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SPECIAL ROUTER ISSUE

WOODWORKER'S JOURNAL

Volume 27

Number 6

December 2003

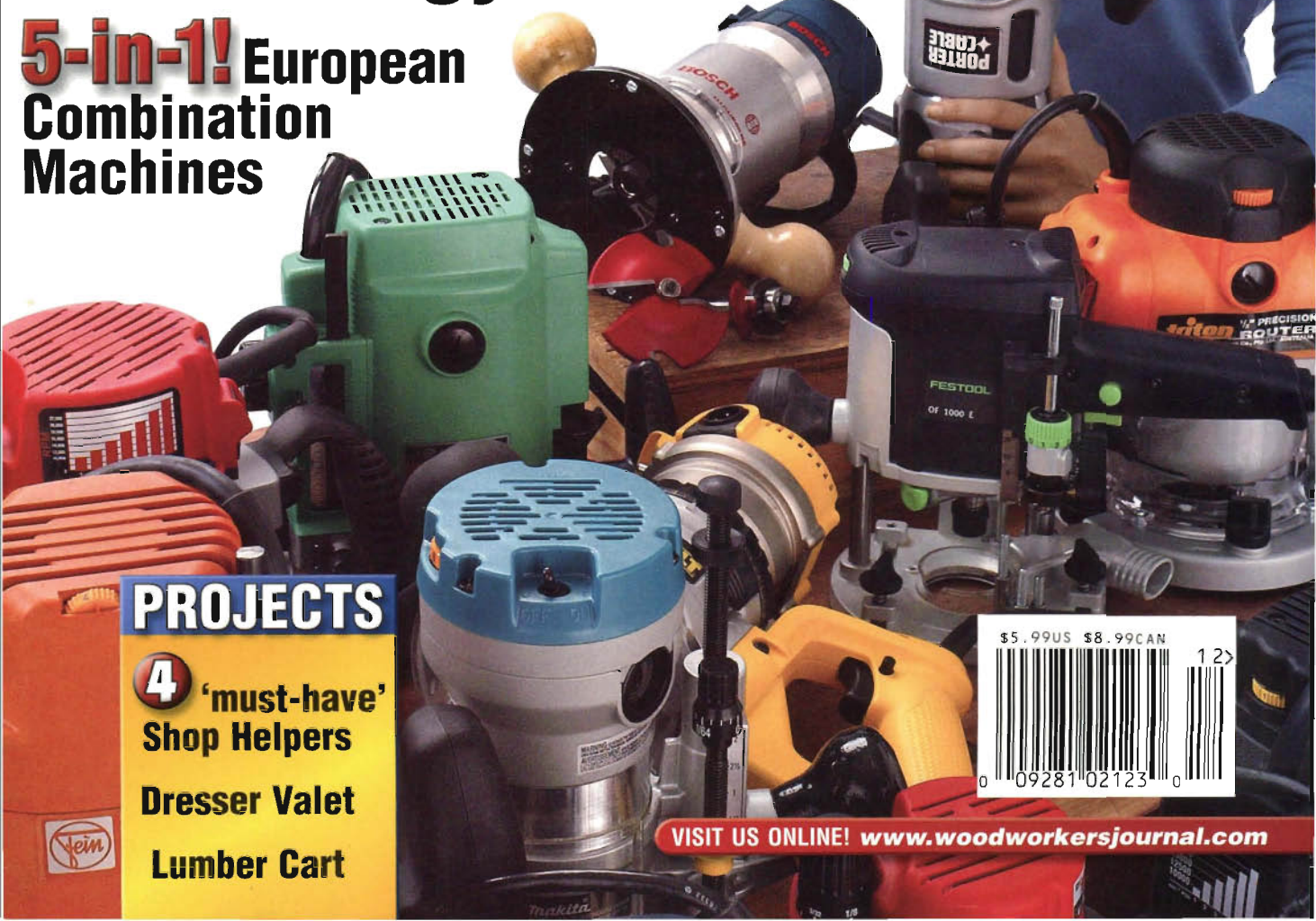
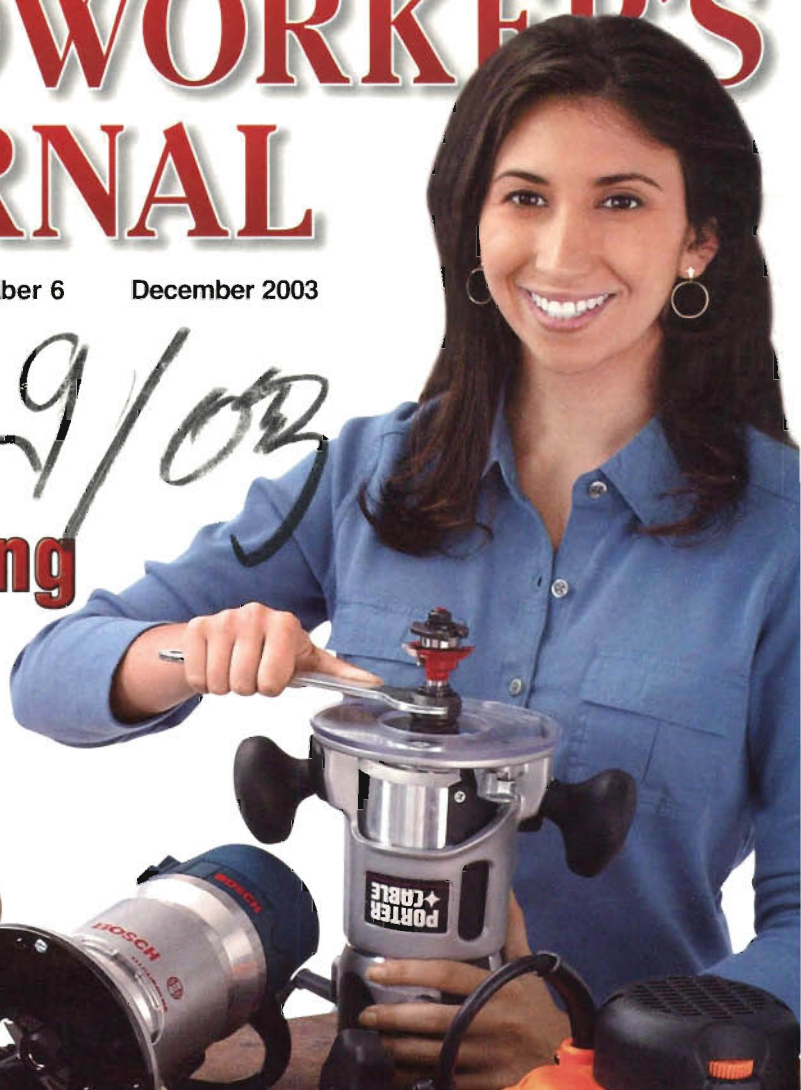
7 The SECRETS of perfect routing

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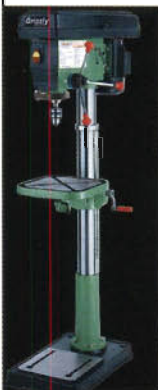


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- MAX. CUTTING HEIGHT: 12"
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- SPINDLE TRAVEL: 3"
- 2 SPINDLE SPEEDS: 7,000 AND 10,000 RPM
- SPINDLE OPENINGS: 1 1/4", 2 1/4", AND 5 1/4"
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- MAXIMUM CUTTING DEPTH: 1/8"
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- MAGNETIC SWITCH W/ OVERLOAD PROTECTION
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- TABLE SIZE: 25 1/2" X 20"
- MAXIMUM CUTTING WIDTH: 20"
- MAXIMUM CUTTING HEIGHT: 8 1/2"
- MAXIMUM CUTTING DEPTH: 1/8"
- FEED RATE: 16 & 20 FPM
- NUMBER OF KNIVES: 4 HSS
- CUTTERHEAD SIZE: 3 1/4" DIAMETER
- CUTTERHEAD SPEED: 4833 RPM
- APPROX. SHIPPING WEIGHT: 785 LBS.



G1033

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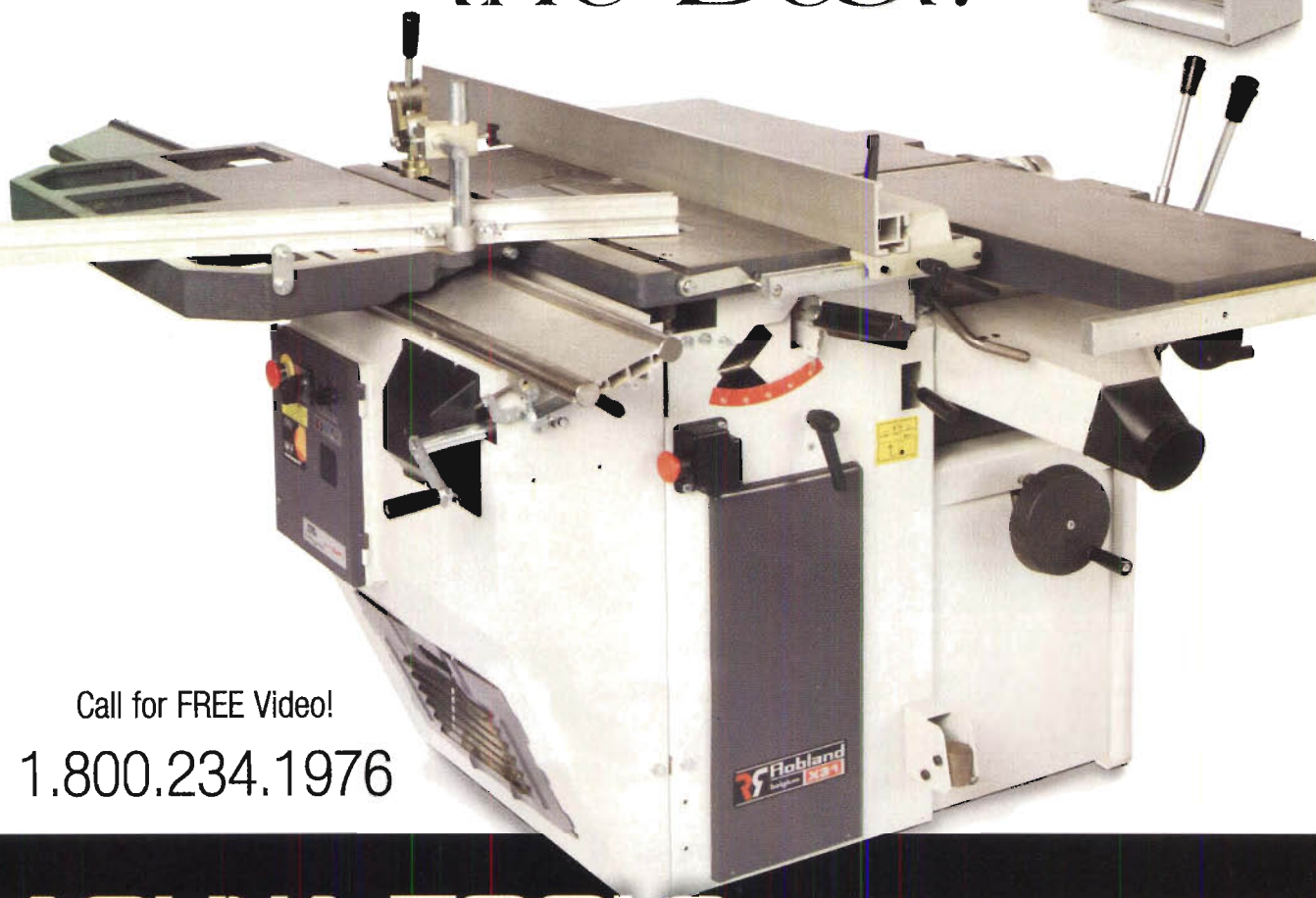
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Features

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52 Seven Ways to Guide Your Router

By Ian Kirby

Get perfect cuts from your router — whether you're guiding it on a base, a bit or a table.

60 Four Handy Shop Helpers

By Bill Hylton

Quadruple your efficiency in the shop with plans for a crosscut sled, adjustable shop horse, roll-off stand and adjustable flip stop and fence.

68 Dresser Valet

By Chris Marshall

You'll give your router a real workout with this cocobolo project featuring a secret cash compartment and a unique hinging mechanism.

75 Rolling Lumber Rack

By Chris Marshall

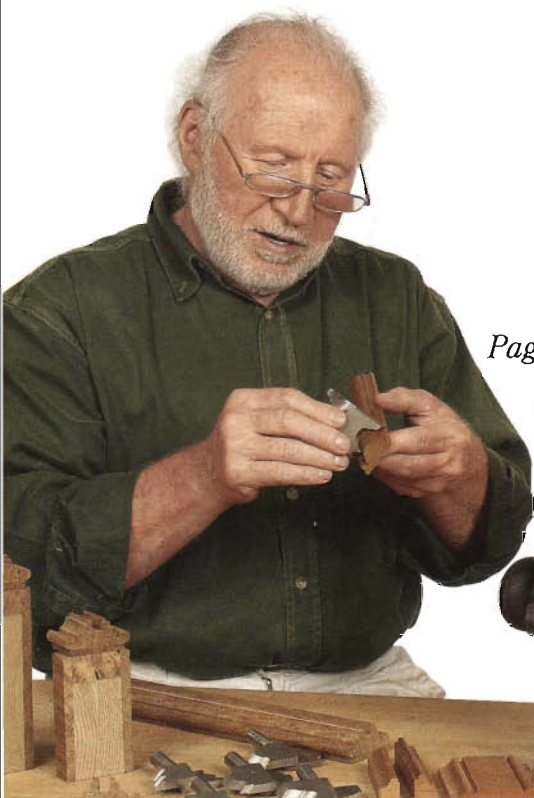
If you're accumulating lots of cutoffs and want a place to keep them safely out of the way, here's the perfect project for your shop.



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Woodworker's Journal

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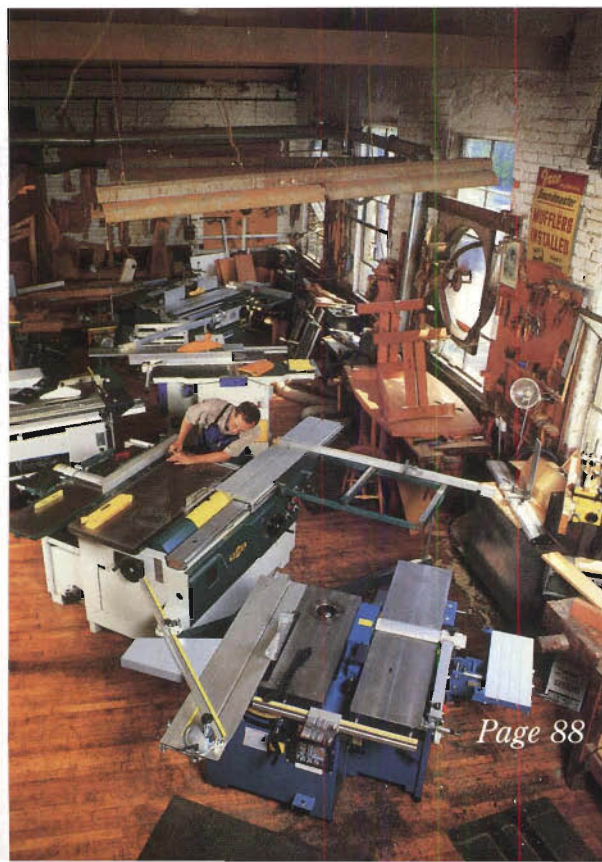
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88 Tool Review

Make mine a combo: Kelly Mehler reviews the new combination machines.

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New tools and totes.

NOW, \$199 BUYS YOU FOUR CORDLESS POWER TOOLS

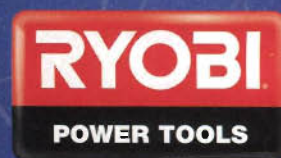


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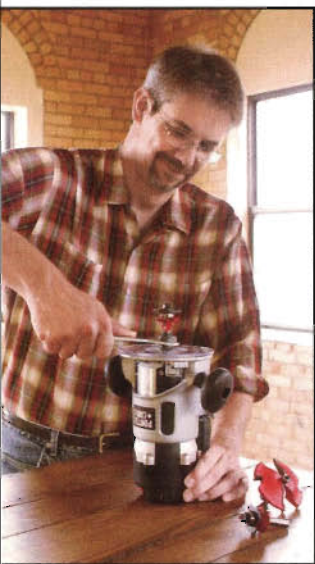
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Why is This Man Smiling?

My editor, Rob Johnstone, is smiling because he's got a new toy. In fact, when we took this photo, it was the only Porter-Cable 890 router that anyone (other than the Porter-Cable gang) had laid their hands on. And when Rob (who I'm *betting* is a lot like most of you shop rats out there) gets his hands on a brand-new tool, especially one that no one else even knows about, he's pretty much like a pig in . . .



Well, you've got the picture: You just can't wipe the smile off his face.

Rob's review of the latest router line from Porter-Cable appears on page 48, but there's plenty more in this issue on the subject of the router. We asked regular contributors Ian Kirby and Bill Hylton (both of whom have written books on the topic) to concentrate on two things: choosing and using a router. There are a lot of new offerings out there, and Bill's article (see page 22) will help you decide which features will be most useful to you. Once you've fired up your new router, spend an evening reviewing Ian's article on page 52. As he points out, making a good cut with a router depends on only three elements: the tool itself, the bit and a guide system. Ian concentrates on the last component this time around. With his help, you

will clearly understand the various ways a cut can be made.

When you're ready to put your skills to the test, try your hand at Chris Marshall's beautiful and challenging router project starting on page 68.



Speaking of new tools, the editorial team has completed its annual travels to woodworking shows and the various product unveilings. In the coming months we'll get you up-to-date on all the new offerings, but if you're really in a hurry, you can get the lowdown in two ways: For starters, subscribers will find the latest version of the *Resource Digest* packaged with this issue, featuring a complete listing of all the companies (including web sites) providing tools, accessories and shop supplies to woodworkers. If you bought your issue on the newsstand, visit our home page (woodworkersjournal.com) to find out how you can get the 2004 Resource Digest for yourself.

The second way to get the latest tool info is, I must confess, no longer a secret. The *Woodworker's Journal eZine*, published online every two weeks and available to all of you at no extra cost (look for signup info at our home page), now has a quarter million subscribers — a few more than the *Journal* itself. If you need the latest in a hurry, sign up now!

Larry N. Storker

NOVEMBER/DECEMBER 2003

Volume 27, Number 6

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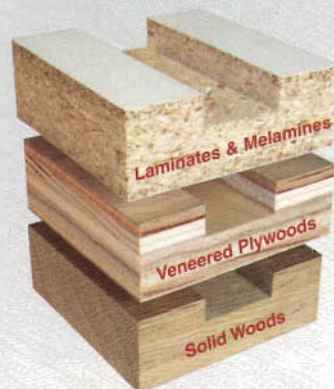
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Twisting Lefties' Wrists



Bosch's
"lock-on" button



What's the right place for a lock-on button? To the left, or in the center? Bosch locates their "lock-on" button on the bottom of the handle, and Makita (at right) puts theirs just below the trigger — both would work well for lefties ...

Left-handed Lock-ons

Larry Stoiaken's "White-Knuckled Wrist Twisters" editorial (*On the Level*) in your August 2003 issue brought to mind a pet peeve. The "lock-on" buttons on corded drills are downright dangerous for left-handed users.

When I use a drill hard in a position that requires a firm grasp, the meat of my hand will often depress the lock switch unknowingly. My wrist and forearm have been badly wrenched and twisted, actually being wrapped up into the cord, and I was only spared a bad break when the drill wrapped enough cord up to actually unplug itself.

Drill manufacturers should either have readily available

(meaning at the store, ready to buy, not a six-week \$300 special order) left-handed models, or have a switch like the Makita's that is in the middle. The switch doesn't have to be that easy to access, either, because the only time someone is likely to use the feature is when using a sanding disc or wire wheel. In those situations, it is easy to engage the switch.

*Tim Wagner
Heritage, Pennsylvania*

WJ Responds:

Tim, you're a woodworker after my own heart — the one that beats on the LEFT side of the body. As a lefty myself, I feel your pain (and I mean that literally). How about it, tool manufacturers — are you ready to accommodate your left-handed customers? You know, of course, that only the left-handed are in their right minds.

— Larry Stoiaken

Mail Call!
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We ask that all letters, including e-mails, include a mailing address and phone number. We reserve the right to edit for length and clarity.

David Clark turned his croquet balls "freehand" and used colored stain on them.





George Trusk's scroll saw has provided good shop fun through several generations.

Many Mallets

I have made family Christmas gifts for years, and the nine croquet sets I made from the pattern in the *August 2000* issue were the largest lathe project I have ever undertaken. I put the wicket holder on the other end of the unit by accident on the first assembly. I liked it, so I did it on all of them.

I finished all nine in between other projects. It took about 35 - 40 hours for each set, and I enjoyed every minute of it. For the nine sets, there were 279 total turnings.

David J. Clark
Gurnee, Illinois

Shop Toy for All Ages

Here's a photo of one of the neatest shop toys for kids. Mine used the scroll saw as they grew up, and now my grandson is having fun with it. I was reminded of it when I saw the story on page 30 ("Helpin' Out in Grandma's Shop," *Shop Talk*) of the *August 2003* issue.

George Trusk
Mercer Island, Washington

Re-thinking Re-coiling

I seldom write responses to articles in magazines. However, the article by Mark Duginske on re-coiling band saw blades (*Questions & Answers*, August 2003) really hit a nerve. In 60 plus years of using band saws, I have never needed a third hand (foot) to recoil. Just grab the blade in two places (approximately) opposite, with one hand at 9:00 and the other at 3:00. Both palms facing left, this puts your left thumb down and the right thumb up. Twist both hands in a counterclockwise rotation, and the blade will roll immediately into three coils.

Frank Wright
Ephrata, Washington

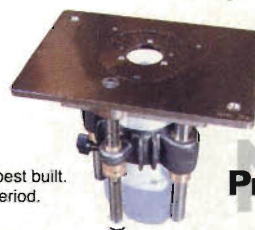
WJ Responds:

As we noted in the caption of the original article, there are many ways to coil a band saw blade. Probably just as many as the "best" chili recipe — and each practitioner is convinced that theirs is the best.

— WJ Editors



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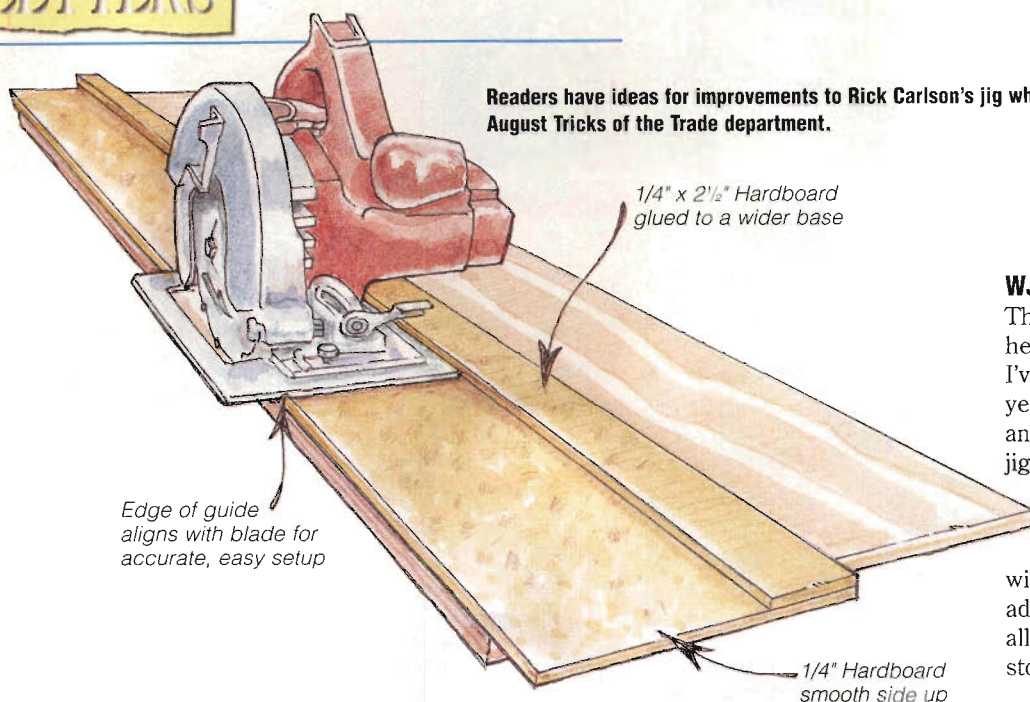
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Readers have ideas for improvements to Rick Carlson's jig which appeared in the August Tricks of the Trade department.

WJ Responds:

There are some good ideas here for improving this jig. I've been using one like it for years, too. Mine appeared in an article about my favorite jigs in the June 2000 issue of WJ. I designed it for use with a router, but it would work just as well with a circular saw. The adjustable stops on mine allow you to do stopped cuts, too.

— Rick White

Tricking Out a Jig

Rick Carlson's trick ("Circular Saw Cutting Jig," *Tricks of the Trade*, August 2003) has been around a long while and I, too, use the circular saw guide. However, I take the idea a step further and use the same kind of jig with my router. I have separate jigs for my 1/4", 3/8", 23/32" (for plywood) and 3/4" straight cutting bits hanging on my shop wall.

Bill Gourlay

Westlake Village, California

I have been using this style of jig for well over 15 years. I do have some additional suggestions for its design and use: 1) Increase the width of the base by about 3" (assuming a 2 1/2" guide strip) to accommodate a pair of 3/0 wooden hand screws. 2) Increase the length of the jig by about 10". This will allow you to position your saw on the jig for a straight cut before your blade contacts the sheet stock.

3) Make at least one jig for every common angle cut you might make. Once you tilt your saw's base to any angle other than 90°, you decrease the distance from the edge of the hardboard base to the guide, making the jig inaccurate for locating any more 90° cuts. (Been there, done that.) 4) Before making a cut, especially cross-grain, position your guide and, using a sharp utility knife, score across the veneer using the jig as an edge guide. This will almost eliminate chip-out. 5) Dedicate one style or brand of blade and circular saw for use with these jigs. The thickness of blades varies, and distances between the blade and the edge of the saw's base plate vary by brand and can wreak havoc with precision cuts. 6) And, finally, drill a 1" hole near each end for hanging this jig, and hang it where you can easily get to it.

Ros Barnes

Los Alamos, New Mexico

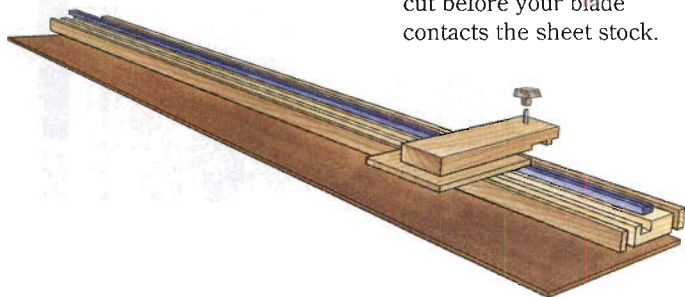
Rick White's version of the jig allows for accurate stopped cuts.

Miter Saw Brakes

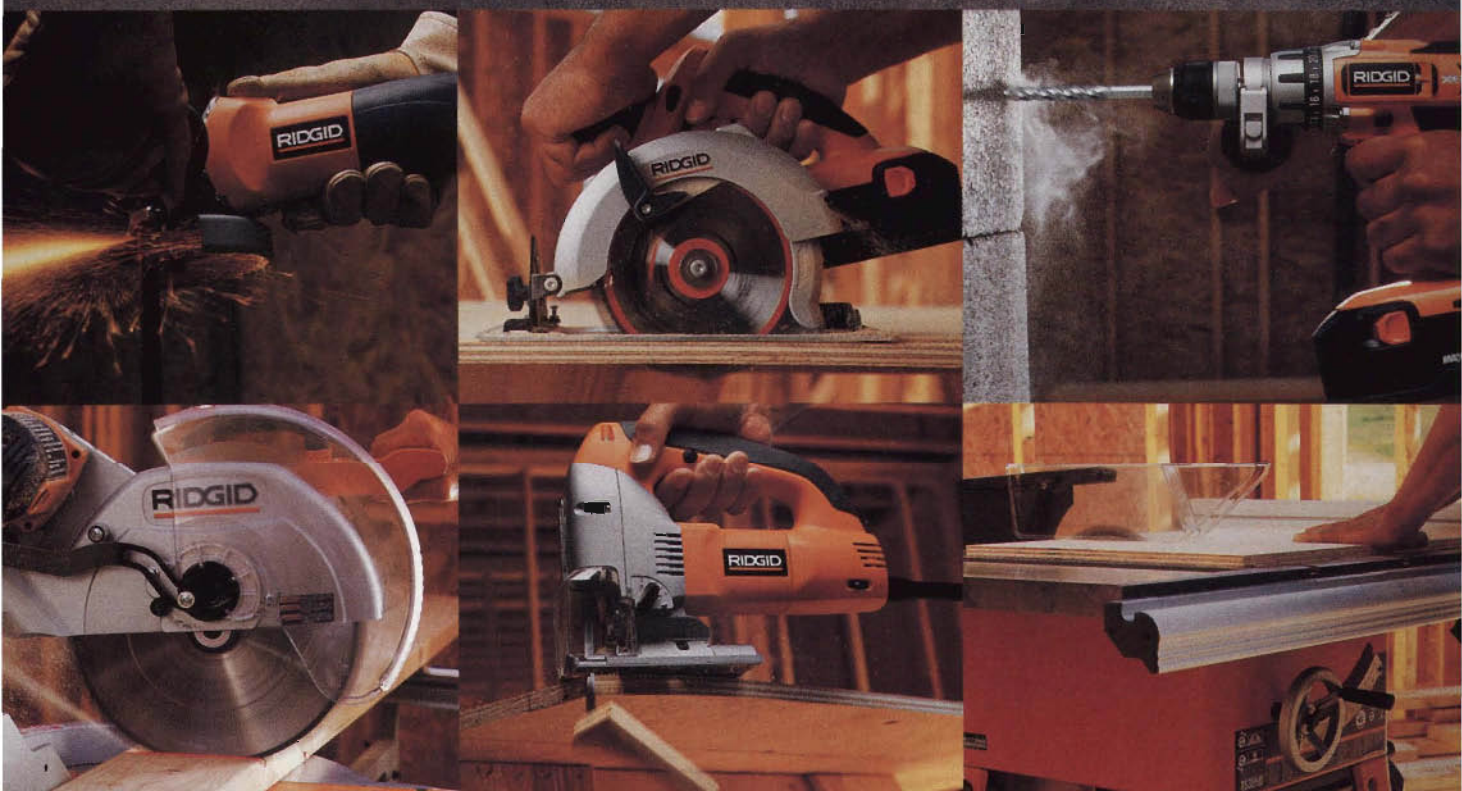
Sandor Nagyszalanczy's explanation of miter saw electric brakes (*Questions & Answers*, August 2003) is very informative, but tell Ryan Vogt there's a much easier fix for 99 percent of brake "failures" on miter saws: simply tighten the nut which holds the blade. Over continued use, the blade nut loosens ever so slightly. When the motor kicks on and causes the arbor to turn, the inertia in the nut and in the blade itself causes the nut to tighten, holding and spinning the blade strongly enough to cut. When the motor turns off, the brake causes the arbor to stop spinning suddenly. Again that little imp called inertia takes over, causing the blade to keep spinning. The blade bears against the nut, causing it to loosen just enough that the blade keeps turning for a while. Part of your routine shop maintenance should be to keep the mounting nuts tight on all saws — miter, radial arm, circular, etc.

