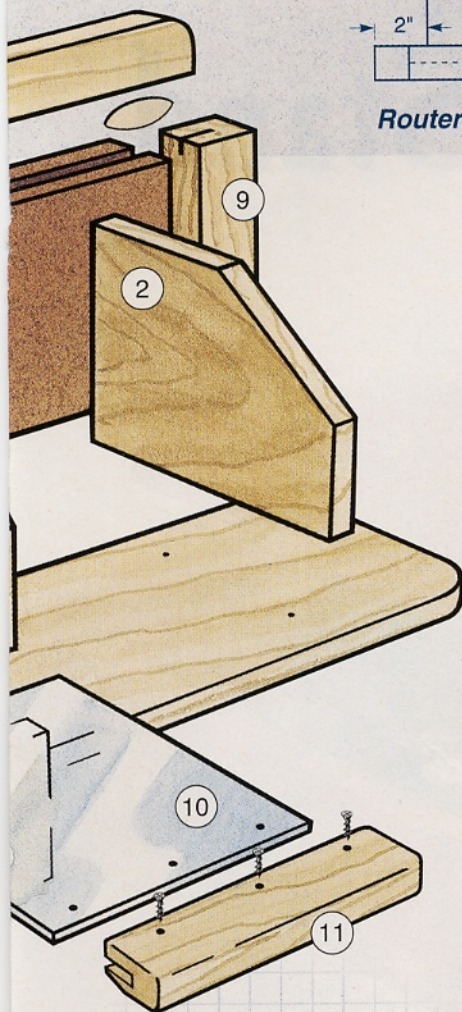


Form the angle on the underside of the lid pull to match the angle on the back of the braces (pieces 2).





Router Fence Assembly (Top View)



Final Assembly

Now it is time for some more assembly. Screw the subfence to the braces and base, then attach the fence to the subfence with glue and more screws driven in from the back. Be sure the edges of the fence parts align exactly. Cut the three poplar edging strips (pieces 8 and 9) to length, rounding the corners of the top piece. (See the *Elevation Drawings* at left.) Join the edging to the fence assembly with glue and pairs of #20 biscuits. Ease the front edges with a 1/4" roundover bit.

Make the lid by screwing a piece of 1/4" Plexiglas™ or hardboard to the lid pull (pieces 10 and 11) as shown at left. Bevel cut the pull's bottom edge before attaching it to



Apply contact cement to both the fence and plastic and after it has dried carefully smooth them together. Use small sticks or dowels to keep them from "sticking too soon."

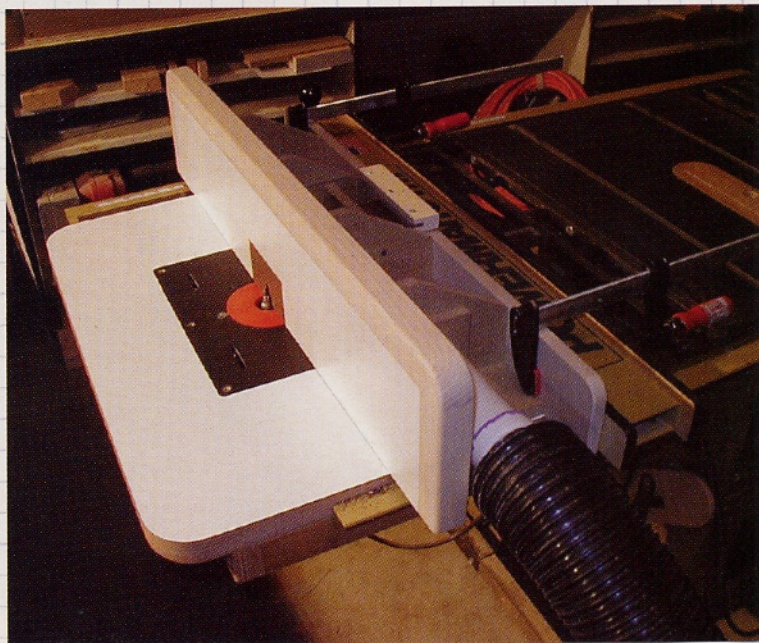
the lid so it fits against the angled edges of the braces. Now turn to the dust collection apparatus. Join the PVC tubing and reducing coupling (pieces 12 and 13) with solvent-weld glue and make the collar (piece 14). Slip the collar over the tubing and slide the tubing through the braces. Secure the collar to both the end brace and tubing with a few short screws. If you have a grounded tubing system, the screws driven through the collar into the PVC tubing

provide a perfect place to attach your grounding wire.

Cut a bunch of hardboard blanks for the replaceable inserts (pieces 15) while you have your saw settings dialed in. The storage compartment behind the dust collection chamber should hold 10 inserts. Drill countersunk holes in the inserts for attachment screws, and use an insert as a template for drilling holes through the fence assembly. Mount the inserts with flathead machine screws and locknuts. I use nuts fitted with nylon to keep them from vibrating loose. To prepare an insert for use, hold a router bit against the insert and trace a slightly oversized profile and cut out the shape on a scroll saw.

Using the router fence is a snap. Set the fence on the router table so the profile on the insert straddles the bit. Secure the fence to the table with a couple clamps. Slide your dust collector hose over the reducing fitting and you're ready to go. Now indulge in all the routing you like — you won't even miss the chips.

The author made the prototype of this router fence to be used on his table saw/router table combo setup. In that version, he added a back stretcher which was clamped to his table saw fence. Useful and very clever.

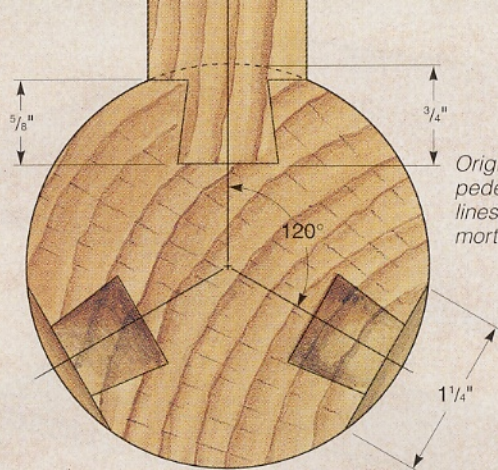


A Shaker Sewing Stand

By Ralph Wilkes



To join the legs to the pedestal seamlessly, the author flattened the curvature of the pedestal and the dovetail sockets, using a sharp chisel.



Originating at the center of the pedestal, the author drew three lines 120° apart to help locate the mortises for the dovetail sockets.

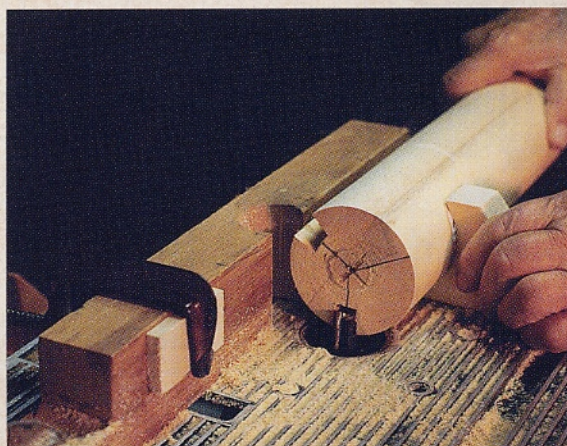
This classic sewing stand design was inspired by one made in the Shaker community of Mt. Lebanon, New York around 1850. Many Shaker furniture items came from that area in the 19th century, the designs often emphasizing that simple things are the most beautiful. Practicality was important in their furniture designs as well, although in later years, Shaker craftspeople relaxed their austere beliefs a little, especially in furniture made for outsiders.

This sewing stand was designed for use by two people at the same time. The drawer is shared and was designed to pull in both directions.

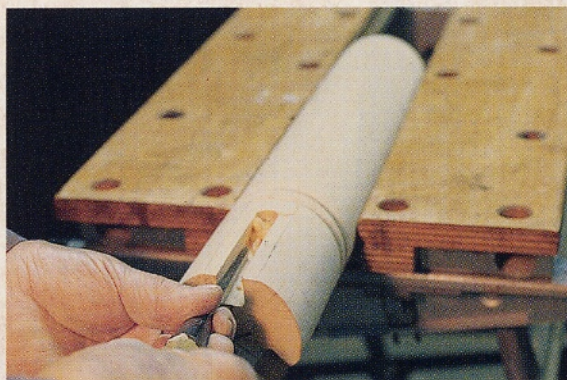
Start With the Pedestal

Since the three legs and the entire top assembly attach to the pedestal (piece 1), it is logical to turn this first. If you have to glue together two or more pieces to get the required size, check carefully to match the grain and wood color as closely as possible.

Turn the entire length to 3" in diameter and leave it at that size until after completing the three dovetail sockets at the lower end, which should be the live center end when mounting it on the lathe. This way, the other end, or dead center end, can later be turned to fit the 1 1/2" hole in the upper assembly. It's also a little easier to clamp this piece when it's all the same size.



The author turns the pedestal to a diameter of 3" and removes it from the lathe. Before completing the turning, he forms dovetail sockets for the legs, starting out on the router table.



Once the straight bit has done its work, the author turns to a sharp chisel to complete the dovetail walls and to flatten the areas that will later be covered by the ends of the legs.

