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Our 30th Year

WOODWORKER'S JOURNAL

"America's leading woodworking authority"™

Your Next Table Saw

Contractor's, Hybrid or Cabinet ...

What's best for your shop?

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Ian Kirby Joinery Master Class

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Projects:

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- Tool Display Case

October 2006

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Woodworker's Journal

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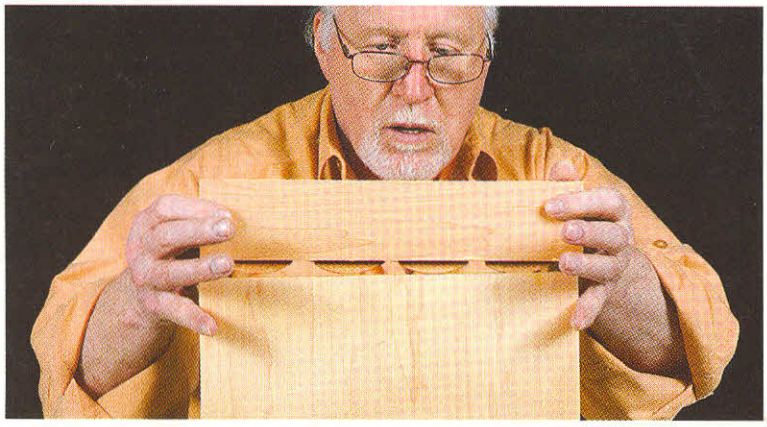

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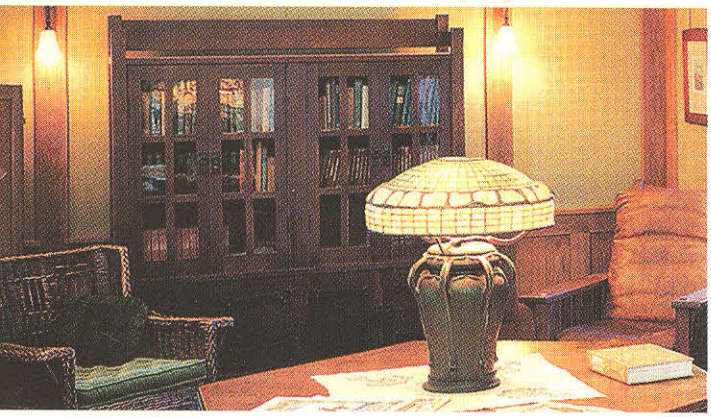

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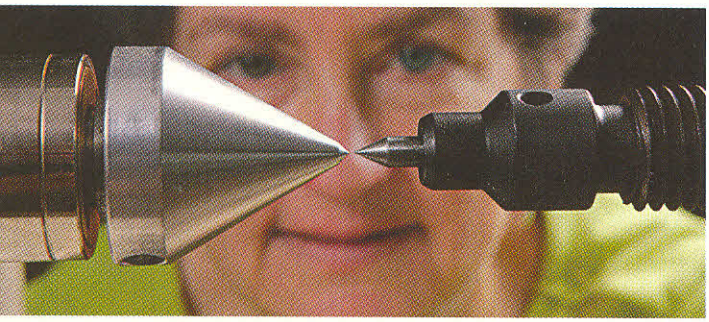

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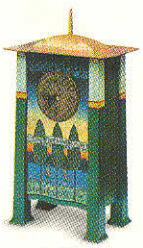


Techniques

Tools

Our 30th Year

From Our Shop to Yours ...

Experts are quick to point out that readers "just don't care" about things like a magazine's anniversary. Well, I'm not ready to ask all of you to observe a moment of silence, but I do think there's something to be said for making it to our 30th anniversary. Think about it this way: If you bought your house 30 years ago, you'd be making your last payment later this year. Does that seem a little more like "forever?"

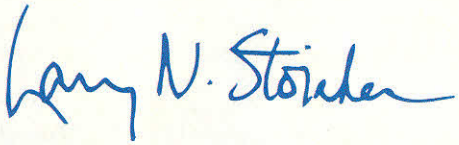
> "Any magazine can report the news ... We delight in telling you about your future."

So how, exactly, do we celebrate? Free tools? *(See below.)* A big cake for 300,000? (A little tricky and probably kind of dry by the time we got slices to subscribers in all 50 states and another 72 countries — no kiddin' — around the world.) How about we just take this anniversary as an opportunity to express our heartfelt thanks for your patronage over the years.

When you begin adding up the turnovers, it becomes clear that we've served way more than a million woodworkers over these three decades. In homes around the world, there are *Woodworker's Journal* projects galore, most of which were first dreamed up in our shop and later appeared as drawings, photos and text in our magazine. These projects have been handed down, gifted, inherited and passed along. They've been repaired, reglued, refinished and remade. Judging from the letters we get, many more of you take our project ideas to your shops, use them for inspiration and come out a week or three later with a unique project of your own making and imagination.

All of this, I must say, is a point of immeasurable pride and satisfaction. Any magazine can report the news ... tell you all about what has already happened. We delight in telling you about your future. You're going to go down to your shop soon ... You're going to be ordering some wood and some hardware and supplies ... and you're going to soon be absorbed fully in a craft with a rich and wonderful history. And when you come out, someone in your life, either now, or maybe even 30 years from now, is going to be very, very happy with what you created.

And to think it all started out as ink and paper, right here in the *Woodworker's Journal* offices. Just like it has been for 30 years. Can you imagine a better job than this?



FREE TOOLS! When I asked editor Rob Johnstone about celebrating our anniversary, he got right to your sweet spot. "Let's give away some tools," he said. "Woodworkers love free tools." Being an editor-in-chief of hifalutin values and immeasurable ethical clarity, I immediately saw this as an opportunity to involve our extended family of advertisers. So that's what we did, and you can find all the sweet details in our contest announcement or by visiting *www.woodworkersjournal.com/30-30.*

SEPTEMBER/OCTOBER 2006
Volume 30, Number 5

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Woodworkers' Varying Tastes

"In your *April 2006* issue, you presented a Poker Box plan. I built the project out of walnut rather than mahogany. My dovetail inserts were made from hard maple. I would never have thought of creating them in the manner demonstrated." — *Charles T. Miller, Cranford, New Jersey*

Mail Call! Contact us by writing to "Letters", Woodworker's Journal, 4365 Willow Drive, Medina, Minnesota 55340, by fax at (763) 478-8396 or by e-mail: letters@woodworkersjournal.com 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.

Cover Boys

I want to thank you for publishing Robert Cristofalo's letter in the June issue *("Letters")*. It stimulated me to reflect on some things I love about *Woodworker's Journal*.

I have enjoyed the appearance of Jimmy Carter. He is an inspiration to all of us of humility, kindness and of the courage to be himself. Sam Maloof is a fitting complement to the [ex-] president — a true leader himself who also has a reputation for fine woodworking, teaching and relational excellence.

I also like to see the women in woodworking shops because I appreciate the assistance, inspiration and presence of my beautiful wife in my shop. She is truly my muse. For my money, keep the good work and diversity coming.

Michael Powell
Bellingham, Washington

In light of your decision to bring politics into your magazine, I have decided to cancel my subscription. I see your choice to put former President Jimmy Carter on your cover as overtly political, and it disturbs my right to peacefully enjoy a hobby that brings diversion from the nastiness of today's world.

Richard Beirne
Galesville, Wisconsin

I, too, have been a woodworker for over 30 years and, while not a great fan of President Carter's presidency, he was by far not the worst we have had. However, I am an admirer of the work he has done since his presidency, and especially his love of woodworking.

For that reason, I applaud your choice of him and Mr. Maloof on your cover. Yours is a woodworking magazine and as such features those individuals who inspire and help promote the love of woodworking in all of us, regardless of anyone's political views. Both President Carter and Mr. Maloof do just that. Keep up the good work.

Edward Taylor
Bowling Green, Kentucky

My husband is the actual woodworker in our house, though I do all the finishing, so I avidly read all his magazines.

Thus, I read your *Letters* page in the June issue and was horrified and dismayed at the second reader's letter. I suppose you must print the opinions your readers send you — but it was so disheartening to read such a nasty spew of vitriol against a person of a different political view — which, incidentally, President Carter no longer even mentions. He is revered as "ambassador to the world," and rightly so, for his tireless efforts to help people everywhere.

Tell you what: I'm going to offer an apology to Mr. Carter, and to you, in lieu of his — because an apology is in order. Your article was great. Keep up the good work (the idea of a "Ladies' Home Woodworker" isn't such an insult, either, really).

Eunice Sorenson
Kathryn, North Dakota

WJ Responds: *President Jimmy Carter and Sam Maloof are woodworkers. One is a hobbyist and the other a master. For the record, if President Bush (senior) were a woodworker, we would be just as happy to feature his work. For us, it's all about the craft.*

A Classic Chair: Not!

I feel that G.R. "Tank" Waldrum makes several valid arguments against Adirondack chairs ("Letters," *June 2006*). I would add that using that many board feet of expensive lumber on something normally that unattractive would be painful. I must concede, however, that your design ("Adirondack Chair," *June 2006*) is one of the best I've seen, and that it almost tempts me.

John R. Watts
Inglewood, California

I wholeheartedly agree with Mr. G.R. "Tank" Waldrum *(Letters, June 2006)*. The chair is clumsy, poorly designed and not relaxing as the back support is a hard, flat surface. I wouldn't build one of these if someone supplied me with the materials.

Charles Honeywell
Independence, Missouri

I built [an Adirondack chair] and found it too hard to get out of with my bad knees. I must say, however, the chair in your *June 2006 Journal* was one of the finest designs I have ever seen. The chair in the *June 2006* magazine would be a great project for a beginning woodworker.

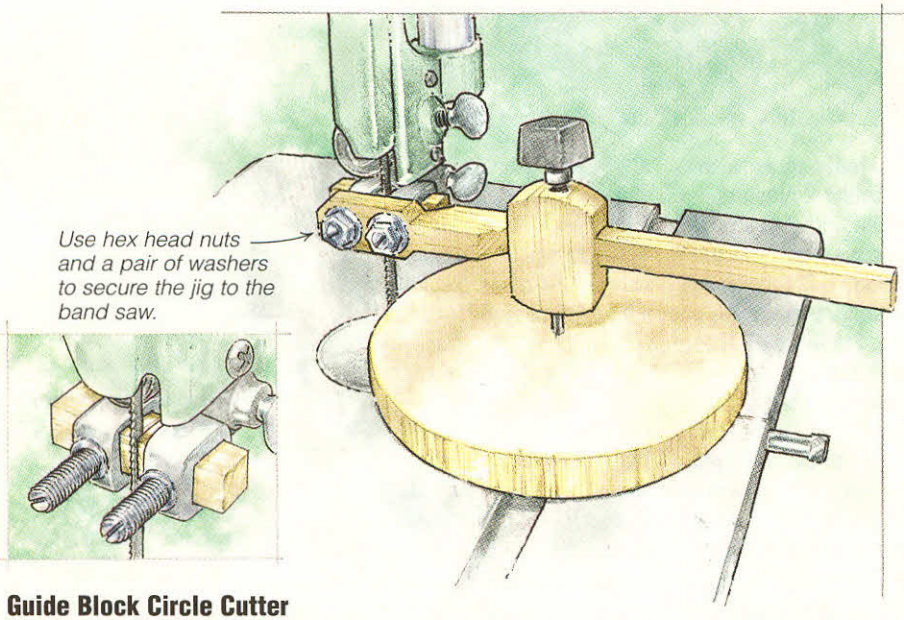
Joe O'Leary
Gold Canyon, Arizona

I agree with G.R. "Tank" Waldrum's comments [on] the Adirondack chair. They are very uncomfortable, and it is extremely difficult to get up from an Adirondack chair.

Paul Holko
Acworth, Georgia

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.

Tricks of the Trade — Then and Now



Guide Block Circle Cutter

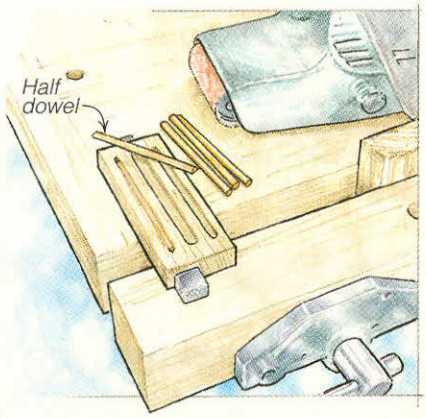
This jig attaches directly to your band saw's guide block assembly, unlike other circle-cutting jigs that clamp to the saw table. To install it, remove the guide block locking screws and replace them with 5/16" 18 tpi threaded rod (or bolts with the heads cut off). I slotted the ends, as shown, in order to leave these screws in the saw for adjusting the guide blocks with a screwdriver.

Tom Flader
Fond du Lac, Wisconsin

Halving Dowels

Every now and then I need to split dowels into semi-circular sections. Sawing a dowel in half puts your fingers at risk, so I came up with this jig. Use a straight bit to rout slots in a piece of hardwood scrap as shown. Fit the dowel into the slot and take it down flush with a belt sander. For larger-diameter dowels I use a hand plane first and then finish with the sander.

Larry Van Hoosen
Foley, Minnesota

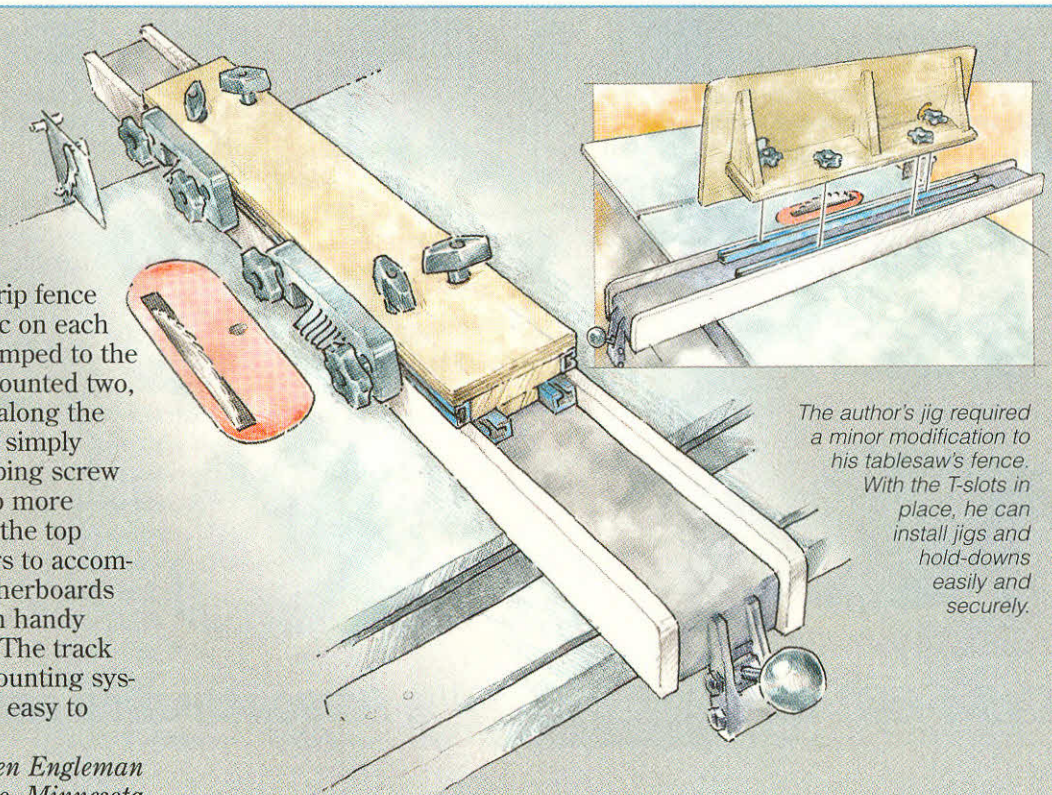


PICK OF THE TRICKS

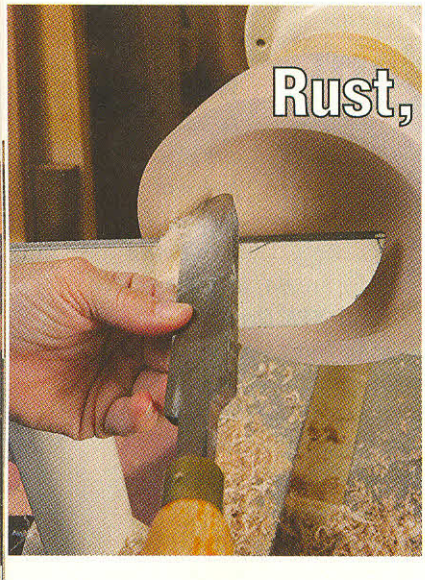
Rip Fence Jig Holder

My new table saw has a rip fence faced with UHMW plastic on each side. I don't trust jigs clamped to the slippery surfaces, so I mounted two, 2-foot lengths of T-track along the fence's metal spine. This simply requires drilling and tapping screw holes. I also fastened two more lengths of T-track above the top edges of the fence facings to accommodate hold-downs, featherboards or other jigs that come in handy when I'm using the saw. The track creates a universal jig mounting system that's both solid and easy to install.

Loren Engleman
Plato, Minnesota



The author's jig required a minor modification to his tablesaw's fence. With the T-slots in place, he can install jigs and hold-downs easily and securely.



Rust, Tool-rests and Shooting Boards

THIS ISSUE'S EXPERTS

Betty Scarpino *is a woodturner whose works are included in the Renwick Gallery of the Smithsonian Institution and is our regular turning columnist.*

Sandor Nagyszalanczy *is a power tool expert and author of* Power Tools *from Taunton Press.*

Ian Kirby *is the author of* The Accurate Table Saw *from Cambium Press and a regular contributor to the* Journal.

Contact us by writing to "Q&A", Woodworker's Journal, 4365 Willow Drive, Medina, MN 55340, by faxing us at (763) 478-8396 or by e-mailing us at: QandA@woodworkersjournal.com Please include your home address, phone number and e-mail address (if you have one) with your question.

Q I'm new to turning and found Betty's article very informative. However, unless I missed it, she didn't state the tool-rest position (center line reference) for all of the cutting, scraping and shear scraping. Only once, in scraping, was it mentioned. I think it would be a big help for beginners like me.

Ron Altier
West Lafayette, Ohio

A The tool-rest should be positioned so that the cutting action happens AT or ABOVE the center line. If the cutting happens below center, it's potentially dangerous because the tool could be pulled downward and away from the tool-rest and be torn from the turner's hands. If you have the tool-rest positioned too high, you simply can't cut anything, and you'll have to lower it a bit. Additionally, the tool-rest should be positioned as close as possible to the work and still be able to cut properly, which means that at times, you might have to angle the tool-rest if you are turning a taper of some sort.

— Betty Scarpino

Q I have been using part of my garage as a woodworking shop with the other half being used by my wife's car. Which is only to say that the garage door is frequently opened letting in moist air. Accompanying the air is the salt that is most unfriendly to any unpainted steel it encounters.

I have several planes and gouges, etc., that are steel or stainless steel. I was surprised to see that the stainless was showing signs of corrosion, particularly in the final machine touch-up areas and adjacent to the edges. I had been keeping them in the canvas bag rolled up and in a toolbox drawer.

Now the question is: Is there a manageable method of keeping the tools so that they won't corrode (rust)?

I have contemplated dipping the ends in a wax to make an airtight cover, but that's cumbersome to remove. I believe this might be good for long-term storage. Also, once the rust appears, it is extremely difficult to keep it from showing up again. Another method I had thought of is to coat the working end of the tools with grease and wrap them in a plastic bag (to keep the grease from being rubbed away), then return the tools to the canvas provided by the manufacturer.

Is there a better method that you might suggest? I imagine that I'm not the only person out here that has a corrosion problem in their shop.

Thank you for your help.

George Kelbert
St. Augustine, Florida

A As rocker Neil Young says in one of his songs: "Rust never sleeps." Fortunately, there are many ways to thwart rust's onslaught, including storing tools in a drier location (say, inside your home), reducing shop moisture with a dehumidifier and treating tools with wax-like rust-inhibiting coatings, such as Bostik TopCote (aka Sandaro TopCote) or Boeshield T9. A terrific hybrid approach is to store tools in a closed tool chest or airtight plastic tub (NOT a canvas roll!) that contains a Bullfrog™ rust-blocking strip. The strips (available online from *www.tacklewarehouse.com)* are impregnated with VpCIs, a chemical that vaporizes and bonds with metal surfaces, automatically forming an effective rust-inhibiting film.

— Sandor Nagyszalanczy

Photo courtesy of Danny Clinch

To paraphrase Neil Young, "My my, hey hey ... it's better to dehumidify than to fade away."

Q I have spent a fair amount of time building a shooting board for trimming 45° miters with a hand plane. I must be missing something because I have found it very difficult to use without cutting into the jig itself. I was careful to follow the plan step by step. Any suggestions?

— Mark King
Portland, Oregon

continues on page 20 ...

QUESTIONS & ANSWERS

Ian Kirby demonstrating a 90° shooting board, which works on the same principles as the questioner's 45° shooting board.

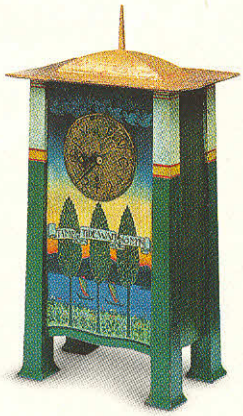
A Without seeing the drawing of the miter shooting board, it's impossible for me to be specific about its design and your interpretation of it. However, your phrase "without cutting into the jig itself" prompts me to emphasize that these things are not jigs. A jig is a device which produces the exact same result no matter who uses it. Your shooting board could be perfectly made, but if the plane blade was not sharpened straight, if it was incorrectly set, if the sole was not square to the side of the plane, or if you pressed harder on one side of the plane than the other while making the cut, then the outcome would be affected. Moreover, this short list doesn't cover all the variables that you or I could introduce.

Now to your problem. To prevent the blade from contacting the 45° holding block on top of the board, the rabbet that the plane runs in is not at 90°. The edge of the top board is made to an angle of 10°- 15°. In this way the closed portion of the throat — the slot that the blade projects through — rides on the bottom portion of the angled rabbet and the blade misses the holding block on top.

— Ian Kirby

WINNER! *For simply sending in his question on turning center lines, Ron Altier of West Lafayette, Ohio, wins* ***the JET variable-speed mini-lathe and 5-piece mini chisel set shown above.*** *With each issue we toss new questions into a hat and draw a winner.*

International Arts & Crafts Show



Clock (above), by Charles Francis Annesley Voysey circa 1895-1896, and the American Room (left), one of four recreated rooms featured at the de Young Museum exhibit.

(Photos by Christine Smith ©Victoria & Albert Museum/V&A Images.)

International Arts & Crafts: William Morris to Frank Lloyd Wright, was presented by San Francisco's de Young Museum, March 18 through June 18, 2006. The major exhibition drew on the Arts & Crafts tradition not only in England but from Austria, Russia, Scandinavia, the United States and Japan. More than 300 works were on display, about a third coming from London's Victoria and Albert Museum and the balance from other museums and private collections, much of which exhibited for the first time. The objects on display included textiles, stained glass, furniture, ceramics, metalwork, jewelry, books, architecture, photography, paintings and sculpture.

It was interesting to see this theme so well displayed with all its national variations. If I were asked

Shop Talk continues on page 24 ...

"Manxman" Piano, by M.H. Baillie Scott, circa 1902 - 1903.

Desk, by Charles Francis Annesley Voysey, circa 1896.

Josef Hoffmann Adjustable Armchair, circa 1908, by J & J Kohn.

The Arts & Crafts Movement combined a reverence for natural materials and indigenous craft traditions with a commitment to producing works of art — works both beautiful and useful — for people's homes.

to define it in words, I would say the Arts & Crafts Movement combined a reverence for natural materials and indigenous craft traditions with a commitment to producing works of art — works both beautiful and useful — for people's homes. It's no accident that the movement started in England where the industrial revolution was well on its way by the 1870s. It turned craftspeople and artisans into wage slaves herded into factories to mass-produce junk and ruin the landscape in the process. (The dark, Satanic Mills of William Blake's hymn "Jerusalem.")