Bernie Van Wormer
Wanatah, Indiana

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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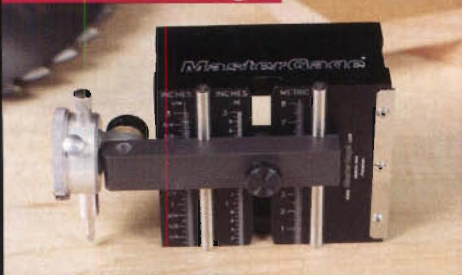
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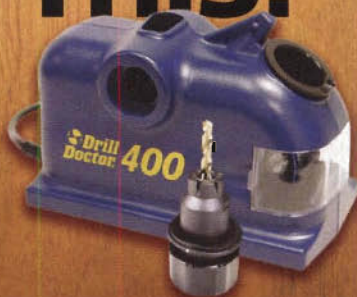
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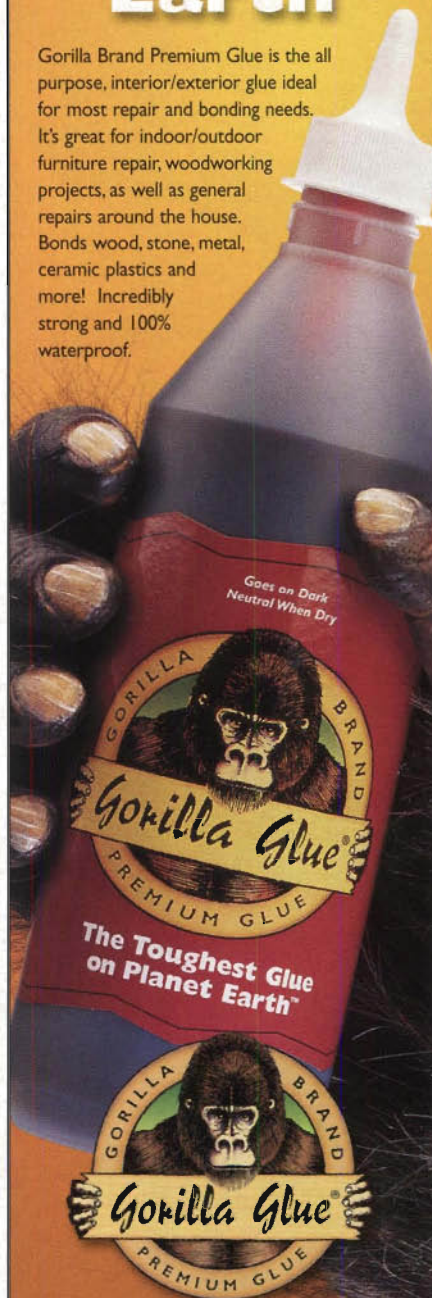
—Stephen Bierhorst
Patterson, Louisiana

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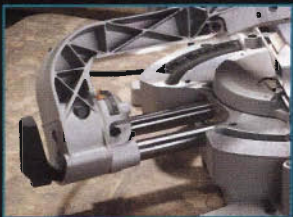
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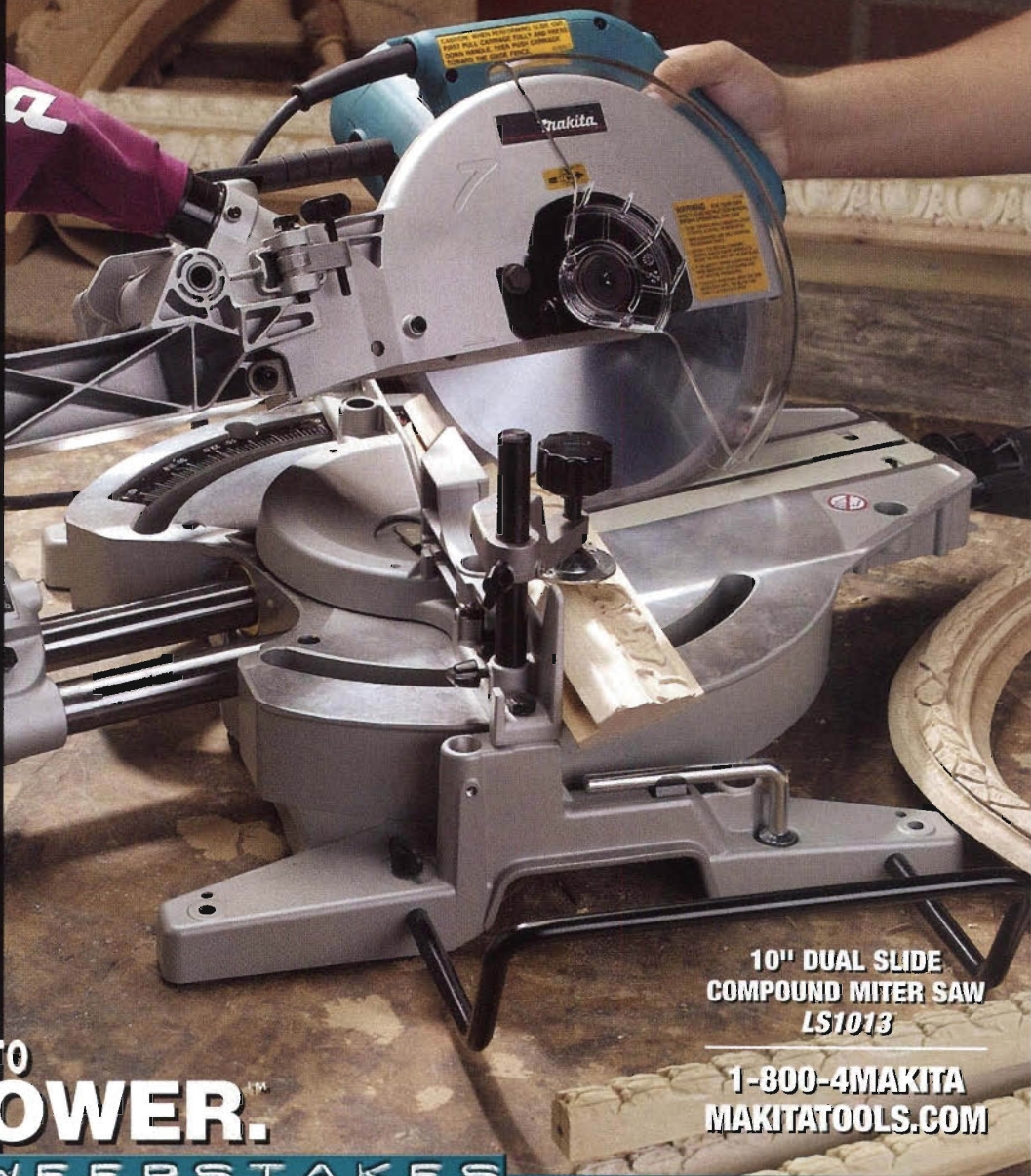


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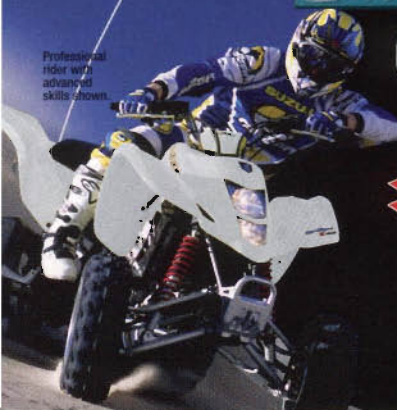
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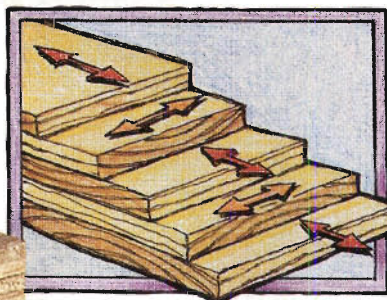
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Can You Cross the Cross Grain Rule?



Plywood is a different matter. First of all, the thin veneers are ruptured on both sides as they are peeled from the log, which weakens their structure. Then the plywood is put together with an odd number of veneers and an even number of glue lines. It's symmetrical about the line of its center plane — we call it “balanced.” We do the same thing when we veneer a panel: we veneer both sides so the stress will be balanced as the glue line cures and shrinks. Nevertheless, unlike particle board or MDF, plywood will distort — but it won't delaminate.

— Ian Kirby

Q I have heard or read many times that you should not glue up wood projects so the grain of one piece is 90° to the other, as this will cause problems due to different rates of expansion and contraction. However, this is precisely the way plywood is made, which does not seem to be a problem. Why is it taboo for my shop but not for plywood manufacturers?

*Dick Faunce
East Palatka, Florida*

A There are few absolutes in woodworking — think about it. All mortise and tenon, as well as dovetail, joints are made with the interface grain at right angles. The “cross grain” area is relatively small, but it would be stressed by wood movement: shrinkage or expansion. I've never seen a failed joint where the culprit was undoubtedly this stress; it's a matter of degree.

A bigger cross-grain area might fail or distort — might.

Q I was proud to buy a 60-tooth carbide tip blade, but it smokes in oak and maple. My friend's 24-tooth blade smokes very little, not at all if you keep the wood moving. So, what good is a 60-tooth blade? I've even seen a 100-tooth.

*Brian Pearce
Fort Worth, Texas*

A It is difficult to say whether the number of teeth was at fault for the burning without knowing more about the type of cut (crosscut or rip, for

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



These two 10" saw blades are designed for different tasks. The 24-tooth blade is made for ripping. The 80-tooth blade is made for crosscutting.

example) you were trying to make. It seems likely, however, that you were trying to rip hardwoods with your 60-tooth blade.

As a general rule, you will find that blades intended for ripping operations have relatively few teeth, spaced farther apart than on other blades, with larger "gullets" in between. These gullets clear sawdust and other debris out of the cut quickly to reduce friction and burning.

A typical 10" combination or general purpose blade, which is intended for both rips and crosscuts, will usually have 40 to 60 teeth.

continues on page 18 ...

THIS ISSUE'S EXPERTS

Ian Kirby is the author of *The Accurate Router* and a regular contributor to *Woodworker's Journal*.

Cliff Paddock is marketing manager for saw blade manufacturer CMT USA.

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

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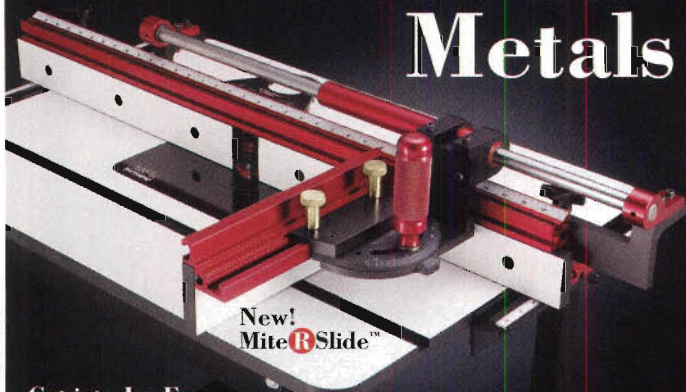


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QUESTIONS & ANSWERS



Blades for miter saws will usually have even more teeth, since they are normally used for crosscuts in molding or other delicate materials. A 10" miter blade will have about 60 to 80 teeth.

As you can see, there is a clear relationship between the number of teeth and the blade's intended use.

— Cliff Paddock

Q I read with interest Michael Dresdner's "Finishing Hotline" answer (October 2003) about using sodium hydroxide (lye) to darken wood. I was fine until I read "be sure it's pure sodium hydroxide, not a drain cleaner." Then I looked at the photo of the lye container which clearly read "drain opener." I'm confused.

Felicity Campbell
Oxnard, California

A The mistake was mine. While editing Michael's answer I accidentally deleted a couple of key words. Lye is traditionally used as a drain opener, so don't be surprised to find that usage listed on your container of lye crystals. (As shown on the Red Devil brand we showed in the original photo, and again above!) Red Devil Lye is, in fact, pure sodium hydroxide.

— Rob Johnstone

Lye is sodium hydroxide ... it can darken wood and open drains.



WINNER! For simply sending in his question on cross grain glue-ups, Dick Faunce of East Palatka, Florida wins a 18V Compact-Tough Drill/Driver. Each issue we toss new questions into a hat and draw a winner.

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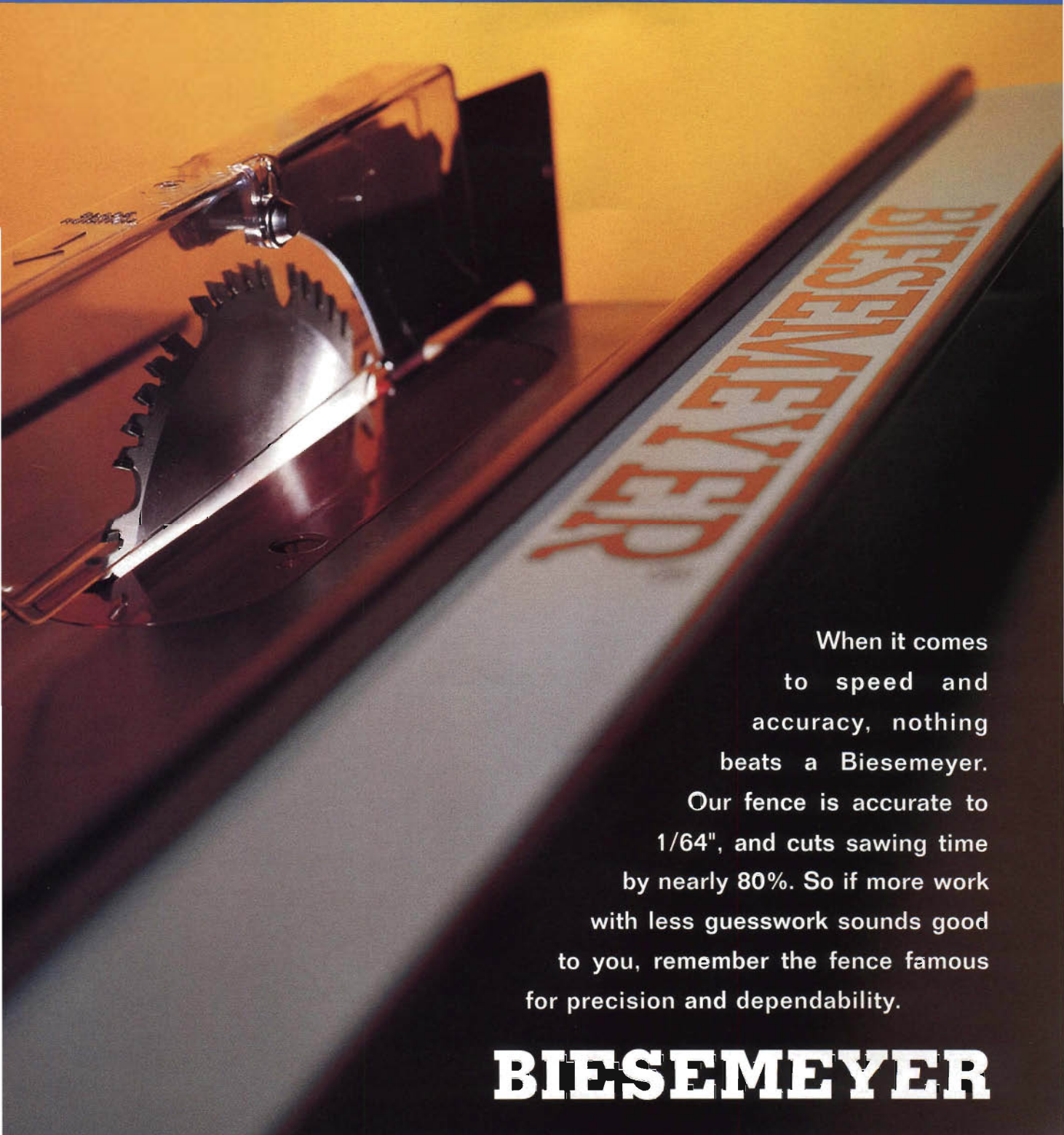
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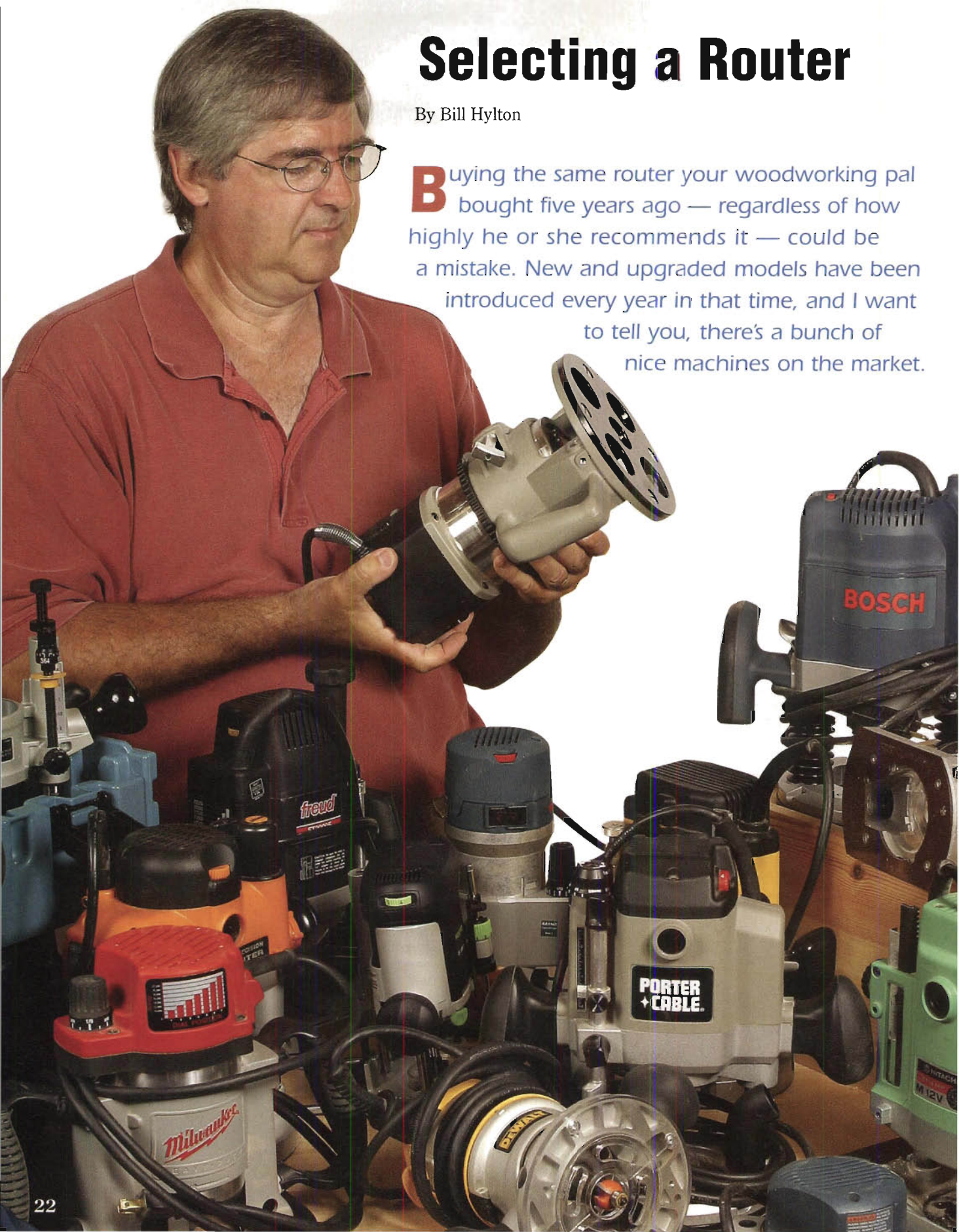
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Selecting a Router

By Bill Hylton

Buying the same router your woodworking pal bought five years ago — regardless of how highly he or she recommends it — could be a mistake. New and upgraded models have been introduced every year in that time, and I want to tell you, there's a bunch of nice machines on the market.



Where Do You Start ...

It's a brave new world if you're in the market for a router. You can get flexibility without compromising on manageability. Adjustments are increasingly easier to make, and accuracy is improving with every new model. Collets are improved, EVS is available on most models, and many of the new routers are decidedly table-friendly. Even if you already own a good router, you almost certainly will find it worthwhile to have several routers in your shop. Call me crazy, but I think having more than one of these tools is essential.

Before you add to your collection, do some research. Collect the stats, but by all means, go to a good tool store and put your hands on ALL the routers. You might hit a woodworking show just to try them out. Usually, you can actually run the routers there, and occasionally, you may be able to make test cuts. With each unit, try all the controls and locks and adjustments. Open and close the base clamp, run the motor up and down, look over the collet, handle the wrenches. Plunge the plungers. Set and reset the plunge depth.

Two Types: Fixed and Plunge

You'll find, if you didn't know, that there are two types of routers: fixed base and plunge. With a fixed-base router, you set the depth of cut and lock it. To make a deep cut in stages, you have to switch off the motor and adjust the cut depth for each stage. The plunge router allows on-the-fly cutting depth changes.

The fixed-base model is less glitzy, perhaps, than a plunge model, but it is the first you should buy. And if you can only buy one router, make it a fixed-base model.

Why?

Because a fixed-base router generally is compact, with a low center of gravity, making it the more stable tool for most operations. Its handles are low enough that you can grip them firmly and still have the heels of your hands braced against the work.

Any work that does not require those on-the-fly changes in cutting depth should be done, in my opinion,

with a fixed-base router. This includes edge profiling and cutting dadoes, grooves and rabbets.

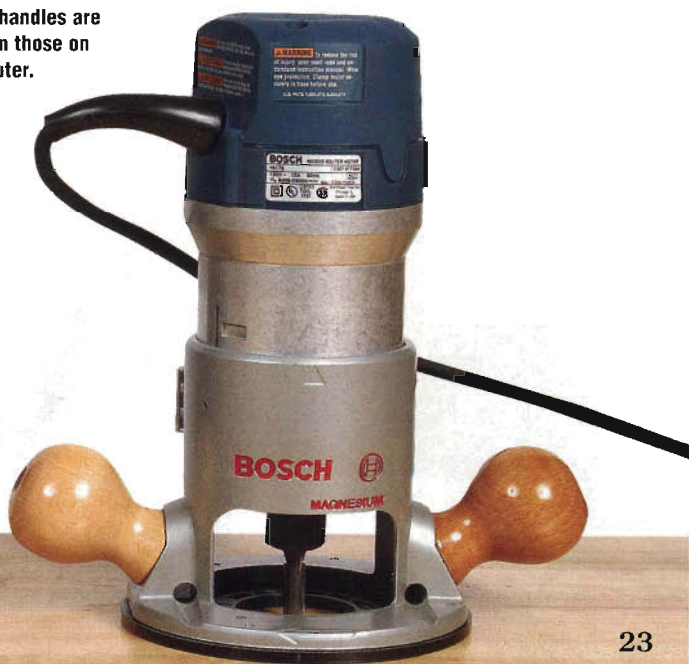
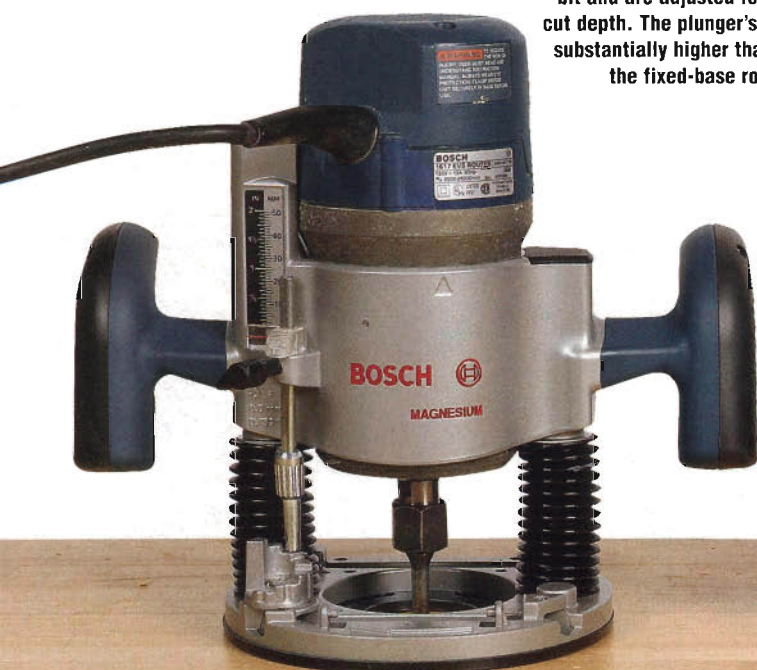
The plunge router enables you to lower the spinning bit into the work in a controlled manner. With it, you can begin and end a cut in the middle of a board, making it ideal for cutting stopped grooves and for inside work with templates. It's essential for routing mortises.

But the tradeoff is balance. The motor rides up and down on a pair of spring-loaded posts rising from the router base. To plunge the router, you release a lock and push down on both handles. It won't plunge smoothly unless the base is fully supported. At rest, the handles are 4" to 6" above the work; even with the router plunged, you may have difficulty bracing the machine, because the handles are too high above the work.

If you really can't make up your mind, fret not. Look at the combination sets, which include one motor and two bases. Six manufacturers make them available in two consumer and four professional grade versions.

Compare the handle positions. Both routers — fixed-base (right) and plunge (left) versions of the Bosch 1617 — have the same length bit and are adjusted for the same cut depth. The plunger's handles are substantially higher than those on the fixed-base router.

Today's Shop continues on page 24 ...





Combination Sets

D-handled bases typically require a motor with a short cord, while the motor supplied with the combination sets has a long cord. DeWalt skirted the problem with a cord that detaches from the motor.



A trimmer can be held in one hand and guided confidently around the edges of a workpiece to cut a roundover or other small profile.

Two Grades: Consumer and Professional

There are two grades of routers, as of other portable power tools: professional and consumer. (You can choose from fixed-base and plunge models in both grades.) The most obvious difference is cost. You can pick up a consumer grade router for \$60 to \$100. Professional grade routers run between \$140 and \$325.

Underlying the cost differences are significant differences in design and manufacture.

A professional tool is designed to weather the workaday uses and abuses of the job site and commercial shop: long running times, incessant on-off cycling, heavy cuts with massive bits and, cumulatively, hundreds and hundreds of hours of use.

The consumer tool, on the other hand, is expected to be used for brief periods. A hobby woodworker who averages 10 hours of shop time a week over the course of a year will have about 500 hours invested. If his or her router is actually running for a tenth of that time, it'll have 50 hours on it. A cabinetmaker can log that in a month or two.

The upshot is that the designer of a consumer grade tool can compromise. The motor and bearings need not be as robust as a pro grade. It may tend to run hotter, and heat kills motors, so running it for protracted periods can shorten its life.

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Porter-Cable pioneered the package concept about 12 years ago, and had the niche to itself for a surprisingly long time. In recent years, Makita, Bosch and DeWalt have elbowed in, and now Craftsman and Skil have similar consumer packages. Competition has really improved the breed. And P-C has just introduced a design that ups the ante yet again.

You should be aware of two other router styles, both subsets of the fixed-base type. One is the D-handle; the other is the trim router.

The D-handle base has a large loop-style handle with a trigger switch, very much like a circular saw. It has one knob opposite the handle. The power cord from the motor plugs into a receptacle on the handle, and a cord on the handle is plugged into a wall outlet. You leave the motor switch "on" and use the trigger to turn the motor on and off.

The attraction is ergonomic. The comfortable D-handle router handles like a circular saw or a hand plane. The manufacturers, though, haven't figured out that the stability could be improved simply by using a teardrop-shaped baseplate that extends under the handle, expanding the footing. The D-handle bases currently available are extensions of the four professional grade combination sets.

The smallest routers are laminate trimmers, often called trim routers. A trimmer can be held in one hand, and that's good, because it doesn't have handles (though Ryobi packages an oversized baseplate with two post-like handles with its trimmer). Given its diminutive size and low power, it's unsurprising that it takes only 1/4" shank bits.

Though designed specifically for work with plastic laminates, these little guys are handy for all sorts of light-duty work in the woodshop.

Consumer Versus Professional

Consumer plunge versus professional plunge.



Consumer fixed-base versus a professional fixed-base.



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Fixed Router Depth Adjustment



An Acme-thread screw is the heart of Milwaukee's vertical adjuster (left). The black release button enables you to insert and remove the motor without resorting to the screw. Once the motor is in the base, the adjuster can be turned with the knob. Bosch's 1617 system (right) combines three coarse settings — notches on the motor — with an adjuster screw to provide accurate vertical adjustments.

Castings will be low-quality “pot metal,” with rough edges and little refinement. The controls will be less sophisticated — plastic levers and knobs instead of metal; fine adjustment features absent. It will be more difficult to set up, especially with accuracy, than a pro model.

Two Sizes: Medium and Large

Trimmers aside, routers are clustered in two sizes characterized primarily by amperage and horsepower ratings.

The largest number of brands and models, both fixed-base and plunge types, are rated between 1³/₄ to 2¹/₄ horsepower. Often called mid-sized

or mid-powered routers, the truth is, these are the baseline models. Besides consumer grade brands and models (and trimmers), you'll find only three routers rated at less than 1³/₄ horsepower: Porter-Cable's venerable Model 100, Festool's unique plunge router, and Makita's fixed-base 3606, which crowds the line between consumer and production routers.

The second cluster is the 15-amp, 3 to 3¹/₂ horsepower club, which includes two fixed-base routers and nine plungers.



The adjustment ring of DeWalt's DW618 is threaded onto the motor can, but latched to the base. Rotating the ring causes the motor to rise or fall without turning. Snap the toggle closed to lock the setting.



An oversized plastic ring winds the Ryobi motor up and down, while a plastic cam-action lever clamps and unclamps the base.

The medium-sized routers weigh between seven and nine pounds, while the big ones weigh between 12 and 14. I was surprised, as I compiled stats, that the consumer models tended to be heavier than the pros. Dedicated plunge routers tend to be a little heavier than comparable fixed-base machines.

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Plunge Router Depth Adjustment



The depth-stop on Porter-Cable's 8529 has a foot that swivels to step on the different levels of its fixed turret.

Instead of a multi-level turret, Ryobi's plunge router has a pad for the depth-stop rod. Turn the pad up or down to micro-adjust the depth of plunge.



Some depth-stop turrets, like the one on Bosch's 1617 plunge base, have many steps of fixed height.



The height-stop rod on the DeWalt DW621 has a rack-and-pinion gross adjustment. With the coarse position set and locked, micro-adjust by turning the knob on the rod to extend or retract the pad at the bottom.

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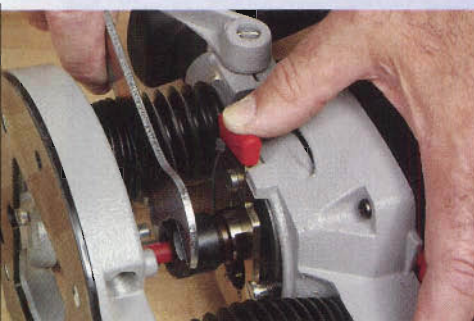
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One-wrench Collet Changes



Changing a bit in a fixed-base router (DeWalt's DW618) that has a spindle lock requires only one wrench.



A spindle lock simplifies bit changes on a plunge router, where access between the posts is limited. Hold the router with one hand, thumb on the spindle lock. Only one wrench is needed.



To change bits in the Triton, you wind the motor all the way to the base. The collet extends through it, and the spindle and the switch are automatically locked. Hold the router with one hand and work the wrench with the other.



The bent wrench supplied with the Porter-Cable 8529 allows you to change bits through the base, ideal when the router is mounted in a router table.

I'd advise you not to put too much stock in horsepower ratings. You may have been advised to look at amperage ratings instead, and there's merit in that. The amperage rating of each tool is assigned by Underwriters Laboratories (UL). It is the maximum amount of current the tool can draw without overheating and, eventually, burning out.

The horsepower rating, on the other hand, is assigned by the manufacturer, based on tests conducted with the motor mounted on a dynamometer. Speed and torque data are recorded as increasing artificial loads are applied, to the point at which the motor simply stalls.

Peak horsepower is the absolute maximum horsepower generated, very probably when the motor is drawing two or three times the UL's amperage rating and consequently starting to over-heat, stink and smoke. There is no link between the amperage rating and the horsepower rating. In use, your router's power output will never approach its rated horsepower.

Vital Characteristics

As you sort through the candidates, assess the vital characteristics. Don't get sidetracked by non-essentials: things like switch location and spindle-locks can be tie-breakers, if you consider them at all.

Manageability is essential. You need to be able to lift your router easily and handle it with confidence. If it is too big or too heavy, if the knobs or handles don't fit your hands, you will have a difficult time using it effectively.

Get a router that doesn't intimidate you. Switch it on — with it plugged in, so you experience the motor screaming — and maneuver it around a workpiece, real or imaginary. If you have an opportunity to actually rout, jump at it.

Above all, don't be reluctant to start small. Get experience. You'll probably find you can do a lot of practical work with a relatively small machine.

Adjustability covers the range, simplicity and accuracy of setups, particularly the depth of cut. Obviously, this is vital. You want to be able to set the cutting depth quickly, yet have it be accurate. The best systems provide both coarse and fine adjustment capabilities, so you can make an initial setting easily and quickly, then make infinitesimal alterations. And, of course, you need to be able to lock in the setting securely, without wrenches or pliers, so your setting doesn't subtly drift as you make cuts.

Research!

"Before you add to your router collection, do some research. Collect the stats, but by all means, go to a good tool store and put your hands on ALL the routers. You might hit a woodworking show just to try them out."

Depth of Cut

With all routers, the cutting depth is governed by the vertical position of the motor in the base.

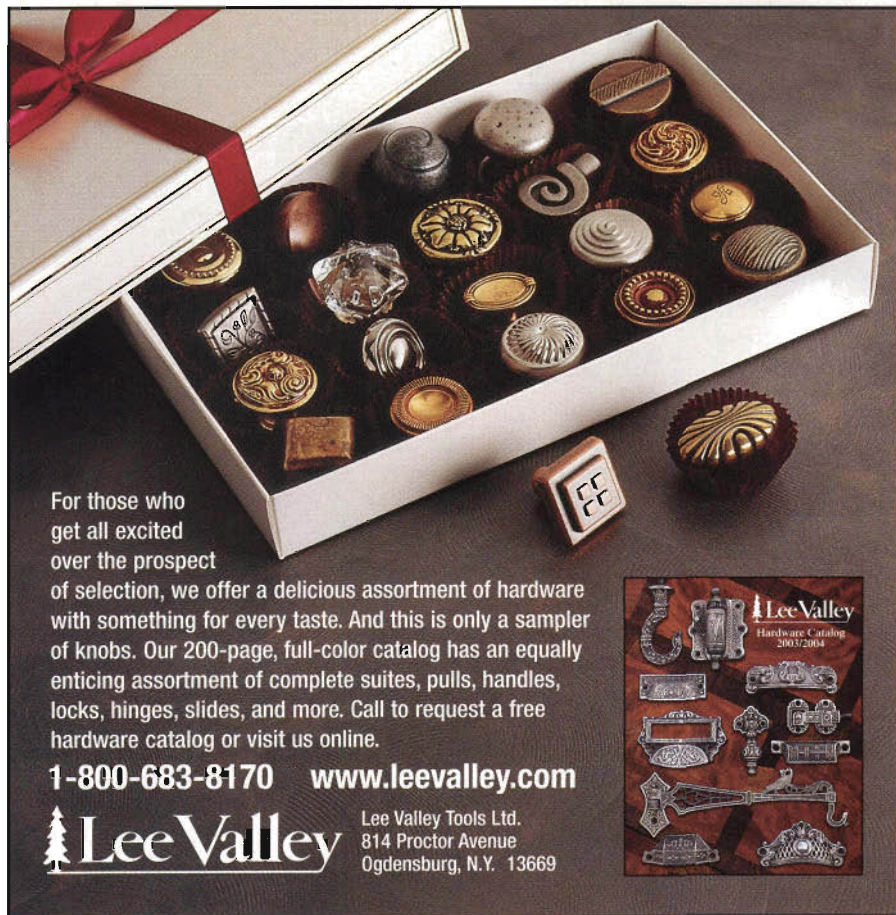
The motor of a plunge router is mounted on posts, and what you set is a stop to limit how close to the base the motor can descend. Release the plunge lock and the motor — spring-loaded — bounces up the posts, away from the base and thus from the work.

The cut depth diminishes.

While the details vary among brands and models, the cut depth of a plunge router is established by the gap between the depth-stop rod and a pad or turret on the base. You install the bit, then plunge the router, bottoming the bit against the work (so the tip is flush with the bottom surface of the baseplate). Drop the rod against the turret, then back it away — a distance equal to the desired cutting depth — and lock it.

To refine a coarse setup, most systems incorporate a means to alter the length of the rod. On several models, the depth rod is actually

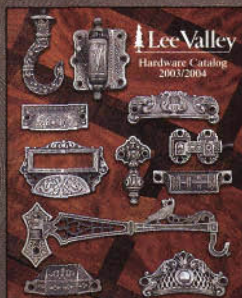
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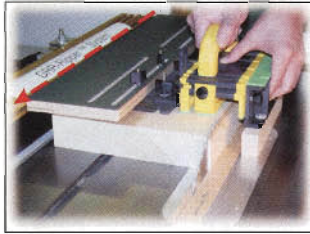
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FESTOOL

The Festool OF 1000 E stands apart, refusing to conform to router design dogma.

Its weight is low; only trimmers weigh less. The German manufacturer doesn't offer a horsepower rating, but at 7.5 amps, it's clearly low-powered. It won't take 1/2" shank bits; you get a 1/4" collet and an 8mm collet. Most obvious is its queer appearance, short with a knob at one end and a pistol-grip style handle at the other.

But set it to work, and you realize that it's a pleasure to use. Routing with the Festool mimics working with a hand plane or a circular saw or belt sander. You can actually plunge it smoothly with one hand. I see it as a D-handled plunge router. And it has plenty of moxie for common hand-guided cuts.

The optional guide accessories enhance the router's utility and accuracy. An edge guide comes with the router, but the optional micro-adjuster improves it. The niftiest accessory — which is also used with other Festool machines — is an aluminum rail you clamp to the work. An attachment on the router registers on the rail's raised guide to keep the router under control, regardless of your feed direction.