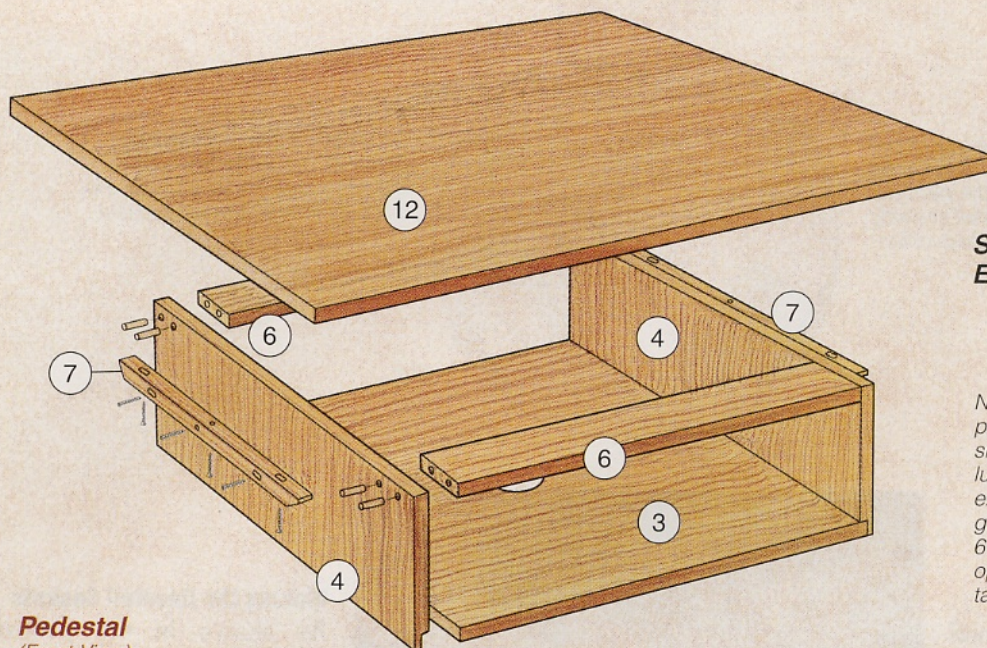
Making the Dovetail Sockets

As shown in the pedestal *Drawing* above, lay out the live center end for the dovetail sockets using a protractor to keep them 120° apart. Draw a line to the center point to aid in eyeballing the location of each of the router cuts. Using a 1/2" straight bit in a table-mounted router, make your first passes 1/4" deep by 3" long. Use a bumper block, clamped to the fence of the router table, as shown in the top photo, to establish the length of cut.

To ensure that the dovetail sockets stayed straight while I cut, I took a few moments to make a cradling jig by cutting an arc into some scrap that perfectly fit the 3" diameter of the pedestal. Face this with some double-sided tape. By pressing my jig against one side of the pedestal, I could easily hold the other side tight against the fence, preventing the pedestal from turning.

After your first pass for each socket, successively increase the depth to 1/2", and finally to 3/4" for your final passes.

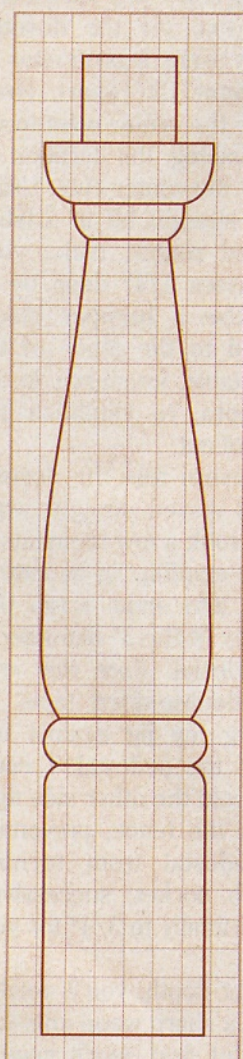
Once you've reached the right depth, you'll need to complete the dovetail cuts with a sharp wood chisel, as shown in the bottom photo. But first, you'll need to flatten the curvature of the pedestal around each dovetail socket. Do this by centering a 1 1/4" x 3 1/2" piece of cardboard over the socket (representing one of the legs) and tracing around it with a pencil. By flattening this



**Shaker Sewing Table
Exploded View**

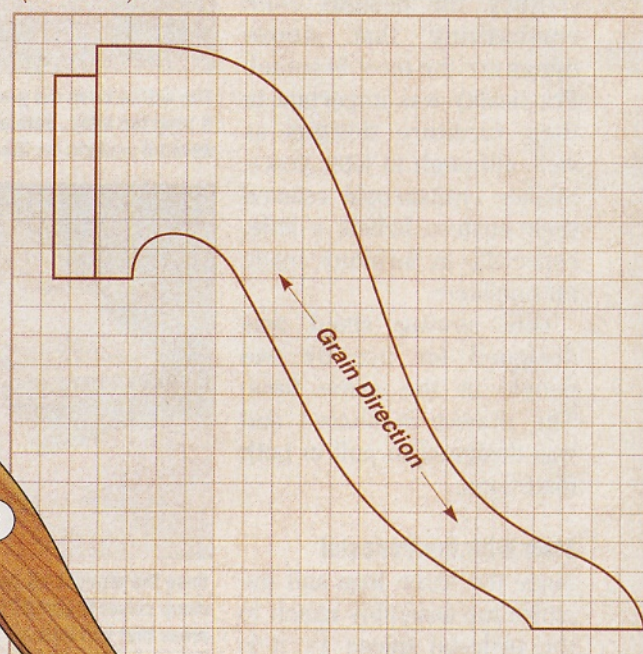
NOTE: The author made pieces 3 and 4 from a single piece of glued up lumber. To avoid exposed end grain, the grain in pieces 3, 4, and 6 runs around the opening at 90° to the table's drawer.

**Pedestal
(Front View)**



One square equals 1/2"

**Leg
(Face View)**



One square equals 1/2"

Material List

	T x W x L
1 Pedestal (1)	3" Dia. x 16 ³ / ₄ "
2 Legs (3)	1 ¹ / ₄ " x 5" x 14"
3 Drawer Box Bottom (1)	3/4" x 17" x 13"
4 Drawer Box Sides (2)	3/4" x 17" x 5"
5 Stabilizer (1)	3/4" x 4" Dia.
6 Drawer Box Rails (2)	3/4" x 2 ¹ / ₂ " x 12"

Table Top Subassembly
(Front View)

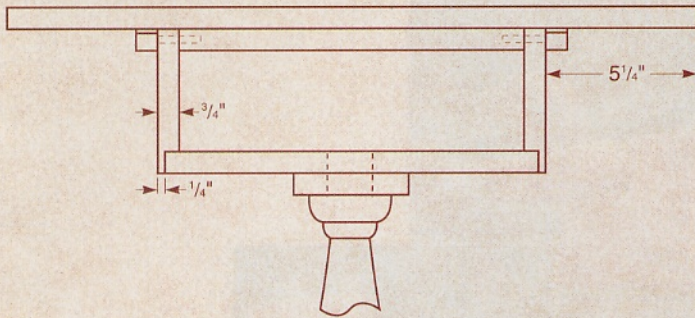
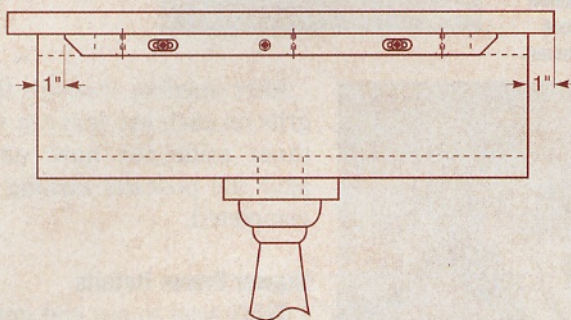
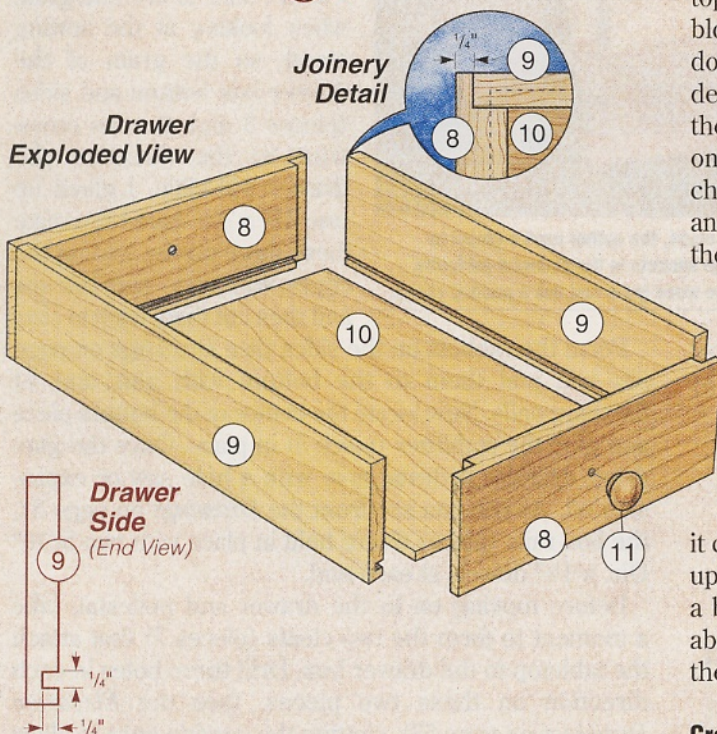


Table Top Subassembly
(Side View)



Drawer Exploded View



Sand the upper and lower edges of the three legs on an oscillating or drum sander or, in their absence, try clamping your belt sander upside down. Then use a 1/4" roundover bit to complete the machining.



area, you ensure a tight fit of the leg against the pedestal. Use a sharp wood chisel, first making the cut across the top end 3 1/2" from the bottom. Sandpaper, backed by a flat block, may be used for final flattening. When you're done with this task, the grooves should measure 5/8" deep. Lay out the guideline markings for the dovetails on the bottom end of the pedestal (see *Elevation Drawing* on page 51) and chisel to the dimensions shown. In any chiseling job, keep the edge sharp by honing frequently and, for your own safety, keep the hand that is not doing the work well away from the business end of the chisel.

Shaping the Legs

Use 1 1/4" thick stock for the legs (pieces 2), choosing wood that is free of knots or blemishes. Use the *Scaled Drawing* at left to create a pattern and transfer it to your stock, paying careful attention to the grain direction. For the neatest and quickest sawing job, I prefer the band saw, although it can be done with a scroll saw or a saber saw. Sand the upper and lower edges until smooth, using the end of a belt sander or a drum sander, as shown in the *photo* above. Follow up with a 1/4" roundover bit, as shown in the *inset photo*.

Creating the Leg's Dovetails

If you plan to make the dovetail depth cuts by hand, start by marking the guidelines and clamping a straight piece of scrap wood across the leg to guide the saw and protect the blade. Make the cuts 5/16" deep, preferably with a back saw.