The Arts & Crafts Movement actually began in England in the 1880s. It was inspired by William Morris and John Ruskin and was partly a reaction to the excesses of the industrial revolution. It also had a social agenda that involved repopulating the villages of England, restoring a sense of community and returning to a simpler, healthier life.

The movement spread (although the social agenda was lost in translation) to continental Europe, Scandinavia and then to America before its final appearance in the Mingei (Folk Arts) movement of Japan.

Of special interest in the de Young show were the four specially created rooms, each furnished in the Arts & Crafts style of the period. Two were from England — one rural and the other urban — another from America and the fourth from Japan, (dating from 1928 and recreated using recently discovered objects).

— Simon Watts

The Turners' Challenge: Year Three

By Betty Scarpino

In our third annual "Turners' Challenge," four amateur turners were provided with identical soft maple turning blanks. The diversity of their output speaks volumes about the possibilites inherent in turning.

What better way to encourage friends to do more woodturning than promise them a free chunk of wood and a chance to show others what they've made! The Women's Woodworking Guild of Indiana meets every month, but I often cannot attend their meetings to talk turning, so I invited four members to participate in this year's Turners' Challenge. The challenge for three of the women was their limited experience using a lathe, particularly for turning a large faceplate form.

Jennifer Shirley, Myra Perrin, and Paula Mann all live in Indianapolis. Anne Shellabarger lives in Mooresville, just west of the city. I arranged to deliver a 16-inch square by 2-inch thick piece of soft maple to each woman: easy enough for them to get started, or so I thought. Right away came the realization that only Jennifer's lathe could turn such a large piece of wood, and Anne doesn't even own a lathe! Several e-mail messages later, and I had visitors to my shop. Myra, Paula and Anne would use my lathe. Even better, a bit of instruction would be included in the deal.

Jennifer, Myra, Anne and Paula approached the challenge in entirely different ways. The end results were varied and outstanding! Photographer Shawn Spence and I met at Jennifer's home early in the morning. Myra was there, too. It threatened to rain the entire day, but we were fortunate that Shawn could take some of the photos outdoors.

What follows is the result of interviews, as well as personal knowledge — I have known these women for several years. When I need flat woodworking done, I call them. In turn, they rely on me for advice on woodturning.

Furniture Maker: Anne Shellabarger

Anne Shellabarger is admittedly a novice woodturner, but she is no stranger to woodworking tools and machinery. She began her career as a carpenter, and she built her own home! She now makes custom furniture, small boxes and hanging shelves, which she designs herself. Her work sells through the Art in Hand Gallery in Zionsville, just north of Indianapolis.

From the beginning, Anne had in mind to make a puu-puu platter. She likes to make utilitarian objects, and she intended this platter to be used. The large diameter of the wood allowed for a center cup for salsa, which could be surrounded by corn chips.

Anne's previous experience using a lathe was limited to spindle turned elements for furniture. Her ability to work with her hands gave her the advantage of being a quick learner. The result was successful!

Anne used the glue-block method to attach her turning blank to the lathe. She first cut the wood into a circle using the bandsaw, then she hand planed a flat spot for the 2"-thick glue block. A quick application of CA glue held the turning blank and glue block together. The next step was to screw the faceplate onto the glue block. Because the wood was large, Anne used six substantial screws to insure a secure hold. Using the glue block method allowed Anne to get full use of the two inches of the turning blank. She would need that to accommodate the depth of the salsa bowl.

Anne Shellabarger

Paula Mann

Jennifer Shirley

Myra Perrin

Anne Shellabarger began her career as a carpenter and now sells custom furniture for a living. Her previous lathe experience was limited to turning spindles.

Paula Mann began turning a few years back after taking a class. This Minister-to-be advises new turners to "let the tools do the work. If the gouge seems to be fighting, try visiting the grinder."

Anne started turning by roughing the blank into the largest diameter available. Because the inside diameter of the receptacle for the bowl was critical, she turned that first, making sure the bottom area was flat. As she turned, she learned. I gave her pointers here and there. Anne's advice for other beginning turners: when turning a large piece of wood, take the prep time to cut it round and to make sure the bottom is flat where the glue block is attached. And, most important, use sharp tools!

A bit of sanding, then Anne was done. She used a parting tool to reduce the diameter of the glue block, and with a mallet and chisel popped the platter from the glue block. She sanded the bottom using a sanding disc. An application of salad oil brought out the beautiful grain of the maple. Add salsa and chips and serve!

Turner: Paula Mann

Paula has been turning wood for a few years, ever since taking a class at the Indianapolis Art Center. Over the past two years, Paula has been making chalice and paten sets and increasingly receives commissions for them.

Paula has a BS in Mechanical Engineering and a Master of Quality Management degree. A major career move happened two years ago when she quit her job and went back to school to obtain her Masters of Divinity at Christian Theological Seminary. She intends to become a Presbyterian minister.

Not surprisingly, Paula's project is a baptismal font. It has a peaceful, serene look when filled with water and river rocks. Paula finished it with oil, like the finish on a cutting board. After use, she dries it with a soft cloth.

The lathe Paula owns is a Shopsmith 510 model, which she bought new in 2002. Its slowest speed is 700 rpm, making it a challenge to turn large objects inboard — the turning can be accomplished, but sanding is a problem. For that, slower speeds are necessary. Like Myra and Anne, Paula headed for my shop. She also used the glue-block method for attaching the wood to the lathe.

Paula turned three groves in the rim, which stand for the Trinity. Each groove's boarder is lower than its neighbor, from outside to inside, so water can flow from edge to the center. She pours water into the outer most edge, letting it spill like a waterfall into the center.

Her advice to others is to let the tools do the work. If the gouge seems to be fighting, it probably means a trip to the grinder is needed or perhaps you should try making the cut using a slightly different angle of the cutting edge against the wood. Good advice for all turners!

Turner: Jennifer Shirley

Jennifer is a part-time woodturner, works full time as a director of one of Indianapolis' television news programs, and is the proud mother of Weston, a fine young teenager. Jennifer is mostly self-taught, but she did take a turning class at Arrowmont School for Arts and Crafts in Tennessee. She also plans to attend a class at the Appalachian Center for Crafts in Tennessee, taught by New Zealand woodturner, Graeme Priddle.

Jennifer is skilled with the use of a chainsaw, and she easily cuts up log sections into bowl blanks. Friends often dump random logs in her driveway, but that may be a thing of the past. She recently began using wood that is already dried and finds that her results are more consistent. With a limited amount of time to devote to her passion, she would rather get right to the turning, which provides balance to the stress of a full-time job.

The lathe that Jennifer uses is a General, which she bought new several years ago. It can turn 22" inboard. Her shop is a converted garage and it's easy to tell from how it's arranged that the General lathe is of primary importance. A miniature JET lathe sits on a workbench, which Jennifer uses to teach Weston, who's making pens and spinning tops.

Jennifer Shirley is a part-time turner and a full-time news program director. Turning, she points out, can provide balance to the stress of a full-time job. Her advice? "Woodturning is easy to do, but hard to do well. Invest in education."

Myra Perrin describes herself as a "bits and pieces" artist who enjoys experimenting with new processes and techniques. That long spindle, for instance, is "Comp Wood," solid ash infused with water under high pressure.

The platter she made is an excellent example of how Jennifer is beginning to develop her own style of embellishing turned objects. Her first attempts were tentative, but now she boldly covers an entire turned object, combining carving, painting, texturing, and wood burning.

Jennifer turned the back of her platter first, took it off the lathe, textured the back with a needle scaler, then added black gesso to create accent areas. She flipped the platter around and reattached it to the lathe using a chuck. Then she turned the front of the platter and left an elevated section in the middle.

While on the lathe, Jennifer painted black gesso for accents on the front. Next, she used the indexing on her lathe to lay out the spacing for the carved arches. At her workbench, she carved the shape of the rim with a power carver and carved the inner details with a reciprocating carver. Jennifer used a wood burner with a variety of pen tips to texture the detail on the rim and inner design. The circles she burned with a piece of copper pipe, heated with a torch. The small metal accents are brass BBs, glued into divots.

Jennifer's advice: woodturning is relatively easy to do, but difficult to do well, so invest in some type of education — it's a step in the right direction.

Artist: Myra Perrin

Myra Perrin describes herself as "an artist who happens to work with wood." She is a recent graduate of Herron School of Art, where she earned a BFA in furniture design. Currently, she is working at an art gallery in the Broad Ripple area of Indianapolis — she loves being surrounded by other people's work.

Myra's Delta lathe is located in her ground-level basement garage, part of an arsenal of woodworking tools and machinery which make up her studio. The lathe has an inboard capacity of 10" — not large enough for this chunk of wood, so she headed for my shop. The turning part of Myra's project was straightforward and easy: turn a disc to use as the basis for a wall hanging. The time she spent turning was minimal compared to the painting and assembling. Myra left the disc rough-turned and used that textured surface for the paint which would be added later.

Myra is a true a "bits and pieces" artist who enjoys experimenting with new processes and techniques. The wood she used for the long spindles that loop around her disc are an example of her interest in combining different elements and trying new materials. It's called Comp Wood, and she purchased it from a company called Fluted Beams *(www.flutedbeams.com)*. It's solid ash, which has been infused with water under high pressure and comes wrapped in plastic. Myra unwraps a piece, rips it on her bandsaw, then bends it into various shapes, using clamps to hold it in place. After about twenty-four hours the wood can be unclamped, and it retains the bent shape.

After Myra painted the bent forms, she attached them to the disc, using wood pegs. They look like pieces of metal, once again a testimony to Myra's ability to experiment with materials and techniques. To achieve that look, she used an acrylic paint that contained graphite, burnishing between coats. For the disc, she used Golden Acrylics paint, charcoal stick and graphite, drawing on the disc during the painting process. The disc also has the look of metal, which compliments the long bent forms.

Myra's advice for beginning turners is to constantly experiment — it's the only way to build skills and design sense. Picasso said, "inspiration exists, but it has to find us working," so turn, turn, turn.

Betty Scarpino is a woodturner who learned her craft from workshops, classes, and self-education. Her web site, www.bettyscarpino.com has recently been redesigned.

Bread courtesy Bread Alone, Boiceville, NY. www.breadalone.com.

Butt Joints and Breadboard Ends

By Ian Kirby

Breadboard ends are a flawed technique ... but woodworkers like how they look. Butt joints are basic in appearance, but they're actually sophisticated in execution.

Three primary joints are used in furniture making: dovetail, mortise-and-tenon and butt. Dovetails are regarded by some to be the epitome of fine workmanship. They join wide boards at the corners to make boxes. Mortise-and-tenons are the workhorse joints of frames and rail-and-leg structures. Butt joints are an anomaly in that the parts don't interlock as in the other two systems; they're simply boards glued together on edge. Butt joints may seem simple, but they have a singular, important purpose: to make wide boards from narrow ones.

The simplicity is deceptive here, because the edges of a quality butt joint must be smooth and in total contact. To illustrate how total the contact must be, I'm reminded of my early days of making furniture when the common adhesive was Scotch glue. It's the smelly stuff known as hide glue in the U.S. that's prepared in a water jacket double boiler.

Once the edges of two boards had been planed and met the various tests for accuracy, one board was clamped in the vise. Very hot and consequently very thin glue was brushed quickly onto both edges to be joined. The second board was now placed on the board in the vise, glue edge to glue edge. The top board was pressed down hard against the first, then slid a few inches forwards and backwards lengthwise. This squeezed out the excess glue, which was rapidly cooling and becoming sticky. The trick was to align the boards correctly before the glue set. The result was called a "rub joint."

After about 15 seconds, we released the vice and lifted the assembly by the top board. Since no clamps were used to compress or distort the wood in any way, the integrity of the joint depended entirely on the joining edges being smooth and in total contact.

Another example of the attainable accuracy of the contact edges is a stunt I would pull for audiences at woodworking seminars. I would make a butt joint, put water on both edges, squeeze the parts together and lift the assembly by the top board. Water alone would hold the parts together, albeit temporarily. It underscores the potential holding power of accurately prepared edges.

Steps Toward a Proper Butt Joint

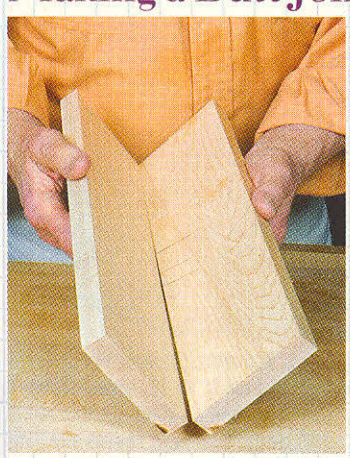
In my experience, there are seven steps to making a correct butt joint:

- Compose the pieces
- Record the composition
- Plane edges; assess total contact
- Dry clamp to prepare for glue
- Apply glue and clamps
- Scrape off dried glue
- Plane the wide board flat

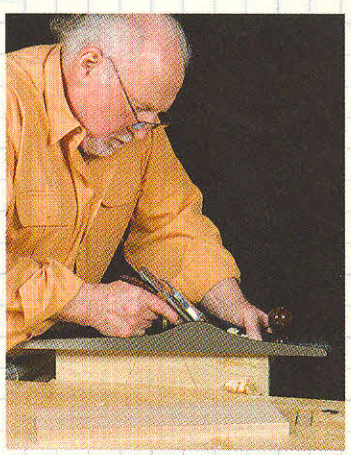
Composing the Pieces

If only two pieces of wood are involved and you can use any face,

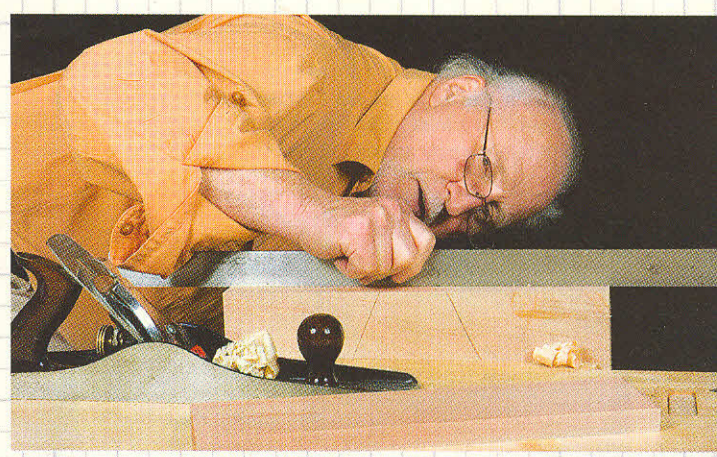
Making a Butt Joint



Take two adjacent boards and fold them together as though they were hinged at the intended joint. The "hinge" can be either side. Clamp the folded pair together in a vise.



Plane the paired edges so they are flat in length and width. The plane should be set for a fine cut to produce .003" shavings.



Checks may be made with a straightedge alone because if the paired edges are flat across their thickness, they need not be square. The out-of-square angles on the two boards will cancel each other when you remove the boards and stand one edge on the other. Nevertheless, I go for square as well and check the paired edges with a try square.

top or bottom, and any edge, left or right, there are many arrangements to choose from. Your task is to find the best-looking combination that minimizes the joint lines and blends the grain pattern effectively.

Recording the Composition

Once you've made your choice, record the arrangement of the boards by marking random lines across each joint or drawing a large chevron across the entire assembly with a soft pencil.

Flattening the Edges

I'm using a hand plane to make a butt joint in this article. The length of the edge that you can make accurately is about 2.5 times the length of the plane. This is the reason planes come in different lengths. However, for all but the shortest joints, a #7, 22"-long plane is my plane of choice. Its ample heft and length promote more accuracy than shorter planes.

How smooth? Glue is more effective on a smooth surface than a rough surface. The surface produced by a sharp hand plane is the smoothest you can get.

How flat? Aim for zero to .005". In practical terms many butt joints stick together quite well beyond this tolerance. You can attribute this mostly to glue strength and the increased contact provided by a row of clamps tightened down on the joint. We will never know the internal stress that the glue must counteract when the clamps are removed, but it makes us look good in spite of ourselves.

A hand plane produces arguably the most effective butt joint, but you can also make good joints with a table saw, a jointer or a router, depending on wood species and sophistication of your equipment.

Glue causes things to stick together in two ways: mechanical adhesion and specific adhesion. Mechanical adhesion occurs when glue enters the porous surface of the wood and acts like a myriad of tiny dowels or connecting hooks. Specific adhesion is the molecular force of attraction between the glue and the surface of the wood.

It used to be thought that mechanical adhesion was all-important, but in fact that accounts for only a small percentage of the glue line strength. The joint will only be as strong as the molecular forces that are able to operate at the interface, so the best results come from the smoothest glue line faces.

Checking the Joint

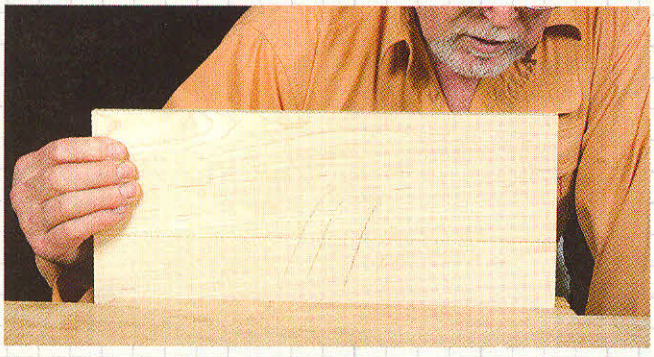
Clamp one piece in the vise and stand the other piece on it edge to edge. If the series of checks that I show below prove positive, it's on to the next joint or procedure. If any of the checks are negative, it's back to square one: you'll need to plane the surfaces further.

Reinforcing a Butt Joint?

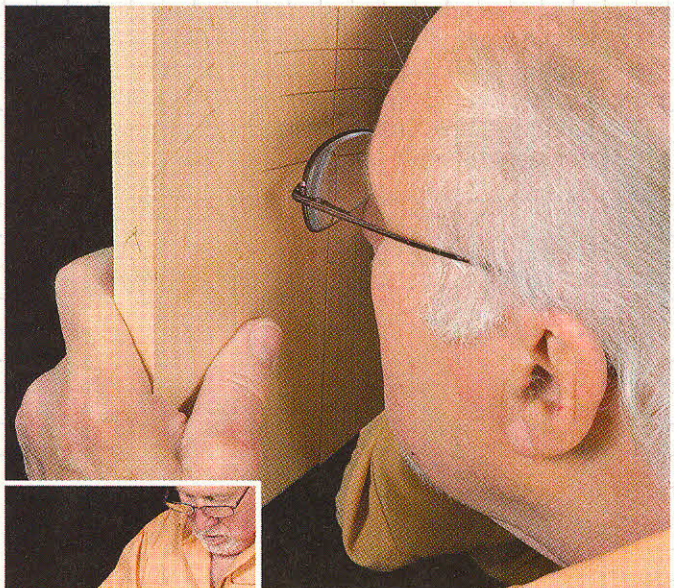
You may be familiar with two

Checking for Accuracy

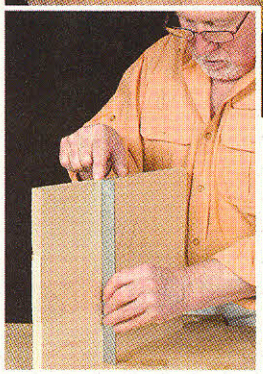
Check 1: If you rotate the top board back and forth, you can feel the contact as the two faces rub one another down their length when the joint is right. If the joint is high in the middle of the board, the top board will rotate easily around the high spot.



Check 2: Pull down hard on one end of the top board and see if and where it lifts from the lower board.



Check 3: If contact looks good by gross inspection from 9" to 12" away, then put your eye right on the joint line about 1/2" away. Light will reveal any gaps in the joint line.



Check 4: Stand boards on end and check alignment with a straightedge.

Efficient, Reliable, Versatile

This is a jubilee year for Lamello. The tool was designed and developed in 1956 in Switzerland by Hermann Steiner. He was searching for a way to join a newly introduced material chipboard, now called particleboard. From an industrial point of view, he was beaten out by the 32mm point-to-point boring system, but his design still earned praise from the New York Museum of Modern Art as one of the most useful inventions of the 20th century. Plate joinery is now used worldwide in shops large and small as an extremely efficient, reliable and versatile joining system.

methods that are believed to make a butt joint stronger, the most common being a spline. Splines are strips of solid wood, preferably the same material as the board, inserted into a groove cut along each joined edge. Now come the questions: How wide and deep should the groove be? What material should the spline be? How tightly should it fit the groove? The answers are overshadowed by two other considerations. First, cutting the spline grooves will remove a significant percentage of the area where the glue's specific adhesion can take place, thereby weakening the joint. Second, even if the interfaces of the joint are correctly made and it is tested to destruction, it will fail at the bottom of the groove where you have reduced the board's thickness.

In light of these two points, if you still believe that a spline truly helps, keep it thin: a 1/8" saw kerf is enough. Make the spline a snug push fit and its width about three times its thickness in each board.

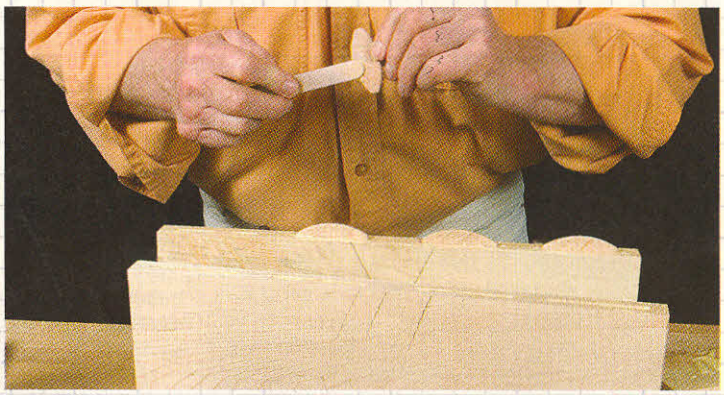
Another option is to use joining plates, more familiarly known as biscuits these days, which improve upon the spline method in several ways. For one, the groove is intermittent rather than continuous, which preserves more area for the glue's specific adhesion to occur. Second, the biscuits are made of European beech, a particularly strong wood. Third, because the grain of the biscuit runs on the bias, it is angled across the joint line, resulting in greater strength. Fourth, the biscuit is compressed at the same time it is stamped out: a biscuit snugly fits in its 4mm kerf when dry, but when wetted by the glue, it swells, causing internal pressure and a strong resistance to being pulled apart.

Preparing to Glue

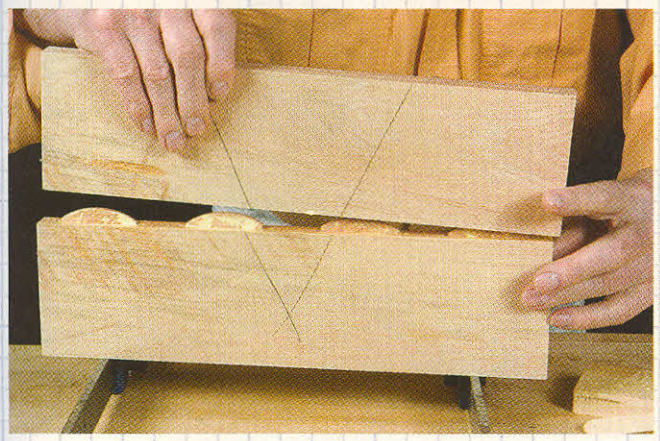
Once you've satisfactorily planed the edges, you can glue and clamp the joint together. Begin by assembling the clamps, arranging the

Gluing Up With Biscuits

Deposit glue in the slots, wet the slot sides with a paddle and remove excess glue. Then roll glue on the two edges to coat the mating surfaces.



Wet the biscuits with a paddle and insert them in the slots.



Assemble the two boards, aligning them with the chevron mark that recorded the composition. Repeat the procedure to include the third board, if applicable.

Position the clamps alternately above and below the assembly. This will counteract the tendency for the boards to buckle as you apply pressure.

boards, and closing the clamps with the joint dry. It's easy to determine the correct number of clamps to use by plotting the pressure fans for each clamp. The fans radiate out from the clamp heads at 90°.