It may not be the dream router you visualized, but it routs like a dream.

a tube with a threaded shaft penetrating it. Without moving the tube, you can extend or retract the threaded shaft, which alters the distance between its end and the turret and increases or decreases the depth by as much as 1/8" and as little as 1/128".

Viewed broadly, the adjustment dynamic is the same on all fixed-base routers. The base is simply a big sleeve-clamp around the motor. Loosen it, and you can slide the motor in and out, altering the distance the bit extends beyond the base. Tightening the clamp locks the position: you're ready to rout.

The state-of-the-art lock is the toggle latch, with only a couple of models still using a wingnut — which has nothing to recommend it — to lock the base around the motor.

Individual Models

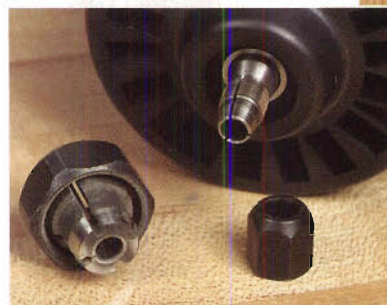
You'll find variations in adjustment schemes on individual routers.

- Bosch uses a two-stage system. You choose one of three positions — 1/2" apart — as a coarse setting, then turn a threaded rod to dial in a precise setting. Each turn moves the bit 1/16".

- Porter-Cable's fixed-base routers (the new 890 excepted) and the Makita RF1101 use four pins registering in a spiral ramp for vertical adjustments. To extend or retract the bit, you twist the motor clockwise or counterclockwise.

For controlled adjustments, these routers have a graduated ring attached to the base. You zero out the ring by rotating the "0" to align with an indicator on the motor. Then you twist the motor (without moving the ring) until the indicator aligns with the desired fraction on the ring. Fine adjustment is all in your wrist. P-C has the ramp cast into the base, while Makita incorporates it into the motor can.

- DeWalt also uses the spiral ramp. The graduated ring is turned onto



The split-arbor style collet used on some consumer grade routers compared to a professional grade self-releasing collet assembly. Both are for 1/4" shank bits.



The lack of a 1/4" collet for some models requires you to use a sleeve on 1/4" shank bits.

the motor. When the motor is dropped into the base, two latches on the ring grab the base, locking the ring and the base together. Turn the ring, and the motor rises or falls without rotating. I have found that very fine adjustments are as easy to achieve as with the threaded-rod-based approaches. Gross adjustment is only possible with the motor out of the base. Then you can spin the ring quickly.

- All of Milwaukee's routers have continuous adjustment from top to bottom, using an Acme-thread screw mounted parallel to the motor axis. The system enables you to push a release to make a gross movement to any point along the threaded adjuster. You never have to wind the motor the length of the adjuster. The screw adjuster can be accessed using a special wrench through the baseplate.

Collets

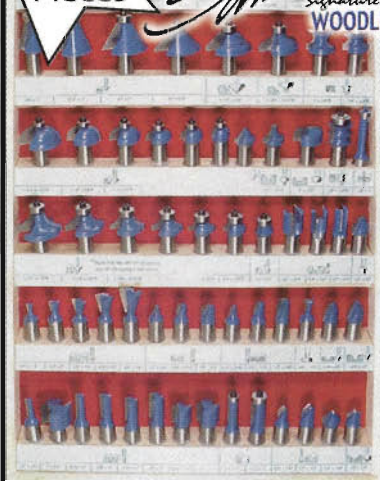
Though the router's collet weighs only an ounce or two, this vital part holds the cutter on the end of the motor's armature shaft.

The best is the self-releasing collet: the collet and the nut are connected and, as you loosen the nut with a wrench, the collet is drawn out of the socket, releasing the bit. You usually have to use the wrench twice, first to "crack" the nut, then again to actually pull the collet so it releases the bit. Varying amounts of

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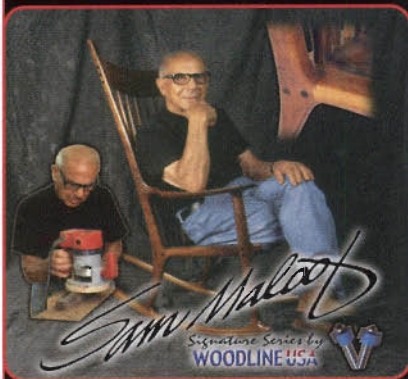
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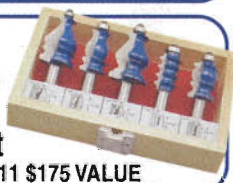
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If you want to dedicate a base to a router table, buy an extra casting. You don't need the handles, so don't buy them. Bosch makes an extension for the 1617's micro-adjuster, which makes it easier to use in a table.

slack are inherent. All the professional-grade routers, except the Hitachi and the Triton, use the self-releasing collet.

The least acceptable collet is what I call a "split-arbor," used on a few consumer models. This collet is integral to the motor's armature; if it gets damaged or worn, you can fix it only by replacing the armature. It'll be cheaper to buy a whole new router.

It's best to focus on routers with both 1/2" and 1/4" collets. Large diameter and very long cutters especially should have 1/2" shanks, and you need to get a router that will take them. At the same time, avoid models that don't provide a true 1/4" collet, forcing you to use to a sleeve to fit them in the 1/2" collet.

Speed Control

Routers cruise at 22,000 rpm, a speed that's fine for bits less than 1" in diameter, but way too fast for 2" or 3" diameter bits. Electronic variable speed (EVS) is an important feature on most models. EVS allows you to dial back the router's rpm, making



Milwaukee supplies a T-handle wrench with its routers so the vertical adjuster can be accessed through a hole in the router table top.

it safer to use large diameter bits.

Variable speed is accompanied by "soft-start." With a bottom-of-the-line router, flick the switch and in a nanosecond, it's running at 22,000 rpm. The whole tool wants to spin along with the armature, and the effect is startling. A router with soft-start accelerates to cruising speed progressively.

EVS also helps the router maintain its rpm under load. This prevents the router from bogging down as you feed it into a cut. (Nevertheless, you can bog down any router with an excessive cut or an overly aggressive feed.) Several manufacturers have boosted horsepower claims for existing motors simply by adding EVS.

Smoothness

In a plunge router, quality number one is how well it plunges. In my opinion, the only reason to buy a plunger is to make plunge cuts. Make sure the one you buy does that well. The movement should be smooth, with no stickiness.

Bear in mind that none plunge smoothly when only part of the base is supported (when routing along an edge). Likewise, you can't plunge a router smoothly with one hand. You need equal pressure on both handles and support under both posts.

Try individual models to assess the effort required to make a plunge cut. Some are very stiff, demanding a surprising amount of effort. Others have low spring rates, and seem more buoyant. Try them and judge which you prefer.

Table Friendliness

Routers frequently are used like stationary tools, by mounting them in tables. While a router sometimes is dedicated to the table, woodworkers on a budget often want one router for both hand and table use.

It used to be that the motor would drop out of an upended base if the clamp was opened. No more. The motor doesn't budge until you work its adjuster. At the same time, the motors of all the pro grade fixed-base models separate easily from their bases. This makes it convenient to drop out the motor, then set it on a benchtop to change bits.

If you prefer to use a plunge model in a table mounting, you can find some that are well-suited. Old standbys, such as the DeWalt DW625 and the Hitachi M12V, have always been easy to adjust in a table if equipped with an aftermarket adjuster knob. Several of these — the Freud and Makita's 3612, for example — are delivered with one of these knobs.

The newest dedicated plungers — Bosch's 1619, the Triton, and PC's 8529 — have adjustment features that enable you to progressively wind the motor up and down the posts. The latter two are designed for above-the-table bit changes.

The one problem that stems from using one router both in hand and in a table is the mounting. Some woodworkers use an insert plate for the mounting and leave it attached to the router, even when they use it in hand for an operation.

The combination sets tempt you to mount the fixed base to the table, and to use the plunge base for every hand operation. I'd urge you instead to buy a second, stripped-down fixed base for the table. (In a table, you don't need the knobs or the baseplate).

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TSC-10CL
shown with standard Align-a-Rip® 30" capacity rip fence.

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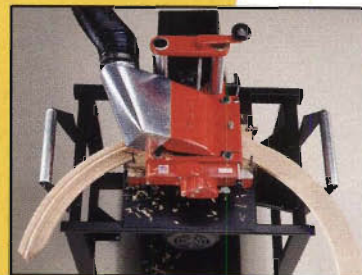
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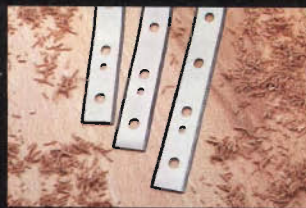
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Three knife cutter-head provides 30% longer knife life than traditional two knife cutter-heads.



A two speed gear box allows users to choose between 96 and 179 cuts per inch.



An automatic carriage lock is built into the four posts to minimize the movement that causes snipe.



A fan-assisted chip ejection system picks up debris and exhausts it from the unit.

TWO SPEEDS AND THREE KNIVES ON THE DEWALT DW735 DELIVER THE ULTIMATE SURFACE FINISH.

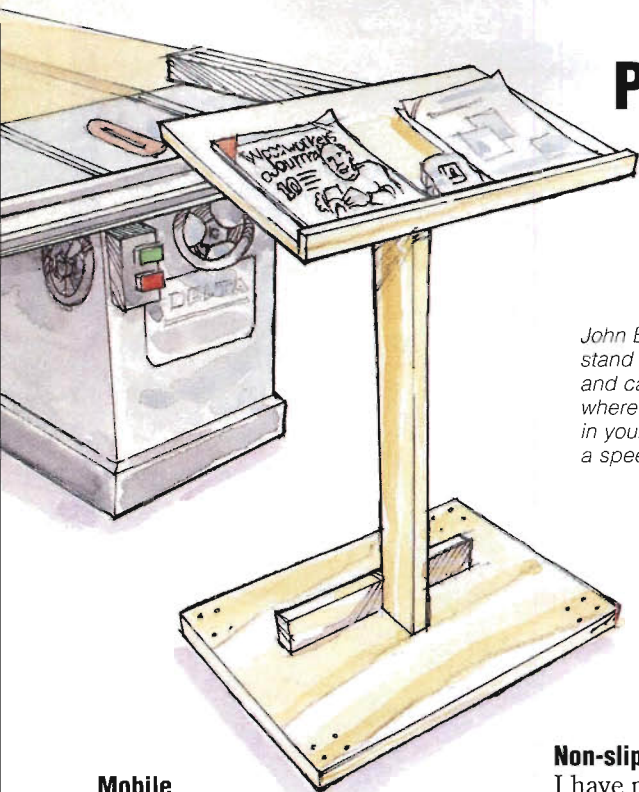
The DW735 13" thickness planer from DeWALT revolutionizes surface finish through a one-of-a-kind three knife cutter-head, two-speed gear box combination. It offers the ultimate in finish quality — even on hard to plane figured woods — by offering the most cuts per inch available on any benchtop thickness planer. A fan-assisted chip ejection system aids in the removal of debris and prevents excess chips from marring material. The unique automatic carriage lock minimizes the movement that causes snipe without having to engage a lever before and after each pass. The solid 19-3/4" cast aluminum base provides twice the rigidity of traditional material support systems that utilize folding tables. The DW735 is a must for the serious woodworker. It takes planing to a whole new level.

For more information, call **1-800-4-DEWALT** or visit our web site at **www.DEWALT.com/planers**

DEWALT

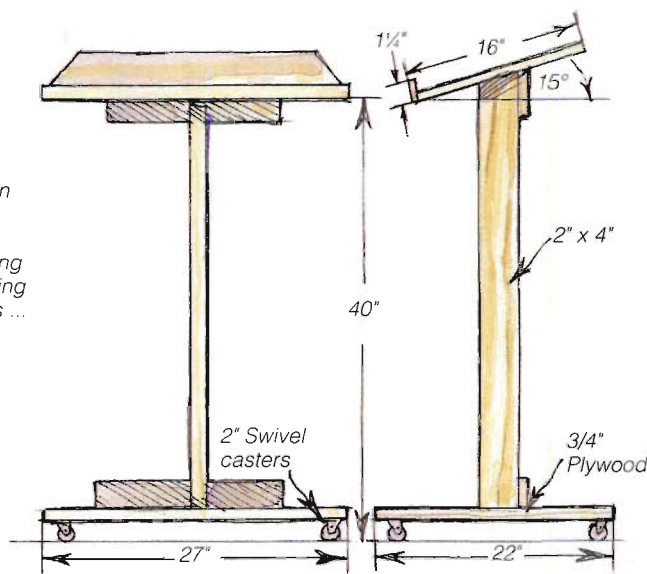
©2003 DEWALT. The following are examples of trademarks for one or more DEWALT power tools and accessories: The yellow and black color scheme; the "D"-shaped air intake grill; the array of pyramids on the handgrip; the kit box configuration; and the array of lozenge-shaped humps on the surface of the tool.

(Circle No. 39 on PRODUCT INFORMATION form)



Put Your Plans on a Pedestal

John Bell's mobile plan stand is easy to build and can roll right to wherever you're working in your shop — or giving a speech to your tools ...



Mobile Plan Stand

I built this small mobile lectern for my shop because I got tired of constantly walking back and forth to double-check the dimensions on my projects.

My unit has swiveling casters so it will easily go in whichever direction it's pushed.

*John Bell
Brush Prairie, Washington*

New Life for Foam Brushes

After removing the foam from a one-use brush, I discovered that it had a plastic plate to stiffen the foam.

Ever on the lookout for ways to conserve resources, I decided to give my brushes a second life — as glue-spreaders. They work great!

*Wayne Johnson
Grand Lodge, Wisconsin*

Non-slip Floors

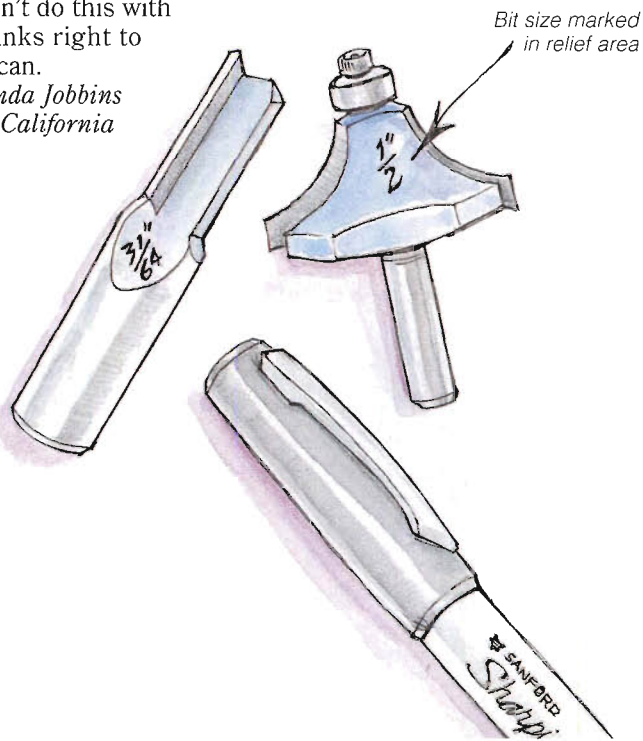
I have painted, wooden floors in my workshop and a little sawdust makes for a dangerously slick surface. When I found out that boatbuilders use crushed walnut shells for a non-skid deck I thought I'd give it a try. I bought half a pound from the local paint store, poured half of it into the can of paint, gave it a good shaking, then painted the area around the table saw. It works great! In case anyone is wondering, you can't do this with sand because it sinks right to the bottom of the can.

*Amanda Jobbins
San Francisco, California*

Marking Router Bits

I've recently taken to marking my router bits with a Sharpie™ fine-point permanent marker. Be sure to mark them on the relief area, as shown below, and you'll have no trouble knowing which is which. It lasts for quite a while, as long as you stay in the relief areas.

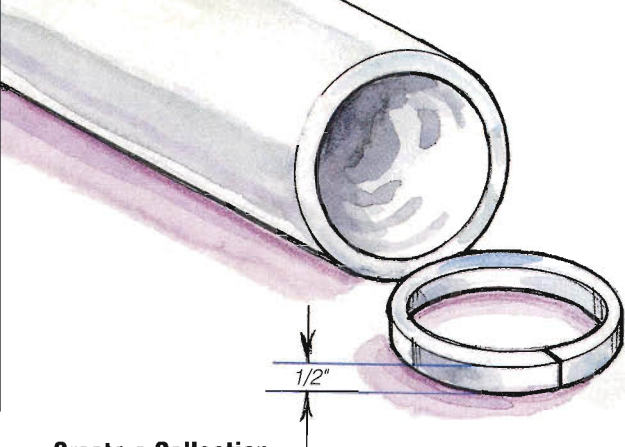
*Charles Hand
Indianapolis, Indiana*



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And if it's **our** **PICK OF THE TRICKS**, you **win** more!!!

see page 37 for the **details!**



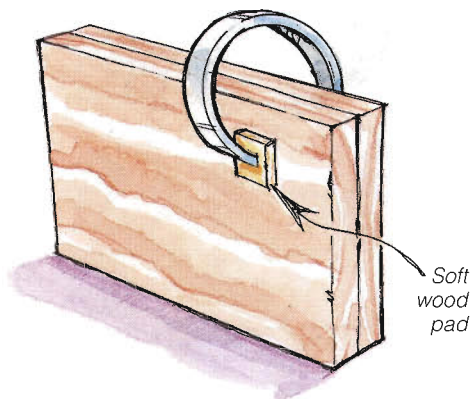
Cut 3" PVC into 1/2" rings and slit them.

Create a Collection of Your Own Mini Clamps

For the occasional small clamping job regular clamps are often too heavy or cumbersome — or you may not have enough of them.

My trick is to take a 3" diameter piece of PVC pipe, slice it up on the band saw and then slit it (using a band saw) as shown above. The resulting "pinch clamp" provides plenty of pressure for small gluing jobs, but you may want to make a few softwood pads to protect your more delicate work.

*Patrick Alexander
Rochester, New York*



WINNER!

In addition to our standard payment (below) Dan Reeve of Swanville,

Maine, will also receive a **a Drill Doctor 400PK 200** for being selected as the "Pick of the Tricks" winner. We pay from \$100 to \$200 for all tricks used. To join in the fun, send us your original, unpublished trick. Please include a photo or drawing if necessary. Submit your Tricks of the Trade to Woodworker's Journal, Dept. T/T, P.O. Box 261, Medina, MN 55340. Or send us an e-mail: tricks@woodworkersjournal.com

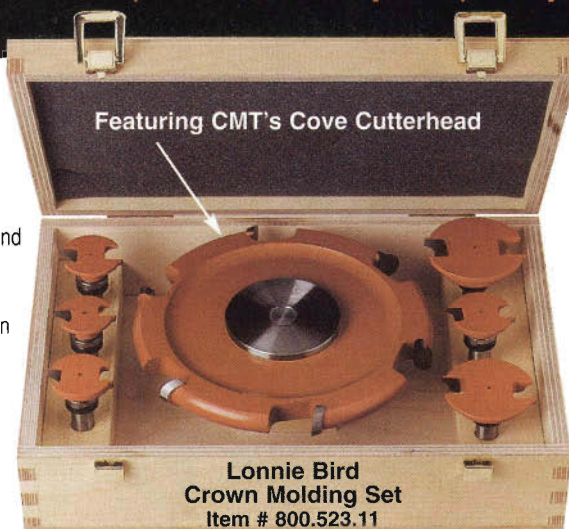
continues on page 38 ...

Where Innovation & Elegance Meet

CMT's Crown Molding Set lets you create completely unique, truly beautiful designs

Create an incredible array of elegant moldings with your tablesaw, router table and CMT's Crown Molding Set. Designed by master woodworker Lonnie Bird and CMT, this set lets you make unique crown molding to precisely match your project, and crown molding is just the beginning of the story. By arranging the profiles of the six router bits in various combinations you can create dozens - or hundreds - of different decorative profiles!

The set consists of our innovative 7" diameter, 5/8" arbor cove cutter for your tablesaw and six 1/2" shank carbide tipped router bits. All six bits feature CMT's special inverted design, allowing you to keep the flat side of your workpiece in firm contact with your router table for unprecedented accuracy and control. So the next time your project demands that perfect molding, your CMT Distributor has just what you need: the Lonnie Bird Crown Molding Set.



Mark Ziobro tested the set for Fine Woodworking (February, 2003).

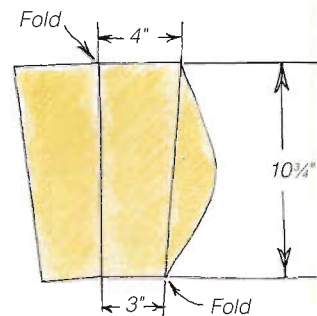
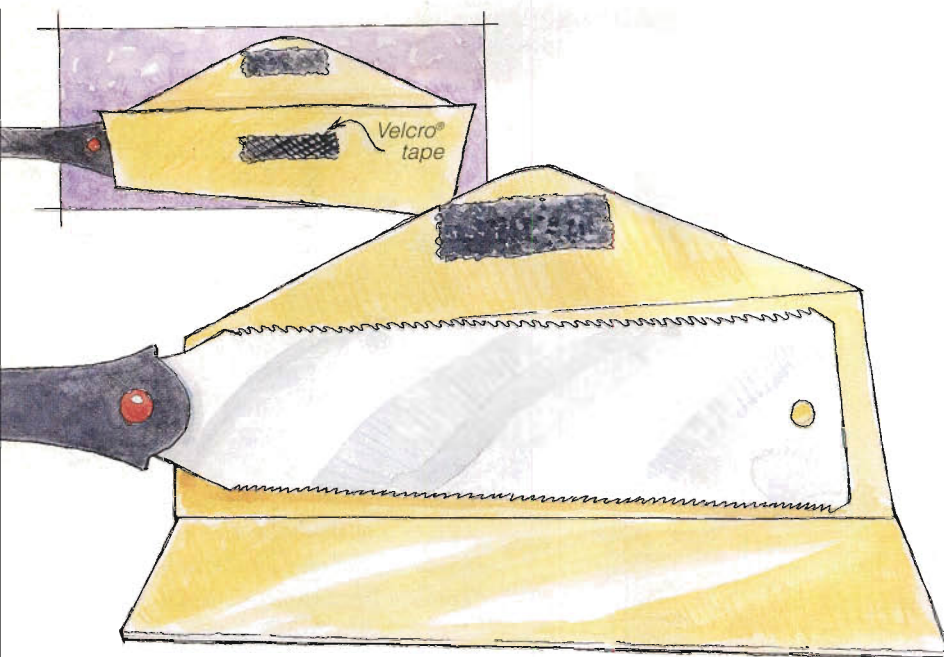
After comparing our cove cutterhead to the cut of a conventional tablesaw blade, he noted that "the surfaces produced by the CMT cutter were noticeably smoother than those made on the tablesaw. As a result, I faced considerably less time with my scraper."



Get the full story about CMT router bits, saw blades, shaper cutters and more. Ask your CMT distributor for your free 2003 catalog, or contact CMT for a catalog and the name of a distributor in your area.

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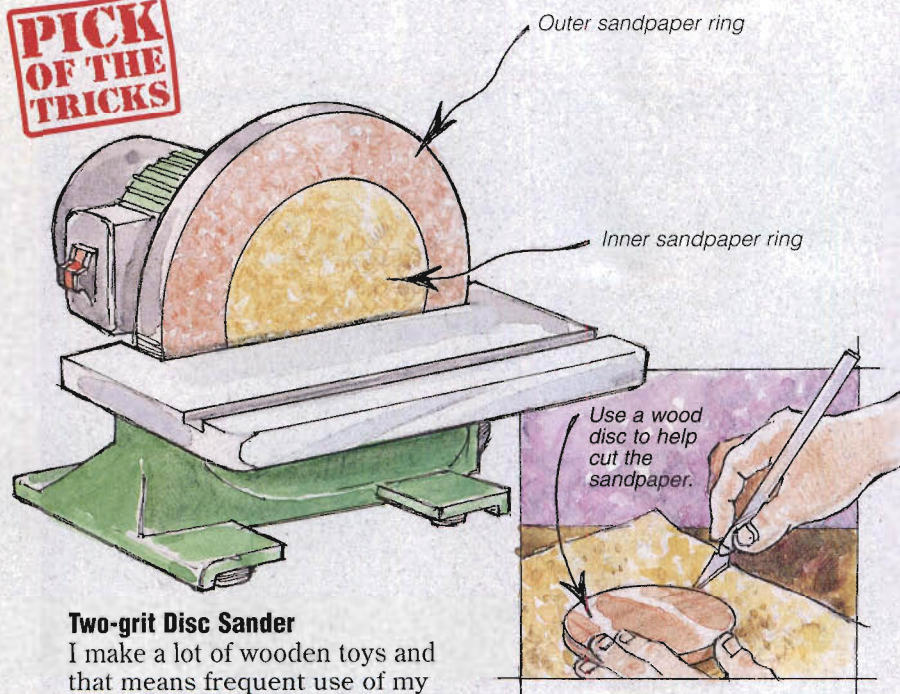
Japanese Saw Guards

Rather than invest in another box of adhesive bandages I decided it was time to make proper protective sleeves for my Japanese saw blades.

I used quality posterboard for the guards, with Velcro® tape closures as shown. You could use different colors for the various sizes and tooth configurations so you'd know at a glance which saw is which.

*Jacques Paquette
Somerset, Massachusetts*

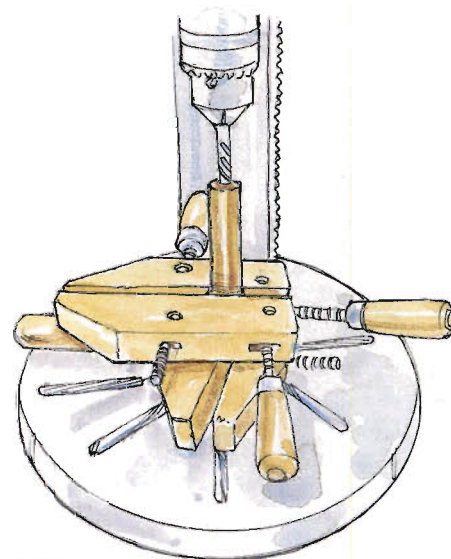
**PICK
OF THE
TRICKS**



Two-grit Disc Sander

I make a lot of wooden toys and that means frequent use of my disc sander for both quick wood removal and for finishing. Until recently, I spent a lot of time switching from coarse to fine sandpaper — since I only have one disc sander. My solution was to turn it into a two-stage sander by using two grits together, 80 and 150, as shown in the sketch. I place the two sheets of fine and coarse sandpaper together and cut through both at once. This makes two sets and also ensures that the outer rings fit perfectly around the inner discs.

*Dan Reeve
Swanville, Maine*



Drilling Holes in the Ends of Dowels

Drilling holes in the ends of dowel rods is awkward because they're hard to clamp vertically. The answer is to use two handscrews together, as shown above.

With this setup you can easily slide your dowel rod around on the drill press table until it is exactly centered under the bit.

*Bill Mayer
Arnold, Missouri*

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-Steven Fee,
New Hampshire
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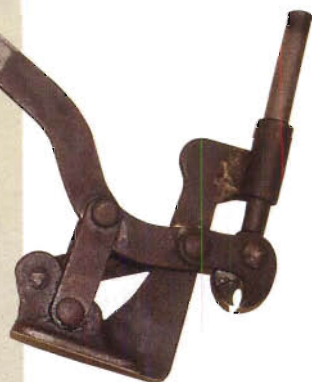
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Readers Know Their Vises

What's This?

Bill Hopcraft from Millington, New Jersey, sent in the tool you see pictured above. He describes it as an "oddball" he pulled out of his shop. **Know what it is? Send in your answer for a chance to win a prize!**



Passing the Test

When I first met my wife's parents, my father-in-law asked me to identify a strange-looking vise. My first guess was a vise for working with sheet metal, but as soon as I had the words out of my mouth, I changed my answer and guessed a vise for sharpening handsaws. I got it right and now am happily married.

*Scott C. Frankland
Bedford, Nova Scotia*

Staying Sharp

Whew! Scott wasn't the only one who identified the August *Stumpers* tool belonging to **Perry Gienger** of Andover, Minnesota.

Specifically, Perry's tool "is a Wentworth's No. 1 patent saw vise," said **Dave Kraatz** of Gladstone, Missouri. "The one I am holding shows a patent date of April 8, 1879." **Bill O'Donnell** of Oceanside, California, has a #3, which "was an improvement over #1 in that it had a screw device on the bottom so that it could be attached upright to your bench."

Before that time, Perry's tool was "probably mounted on the board to make it portable," said **Bob Lizardo** of Niagara Falls, New York.



"Anyone who has ever filed a saw will recognize this," says **Ken Libby** of West Des Moines, Iowa.

That way, added **Terry Godar** of Dillsburg, Pennsylvania, "you could adjust the height of the saw to suit you."

To use the vise, **Roger Keindl** of West Point, Utah, said, "You pulled the jaws toward you an inch or two, and they would open just enough to fit the saw blade in between." When the jaws close, said **Fred L. Murphy** of Klamath Falls, Oregon, "the saw is held firmly with the teeth exposed."

"You would first set the pitch of the teeth," said **Gary Storme** of Anacortes, Washington, using a tool that "looked something like a cross between a pair of pliers and a leather hole punch." "Then, with a three-corner file, you sharpened each tooth," said **E.M. McGehee** of Summit, Mississippi.

"Each saw would need to be clamped three or more times in the vise to reset and sharpen each side," said **Robert Dupree** of Spring, Texas, who used to watch his grandfather sharpen saws. "He could only sharpen every other tooth on each section: those pointing towards him."

So, what's the drawback that caused these saw sharpening vises to fall out of favor? Perhaps **Jack LaDove** of San Francisco, California, can provide a clue with this little ditty:



Roger Albert from Vinton, Iowa, knew this tool was a saw vise — as **Karen Burger** of Kremmling, Colorado, proved with her old catalog image.



*I looked once/maybe twice./
I recognized/the hand saw
vise./Mine is similar/but not in
use./My saws are dull./Here's
my excuse./Sharpening is
easy/for heaven's sake/but the
filing noise/is hard to take.*

— *Joanna Werch Takes*



WINNER! **Al Sindlinger** of Visalia, California wins a **Delta ShopMaster Triangle Air Cleaner and Work Light**.

We toss all the *Stumpers* letters into a hat to select a winner.

If you have your own woodworking mystery tool (or the answer to this issue's entry), send it to Stumpers, c/o Woodworker's Journal, P.O. Box 261, Medina, Minnesota 55340. Or send us an e-mail: jtakes@woodworkersjournal.com

ROUTER & ACCESSORIES SHOWCASE



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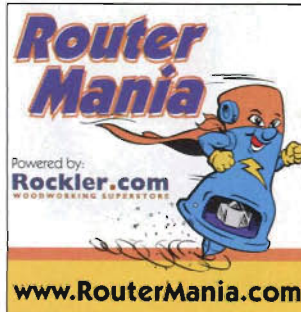
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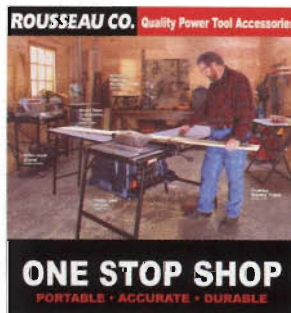
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ROUTER & ACCESSORIES SHOWCASE



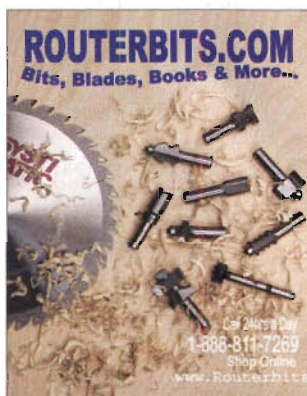
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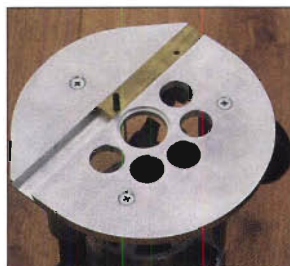
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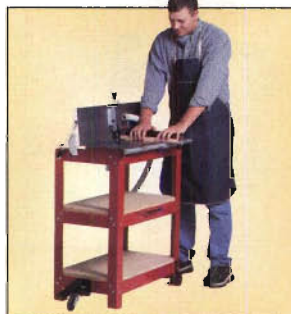
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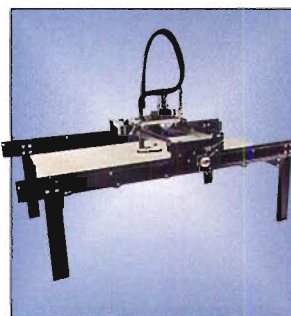
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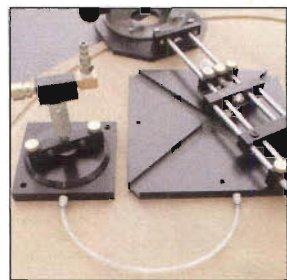
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RYOBI TOOLS

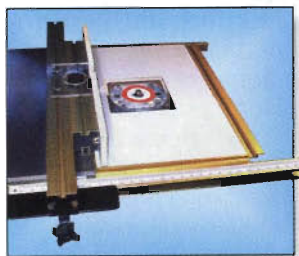
Ryobi's new 2 HP 3-Base Router Combo Kit, Model RE1803BK, comes with a fixed, plunge and D-handle base, with 1/2" collet and a 1/4" adapter. It features electronic feedback and motor SoftStart™ for excellent performance. It comes with kit-bag, vacuum adapter, edge guide and five-piece template guide kit for just \$179. Call us at 800-525-2579 or visit us online at the web site ryobitools.com. (Circle No. 130)

ROUTER & ACCESSORIES SHOWCASE



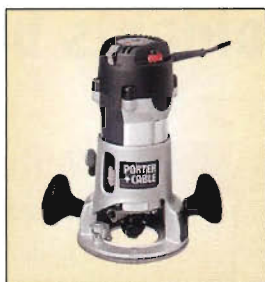
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Can 30,000 Saw Accidents be Avoided?

San Diego's Finest

No Losers at This Show

Entries in the 22nd Annual Design in Wood Exhibition demonstrate the quality of woodworking out there. Sponsored by the San Diego Fine Woodworkers Association, this show is held in conjunction with the Del Mar [California] Fair — which this year attracted about 1.3 million attendees.

Woodworker's Journal continued our sponsorship of one of the show's categories — and our appreciation of the tough job the judges faced!