I found that I could do a neater and more accurate job on my table saw. I quickly traced out two jigs, one for each side of the leg, to hold it in position during the cut,

	T x W x L
7 Cleats (2)	3/4" x 3/4" x 15"
8 Drawer Fronts (2)	3/4" x 3 1/2" x 12"
9 Drawer Sides (2)	1/2" x 3 1/2" x 16 1/2"
10 Drawer Bottom (1)	1/4" x 11 1/2" x 16"
11 Drawer Pulls (2)	1 1/2" Dia. x 1"
12 Tabletop (1)	3/4" x 19" x 24"

as shown in the photos at right. Using 3/4" scrap stock, hold the scrap and one leg (the end you will be dovetailing) squarely against your table saw's rip fence and accurately transfer the leg's curves with a pencil.

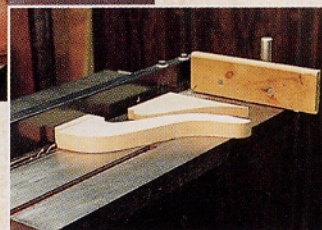
On the table saw (for legs that are 1 1/4" thick), set the blade to a depth of 5/16", then make the shoulder cuts on each side of each leg to define the back of the tail. If you are short on experience with this type of joint, try shaping a complete dovetail on a piece of scrap stock first.

Consult the dimensions in the *Drawing* shown below to complete your dovetails, testing the fit in the sockets as you go. To shape the dovetail to fit the pedestal socket, use a padded clamp to hold the leg firmly in place on a bench and make the chisel cuts in the direction of the grain, not across it. Round the tail's upper corners to match the shape of the socket.

Dovetail Tenon Detail



To ensure straight shoulders on the tails, the author created two jigs to hold each leg exactly square as he formed the shoulder of the dovetail. The curve in the leg is matched by the shape of the jig (inset photo) to hold the legs securely as they are being machined.



Once the shoulder cuts are made, the author uses a chisel to shape the dovetails to fit the sockets in the pedestal perfectly. Chisel in the direction of the wood grain and use a padded clamp.

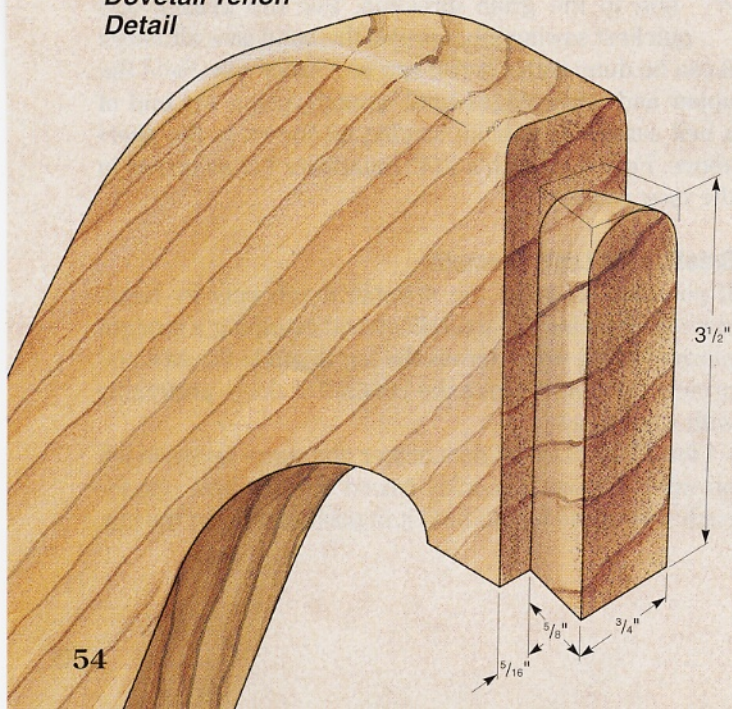
After sanding through the grits on each leg, you can set them aside for now, until after the pedestal turning is completed.

Drawer Frame Details

I didn't want to see end grain when looking at the sewing stand, so the grain of the drawer box bottom and sides (pieces 3 and 4) runs cross-wise to the direction the drawer will slide. I glued up one 17" x 24" panel to create these three pieces, joining the edges with glue and biscuits and then cut them each to size.

Form the rabbets on the sides (see *Drawings* on page 53) and join them to the bottom with glue and #4 finishing nails. Now locate the center of the bottom piece and glue the stabilizer (piece 5) in place. Once the glue dries, drill the pedestal hole with a hole saw or expansion bit. As you can see from the *Drawings* on page 52, the box rails (pieces 6) are held in place with two 5/16" Dia. x 1 1/2" dowels at each end.

Before moving on to the drawer and pedestal, take a moment to form the two cleats (pieces 7) that attach the tabletop to the drawer box. Drill three holes in each direction on these two pieces, (see the *Elevation Drawings* on page 53), slotting the outside ones to allow for seasonal movement of the sides and top. Because round-head screws with washers were employed here, I used a Forstner bit to set the heads below the surface.



The legs are joined to the pedestal with simple dovetails, as is traditional in Shaker-inspired furniture. The top of the dovetails are rounded to match the router-formed sockets in the pedestal.

Completing the Pedestal

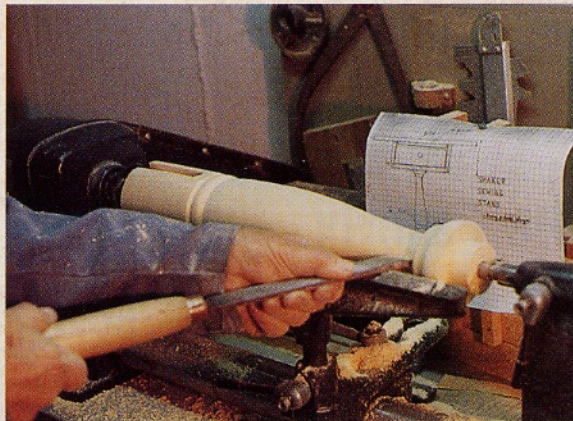
At this point you can return to the pedestal and bring it to final shape. Start by dry fitting the legs and lightly marking their uppermost locations. Raise the first bead above that point, as shown in the *Drawing* on page 52. Then move to the top end and turn it down to fit the hole in the center of the drawer box bottom. With the two ends done, follow the *Scaled Drawings* (see page 52) to complete turning the pedestal's gently curving shape. Sand the pedestal while it's turning, ending with #220 or finer. When you're just about done, turn off the lathe and sand lengthwise by hand to remove any final scratches. Don't sand the upper tenon that fits into the drawer frame.

Attaching the Legs

Before gluing the legs permanently in place, fit them into their sockets and set the assembly on a level table. Use a carpenter's square to check to be sure the pedestal rises at exactly 90° from the surface, photo below. Even the slightest error here can give you something akin to the Leaning Tower of Pisa. While a variation might be almost invisible to the eye, mark the exact place where the upper edge of each leg meets the pedestal when it is vertical. If you've done your work accurately to this point, each leg should be perfectly in line around the base of the column, with the pedestal rising perfectly plumb.

Glue the first leg and use a padded C-clamp and several heavy rubber bands to hold it tightly until dry. The goal is to apply equal pressure along the entire length of the glued joint. After each joint dries, proceed to the next. Use a wood chisel or knife to scrape away any fresh glue that squeezes out of the joint, then go over the surface with a wet cloth.

A carpenter's square can be used during the final glue-up of the legs to the pedestal to be sure there will be no tilt to the top.



After the dovetail slots are completed, the author returns the pedestal blank to the lathe and wraps up the turning. He also completes all but one sanding step on the lathe as well, saving a final pass to do by hand, with the grain.

Making the Drawer

The double-ended drawer (pieces 8 through 10) is made with rabbeted corner joints and a plywood bottom which slides into grooves before attaching the second

front (see *Drawings* on page 53 for machining details). Do not use glue to secure the drawer bottom. Center the drawer pulls (pieces 11) vertically and horizontally. Drill a hole for each and countersink it on the inside for the screw. Drawer pulls may be made on the lathe or purchased locally.

Final Assembly

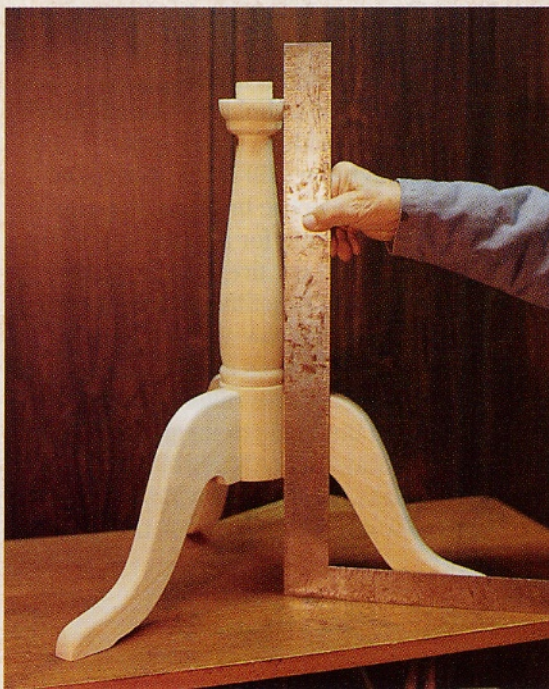
You're now ready to bring all the components together. Start by placing the pedestal on a level surface, and applying glue to the top tenon. Press the drawer box in place, using your level to ensure that it dries flat. While the glue dries, select some of your best boards (with matching grain) for the tabletop (piece 12). These pieces are fitted with three biscuits at each joint before edge gluing and clamping. Trim the ends to size and sand the edges and top. Soften the edges with sandpaper, but just enough to break the sharpness.

Finishing

Before attaching the tabletop, apply at least one coat of varnish to the inside of the drawer frame and to the underside of the tabletop to prevent uneven moisture absorption.

Apply stain, if desired, and after it has dried, use two or three coats of a sturdy polyurethane — finish sanding between coats. A bit of wax applied to the outside of the drawer, to help it slide easily, and you have an elegant, yet simple gift.

Ralph Wilkes is a writer and long time woodworker from Penn Yan, New York. His work has appeared previously in *Woodworker's Journal*.



All in the Family

By Chris Marshall

Combo tool kits aren't just for the trades. Here's a group that offers good bang for the woodworking buck. They'll serve you well in the shop or on the go.