Applying Glue Correctly

Glue cannot work unless it wets the wood — and that's not as simple to accomplish as it may sound. The best method is to roll a thin layer onto each surface. Roller pressure wets the wood and ensures that a thin glue layer is deposited on each face, resulting in a controlled and limited squeeze-out.

A common but definitely poor method is to squeeze a bead onto one edge and rely on clamp pressure to spread the glue. The thickness of the bead causes the pieces to slide out of alignment, and squeeze-out is often excessive and spotty. Limited or no squeeze-out indicates there may be no wetting and, therefore, no adhesion.

To facilitate cross-grain planing, trap the workpiece firmly on three sides: the bench stop, a board clamped in the vise and a board clamped to the bench.

Between these best and and worst methods of applying glue, we typically use brushes, paddles, and even fingers as applicators. Don't use your fingers: they contaminate the glue with residual oils, making it less effective. Wet fingers also get glue in places where it shouldn't be.

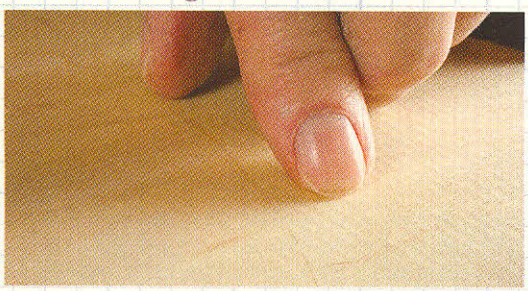
For a simple butt joint without splines or biscuits, a roller is the only required applicator. The butt joint with biscuits shown on page 33 requires a more complicated glue application procedure, which is described in the *photo* captions.

Flattening the Board

Once the glue has cured — about two hours for PVA glue — unclamp the board but let it rest for another five or six hours so it will be strong enough to resist the stresses of further planing.

The board must now be made flat in length and width, to thickness, and to dimension. The way boards are flattened by hand is to plane across the grain. Counter-intuitive as it may seem, this method produces flatness and smoothness impossible to achieve any other way, and it underscores the unique capabilities of the humble hand plane once again. Refer to the *photo sequence* shown below.

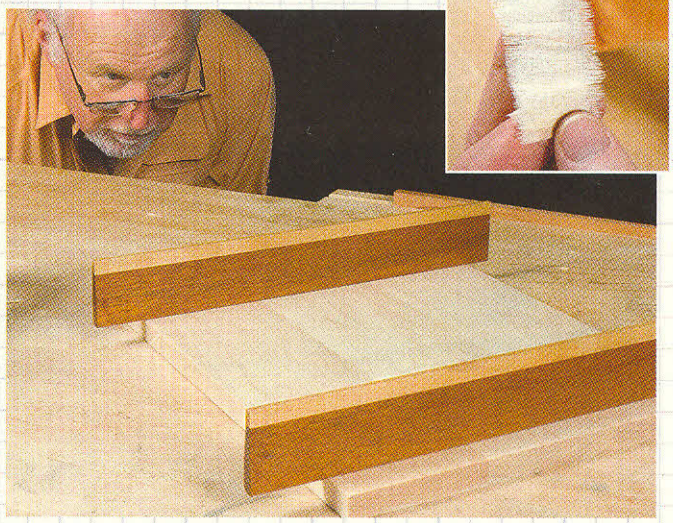
Flattening the Board



The first across-the-grain cuts clean the board and reveal the machine marks.

Check for flat in length and width as you proceed, using a straightedge. Continue planing until you see no light underneath.

Here's a shaving from a slightly curved blade when planing across the grain: thick in the middle, thin on the outside edges.



Periodically check for twist by sighting across the top of a pair of winding sticks.

Rescued by Clamp Pressure

With the "rub" joint I described at the beginning of this article, total contact relies on well-jointed surfaces. There's no way that hand power alone can compete with clamping pressure. However, when using clamps it's easy to apply too much pressure and starve the joint of glue, assuming the joint is well made. Anything less than initial total contact means that final total contact occurs because clamp pressure deflects the wood: in other words, clamp pressure makes a bad joint look good. The joint usually stays tight once the glue has cured and the piece is removed from the clamps, but who knows what internal stress is required to keep the glue line closed? The fact that glueups usually endure despite less than perfectly jointed surfaces is a testament to the forgiving nature of the materials we use. Nonetheless, you should strive for total contact.

Clamp the workpiece firmly to the bench. Set the plane for a fine cut and lubricate the sole with a few strokes of candle wax. Begin on one edge. You will hear and feel the plane click and catch where it cuts the high spots. Make about six strokes in the same place, then move over a plane width and repeat. Lighten the cut when you start producing a continuous shaving as the plane travels across the board. Continually brush the workpiece clean of shavings. Keep checking for flat with your straightedge. Check for twist early in the flattening stage with winding sticks, and make the appropriate adjustments. As you steadily lighten the cut, the shavings will become ever finer. When they reach the near-dust stage, the board is as smooth as you can make it with a plane. In the case of a breadboard, or a benchtop surface, the job is done. If the work is a piece of fine furniture, you can turn to finer grits of sandpaper, starting at #250, before applying the finish.

Are butt joints simple? Not really. But learning to make them correctly provides you with a good opportunity to improve your hand-planing skills.

Ian Kirby is a master woodworker and designer and a frequent contributor to Woodworker's Journal.

Breadboard Ends:
A flawed technique lives on

Two options for attaching breadboard ends are loose tongue (top left) and biscuits (right). The inset *photo* shows the flush-fitted biscuit option at bottom while at top is the loose option embellished with 1" ebony inserts. The end board extends beyond the main board, and the inserts — extending proud of the end board — have been modeled by a file to follow the shapes of the main board and end board.

There are various stories about why the breadboard end came into being. The popular one, of course, is that it keeps boards flat. It doesn't, no matter how well constructed: if the center pieces are determined to cup, nothing will stop it from happening.

A cursory inspection of any breadboard end will show that shrinkage leaves the once flush edges at odds. No surprise here, since the base board shrinks and expands in width and the end board remains constant in length. In short, it's an example of cockeyed technical thinking; it doesn't work. However, aesthetically it has become a widely-accepted practice because it frames the long grain of a tabletop or a breadboard attractively.

Breadboard ends first appeared when hand tools ruled the shop, so it's no surprise that the end piece was applied as a tongue-and-groove. Because a hand plow plane can't make a stopped groove, the through groove on the end board was married to a tongue on the base board made with a shoulder plane.

Once shapers and table saws became the norm, the hand tool method was replaced by a loose tongue. Having a joint comprised of three separate pieces enabled makers to hide differential shrinkage by having the end board project from the base board and the spline project still farther. The detail could be further emphasized by using a different wood for the spline. This technique was widely used by the architects Charles and Henry Greene.

Now, biscuits allow us to dispense with the spline, but the shrinkage problem remains. Again we can resort to slightly different dimensions of the parts. The end result is the retention of a technique, which, although flawed, persists simply because we like its appearance.

Shop-built Passage Door

By Bill Hylton

Our author kicks off Woodworking for Your Home *with the perfect project for any room. And, he reports, his wife had some early feedback: "Wow!" she said, "When are you going to make doors for the UPSTAIRS?"*

Until that comment came, my shop-door construction project was just that — another project for the shop. But now that my wife has seen the result ... well, she has recently added new custom doors for our bathroom, bedrooms and closets to her ever-expanding "honey-do" list.

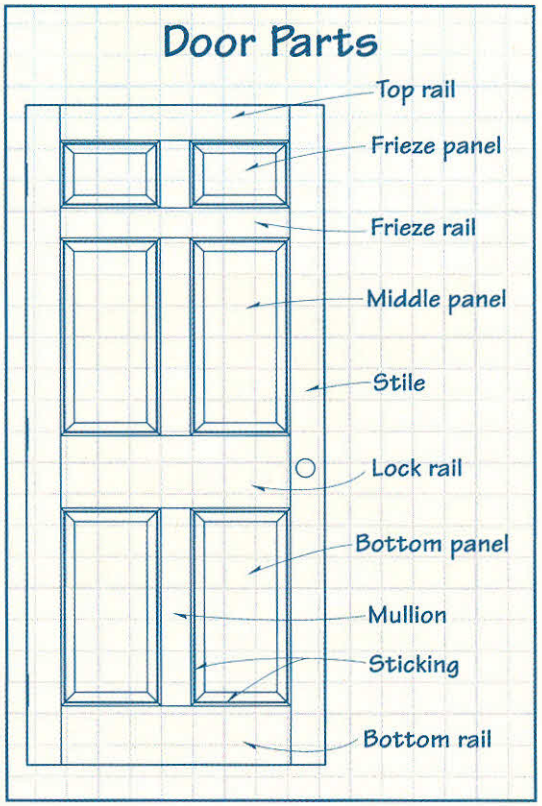
It doesn't take a shaper and cutters to make these six-panel doors; just some router bits designed specifically for forming cope-and-stick joinery on very thick stock. One set is from Infinity, the other from Freud. Either set will enable you to mill basic cope-and-stick joinery for traditional frame-and-panel doors on the router table. The Freud set can take you beyond just the cope-and-stick, as I'll explain in the *sidebar* on page 40.

Building with Loose Tenons

Cope-and-stick joinery is fine for cabinet doors, but it's quite a leap from an 18" x 30" door made from 3/4" stock to one that's 30" x 80" and 1¾" thick. Although the Freud bits are designed specifically to cut rails with integral tenons, I decided to go with loose-tenon construction instead.

A mortise-and-loose-tenon joint is made by cutting mortises into both mating parts and using a separate strip as a tenon to link them. I've used this form of mortise-and-tenon many times, and in my opinion, it has a lot of advantages.

First, you can cut the mortises with a commonplace plunge router. Fitted with an edge guide and a long up-spiral bit, I use the router with a shop-made mortising fixture. It's efficient because there's only one major setup for mortising. The loose tenons are a snap to mass-produce and easy to fit to their mortises.



Here's an additional benefit: The joinery allows trial assemblies at several stages, helping you to sidestep mistakes. In this project, you can dry-assemble the door parts and clamp them after the cope-and-stick joints have been routed and the panels raised. Then you can lay out and cut the mortises. It virtually guarantees the joints will align and the assembly will be square.

Panel dimensions gave me pause briefly. The Infinity bits produce a 1/2"-wide panel groove and matching stub tenon when set up for 1¾" stock, while the Freud bits produce a 5/8" groove/stub tenon. Making sample panels proved that I could achieve the appearance I wanted with either tongue thickness. A 1/2" tongue requires a 1¼"-thick panel; the 5/8" tongue, a 1⅜"-thick panel.

Choosing Materials

Shop doors are utilitarian, so I chose poplar. For each door, I bought three 10"-wide 8/4 boards, which yielded all the frame parts and the panels. Then I built one door. While the process went more or less as expected, it exposed a couple of shortcomings. When I built the second door, the process was smoother, and I think the second door is definitely stronger than the first.

"I built the first door, and procedural surprises and histrionics aside, the result was good. But experience is a good teacher. Slight changes in layout, joint dimensions and parts labeling improved the whole construction process, and the second door is decidedly stronger."

— Bill Hylton

Starting with Cope and Stick Cuts

Three operations are primary to building these doors: Routing copes on the ends of rails and mullions, routing the sticking and raising the panels. Prepare your stock first, following the dimensions shown in the *Material List* on the next page. You can cut all the parts to final size, but I suggest leaving the stiles overly long for now. Because you don't have to account for the tenons, parts lengths are easy to figure out.

The cope cut forms the negative of the sticking profile (the cope) on either side of a stub tenon. It is the first cut you make. Because it's a cross-grain cut, it's likely to cause splintering as the bit emerges from the wood. The sticking cut that follows the cope cut will remove any splinters produced by the cope cut.

Install the cope bit in your router table and set the height. Make a test cut and measure the shoulders of the cut; they should be equal in width. Then cope the ends of the rails and mullions in a single pass.

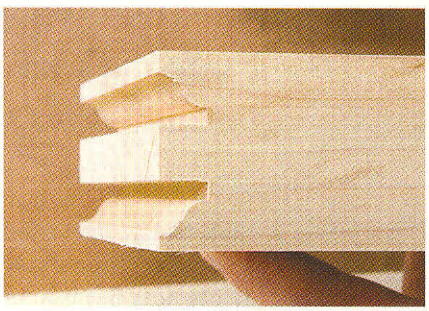
Now switch over to the sticking bit. Use a coped piece to gauge the bit's height, aligning the bit's slot-cutter with the stub tenon. The sticking cut forms the panel groove and the decorative profile on both edges simultaneously. Make this cut along both edges of the mullions and the frieze and lock rails, but only rout the inside edge of the top and bottom rails and the stiles.

Raising Panels

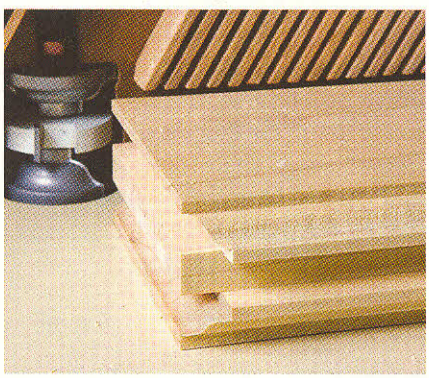
The next step is to raise the panels. Use whatever panel-raising bit you have — either horizontal or vertical styles will work. Make a shallow first pass, a deeper second pass and clean up with a final pass. At each cutting-depth setting, rout all four edges of both sides of each panel. Then adjust the setup for a deeper cut and repeat.

As you work your way around each panel, always begin with a cross-grain cut. You'll get some splintering as the bit emerges from the ends, but the following long-grain cut will eliminate it.

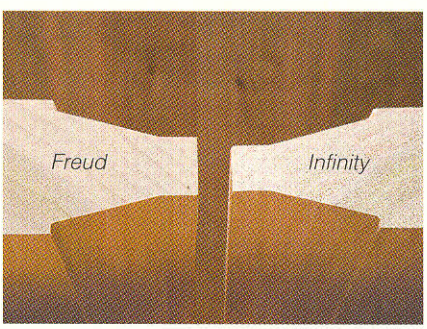
You're now at a point where you can dry-assemble the door to see how it looks. And it looks good, right?



The cope cut forms the reverse of the sticking profile — the cope — on either side of a stub tenon. Cross-grain cutting causes splinters, but the following sticking cut removes them.



Minimize chipping by staging the sticking cuts. Follow a shallow first pass with a not-quite-full-depth cut. A final cleanup pass leaves you with a virtually chip-free finish.



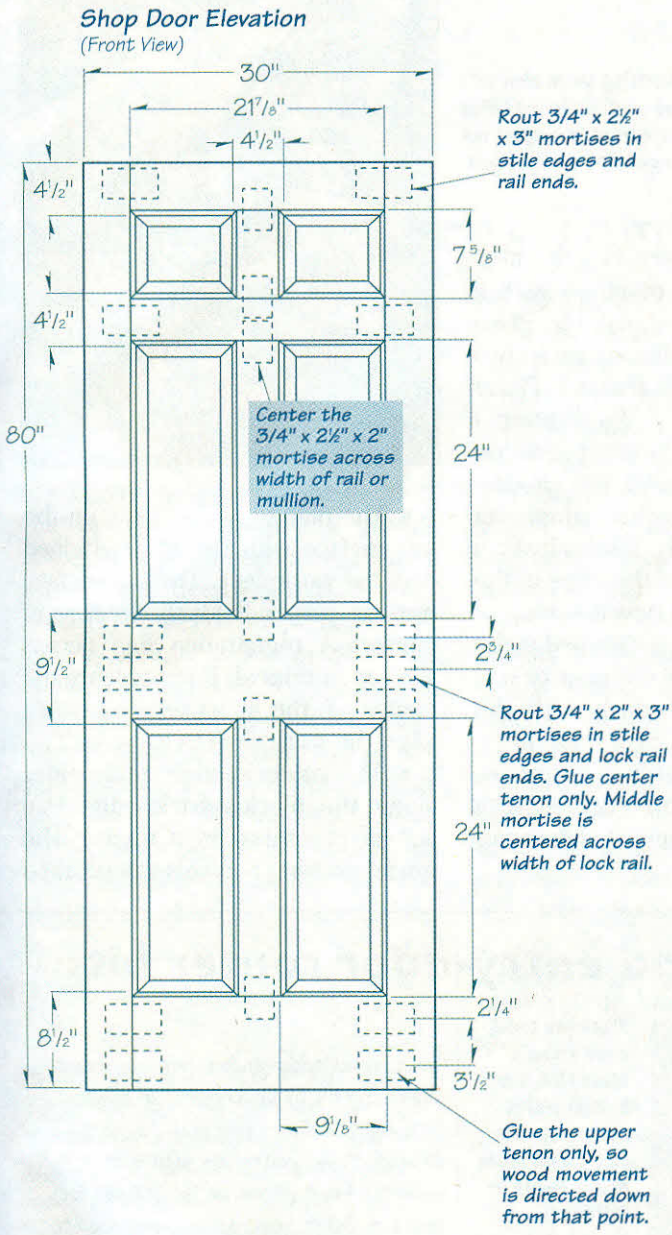
A 1⅜"-thick panel with a 5/8"-thick tongue compared to a 1¼"-thick panel with a 1/2"-thick tongue. The former, proportioned to fit an exterior door frame prepared with the Freud bits, must be milled from 8/4 lumber. The latter, scaled for an Infinity-bit-produced exterior door frame is milled from 6/4 lumber.

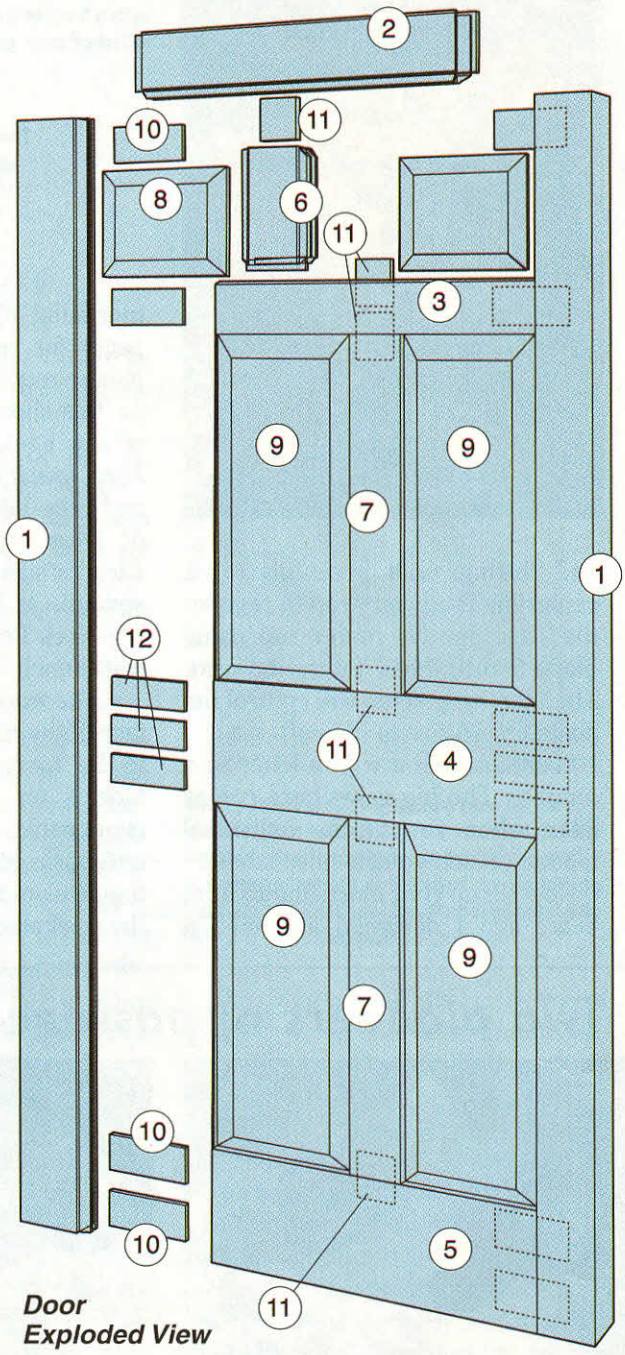
Making the Loose-Tenon Joints

With the door assembled, clamp it exactly as you expect to in the final glue-up. If you've opted to leave the stiles long, align them so they extend beyond the rails at each end by a couple of inches. Check the assembly for squareness.

Now lay out the mortise locations. Twenty loose tenons hold the door together (see the *Elevation Drawing* on the next page). Some will argue that all you need are tenons at the rails and stiles and that those between the rails and mullions are superfluous. I won't dispute that contention, but the short tenons joining the rails and mullions provide positive alignment during assembly, and to me, that is a BIG benefit. Taken together, all the joints provide strength.

For each pair of mortises, lay out the centerline, scribing a single pencil line along the rail and across the stile or along the mullion and across the rail. The lines will help you return the parts to this exact alignment during the tenon fitting





Door Exploded View

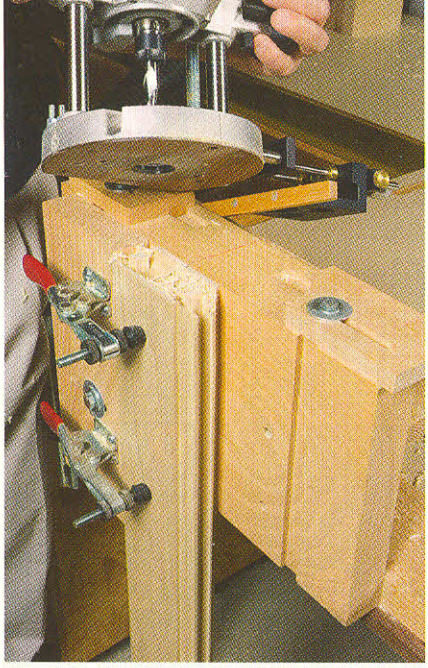
MATERIAL LIST Shop Door

		T x W x L	
1	Stiles* (2)	1¾" x 4½" x 80"	6/4 poplar
2	Top Rail (1)	1¾" x 4½" x 21⅞"	6/4 poplar
3	Frieze Rail (1)	1¾" x 4½" x 21⅞"	6/4 poplar
4	Lock Rail (1)	1¾" x 9⅛" x 21⅞"	6/4 poplar
5	Bottom Rail (1)	1¾" x 8½" x 21⅞"	6/4 poplar
6	Frieze Mullion (1)	1¾" x 4½" x 7⅝"	6/4 poplar
7	Mullions (2)	1¾" x 4½" x 24"	6/4 poplar
8	Frieze Panels (2)	1¼" x 9⅛" x 7⅝"	
9	Middle/bottom Panels (4)	1¼" x 9⅛" x 24"	
10	Loose Tenons (8)	3/4" x 2½" x 5⅞"	scraps
11	Loose Tenons (6)	3/4" x 2½" x 4"	scraps
12	Loose Tenons (6)	3/4" x 2" x 5⅞"	scraps

NOTE: These dimensions are based on the use of Infinity bits. If you use Freud bits, rails and mullions must be slightly longer.

*Work with pieces 4" to 6" longer than final length; trim excess after assembly.

If you use Freud bits, the panels must be 1⅜" thick; start with 8/4 stock.



By clamping the rails and mullions vertically in the mortising block (left), you can mill mortises in the ends accurately with a handheld plunge router (note the attached edge guide).

The same mortising block also sets up the edge mortises in the stiles (right). You'll need to support the long free end with a workstand.

and during final assembly. This centerline is all you need to register the part on the router mortising block fixture that I'll describe next. The mortising setup will control the position and size of the cut.

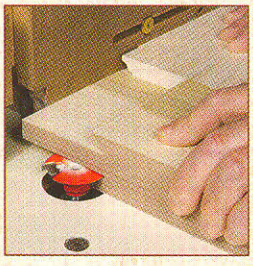
Label each joint with a letter or a number. The big value here comes later, when you fit the individual tenons (which you can also label).