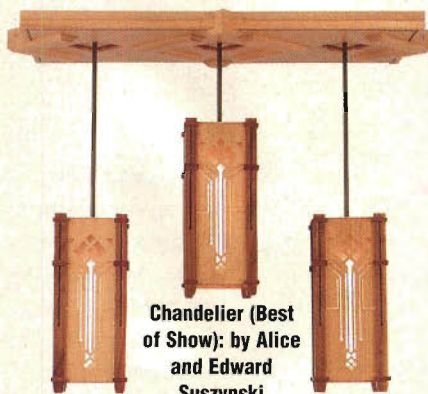
Nightstand:
by Cindy Vargas



City Park Bench: by Del Cover



Three Shell Bureau: by Bill Cox



Chandelier (Best of Show): by Alice and Edward Suszynski



Free Standing Sculptural Form: by Richard Trujillo



Two of the pieces that placed in the category sponsored by *Woodworker's Journal* are shown. At left is a Norfolk and Canary Island pine lamp by Brian Jackson and below is a cocobolo box by Kevin Kelly.



Automatic Blade Brake

SawStop Pushes Their Case

In the three years since Dr. Stephen Gass's invention was the hot dog of the 2000 International Woodworking Fair, his automatic table saw blade brake has not leaped onto the plates of table saw manufacturers. Now, Steve is turning up the heat with a petition to the Consumer Product Safety Commission and the launch of his own saw line, SawStop included.

The SawStop device brakes a spinning saw blade within five milliseconds of detecting a higher field of electrical conductivity than wood (such as human flesh). Steve tried to license it to manufacturers. Citing concerns about the need to retool all of their saws (the SawStop cannot be retrofitted); the potential for increased liability; and the impact of pricing their saws higher than their competitors (adding the SawStop could add as much as \$100 to the price of a saw), "ultimately all of 'em decided not to do it," Steve said.

This year, Steve and his SawStop business partners — fellow former patent attorneys — filed a petition with the CPSC requesting that "every table saw designed primarily for cutting wood with a blade ... 12" or less shall be equipped with ... a system capable of detecting contact or dangerous proximity between a person and the saw blade" when spinning or cutting.

Considering a governmental rulemaking process and a likely grace period, "It would probably be about five years before we see anything on the market in response to this," Steve said. The partners' own table saw line is expected on the market in late December.

Currently, says *The Table Saw Book* author Kelly Mehler, the

A hot dog replaces a finger in this re-creation of SawStop's unit braking a saw blade. The frank escapes with only a minor nick (inset) — which is why the SawStop's inventor says all table saws should have one.

SawStop "has not been field tested; it has no track record." Kelly also says SawStop doesn't address the most common form of table saw injuries: kickback. "It's a good invention, but it's not the first step we need," Kelly said. "Steve's invention is like an air bag — and right now table saws go around with no brakes." A riving knife system (which, Steve says, will also be included on the new SawStop saws) is a more important safety adjustment, in Kelly's opinion, "because it's likely to prevent more accidents." The SawStop CPSC petition cites statistics for table saws of 30,000 serious injuries per year in the U.S., about 10 percent of which are amputations.

Kelly also notes that the SawStop "calls for a complete redesign of all the manufacturers' saws, which is a lot of money: anti-kickback's cheaper." Although table saw manufacturers contacted for this article declined to comment on the record, there are also potential liability concerns with a product that claims to prevent injury to fingers stuck into spinning blades.

Kelly Mehler isn't worried about SawStop limiting the functionality of U.S. table saws. For example, he said, saws made for the European market don't have dado capacity due to laws there, but manufacturers add it to tools for the U.S. market because of demand.

Steve says his motivation to get the SawStop out on the U.S. market is because "I don't want to go to a trade show five years from now and have some kid come up to me with his mangled hand and ask 'Why didn't you try harder?'" Right now, he said, "manufacturers aren't paying for the injuries, so they don't want to pay to solve them. It's the woodworker who ends up paying the rest of his life."

View the full petition at www.cpsc.gov/businfo/frnotices/fr03/cpscfr03.html.

— Joanna Werch Takes
continues on page 46 ...



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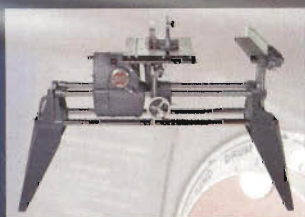
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SHOP TALK

A Superior Education Travels with LiLi

Woodworker's Journal apprentice LiLi Jackson's lakeside getaway this summer was complete with the sounds of the band saw and the smell of sawdust.

As a supplement to her woodworking education in Rick White's shop, LiLi has been traveling to institutes of woodworking education to sample their offerings. A weekend class at North House Folk School in Grand Marais, Minnesota, provided her with the chance both to build a workbench and to gaze at Lake Superior while waiting her turn at the band saw.

The "build your own workbench" three-day class attracted woodworkers of all skill levels — ranging from absolute beginners to those more experienced. Windsor chairmaker John Beltman of Nashwauk, Minnesota, was the instructor for the class in making a traditional style workbench with mortise and tenon joinery. Students chose their wood from piles precut for thickness, then went to work.

They shared their workshop classroom with another North House class, this one working on building a kayak, while outside



LiLi Jackson put a chain mortiser to use in making her workbench — pieces of which are shown at left.



other classes learned to identify birds and built a brick oven. The focus of the North House Folk School is on teaching and preserving traditional Northern crafts — a large selection of the classes have a Scandinavian element to them.

Students stay in the nearby historic community of Grand Marais and commute to the school either on foot or by vehicle. For more info about the North House Folk School, visit northhousefolkschool.com or call 218-387-9762.

Woodworker's Journal's LiLi Jackson and instructor John Beltman wrap up final planing on LiLi's new workbench.



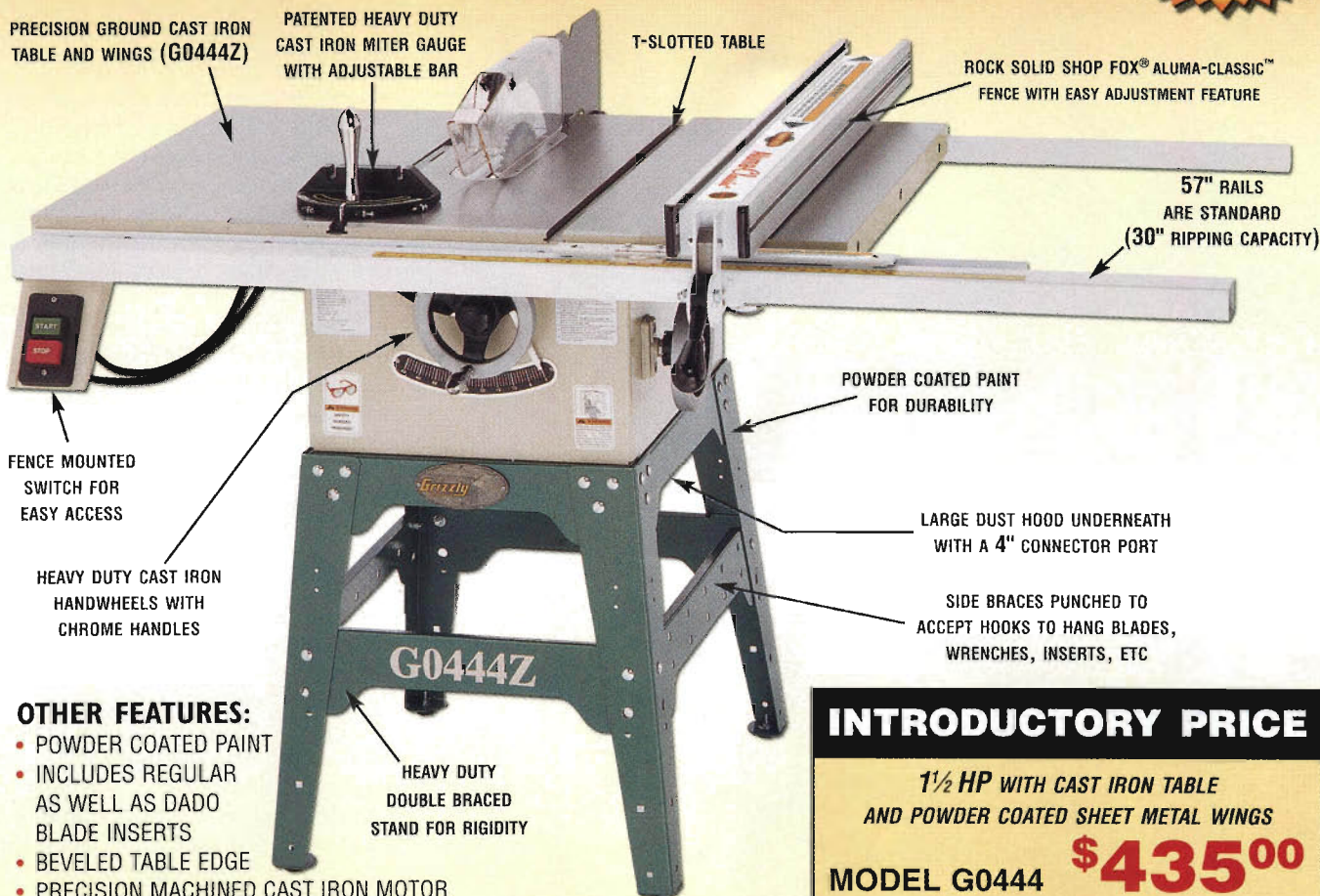


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Porter-Cable's New 890 Router

By Rob Johnstone

For many years, the Porter-Cable 690 has been a workhorse in thousands of shops around the country — both professional and hobby. In fact, most professional shops (and many hobbyists, too) will have several 690s dedicated for specific jobs: roundovers, edge trimming, ogee edges, etc. And it is even common to find a whole series of jigs that a 690 motor housing will slip in and out of in a jiffy. But in recent years a new category of routers has entered the market. They are in the 2¼ HP range with advanced features like soft start and EVS systems ... all of them with their own set of bells and whistles. Porter-Cable has been notable by their absence in this category ... but not anymore. Starting in November, Porter-Cable will complete their router line by offering the 890 series of 2¼ HP routers. I got a look at a preproduction model and have to say that the wait has been worth it.

Options are the Key

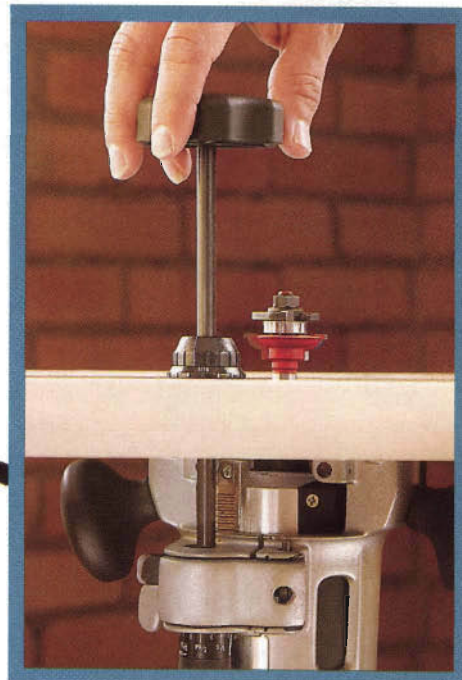
The innovative aspect of the 890 series of routers is not that P-C has developed a bunch of bold new features, but that the combination of the latest advancements in this 2¼ HP category are all working here to good effect. Much of the technology and advanced user features on the 890 have been seen before in one form or another, but never all in one place. I particularly like the high-low power switches and the power



The new 890 router is available in three basic versions: a fixed base, D-handle and plunge base. A feature that the author appreciates is the one-wrench, above-the-base-plate bit change. The 2¼ horsepower motor is sufficient to spin even large diameter bits.



A full-featured router



Above the router table bit adjustment is easy with a 3/16" hex socket or this specially designed Porter-Cable accessory. You can release the locking buckle and then turn the micro adjust knob through two separate holes drilled in the router tabletop.

switch lock-out and spindle lock for bit changing. It is quite elegant. And thank goodness P-C kept a flat top on the 890. It annoys me to no end when I try to change bits on a router that has a rounded top ... those designers obviously don't do much woodworking.

Another significant design feature is that the 890 body will fit into a 690 base. All of the jigs and fixtures around the country that were built to fit the 690 should work even better with an 890 ... brilliant! The 890's clear base plate will also interchange with the 690 plate, so you can use the Porter-Cable rub collars. An optional 890 base plate that accepts rub collars is also available.

Dust collection has been well accommodated in each of the three versions of the router. The D-handle router has a very slick through-the-handle (Grip-vac) dust collection option that should be effective and easy to use. Porter-Cable is also offering a storage/carrying case that works as a router rest and bit storage area while the router is in use.

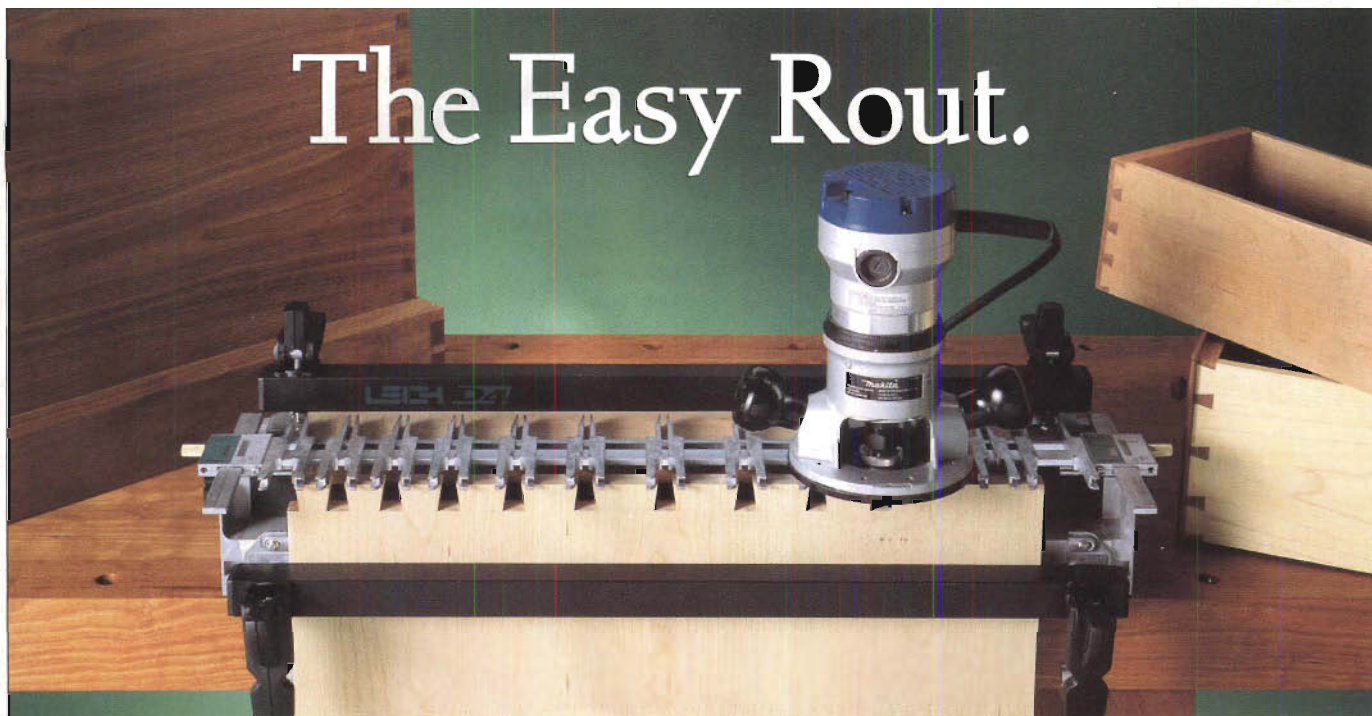
The three basic versions of the 890 router series will be packaged into six models. These options will include different base choices (fixed, plunge, D-handled or Grip-vac), as well as combination fixed and plunge base kits, the multi-use carrying case and router table accessory kit.

Tools by the Numbers

The Porter-Cable 890 Router Series

Amps	12
Horsepower	2 ¹ / ₄
RPM (Variable)	10,000 - 23,000
EVS	Advanced system
Collet	1/4" and 1/2"
Base Bit Opening	2 ¹ / ₂ "
Plunge Base	Available
Fixed Base	Available
D-handle (Grip-vac)	Available
Price (Six Models)	\$199 to \$259
More Information	800-368-1487
www.porter-cable.com	

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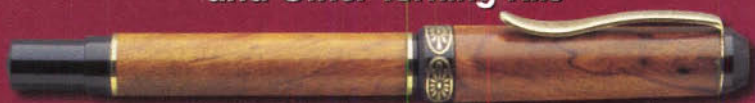
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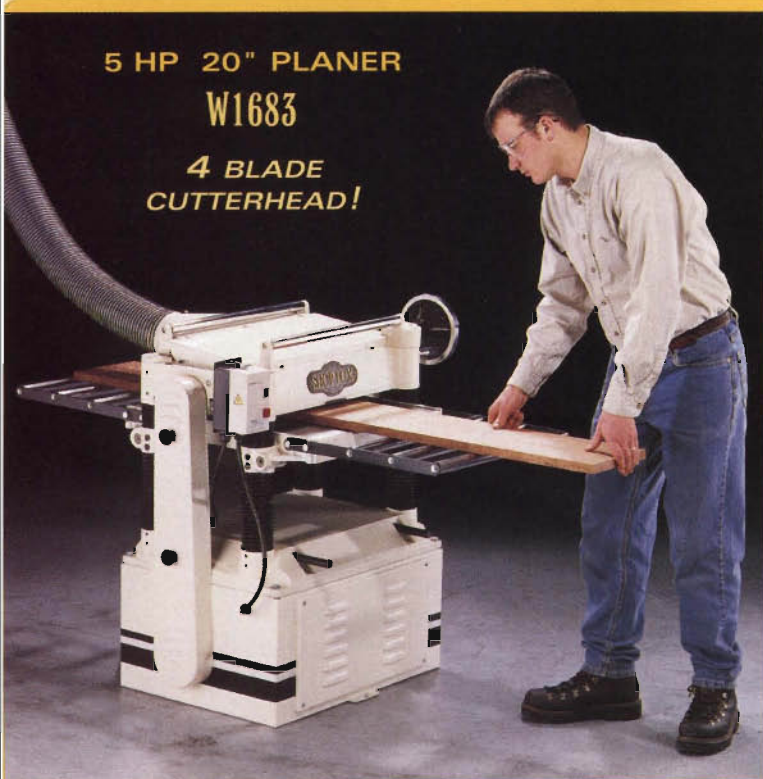
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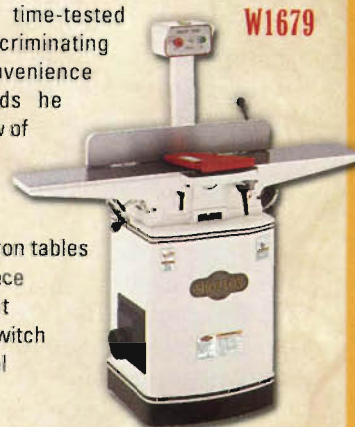
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- Silky-smooth handwheel table adjustment
- Powder coated paint
- Approx. shipping weight: 495 lbs.

W1684



WOODSTOCK
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The Heart of an Accurate Cut

By Ian Kirby

There are three elements to making cuts with a router: the router, the router bit, and the guide system.

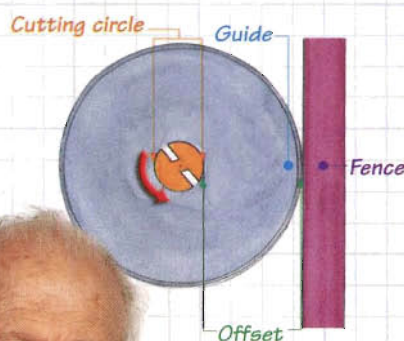
Routers are available from a variety of makers in a variety of models. Your choice is aided by specifications and best-buy articles. The main difference between them is whether they are fixed or plunge models.

Router bits are simple enough. What they cut is projected by their profile. How well a bit cuts is generally dependent on what you paid for it. The main difference between them is whether they are plain bits or have a pilot guide.

Guide systems are the most challenging element because they involve much more than a simple tool purchase. They require a clear understanding of the ways a cut can be successfully made.

There are a total of seven guide systems. Four are applicable when the router is passed over the top of a clamped-down workpiece; three when the workpiece is pushed past the cutter with the router mounted under a table. Each guide system allows you to make a variety of

“Understanding each guide system requires understanding the four elements that all systems have in common: fence, guide, cutting circle, and offset.”



cuts, so understanding them lets you choose the best setup for your equipment and the job in hand. More than any other tool or machine, the router coupled with your creativity offers multiple solutions to most cutting problems.

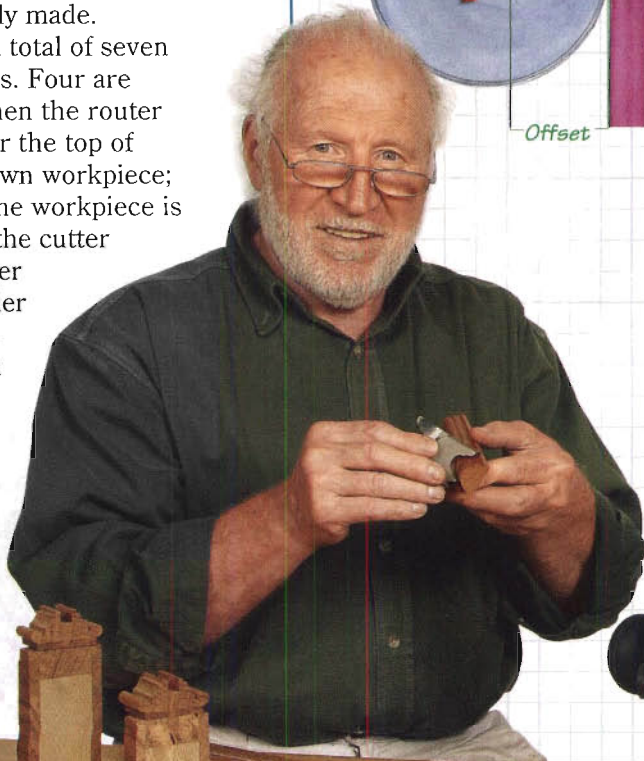
Defining Terms

Understanding each guide system requires understanding the four elements that all systems have in common: fence, guide, cutting circle and offset.

The **fence** establishes the path — straight, curved, or complex — that the bit will follow. The fence can be a separate straightedge, it can be the edge of workpiece itself, or it can be a template. The fence is always separate from the router.

The **guide** is the part of the router that contacts the fence. It can be the edge of the router base plate, a base guide attached to the router base plate, a guide collar, a ball-bearing pilot mounted on the router bit, or a trammel.

The **cutting circle** is the largest diameter of the cut a bit makes, while the **offset** is the distance between the fence and the router's cutting circle.



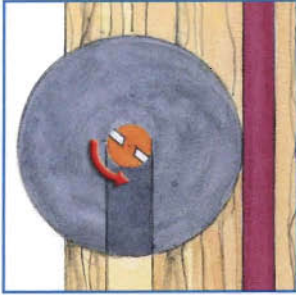
Ian reviews some of the bits he used to make special moldings.

Understanding the Drawings

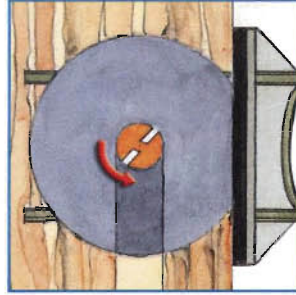
 Fences are purple.
 Router bits are orange.

 Dots indicate an object.
 Bit rotation
 Arrows indicate an edge, surface or point.

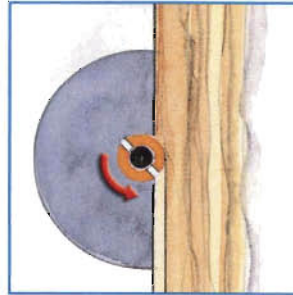
Four Router-on-top Guide Systems



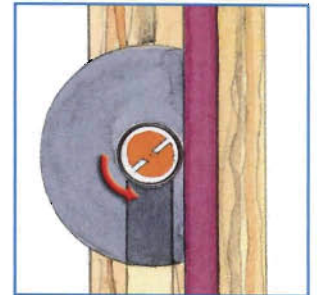
1. Fence attached to workpiece



2. Base guide attached to router base



3. Pilot on router bit



4. Guide collar on router base

Setup

The setup is the means by which you put each guide system into practice. It includes clamps, jigs and support blocks. There are two routing setups: (1) you drive the router over a stationary workpiece; (2) you drive the workpiece over a table-mounted router.

Router-on-top Guide Systems (1 – 4): In each case you must control the travel of the router. It must be held firmly so that contact between fence and guide is constant, and the workpiece must be securely fixed.

Workpiece-on-top Guide Systems (5 – 7): In each case you must control the travel of the workpiece. It must be held firmly to the bed and fence or pilot bit on the router table. The router is securely mounted under the router table.

Control Chips and Dust for Greater Accuracy

Because router bits revolve at high speeds, the size of chip they make when cutting solid wood is very small. When cutting particleboard or MDF, the waste is dust which is bad to breathe and makes a greater mess than wood chips. This is a real problem because the mess gets everywhere, including the work and the jigs, and anything that comes between the guide and the fence reduces the accuracy of the cut.

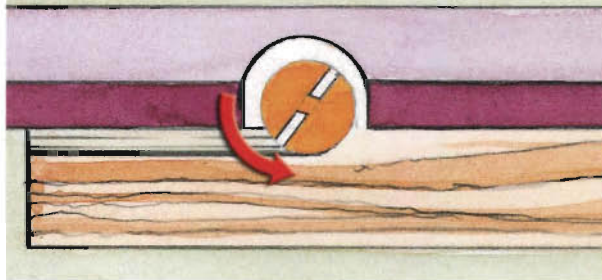
You can do two things: remove as little waste as possible and exhaust it. You can often reduce the waste by removing bulk with another machine — the router doesn't like bulk waste anyway. For example, if you are making parts with a curved edge, band saw the curve to 1/16" of the line. If you are making mortises, drill out the centers.

By whatever means, exhaust all the waste you can as the cut proceeds. It's worth the time and effort to rig any sort of exhaust system even if it's way less than 100% effective.

Three Workpiece-on-top Guide Systems

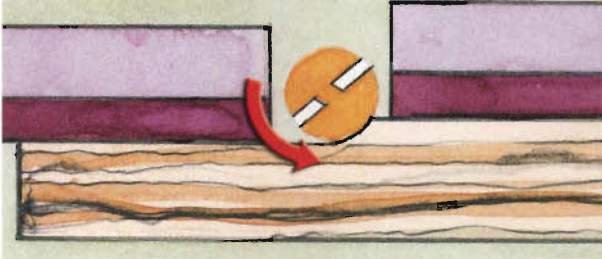
A one-part fence is accurate for cuts that do not remove the entire edge of the workpiece.

5. One-part fence on router table



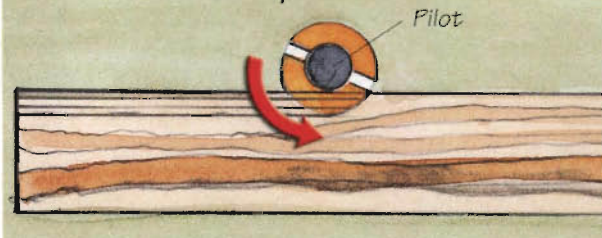
A two-part fence is like a jointer turned 90°. The edge of the workpiece is guided by the infeed fence and, in turn, the stock removed by the bit is guided by the offset outfeed fence.

6. Two-part fence on router table



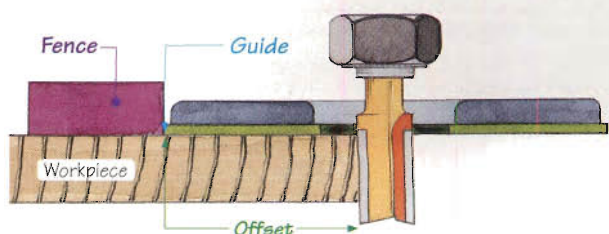
A pilot bearing on the router bit is guided by the surface of the workpiece.

7. Pilot on router bit on router table



Guide System 1

Fence attached to workpiece



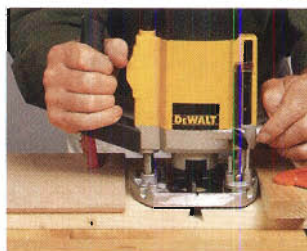
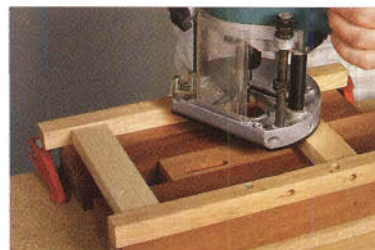
The **fence** is the wood or metal straightedge clamped to the workpiece. The **guide** is the edge of the router base. The **offset** is the distance from the guide to the router bit's **cutting circle**. This is the simplest and most common guide system. With it you can:

1. Square the edge of the workpiece by taking a full cut with a straight bit.
2. Make a rabbet with a straight bit.
3. Mold all or part of the edge with a curved or complex bit.
4. Make a groove along the face of the workpiece. A fixed-base router can only make a through groove while a plunge router can make a stopped groove.
5. Make a dado or housing across the face of the workpiece. A fixed-base router makes a through housing, while a plunge router can make a housing that stops short of the edge of the wood.
6. Make a mortise using a straight bit, a plunge router, and a simple jig.



Square the edge of the workpiece by taking a full cut with a straight bit. This is a quick and easy setup which will clean up a sawn or distorted edge. Using a spiral bit gives an even smoother cut and face.

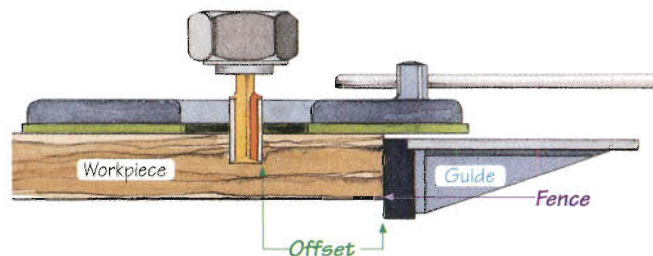
Make a mortise using a straight bit, a plunge router and a simple pocket jig. If you make the tenon on a table saw, as many people do, it's easy to chisel square the rounded ends of the mortise.



Rout a dado or housing across the workpiece. Using two fences, you can quickly and accurately make the cut any width you want. (Note the gap between the base and fence on the left.)

Guide System 2

Guide attached to router base



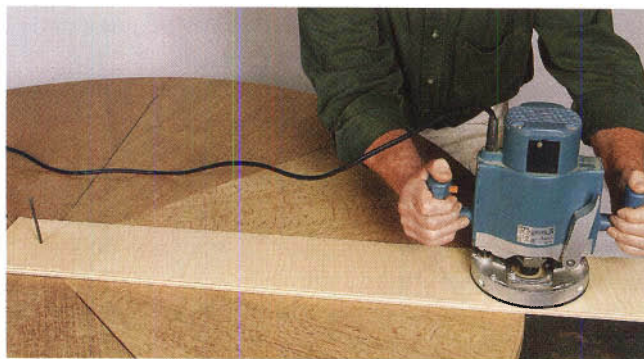
The base **guide** attached to the router base steers the router along the edge of the workpiece. The **fence** is the edge of the workpiece. The **offset** is the distance from the guide to the bit's **cutting circle**.

With this guide system you can:

1. Mold part of a square edge, though not the whole edge because part of it must remain intact to act as the fence.
2. Run grooves, flutes, or decorative shapes parallel to the edge of the workpiece.
3. Mold part of the edge of a circle, using a two-point version of the base guide.
4. Flatten a surface, using an extended version of the router base.
5. Rout a circle using a trammel that attaches to the router base like the regular base guide.



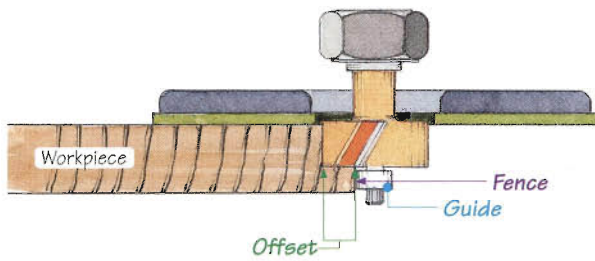
Run grooves parallel to an edge (left). Flatten a surface (above). This is a good setup to use if you want to flatten a small end grain block cutting board.



Cutting a circle with an extended base and a pivot is a unique router guide system. In this case the guide is a point, not an edge, so it has a foot in two camps, "Fence attached to workpiece" and "Guide attached to router base." Which camp you choose to place it in is of little matter.

Guide System 3

Pilot on a router bit

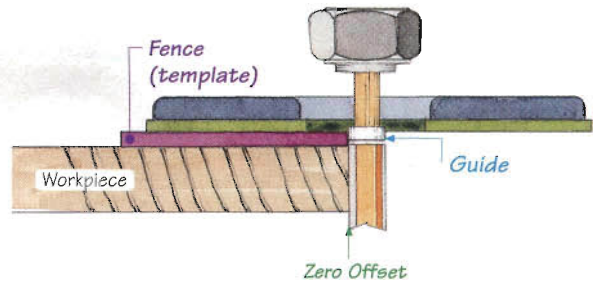


The solid pilot or ball-bearing pilot runs against the workpiece edge. The **guide** is the pilot bearing. The **fence** is the workpiece edge. The **offset** is the distance from the bearing's outer diameter to the **cutting circle**.

When the workpiece edge is the fence, the bearing can only shape part of the edge. The rest of the edge must remain untouched, else the cut would go out of control.

With this guide method you can:

1. Make a rabbet. One way to adjust the side of the rabbet is to change the diameter of the bearing on the bit.
2. Mold part of the edge of a board.
3. Rout a groove or slot in the edge of a board.

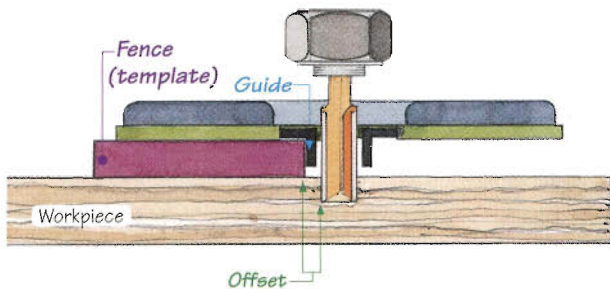


4. Rout multi-part shapes, such as the two-part pencil mold.

When a template is the **fence**, (see drawing above) the bit can remove all or part of the workpiece edge. It's possible to construct equivalent setups with shank-mounted or tip-mounted bearings. However, when you're driving the router on top of the workpiece, you'll get the best view of what's happening with the template on top and a shank-mounted bearing. When the offset is zero, this setup reproduces the shape of the template. This is the most accurate way to reproduce a curved or complex shape. It's how most dovetail jigs work.

Guide System 4

Guide collar on router base



The guide collar is, in effect, a much reduced router base. It runs against a template. The **guide** is the outer surface of the collar. The **fence** is the template. The **offset** is the distance from the outside of the guide collar to the bit's **cutting circle**.