One hot trend among toolmakers these days is to bundle several cordless tools into kits. Along with the tools, combo kits typically include two batteries and a charger, with everything fitting into a carrying case.

Portability makes combo kits perfect for the building trades, but some kits seem tailor-made for woodworkers, too. Recently *Woodworker's Journal* selected seven kits for me to review that feature tools we woodworkers reach for all the time.

If you're planning to add several cordless tools to your collection anyway, combo kits are generally a good value for the money. In this sample group, I discovered that kits are priced to save you as much as 26% over buying the same tools separately. Plus, tax and shipping costs hit your wallet only once.

I didn't test these tools with diagnostic equipment, so my impressions are those of a tool user and not an engineer. Here's how these kits sized up for me.

Grizzly 14.4-volt Drill/Driver, Jig Saw & Detail Sander Kit

Grizzly's tool selections for this kit should entice any woodworker, especially the bargain hunters



Grizzly G8594 14.4-volt

among us. There's no end to the kits that include circular saws and drill/drivers, but Grizzly is one of the few manufacturers to offer jig saws and sanders as well.

None of the tools in this kit will wow you with extra frills, but their simplicity might be a fair tradeoff for the kit's low sticker price. The drill/driver features a keyless Jacobs chuck coupled with a six-position clutch. The drill is comfortable to hold, but it could be improved with a rubber grip. Although the drill is variable speed, it has no electric brake to stop the chuck. Waiting for a bit to spin down could get tiresome if you have lots of repetitive drilling to do.

Both the jig saw and sander are no-nonsense tools as well. The saw has an adjustable roller guide behind the blade to keep it lined up, always a nice feature. Blade changes involve removing an Allen screw and retainer tab — no quick

Grizzly G8594

Street price: \$99.95
Battery: one 14.4-volt (Ni-CD)
Phone: 800-523-4777
www.grizzly.com
Drill/driver: 3/8" chuck
Max. torque: N.A.
No-load rpm: 0-600
Weight: 3.4 lbs.
Jigsaw: 0-2,200 strokes/min.
Blade type: universal
Weight: 3.5 lbs.
Sander: 7,000 orbits/min.
Weight: 2.7 lbs.

release mechanism here. The steel base swivels for making angled cuts, but the bevel gauge is located inside the base and the markings are a bit hard to read. The tool operates at one speed, and it has a dust port for connecting to a vac.

The detail sander is also single-speed, and its triangular base pad accepts hook-and-loop sanding sheets. Although there's a six-hole pattern on the pad for dust clearance, the sander has no vacuum port, canister or dust bag to draw the dust up and away.

Power is delivered to all three tools through one Panasonic Ni-CD battery, which can be

recharged in an hour. A second battery would be a real plus. All in all, this kit seems a good value if you're an occasional woodworker or ramping up your cordless tool collection on a tight budget.

Ryobi 14.4-volt Drill/Driver & 5 1/2" Circular Saw Kit

Ryobi says this drill/driver and circular saw combo provides professional features at an affordable price. I think their claim is accurate on both accounts.

The drill/driver sports a keyless chuck and 24-position clutch. A two-speed gearbox can be set for higher speed ranges or more torque. Along with a comfortable

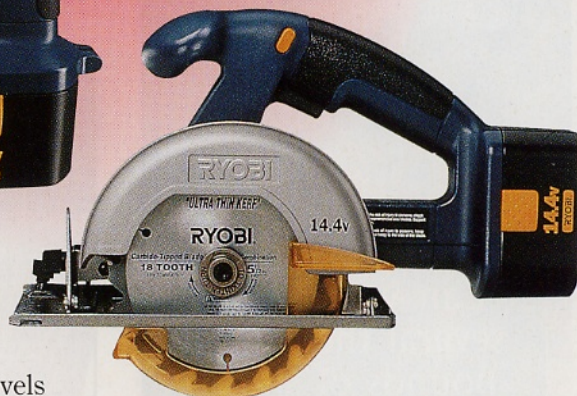
rubber grip, this drill has several other niceties worth mentioning. The tool has a pair of bubble levels mounted on top and on the rear to help keep drilling and driving plumb and square. The top level slides off for use as a spare level. A magnetized tray on the battery housing provides a place for parking spare bits or screws.

Ryobi HP214MK2

Street price: \$139
Battery: two 14.4-volt (Ni-CD)
Phone: 800-525-9259
www.ryobitools.com
Drill/driver: 3/8" chuck
Max. torque: N.A.
No-load rpm: 0-330; 0-1,100
Weight: 4 lbs.
Circular saw: arbor 3/8"
Blade diameter: 5 1/2"
Max. cutting D. @ 90°: 1 1/8"
Max. cutting D. @ 45°: 1 1/8"
No load rpm: 3,800
Weight: 7 lbs.



Ryobi HP214MK2 14.4-volt



I was pleased with how smoothly the 5 1/2" circular saw cut through a 2x4. Even though its maximum depth of cut just clears 2X lumber, the saw is amply powered for the task. It also cut easily through 3/4" oak, even when I set the base to the maximum 50° bevel angle. The motor is pleasantly quiet to boot.

There are a number of useful scales on the saw base, including blade offsets along the front, a decent bevel gauge and even a depth of cut indicator. For accurate rip cutting, a clamp-on guide comes with the saw. A thin kerf blade is also included.

DeWalt 14.4-volt Drill/Driver and 3 5/8" Trim Saw Kit

Early last year DeWalt unveiled a redesigned trio of cordless drill/drivers with extended run-time performance XRP™ batteries, all-metal transmissions and higher torque motors. You'll find the middle child of this new drill family included here, packaged with a trim saw, one-hour charger and two Ni-CD batteries.

The drill/driver feels heftier than other 14.4-volt models I've tried,

DeWalt DW983KS-2

Street price: \$299.99
Battery: two 14.4 v. XRP (ni-cd)
Phone: 800-433-9258
www.dewalt.com
Drill/driver: 1/2" chuck
Max. torque: 400 inch/lbs.
rpm: 0-450; 0-1,400; 0-1,800
Weight: 5.2 lbs.
Circular saw: arbor 3/8"
Blade diameter: 5 3/8"
Max. cutting D. @ 90°: 1 5/8"
Max. cutting D. @ 45°: 1 1/8"
No load rpm: 3,000
Weight: 6.8 lbs.



DeWalt DW983KS-2 14.4-volt



Craftsman 11314 18-volt



but the weight isn't the least bit unwieldy. A few extra ounces can probably be attributed to the metal tranny, which provides 23 clutch positions and three — rather than two — speed settings. DeWalt is the first manufacturer to offer a three-speed transmission. It's designed to increase drilling and driving speeds while providing more torque. I'll admit that when I shifted to the highest speed setting, the tool drove screws incredibly fast.

The drill delivers all this torque and speed through a ratcheting Jacobs chuck. DeWalt says the chuck holds bits twice as tightly as other chucks, and it tightens with one hand.

The 5 3/8" trim saw is a bit lean on features but not really lacking. At 90°, the saw has a 1 5/8" maximum depth of cut, and it sliced through 2x lumber without difficulty. Pivot the saw base all the way to 50°, and there's plenty of tooth to spare for cutting 1x stock. The motor was burly without being loud, but I was surprised that it had no electric brake. A thin kerf blade comes with the tool.

There's a bevel gauge on the saw base with large, easy to read markings, but the base has no other gauges. It also isn't outfitted for holding a ripping guide, which would be a helpful accessory to include with the kit.

Although this combo sells for more than twice the price of the Ryobi, DeWalt's performance reputation should make it a good buy whatever your needs may be.

Craftsman 18-volt Drill/Driver, 5 1/2" Trim Saw & Worklight Kit
Craftsman's mid-voltage combo kit includes a drill/driver, 5 1/2" circular saw and worklight. The trio shares a pair of Ni-CD batteries and a one-hour charger.

While Craftsman may not be leading the pack with cordless drill/driver innovations, this drill includes most of the solid features you'll find on pricier pro-series drills. The tool has a keyless chuck, 24-position clutch and two-speed gearbox. Like Ryobi's drill, it has a bubble level on top, but Craftsman also includes a handy wrist strap.

I liked the trim saw for the same features I saw on the Ryobi saw. The motor is quiet and provides plenty of power for cutting through 2x4s in a single pass. Even at 45°, the blade has a 1 1/8" depth of cut for bevel-cutting 1x lumber. The black saw base has scale markings highlighted in white, making them easy to see. Aside from color, the base matches the Ryobi saw, with all the same helpful cutting gauges. A ripping guide and thin-kerf blade are standard equipment.

Priced at a smidgen under \$200,

Craftsman 11314

Street price: \$199
Battery: two 18-volt (Ni-CD)
Phone: 800-932-3188
www.sears.com/craftsman
Drill/driver: 3/8" chuck
Max. torque: 330 inch/lbs.
No load rpm: 0-350, 0-1300
Weight: 5.2 lbs.
Circular saw: arbor 3/8"
Blade diameter: 5 1/2"
Max. cutting D. @ 90°: 1 5/8"
Max. cutting D. @ 45°: 1 1/8"
No load rpm: 4,200
Weight: 6.9 lbs.

Craftsman is bundling respectable value for the money. A handy worklight just sweetens the deal.

Porter-Cable 19.2-volt Drill/Driver & 6" Saw Boss Kit

With almost a century of tool making under their belts, the folks at Porter-Cable know

a thing or two about building high-quality tools. This mid-range combo shouldn't tarnish the company's good reputation a bit.

The drill/driver can handle larger drilling tasks, thanks to a 1/2" keyless chuck, two-speed gearbox and 20-position clutch. My testing wasn't comprehensive by any stretch, but I can tell you that this drill will drive a 1" spade bit repeatedly through hardwood or softwood with power to spare.

The drill's T-handle configuration with rubber ribs provides sure grip, even with its rather sizable battery on board.

The Saw Boss circular saw offers almost 1/2" more cutting capacity than the smaller trim saws in this article, so it won't come up short when bevel cutting 2X material. The saw's motor has plenty of power for slicing through thick

lumber, and it does the job quietly. Porter-Cable says this saw will crosscut 100 2x4s before the battery needs recharging.