Now set up your mortising fixture. Years ago I designed and built a mortising block (see box on next page) for routing mortises with a plunge router and edge guide. Plans for this shop-built fixture are in two of my books, *Bill Hylton's Power Tool Joinery* (F&W Publications) and the newly revised edition of *Woodworking with the Router* (Reader's Digest Books). Simple yet versatile and sturdy, it's basically a big block I clamp at the edge of the workbench. Here's how it works:

- The workpiece is clamped to the face of the block, so the edge or end to be mortised is flush with the block's top surface. It has interchangeable, adjustable workrests — one horizontal, one vertical — with toggle clamps to support and secure the workpiece.
- The plunge router rests on the top surface with the bit positioned over the workpiece. The top surface must be perpendicular to the face, of course. A registration line across the top is critical: It represents the center of the mortise, and you'll align the workpiece to it.
- The router's edge guide rides along the block's back edge (It's actually captured in a track.) The guide's setting controls the position

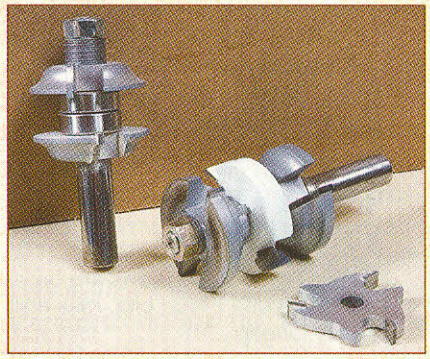
Two pioneers of passage- and entry-door router bits

Infinity was first to market an architectural door set. Basically, they're pumped-up cope-and-stick bits designed to machine stock up to a full 1¾" thick in one pass. Until they appeared, routing architectural door parts required multiple passes with "doctored" cabinetry bits. What these specialty router bits do is no less than what shaper cutters have done for decades. With Infinity's bit set, as with all shaper cutters intended for the same job, making strong joints is an entirely separate undertaking from milling the basic cope-and-stick connection.



When you break down Freud's coping bit, the bottom profile cutter can mill an integral tenon of any length by shifting the fence.

Freud's new router-bit set, on the other hand, takes joint strength one step further. Its innovative cope cutter enables you to form an integral tenon as long as you want. After an initial cut that forms both copes and a stub tenon, you break down the bit by unscrewing an arbor holding a profile cutter and the pilot bearing. What you're left with is an inverted-head, pilot-free bit, still set for the cut. Additional passes, controlled by the fence position, extend the cope cut farther and farther into the rail without touching the tenon, which gets longer and longer.



Infinity's two bits are a bare pair. A 1/4" slotter to use when working 1¾"-thick stock is included, but there are no instructions for setting up or using the bits.

Putting the Pieces Together

of the mortise. It also ensures the mortise is parallel to the workfaces.

- Adjustable blocks screwed to the block's top crowd the router, which limits the length of cut and establishes the mortise length.
- The router governs the depth of the mortise through its plunge setting, but you'll need a long bit. To achieve the deep door mortises, I used a DeWalt DW625 plunge router and a Leigh 1/2" up-spiral bit (180CL), which has 3"-long cutting edges and an overall length of more than 4". If you don't have this router, you'll need one with a plunge range that exceeds 3". Even on my DeWalt, I had to remove the "height-stop thumbwheel" from the threaded rod on the right front of the router to allow the motor to rise 5/8" higher on the posts.

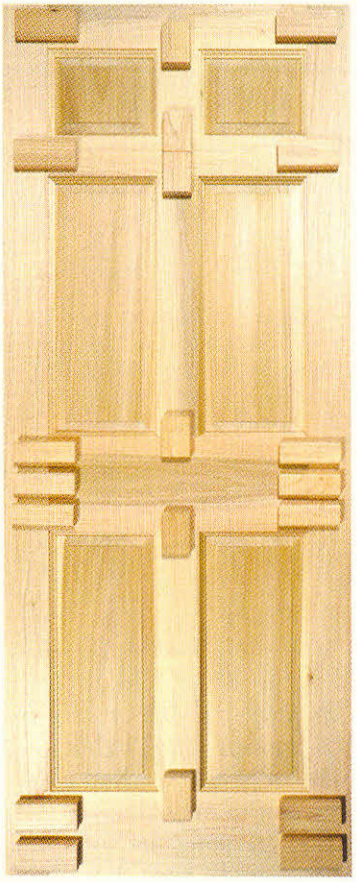
Here's an inventory of the 40 mortises you need to cut for each door: 16 are 3/4" wide, 2½" long and 3" deep; 12 are 3/4" wide, 2½" long and 2" deep; 12 are 3/4" wide, 2" long and 3" deep. I did them all with one basic setup.

Cutting the Mortises

Begin setting up by laying out a mortise on a sticked scrap of the working stock. Mark the center, and measure and mark 1¼" to either side of the center line. Clamp the scrap to the block, aligning the center line with the registration line. Install the 1/2" bit in the router and adjust the plunge depth to 3". Fit the edge guide loosely in place. Set the router onto the block. Adjust the edge guide to center the bit in the scrap's panel groove. Move the router to one mortise end mark and set the first stop, then shift it to the other end and set the second stop. You're now all set up to rout the mortises.

A couple of tweaks, described on the next page, allow you to rout those shallower mortises and shorter mortises without touching this basic setup. You switch from edge mortises to end mortises simply by changing workrests.

Always put the workpiece face with the layout lines against the mortise block face. That way, all the mortises will be a consistent distance from that face and they'll all align. Likewise, always line up the mortise center line on the workpiece with the registration line on the block.



Twenty loose tenons — shown here on the surface of an assembled door — hold the door together. Positive alignment during assembly is a primary benefit of the short tenons joining the rails and mullions. The long tenons joining the rails and stiles provide strength.

The biggest difference between routing these mortises and those for cabinet doors or table legs is the size and weight of the workpieces. I used a telescoping stand to support the outboard ends of the stiles. I had to forgo the vertical workrest and use regular clamps to secure the lock and bottom rails for mortising.

Here are some tricks I used in routing the mortises, which took about an hour altogether to mill:

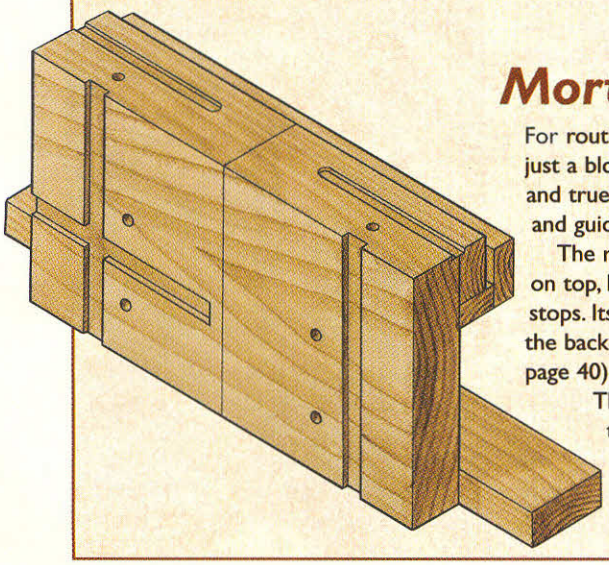
Rout the radiused edges of the tenons first; then refine their fit if needed by taking off a few shavings with a block plane.

After forming all the tenons, you rout the sticking cuts. On wide rails, like the lock and bottom rails, you divide the tenon on the band saw, leaving a stub tenon between tenon segments. The panel groove cut by the Freud bits is 1/16" deeper than the sticking profile, so you don't have to cut too close to the shoulders of the copes.

How you cut the mortises is up to you, though Freud's extensive instructions include suggestions for that procedure and every other step of a door project.

Expect more doormaking bit options to come from these two companies. David Venditto of Infinity told me that an inverted-head cope bit for the set is in development. Freud's Cliff Paddock said additional profiles will be introduced later this year.

— Bill Hylton



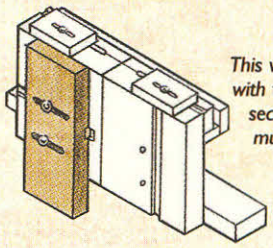
Mortising Block

For routing all manner of mortises, just a block of wood with square and true edges can hold the work and guide the tool.

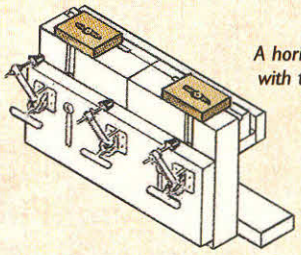
The router rides back and forth on top, limited by the adjustable stops. Its edge guide tracks along the back edge (see *photo*, top left on page 40).

The bit diameter establishes the mortise width, while the router's plunge controls the depth.

— Bill Hylton



This vertical holder with toggle clamps secures rails and mullions for end mortising.



A horizontal holder with toggle clamps secures stiles for edge mortising.

• *Routing 3/4"-wide mortises with a 1/2" diameter bit:* Use stop collars on the edge-guide shafts/rods to enable you to move the router 1/4" fore and aft along the rods. Collars (one on each rod) between the router and the guide set the fore position; collars on the outboard side of the guide set the aft position.

I set the guide against the router-side collars first and routed a 1/2"-wide mortise to the full depth. Then I shifted the router forward and re-routed the mortise, widening it 1/4". Remember, the guide is trapped in the mortising block's guide track, so it can't move fore or aft, only side to side.

The first step in setting up is to fit the stop collars on the edge guide rods. Slide one on each rod, mount the guide, then add the second pair of collars. Leave them loose.

Clamp a workpiece to the block and position the router to center the bit in the panel groove. Lock the edge guide. Measure 1/8" along the rods from the guide and position and tighten the collars. (I used a 1/8"-thick gauge bar held against the edge guide, then slid the collar against it and tightened the collar.) Set each of the four collars this way.

• *Use the router's plunge-stop turret to govern the two different mortise depths.* Use the lowest step on the turret for the deepest mortises. When routing the shallower mortises, rotate the turret to a higher step to reduce the plunge depth by 3/4" to 1".

• *Use spacers between the router and the mortising-block stops when routing the short mortises for the lock rail.* The baseline setup allows the router to move 1" to the left and 1" to the right of the registration line. With a 1/2"-diameter bit in the router, the result of that travel is a 2½"-long cut.

Seat the lock-rail to the middle mullion joint by applying a clamp momentarily. A coped scrap is valuable as a clamp block to protect the sticked edge of the lock rail.

Notice that the lock-rail mortises are only 2" long. So stick a 1/4"-thick shim (I used 1/4"-thick MDF) to each stop with carpet tape. This reduces the router's travel by 1/2", thus shortening the mortise an equal amount on either side of the registration line.

Making the Tenons

Complete this joinery work by making the loose tenons. I made mine from scrap poplar stock. Plane stock to fit a typical mortise. Rip strips to match the two different mortise widths. On the router table, round the tenon edges to match the mortises, then crosscut the tenons to length. As you dry-assemble the door, pare individual tenons with a block plane as necessary to refine their fit in the mortises.

Assembling the Door

Assembling the entire door without glue is an essential prelude to the final glue-up. Take time now to resolve fit, alignment and clamping issues. You should have labeled the joints as you laid them out. Now label the individual loose tenons so you don't mix them up or misorient any during final assembly.

Midway through the assembly, I applied two long clamps — one along the underside, the other along the topside — to pull all the rail-and-mullion joints tight. Position the "underside" clamp first and flank it with long boards to support the door parts (see *photos*, next page).

As you assemble a joint, use your penciled mortise layout marks to align the parts. Make sure they really do line up. If the marks don't align, disassemble the joint and

The Final Assembly … a Methodical Progression

whittle the edges of the loose tenon with a block plane to create a little extra play where you need it.

The lock and bottom rails have multiple tenons joining them to each stile. Only one tenon is actually glued to both the rail and stile. The theory is that gluing all the tenons hampers expansion and contraction of the wide rails, and this could cause them to split when humidity is low for a protracted period. Gluing one tenon holds the joint closed, while the unglued tenon(s) maintain alignment, preventing the rail from cupping or twisting.

During final assembly, I glued all the loose tenons to the rails, but I glued only the center lock-rail tenon and the upper bottom-rail tenon to the stiles. In preparing for final assembly, I pared the edges of the tenons that wouldn't be glued to the stiles to provide a modicum of clearance for wood movement.

If you use yellow glue, don't wait too long to pull a joint tight. I applied a clamp temporarily to individual joints to seat them. I worked out which clamp I'd use at each juncture during the dry assembly.

Other Final Assembly Notes

Assemble the mullions and rails in top-down (or bottom-up) sequence. Insert the panels — don't glue them, of course — as you progress: It helps keep the parts in alignment.

Install the first stile. As before, apply clamps briefly to pull the joints tight and seat the stile against the ends of the rails. Install the second stile. At this point, remove the two top-to-bottom clamps so you can apply clamps across the door. Install one so it's lined up with the lower portion of the bottom rail, a second with the lower portion of the lock rail and a third with the frieze rail. Turn the door over and apply clamps aligned with the top rail and the upper portions of the lock and bottom rails.

After the glue has set and the clamps are removed, use a straightedge and a circular saw to trim the top and bottom ends of the door to remove the stile extensions, establish the final height and square up the door overall.

About Those Other "Honey-Do's"

Now that I've got the basics down, I'm ready to polish my technique and expand my repertoire. Next up is a French door. Then I'll build passage doors glazed with opaque or textured glass to provide separation, quiet and privacy without cutting off natural light from hallways. For those closets and bathrooms, I'll try varying panel sizes, arrangements and materials.

An entry door represents yet another step up. The materials, construction and finish must be weatherproof and stable to withstand being icy cold on one side and toasty warm on the other (and have these sides essentially flip-flop from season to season). I think you'll find the challenge is both rewarding and fun. Good luck with your door projects!

Bill Hylton is a regular contributor to Woodworker's Journal. *His latest book,* Woodworking with the Router, *is available from Reader's Digest.*

Start your dry or final assembly of the mullions and rails by working from the top of the door down or the bottom up. Insert the loose tenons and install clamps above and below the assembly to close the joints.

Continue the assembly process, slipping panels into their grooves to help hold the rails and mullions in position. Make sure the mortise layout marks are aligned. Then finish up by installing the stiles.

19th Century Manual

By J. Petrovich

Some will look at this portable desk and ask "why?" Others of a certain vintage will see its value right away. Even in this computer-driven age, a few of us still compose the traditional way — with pen and paper.

For some of us it may have been our educations. We were taught to compose by hand and to transcribe from that draft with our typewriters. Those final handwritten drafts were worked, re-worked, edited and re-edited long before they were typed. Typing was a stage completely separate from composition. And so our writing habits were formed around composition at a pen's pace. This handsome desk serves that purpose.

Plan ahead and have your hardware on hand prior to starting work on this reproduction piece. There's even an opportunity to create some of your own.

Selecting Desk Hardware and Lumber

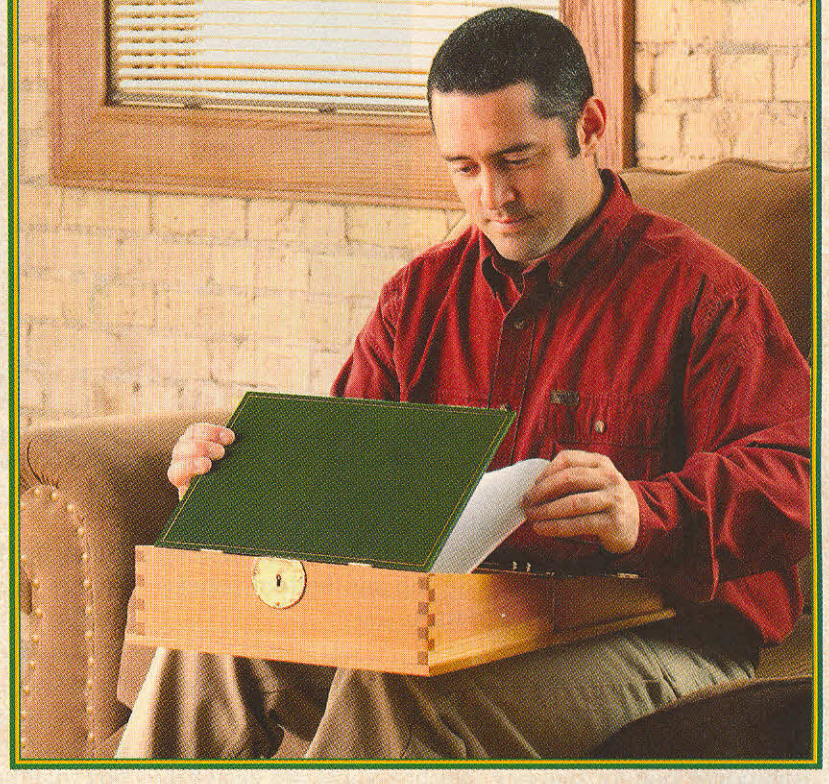
In designing this desk, my first concern was the hardware. Having built or repaired a dozen or so of these desks over the years, I knew the importance of the hardware. The old desks frequently had specialty hinges that are no longer manufactured, with L-shaped leaves that served to reinforce the corners of the desk as well as provide articulation. The simple butt hinges for the writing boards were much thicker than what's commonly available today.

To hinge the box of the desk, I found a reasonable substitute on the Internet (whitechapel-ltd.com). The hinges are "strap" or "box" style, made of 1/8"-thick extruded brass. For the writing board, I selected two pair of 1" x 5/8" extruded brass butt hinges from Lee Valley Tools (leevalley.com). You could use stamped brass hinges instead, but realize that with use and over time, they will loosen, resulting in sloppy alignment and probably loose hinge screws.

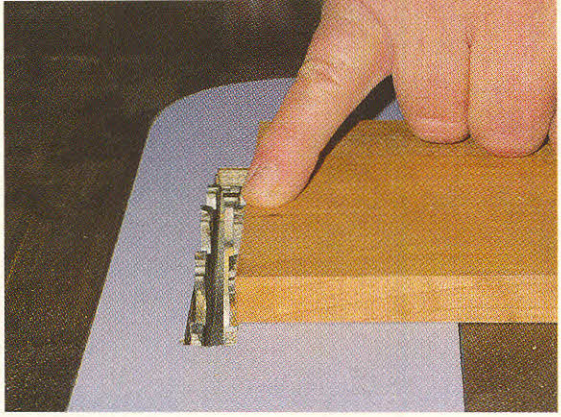
To keep the desk closed and secure during transport, I chose a box lock. While a latch or draw catch could be substituted for a lock, it gives the box a different appearance. Because the back of the lock will be visible when the writing boards are opened, buy a good-quality lock with a snug-fitting link. They're available at *rockler.com*.

I used a pair of rare earth magnets to hold the writing boards snug against the lid or base while the desk is being opened. The antiques that I have seen depended on a tight fit or a very small lock for this security. Magnets, I've found, are a better solution.

Laptop



E-mail has mostly eliminated good old-fashioned letters, but you still have to pay bills and send those birthday cards. Here's a project that will allow you to do so in comfort!



When laying out your box joints *(see box below)*, the first step is to set your dado blade height 1/32" higher than the thickness of the stock.

I chose cherry for this project, because it has a soft, tactile look to it and lovely coloration. Since this desk is made from thin stock, you'll probably need to plane 3/4" material down to size. Be certain to remove equal amounts of wood from both faces of the boards to reduce the chance of cupping. Or, use quartersawn lumber instead, especially for the wide top and bottom panels, which are especially prone to warp.

Assembling the Desk Box

Start construction by cutting the sides (pieces 1), front and back (pieces 2) to size. Dovetails would provide a traditional look for this box, but box joints are easier to construct, equally attractive and plenty strong. Plus, you can make them entirely on the table saw.

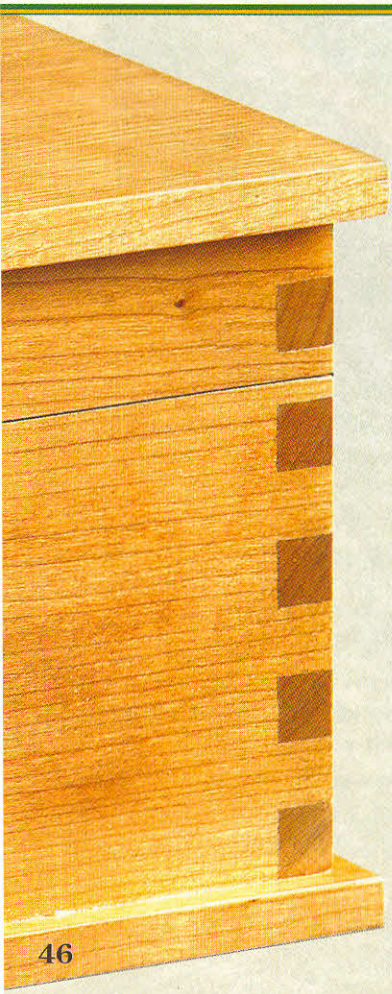
You'll need to build a very simple box joint jig for your saw's miter gauge, similar to the one shown in the *sidebar* below. Make the jig's backer board from a piece of hardwood scrap, approximately 6" x 12". Glue a 1/2" x 1/2" x 2" registration peg into a slot in the backer board. Clamp the jig to your miter gauge and make some test cuts on matching scrap to fine-tune its setting. When your test cuts produce joints that mesh with an easy friction fit, cut the actual corner joints on the box parts.

Gluing Up the Corner Joints

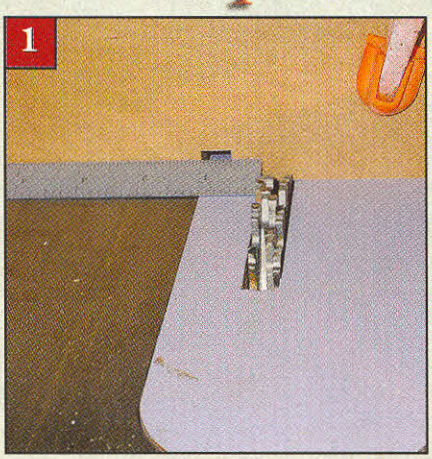
Scrape or sand the faces of the boards to 220 grit. Be careful not to round over the edges of the joint pins. Spread glue onto the contact surfaces of the joints with an artist's palette knife or small paintbrush to help minimize glue squeeze-out. Try to keep glue out of the inside corners where it's tough to clean up. Clamp the box together and check it for square.

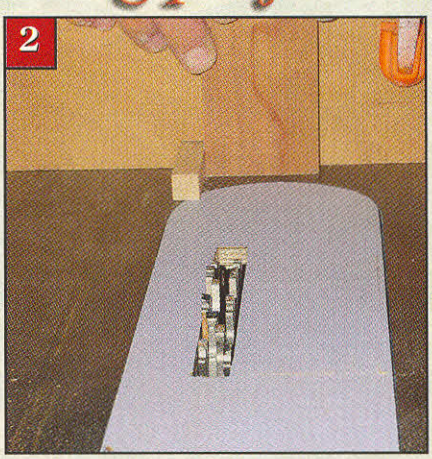
Separating the Halves

When the glue cures, pare the faces of the corner joints and the edges of the box flush, using a low-angle block plane set for a thin cut. You're now ready to split the box in two. The perfect tool would be a large, well-tuned bandsaw, but most of us don't have a bandsaw of sufficient

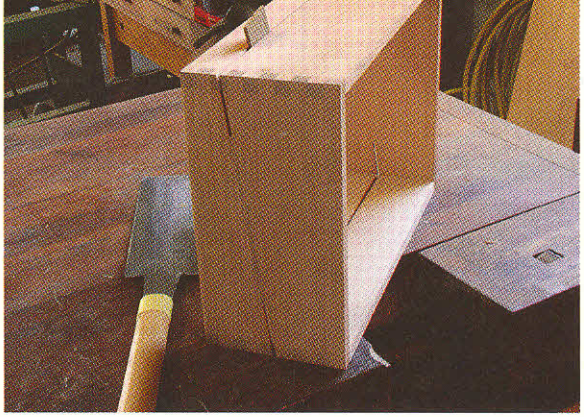


Five steps to cutting perfect





To set up the box joint jig, mount a 1/2"-wide dado blade in your saw and raise the blade to the thickness of the box sides plus 1/32". This will create joint pins that protrude slightly. Clamp the jig to the miter gauge so at least 3" extends to the right of the blade and cut your first slot for the jig's registration peg. Next, loosen the clamp and adjust the jig so it's exactly one slot width away from the first slot (see Fig. 1) and cut your second slot. Measure carefully: Precision is critical here. Make the registration peg from hardwood and glue it into the first slot. To use the jig, hold a test



Use a table saw blade tipped to 7° to begin the process of separating the box lid from the base, then switch to a handsaw to complete the cuts on the sides.

size. The next best choice is the table saw.