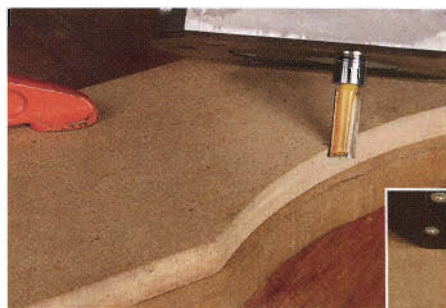
With this guide system you can:

1. Make practically any shape, recess or hole in or through a board.
2. Cut the edge of a board straight.
3. Make a rabbet or a groove parallel to the edge of the template.
4. Make an inlay and a matching recess in the workpiece.

This setup works well for straight cuts. When you use guide collars with a shaped template, the template has to be adjusted to compensate for the offset. Adding and subtracting offsets from templates is a source of much confusion, and most people have to experiment before they understand how it works and rout a recess that exactly fits an inlay. Details next page.



Cut the edge of a board straight.



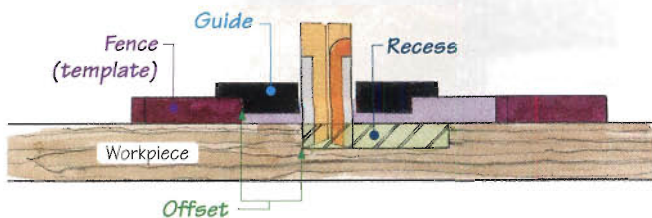
Cut a curved head rail for a raised and fielded panel. The bit can be easily adjusted to cut just beyond the depth required.



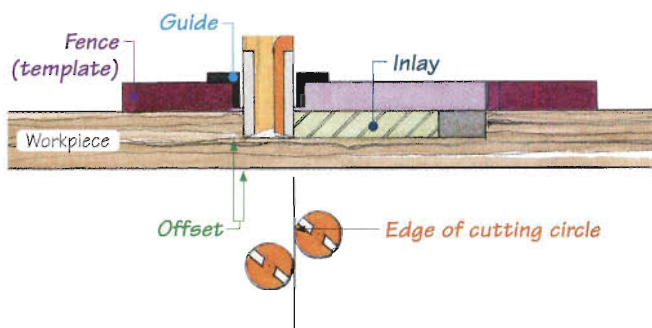
Make an inlay and a matching recess in the workpiece.

Guide System 4

Guide collar on router base (continued)



Two correctly sized guide collars following the same template can rout a recess and a matching inlay. The hatched areas of the two illustrations are equal in size. The top one is the recess. The bottom one is the inlay.



One guide collar cuts to the left and the other guide collar cuts to the right and to exactly the same line, making inlays very accurate.

Routing for Inlays

A **guide** collar can reproduce the shape of a template, reduced or enlarged by the **offset** distance between the outside of the collar and the bit's **cutting circle**. To rout an inlay and the recess it fits into, you need two different sized guide collars. The size relationship is: Outside Diameter (OD) of large collar minus (–) bit diameter equals (=) Outside Diameter (OD) of small collar plus (+) bit diameter.

For example, with a 1/2" bit, this combination works:

$$2" \text{ OD collar} - 1/2" \text{ bit} = 1\frac{1}{2}"$$

$$1" \text{ OD collar} + 1/2" \text{ bit} = 1\frac{1}{2}"$$

Similarly, with a 1/8" bit:

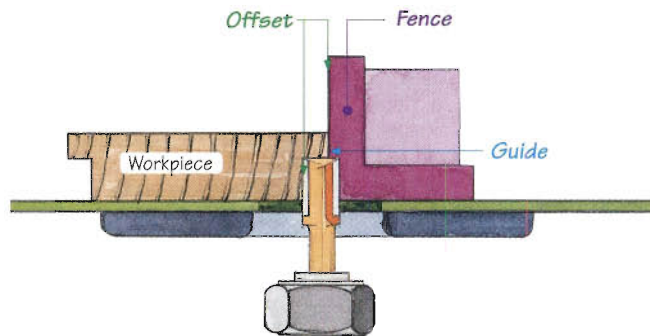
$$3/4" \text{ OD collar} - 1/8" \text{ bit} = 5/8"$$

$$1/2" \text{ OD collar} + 1/8" \text{ bit} = 5/8"$$

Deciding whether to use a guide collar or a bit with a shank-mounted bearing is a tradeoff. The bearing-guided bit reproduces the exact shape of the template in the workpiece, with no need to calculate offsets. However, it doesn't allow you to control the depth of cut, making the method impractical for most inlay work. While guide collars require an offset calculation, they give you control over the depth of the cut. Don't ignore guide collars as many woodworkers do. Once you get comfortable using them, they expand the use of your bit collection considerably.

Guide System 5

One-part fence on router table



The **guide** is the edge of the workpiece. It runs against the router table **fence**. The cutter is partially buried in the fence. The **offset** is the distance from the fence to the edge of the **cutting circle**.

When it's possible to make the cut you want with a one-part fence on the router table, it is the safest and simplest method of routing.

This method is accurate for cuts that do not remove the entire edge of the workpiece. If the cutter were to remove the entire edge of the workpiece, it would also destroy the guide surface, and the setup would be thrown out of control.

Work-holding sleds with fences that run on the front edge of the router table use the same guide method.

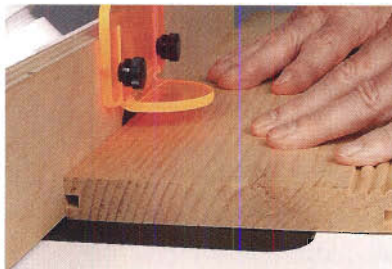
With a one-part fence on the router table you can:

1. Rabbet an edge.
2. Mold part of edge.
3. Slot or groove the workpiece.

Note that you can use pilot-bearing bits with the router table fence, by setting the fence in line with the bearing or forward of it.



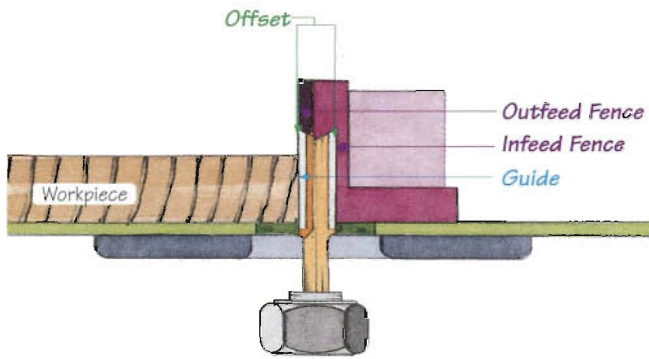
Rabbet an edge. Router bits make very clean cuts in particleboard and MDF. But they turn the waste into a fine dust, so always use an exhaust system on a router table.



Groove the workpiece. The part is a piece of strip wall panel. The strips are connected by a center spline. One edge has been molded with a three-reed bit.

Guide System 6

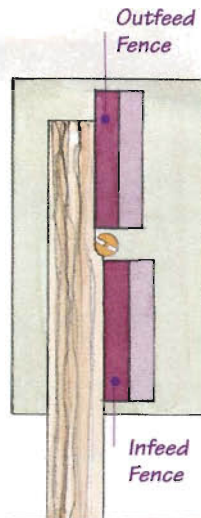
Two-part fence on router table



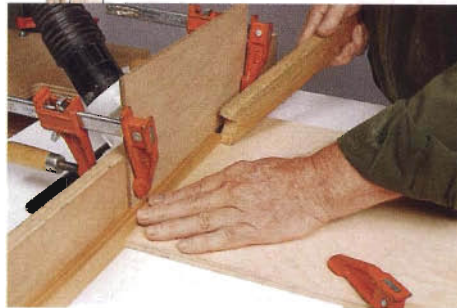
This setup is like a jointer turned 90°. The **guide** is the edge of the workpiece which runs initially against the **infeed fence**. The **offset** is the distance from the infeed fence to the **cutting circle**. Once a cut of 4" to 5" is made, the workpiece must be kept in tight contact with the **outfeed fence**. The edge of the workpiece becomes a self-jigging fence that uses the outfeed fence as a guide.

With this guide system you can:

1. Remove all of an inadequate edge to make it straight and square to the face.
2. Mold all of an edge.



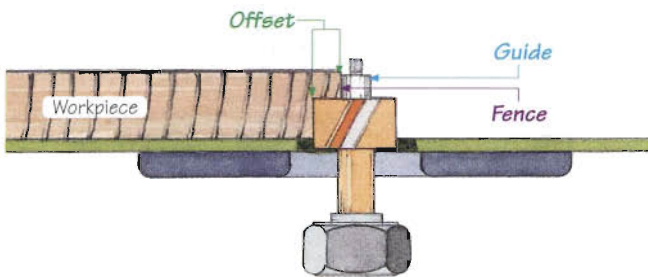
Straightening an edge. The photo clearly shows the correct way to joint an edge by pressing the workpiece against the outfeed table after two or three inches of the cut have been completed.



Running molding strips. To get consistent results, it's essential to run the molding through a "tunnel" of hold-downs to keep the workpiece tight to the table and the fence. Use a push stick to complete the cut.

Guide System 7

Pilot on router bit on router table



The pilot bearing is the **guide**. The **fence** is the workpiece edge, or a template attached to the workpiece. The **offset** is the distance from the outside of the pilot bearing to the **cutting circle**. This setup always requires a starting pin.

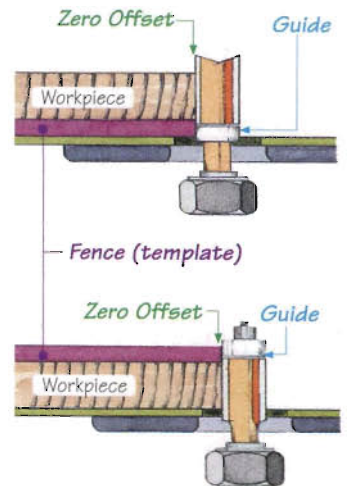
With this method you can:

1. Make a rabbet. One way to adjust the size of the rabbet is to change the bearing on the bit.
2. Mold part of the edge of a board.
3. Rout a groove or slot in the edge of a board.
4. Make cope-and-stick frames for cabinet doors.
5. Raise a panel.

To shape the full edge of the workpiece, you must use a separate template. The template can be mounted on top of the workpiece or below it.

Mounting the template below the workpiece allows the edge of a work-holding sled to act as the template. This makes a safe and stable setup for pattern-routing shaped parts, such as chair legs.

Mounting the template on top of the workpiece gives you better visibility of the contact between guide and bearing. This calls for a bit with a tip-mounted pilot. When the pilot bearing is the same size as the router bit, the offset is zero and the setup reproduces the template. When the pilot bearing is not the same size as the router bit, the offset reduces or enlarges the template profile.



Ian Kirby is a master woodworker and regular contributor to the Woodworker's Journal. This article is adapted from his book The Accurate Router, available from Linden Publishing.

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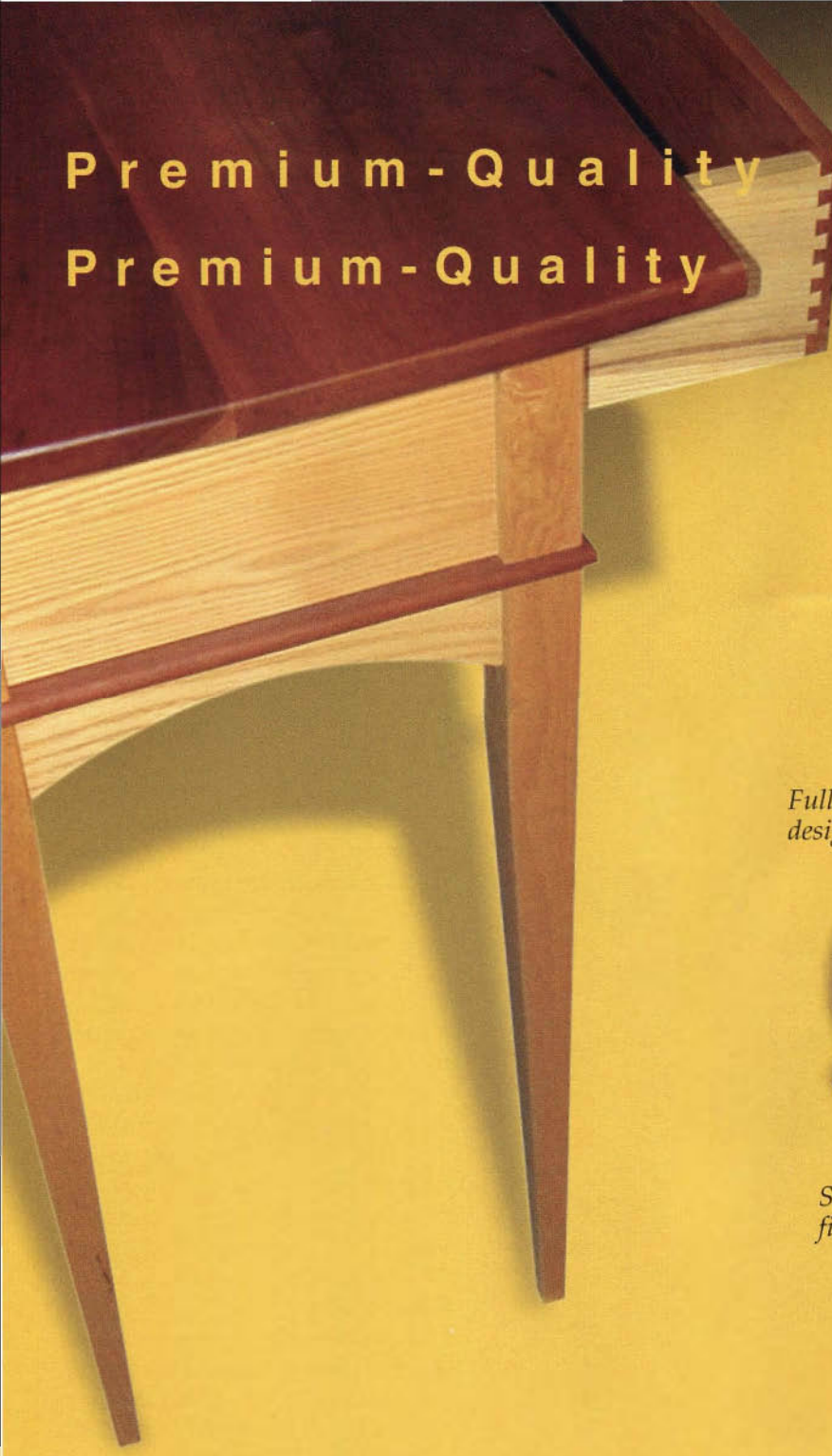
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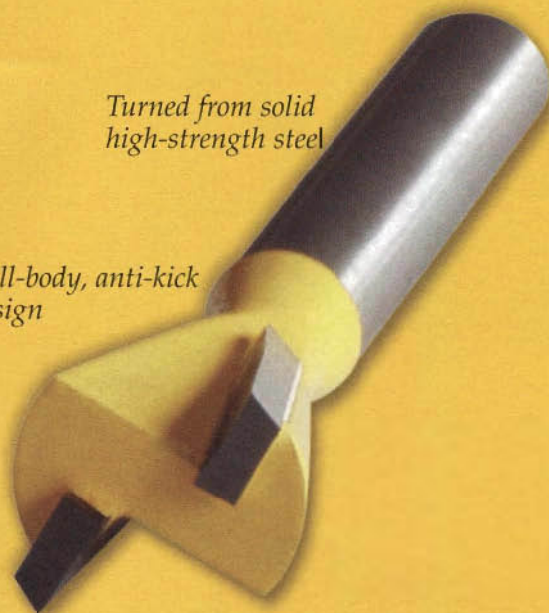
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Bill's Excellent Shop Helpers

By Bill Hylton



Building new jigs for your shop is always satisfying, but the author's four handy helpers will also add safety, accuracy and ease of operation to work. You'll wonder how you ever got along without them.

We all need a little help in the shop now and then. An extra pair of hands, for example. Or a device that helps to improve the accuracy of our work. The best helpers I have are simple devices I've built myself, often using odds and ends left from other projects. There's a double reward in these things for me. I save some money, and I get a jig that's designed to help me, not "every woodworker."

Here are plans and construction information on four of my most-used shop helpers. They're not particularly original, of course ... these old standbys are found in one form or another in most active woodshops.

Crosscut Sled

I very seldom use a miter gauge, though I do have a decent one. I prefer the crosscut sled, also known as a cutoff box. The several sleds I have (big, bigger, and biggest) are built specifically for right-angle cuts, though you can make them for miters.

Three design characteristics stand out in my mind. First, a sled must ride in both miter gauge slots (instead of just one). That helps keep it tracking without slop. Second, it should immobilize the workpiece on a platform mounted to those slides, against a sturdy fence. And third, the sled isn't adjustable, so it won't get out of square.



Crosscut Sled



Shop Horses



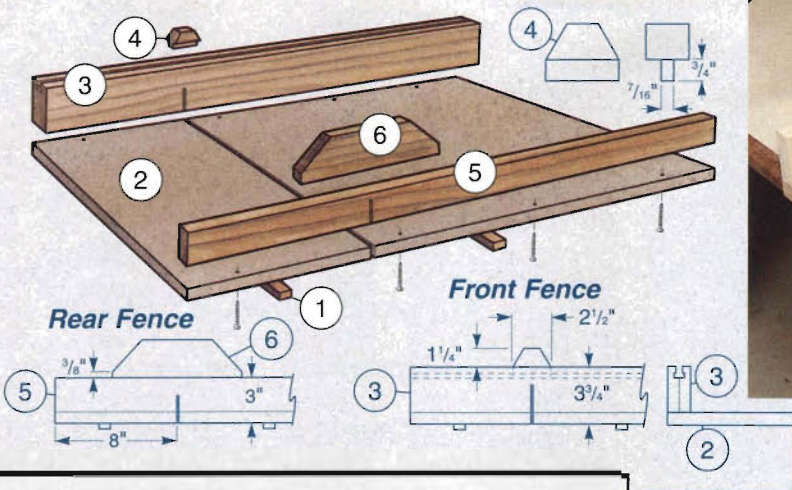
Roll-off Stand



Adjustable Flip Stop

Crosscut Sled

Front Fence Extension (Front & End Views)



MATERIAL LIST CROSSCUT SLED

	T x W x L
1 Slides (2)	3/4" x 3/8" x 18"
2 Base (1)	3/4" x 18" x 28"
3 Front Fence (2)	3/4" x 3" x 28"
4 Front Fence Extension (1)	1 1/2" x 2" x 2 1/2"
5 Rear Fence (1)	1" x 2 1/4" x 28"
6 Rear Fence Extension (1)	1" x 2 1/2" x 8 3/8"

The plan *Drawing* shows the most recent sled I've made. After hoisting very large sleds on and off my saw for the last decade, I opted this time for a more compact size. For cutting bigger pieces, I still have those larger sleds. What this sled has that my others don't is a fence that'll accept my shop-made adjustable stop. (I'll show you how to make it later.)

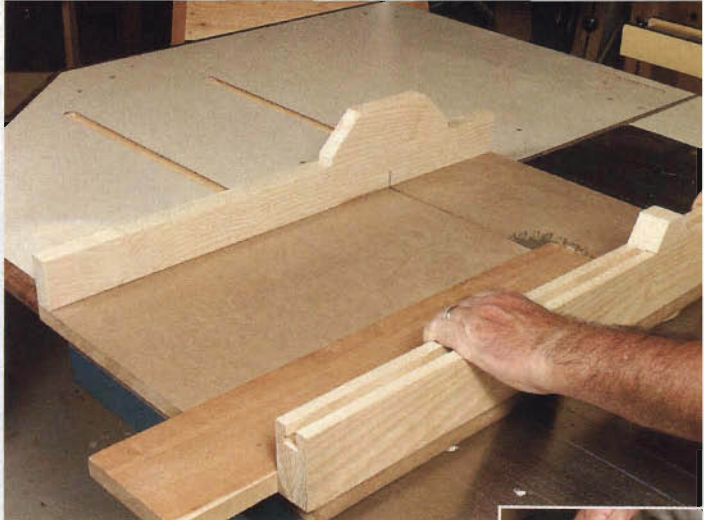
Get started by roughing out the two slides (pieces 1). They must be straight, so you'll want to cut them to rough size, then let them acclimate for a day or two. Then rejoin and thickness them to final dimensions.

While the slides settle, complete the machining of the base and fence parts (pieces 2 through 6). The back fence and its extension are straightforward, but the front subassembly is more involved; see the *Elevation Drawings* above and the lower two photos on page 66. The extensions which are glued into place later reinforce the fences where the blade cuts through.

Carefully fit the slides to the saw table's miter slots. Drill four or five counterbores and pilot holes in each slide and install them as shown in the photos at right.

Before mounting the fences, switch on the saw and raise the blade up through the base. As shown in the photos at right, square the front fence to the blade. Drive a mounting screw up through the base into the end of the fence closest to the blade. Use this as a pivot as you align the fence to the blade with a square. Drill an oversized pilot for a screw at the far end of the fence and secure the fence. Make a test cut and check it for square. Once the alignment is perfect, secure the fence with additional screws.

The rear fence doesn't need to be exactly square, so mounting it is a little easier. Use glue and clamps to install the extensions, and you are ready to crosscut.



After tacking the slides from above (inset), slide the assembly partway off the saw table to drive screws up through the slides into the base. Do a couple of screws at the back of the saw, then repeat the process at the front.



Carefully raise the blade through the sled's base. This provides a reference with which to square the front fence. An absolutely 90° relationship between the blade and fence is essential.



When you're ready to attach the fence, start with a single screw (on the fence end closest to the saw blade). This provides a pivot point as you adjust the other end of the fence to a perfect 90°.





By simply adding the function of height adjustment to your shop horses, you turn a workshop steady-Eddy into a star performer. A couple of grooves and some hardware make all the difference.

Adjustable Shop Horse

Everyone needs trestles or sawhorses, and I'm certainly no exception. Each pair of my shop horses is slightly different, though all have the same basic design and construction. The first pair I made are about knee-high and 30" wide. The second pair, my ponies, are shin-high and only 24" wide. The third pair — the ones I'll be describing here — are adjustable in height, ranging from 24" up to nearly 35".

My adjustable horses have nesting posts, joined with sliding dovetails. The outer elements are mortised into the trestle feet. The inner elements are attached to a beam and are joined to a wide stretcher with cross-dowels and connector bolts. The outer elements are similarly joined to a narrow stretcher.

Begin construction with the feet. Each foot is made by glue-laminating two plies (pieces 1 and 2). You cut a half-lap across each piece, and when they are glued up, the laps form a through mortise.

Shaping the Feet

To produce the shape, I routed an instep on each foot blank, then band sawed the rough contour and template routed to final shape. Only after this work was done did I glue up the feet.

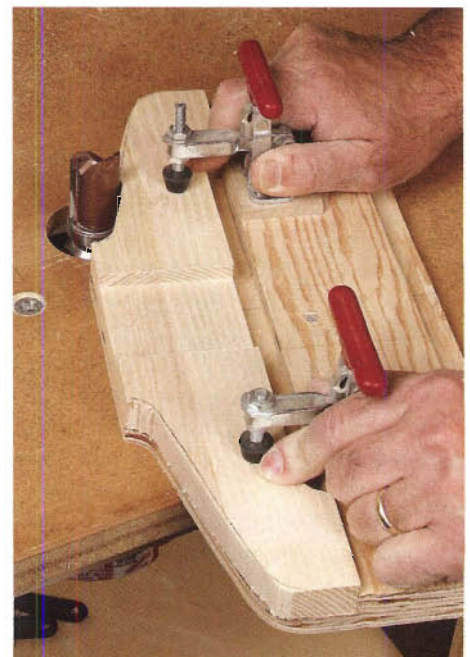
The instep is a simple cut on the router table, but it does take several passes to complete each part. Use a 1" diameter straight bit. Raise it about 7/8", and set the fence so about half the bit is exposed. Clamp stops to the fence to give you starting and ending points for the cut. To limit the amount of material removed on each pass, use a series of removable shims until you are routing right up against the fence.

To contour the foot blanks, make a template to which you can clamp the workpieces with toggle clamps. The template need have only the right-hand portion of the overall contour: so when you rout, you are moving from ankle to toe, and the cutting edges are "laying down the grain." That's a clean, problem-free cut. To complete the shape, flip the workpiece over and rout the second half of the blank, again moving from ankle to toe.

Making the Telescoping Uprights

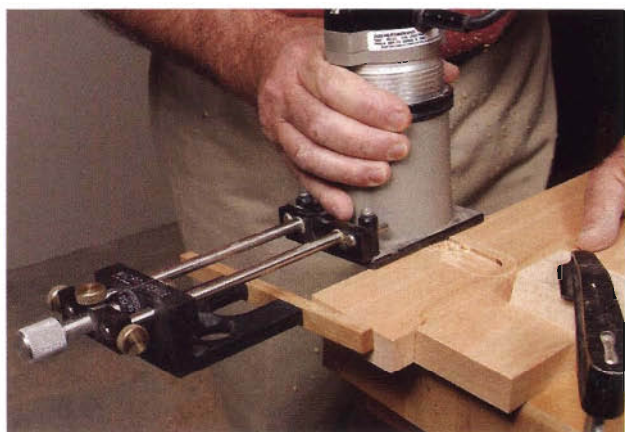
The uprights (pieces 3 and 4) are made up of two pieces, joined with a sliding dovetail. See the *Elevation Drawings* for the details. The strips that are to be the

Template rout the contour of the foot plies. The author's template has a left and right aspect to help show off the finished shape. In practice, you only need to create the right-hand profile.



MATERIAL LIST FOR 2 ADJUSTABLE HORSES

	T x W x L
1 Thin Foot Plies (4)	3/4" x 3 1/4" x 18"
2 Thick Foot Plies (4)	1" x 3 1/4" x 18"
3 Inner Uprights (4)	3/4" x 2 1/8" x 16 7/8"
4 Outer Uprights (4)	3/4" x 3" x 20 1/2"
5 Upright Inserts (4)	3/4" x 2 1/8" x 5 3/4"
6 Bottom Stretchers (2)	3/4" x 3" x 22"
7 Upper Stretchers (2)	3/4" x 6" x 22"
8 Beams (2)	7/8" x 3" x 31 1/2"
9 Cross-dowels (16)	3/8" Dia. x 5/8", 1/4"-20
10 Connector Bolts (16)	1/4"-20 x 2 3/4"
11 Carriage Bolts (4)	3/8" x 2"
12 Fender Washers (4)	3/8" I.D.
13 Ergo-style Wingnuts (4)	3/8"-16

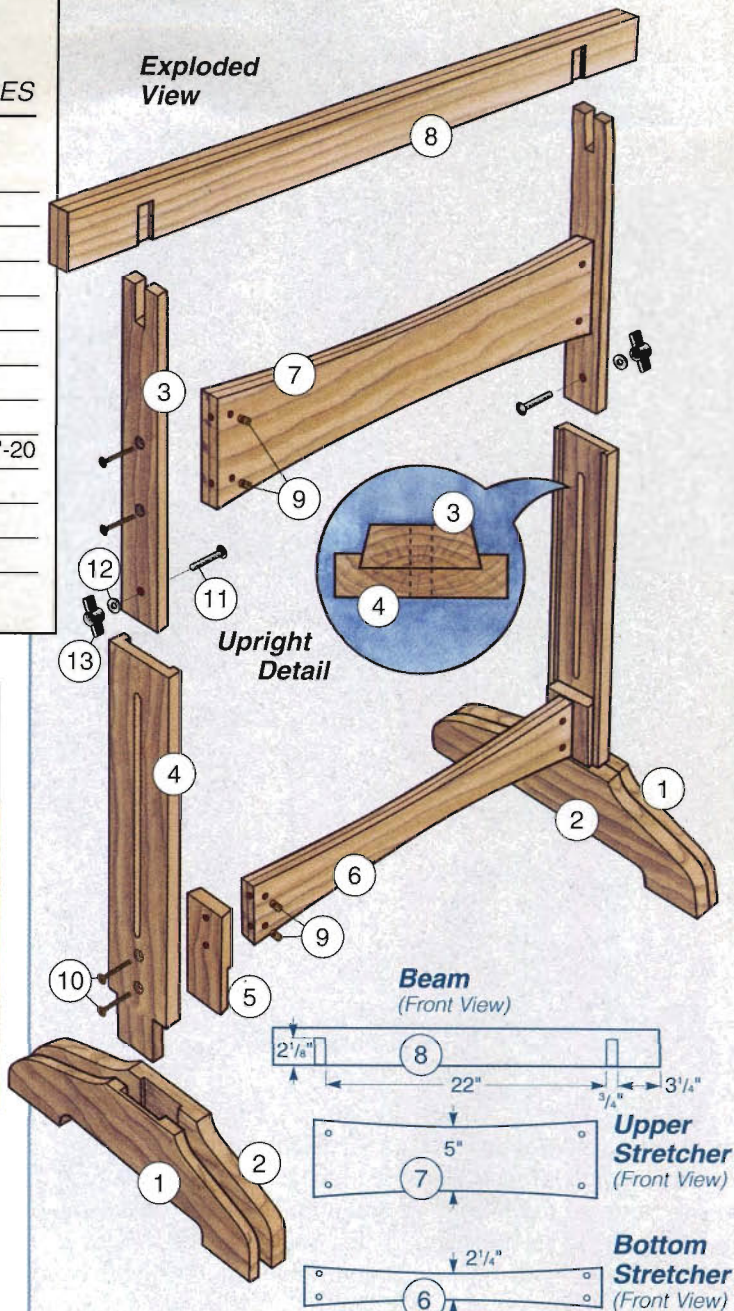


Using an edge guide to position the shallow dado in the beam ensures that all four cuts will be the same distance from the ends. The clamp secures a stop block.

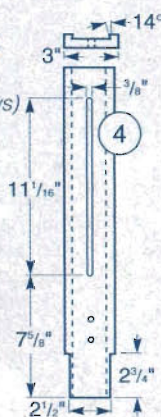
inner (or narrow) uprights are crosscut roughly 6" overlong. Bevel their edges on your router table. The matching groove is plowed end to end in the outer (or wide) uprights. Then 5 3/4" lengths — the upright inserts (pieces 5) — are crosscut from the narrow uprights and glued into the grooves. Form the adjustment grooves and the barefaced tenons on the outer uprights. Go ahead and machine the stretchers and the beams at this time. The final task is to cut the slot for the beam in the tops of the uprights.

Assemble the feet and uprights without glue, then lay out the connector bolt holes in the uprights and stretchers. Dismantle these assemblies to drill the holes. Then glue up the feet and uprights. Bolt the stretchers to the appropriate uprights, and slide the inner assembly into the foot-and-wide-upright assemblies. Use the appropriate hardware (pieces 9 through 13) to assemble each horse. All that remains is to rout shallow dados in the beam and to set it into the slots in the uprights. Tally ho!

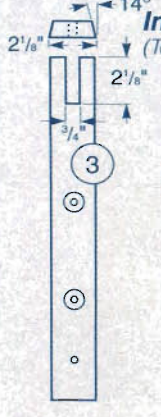
Exploded View



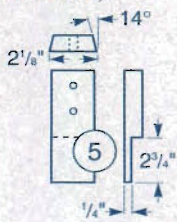
Outer Upright
(Top and Front Views)



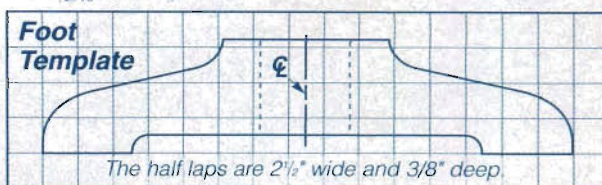
Inner Upright
(Top and Front Views)



Upright Insert
(Top, Front and End Views)



Foot Template



Each square = 1"



As helpful as a third hand, a rock-steady roll-off stand not only makes your work easier, but it is a great safety measure as well. This version is adjustable in height so it works as well with your router table as it does with your table saw.

This stand is a hollow column that houses a solid post. The post slides up and down inside the hollow column, and it's locked at any height with a twist knob on a bolt. Four feet give it a solid stance without excessive weight or an oversized footprint.

Make the post and column assembly first (pieces 1, 2 and 3). You have a bit of leeway to alter the girth of the post, but you want it to fit well in the column. I recommend you mill the post but leave it as thick and wide as possible. Make a column to accommodate it. Then, plane the post as necessary to allow it to slide smoothly inside the column.

As shown in the *Elevation Drawings*, the column is built up using dado-and-rabbet joints. I cut the joints on the router table, using a slot cutter for the dado (technically, it's a groove, since it parallels the grain's direction) and a straight bit for the rabbet. After the column is glued up, rout the slot (see photo below left) for the adjustment bolt on the router table. Also rout a recess for the tie plate (piece 4) at the top of the column. Then plane the post as necessary to achieve a smooth, bind-free action.

Drill the adjustment bolt hole in the post using the column as a locator. Slide the post inside the column, line up the drill bit at the bottom of the slot in the column, and bore into the post. Slide the post out of the column to complete the hole. Do this with the post clamped to the drill press table. Then, without moving the post, switch to a Forstner bit and make the counter-bore for the carriage-bolt's head.

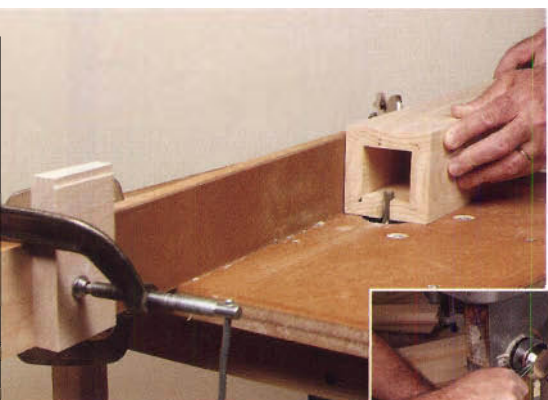
Make the base next. Rip the base elements (pieces 5 and 6) to match the width of the column. Cut the cross-laps in the base members. I routed these joints with a job-specific jig guiding a bit with shank-mounted bearing. Cut and glue the feet to the ends of the base elements. Round over the edges if you like, then glue up the X-shaped subassembly.

To join the column to the base, I used a mounting block (piece 7) and a pair of biscuits. Rip and crosscut a 1" thick scrap to fit tightly inside the column. Face-glue it to the base (orienting its grain parallel to the piece you are gluing it to). Cut two biscuit slots in the base,

Roll-off Stand

With my trusty adjustable roll-off stand you can halve a sheet of plywood on your table saw or, if you are ripping, keep the two long halves of a board from tipping off your outfeed table. In addition, because this one is vertically adjustable, you can use the stand with a jointer, drill press, band saw, and router table, all of which have slightly different table heights.

I've been using a telescoping stand like this one for a decade or more. The roller balls are a superior design when compared to a cylindrical roller. The latter has to be aligned square to the line of travel of a workpiece that's in motion or it'll steer the piece.