For features, the saw's lower blade guard is metal rather than plastic. There's also an exhaust port on the upper guard with a removable nozzle to direct chips into a dust bag. The base has a depth of cut gauge as well as the usual bevel gauge, and two set screws provide positive stops for right angle and 45° bevel cuts. Long-throw levers lock the base settings. I liked the push-rod style spindle lock, which makes for convenient blade swaps.

You'll need to drop around \$370 for this kit, but both tools seem to be solid performers that should earn your respect around the shop.

Bosch 24-volt Drill/Driver, 6½" Circular Saw & Worklight Kit

Bosch claims that its line of 24-volt tools, which include this tag team of drill/driver and circular saw, take cordless power to the threshold of corded tool performance. After spending some

time with these heavy hitters, you might be inclined to forget your corded versions altogether.

According to Bosch, the drill/driver features the largest planetary gear train in the industry. Two speed settings and a 16-position clutch help bridle all the torque it produces. Up front, a 1/2" single-sleeve chuck makes bit swaps a one-handed task. What a slick improvement in chucks.

With a big battery and monster tranny, this drill felt a little heavy, but I guess some extra heft is to be expected from a drill that can

deliver up to 500 inch/lbs of torque. I can't speculate about its performance limits, but I can say that after boring two dozen holes through a 2x4 with a 1" spade bit, the battery was still going strong. Even on the hi-speed setting, the drill bored these holes cleanly and without bogging. For high torque jobs, there's a bolt-on side handle to help save your wrists.

There's little to grouse about with Bosch's circular saw. Its 6½" blade gives it the capacity to cut through 8/4 stock with tooth to spare, and an electric brake stops the action



Porter-Cable 9884CS 19.2-volt

Porter-Cable 9884CS

Street price: \$370
Battery: Two 19.2-volt (Ni-CD)
Phone: 800-487-8665
www.porter-cable.com
Drill/driver: 1/2" chuck
Max. torque: 390 inch/lbs.
No load rpm: 0-500, 0-1500
Weight: 5.5 lbs.
Circular saw: arbor 1/2"
Blade diameter: 6"
Max. cutting D. @ 90°: 2"
Max. cutting D. @ 45°: 1⅝"
No load rpm: 2,600
Weight: 9.5 lbs.

Bosch 3960CFK

Street price: \$499 – \$509
Battery: two 24-volt (Ni-CD)
Phone: 877-267-2499
www.boschtools.com
Drill/driver: 1/2" chuck
Max. torque: 500 inch/lbs.
No load rpm: 0-4,000; 0-1,300
Weight: 6.2 lbs.
Circular saw: arbor 5/8"
Blade diameter: 6½"
Max. cutting D. @ 90°: 2⅞"
Max. cutting D. @ 45°: 1⅝"
No load rpm: 3,600
Weight: 9.5 lbs.

Bosch 39060CFK 24-volt



Makita DK2402HF 24-volt



instantly. Setting up cuts is easy, thanks to blade offset and depth of cut scales, an adjustable line of cut indicator and ripping guide. I found this saw to be noisier than other saws in the test group, but it's still quieter than my corded saw. For cleaner cutting, a hinged dust collection port on the upper blade guard connects to Bosch's Air Sweep vacuum system.

Around \$499 buys both tools, a pair of Ni-CD batteries, one-hour charger and a swiveling head worklight. For this price you should expect high performance, and I think Bosch delivers it.

Makita 24-volt Compound Miter Saw & Drill/Driver Kit

Makita is one of only a few manufacturers building cordless compound miter saws. This 24-volt saw makes a great combo kit when paired with a 1/2" drill/driver.

The drill/driver features an 18-position clutch and two-speed gearbox for carrying out a full range of drilling and driving tasks. One-handed bit changes are made possible with the single-collar chuck. I put the drill through the same paces as the Bosch. After

boring 24 spade bit holes with the drill set to high speed, there was no noticeable loss of power.

The kit includes a clamp-on side handle for high-torque drilling as well as a depth stop rod. Externally accessible motor brushes should make eventual tune-ups easy.

If you're looking for a sliding compound miter saw that's compact but not short on features, this saw deserves serious attention. The saw carriage rides on a pair of tubular rails that slide into the base. This geometry keeps the tool's footprint at only about 3 square ft. when fully extended. It takes up about half that amount of bench space when retracted.

Here's how the saw's cutting capacities stack up: With a 7 1/8" blade, the saw can crosscut 8/4 stock up to 7 1/8" wide at 90° and 2x lumber of the same width when tipped left to 45°. Its base swivels 47° to the left and 57° to the right

for cutting miters on stock up to 5" wide. A taller fence would make the saw even more useful for cutting wide crown molding.

The detailed miter scale on the base has preset detents at 0°, 15°, 22.5°, 30° and 45°. An adjustable stop limits depth of cut for making lap joints and cutting dados.

Makita has determined that the saw will cut 316 2x4s on a single battery charge. In my test cuts, the saw slid smoothly and sliced through 2x stock without laboring. The controls are thoughtfully laid

out, making the tool straightforward to operate and adjust.

Tallying up other niceties, this slider comes with a dust bag, a vertical hold-down clamp and a 40-tooth blade. The motor brushes are externally accessible as well.

The street price for this kit is steep, but the rep I spoke with says pricing has a lot to do with state-of-the-art MakStar™ battery technology. Each nickel-metal hydride

battery has 20 internal cells with a memory chip that records the cells' charging history. A computer in the charger uses this information to determine the optimal charging cycle for each cell. The charger also features a built-in cooling fan that blows air through the batteries during charging to extend their lives and boost recharging efficiency.

Makita DK2401HF

Street price:	\$1049
Battery:	two 24-volt (NMH)
Phone:	800-462-5482
www.makitatools.com	
Drill/driver:	1/2" chuck
Max. torque:	476 inch/lbs.
No load rpm:	0-460; 0-1,500
Weight:	5.7 lbs.
Sliding compound miter saw	
Arbor:	5/8"
Blade diameter:	7 1/8"
Maximum cut	miter/bevel
2" x 7 1/8"	0°/0°
2" x 5"	45°/0°
1 3/8" x 7 1/8"	0°/45°
1 3/8" x 5"	45°/45°
No load rpm:	2,300
Weight:	24.3 lbs.

Chris Marshall is a freelance writer and woodworker who lives in Ohio. See his dust collecting router fence article on page 47.

By Sandor Nagyszalanczy

The biggest buzz in tool and home appliance batteries in the past few years has been the introduction of nickel-metal hydride (Ni-MH) batteries. Currently, two manufacturers make Ni-MH packs for power tools: Makita and Panasonic. Among their touted advantages, Ni-MH cells lack the "memory effect" that can reduce the useful life of a standard nickel cadmium (Ni-CD or "Nicaid") battery. This effect occurs when a Nicaid pack is recharged before it's spent, thus reducing the total charge the battery is capable of holding. Ni-MH batteries can be topped up at any time without compromising their useful life.

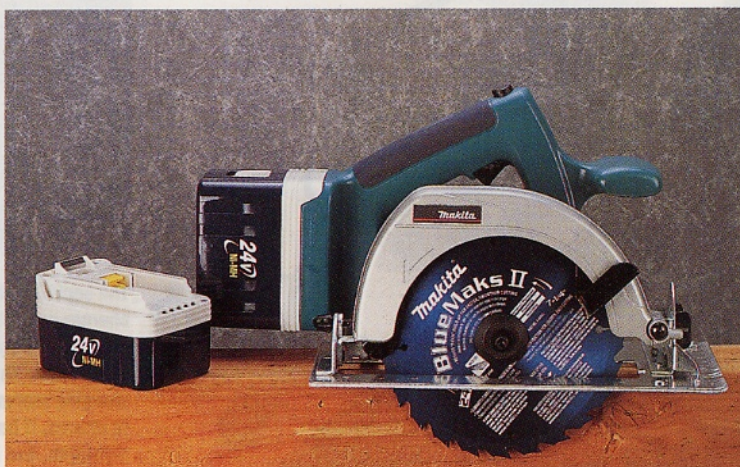
Another thing nickel-metal hydride batteries have going for them is higher capacity: Ni-MH cells have a greater energy density than Nicad cells, so they can hold 25% to 50% more power (depending on whose statistics you believe), allowing for lighter-weight tools with longer run times between charges. Due to their cell chemistry, Ni-MH batteries are also environmentally friendly compared to Nicads, which are considered hazardous waste and must be carefully recycled after they expire.

On the downside, Ni-MH batteries are more costly than Ni-CDs and require a special charger, due to their particular recharging characteristics (you can ruin them with a regular Nicad charger).

Early opponents of Ni-MH claimed that these packs discharged more quickly than Nicads and had a shorter life span: 500 charge/discharge cycles instead of the 1,200 to 1,500 cycles common for Nicads. However, Panasonic, a leader in cordless appliance and tool development, says that these reports likely stemmed from tests done with improperly charged batteries. They maintain that Ni-MH packs have a similar life cycle to Nicad packs in actual usage.

Higher Voltage, More Capacity

Since the earliest days of 7.2-volt-powered drills, battery pack voltage and capacity has been steadily on the rise. Pro users'



Makita's new Makstar™ NiMH batteries are available in both regular and higher-capacity versions, including the 3 amp-hour pack shown above (left). These batteries fit Makita's new model BSS730 circular saw, the first cordless saw to sport a full-size 7¼" blade.



Porter-Cable's model BN200V12 brad nailer heralds an interesting variation: The tool runs on either a 12-volt battery, which powers a small internal air compressor, or via an air hose fed by a portable compressor.

needs for greater power output and run time have led manufacturers to develop lines of 18-, 19.2- and 24-volt portable power tools and even benchtop saws. Amazingly, the latest 18- to 24-volt cordless models can rival the power output of similar corded tools!

For greater tool run times, some manufacturers have upgraded the capacity of their battery packs by developing special cells that produce more power (a higher number of amp-hours usually equals longer tool run times). For example, DeWalt produces a 2.4 amp-hour 24-volt battery pack, as well as an 18-volt DW9096 XR+ extended run-time pack. The latter

uses 2.4 amp-hour cobalt Nicad cells that DeWalt claims deliver 40% greater run time than standard 18-volt packs. Makita's new Makstar™ Ni-MH batteries are available in higher-capacity versions, including a 3 amp-hour, 24-volt pack and a 3.3 amp-hour, 14.4-volt pack.