First, lay out the two angled cuts on the sides of the box (see the *Drawings* on page 49). If you are following these plans exactly, the angle should be 7°. Tilt your saw blade to this angle and adjust the rip fence to width. Raise the blade to about 1½" and make the first angled rip cut. Readjust the fence to width before cutting the opposite side of the box. This will leave about 7" of material left to cut on the sides. Use a Japanese-style handsaw to complete these two cuts (see *photo* above). After the lid and base are separated, smooth the sawn edges with a block plane to create an even fit all around.

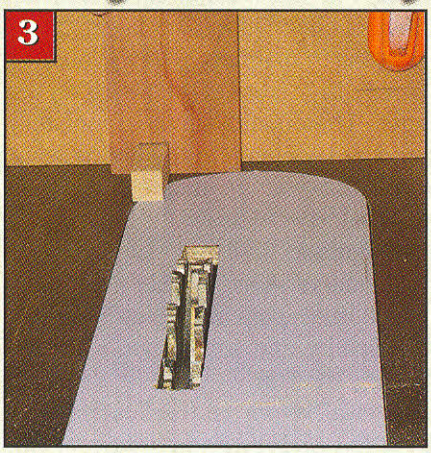
Mortising the Hardware

Letting in the hinges and lockset requires time and patience. Chisel the mortises by hand in the following sequence: 1) strap hinges; 2) lock and link; and 3) writing board hinges. The strap hinges should be located and marked with the two halves butted against one another. The writing board hinges must be offset from one another to allow for passage and closure. They must also be counter-mortised where the knuckles of the hinges meet the opposing box half. A small, sharp gouge works well for this job. The last bit of chisel work is to let in some depressions that allow access so you can easily lift the writing boards. Once the chiseling is completed, install the hardware.

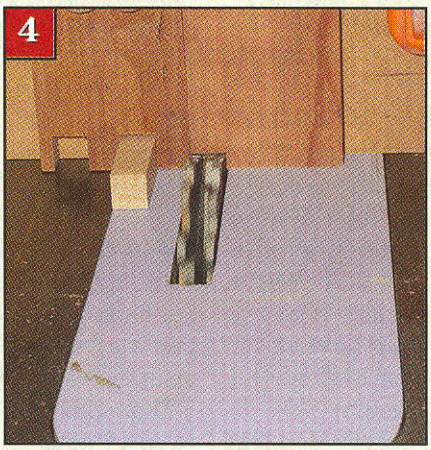
Making the Writing Boards

A writing surface should be smooth and durable. I recommend using 1/4" "Baltic" or "Finnish" birch plywood for the writing boards (pieces 3). It has five "plys," no voids and usually is without "blow holes" on its faces. The tight, even laminations of the material hold screws well, and the grain usually requires no filling. Cut the boards to allow 1/16" of reveal between the box sides and the edges of the boards. Next, form the angled mortises *(see Drawings)* for the hinges into these boards with a sharp chisel. Fasten the board hinges in place.

box joints on your table saw

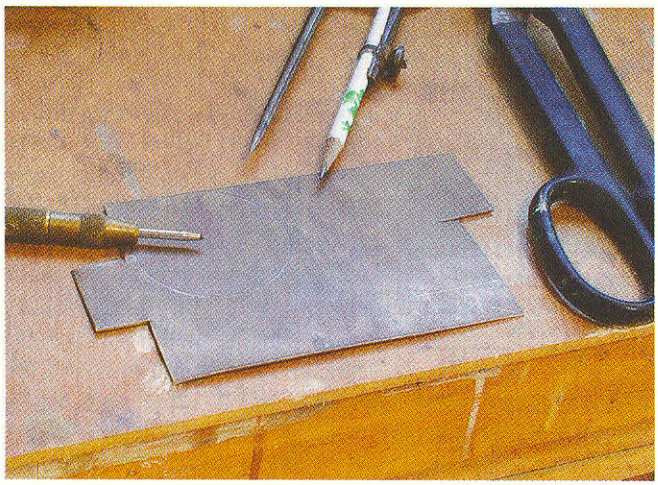


piece firmly against the peg, and make the first cut to create the joint's first pin and slot (see Fig. 2). Fit the slot over the jig peg and repeat the process to cut pins and slots across the test piece (see Fig. 3). Cutting the mating piece correctly involves starting with a slot instead

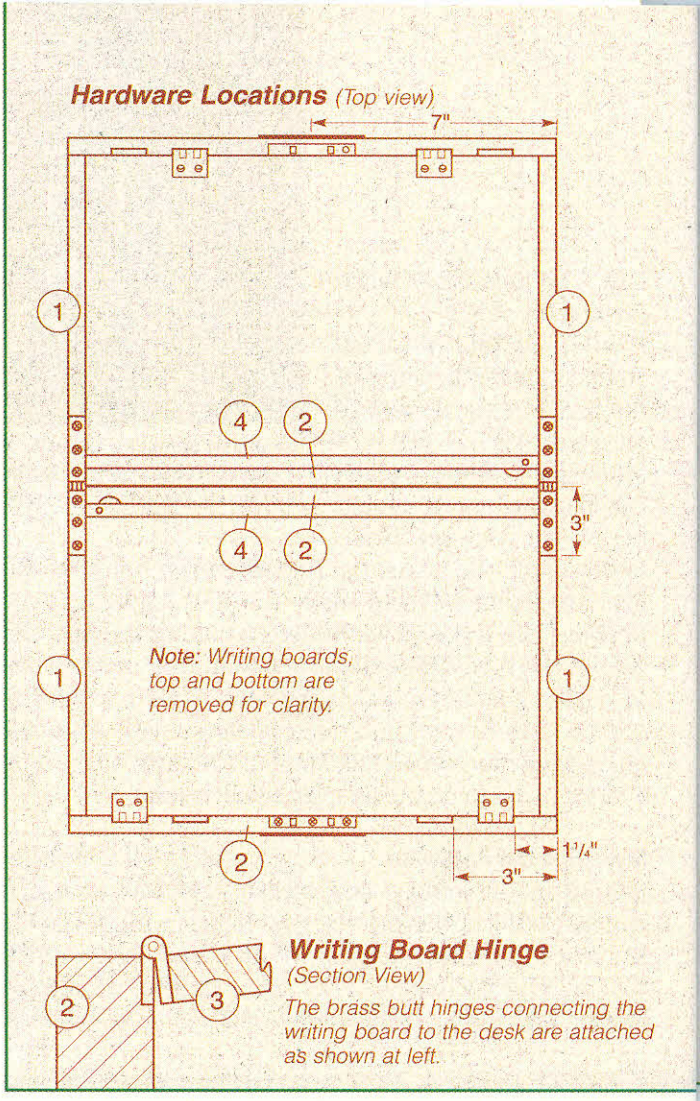


of a pin. To do this, use the outermost pin of the first test board as a spacer, fitting the test piece over the registration peg. Butt the second board against the first to cut the edge slot (see Fig. 4). Now mill the remaining pins and slots. Test the fit of the joint parts. They should be snug

and require little more than a good push to slip together (see Fig. 5). If they are loose, reclamp the jig slightly to the right to cut wider pins. Loosen a tight fit by shifting the jig to the left. A light tap is often all that's required to dial in the jig. Cut more test pieces to check your adjustments.



Make the escutcheon plate from 1/16" thick brass. My escutcheon measures 2½" in diameter. Use a centerpunch to locate the keyhole, then cut out the shape to your liking.



With the boards hinged, locate the board rests (pieces 4) and glue them in place. Remember to rip the 7° angle onto the top edge of this piece. After the glue has cured, unscrew the boards from their hinges and rout or chisel in the finger depressions that allow access for lifting the writing boards.

Many of the writing boards I have seen on older desks are covered in leather or felt. An easier approach is to use the following Chinese painting and lacquering technique. Sand the boards to 180 grit and coat the faces and edges with acrylic gesso (available at art supply stores). The boards are now ready to accept color. The Chinese used shellac mixed with pigment for the next step. I use a product called "Fresco Color" instead of authentic Chinese pigment. Mix the pigment into the shellac to a consistency of about whole milk — make it slightly thicker than a 3-lb. cut.

Brush the paint on quickly but carefully; it dries fast. Apply two coats, sanding lightly between them. Allow the paint to dry over night. If any final sanding is necessary, do it gently to avoid penetrating the color. Before applying the top coats of lacquer, you can add a bit of surface decoration with faux gilding. I use an ordinary gold paint pen and a black permanent marker. With my fingers serving as a marking gauge sliding against the edge of the board, I simply move the pen to draw the lines. Apply the gold first and then the black.

An alternative method of coloring the boards is to use aerosol enamel instead of shellac and pigment. Start with the gesso, then spray-paint the boards. Give the paint 24 hours to dry.

Whichever painting method you choose, topcoat the writing boards with two coats of lacquer. Normally I use gloss lacquer and adjust the sheen if necessary by rubbing out the finish. For the writing boards I was concerned about revealing the gesso, so I used a semi-gloss lacquer. If you paint with enamel, the lacquer may be incompatible with it. You will need to apply at least two sealing coats of 3-lb. shellac before lacquering.

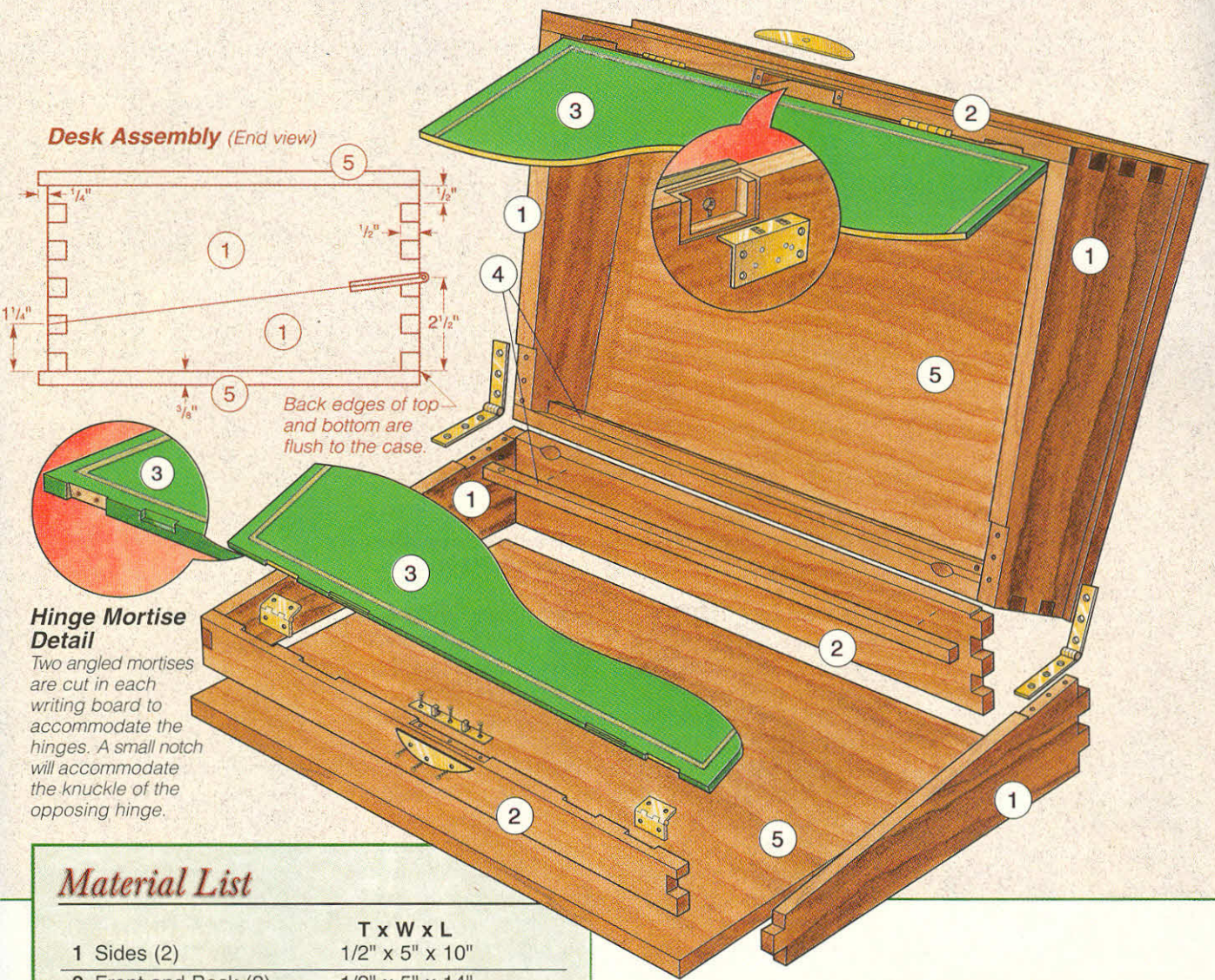
Finally, locate the rare earth magnets. They should be situated about 1/8" from either edge of the board on the side opposite the hinges. Then install simple upholstery tacks, filed neatly round and driven into the board rests, to serve as tiny contact points for the magnets.

Adding the Desk Top and Bottom

As I suggested earlier, quartersawn lumber will make the most stable top and bottom panels (pieces 5). While this may seem a little finicky and expensive, it's good insurance against cupping later on.

Edge-gluing 3/8" material requires a delicate touch. *(Editor's note: Check out Ian Kirby's helpful article on butt joint construction on page 30 of this issue).* First hand-plane the edges and check for squareness, then spread the glue and rub the mating edges together to ensure an even coating. Apply just enough clamping pressure to keep the boards from shifting during curing.

Glue the top and bottom panels to the desk's sides one at a time. Line up each panel so it is evenly spaced from the sides of the box and flush with the back or strap



Material List

	T x W x L
1 Sides (2)	1/2" x 5" x 10"
2 Front and Back (2)	1/2" x 5" x 14"
3 Writing Boards (2)	1/4" x 8 7/8" x 12 7/8"
4 Board Rests (2)	3/8" x 1/2" x 13"
5 Top and Bottom (2)	3/8" x 10 1/4" x 14 1/2"

hinge side. Lightly mark the location of the sides on the top and bottom with a few dots. Apply glue to the box side of the joint, not to the top or bottom. Be judicious. Too much glue will produce squeeze-out that will be difficult to clean up. Scrape off the excess in an hour or two.

Finishing Up with a Handmade Escutcheon Plate

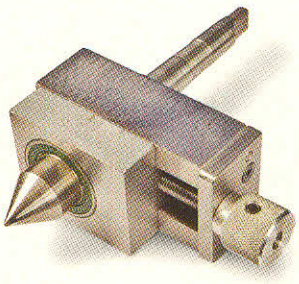
To finish the desk I applied one coat of Watco's Danish oil and allowed it to dry for three days. I applied the oil only to the outside and the edges of the desk's interior. I then sprayed a single coat of gloss lacquer on the interior and used 400-grit sandpaper to smooth it. The exterior received three light coats of semi-gloss lacquer, with a light sanding between coats.

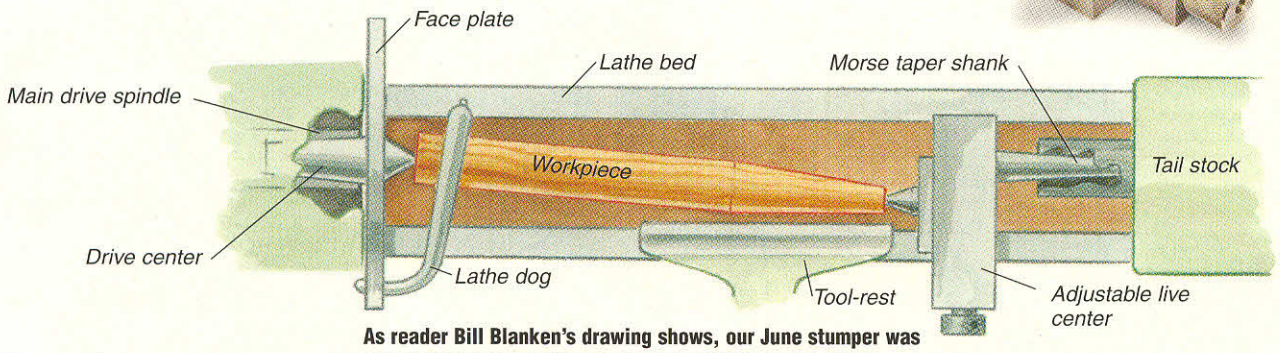
The last step in construction is to install an escutcheon plate. Escutcheon plates are readily available from most hardware suppliers, but I was after something different. I tried to imagine what the box will look like in a few years: a deep red color with little obvious grain. I wanted the escutcheon to accentuate the box, so I made it from a disc of 1/16"-thick brass. If you'd like to do the same, here's how to make it: Lay out the escutcheon design on a piece of sheet stock. Locate the keyhole and center-punch it for drilling. Drill out the keyhole, then cut out the shape. Refine the shape of the plate and the keyhole with files. Ease the edges by filing a tiny bevel all around. You can planish the surface if you like with an 8- to 12-ounce ball peen hammer, working lightly. To color the brass I used several applications of Brass Black (available at gun stores) that I buffed selectively. The bit of "antiquing," produced by the Brass Black, serves to accent the planishing marks and minor scratches. Install the escutcheon with several tiny brass brads.

Now, fill it with stationery and enjoy your new "laptop." Whether you're journaling, penning letters or writing the next great thriller, this desk should age gracefully and serve you well.

Joseph Petrovich is a woodworker and writer and an occasional contributor to Woodworker's Journal.

Live Center Fools No One





As reader Bill Blanken's drawing shows, our June stumper was an adjustable live center, used in the tailstock of a lathe.

What's This?

Rick White from Zimmerman, Minnesota, dropped off the tool below, complete with the attached "What am I" green tag. The handle slides in and out, opening and closing a scissors-like apparatus.

Know what it is?

Send in your answer for a chance to win a prize.

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:* stumpers@woodworkersjournal.com

Adjustable Live Center

The stumper [from the *June 2006* issue] is an adjustable live center, used in the tailstock of a lathe. The thumbscrew is used to move the live center in or out of alignment with the headstock of the lathe, thus making the process of turning a cone much easier. To turn a cone when the tailstock is centered with the chuck requires moving the cutter simultaneously in the axis, which is difficult on most lathes. Having an adjustable live center makes it possible to move out of center and turn a cone with a lot less difficulty.

Bill Blanken
Hanford, California

A Solid Turnout

Well, Bill, looks like you centered in on the answer, along with just about all of our responders this time around. In stark contrast to the last "Stumpers," in which no one could agree on the name or even function of the tool, almost all of your submissions were correct, with a few exceptions, such as **Thomas Mercer** of Seymour, Tennessee, who guessed that it was "a hole punch of some sort." (Sorry Tom, not quite, but don't worry, your name still goes in the hat for the prize drawing.) **Richard Harris** of Lynville, Tennessee, explained that, "The mystery tool ... is typically used in offsetting the tailstock center for taper turning in a metal cutting lathe. [It] is used to avoid the hassle of resetting the tailstock center." **Joe Wagner** of Ozark, Alabama, clearly has years of experience with this tool: "I used one of those gadgets over 60 years ago on a metal-cutting lathe. It's an offsettable tailstock 'live center.' It permits cutting long, straight tapers on cylindrical parts, using the lathe's longitudinal feed."

Some readers, such as **Kevin Elswick** of Chilhowie, Virginia, pointed out that the adjustable live center can be used on a mill, as well. "Using a tail center and an indexing head, you can make slots or designs on a tapered shaft or table leg," Kevin explained. "I have used it to make hexagons on a tapered barrel on a muzzle-loader."

This mystery tool was recognized by turners of all ages. **Bill Majors,** an 82-year-old woodworker from Fort Payne, Alabama, said, "It was no problem for me to identify your mystery tool." And **Dominic Meyer**, age 13, of Keizer, Oregon, who "has been a woodturner for at least five months," said he recently saw a "very, very small lathe" with this tool as a tail center. **Harold Anacker,** a 92-year-old woodworker from Ferndale, Washington, also correctly identified the tool, taking the prize as our oldest responder. **Tom Linder** of West Bend, Wisconsin, turned out to be the most intuitive guesser when he noted: "I never saw a gizmo like this before, but it's obvious what it is just by look'n at it ... If it ain't an eccentric center, it sure looks like it would make a dandy one anyway."

— Elizabeth Stoiaken

WINNER! *Bob Rich of Sherborn, Massachusetts, wins a Delta ShopMaster Model LA200K Midi Lathe®. We toss all the Stumpers letters into a hat to select a winner.*

Boring Gets Interesting

The 'plain Jane' drill press is being upgraded to better complement a woodworking environment. What does that mean for you?

The drill press is usually not included in the pantheon of power tools that woodworkers moon over and hold up as a status symbol. It is more often a go-to tool that sees heavy use in some operations (installing European hinges for example) and then gathers dust or a collection of half-full coffee cups at other times. This ambiguous relationship is not surprising when you consider that the drill press is really a tool developed for the machine shop and, until recently, has only been moonlighting in woodshops around the world. But now, several manufacturers are building drill presses with the woodworker targeted as the primary user.

Drill presses designed primarily for woodworking will have larger and more adjustable tables, on-the-fly RPM adjustment, longer quill travel, laser alignment features and details like keyless chucks. Other woodworking-friendly features include fences (with or without adjustable stops), multiple table angle adjustments, built-in lighting and a means of locking the quill in place.

The biggest advantages that a drill press provides are the ability to use large-diameter bits safely and effectively, increased accuracy and the repeatability of any boring operation. Repeatability is most often provided by the addition of a jig or specially made fence. Once you have your setup properly secured (see photo at left), you can make a couple of accurately drilled holes or a thousand — it's up to you.

Boring a compound angle, like those found in Windsor chairs, is easily completed by adding a jig to your drill press. First, the drill press table is set to one of the desired angles (here 10°). Then, the second angle is formed by creating a second table with its tapered supports cut (in this case) to 7°.

LET THE GOLD STA

Drill Press Speed: Getting the Best from Your Bits

Changing speed on a drill press is essential to achieve proper performance from drill bits and other cutters. Most of us avoid this task for a couple of reasons. First and foremost, it's because the most common way to change bit speed requires moving belts to different pulleys that are hidden "under the hood" — and it is a bit of a hassle. Second, most of us only have a very general idea of what those bit speeds should actually be. But there is help to be had. For example, there are inexpensive magnetic bit speed charts (like the one at right) that can be slapped on your drill press for quick reference.

And now that more drill presses are being designed with woodworking in mind, some, like the Powermatic model featured in this article, have on-the-fly variable speed adjustments. With these obstacles removed, you will find it much easier to get the best from your bits.

TIP: Varying the speed of a drill bit will affect the size of its boring. Although the variation is small, it can be just enough to make the difference between a good dowel fit and an annoying fit.