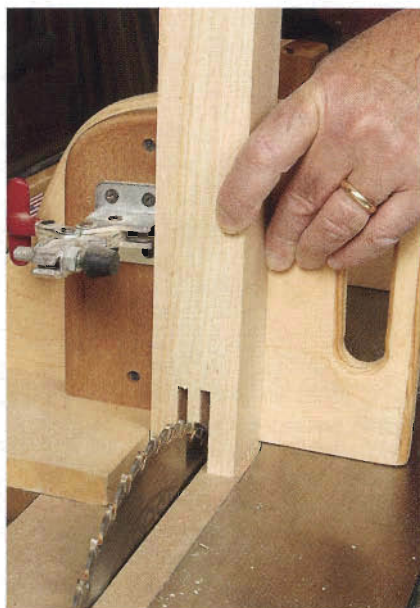
To make the stopped adjustment slot, measure from the bit and clamp a stop to the end of the fence. Cut the slot in two or three passes. Use the slot to locate the adjustment bolt hole in post (inset).



MATERIAL LIST *ROLL-OFF STAND*

	T x W x L
1 Narrow Column Sides (2)	3/4" x 2 1/2" x 22 1/2"
2 Wide Column Sides (2)	3/4" x 3 1/2" x 22 1/2"
3 Post (1)	2" x 2" x 24"
4 Tie Plate (1)	3/8" x 1 1/4" x 3 1/2"
5 Base Members (2)	1" x 3 1/2" x 18"
6 Foot Blocks (4)	3/4" x 3 1/2" x 2 3/4"
7 Mounting Block (1)	1" x 2" x 2"
8 Mounting Bar (1)	3/4" x 3" x 12"
9 Roller Base (1)	3/4" x 4" x 12"
10 Adjustment Bolt (1)	3/8" x 3 1/2"
11 Fender Washer (1)	3/8" I.D.
12 Ergo-style Wingnut (1)	3/8"-16
13 Ball Bearing Rollers (6)	1" Dia.

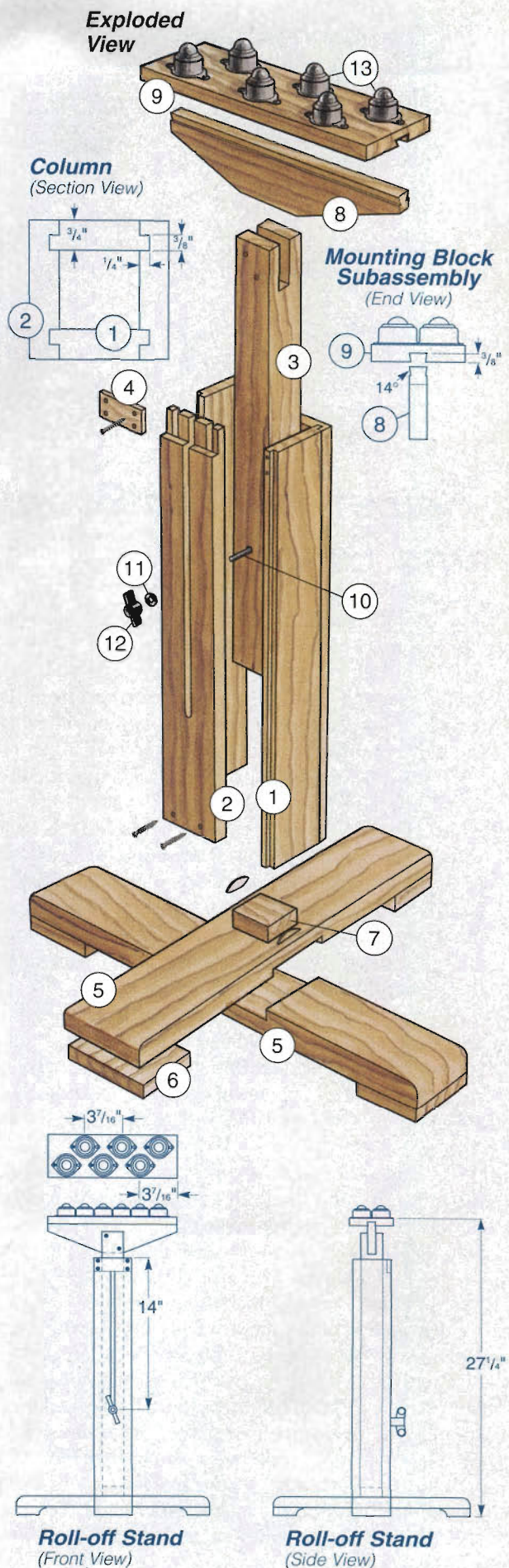
The bridle-joint slot in the post can easily be sawed with a tenoning jig on the table saw. Cut the margins of the slot first, then remove the waste from the middle.

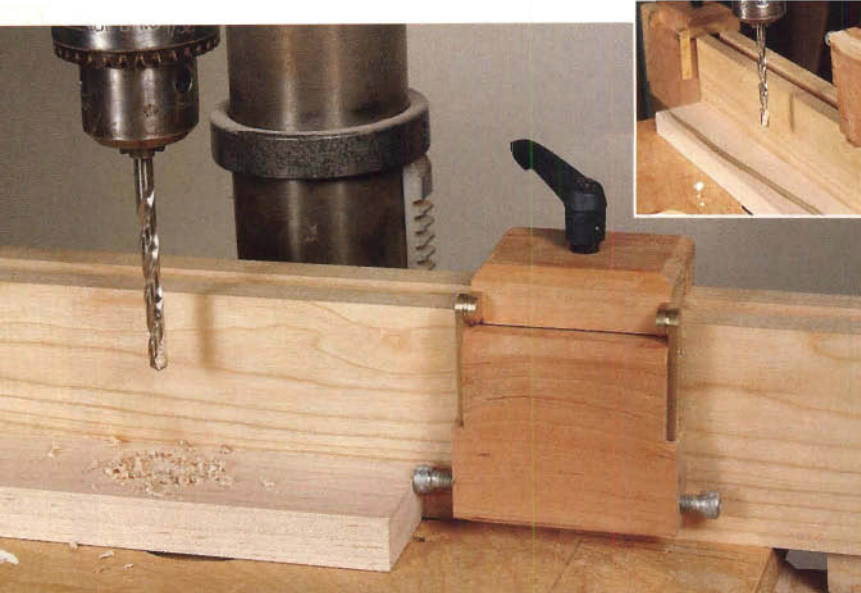


using the block as a reference surface and making the slots parallel the grain. Cut matching slots in the end of the column, using the post as a reference surface. Glue the column and base together.

The base for the roller balls is joined to its mounting bar (pieces 8 and 9) with a sliding dovetail joint. I routed both halves of the joint on the router table. The bar is joined to the post with a bridle joint. I cut the slot in the post using my shop-made table saw tenoning jig. The tapers on the bar were sawed on the band saw, then smoothed with a hand plane. The sliding dovetail is glued, the bridle joint is fastened with screws.

After fitting the adjustment bolt (piece 10) through the post and driving the head into its counterbore, slide the post into the column. Fit a fender washer and an easy-on-the-fingers plastic wingnut (pieces 11 and 12) on the bolt. Install the tie plate with four screws but no glue, so it can be removed easily should the post assembly need servicing. Attach the rollers (pieces 13) to their base and you are ready to roll ... literally.





Fast, accurate and easy to use ... this fence and stop system has both coarse and micro-adjust functions all packaged in a shop-made jig. Use this flip stop on the fence built here and the crosscut sled on page 61.

Adjustable Flip Stop and Fence

This little gizmo is used at several tools around my shop — table saw, miter saw, drill press, router table. Though I'd like to, I can't take credit for it. A fellow I once worked with, Bob Moran, cooked it up. Bob is a stickler for accuracy in his work, and he railed against the play common to commercial stop mechanisms.

His design consists of two parts: the fence and the stop assembly. The fence has a large T-slot cut into its top edge. The stop is simply two small wooden blocks joined with a pair of knife hinges. The slide block rides on top of the fence, and the stop block hangs down the fence face. A bolt passes through the slide into a machinist's T-nut trapped in the fence's T-slot. Tighten the bolt and the slide is locked in position; loosen it and you can move the assembly back and forth on the fence.

As you can see in the photo above, the locking bolt has a little handle to make adjustments easy. I thread a cap screw into each end of the stop so I can make micro-adjustments after the stop is coarsely set. Because the stop is hinged to the slide, it flips up out of the way in a snap.

Critical to the stop's accuracy is the fit of the slide on the fence and the fit of the hinges. You are in control of both. Be finicky as you make the two blocks and your stop will be more accurate. Also critical is the precision of the knife hinges you use. Play in the hinge pivot results in looseness in the stop assembly.

Construction of this handy helper begins with the fence. You use two plies (pieces 1) of 3/4" stock for each section of fence. First you rout a groove in each strip, as shown in the *Elevation Drawings*, then you trim back the narrow shoulder of the groove (see photo, above right). Glue the two plies face-to-face and these cuts become your T-slot.

Before you actually cut the blocks (pieces 2 and 3), you should have all the hardware in hand. You must be able to separate the leaves of the knife hinges (pieces 4).



After routing a groove in each half of your fence stock, lower the slot cutting bit and reorient your stock to trim the shoulders. The fence is completed by face-gluing it together, as shown in the inset at right. Keep the glue squeeze-out to a minimum.

The slide block must first be fitted to the top edge of the fence. Do this by routing a shallow (1/8" deep) recess the same width as the fence into the block's bottom surface. It should be centered, so you have roughly equal-width shoulders in either side. Don't try this cut on a bitty block; rout the recess on a 6" - 10" long piece, then crosscut it into two or three slide blocks.

Rout the hinge mortises in the slide block, and square them with a chisel. Drill a hole in the center for the locking bolt and stud handle (pieces 5 and 6). To allow the stop to flip straight up, chamfer the matching edges (see the *Drawings*) of it and of the slide. I chamfered the other top edges on the slide with a block plane, just for looks.

To mount the hinges, lock the slide on the fence section and secure that in your vise. Lay a leaf with the pivot pin in the mortise, drill pilots, and screw the leaf to the block. Turn the block around and mount a leaf with a pivot pin on the other end of the block.

MATERIAL LIST FENCE AND FLIP STOP

	T x W x L
1 Fence Plies (2)	3/4" x 3" x 28"
2 Slide Block (1)	3/4" x 2" x 2 5/8"
3 Stop Block (1)	3/4" x 2 5/8" x 3"
4 Knife Hinges (2)	1 7/8" x 3/8"
5 Studded Handle (1)	1/4" x 1 1/8" Stud
6 Machinist's T-nut* (1)	1/4-20
7 Micro-adjusters (2)	1/4-20 x 1" Cap screw

*Available at www.reidtools.com or call 800-253-0421.



Yes, you can tap wood. For the cap screw that serves as a micro-adjuster, drill a pilot into the end of the stop. A standard tap — no cutting fluid is needed for this — will cut threads into the wood.

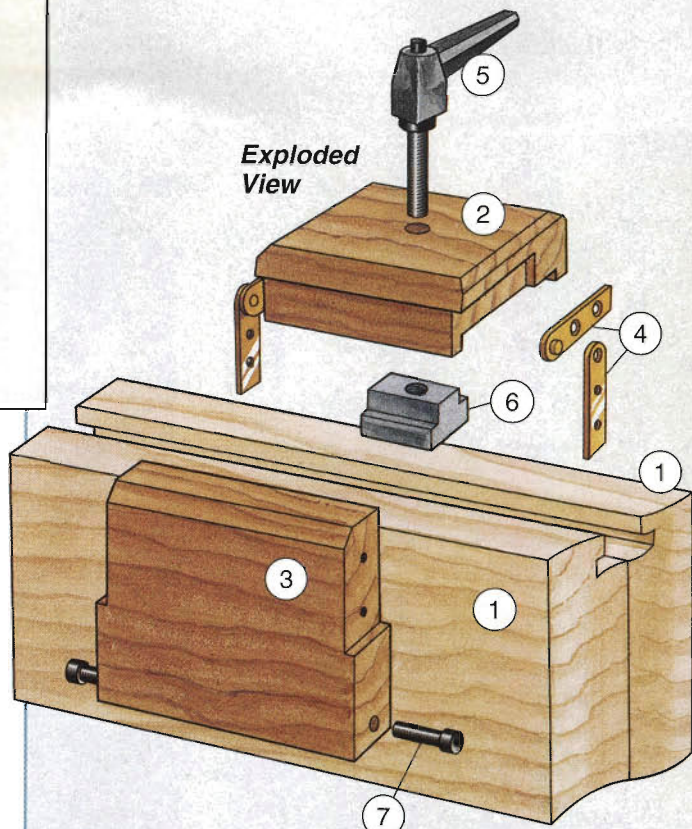


Clamp the stop block to the fence next. Its edge should be against the shoulder of the slide. Drop a leaf onto the pin of the already mounted leaf, align it on the end of the stop, and scribe along the leaf end on the stop. This is the shoulder of the leaf mortise you'll now cut.

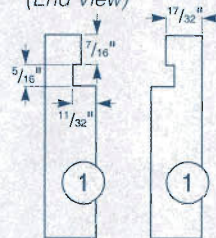
Use the mark to set the elevation of your table saw blade. Guiding the block with the miter gauge, notch each end. Just the thickness of the blade will do for now. Now reclamp the stop to the fence and mount the hinge leaves. Check the action of the hinges. If it is too loose, remove the leaves from the stop block, shave the hinge notches, and remount the hinges.

Finally, drill and tap a hole in each end of the stop. Yes, you can cut threads in wood. For 1/4 - 20 thread, use a 13/64" drill to bore the root hole, and a standard 1/4 - 20 tap to cut the threads. No cutting fluid needed. When the holes are tapped, turn a cap screw (pieces 7) into each one, and your micro-adjust stops are ready.

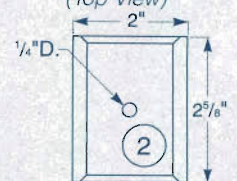
I hope you find these faithful shop helpers to be as useful as I have over the years. While it's my guess that you'll modify them to suit your needs and personal style, these babies are time-tested and well-proven. Enjoy.



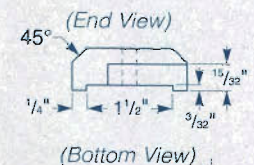
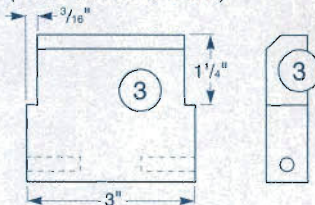
Fence Ply
(End View)



Slide Block
(Top View)



Stop Block
(Front and Side Views)



Bill Hylton is a regular contributor to the *Woodworker's Journal* and the author of *Woodworking with the Router*, available from *Reader's Digest*.

Project Supplies for Shop Helpers

Cross Dowels #31823.....	\$2.69
Connector Bolts #31856	\$4.99
3/8" Ergostyle Wingnut #26755	\$3.99
1" Ball Bearing Rollers #20822	\$17.99

See individual Material Lists for hardware quantities.

To order your supplies, call 800-610-0883 and mention code W3123.

Dresser Valet

By Chris Marshall



Tired of heaping your loose change on the dresser or searching for those seldom-used cufflinks? Want to spend some quality time with your router and band saw? Here's a handsome project that fits both bills — and shhh ... it hides a few, too.

Every guy needs a spot for storing trinkets, a watch, pocket change and maybe even a little extra “allowance” now and again. If you're still using an old cigar box or a catchall dresser drawer, it's time to treat yourself to something more sophisticated. This dresser valet offers two ample drawers of storage space plus a secret hidden cubby under the cap for stashing a larger bill or two. The cubby locks in place when the drawers are closed.

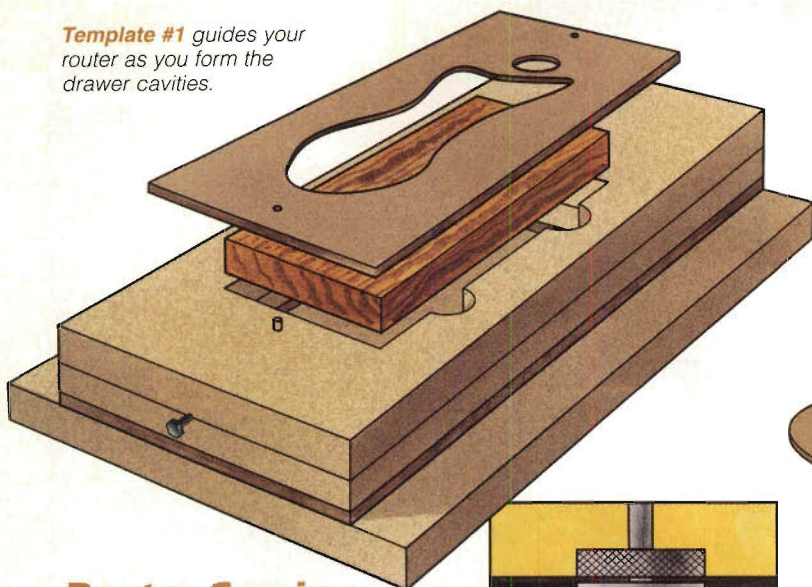
You can use any hardwood to build this project. I chose cocobolo accented with ebony for the cap and top drawer laminations, but it's really a matter of which dark hardwood you find attractive.



The valet's ebony cap forms a pleasing detail when the drawers are closed, but open them both up and the cap pulls out to reveal a hidden money holder.



Template #1 guides your router as you form the drawer cavities.



Router Carving

Shaping the drawer cavities with curved bottom corners is a challenge. Here's the 3-step process:

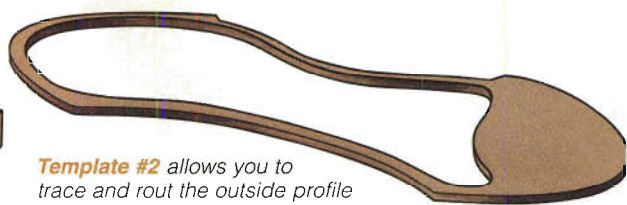
1. Start the drawer bottom recess by routing out the center waste with a 1" O.D. guide collar and 1/2" straight bit. The bit and bushing will create a 1/4" inset from the template edge.
2. Rout away the inset and form the curved edges inside the drawer bottom with a 1/2" core box bit and a 5/8" O.D. guide collar.
3. After gluing up the drawer, cut the remaining pieces with the 1/2" straight bit and 5/8" guide collar.

Making a Router Jig and Templates

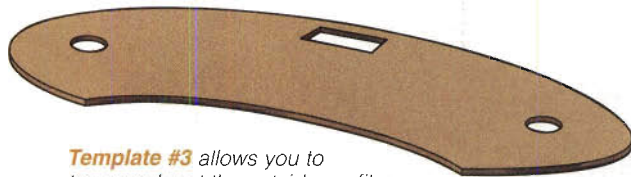
A unique feature of this project, from a building standpoint, is that the drawer interiors are routed out of three pieces of laminated stock. Making them is a bit more like carving than drawer building. The secret to routing the drawer interiors accurately is to make a jig that registers the router areas for you automatically. I made mine from 3/4" MDF and 1/4" hardboard. It consists of a base with built-up strips of hardboard and MDF that hold blanks for the drawer parts while you rout them. I mounted a hardboard template on top of the jig to guide the router during milling. A pair of short dowel pegs hold the template in place on the jig but allow it to be flipped for routing the opposite-facing drawer.

On one end of the jig, I recessed a nut and drilled a through hole for a long bolt. You'll make the drawer blanks slightly shorter than the jig opening, and this bolt presses them securely in place in the jig. The wide built-up strips around the open center area of the jig provide a stable bearing surface for the router, which I mounted on an acrylic router table insert plate to act as an oversized base. The semi-circular cutouts around the jig interior provide finger spaces for pulling the drawer blanks out. If you build your valet to match the proportions in the

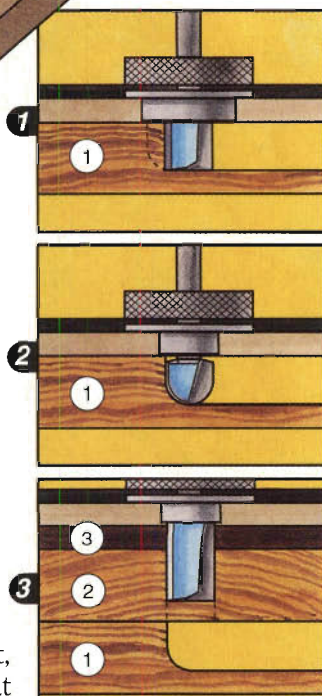
Template Accuracy



Template #2 allows you to trace and rout the outside profile of the drawers. The inside opening is required to align the jig to the drawer cavity.



Template #3 allows you to trace and rout the outside profile of the top and bottom. It is also used to mark the locations for the hinge dowels and secret compartment opening.



Material List, make the jig base 16" x 23" and the built-up strips 3" wide. Nail two layers of MDF and one layer of hardboard to the jig base, leaving a 6" x 17" center opening. See the illustration above to get the gist of how your jig will look.

You'll need three hardboard templates for making the valet. The first one is rectangular and mounts to the router jig. The other two are patterns for tracing (and pattern routing) the drawer, top and bottom pieces to shape and for registering the dowel hole locations. The *Drawings* above will give you the general relationships of the templates. If you decide to build the valet, send off for the free template pattern CAD drawings (they're a "must"). Mount the paper patterns on 1/4" hardboard, and cut them out with a scroll saw. Make the overall size of the rectangular jig template match the built-up area of the jig so you can

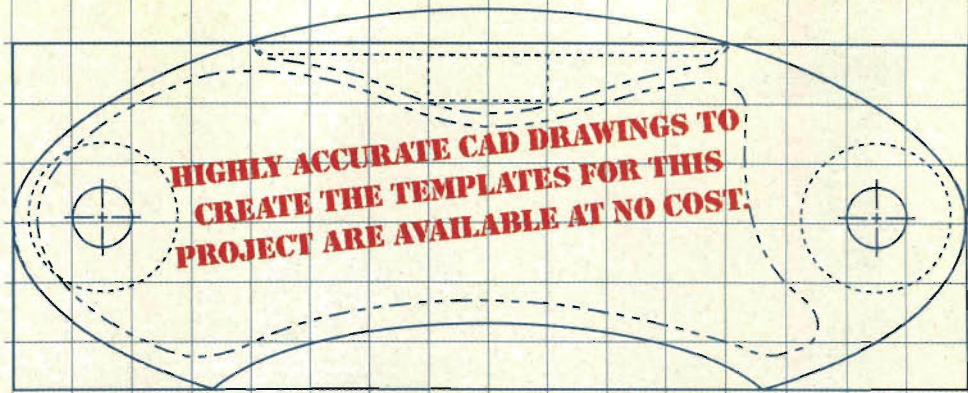


After gluing the drawer laminations together, the drawer bottom will be concealed inside the blank. Use the jig and a 1/2" straight bit to rout down through the top and center laminations, opening up the drawer bottom again. Lifting out the waste piece will reveal your drawer cavity.

CAD Drawings Available

The machining tolerances in this project are extremely tight and very challenging. However, if you take a minute to send off for our full-size template patterns, they are also very workable.

We didn't present the patterns in the issue because scaled drawings tend to distort as they're enlarged. Instead, we're providing full-size CAD generated drawings that are ready to use. Send us a stamped, self-addressed envelope (large size), and we will put your ultra-accurate patterns in the mail, for free.



**To request your free, full-size, CAD drawings,
send a large self-addressed, stamped envelope to:
CAD DRAWINGS c/o Woodworker's Journal, 4365
Willow Drive, Medina, MN 55340.**



register it easily. Locate the paper template on this piece of hardboard so it will be centered over the drawer blanks when they are set in the jig. Sand the edges of the other two templates smooth so their contours match.

Finish up the router jig by installing a pair of short dowel pins into the top, centered on its width. Drill the dowel holes through the rectangular template and into the jig at the same time so your dowels and template holes align.

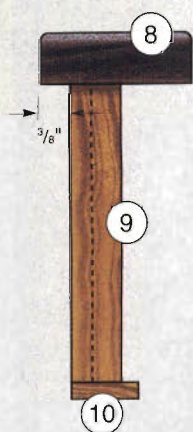
Making the Drawers

Start the drawer-making procedure by cutting the drawer bottoms, center and top laminations to size (pieces 1, 2 and 3). Make these blanks 16½" long. Stack one set of drawer parts in the jig with the drawer bottom on top, and slip a small scrap of hardboard in front of the bolt. Tighten the bolt. The scrap puts clamping pressure across all three blanks. Set jig template # 1 in place on the dowel pins and clamp the assembly to your bench.

The first milling step will establish the flat drawer bottom. Install a 1/2" straight bit and 1" O.D. guide collar on the oversized router base. Guide the router counterclockwise around the inside drawer profile on the template in a shallow pass, then clean out the center waste area by sweeping the router all across the cutout. This operation will inset the router 1/4" from the template edge. Make additional passes to clean out the waste, increasing the depth by 1/8" each time until the drawer bottom is milled 1/2" deep.

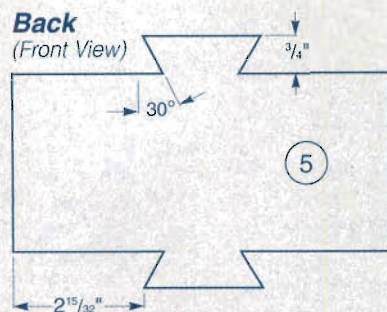
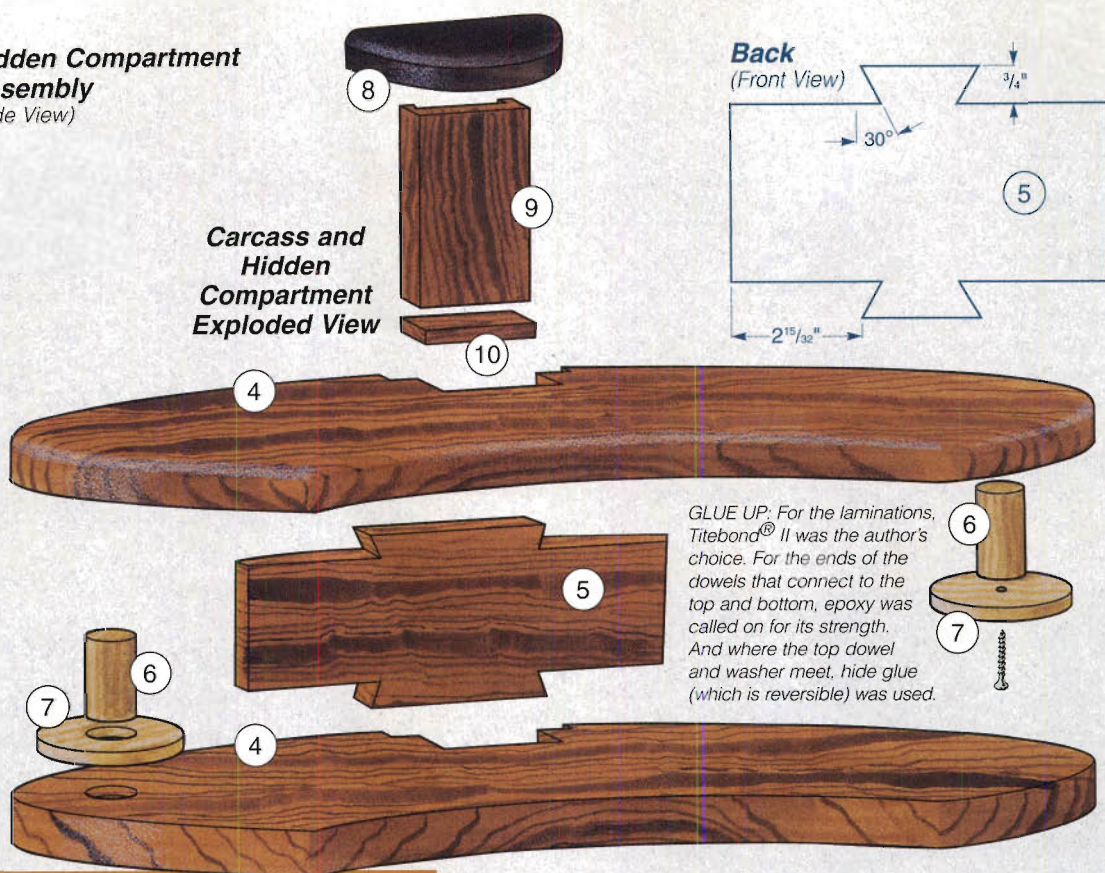
Switch to a 1/2" diameter core box bit and 5/8" O.D. rub collar for the next step — routing the curved corners inside the drawer bottom. Shave away the 1/4" of waste left behind by the straight bit in progressively deeper passes until the bit forms a smooth, curved transition with the flat drawer bottom. Flip the bottom piece to the other face and switch back to the straight bit. Mill the round washer recess on the stock 3/16" deep.

Use template #2 to trace the outer drawer shapes, then cut out the drawers on a band saw. A silver marker makes the layout lines easier to see against the dark ebony top lamination.

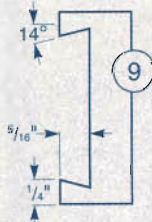


Hidden Compartment Assembly
(Side View)

Carcass and Hidden Compartment Exploded View



Money Holder
(Top View)



GLUE UP: For the laminations, Titebond® II was the author's choice. For the ends of the dowels that connect to the top and bottom, epoxy was called on for its strength. And where the top dowel and washer meet, hide glue (which is reversible) was used.

MATERIAL LIST

	T x W x L
1 Drawer Bottoms (2)	3/4" x 5 3/4" x 16"
2 Drawer Center Laminations (2)	3/4" x 5 3/4" x 16"
3 Drawer Top Laminations (2)	1/4" x 5 3/4" x 16"
4 Top/bottom (2)	3/4" x 6 1/2" x 16"
5 Back (1)	3/4" x 5 3/16" x 7 7/8"
6 Drawer Dowels (2)	1" Dia. x 2 3/16"
7 Washers (2)	1/4" x 2 3/8" Dia.
8 Cap (1)	3/4" x 2 1/4" x 3"
9 Money Holder (1)	3/4" x 2" x 4 7/16"
10 Catch (1)	1/4" x 1" x 2"

Pull the drawer parts from the jig and glue the center and top laminations together. (Carefully align their edges.) Then glue the drawer bottom face-down to the center lamination. Have the drawer bottom on top of the glue-up so gravity will keep the wet glue from migrating into the drawer bottom cavity where you can't clean it up. When the glue dries, drop and secure the blank in the jig with the thin lamination on top.

Finish milling the drawer interior by routing down through the top two laminations to meet the inside walls of the drawer bottom. Use a 1/2" straight bit and the 5/8" O.D. rub collar for this operation. Rout down in shallow passes around the drawer opening in the template until the bit breaks through to the drawer bottom cavity. Rout the inner waste piece until it's nearly free, then break it out and rout out the last bit of waste.



Cut the top and bottom dovetails to shape on the table saw with the miter gauge pivoted to 30°. Set the blade height to match the back thickness. Notice the money holder hole has already been cut in the top.

Follow this same three-step routing procedure to make the second, mirror image drawer body. NOTE: this time, flip the template over when routing all the parts, or you'll end up with two matching rather than mirror image drawers. Cut the washer recess 3/16" deep on this drawer. It will serve as the bottom drawer.

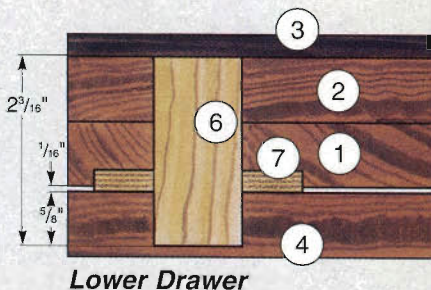
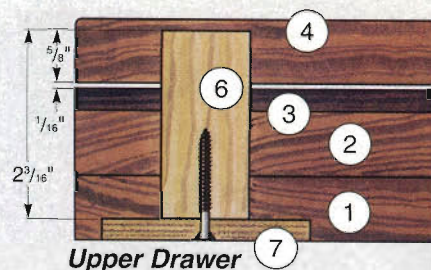
Use your drawer-shaped template to trace the outside profile of the drawer on each drawer blank. Be sure to flip the drawer template end-for-end when tracing the second drawer. The drawers pivot from opposite ends in the valet. Cut out both drawers on the band saw, and template rout them to final size.

Laminated Drawer Exploded View



NOTE: The top drawer hangs on the upper hinge assembly. After testing the fit and action of the drawer in its opening (with the screw in position), put a small drop of liquid hide glue on the washer end of the hinge dowel for final assembly. Be sure to avoid squeeze-out, or you'll end up gluing the drawer to the hinge assembly — which you don't want.

Hinge & Drawer Assembly (Section Views)



NOTE: The lower hinge dowel is epoxied into the bottom, and its washer is drilled out to accept the dowel.

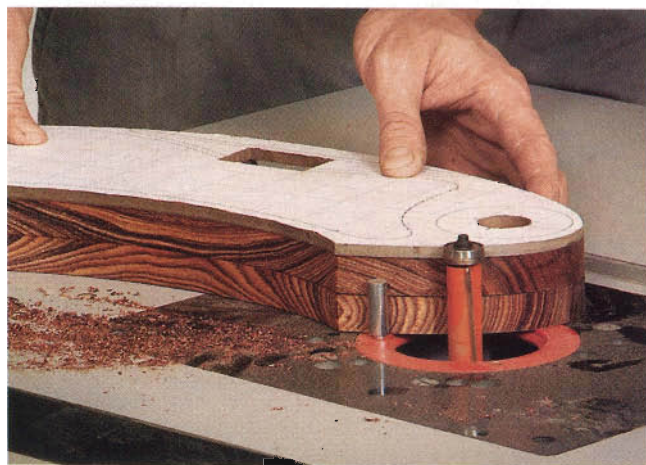
Joining the Top, Bottom and Back with Dovetails

Measure and cut the top, bottom and back (pieces 4 and 5) to the *Material List* dimensions. You'll need to make the back dovetail joint now, while these parts have flat edges. Lay out the dovetail shapes on the top and bottom blanks following the dimensions in the *Drawings*. On the table saw, mill the money cubby clearance hole in the top with a series of $1\frac{3}{4}$ " deep, side by side cuts. Stand the workpiece on edge against the miter gauge to do this. Then drop the blade height to match the thickness of the back and cut away the center area of the dovetail from the bottom piece. Pivot the miter gauge to 30° both ways for cutting the dovetail angles, and trim the dovetails to shape.

Use the top and bottom dovetail cutouts to lay out the dovetail shapes on the back piece. Cut these dovetails on the band saw and fit the joints together. I shaved the top and bottom dovetail cutouts on the table saw as needed to tweak the fit of the joints.