Hybrid Power

Being able to run a cordless tool on an alternative source of power is a real blessing — especially during a busy day when all your batteries are dead. Both DeWalt and Skil have developed optional AC/DC power converters for their cordless lines. If your battery pack poops out, simply slip the converter into the tool, plug in the cord and you're back in action.

DeWalt's 24-volt DW0247 and Skil's 14.4- 12- or 9.6-volt "Dual-Source" converters give you the flexibility of owning a cordless tool, yet using it as a corded tool with unlimited run time when you need to.

Porter-Cable's innovative new model BN200V12 brad nailer runs on either battery or air power. A 12-volt pack powers a miniature compressor in the tool's body, providing enough air pressure for regular operation — great when you're on a rooftop or away from shop power. Remove the battery (to save weight), and you can power the nailer traditionally, via an auxiliary compressor.



Modern cordless tool battery chargers range from simple to advanced. Shown here: A Skil screwdriver with non-removable battery and a simple charger that the tool plugs into, Black & Decker's simple charger that replenishes the tool's removable battery packs, and micro-processor controlled Hitachi and Makita chargers with LEDs that display state of charge.

Improved Charger Technology

As cordless tool batteries have changed and improved over the years, so have the chargers that replenish them. While the cheapest bargain models still use built-in batteries and "wall-wart" style plug-in chargers, the standard chargers used with the majority of woodworking cordless tools that have removable batteries are more sophisticated, delivering higher current to recharge removable battery packs in about an hour. The simplest of these chargers use heat-sensing switches that turn power off when a battery is full.

The more advanced chargers use micro-processor circuitry to monitor a battery's condition. By using sophisticated thermal sensing to read a pack's temperature, these "smart chargers" can replenish batteries in as little as 15 minutes

while reducing the risk of damage due to heat — a battery's greatest enemy. If a pack is hot off the tool, charging doesn't begin until the battery cools down, and then it is charged to full capacity. The unit also shuts off if the battery overheats during charging, preventing costly damage.

The latest, most advanced chargers have more impressive features than ever. Makita's new Makstar™ system uses the charger's CPU (computer brain) to read battery conditions via an EEPROM microchip built into each battery. The chip records the battery's history of use and transmits the data to the charger, which then optimizes the charging regime for peak performance and long battery life. While most chargers have at least one light that shows charging status, the multiple LED display on Makita Makstar chargers also reports the condition



The sophisticated Makita Makstar computerized charger actually communicates with the tool's nickel-metal hydride battery via a microchip in the pack. The unit's four-light display reports charging status, if battery is too cold or too hot to charge, if battery is being conditioned or is defective, and if the unit's built-in cooling fan is malfunctioning.

of the battery and when there is a charging problem. DeWalt and Makita both have chargers with a conditioning mode that optimizes battery performance. The companies says it gives users up to 20 percent more cycle life and more consistent run-time with every charge. The latest 24-volt DeWalt (and Makstar) chargers have built-in fans which force cool air through the pack, dispelling heat and extending battery life.

New Cordless Models and Features

What started with cordless drills has now blossomed into nearly an entire workshop's worth of battery powered tools, whose ranks now include: screwdrivers, drill/drivers, impact wrenches, hammer drills, power planers, circular saws, jigsaws,



These two cordless screwdrivers cover the voltage range — from the 3.6-volt Panasonic EY6225CQ to the more powerful, 12-volt DeWalt DW920. Both tools have removable battery packs.

DeWalt's three-speed gearbox drill allows the 18-volt model DW980 drill/driver to spin small drill bits or driver bits at up to 2,000 rpm — significantly faster than other cordless drills with only two-speed gearing.



reciprocating saws, compound miter saws, routers, rotary tools, chainsaws, biscuit joiners, caulking guns and flashlights that run on tool battery packs. Here are some of the most recent models to hit the market, that are stretching the limits of what battery powered tools can do for woodworkers.

Screwdrivers: Once only available with low-voltage tools with internal batteries, newer cordless screwdrivers, including the Panasonic EY6225 CQ (see photo, bottom left), feature removable battery packs. This 3.6-volt screwdriver has a 22-stage clutch and an "Auto Shut-off" feature that extends battery life by shutting off the motor once selected torque setting is reached. If you have heavier-duty needs, DeWalt's DW920 cordless screwdriver offers even more power and longer running time, with its 12-volt packs.

Drill/drivers: Long held as a mainstay among cordless shop

tools, the latest crop of drill/drivers abounds with new features. Take first, the Black & Decker 12-volt Firestorm FSD122 with its unique quick-change chuck that may be fitted with a drill or other bit, then removed to reveal a hex-socket-mounted driver bit underneath. To keep holes square or plumb, the Firestorm also has a handy built-in electronic level indicator.

The Black & Decker Firestorm FSD122 has some unique features, including a removable quick-change chuck with a hex-socket driver underneath. This allows you to drill a hole using a bit in the chuck, then quickly remove the chuck and use the bit to drive a screw. Firestorm's built-in electronic level indicator (inset) lights up when the bit is either level or plumb.



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Although it looks like a typical drill/driver, DeWalt has put a different spin into its 18-volt model DW980 — a faster spin, actually: The tool's three-speed all-metal gearbox (see photo on page 72) bests regular two-speed models by turning bits at up to 2,000 rpm, really a boon for drilling hard materials and driving long screws.

Impact drivers and wrenches: If you often have tough driving needs: spinning long, fat screws into dense woods or hard building materials, you should consider buying a dedicated cordless driver. The latest impact drivers, including the Makita BTS150, not only spin the bits fitted into their hex-socket collets (they lack adjustable chucks), but add strong torque pulses when resistance is encountered — either when driving or removing fasteners. Some models, like the DeWalt DW977, add a torque setting, so you can limit driving force and avoid snapping or stripping smaller screws. Need even more power for driving lag bolts and tightening nuts and bolts for construction or mechanical repair? Choose an impact wrench, a sort of beefier impact driver. Most models come with a square 1/2" drive shank that accepts standard impact sockets and accessories. Milwaukee's 18-volt model 9079-20 impact wrench socks out up to 250 foot pounds of wrist-twisting torque — plenty for removing even rusty lug nuts from your car!

Circular saws: While the first cordless portable circular saws were barely powerful enough to cut thin plywood paneling, the newest generation of saws sports ultra-thin-kerf blades and high voltage batteries that give them enough gusto to slice through an impressive pile of



Impact drivers, including the Makita BTS150 and DeWalt DW977, apply pulsing torque to help drive screws and fasteners into hard or difficult materials. For driving full-size bolts and fasteners, the beefy Milwaukee model 9079-20 impact wrench delivers up to 250 foot-pounds of pounding torque.

construction lumber on a single charge. To give their saw the same cutting capacity as a standard corded circular saw, Makita recently introduced a 7 1/4" bladed model BSS730 as part of their 24-volt Makstar lineup (see photo at top of page 71).

Reciprocating saws: Cordless recip saws have become a must-have tool for plumbers and remodeling contractors — as well as well-equipped do-it-yourselfers. Milwaukee, maker of the legendary Sawzall models, recently introduced an interesting variation: Their model 6514-12 "Hatchet" has the head of a Sawzall attached to a swiveling pistol-grip-drill style handle. By pivoting the handle down, the 18-volt tool becomes

much shorter and easier to handle than a traditional long-bodied recip saw, especially in close quarters.

Compound miter saws: The first benchtop tool tapped for conversion to battery power, the Bosch 3924 (see photo on page 76) cordless compound miter saw, has a full-sized 10" blade powered by Bosch's premium 24-volt "Platinum" battery pack. The big blade is capable of dispatching wide moldings and 2-by lumber with aplomb, and the beefy battery gives the 3924 enough power to please most finish carpenters and furniture/cabinet builders.

Routers: Porter-Cable's new model 9290 cordless router (see photo on page 76) is based on one of its workhorses: the classic model 690. Packing a 19.2-volt battery pack (shared by a wide range of other PC models), the router's 600-watt (the approximate equivalent of 3/4 horsepower), 23,000 rpm motor has adequate power to drive smallish bits in its 1/4" collet. The tool is designed to be versatile, as the 9290 motor unit works with Porter-Cable's interchangeable base system, so the fixed-base 9290's motor unit fits easily into a plunge, D-handle or table-mounted base.



Unlike regular straight-bodied reciprocating saws, the innovative Milwaukee model 6514-12 Sawzall "Hatchet" has a pistol-grip-drill style handle that swivels and locks into several positions.

**“What started with
cordless drills has
now blossomed
into nearly an
entire workshop’s
worth of battery
powered tools.”**

Recommendations

If you’re thinking of replacing or upgrading your cordless tool arsenal, you’ll be impressed with the performance of the latest tools — almost regardless of voltage — compared to those manufactured five or 10 years ago. But before you plunk down hard-earned cash to buy a top-flight cordless drill or circular saw, consider first that a corded tool can provide more power and less hassle. Cordless tools are more expensive to buy and maintain (batteries wear out and need replacement), are less powerful (save for the 18 to 24-volt models) and are heavier than their corded cousins.

If you’ve decided to go cordless, the biggest issue facing you is what voltage tool to buy? If you’re leaning toward an 18-, 19.2- or 24-volt model, ask yourself if you really need all the power such a tool delivers. Unless you’re a pro who demands stellar cordless performance, it’s likely a lighter

12-, 14.4- or 15.6-volt tool will do the trick. Drill/drivers in this voltage range easily handle screw driving chores and can bore up to 3/4" holes in wood and 3/8" holes in steel.

If you’re leaning toward a high-voltage model, remember that power has its price: The higher the voltage and/or size of the battery, the more weight you have to hold and carry, and the more torque you must resist when using the tool (Porter-Cable developed 19.2-volt tools because they viewed them as having a better weight, power and cost balance than 24-volt tools).

Top-power tools also put a strain on your wallet: These big tools, special chargers and hi-octane batteries cost big bucks!