ROCKLER
WOODWORKING AND HARDWARE

Drill Press Speed Chart

Twist Drill Bits	Hardwood
1/16" - 3/16"	2200
1/4" - 3/8"	1700
7/16" - 5/8"	1000
11/16" - 1"	500
Brad-Point Drill Bits	
1/8" - 1/4"	1000
3/8" - 1/2"	750
5/8"	500
3/4" - 1"	250
Forstner Bits	**Hardwood/Softwood**
1/4" - 3/8"	700/2000
1/2" - 5/8"	500/2000
3/4" - 1"	500/1200
1½" - 1¼"	250/800
1⅜" - 2"	250/500

Pilot Hole Chart

Screw	Hardwoods	Softwoods
#4	5/64"	1/16"
#6	7/64"	3/32"
#8	1/8"	7/64"
#10	9/64"	1/8"
#12	5/32"	9/64"
#14	11/64"	5/32"

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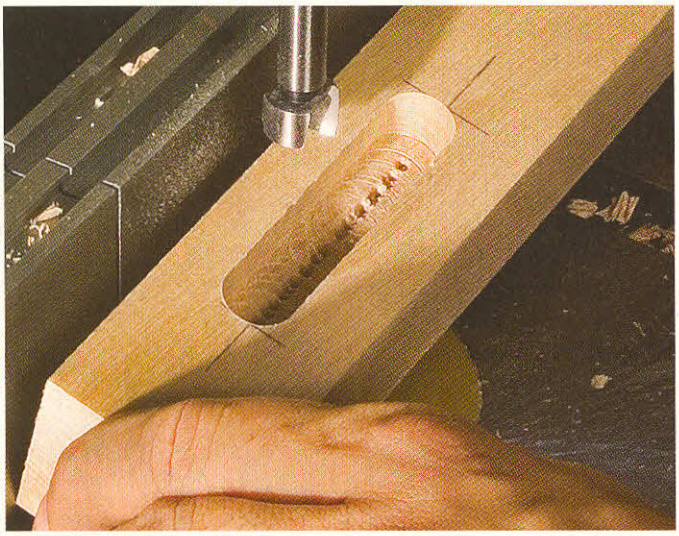


With a solid fence, a sharp Forstner bit and a substantial drill press, forming mortises is a simple task. Little paring of the sides is required when care is taken while removing the waste from the mortise.

In recent years, the accuracy of off-hand drilling has been increased rather remarkably, with the inclusion of laser technology, which indicates exactly where the bit will be making contact with the workpiece. These lasers come as standard equipment on some drill press models, and are available as an aftermarket add-on with others. Lasers don't make sense on every woodworking tool, but they are the clear deal when it comes to a drill press.

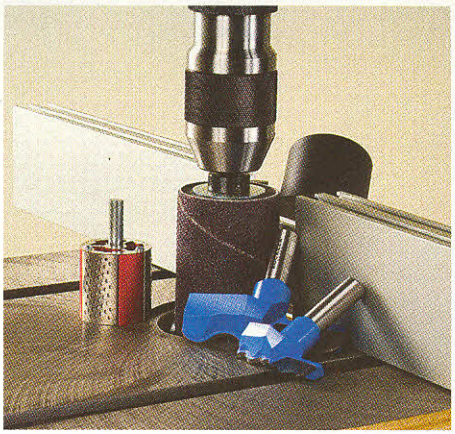
When you think of all the tasks that you perform with your drill press — forming mortises or dowel holes, making plugs, etc., it is clear that a good-quality drill press is a big advantage in your shop. So, as woodshop-intended drill presses become more and more common, it is likely that their status will shift from that of a useful but forgettable shop helper, to one of those "Hey, have you seen my new drill press?" kind of tools.

NDARD TAKE YOU TO

Sanding and Shaping

One traditional use of the woodshop drill press has been edge sanding. A whole range of spindles and sandpaper sleeves are just the ticket to smoothing the edges of curved panels, etc. Which creates another classic woodshop problem we're all familiar with — runaway sawdust.

Powermatic has addressed this problem on its new drill press by creating a split fence with a dust shroud attached to its back face. It will not be a big help when sanding concave curves, but should help otherwise. And let's face it, any help controlling sawdust while sanding is always welcome. Another nice feature of this drill press is the large opening in the tabletop. This allows the sanding spindle to be lowered through the table, making it easier to use the full length of the sleeve effectively.



Employing your drill press to sand or shape wood is not likely your first impulse. But with the variety of specialty bits and cutters on the market, the opportunities continue to expand.

Relatively new on the drill press front are rotary shapers from Microplane®. These cutters work much like a sanding sleeve, but their perforated metal skins cut, rather than abraid. They make for a great addition to your drill press bag of tricks.

Creating Rosettes

Using your drill press to create beautiful details is a great way to add to your creative quiver of decorative arrows. These plinth blocks and moldings were made using only a drill press and a table saw.

When it comes to cutting the large rosettes shown in the accompanying photo, a drill press with plenty of power is a must. The rule of thumb with large bits like these is to adjust the tool's RPM to a low-speed setting and clamp your workpiece securely in place. Using the laser on this drill press to locate the rosette locations was a snap.

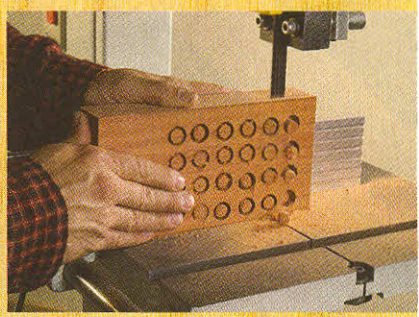
THE NEXT LEVEL.

Keyless chucks, long a desired feature on cordless drills, have arrived on the drill press scene. Just one more way this machine-shop refugee has made itself at home in the woodshop.

And of course there are specialty drill bits like the rosette cutters shown at left and below. While they are in some ways one-trick ponies, their limits are really only bounded by your imagination. Combining different-sized rosettes with wing-cutters and Forstner bits, it is possible to create ornate moldings and decorative details that are completely custom in nature.

Plugs and Plug Cutters

Plug cutters are another way that a drill press can really lift your woodworking to the next level. Often, wooden plugs are used to cover countersunk screws, and as such, are looked at as necessary evils rather than something that will really make a difference in your work. But by carefully making your own plugs, you can do more than just cover a screw hole... you can make that screw hole disappear!



A shortcut to creating several specialty plugs in a hurry is to gang-drill a bunch of plugs at one time. Then step over to your band saw and slice them loose.

To start, use the same lumber to make your plugs that you use to build your project. Next, take a bit of time to match the plug to the grain pattern at the screw hole location. Select from several plugs the one that best matches the grain pattern, and glue it in place, taking care to keep the glue from coming all the way up to the surface of your project. Now, with a little bit of sanding, that tight-fitting, custom made plug will disappear.

For more about the PM2000, visit

www.powermatic.com/wj

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PHILLIPS

Fine Tool Display Case

By Scott Phillips

Special tools deserve a special place. This easy-to-build weekend project will let you put them on display, right where they'll be ready for use.

My dad was a woodworker, so I guess you could say he was my first real shop teacher. Well, when he decided to hang up his tool apron for good, he passed along his prized collection of Clifton shoulder planes to me. I love them dearly, and I built this little display cabinet to keep them in sight as a constant reminder of those good times with Dad in his shop.

Whether you build your cabinet for tools, collectibles or even spices, you'll have it wrapped up with less than a day's effort, easy. The joinery is simple — mostly butt joints and screws — but you'll need cope and stick bits to build the door. So, grab a few boards of your prettiest walnut and let's get to work!

Starting with the Case

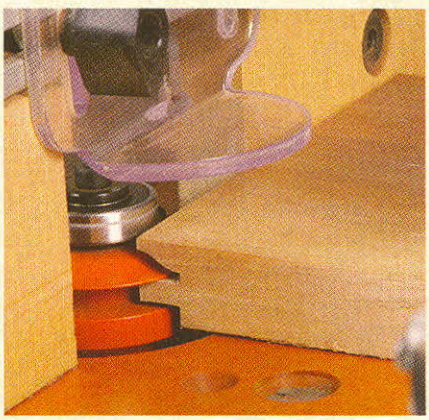
Joint and plane your stock for the case sides (pieces 1), top and bottom (pieces 2), and cut these parts to the sizes in the Material List on the next page. Notice that I used full 1"-thick stock for the sides (and for the door, too). It gives this cabinet some nice stature and the door a real solid feeling when you open it up.

Set up your router table with a 1/4" straight bit, and mill the back panel grooves along the inside faces of all four case parts, as shown in the photo at right. They're 1/4" in from the back edges.

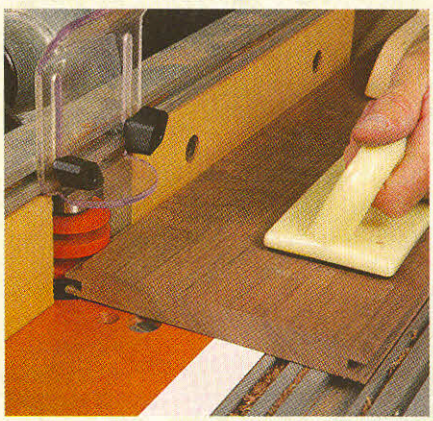
You'll need to drill some shelf pin holes in the case sides next. I used my Jig-It® shelving jig from Rockler for this job, but you could use a piece of pegboard as a drilling template instead, if you like. Just make sure your shelf pin diameters match the drill bit you use.

Rout the back panel grooves along the four case parts at the router table with a 1/4" straight bit chucked in your router.

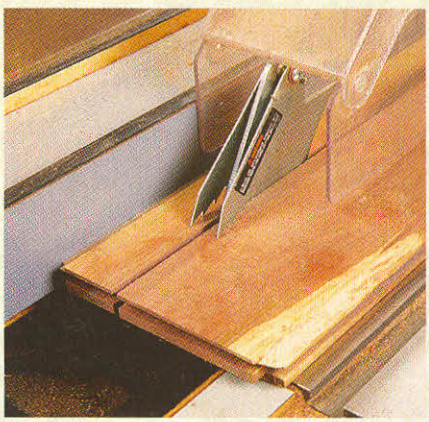
Rout the door rails and stiles on overly wide stock for safety's sake



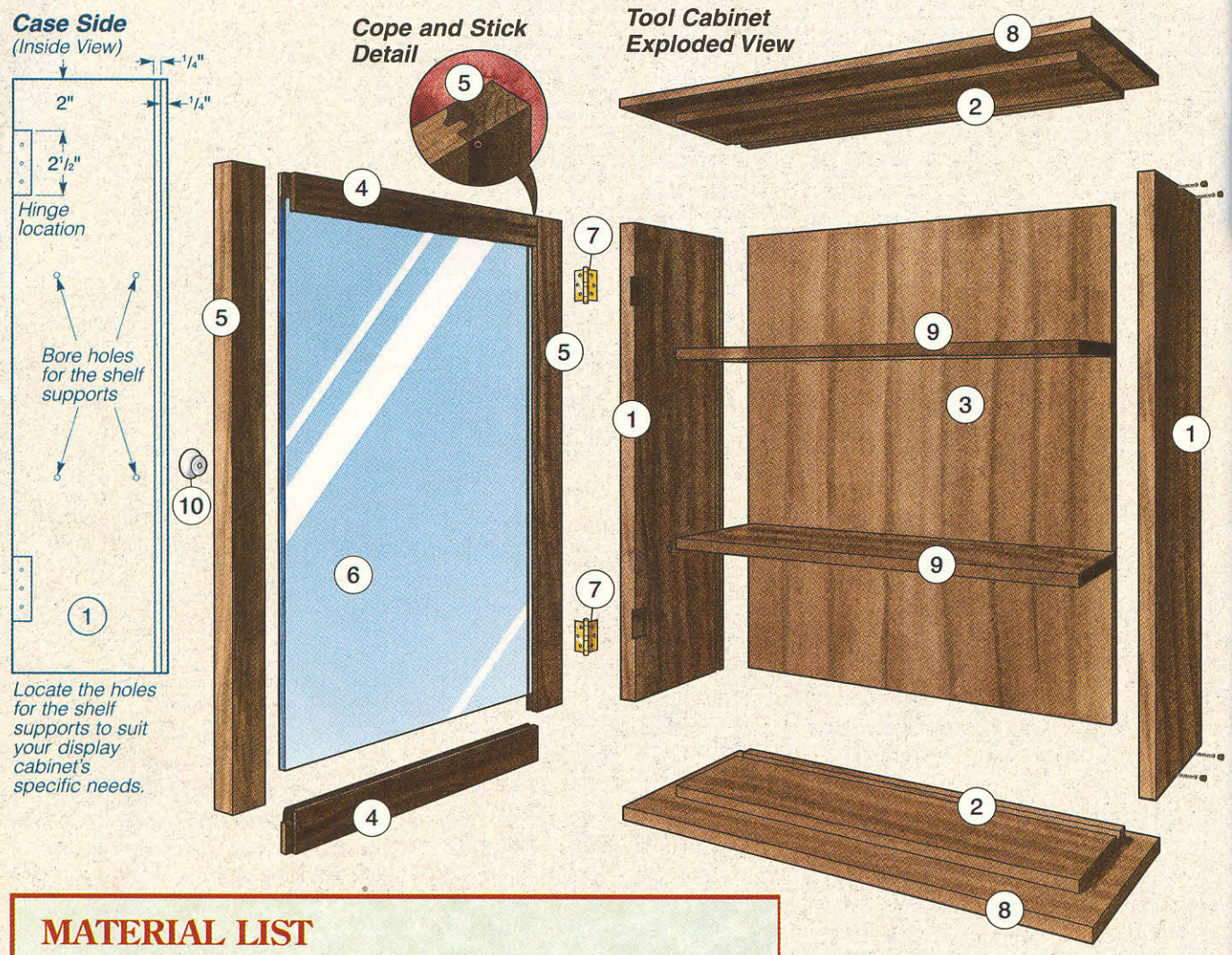
Mill the cope and stick joints for the door frame starting with the rails. First mill the cope profile across the ends of a 6"- to 8"-wide workpiece, using a guard to shroud the bit.



The rails and stiles receive sticking cuts next along the edges (stiles are shown here). Wide stock keeps your hands safer and allows you to mill both stiles at once on one workpiece.



Once the cope and stick joints are routed, turn to your table saw to rip the rails and stiles free. The combined rail workpiece is shown here.



MATERIAL LIST

		T x W x L
1	Case Sides (2)	1" x 6" x 23"
2	Case Top and Bottom (2)	3/4" x 4 7/8" x 18 7/8"
3	Back Panel (1)	1/4" x 19 3/8" x 22"
4	Door Rails (2)	1" x 1 3/4" x 16 1/8"
5	Door Stiles (2)	1" x 1 3/4" x 22 7/8"
6	Glass (1)	Cut to fit
7	Hinges (2)	2 1/2" Brass
8	Cap/base (2)	3/4" x 7 1/2" x 23"
9	Shelves (2)	1/2" x 4" x 18 3/4"
10	Porcelain Knob (1)	White, 1" Dia.

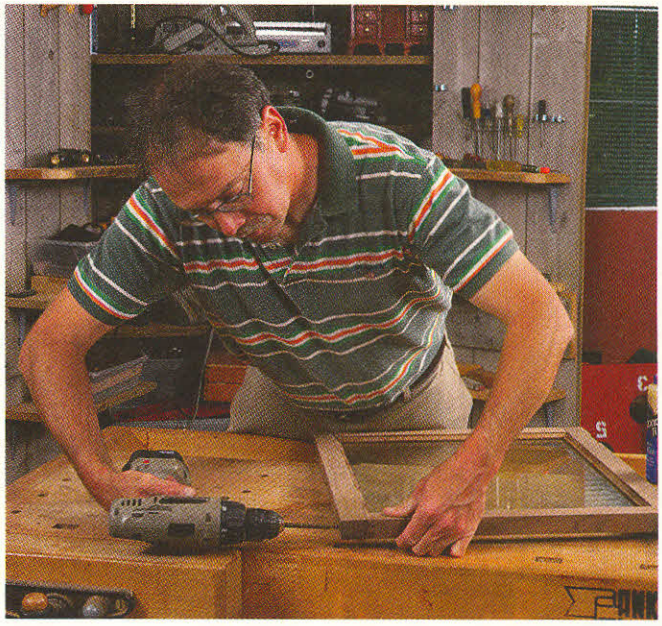
Choose a nice piece of walnut veneer plywood for the back panel (piece 3), and cut it to size. Then fit the back panel into its grooves in the case parts to check that everything will go together as it should. The top and bottom are narrower than the sides, so the door will fit "inset" style. Give the parts a good sanding up to 180-grit — it's always easier to sand before assembly! Use glue and pairs of 2" screws to fasten the corner joints, as shown (right). Drill counterbored holes so you can cover the heads with plugs.

Building the Door

Here's where things can get tricky. Cope and stick bits are the right choice for the door joints, but they're fussy to set up and easy to confuse if you're not careful. Take my advice and make up some test pieces so you can tame these rascals before you shape your workpieces.

Joint and plane a couple of 6"- to 8"-wide pieces of stock for the rails and stiles (pieces 4 and 5). Keep them wide — this way you can rout both edges of each piece to produce the rails and stiles, as shown in the photos on the previous page. This method is efficient and keeps your fingers a safe distance from those big cutters. A couple of rip cuts later will separate the rails and stiles and bring them to final width. You can crosscut the rail and stile workpieces to final length now.

The best order for milling the rail and stile joints is to start with the rails, then do the stiles. Install your cope bit in the router table and set the bit depth properly. Make sure the bit will create a sturdy lip on the



There's no fancy finery to the case's corner joints (left); they're just screwed and plugged butt joints at all four corners. The author even chose to use screws to secure the cope and stick joints on the door (right). The rails and stiles are machined and test-fitted prior to assembly.

back of the rails to support the glass. Rout the cope cuts on the ends of the rail workpiece, backing up the wood with your miter gauge. Since these cope cuts run across the grain, the sticking cuts that follow will remove any corner tearout.

Now that the cope cuts are done, switch to your sticking bit. Use the coped profile on the rails to help you dial in the height of the sticking bit carefully. I used a one-piece cope and stick bit and let me just say, these bits can still be brain teasers even after building hundreds of doors like I have. Keep your focus!

Mill the sticking profile along both edges of the wide rail and stile workpieces. Once the dust clears, take these parts to your table saw and rip the rails and stiles free.

For the glass, I recommend 1/8"-thick tempered safety glass. You may need to fill the rest of the groove with a couple of dabs of clear caulk to keep the glass from rattling.

Dry-fit the door parts together, then drill a pair of counterbored holes through each stile for 2½" wood screws to lock these joints, as shown above (right). You'll hide them with wood plugs, too. Some folks might squawk about using screws here, but they'll make rock-solid joints in the end.

Hanging the Door

Mount the door on the case with a pair of 2½" brass butt hinges. Chisel the hinge mortises carefully by hand; you'll want to keep your mallet as far away as possible from that glass when cutting the door mortises. Add a button catch and a porcelain knob, and check the door's swing in the case opening.

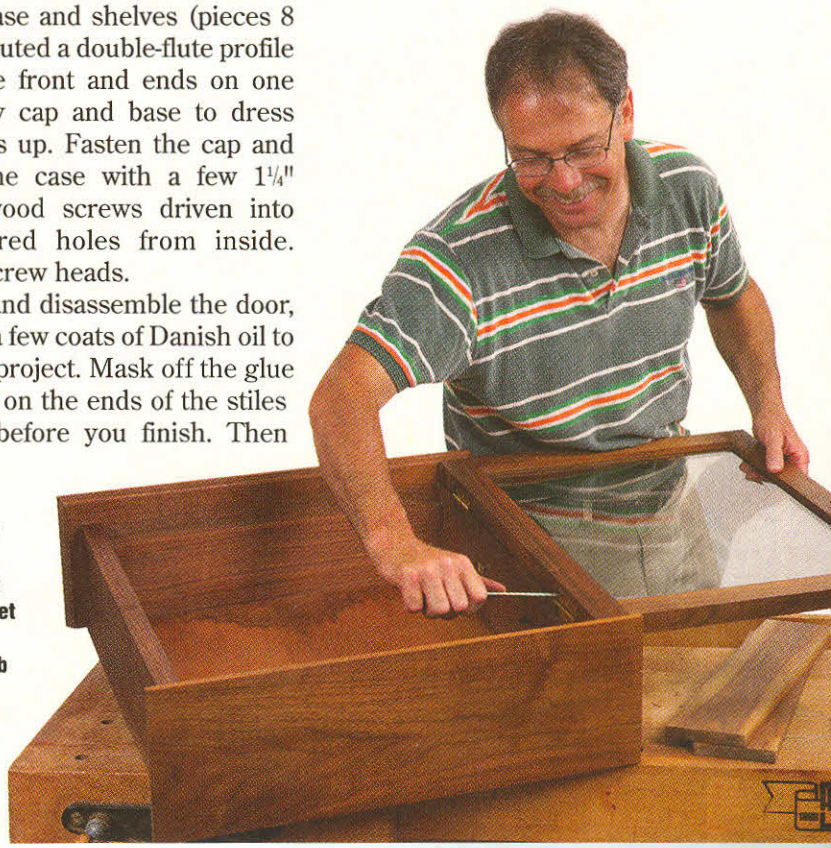
Adding the Cap, Base and Shelves

The last construction step is to make the cap, base and shelves (pieces 8 and 9). I routed a double-flute profile around the front and ends on one face of my cap and base to dress these parts up. Fasten the cap and base to the case with a few 1¼" flathead wood screws driven into counterbored holes from inside. Plug the screw heads.

Pull off and disassemble the door, and apply a few coats of Danish oil to the whole project. Mask off the glue joint areas on the ends of the stiles and rails before you finish. Then glue up the door joints, rehang it and add your shelving. Now, find a good spot on the shop wall to hang this project and start searching for those prized hand tools!

Keep making sawdust!

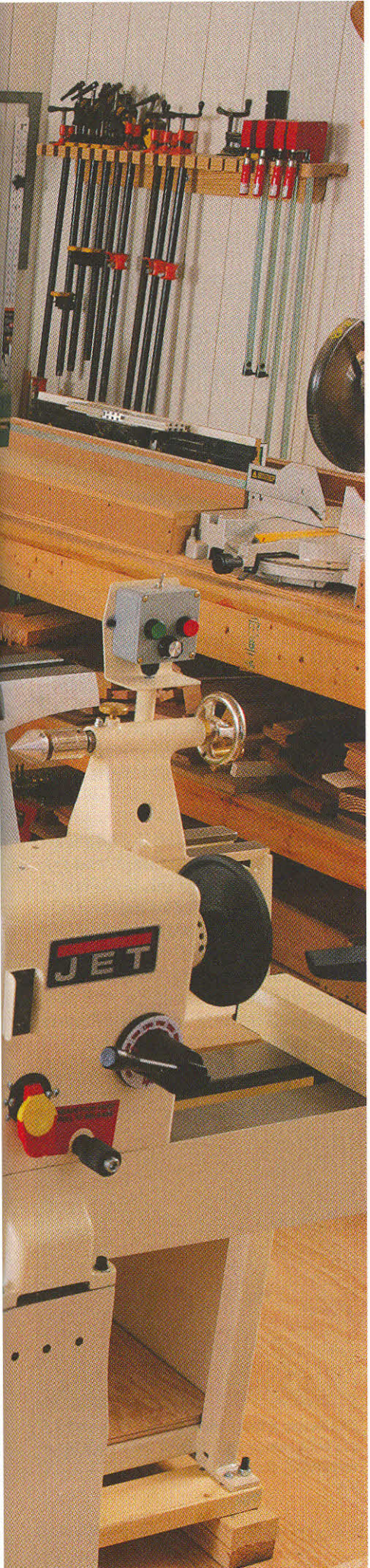
Scott Phillips hosts the nationally syndicated television program, The American Woodshop®. *He and his wife Suzy also star in* The American Homeshop® *on PBS stations across the country.*



Hang the door with a pair of 2½" brass butt hinges. A bullet catch and porcelain knob finish it up.

QUIK-LINK

Quik-Link takes you directly to the web page on which these products appear! No navigation necessary ... just go to *www.woodworkersjournal.com* and click on the Quik-Link icon shown above.



Betty and the Seven Lathes

By Betty Scarpino

Looking for a mid-sized lathe at a "mid-sized" price? There are a gaggle of choices, but you've got to shop carefully. Hi-ho, hi-ho ...

I am often asked, "Which lathe should I buy if I only have X-amount of money to spend?" That's a complex question because there are many variables. And the only way to offer an honest answer is to try a bunch of machines out.

Recently, I had just that chance, and I eagerly obliged. I spent the day in Chris Marshall's shop (he's the *Journal's* Field Editor) trying out seven mid-sized lathes — operating levers, turning power switches on and off, opening and closing casings, sliding tool-rests and headstocks and testing parts. I also made some shavings, turning faceplate and spindle work — definitely the most fun part!

To help narrow down the candidates for this lathe test, I used two primary criteria: size and price. This ruled out miniature lathes as well as lathes with large capacity (and high sticker prices). The lathes in between became the "mid-sized/mid-priced" lathes. Admittedly, it's a wide range. The brands in the test group are JET, Oneway, Powermatic, General International, Nova, Delta, and Craftsman. There are a few others out there that could have been included, but not every company could supply us with a model to test. Additionally, several of these companies have other models in their lines — be sure to visit their web sites to see the other options.