Curves, Curves and More Curves

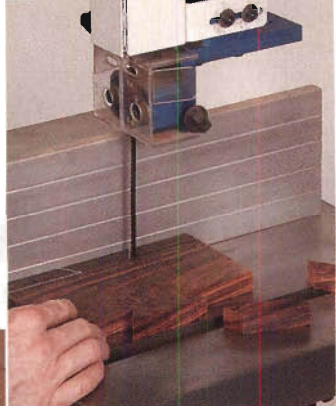
Cut the top and bottom pieces so they are slightly oversized on your band saw, and use the top/bottom template as a guide for trimming them to final size on the router table. Install a $\frac{5}{16}$ " rub collar and $\frac{1}{4}$ " straight bit to rout the recess for the money cubby catch in the valet bottom piece. Make this recess $\frac{1}{4}$ " deep. Now you're really making progress.



Guide a long flush trim bit against the top/bottom template to shave the valet top and bottom to final shape. Tack the parts together first with a few dabs of hot-melt glue. Start the trimming work against a guide pin on the router table and feed counterclockwise.

Next, slip the dovetail joint together and trace the curved profile of the top and bottom onto the back piece to establish its curvature. Cut the back curves on a band saw, assemble the dovetail joints, and sand the back curves to match the top and bottom using a disk or belt sander. Bevel the short ends of the back piece to 40° . (Again, I employed my stationary belt sander). Wrap up the curvy work by easing the top edge of the valet with a $\frac{5}{16}$ " roundover bit. Do this step with the top dovetail joint assembled.

Shaping on the Band Saw



Lay out the dovetail shapes on the valet back piece and cut them out on a band saw. Use your saw's rip fence to index the flat shoulder cuts on either side of each dovetail.

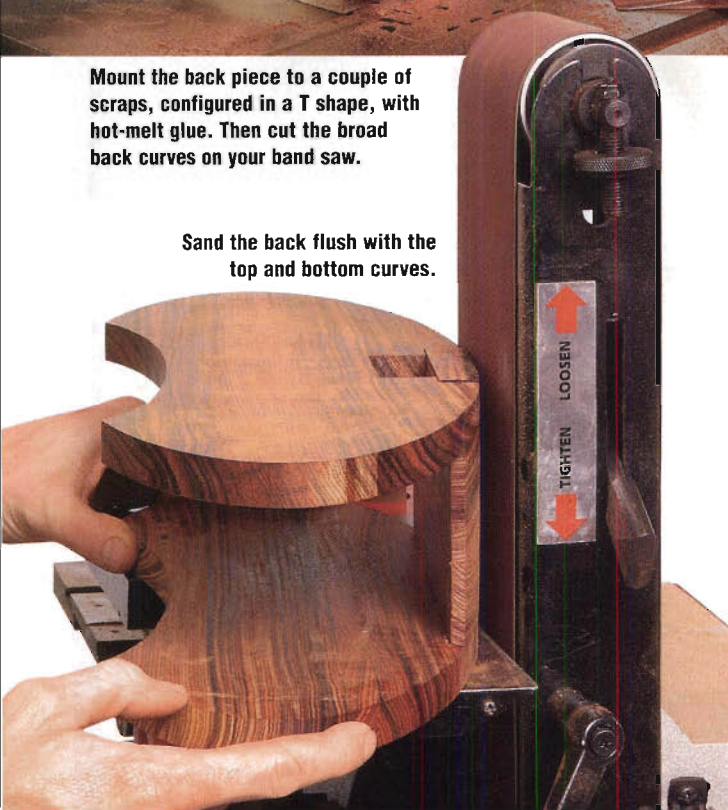


Dry-fit the dovetail and trace the top and bottom curves onto the back.



Mount the back piece to a couple of scraps, configured in a T shape, with hot-melt glue. Then cut the broad back curves on your band saw.

Sand the back flush with the top and bottom curves.



Building the Pivot Hinges

Each drawer pivots on a dowel and plywood washer. Cut the dowels to length and the washers to size. I used a circle cutter on the drill press to make the washers.

The dowel for the top drawer fits into a 5/8" deep stopped hole in the valet top and passes through the drawer to the washer recess. The washer fastens to the dowel with a screw and supports the drawer. Use the top/bottom template to register the dowel location. Stack the drawer, top and template together with the template on top, and drill the hole with a 1" Forstner bit.

Similarly, the bottom drawer pivots on a dowel, but the pivot hole is stopped to hide the dowel. Use the top/bottom template to locate the centerpoint of the dowel. Drill a tiny reference hole for locating the dowel position down through the drawer and the washer, and just slightly into the valet bottom. Pull the parts apart, set the washer in place in the drawer recess, and drill the stopped hole in the drawer 1 1/2" deep with the Forstner bit. Drill the hole in the valet bottom 5/8" deep. Plug the reference hole in the drawer so it won't show.

Finishing and Assembly

Before assembling the joints permanently, sand the top, bottom and drawers, and ease the edges with slight chamfers if you wish. Apply finish now while the part surfaces are still fully accessible. On my cocobolo valet, I applied three coats of aerosol lacquer. It cures well over this oily wood and dries in a flash. Use two-part epoxy to glue the dowels into their stopped holes in the top and bottom. Slip the washers and drawers in place, and screw the top drawer washer to the dowel. Spread more epoxy onto the dovetail surfaces, and slide the top and bottom assemblies onto the valet back.

Making the Hidden Compartment

The hidden compartment consists of three pieces: the top cap, money holder and catch. Cut the cap to shape using the template provided with the CAD drawings (see page 71 to order). Ease the top edges of the cap on a sander or with a 5/16" diameter roundover bit on the router table. The money holder is simply a piece of straight stock with a wide dovetail milled into one face. The dovetail angles hold your folded bills in place. I milled the dovetail in several side by side passes with a 5/8" diameter dovetail bit.

Cut the catch to size from 1/4" stock, and assemble the hidden compartment with two-part epoxy. Open the drawers slightly to slip the money holder in place. Now you've got a secret spot for squirreling away a few bills toward your next tool purchase ...

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By Chris
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By Chris Marshall

In my garage shop, floor space isn't the only real estate in short supply — the walls are filled up, too. If a wall-mounted lumber rack isn't in the cards for your shop either, my rolling lumber cart offers more than 70 square feet of shelf space, a separate compartment for storing sheet goods and a roomy bin on top for cutoffs. Heavy-duty shelf standards and brackets keep it all high and dry.



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Drill counterbores to recess the lag bolt heads and washers that fasten the base sides and ends to the crossbraces. Clamp a straightedge to the table to keep the counterbores aligned.

Starting with the Base

Get this project rolling by cutting the base parts (pieces 1 through 5) to size. Five cross brace assemblies reinforce the base and serve as attachment points for the uprights. Notice in the *Drawings* that the end and center cross brace assemblies are sandwiches of two 2 x 6s and blocking; the other two cross braces are just pairs of 2 x 6s. Build the thicker cross braces by gluing and screwing each base end (piece 1) to a cross brace (piece 3) with two sections of short blocking (pieces 4) in between.

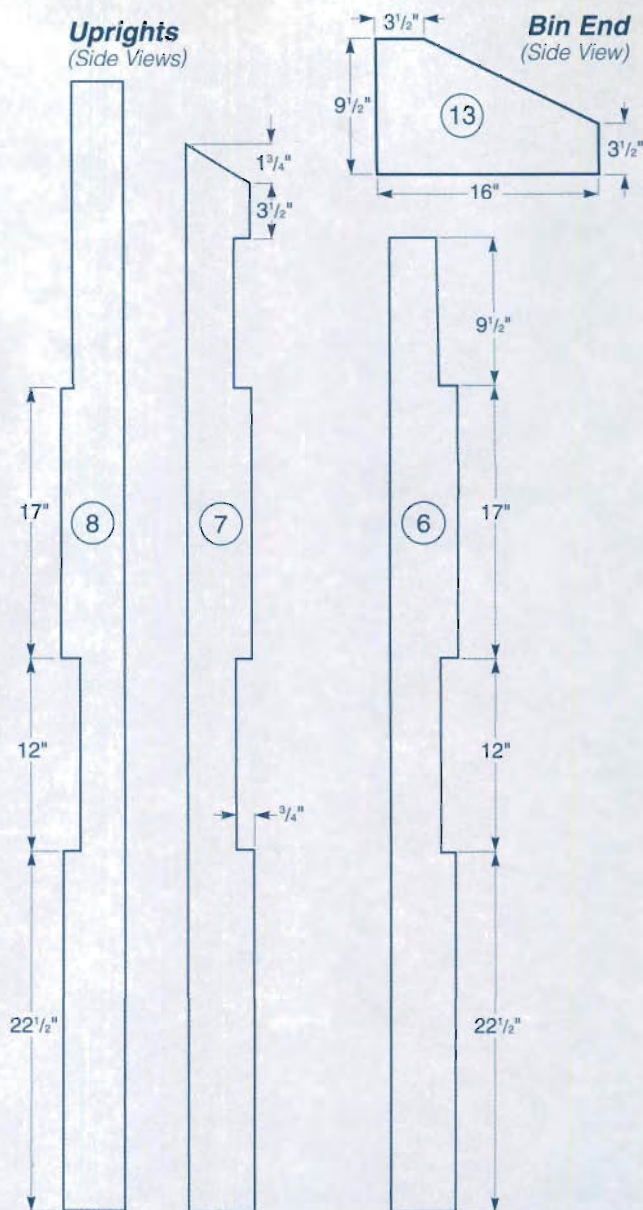
Make the thick center cross brace the same way, using two cross braces instead of a base end. Leave the center cavities of these three assemblies open for now.

To make the other two narrower cross brace assemblies, first plow a pair of $\frac{3}{4}$ " x $3\frac{1}{2}$ " wide dadoes across the face of each cross brace to form

Chris Marshall works in a chronically space-challenged shop and is a contributing editor to Woodworker's Journal. Chris also built the Dresser Valet appearing on page 68 of this issue.

Uprights
(Side Views)

Bin End
(Side View)



bridle joints for housing the uprights. Follow the *Drawings* (above) to locate these cuts. Fasten pairs of cross braces together with glue and screws, then rout a shallow recess along the top edge (of each) to install a plastic slide (pieces 15) in each one. Make the recesses $\frac{1}{8}$ " deep and $1\frac{1}{2}$ " wide so they span the distance between the upright cutouts.

Assemble the base framework by attaching the five cross brace assemblies to the base sides (pieces 2) with $\frac{5}{16}$ " x 4" countersunk lag bolts and washers. Space the cross braces evenly on the base.



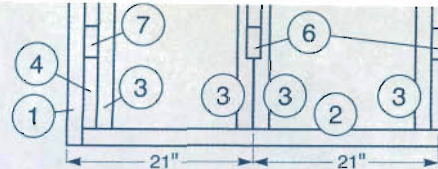
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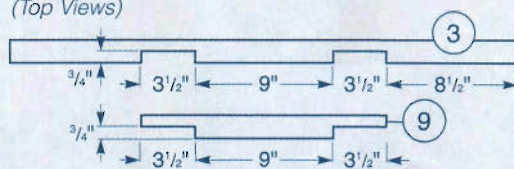
MATERIAL LIST

	T x W x L
1 Base Ends (2)	1 1/2" x 5 1/2" x 36"
2 Base Sides (2)	1 1/2" x 5 1/2" x 81"
3 Base Cross Braces (8)	1 1/2" x 5 1/2" x 33"
4 Short Blocking (6)	1 1/2" x 5 1/2" x 8 1/2"
5 Long Blocking (3)	1 1/2" x 3 1/2" x 9"
6 Front Uprights (3)	1 1/2" x 3 1/2" x 61"
7 Angled Uprights (2)	1 1/2" x 3 1/2" x 66 1/4"
8 Rear Uprights (5)	1 1/2" x 3 1/2" x 70 1/2"
9 Top Cross Braces (4)	1 1/2" x 3 1/2" x 16"
10 Wide Upright Braces (2)	3/4" x 12" x 81"
11 Narrow Upright Brace (1)	3/4" x 9 1/2" x 81"
12 Cutoff Bin Back (1)	3/4" x 19" x 81"
13 Cutoff Bin Ends (2)	3/4" x 9 1/2" x 16"
14 Cutoff Bin Bottom (1)	3/4" x 15 1/2" x 81"
15 Slides (5)	1/4" x 1 1/2" x 9" UHMW
16 Shelf Standards (10)	1 1/2" x 55" Steel
17 Casters (6)	4 Swivel, 2 Fixed

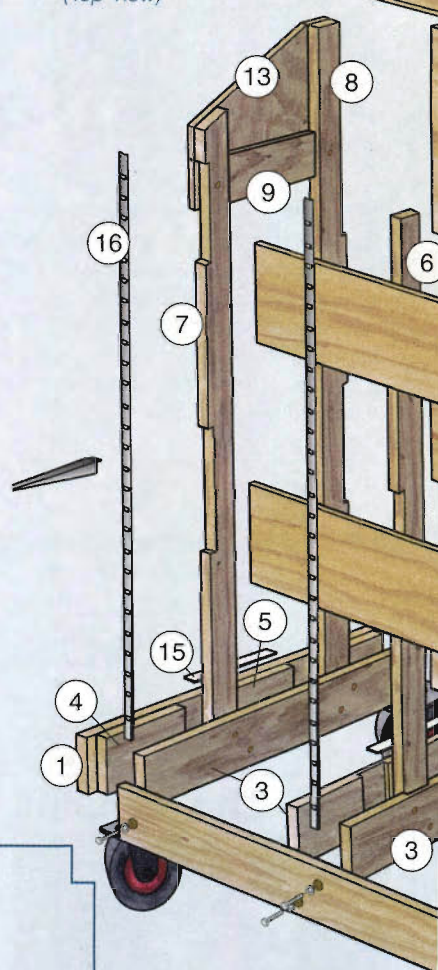
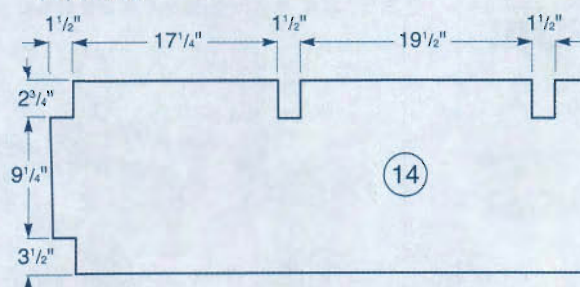


Base Assembly
(Top View)

Top and Base Cross Braces
(Top Views)



Cutoff Bin Bottom
(Top View)



Making the Rack

When you get this rack all filled up (and you'll be surprised how many great deals you can find on wood when you actually have a place to put it), there's going to be some substantial weight involved. That's why I turned to cross braces and blocks — this is one project I didn't want to be guilty of underbuilding on.

Refer to the *Drawings* to lay out the ten uprights (pieces 6, 7 and 8). Cut them to size and shape. Cut the top cross braces (pieces 9) to length now, too. Use a dado blade for milling the long, 3/4" deep recesses

in the uprights as well as the tongues on the ends of the top cross braces. When you're through dadoing, slide the uprights into their cutouts in the base to test the fit. You can turn to a small block plane if you find it necessary to refine the fit.

With the uprights in place, fill the voids in the center and end base cross braces with long blocking (pieces 5). Tap the blocking down below flush to form 1/8" deep recess between the uprights for more plastic slides. Screw the blocking into place.

Choice

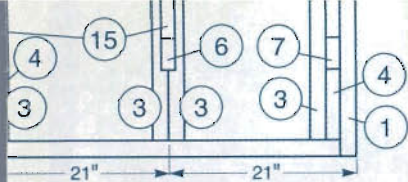
Tool Groups



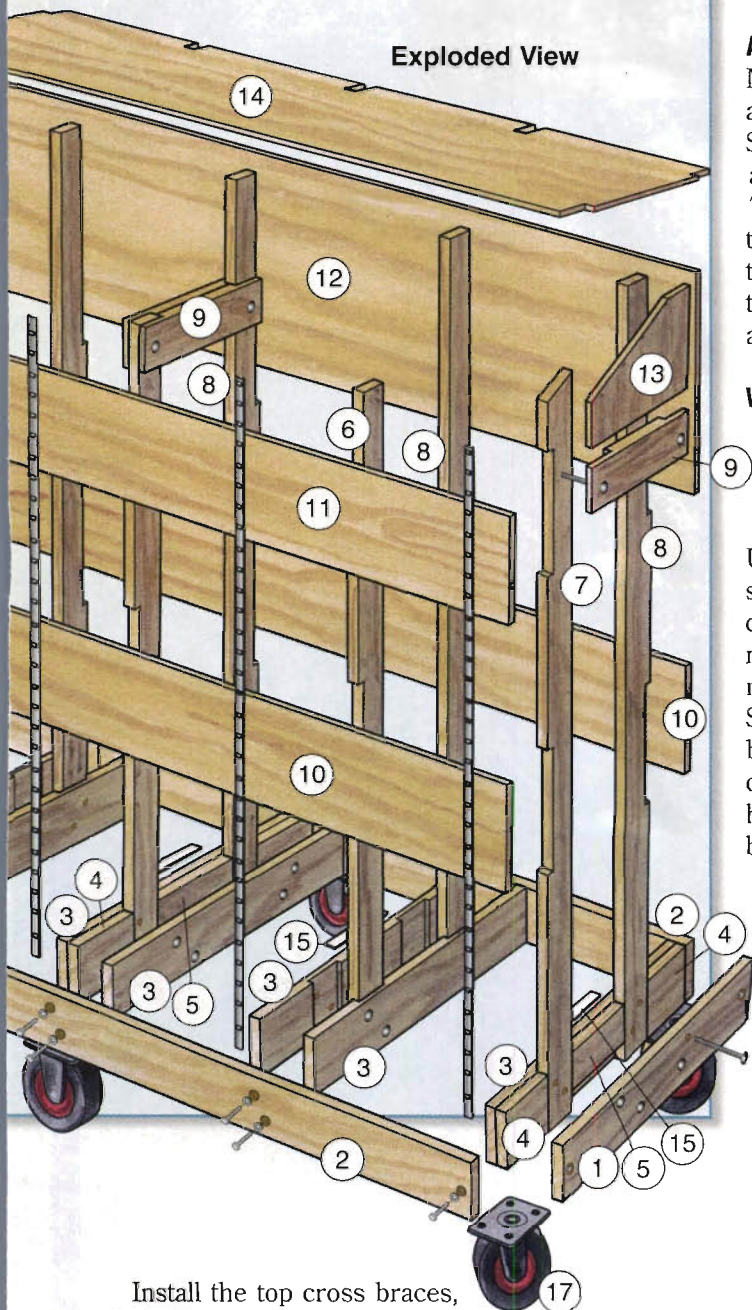
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Exploded View



Install the top cross braces, including the pair that wrap around the center uprights. Attach all the cross braces to the uprights with carriage bolts. Cut the wide and narrow upright braces (pieces 10 and 11) to size (I used plywood for these pieces) and fasten them to the uprights with screws.

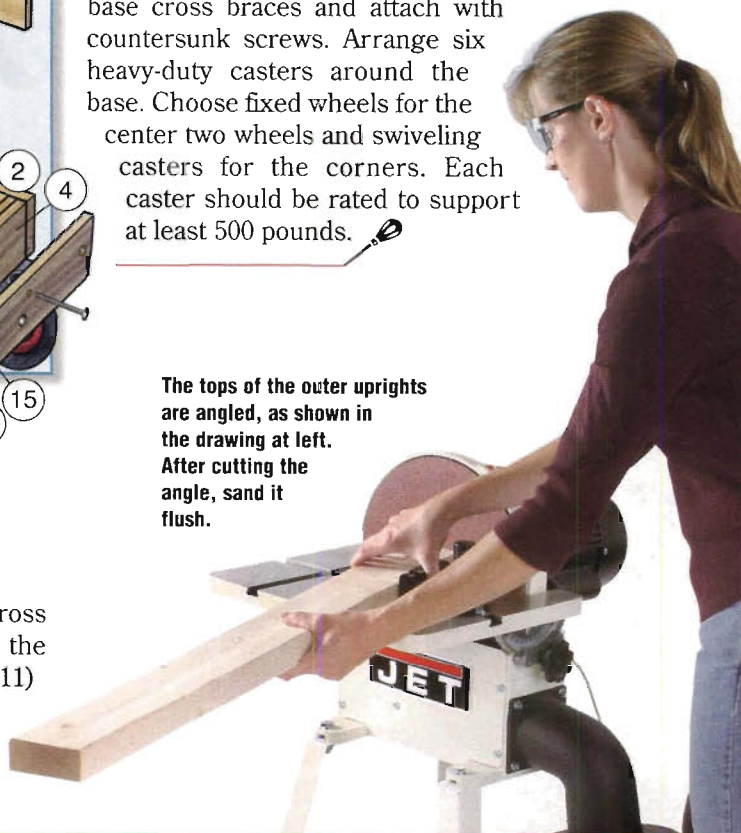
Assembling the Cutoff Bin

Making the cutoff bin is a snap. Cut the bin ends and back (pieces 12 and 13) to size and shape. Screw these parts to the uprights and to one another so the ends overlap the back at the corners. Take your time plotting and cutting the shape of the bin bottom (piece 14) so it fits snugly around all those protruding uprights. Chamfer the front edge to keep it from splintering later. Drop it into place and screw it to the ends, back and braces.

Wrapping Things Up

Time to install some hardware. Bolt shelf standards to the uprights. Use four 5/16" x 3" lag bolts and 1 1/2" diameter (O.D.) fender washers to attach each standard. Cut pieces of Ultra High Molecular Weight (UHMW) plastic into slides (pieces 15) and chamfer the top edges. (You can buy sheets of this super slippery plastic from many woodworking suppliers. These slides make it much easier to load and unload heavy sheet goods.) Slip the slides into their recesses in the base cross braces and attach with countersunk screws. Arrange six heavy-duty casters around the base. Choose fixed wheels for the center two wheels and swiveling casters for the corners. Each caster should be rated to support at least 500 pounds.

The tops of the outer uprights are angled, as shown in the drawing at left. After cutting the angle, sand it flush.



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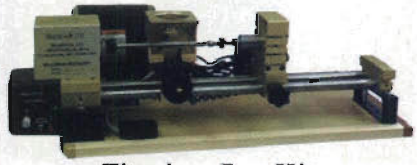
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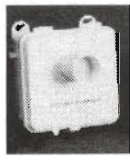
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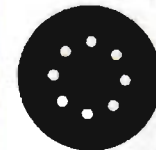
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European Combo Machines

By Kelly Mehler





One machine that does the work of five and does it better — sound too good to be true? Read on ...

If your shop is small, your bank account burgeoning, or you demand from your woodworking machines what the Swiss do from their watches, a combination machine could be the answer to your prayers.

Combo machines merge a sliding table saw, shaper, jointer, planer, and slot mortiser into one unit, yet they occupy about the same footprint as a decked out table saw. They hail from Europe, where space is in short supply and tool quality and safety standards are second to none. Unlike Shopsmith's lathe-based multi-tool with a single motor, these combination machines have separate motors that drive the table saw and shaper and a third motor for the jointer/planer/mortiser.

For this review I put six current combination machines through their paces over a six-month period in my shop. Machine sizes vary, based primarily on the sliding table length and the jointer/planer capacity. I selected combos with a 12" jointer/planer, single-phase 220-volt motors and sliding tables about 6' long. I also added the optional outrigger arm for

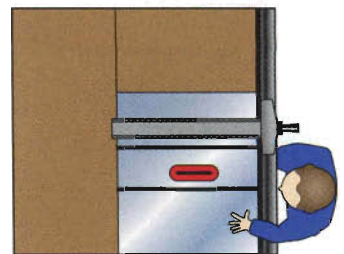
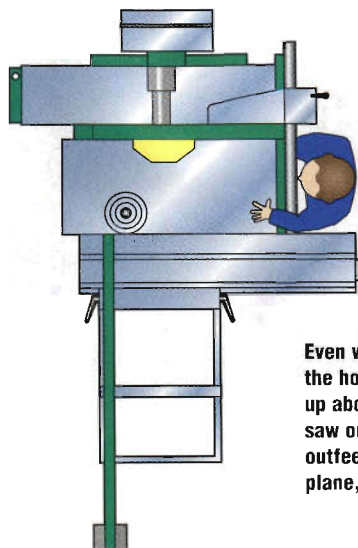
supporting a large table attached to the slider for cutting full-sized sheet goods. These capacities are about right for the average home woodshop.

I will tell you from the start that I've been building furniture with a combination machine for nearly three years now, after decades of woodworking with conventional machinery. Having worked in both modes, I can say without reservation that I'm a strong advocate for these versatile Euro machines.

Cost

Before we go further, let's get the issue of cost out on the table. Prices vary from about \$5,000 for a basic combo machine to \$20,000 and up for an industrial model with frills. You'll probably pay more for five individual tools of comparable quality than you will for one entry model combo machine, but it's still a whopping price tag for the average hobbyist woodworker. An investment like this won't be feasible for everyone, but it's definitely an investment in quality.

Tool Review continues on page 90 ...



Even with five heavy-duty tool options under the hood, a combination machine still takes up about the same floor space as a cabinet saw outfitted with an extension fence and outfeed table. Just try to make your saw plane, joint, shape and cut mortises!

Five major combo tool operations



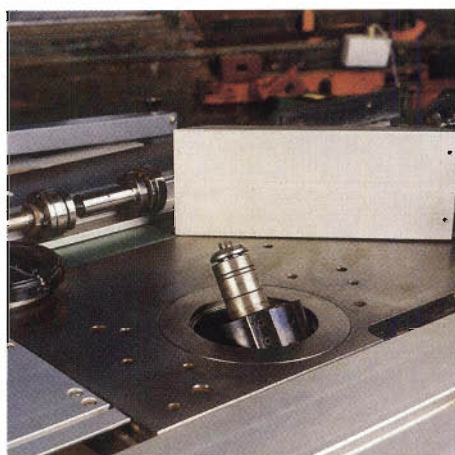
① Saw



② Joint



③ Plane



④ Shape



⑤ Mortise

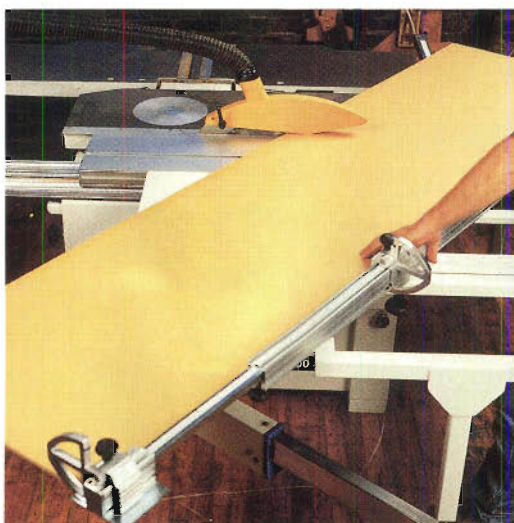
Just about every machining operation that you use to do woodworking is included in one small footprint. The table saw with a sliding table next to the blade is state-of-the-art. Using the jointer is only a matter of reattaching the fence (if you had removed it). The planer takes about a minute to get to by lifting the jointer tables up, flipping over the dust hood attaching the dust hose and cranking up the bed. The shaper is handy to the sliding table and is elevated through the table. The shaper fences have anxiety-reducing guards and hold-downs for safer shaping. The mortising tables can be left on the side of the machine and are a great solution for slot mortising and doweling.

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Sliding table saw: The heart of the table saw is the long, narrow aluminum table that slides back and forth next to the blade. Lengths range from 4' to 10'.

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Large sliding tables provide plenty of real estate to bring sheet goods down to size. The fence can be adjusted to any angle for making miter cuts.

effortless and dead accurate cutting at all miter angles. Side tables clip on to the sliding table for supporting wide or long work. An optional outrigger swinging arm supports large side tables and is a necessity for working with full-sized sheet goods.

One or two T-slots along the length of the table can be used for mounting jigs, stops and other ripping and tenoning accessories.

The standard ripping capacity of the table saw with its rip fence ranges from 24" to 36", which seemed narrow to me after using a 52" fence for

Tool Review continues on page 92 ...

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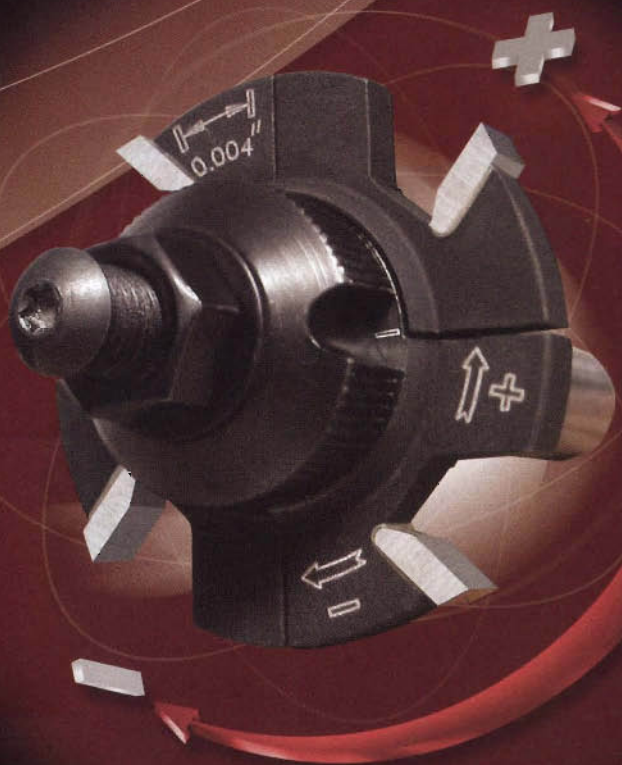
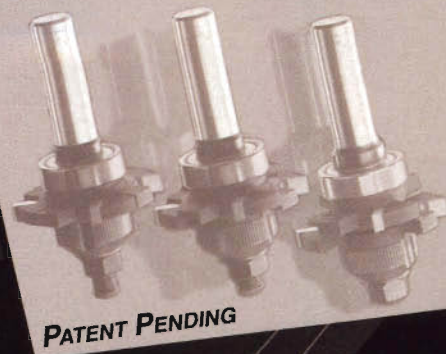
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Knapp 310 Kombi Profit

so many years. I discovered that the capacity is more than adequate because you'll use the sliding table instead of the rip fence for ripping wide sheet stock anyway. This also might explain why the rip fences on these tools are not as evolved as many of the other features.

Blade capacity is 12" for this test group. All of these saws, except for the Robland, can be outfitted with a scoring blade that pre-cuts a shallow kerf so the main blade cuts without chipping. It's a wonderful feature for cutting melamine and veneered panels.

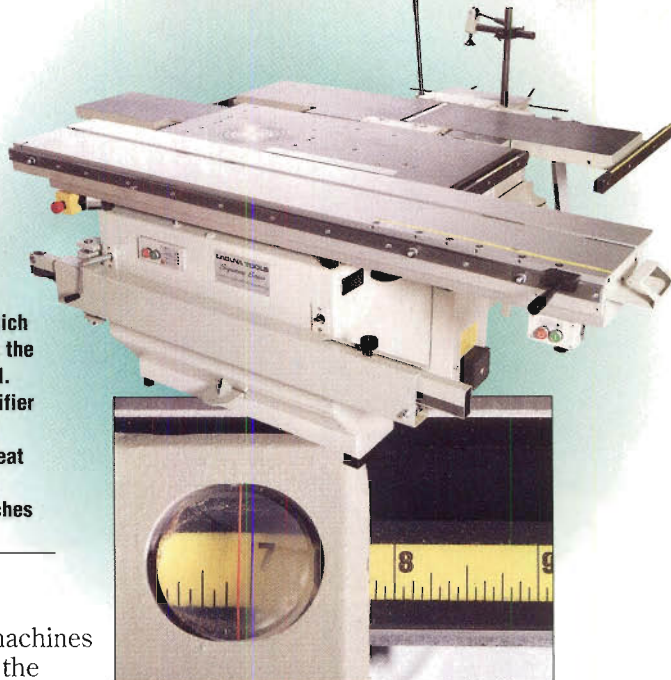
Half the machines have changed from metric arbor diameters to the more common 5/8" size. Knapp, Felder and Hammer have stayed with a 30 mm arbor. Not to worry: It's inexpensive or free to have new blades rebored at the factory.

In Europe, safety regulations prohibit the use of dado blades on

The Knapp maneuvers from the side (left), which makes it far and above the easiest to move around. The easy to read magnifier and micro-adjuster on a sturdy fence are a treat to use. The placement of the saw on/off switches is quite convenient.

a table saw. For machines that are made for the U.S. market, this option has been added to all models except the Hammer. Felder actually developed a special dado slotting cutter that makes superior dados up to 3/4" wide.

Shaper: All the shapers on these machines have a reversible motor for climb cutting when using a power feeder. A great feature of the shaper on a combination machine is that it shares the sliding



Knapp 310 Kombi Profit

Made in Austria (Imported by Laguna Tools)
Price: \$21,318 (with comparable options)
Minimum width: 35"
Motors: 4 HP
Weight: 2,660 lbs.
Warranty: 1 year labor and parts
Slider Warranty: 1 year labor and parts
Phone: 800-234-1976
www.lagunatools.com
Support group: www.lagunatools.com

Robland NLX-31

Robland NLX-31

Made in Belgium (Imported by Laguna Tools)
Price: \$8,725
No tilting shaper or scoring option
Minimum width: 47"
Motors: 3 HP
Weight: 1,300 lbs.
Warranty: 1 year parts and labor
Slider Warranty: 1 year parts and labor
Phone: 800-234-1976
www.lagunatools.com
Support group: www.lagunatools.com

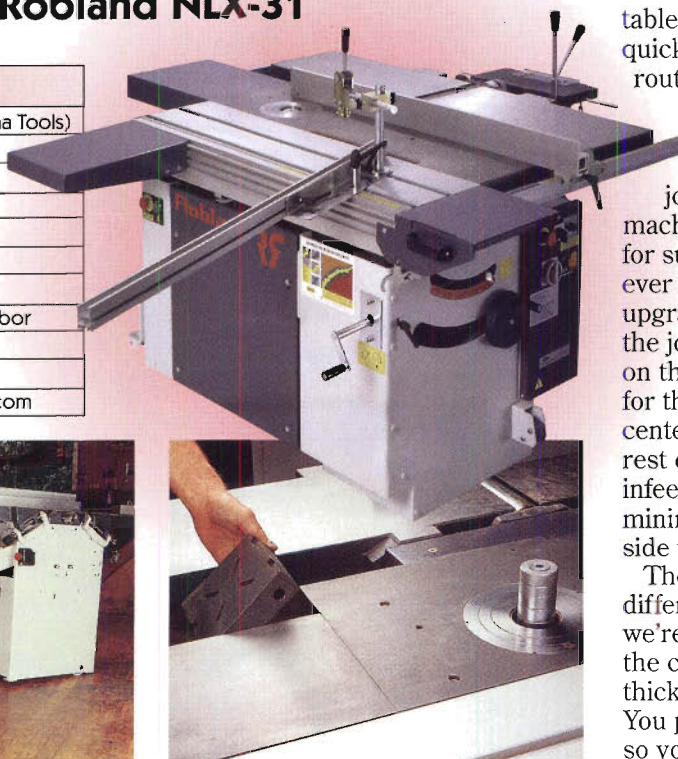


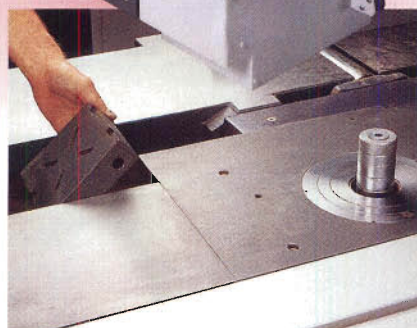
table for supporting large work. It's quick and easy to swap shaper and router spindles, and all these tools have heavy-duty, fully adjustable fences.