It’s usually most economical to buy a new cordless tool in a kit with two batteries and a charger (check *Chris Marshall’s* article on combo kits starting on page 62). Heavy-duty users should buy three batteries: One to use, one to let cool after use, and one to charge. Given the choice between two models with similar features, definitely choose the tool that comes with the more advanced

charger (look for at least 3 or 4 electrical contacts on the battery). You’ll get better performance and longer battery life in the long run. Are Ni-MH or special “extended power” batteries worth their greater cost? My experience suggests that they’re best suited to pros and “power users” who really push their tools hard.

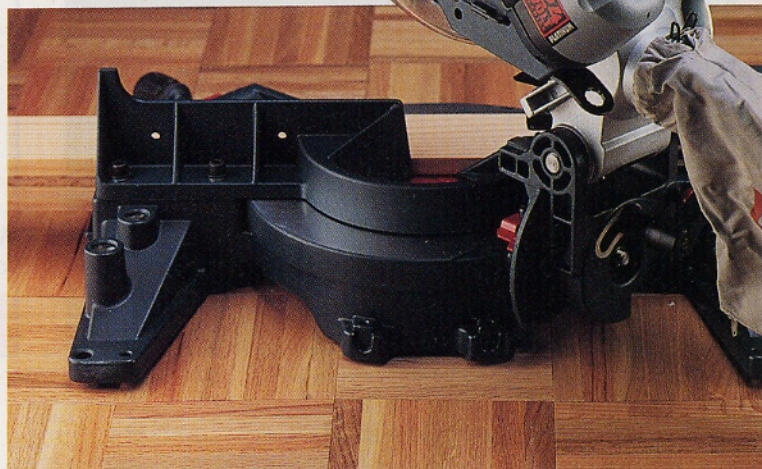
Speaking of batteries, make sure to check the price of a replacement battery before you buy a tool. All batteries wear out eventually, and you might get a quite a shock (emotional, not electrical) when you find out that a replacement can cost more than one third the price of the original tool! For packs more reasonably priced than factory replacements, check out these web sites: www.ecordlesstool.com and www.batterybarn.com. The latter site offers economical replacements — including Ni-MH — for most brands, models and voltages.

Sandor Nagyszalanczy is a professional writer, photographer and author of seven books, including “Power Tools: An Electrifying Celebration and Grounded Guide” available from The Taunton Press.



Porter-Cable’s new 9290 is the world’s first cordless router. The 1/4" collet router comes with a fixed base standard, but easily plugs into other Porter-Cable model 690 bases, including the plunge base shown here.

It takes a hefty 24-volt battery pack to drive the Bosch 3924 cordless compound miter saw’s big 10" ultra-thin-kerf blade through full-size cuts in hardwoods and construction lumber.



Spring Spruce-up: Deck and Patio Furniture

By Michael Dresdner

In spring, a young man's fancy turns to thoughts of ... refurbishing the deck and patio furniture. That may not be so poetic, but it's a darned good idea to redo your deck every year, and the patio furniture every few years. Yearly upkeep is simple, and involves only cleaning and recoating, but let it go too long and the deck becomes an unsightly mess that is a real chore to restore. This column will take you through the process of cleaning the wood, then sealing both the deck and the furniture on it.

Clean and Wash

The first step for the deck, its railings and stairs, and even the furniture that sat out on it all winter, is to clean it. After a year

of exposure, there will be dirt to be removed and, if you live in a wet climate, you might also have mildew. The bane of exterior wood, mildew is a slippery black or green fungus that looks like a tenacious layer of ground-in dirt. You can buy special mildew removers at the home store, or mix your own by adding a quart of fresh laundry bleach (like Clorox) to a gallon of water.

Killing Mildew

Bleach can kill plants, so before you start, wet down the lawn and shrubbery below or around the deck with a mist of clean water.

If possible, cover them with thin plastic film while you work, but remove it as soon as you finish the cleaning process. Plants will wilt quickly under plastic in the hot sun. When you remove the film, mist the plants again. Wash off any surface dirt or leaves with the garden hose nozzle set to full throttle. Flood the bleach mixture onto the still wet wood with a synthetic fiber mop, floor pad, or brush. (Bleach breaks down natural fibers.) It will kill mildew and remove its distinctive color almost immediately, so there is no waiting time. Afterwards, rinse the wood well with the hose.

“If you own a pressure washer, now's the time to haul it out and prove to your spouse that you really did need to buy it.”



A bleach-and-water mixture is all you need to kill mildew and remove its distinctive color.



Removing the Dirt

Once the mildew is gone, what's left is good old-fashioned dirt. I like to use TSP or the more environmentally friendly TSP substitute to remove the grime, but you can find special deck cleaning compounds in the deck coating aisle at your building supply store. All are safe for the existing finish, but strong enough to do the job. Mix according to the directions on the label and apply with a scrub brush and some elbow grease. Do a section at a time, and rinse with the hose to make sure you've gotten all the dirt off.

If you own a pressure washer, now's the time to haul it out and prove to your spouse that you really did need to buy it. Set it on low power and wide fan; a strong pinpoint blast from this tool can peel back a layer of wood lickety-split. Even without cleaner added, a pressure washer can make short work of surface dirt. However, most of these rigs have either a hose or compartment that can add concentrated cleaner to the water stream for a more thorough scrubbing. You'll find compatible deck and siding cleaners in the pressure washer aisle of your local home store.

Taking the Gray Away

Sometimes it seems the only thing turning gray faster than your hair is your deck. That's an indication that that area is unsealed, because only raw wood goes gray. Fortunately, you can easily reverse it without damaging the finish on adjacent, ungrayed areas. Buy special gray removing concentrate or a container of oxalic acid and mix it according to the directions

on the label. Wear a dust mask and goggles when mixing oxalic acid powder as it is a toxic irritant to

mucous membranes. Flood the mixture on the entire surface, grayed or not. Leave it alone until it dries, then hose it down thoroughly to remove any acid residue.

Stripping Old Finish

Decks that are recoated regularly may never need to be stripped. But if for whatever reason you decide to remove the old finish and start fresh, be aware that you are in for a tough task. Special deck strippers sold in the deck coatings aisle will do the job. Wear gloves, old clothes, and rubber boots. With a synthetic long-handled scrub brush, wet a small area at a time; no more than 10 square feet. Reapply if you must, but keep the stripper wet for at least 15 minutes, or until the finish softens, then scrub to loosen it. Rinse away the dissolved finish and move to a new area. Be careful, though; this stuff gets VERY slippery. You might want to duct tape sections of old 40 grit sanding belts to the soles of your boots for traction.

Applying the Sealer or Stain

As always, preparation is the hard part. Now comes the easy part. The only challenge is to apply the coating as uniformly as you can. Choose a day when the weather is going to cooperate with you. A calm, warm, dry, slightly overcast day is best. Strong winds can blow dirt into the finish, and few things are as annoying as watching an uncured deck coating get destroyed by rain. Cold

continues on page 80 ...

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weather will slow the dry time, and intense hot sun can make the finish dry faster than you can smooth it out. If the deck is in direct sunlight, try working in the early morning or evening when the sun is low in the sky.

Start with the railings and peripheral areas, and leave the deck itself for last. A brush, spray gun, or even a garden sprayer will work for railings and for patio furniture, but my favorite tool is a painter's mitt. It looks like a sheepskin mitten and slips right over your hand. Dip it into the coating, grab the post or rail and run your hand over it. Make sure you wear a vinyl or latex glove underneath. The mitt is cloth and the coating goes right through it.

For the deck itself, you can use a brush, roller, or spray gun, but most home and paint stores sell long handled 18" paint pads

“Sometimes it seems the only thing turning gray faster than your hair is your deck.”

specifically designed for deck coatings. Some come with a cheap plastic pan to load the pad from. For two to three dollars, I would upgrade to a better quality narrow pan that will not crack or tip over so easily. While you are there, pick up a smaller, standard paint pad.

Stir the coating well and pour it into the pan. Do the perimeter near the house or railings and coat the first 4" or so in from the edge with the small paint pad. That will

let you get into corners and small spots without slopping finish around. For the main area of the deck, switch to the large pad and apply the finish as evenly as possible, blending into the already coated perimeter. Keep it fairly thin. You can always apply a second coat in a day or two if you need it, but put it on too thick and it will stay tacky for a long time. One final word of caution: don't paint yourself into a corner. Plan your coating pattern in advance so that you end up by a door to the house or a break in the railing. Or at the very least, carry a cell phone. That way, when you call for help, your family can come and laugh at you and snap photos.

Michael Dresdner is a nationally known finishing expert. His book, The New Wood Finishing Book, is available from Taunton Press.

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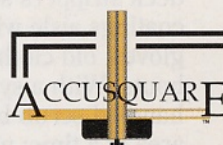


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tool company
to introduce

a sliding dual compound miter saw, has released a follow-up: the 12" C12FSA. The new edition has a 12" blade for greater cutting capacity and a belt-driven 12 amp motor with gradual progression to its maximum 3,200 rpm. The motor also features an electronic feedback control which prevents slowdowns and protects against overloads. The C12FSA sliding dual bevel compound miter saw has a miter cutting range of 0° - 57° left and right and a bevel cutting range of 0° - 45° left and right. Positive miter stops are at 0°, 15°, 22.5°, 31.6°, 35.3° and 45°. A safety chip deflector is standard on the 55-pound saw. The C12FSA sells for \$799.99. For more information, call 800-829-4752 or visit them on the web: www.hitachi.com/power tools.

KCJig Shows You Where to Cut

The KCJig's connection to the Show Me State is clear. Manufactured by a Kansas City, Missouri, company, the jig is made of clear Lexan that allows you to see the material — and the pattern lines — beneath your router. The KCJig attaches to the router in place of the router plate, where it stabilizes hand-held plunge routers and makes freehand cuts easy. It also works in a router table. Fence changes occur with the aid of easy-to-grip knobs.

Tapping 3/16" roll pins into predrilled holes in the KCJig fences and a drilled hole in your material allows you to use the jig for cutting out scallops, circles or semicircles for applications such as medallions or mullion grids. Fence settings on the KCJig can also set a router bit to maintain molding profiles (fluted, circle or radius) in straight line or curved cuts in solid stock or laminated material. The basic jig can be adjusted from two inches to two feet. An optional extension allows a six to eight foot cutting range. Retail price for the KCJig is \$149.