Prices for these lathes range from just under $600 to $3,000 — obviously a huge spread! Inboard capacity ranged from lathes with a capacity of 10" to ones that could handle up to 20". The spindle length capacity ranged from 24" to 42".

I was already familiar with the JET, Oneway, and Delta models tested here. I was somewhat knowledgeable about the General International and Powermatic, but I had not previously tried the Nova or Craftsman machines.

Two Quick Tests for Quality

Here are some easy tests that I used to help determine the quality of a lathe: 1) The headstock and tailstock should line up parallel with each other and be parallel to the bed of the lathe; and 2) All the parts should stay where they are when locked into place. (These tests can be performed right on the showroom floor and do not require tools or special equipment.)

To test that the headstock and tailstock line up, securely place the drive center into the headstock spindle and the live center into the tailstock. Slide the tailstock down the bed of the lathe until the two points of the centers almost touch. The points of the two centers should meet dead on. If they don't,

Tool Review continues on page 66 ...

then something is off. It could simply be that the points have been damaged and bent, which is easily repaired. If the centers themselves are not manufactured correctly, that is a bigger deal. If the headstock and tailstock are actually skewed, that's major and will cause problems for turning spindles or using the tailstock to support large faceplate turnings.

In terms of alignment, I found the JET, Oneway and Powermatic to be right on. The Nova and General were off only minutely, but not enough for concern.

The second test is to determine whether the toolrest, tailstock and headstock can be securely locked into position. For the toolrest, clamp it down, then grab hold of the assembly and pull on it, firmly twisting from side to side. It should remain in place. If it doesn't, try tightening the nut underneath. You need to strike a balance between tightening the nut, yet still leaving it loose enough for the toolrest to slide easily on the ways.

The same is true for the tailstock. For this, you will need to place a small chunk of wood between centers and lock the tailstock against it. Make a small mark on the bed of the lathe with a pencil, right where the tailstock is located. Advance the quill of the tailstock, tightening the wood between centers and check to see if the tailstock creeps back or if it stays in place. Don't overdo it here; moderate cranking is enough.

All the lathes did surprisingly well for the toolrest and tailstock tests, with the Oneway, General, Powermatic and Nova lathes at the top. Generally the cam system that locks these sliding parts works well.

"The stand that the bed of the lathe sits on is where the 'rubber meets the road,' so to speak. It's crucial to have a stand designed to limit vibration — a nagging problem for wood lathes."

— Betty Scarpino

ONEWAY
Model: 1224
Price: $1,995
Phone: 800-565-7288
Motor/Weight: 1 HP/300 lbs.

Capacity: 12" inboard, 24" between centers

Speeds: (rpm): 0-4,000

Spindle size: 1" x 8tpi

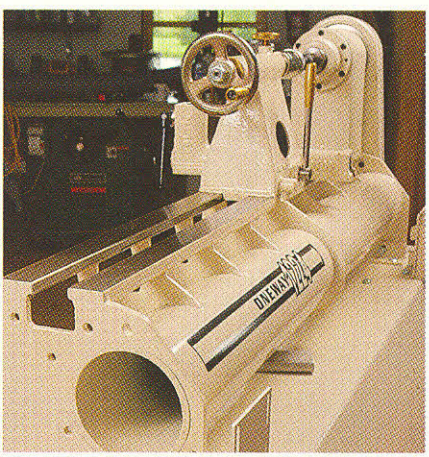
Other: Stationary headstock, steel cabinet stand with shelf

For more info on the web: use our QUIK-LINK

Swiveling Headstocks

A swiveling headstock introduces another place where things can go wrong. In general, I am not a fan of lathes with headstocks that swivel. It's just one more part that can become misaligned, or where things can go wrong. Some lathes advertise swivel heads for increased turning capacity inboard. I understand the theory, but in

One telltale sign of a good lathe is the ability of the drive and live centers to line up accurately. The Oneway was dead on.



All Oneway lathes, including the 1224 model, are built around stiff, tubular lathe beds for dampening vibration.

practice, even with the best of the elongated tool-rests, I find it impossible to turn a platter or large bowl of any size larger than the original inboard capacity. Also, the location of the on/off switches on five of the lathes require that you reach around and over the spinning wood to hit the off switch, which is dangerous.

If those considerations aren't enough, I have concerns about the ability of the elongated tool-rests to withstand even moderate dig-ins. Dig-ins happen to every turner. When the tool-rest extends way beyond the bed of the lathe, the force on the tool-rest, exerted from dig-ins, increases dramatically.

Furthermore, if that weren't enough, having the weight of a heavy, spinning object hanging over the side of the lathe increases the instability of the lathe itself. The wide stance of most lathe stands isn't enough to compensate for the weight shift to one side. My advice: If you consistently turn large chunks of wood, plan to buy a large-capacity lathe.

That said, one clear advantage to a lathe with a swivel headstock is the ability to turn a bowl without leaning over the bed of the lathe. For those with back trouble, this might be ideal. But you could also buy a lathe that has a headstock that slides to the end of the bed. A tool-rest assembly can be attached to the end of the lathe. The Powermatic is one such lathe.

Lowdown About Lathe Stands

The stand that the bed of the lathe sits on is where the "rubber meets the road," so to speak. It's crucial to have a stand designed to limit vibration — a nagging problem for wood lathes. Too much vibration can keep even good turners from achieving clean, consistent cuts. Here are three things to consider when looking for a sturdy, stable stand: weight, stance and design.

Tool Review continues on page 70 ...

JET
Model: JWL-1442VS
Price: $999
Phone: 800-274-6848

Motor/Weight: 1 HP/284 lbs.

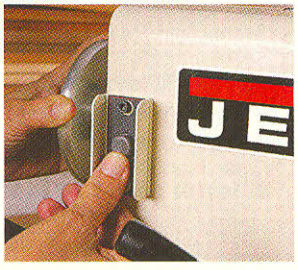
Capacity: 14" inboard, 42" between centers

Speeds: (rpm): 450-3,000

Spindle size: 1" x 8tpi

Other: Swiveling/sliding headstock, cast-iron stand

For more info on the web: use our QUIK-LINK



A swiveling headstock (above) is a mixed blessing for our author, but a spring-loaded spindle lock (right) should help prolong spindle life — and prevent ear-splitting screeches ...

In general, the more the stand weighs, the better it dampens vibration. Stands made from thin-gauge sheet metal not only are lightweight, but they also tend to twist with out-of-balance loads. Even so, adding weight helps, so load up your lathe if you are experiencing vibration. Sandbags work well. Several of these lathes have shelves or brackets for shelves built into the stand — great places to put extra weight. Oneway's lathe is built around a heavy, hollow tube which not only looks nice, but also most likely helps to dampen vibration.

A wider stance in the legs increases stability, so check out lathe stands by looking at them from either end. The Powermatic lathe was by far the heaviest lathe, and its 24" stance was the widest. The General lathe was a bit top-heavy due to the narrow width and relatively light weight of the stand, but by adding the weight to the hollow uprights of its stand, it should be fine.

I like the design of the legs on the JET and Powermatic lathes. Their curved, cast-iron legs are reminiscent of old-fashioned machinery blended with new technology. By comparison, the thin-gauge metal legs and narrow stance of the Delta and Craftsman lathes suggest that these lathes are meant for shops where space is limited. They would be easy to move out of the way.

Most of the stands on these test lathes could be bolted to the floor, an option that sometimes provides added stability. Two of the lathes had leveling pads, which are handy to have if your shop floors are uneven. A lathe that sits with all four legs solidly on the floor will be more stable than one standing on three!

The Nova lathe came with a medium-gauge metal stand that was too long for the length of the lathe, but the manufacturer, Tecknatool, is in the final stages of production on a new cast-iron stand. Delta also offers a few newer models with sturdier tubular stands.

Another issue to consider is the height from floor to spindle. It varied somewhat from one model to the next. Height of a lathe is certainly a consideration, but you get what you get. If the lathe is too low, build a platform for it to sit on. If it's too high, make a soapbox to stand on.

Variable Speeds and Control Panels

Most new lathes have variable speed of one sort or another. The technology and design in this area keep evolving. Oneway figured out a good system years ago. I find their design to be straightforward and easy to use. That's not to take away from the others — any lathe with variable speed is a treat.

I like the fact that the slowest speed offered for the lathes in this group was slow enough for turning most large-capacity, off-balance objects (450 RPM). My preference, however, is when the speed selection starts at zero. Several of these lathes provided that option.

The control panels on these lathes were all different. A speed-control dial or lever worked the best for me — these were simple and straightforward to use. The control panel for the Oneway lathe was moveable. It could be

positioned at the headstock or at the tailstock — a handy feature when turning large bowls and platters so you don't have to reach over the spinning object.

General's solution is to provide a magnetic-backed emergency "kill" button that can be attached anywhere. The large red push button is easy to find and use. Several lathe manufacturers offer these as optional equipment.

Faceplates, Hand Wheels and Spindle Locks

Most woodturners use a 3" or 4" faceplate, even when turning large stock. The one 6" faceplate I own functions quite well as a hand wheel. It's a minor point, but lathes ought to include a 3" faceplate as standard equipment. Some of these did; others had a 6" faceplate.

A hand wheel is a helpful feature for a lathe. Among other things, it allows the turner to rotate the stock when checking

continues on page 72 ...

Powermatic's beefy, wide, cast-iron stand addresses vibration and instability better than a lighter-weight steel stand. This lathe also has an easy-access door to the pulleys and drive belts (see inset).

POWERMATIC
Model: 3520B
Price: $2,999
Phone:
800-274-6848

Motor/Weight:
2HP/720 lbs.

Capacity:
20" inboard,
31" between centers

Speeds: (rpm): 50 - 3,200

Spindle size: 1¼" x 8 tpi

Other: Sliding headstock, cast-iron stand, safety guard

For more info on the web: use our QUIK-LINK

GENERAL INTERNATIONAL
Model: 25-650
Price: $1,769
Phone: 514-326-1161

Motor/Weight: 1 HP/407 lbs.

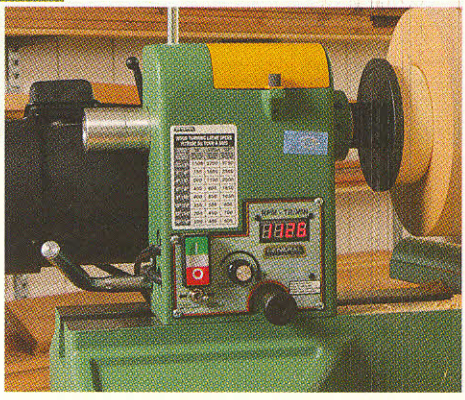
Capacity: 16" inboard, 42" between centers

Speeds: (rpm): 0-3,750

Spindle size: 1" x 8tpi

Other: Swiveling/sliding headstock, steel cabinet stand

For more info on the web: use our QUIK-LINK



General provides digital readout and a helpful speed chart to dial in the variable speed (right). The 25-650 also comes with a magnetic "panic" button (above) that can mount anywhere you want it to be.

for clearance or for marking lines on the wood, and it allows for rotation of the spindle when checking for sanding scratches. I found myself reaching for the hand wheel when testing all these lathes and missing its presence when it wasn't there. Even though the Nova is a direct-drive lathe, there is a nicely machined hand wheel on the end of the headstock. The Craftsman didn't have a hand wheel.

All the lathes had spindle locks — you know, those little things you sometimes forget to unlock before you turn on the lathe ... and screeeech! The JET and Powermatic have a spring-loaded spindle lock pin. I rather liked this new development, even knowing that it will sacrifice the option of locking the spindle in place to saw off a finished bowl.

Reverse/Forward Options

Several of these lathes have a reverse option: It's helpful for sanding and for some types of bowl or box turning. I will say, however, that for the most part, it's not an option I find particularly necessary.

Improved Drive Centers

Out with the old, in with the new! Most woodturning schools have switched from spur drive centers to newer "spurless" models — they are much safer. Sure, a spur drive center will ensure that the wood stays on the lathe if a dig-in occurs, but when that happens, something needs to give. That something could be the skew chisel or gouge! The new drive centers securely hold the wood on the lathe, and when a dig-in occurs, the wood simply stops rotating. It teaches a turner to be more sensitive to each cut, and with proper instruction and practice, slippage rarely happens.

Oneway recently introduced a spring-loaded, one-point drive center. The point is extra long, helping to keep the wood on the lathe. Several independent lathe-accessory companies offer modified-looking tailstock centers with a series of saw-kerfs on them. They work great.

Noise! What Noise?

New lathes are quieter than any of the old shop lathes. I found several of them to be extremely quiet, in particular the General. I was annoyed by the pitch of the Nova lathe — it was at just the wrong level for my ears. But, I suspect this is merely personal preference.

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Craftsman's motor swivels when needed (see above), and its variable-speed is provided through a centrifugal clutch instead of the usual belt and pulleys (inset).

CRAFTSMAN
Model: 21715N Professional
Price: $580/Stand: $100
Phone: 800-377-7414

Motor/Weight: 2HP (max)/175 lbs.

Capacity: 15" inboard, 38" between centers

Speeds: (rpm): 360 - 2,400

Spindle Size: 1" x 8 tpi

Other: Headstock swivels 90°, steel stand not included

For more info on the web: use our QUIK-LINK

Other Options to Consider

Sometimes it's the little things that make the difference, and I found several delightful new features on these lathes.

Some of these lathes have a pin that threads into the ends of the lathe beds. These will keep the headstock and tailstock from slipping off the lathe — an important feature for headstocks that can be moved along the ways of the lathe. What a disaster if the headstock were to fall off!

Tool Review continues on page 76 ...

DELTA
Model: 46-715
Price: $649
Phone: 800-223-7278

Motor/Weight: 3/4HP/300 lbs.

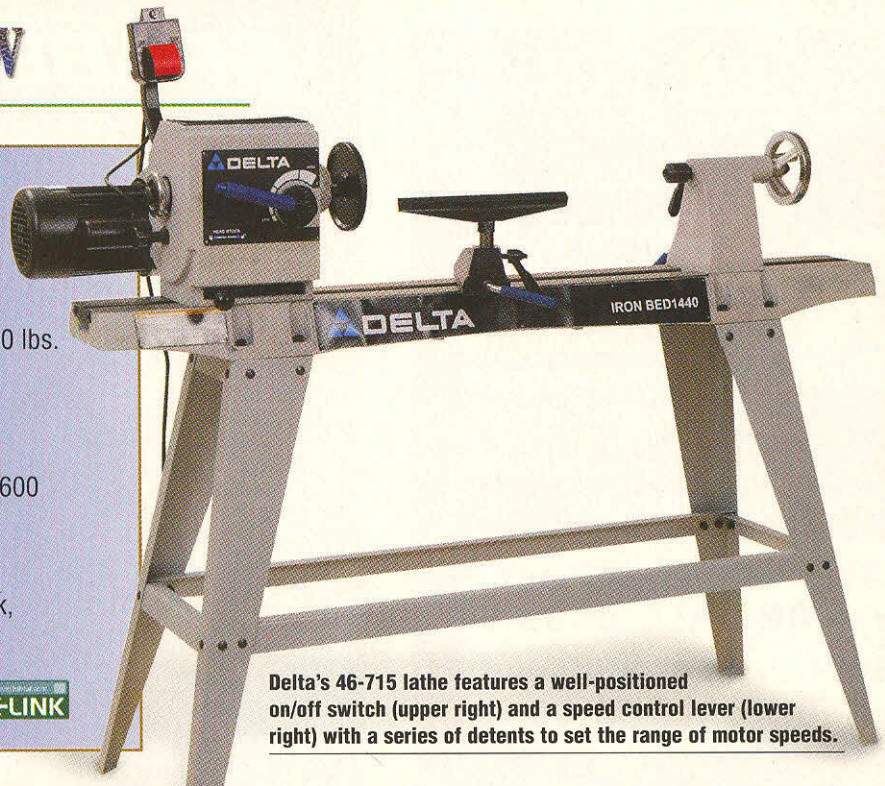
Capacity: 14" inboard, 40" between centers

Speeds: (rpm): 450 - 2,600

Spindle Size: 1" x 8 tpi

Other: Sliding headstock, steel stand

For more info on the web: use our QUIK-LINK



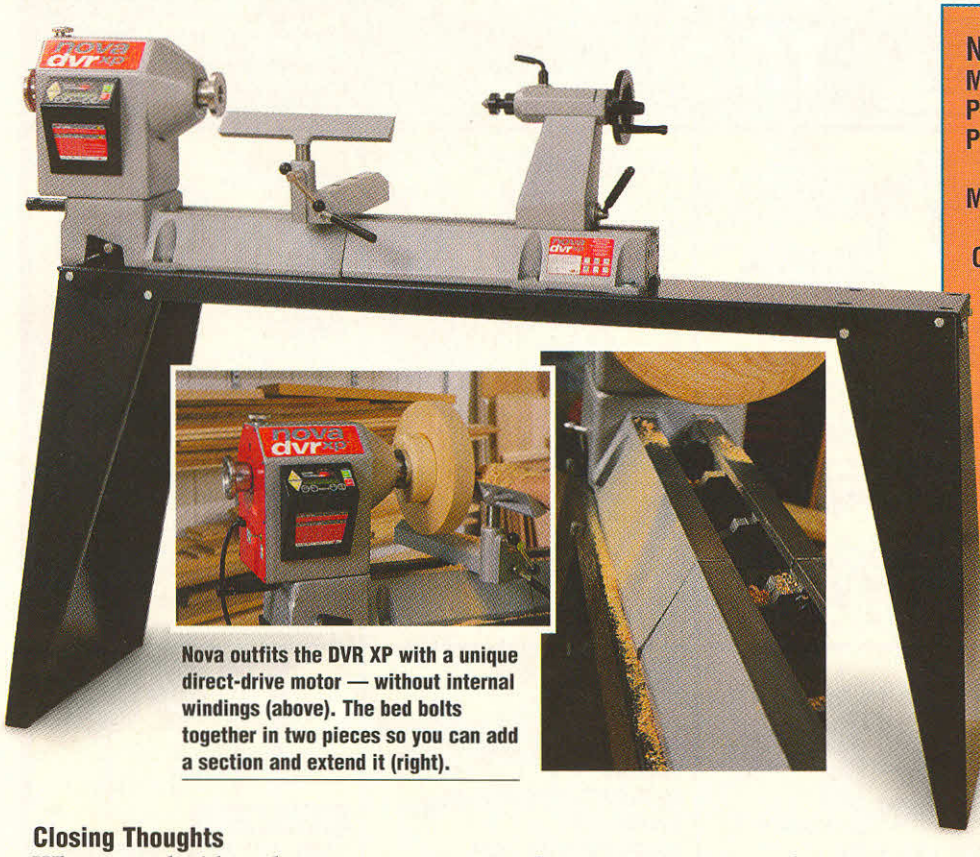
Delta's 46-715 lathe features a well-positioned on/off switch (upper right) and a speed control lever (lower right) with a series of detents to set the range of motor speeds.

The Powermatic lathe had a nifty rack attached to the headstock end of the lathe for accessories storage. The Oneway lathe came with a blue-handled Allen wrench for securing or removing faceplates.

There was even a holder for it located near the headstock. The General and Oneway lathes also had a helpful place for storing their knockout bars — right on the lathe.

The bed of the Nova lathe is built in sections. If, at a future date, you need a longer bed, sections can be bolted on easily. Nice expandability!

Tool Review continues on page 78 ...



Nova outfits the DVR XP with a unique direct-drive motor — without internal windings (above). The bed bolts together in two pieces so you can add a section and extend it (right).

NOVA
Model: DVR XP
Price: $2,195
Phone: 866-748-3025

Motor/Weight: 1¾ HP/181 lbs.

Capacity: 16" inboard, 24" between centers

Speeds: (rpm): 100 - 3,500

Spindle Size: 1" x 8 tpi

Other: Swiveling headstock, expandable bed, steel stand

For more info on the web: use our QUIK-LINK

Closing Thoughts

When you decide to buy a new lathe, give several models a test drive. Even if you are purchasing at the lower end of the price range, you are still spending hundreds of dollars. In the lower price range, I liked the JET lathe at about $1,000. It offers a good blend of performance, features and sturdy construction for the money. In fact, it's my pick for the "Best Bet" award in this review. If you only have a few hundred dollars to spend, or plan on turning just every now and then, try the Delta or the Craftsman lathes.

In the next price-range category of around $2,000 are the Oneway, General and Nova lathes. Considering these prices, I strongly recommend that you test these lathes to determine your personal preference. Each manufacturer has put money into different features. Personally, I liked the straightforward simplicity of the Oneway and the General, both made in Canada. The Nova, manufactured in New Zealand, has a direct drive motor which might appeal to some — there are no internal windings to replace. The Powermatic was the most expensive, and it truly did seem indestructible.

Whatever lathe you decide to purchase, do the research and testing first. But above all, buy a lathe! If not, you are missing out on some of the most rewarding, fun experiences of working with wood.

Our turning expert, Betty Scarpino, recently had the opportunity to use an old, long-bed Powermatic lathe. Check out her web page at www.bettyscarpino.com to see the tall spindle she made.

The author (left) got an assist from Field Editor Chris Marshall, who opened his shop to her and the seven lathes that followed her to Ohio.

Meditating on the Difference

By Rob Johnstone

Discerning the differences between these categories of table saws is not so simple. Figuring out which is right for you might even lead you into a contemplative confluence of a very personal sort. Be at peace; the Journal's *yogi of tool geekdom will lead you down the path of power tool enlightenment!*

What's in a name? As the bard observed, "... a rose by any other name would smell as sweet." So a name's meaning is not as immutable as it first appears. This is especially true of technology. With time, as a product evolves, so too do the names we use. In the computer world, the question used to be "Do you use an IBM or an Apple?" Now, the same question is framed, "Are you a Windows® or Mac person?" That same sort of shift seems to be at work in the sphere of table saws. For many years, the three main categories of table saws used in our home-shops (and even small professional shops), were benchtop, contractor's and cabinet saws.

Historically, these names were simply descriptive in nature: The benchtop was used on a bench; contractor's saws were developed

Delta 10" Hybrid Saw with Biesmeyer fence (Model 36-717)

RIDGID TS3650

... Cabinet, Contractor's or Hybrid Saws

for job site work; and the more robust saws, coveted by those making cabinets, had a metal cabinet that enclosed the motor, trunnions and eventually, gears to raise, lower and tilt the saw blade. Unimaginative, but effective. In the late 1970s, home woodworking began to increase in popularity. The demand for appropriate power tools for the "hobbyist" market generated products to serve this group. From that point on, the commonly used names for table saw types were used to identify a commodity of tool, in contrast to being a simple descriptor. This natural evolution drove a further event — these increasingly popular saws were fine-tuned to fit the needs of the home woodworker. Additional features and characteristics were added to these saw categories in a sort of "mix and match" manner. For example, increased horsepower motors and fancy fences that were once only found on cabinet saws became common on contractor's saws. Open stands that were a defining characteristic of contractor's saws became available on benchtop models. This commingling of features blurred the traditionally clear-cut boundaries defined by each saw's name.

Then, in the late 1990s, DeWalt introduced a table saw that they appropriately called a "hybrid," which threw a monkey wrench into the mix and essentially made the old naming convention nearly meaningless. Product naming continues to limp along, driven mostly by marketing concerns, with today's contractor's saw being the least meaningful (at least name-wise) of the lot.

Setting the Field

Leaving behind the more limited grouping of benchtop table saws and understanding how these three somewhat ambiguous categories of saws are constructed is the key to determining which of them best suits your needs.

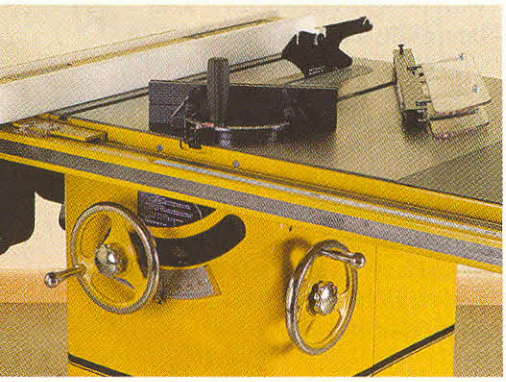
Today's Shop continues on page 86 ...