Jointer: The smallest jointer on any make of combo machine is 12"! This is an ideal size for surfacing most lumber you'll ever find these days and a huge upgrade for home shops. I found the jointer fences to be a little weak on the whole for this group. Except for the Rojek that attaches at the center near the cutter head, the rest of the fences mount near the infeed end. Rojek's mounting helps minimize deflection on the outfeed side where it really matters.

The Euro-style jointer guard is different from the swing-out guard we're familiar with. It adjusts above the cutter head as well as to the thickness of wood you're jointing. You pass the wood under the cover, so your hands are never over the



The mobility kit on the Robland and the Mini-Max worked, but were difficult to maneuver with just one wheel. The hinged power feeder table (right) is a nice option that allows the feeder to flip out of the way when it's not needed.



Tool Review continues on page 94 ...

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Minimum width: 42"
Motors: 4.8 HP
Weight: 1,408 lbs
Warranty: 1 year parts & labor
Slider Warranty: 5 years
Phone: 866-975-9663
www.minimax-usa.com
http://groups.yahoo.com/group/MiniMax-USA

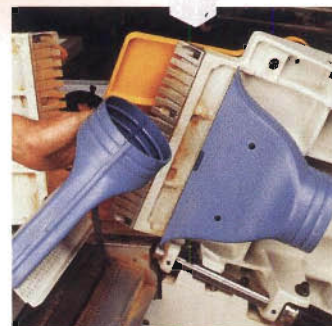
blades. No need for push pads this way. I felt immediately more comfortable with this system. Incidentally, Mini-Max provides a swing-out guard for the U.S. market.

Planer: The planer shares the same cutter head as the jointer and has heavy cast-iron beds. All these machines will surface lumber up to about 9" thick. Accessing the planer is a matter of lifting the spring-assisted jointer tables out of the way and flipping up a lightweight planer hood/dust port cover. The changeover takes less than a minute. The planer bed cranks up to set the cutting height. When returning to the jointer, the bed has to be lowered

Mini-Max CU 300 Smart



The Torsa system makes removing and installing planer/jointer knives a breeze.



The separate small profile planer and jointer dust hoods allowed for quicker changeovers than the other combos.

Tool Review continues on page 96 ...

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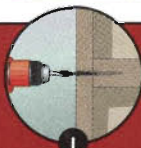
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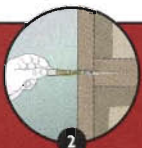
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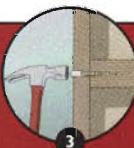
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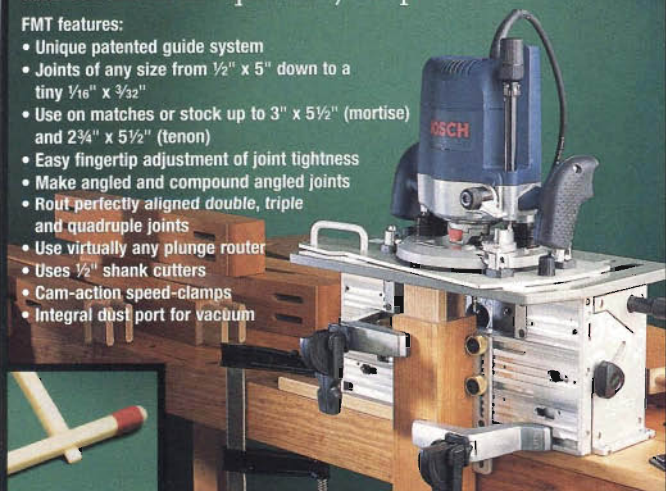
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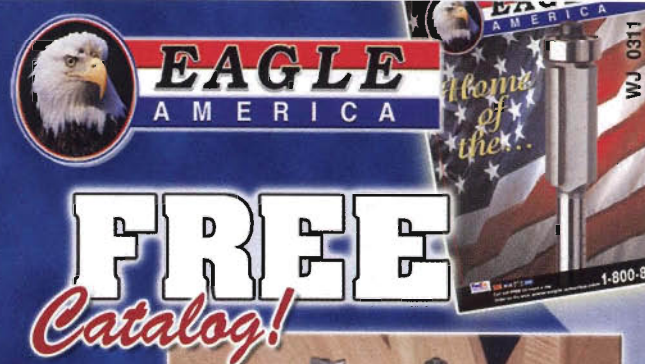
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to allow the hood to swing down and out of the way.

The Knapp and Mini-Max require the least amount of cranking to make these switches from jointing to planing. If the cranking annoys you and you have the extra budget, Felder will sell you a motor-driven option. For the ultimate in ease and repeatable precision you can get a digital display as well, but it's pricey.

Horizontal slot mortiser: Combo machines have a horizontal mortiser that simplifies accurate mortising. It amounts to a fully adjustable table with stops for cutting depth and length. The workpiece is held down with a clamp on the movable table. Once the table is adjusted to the correct height, the table is maneuvered with a handle. The wood is plunged

**"Each tool
function on
a combo works
better than any
dedicated
machine I've
ever used."**

— Kelly Mehler

into the cutter for depth and moved sideways for the length of the mortise. The table mounts on the side of the machine at the end of the jointer/planer cutter head. The cutter head accepts a chuck for mortising and drilling bits. Cutting mortises has never been easier, and you'll quickly become a fan of slip tenon joinery.

Performance and Changeovers

It's logical to wonder if each feature of a multi-function machine performs as well as five dedicated tools. You might also question how efficiently these machines change over from one function to the next. What I've found is that each tool function on a combo works better than any dedicated machine I've ever used. Changing from one function to another takes no more than a minute or two on any of these tools. If you're tackling a sequential machining task, a little forethought prevents unnecessary changeovers. Using a combo machine isn't quite the same as walking up to a dedicated tool that's ready to go, but the changeovers aren't bothersome.

Tool Review continues on page 98 ...

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Average footprints for these test machines are 5' to 6' square. Even in a one-car garage you could work efficiently around them and still have room for other tools and shop fixtures. When you need to move them, all six combos have optional mobility kits that consist of a three-point caster system with a wheeled lever bar and a pair of wheels on the chassis. I opted for a pallet jack for my combo because of its versatility. Only the Mini-Max and Robland have no provisions for a jack.

Safety Features

I'm a stickler for safety, so I was happy with the thoughtful safety features built into these tools. For one, the table saws come with a riving knife, which functions like a splitter except that it moves up and down with the blade and is never more than 1/4" from the

back blade teeth. Riving knives dramatically reduce kickback. A blade cover attaches to the riving knife and can be quickly taken off for non-through cutting ... without removing the riving knife. I found the cover on these machines can be removed and re-attached in less than 10 seconds. On the Felder and Hammer the riving knife can be adjusted to just below the blade so it can stay on the saw when making non-through cuts.

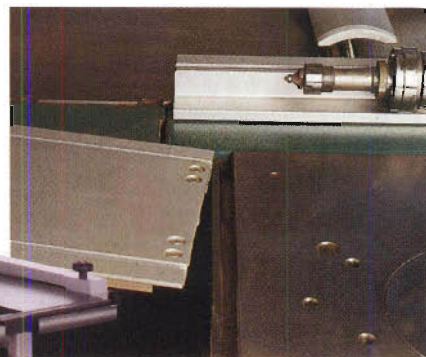
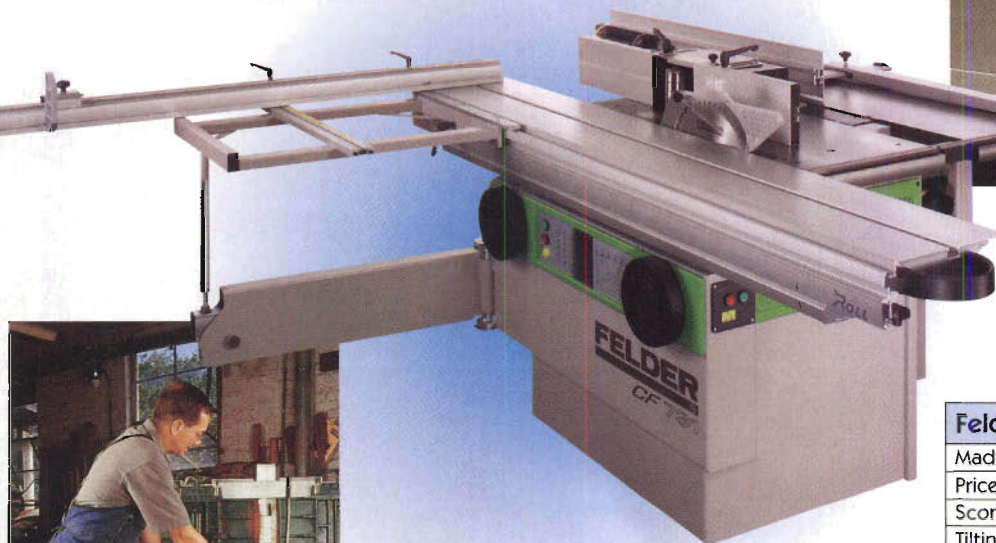
All these motors have braking that stop spinning cutters within a few seconds of hitting the off button. Off and emergency off switches are conveniently located all around the chassis, and each will turn off whatever motor is running at the time.

Dust Control

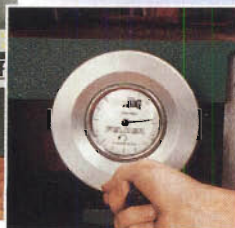
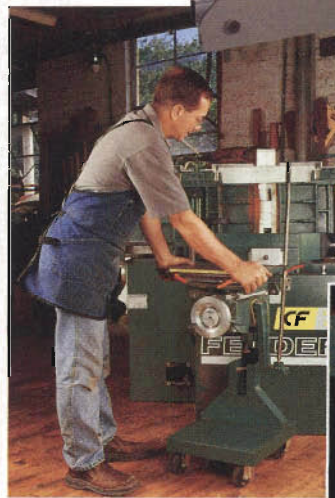
I really appreciated the efficient dust collection system integrated into every tool. Each function has a separate collector positioned near the cutter that ports the dust to an exhaust outlet. The table saw collects dust from above through the blade cover as well as from below the table (a feature I would like to see become universal to all table saws). Although each machine component has its own exhaust port, collecting the dust is as easy as connecting a standard dust collection hose to a quick-connect fitting, then moving the hose to the appropriate exhaust port.

Tool Review continues on page 100 ...

Felder 731 Professional



Ledges around the machine allow you to instantly extend work surfaces.



Rolling the heavier mortising unit (left photo) right into its mating dock is convenient. A dial indicator (right photo) for the planer makes repeatable thicknessing to thousandths of an inch a reality.

Felder 731 Professional

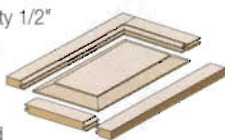
Made in Austria
Price: \$13,853 with optional mortiser & mobility kit
Scoring: add \$260
Tilting shaper option is standard
Sliding table: 81"
Minimum width: 31"
Motors: 4 HP
Weight: 2,500 lbs
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1-3/4" large diameter.

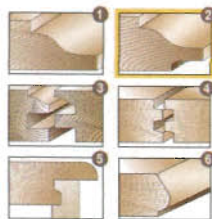
5. The **Drawer Lock** bit creates a strong joint that fits precisely because one bit makes the cut in both the drawer front and the drawer side. 1-3/4" large diameter.

6. The **Round Over & Ogee Door Lip** bit finishes your door edge professionally in one pass.

All bits are intended for use in a router table only.

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T-slot allows attachment of featherboards or jigs to the fence. The split fence includes a dust collection port. T-slot mounted fence adjusts independently and varies openings around the router bit. Plastic safety guard helps protect eyes. Measuring tape on fence reads both right to left and left to right.

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Hammer C3-31 Comfort

Getting It Home ...

These are big machines weighing in between 1,200 and 2,000 pounds. Unless you happen to live near the distributor, the machine will come crated to your door by way of general freight truck. If you're lucky, the truck will have a lift gate that can lower the crate to the ground — but don't count on it. I ended up renting a forklift to unload several different deliveries. Ask about lift gates (and how much weight the lift can handle) when you buy so you can be prepared.

It's also a good idea to measure your shop door opening to be sure the machine will fit through it (see the minimum width measurements in the specs boxes). Most models allow for the jointer/planer to be detached if your doorway is too narrow.

The instruction manuals, for the most part, leave something to be desired. Not only do they have to deal with five functions per machine with a multitude of accessories and adjustments, but being from Europe, the manuals are written in multiple languages. It's amusing to see what gets lost in the translation. (Felder/Hammer will send a professional tech to do a complete setup and tune-up on a Felder for \$595 and on a Hammer for \$395 nationwide. Laguna, supporting Knapp and Robland, will charge from \$350 to \$650, depending on which part of the country you are in. At this time Rojek and Mini-Max don't have such a service.)

Support

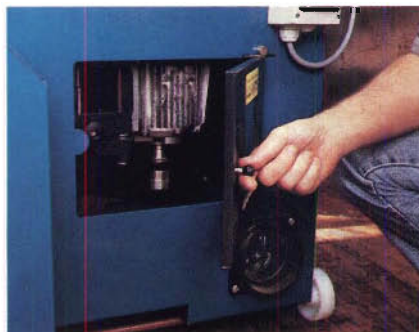
Since combination machines are relatively new in the U.S., you won't find a large network of dealers and service centers. However, a conscientious distributor can have an unstocked part shipped to you



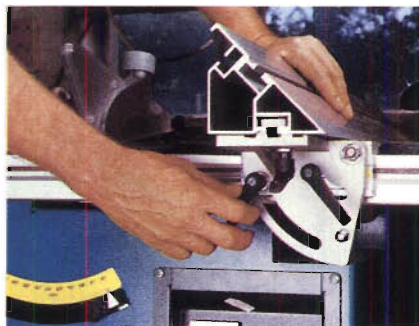
Hammer C3-31 Comfort

Made in Austria
Price: \$8,920 with mortiser, mobility kit & miter index
No tilting shaper option
Scoring: add \$300
Slider: 78"
Minimum width: 43"
Motors: 3 HP
Weight 1,450 lbs
Warranty: 1 year parts, 6 months labor
Slider Warranty: 1 year parts, 6 months labor
Phone: 866-792-5288 or 800-572-0061
www.hammerusa.com
http://groups.yahoo.com/group/felder-woodworking

from overseas within a couple weeks. There are independent interest groups for each of these machines on the Internet. I've found the groups to be helpful resources for sharing useful information, experience and suggestions. Well-established groups like the Felder Owners Group (FOG) have a wealth of searchable files, photos and other resources. See the web addresses in the specs boxes for each machine to find support groups.



The Hammer, like the other combo machines, offers convenient access to the shaper motor for changing speeds.



The three handles for making rip fence adjustments are bunched together and are not very intuitive to operate.

How These Machines Stacked Up

The Felder and Knapp are at the top of the list in terms of quality, superior engineering and industrial strength, along with cost. The Felder offers an amazing combination of optional features such as digital power for the planer, electronic variable speeds, digital fences and a whole catalog more. The Professional model comes standard with a two-knife quick-change cutter head, dual lifting jointer tables, two-speed planer, digital indicator on the planer, shaper fence memory system, quick-change shaper spindle and an 81" sliding table.

The Knapp is billed as an industrial machine, and it's easy to see why. The tool has a massive feel but with elegant execution. The planer was the best built, using four corner threaded supports, unlike the single cylinder support on the rest of the 12" planers. The saw

Tool Review continues on page 102 ...



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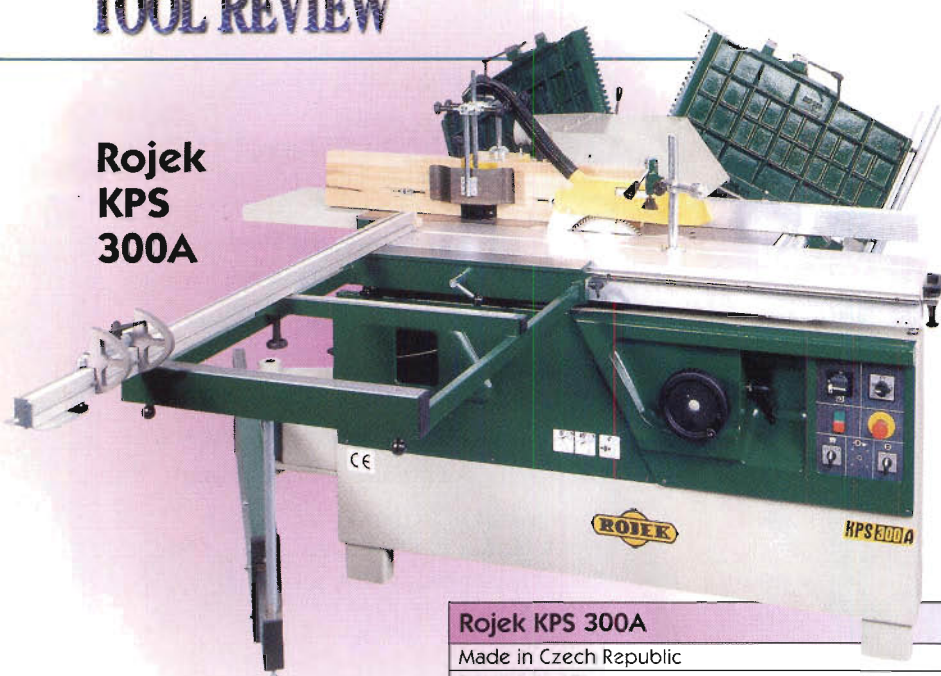
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TOOL REVIEW

Rojek KPS 300A



Rojek KPS 300A

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Minimum width: 34"
Motors: 3.6 HP
Weight: 1,565 lbs
Warranty: 6 month electric, 1 year mechanical — just parts, no labor
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www.tech-mark.com
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power switch is conveniently located. My only disappointments with the Knapp were the opaque blade guard that did not work well and the riving knife that won't adjust below the blade. As you can see from the prices, there is a considerable difference between the Felder and the Knapp with comparable options.

The Mini-Max offers a good price to options ratio. The mortiser, scoring blade and quick-change shaper spindle and Torsa cutter head are all standard equipment. If you want a tilting shaper, it will cost you an extra \$1,000.

The jointer guard can be in the way when cutting large panels on the combo machine. The Mini-Max requires a tool (Allen wrench) to remove it, while all of the others just flip over out of the way.

The Rojek also offers a good price to options ratio. Standard equipment includes scoring blade, mortiser, four-knife cutter head and quick-change shaper spindle. There is no tilting shaper spindle.

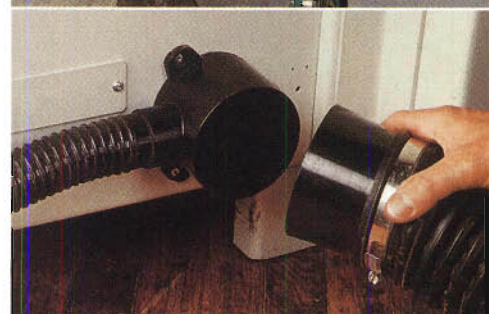
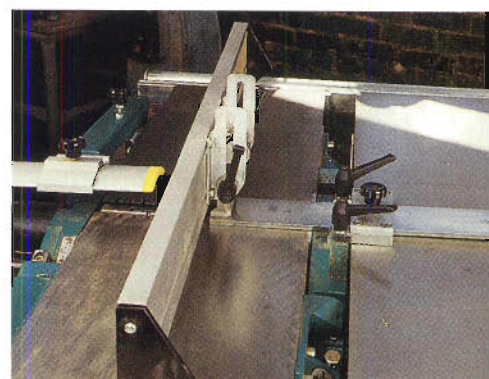
While the Hammer is lighter than some in the bunch on the scales, it's far from starving on quality. Actually, the Hammer is a less expensive sibling of the Felder and has much of the same attention to fit and finish. The fence has some

flex at the end, but it did not affect accuracy. It has to be slid all the way over to the end of the guide bar to be removed. The fences on the other machines lift off anywhere along the guide bar. The blade guard and splitter are a treat to use.

The Robland had one of the more solid rip fences with an easy-to-read indicator, but it's the only fence without a micro-adjuster. The slider is as wide as more expensive machines, and this machine has the largest cast-iron table. The planer bed is scarcely supported, but this did not seem to affect cutting.

Conclusions

Combination machines are well worth looking into for their high quality, safety features and space efficiency. All of these combination machines are excellent tools that have no glaring shortcomings. The Austrians come out on top for most sophisticated tooling and closest tolerances. There was a noticeable



The Rojek was the only machine to supply dust hoses. Unique to them is this double exhaust port for connecting to the table saw blade cover hose.

The control panel on the side of the Rojek is not only a better place for controlling the table saw, but provides slightly better access for switching to the other machine functions.

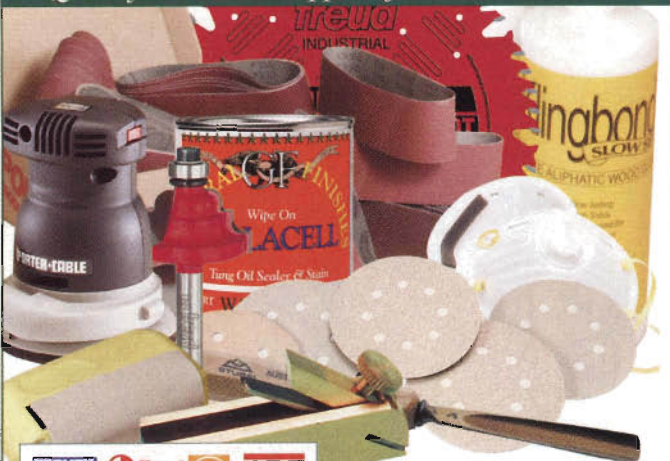


difference in the fit and finish on nearly every part on the Knapp, Felder and Hammer compared to the other combos. As their prices reflect, the Felder and Knapp are in a different league. If the prices were the same, I would choose a Knapp, which is a bit more industrial in design and execution. The Felder seemed to have the best combination of quality, price and performance. The rest of the pack are very close in price and performance. The Mini-Max and the Hammer rise to the top of my list, where a flip of the coin could easily make my decision.

Kelly Mehler is a cabinetmaker and table saw expert located in Berea, Kentucky. His updated The Table Saw Book is available from Taunton Press or at www.kellymehler.com.

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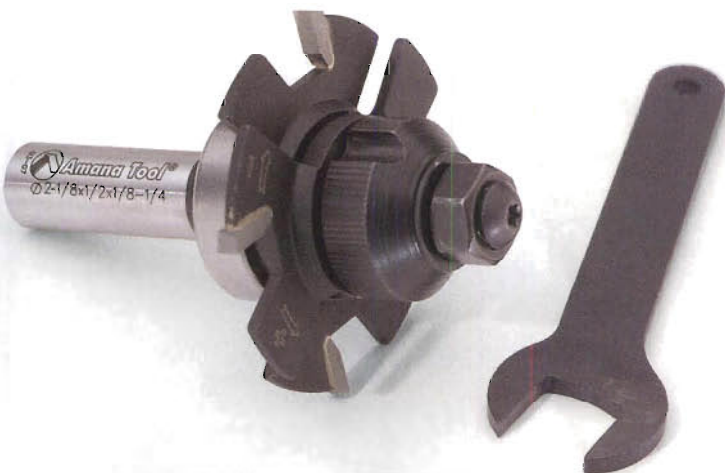


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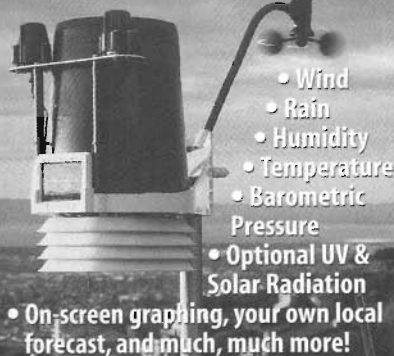
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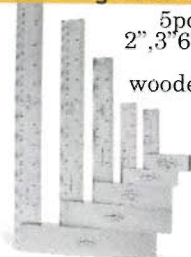


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Sealer: The First Coat of Finish

By Michael Dresdner

I suspect far more people are confused about sealer than understand it. As a result, questions abound, such as: "Is it the same thing as pore filler?" (No) "Should I use sealer before my topcoat?" (Sometimes) "Is there a universal sealer that will work with every finish?" (Yes) It's time to clear the air and explain what sealer is, what it isn't, and when to use it.

What is Sealer?

Sealer is the first coating applied to raw wood. While its use is always optional, it can be very helpful in some situations, performing all or some of the following functions:

- locking in contamination on the wood surface, such as grease, oil, wax, or sap and anti-oxidants that occur naturally in the wood
- preventing spongy wood from excessively absorbing repeated coats of finish
- reducing grain raising under waterbased finishes

- acting as a tie or barrier coat to allow otherwise non-compatible finishes to go over one another
- increasing adhesion of the topcoat to the substrate or stain
- preparing an old finish for recoating with a different topcoat
- making it easier to sand the first coat of finish
- providing a superior moisture barrier

Sealer Versus Sanding Sealer

If you've ever sprayed nitrocellulose lacquer directly onto poplar or cedar, you know these woods absorb quite a bit before the film starts to build. The hard lacquer is difficult to sand once you do get enough on to seal the wood. To deal with this problem, sanding sealer was developed.

Sanding sealer is made by adding zinc stearate, a soft, fluffy soap, to lacquer. This causes the lacquer to build up faster, sealing spongy wood quickly. The steared sealer sands easily, and acts as a lubricant to boot. Because this coating is softer than the lacquer that goes above it, use only one or two coats. Building up a lot of sanding sealer can make the harder lacquer above it more prone to chipping and cracking.

Because sanding sealer builds fast and sands easily, some folks try to use it as pore filler, building up coat after coat and sanding it back until the pores are filled. This is not a good idea. Pore filler is inert, but most sealers continue to shrink over time, just as finishes do. The extra material in the deeper pores shrinks proportionally more, causing the pores to show up again as depressions in a matter of months.

Universal Sealer

Different types of sealers are often specifically formulated for particular coatings and tasks. For instance, both vinyl and urethane sealers increase adhesion on some substrates, add moisture resistance, and block anti-oxidants. But choosing a sealer for your everyday work need not be a confusing task.

Fortunately, there is a universal sealer that will do everything on the list above, and is compatible with every wood and between all coatings. Made by Zinsser under the Bull's Eye label, SealCoat™ Universal Sanding Sealer is a modified dewaxed shellac with a long shelf life. (Freshly mixed dewaxed shellac is an appropriate substitute.)

Not every sort of topcoat finish benefits from a first coat of sealer. Oil and oil-based polyurethane do not, while waterbased polyurethane definitely does.



When to Use Sealer

Strictly speaking, any finish that forms a film on wood can be used as a sealer. Some coatings are so good at this task by themselves that they are called "self-sealing" finishes. Other finishes are not, and they benefit from special sealers.

Shellac and oil-based finishes, (including Danish oil, varnish, and polyurethane) work so well by themselves that they do not require any special sealer under them. Some finishers prefer to thin the first coat of these materials to make them dry quicker or sand easier, but that is strictly a personal choice.

Lacquer and waterbased coatings, on the other hand, work better over sealer. The right sealer will lock in contaminating oils and waxes, reduce the number of coats needed by preventing excessive absorption, improve adhesion, and reduce grain raising under waterbased coatings.

The wood also plays a part. With very dense woods, such as rock maple, you can usually omit the sealer. However, spongy or absorbent woods, like poplar, red alder, and most softwoods, can benefit greatly from sealer, especially under lacquer. The sealer coat envelopes



The author prefers to flood sealer on liberally by hand (top), then wipe off the excess with shop towels. Wear gloves for this procedure. Stearated sealer builds up quickly and sands easily — although it creates a lot of dust. One or two coats are sufficient.

continues on page 110 ...

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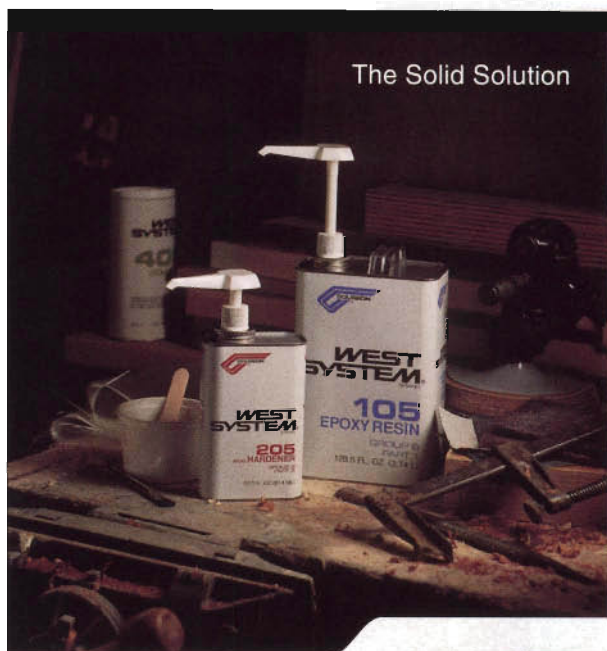


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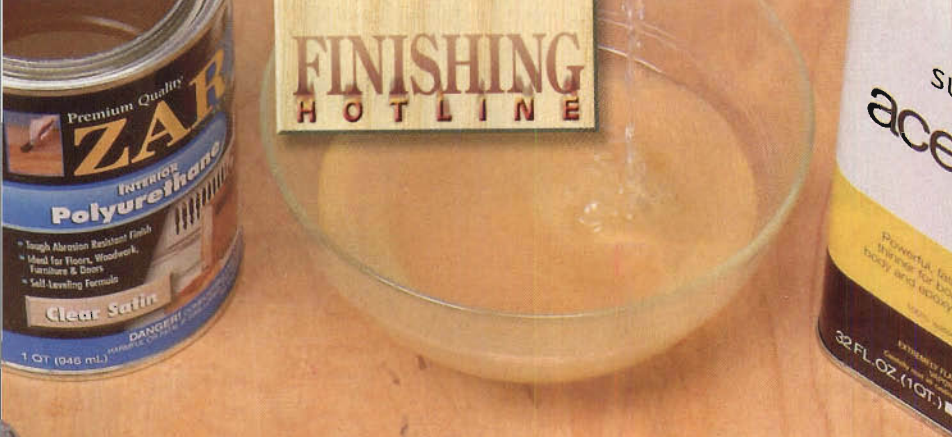
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FINISHING
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FINISHING THOUGHTS

Uh-oh, what did I do?

I read "Polyurethane: Oil-based or Waterborne" (Dec. 2002) just as I was about to begin spraying 45 cabinet doors and drawer fronts. I have never had my material flow so well. The only problem I ran into was a sheen on the finish. I used well-known semi-gloss polyurethane, but the finish was closer to a satin. I noticed that when I added the acetone, it turned milky. Would I have the same results with polyurethanes of other manufacturers, or did I do something wrong?

Jim Pych
Lawrence, Kansas



I'm glad that the technique worked for you.

It is not unusual for highly thinned material to come out a bit lower in sheen. You can bump up the sheen by spraying a mixture of gloss and semi-gloss, or by rubbing out the finish once it is cured.

The milky appearance you mentioned will happen with most polyurethanes. The good news is that it is not a problem, since the coating will still dry clear.

The culprit is the acetone, and the more you add, the more milky the mixture will look. Acetone is a diluent for polyurethane, not a solvent such as mineral spirits or naphtha. A diluent merely thins the coating without dissolving the resin. The milky appearance is caused by the same quirk of light refraction that makes waterbased finishes appear milky or white in the can. With waterbased coatings, the diluent is water, and they, too, dry to a clear film, in spite of being almost white in the can.

— Michael Dresdner



Winner! For simply sending in the question on spraying polyurethane, Jim Pych of Lawrence, Kansas, wins a complete ZAR® Wood Finishing Kit shown at left.



The author's favorite sealer, Zinsser's SealCoat — a long-lived de-esterified shellac, works for all sealing applications.

the porous wood, preventing the first few coats of lacquer from being excessively absorbed.

Some problem woods, like rosewood and cocobolo, contain anti-oxidants that prevent certain finishes from curing. These need sealer under oil-based coatings, but not necessarily under lacquer or shellac. Fortunately, it doesn't hurt to use the correct sealer, so when in doubt, err on the side of safety.

Applying Sealer

You can apply sealer as you would any coating, with a brush, gun, or pad. The problem is that after one coat, end grain and spongy areas may still be "hungry" and insufficiently sealed, while denser flat grain areas are starting to build up too much coating. I prefer to flood the sealer on liberally by hand, using a nylon abrasive pad as an applicator, then immediately wipe it off with paper shop towels while it is still wet. Wear gloves and work small areas at a time so the sealer does not dry before you wipe it off.

The advantage of this method is that it allows end grain to absorb as much sealer as it can, but wipes any extra off flat grain surfaces that tend to absorb less. Once the sealer is dry, the entire piece is uniformly sealed, and the next coat of finish will lay out the same in all areas.

Contributing editor Michael Dresdner's latest book, *The New Wood Finishing Book*, is available from Taunton Press.

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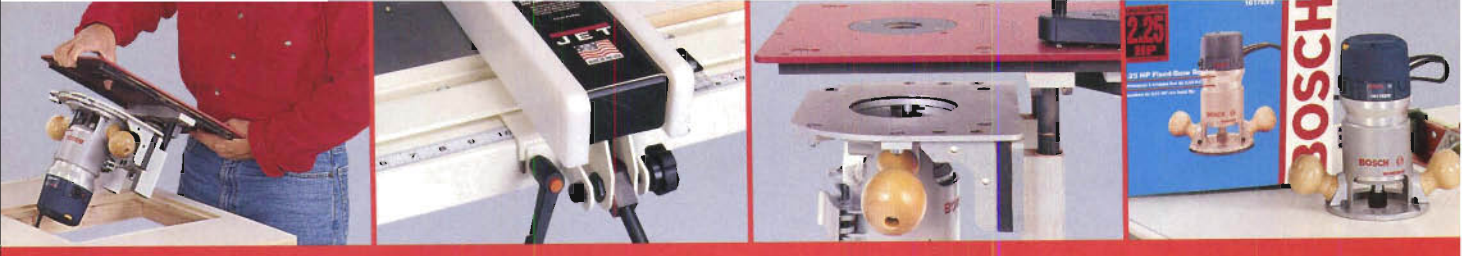
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