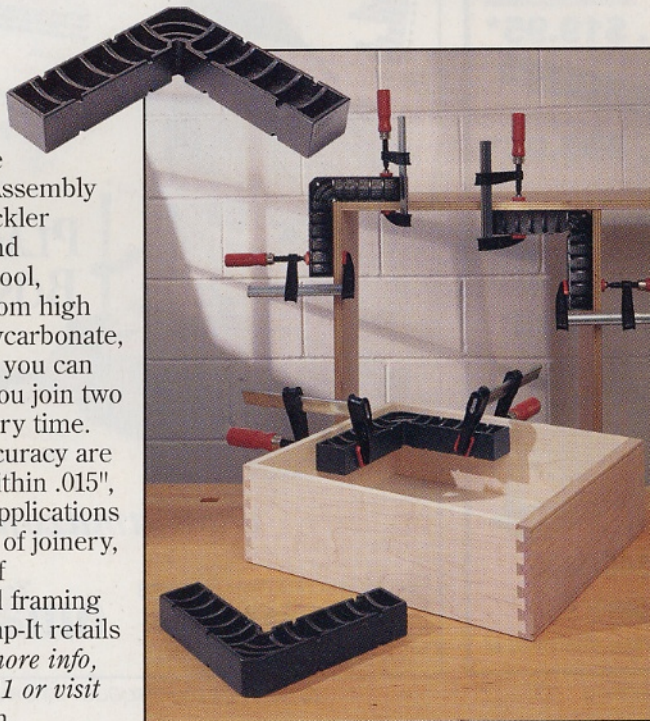
For more info, call 816-420-8120 or visit www.kcjigs.com.



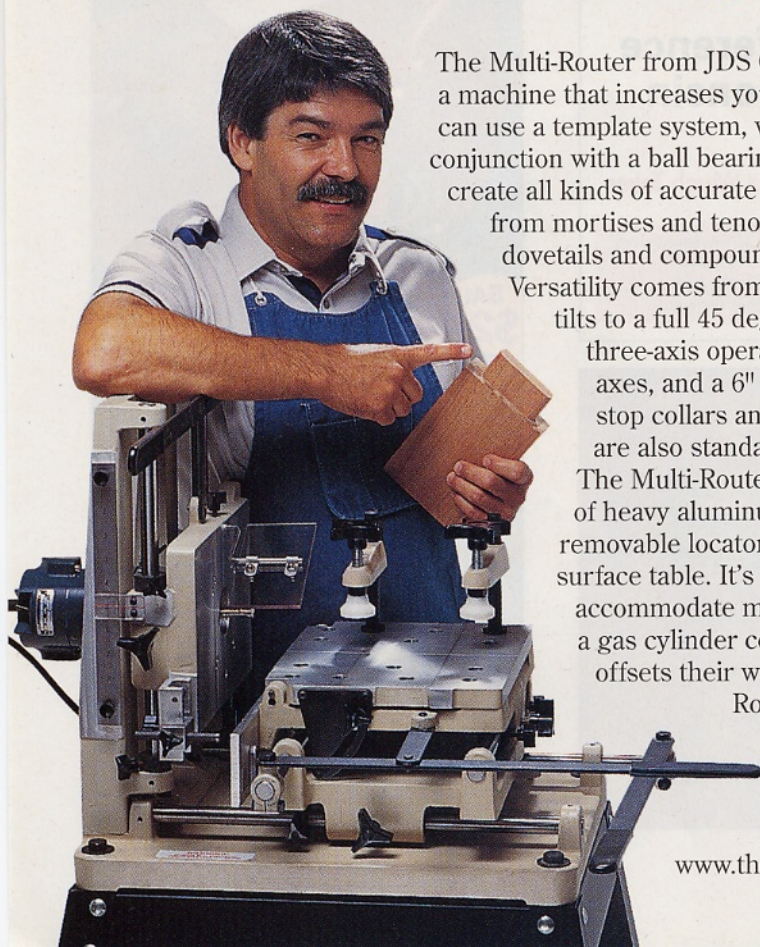
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Clamp-It Now: the "Right" Angle

It's a clamp. It's a square. It's ... both, if you're talking about the new Clamp-It™ Assembly Square from Rockler Woodworking and Hardware. The tool, manufactured from high impact rigid polycarbonate, is "a square that you can clamp," letting you join two pieces at 90° every time. Strength and accuracy are guaranteed to within .015", and suggested applications include all types of joinery, cabinet and shelf construction and framing decks. The Clamp-It retails for \$11.99. *For more info, call 800-279-4441 or visit www.rockler.com.*



Multi-Router Gives You Multiple Options



The Multi-Router from JDS Company is a machine that increases your options. You can use a template system, which works in conjunction with a ball bearing-tipped stylus to create all kinds of accurate joints — ranging from mortises and tenons to box joints to dovetails and compound angled joinery. Versatility comes from a work table that tilts to a full 45 degrees and from three-axis operation: 8" X and Y axes, and a 6" Z axis. Adjustable stop collars and a chip deflector are also standard equipment. The Multi-Router is constructed of heavy aluminum castings, with removable locator pins on the work surface table. It's designed to accommodate most routers, while a gas cylinder counterbalance offsets their weight. The Multi-

Router sells for \$2,395. *For more info, call 800-382-2637 or visit online*

www.thejdscompany.com.



Color Code Clues You in to Sanding System

Green, maroon and gold. Sounds like an adventurous outfit for a sports team, doesn't it? Actually, those are the colors that 3M™ chose to differentiate between the three levels of performance in their new SandBlaster™ line of abrasive sponges, sponge mats and sheets. The color coding is designed to "take the guesswork out of selecting the appropriate finishing product for the task at hand". Green (36 and 60 grit) is for paint stripping, while maroon (80, 100 and 150 grit) works well on bare wood and other surfaces. The gold sponges (180 and 320 grit) are reserved for finishing. The company says that these sponges — in both block and pad form — will sand three times faster than conventional sanding sheets, while lasting three times longer. Suggested retail prices are \$2.99.

For more information, call 888-364-3577 or visit them on the Web at www.3m.com/us.

Horse Sense

By Joanna Werch Takes

Ill speak plainly about the latest mystery tool, pictured at right: it's a plane. I know that, you know that, and owner **Joe Bando**ck of Olympia, Washington knows that. But what *kind* of plane is it?

Aye, there's the rub — and the question for all of you *Stumpers* readers out there. Check out its cool adjustability and tell me: the name of this kind of plane, the manufacturer, model number and date(s) of production. Oh, and Joe wants to know, "Is the value worth the \$4 I paid at a garage sale?"

Don't rein in your horse sense as we discuss a previous mystery, either. **Ansel Hiram**'s tool showed up in the February *Stumpers*, and it brought out the cavalry. "This tool is one you would find in the employ of a farrier, a person who shoes horses," said **W. Wayne Miller** of Winchester, Virginia. Its name, **Ron Beerkircher** of Chalfont, Pennsylvania, tells us, is "butteris."

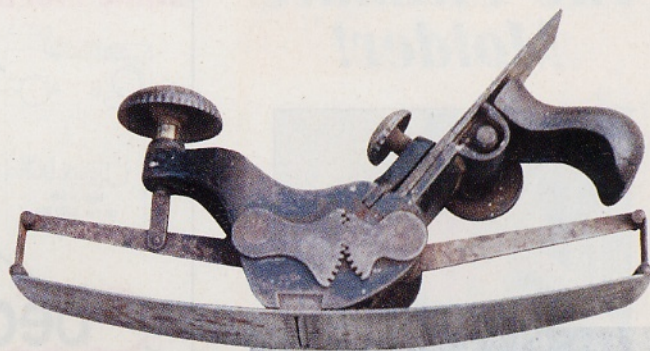
"As I understand the operation," explains **Lowell H. Brigham** of Houston, Texas, "the farrier grips the lever sticking out from the metal shaft and pulls the butteris back against his (or her) shoulder while at



Just a trim — for your horse's hooves — is the purpose of the butteris tool.

the same time revolving the blade to fit the part of the horse's hoof that needs paring. Then the hoof is cut with a push from the farrier's shoulder." **George Webb** of Cincinnati, Ohio, adds that, "The horse's hoof is held between the knees of the person shoeing the horse."

The purpose of the butteris, says **Robert M. Fox** of Tampa, Florida, was to clean the frog — the wedge-shaped, horny pad on the bottom of a horse's foot — before putting new shoes on the horse. "Before a horse can have new shoes fitted, the hoof must be trimmed," explains veterinarian **Don Bidlack** of Coarsegold, California. "The wall of the hoof continues to grow, just as do our fingernails and toenails."



It's curved. It's straight. It's a plane. It's a ... Ahem. You tell us the rest of the latest mystery tool's story.



Leon Renaud of North Grosvenordale, Connecticut,

a modern-day blacksmith "who has taken part in colonial reenactments since the early '80s" says the butteris might have been a common tool historically, but, "I don't believe anyone uses them today. A missed cut could do a great deal of injury to the farrier or the animal."

That's why *Journal* editor **Rob Johnstone**, who has been known to pare a goat hoof or two in his time, prefers the explanation that the tool is a "barking spud, used to strip the bark off of oak trees," from **Larry H. Hicks** of Columbus, Ohio. The point of getting the bark off of these trees, says **Michael Spade** of Coldwater, Michigan, is that "hides were tanned in an acid solution made from the ground-up bark of oak and hemlock trees."

Of course, you could use the tool, as **Doug McDaniel** of Payson, Arizona suggests, for "a bulb planter to aid a one-armed gardener" — and **David T. McGregor** of Flint, Michigan, has dug up the information that butterises were made to order, so hardly any of them looked alike. "Some examples can be found without the handle on the shaft, and some with a 'crank' in the shaft design," adds **Bill White** of Alpharetta, Georgia. Ansel's tool, according to **Eleanore Houghton** of Bryant Pond, Maine, "was handmade by a blacksmith and has a mortised side handle versus one just forged on. When the blade wore out, the blacksmith could forge weld a new blade on."



WINNER! For taking the time to respond to *Stumpers*, **Karl Haak** of Moberly, Missouri wins a Makita 100 Series 2HP Router Kit. Reach us at *Stumpers* Dept., *Woodworker's Journal*, P.O. Box 261, Medina, Minnesota 55340. Or send us an e-mail:

jtakes@woodworkersjournal.com