Three exceptional examples of their individual categories: These table saws were selected to demonstrate the essential characteristics and differences to be found among cabinet, hybrid and contractor's saws. Which saw of this trio most closely accommodates your woodworking needs? The answer will be found in the features.

Powermatic PM2000 Cabinet Saw

Cabinet Saws:
Precise, powerful and pricey

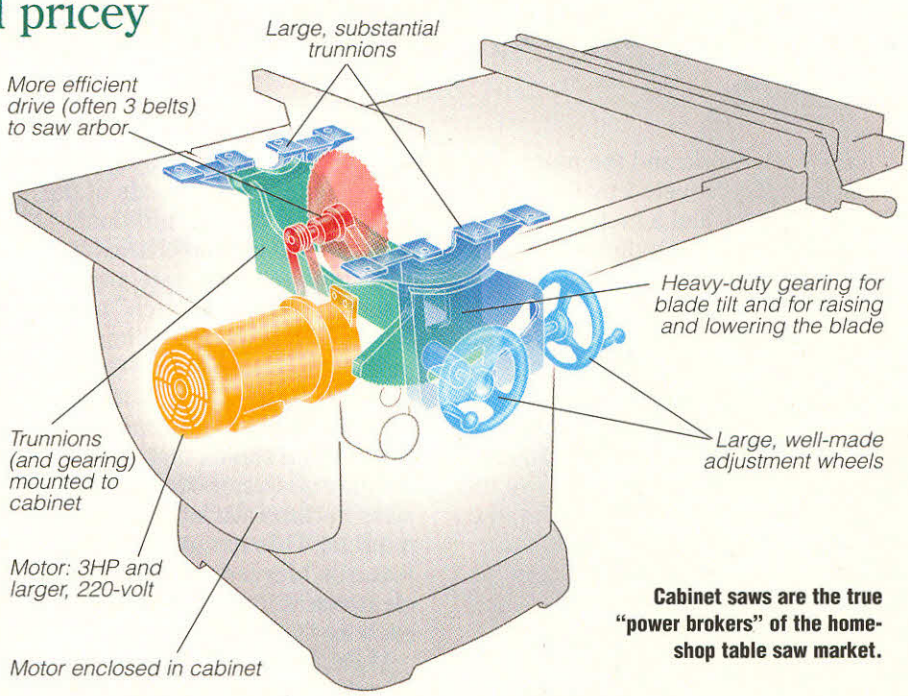
The classic cabinet saw is the quintessential woodworking power tool to my way of thinking. I want a Delta Unisaw or a Powermatic 66 in my shop in the same way I want a mint, early-model Thunderbird or a full-sized 4 x 4 pickup truck with the off-road package.



Every feature of this cabinet saw is certifiably heavy-duty. Made for professional shops, they're increasingly popular with home woodworkers.

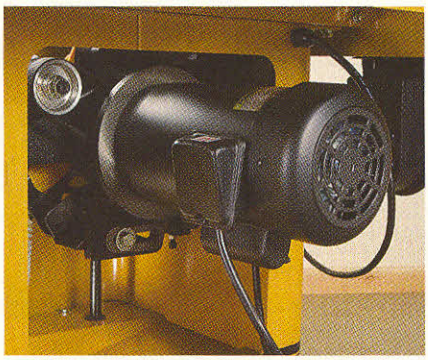
If I look at it rationally, I know that there is little that the cabinet saw can do that I cannot do sufficiently well on one of the less substantial table saws. But in tough tasks that challenge smaller saws, the cabinet saw breezes through without even breaking a sweat.

Power and durability are the key factors that cabinet saws deliver over and above the other table saws under discussion here. In every detail, with the possible exception of the fence systems, cabinet saws are bigger, stronger and, in general, better built.



Cabinet saws are the true "power brokers" of the home-shop table saw market.

These saws are designed for professionals but are well-loved by all woodworkers. Cabinet saws have more cast iron and steel, bigger pulleys, gears and more robust bearings. They have more powerful motors (requiring 220-volt circuits for 3HP and larger motors), often with three belts driving the arbor. Their weight is considerable. They are, in general, machined to more exacting standards. All this costs more money to produce — it's as simple as that. But the additional heft and substance mean that they will also last almost forever. When I started serious woodworking in the 1970s, I used a Unisaw that was built in the 1940s … and it never missed a beat.



Motors that range from 3HP to 5HP (and larger) are common on cabinet saws. These saws are designed to run all day, every day.

Prices for these big-boys range from just under $1,000 (Grizzly's G1023S) to well over $2,100 (Powermatic's PM2000). Within each category of saw, you get what you pay for.

Powermatic PM2000 Cabinet Saw

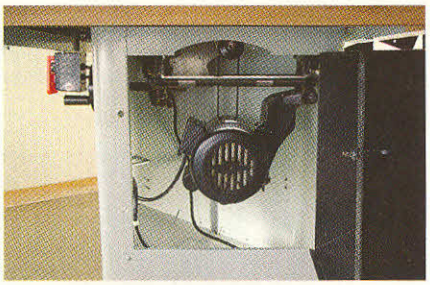
Cabinet Saw Lowdown

More saw than the average woodworker needs, but not more that they can make use of. Here are some common cabinet saw features:

- Fences and miter gauges that are of good quality
- Large, flat, cast-iron tables
- Low vibration due to solid construction
- Exceptional durability
- Powerful motors (won't run on 120-volt common household current)
- Price range: $1,000 to $2,100 plus — some much more

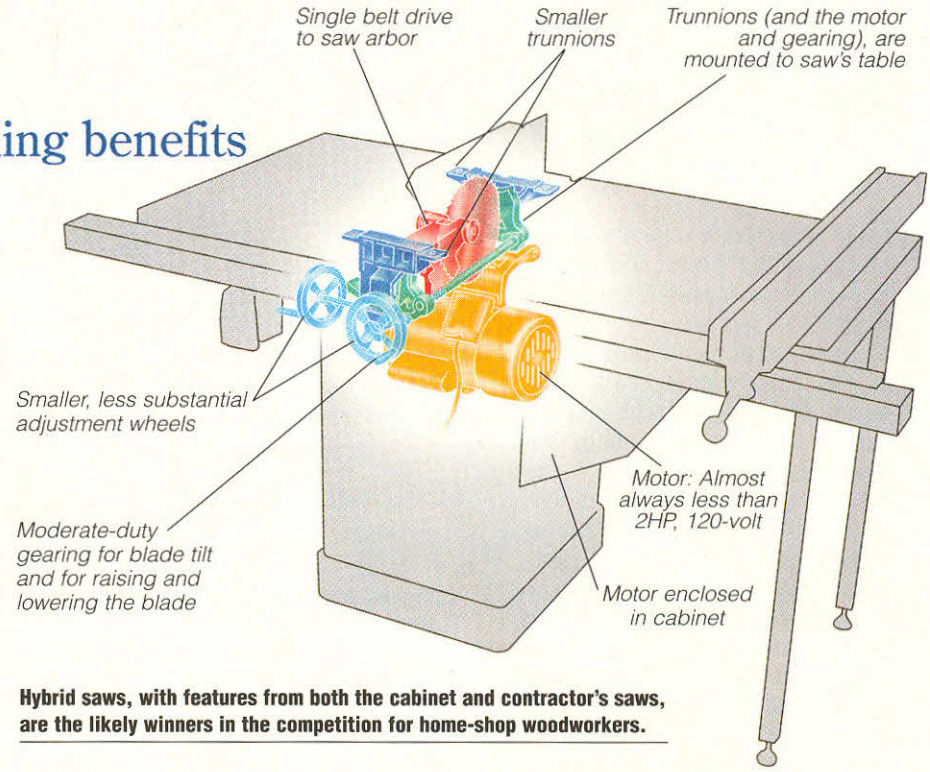
Hybrid Saws:
Bending rules, blending benefits

Hybrid saws are simply a great idea: Take elements of cabinet saws and contractor's saws, by far the two dominant home-shop table saws, and blend them into the perfect home-shop compromise. But alas, no compromise is perfect. While hybrid saws have cabinets, they are not as robustly built as their pro-shop cousins. Their motors all run on 120-volt household current, which makes them much more



The hybrid cabinet is a great help in controlling sawdust. It also contains the motor, which makes it a bit quieter than a contractor's saw.

convenient for the average home woodworker but limits the horsepower. (Although claims of 2HP motors are not uncommon, unless a special 30-amp circuit is provided, the saws will not deliver that much oomph.) The cabinet does help control sawdust and mask a bit of noise as well. Both the DeWalt hybrid and JET Supersaw offer versions with sliding tables, a very sophisticated feature borrowed from top-drawer cabinet saws. The trunnions and gearing of most

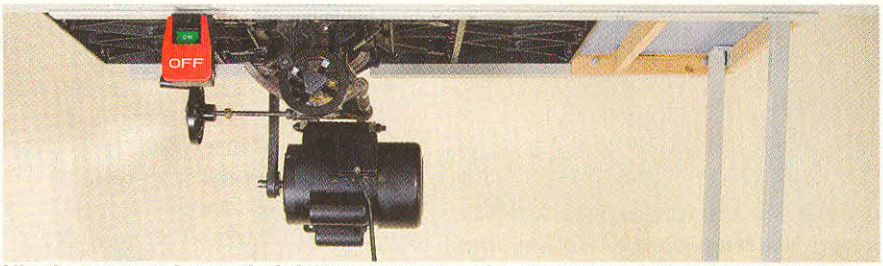


Hybrid saws, with features from both the cabinet and contractor's saws, are the likely winners in the competition for home-shop woodworkers.

hybrids are more substantial than contractor's saws, but not even close to that of cabinet saws. But they're just fine for 99 percent of home-shop woodworking projects.

Hybrid saws may well be the future of the home-shop table saw. Their success will likely lead to the death knell of the contractor's saw. Why buy a moderately powered saw with an open base that has its motor hanging out behind it? The major limitations of hybrids is power, and the fact that they will not be as durable as a cabinet saw. Their prices top out at $1,300, but they can be found for as low as $700, depending on the brand.

Today's Shop continues on page 88 ...



Like the contractor's saw, the hybrid's motor and gearing are mounted to the tabletop. Trunions and gearing are smaller and less robust than a cabinet saw's.

Hybrid Saw High-points

An ultra-practical power tool for the home-shop woodworker. Moderately priced with great accessories available. Consider these details:

- Fences and miter gauges are of good quality
- Enclosed cabinet for better dust collection and control
- Large tabletops
- 120-volt motors will run on common household current
- Price range: roughly $700 to $1,300 or a little more

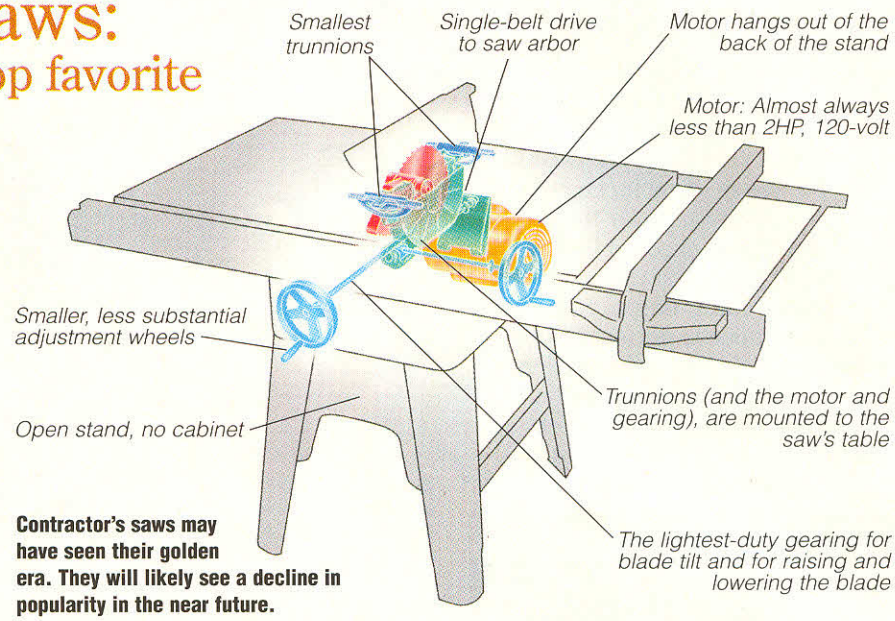
Delta 10" Hybrid Saw with Biesmeyer fence (Model 36-717)

Contractor's Saws:
Traditional home-shop favorite

Contractor's saws are the blue-collar heroes of the home-shop world. Reasonably priced, straightforward in design and operation, few tools fueled the wave of home woodworking half as much as the contractor's saw. Originally designed to be hauled from work site to work site, this open-based saw often had a tabletop of open web-frame cast iron or stamped sheet metal fabrication.

But as these practical saws gained in popularity with the home-shop crowd, solid, cast-iron tops became more common, and upscale accessories arrived on the scene as well. One of the important details that made the contractor's saw so popular was the fact that it ran on 15-amp, 120-volt power. This eliminated the cost and hassle of adding new wiring to a basement or garage.

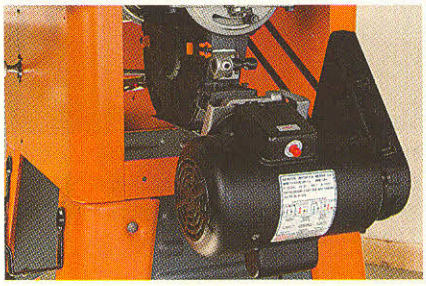
An open base is less expensive to manufacture but much messier in the shop. Many folks are concerned about dust collection these days.



Contractor's saws may have seen their golden era. They will likely see a decline in popularity in the near future.

Although woefully under-powered by cabinet saw standards, outfitted with a superior-quality saw blade and an after-market fence, it was the practical Ford Fairlane station wagon, as compared to the cabinet saw's F-350 4x4 pickup truck.

One reason that contractor's saws remain less expensive is the fact that you virtually have to assemble them from scratch. With prices ranging from around $500 to more than $1,000, it's the least expensive of these three types of saws. But I think the days of contractor's saws are numbered. Contractors no longer use them — upscale benchtop saws are ruling their world. With hybrid saws' prices looking similar to many contractor's saws ... the intrinsic drawbacks of an open base, smaller trunions and the motor hanging out of the back of the saw will be enough of a drawback to move folks to the hybrids, or whatever their progeny will be.



With the motor hanging off the back and even smaller trunnions and gearing, the end of the contractor's saw may be drawing near.

So ... which model is best for you? That depends, but the flowchart on page 90 may help you decide!

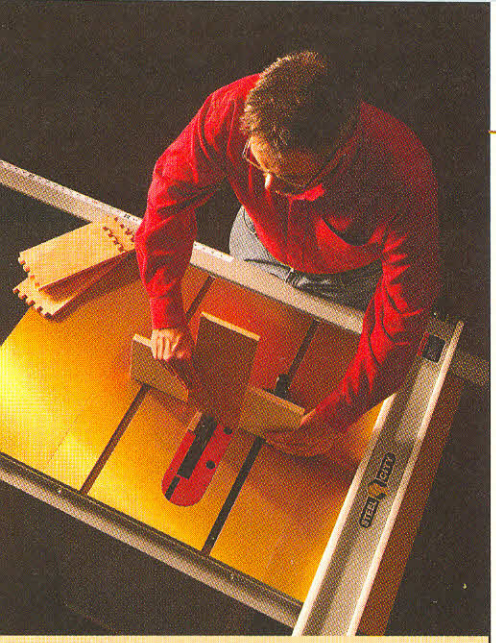
Today's Shop continues on page 90 ...

Contactor's Saw Straight Talk

Perhaps the most popular home-shop woodworking saw ever made. This old standby is still the go-to tool in thousands of shops:

- Fences and miter gauges of good quality are available
- Open stand for limited dust collection and control
- Small- to moderate-sized tabletops
- 120-volt motors will run on common household current
- Price range: $500 to $1,000 plus

RIDGID's TS3650



Steel City Tools:

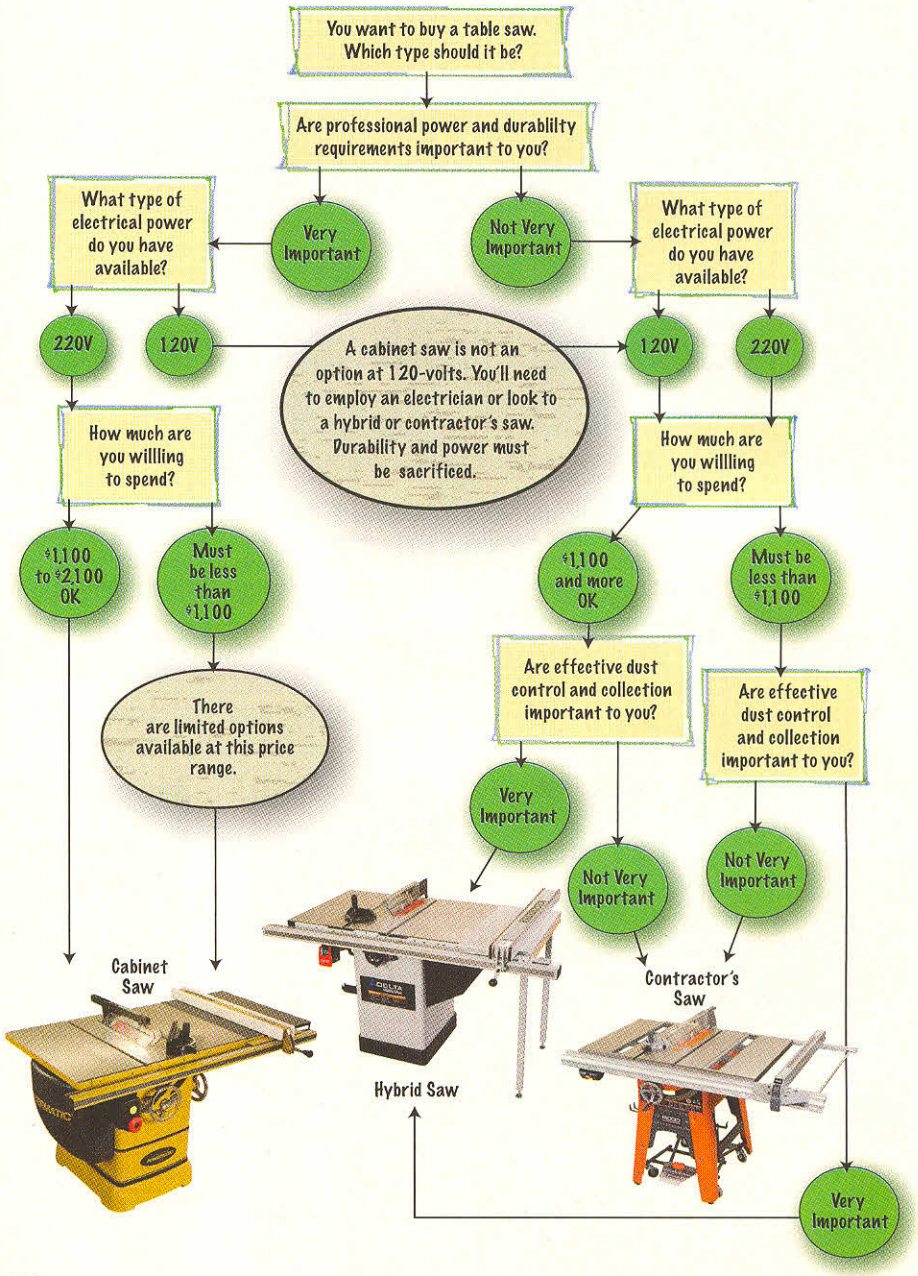
The New Kid on the Block

At the International Woodworking Fair in Atlanta last August, a new tool company showed off a complete line of stationary power tools. Steel City Tools is made up of alumni from most of the major power tool companies, and their line of tools is anchored by a full complement of table saws.

Interestingly, Steel City decided not to put out a contractor's saw model. Their least-expensive model is what Vice President Scott Box calls "the next generation of hybrid saws." Its trunnions and gearing are attached to the cabinet — but it is less robust than the classic cabinet saw. Steel City follows that entry-level saw, with several models and options that continue up to a 12", 7HP cabinet saw.

New and innovative from Steel City is a titanium nitrite (TiN) impregnated cast-iron tabletop (see the photo above and on the cover) that they match with table saws and shapers. Titanium nitrite is harder than carbide, and these new tops are virtually maintenance-free, with increased lubricity. The process increases the price of a table saw by approximately $200. Steel City Tools will be sold through the industrial tool channels.

Which Table Saw Type is Best for You?



Deciding which saw works best for you is a process that's affected by many and varied factors, both too broad and too specific to be covered comprehensively in an article like this. However, I've constructed the flowchart above as a good starting point. It incorporates common criteria that many folks find to be important considerations when purchasing a saw. The chart may clue you in to criteria that you may not have yet considered. It will definitely get you started down the right purchasing path. Every tool purchase is a compromise of sorts: Available funds versus quality, space versus features, desire versus reality.

In the end, I always like to pass along the advice that my father gave me years ago: "Buy the best you can afford and you'll only cry once."

Rob Johnstone is the editor of Woodworker's Journal *and* Woodworker's Journal eZine. *He lives in Minneapolis with his family.*

Our 30TH Year

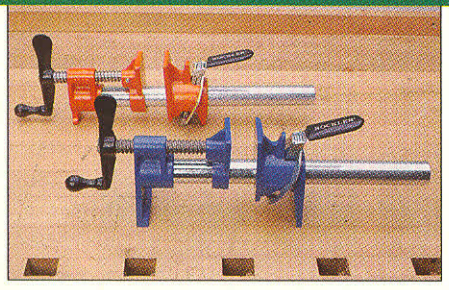
Smarter, Safer, Stronger

FIRESTORM KEEPS CUT LINE IN CLEAR VIEW

Black & Decker's 10" Firestorm Compound Miter Saw has a laser mounted on the blade guard that keeps the laser line visible before, during and after your cut. With the manual On/Off switch, you can accurately line up your cut without having to run the saw. Simply turn on the laser line, line up your cut and then turn on the saw. Equipped with a powerful 15-amp, 3HP motor, the Firestorm comes with a 40-tooth carbide-tipped blade that cuts 47° left/right miters and -2°/48° bevel cuts. An electric brake stops the blade in seconds after each cut so you can move on quickly to the next cut. Nine pre-indexed miter stops provide for easy repeatability and a high-sliding fence provides solid support for cutting taller materials. Suggested retail is $159.

For more information, call 800-556-6696 or visit www.woodworkersjournal.com and click on QUIK-LINK.

ROCKLER SOLVES CLAMPING'S STICKY CLUTCH PLATE PROBLEM

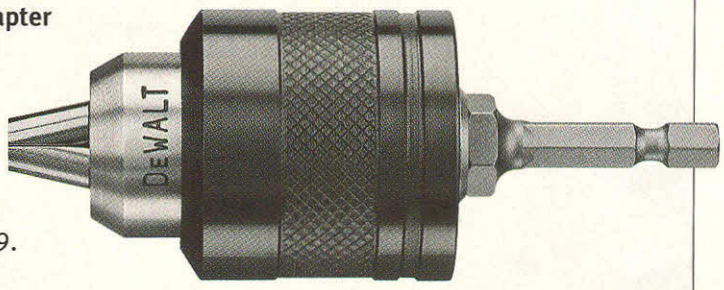


Rockler's new EZ-Clutch™ Quick Release System eliminates pinched or sticky clutch plates when you're trying to release tailstock. Available for either standard 3700-style bar clamps (Model #38765) or Sure-Foot™ and Pony® pipe clamps (Model #30618), the EZ-Clutch dramatically increases your leverage so that bar and pipe clamps release with ease. The EZ-Clutch system is retailing for $3.99. *For more information, call 800-279-4441 or visit* QUIK-LINK.

QUIK-LINK **Quik-Link takes you directly to the web page on which these products appear! No navigation necessary... just go to www.woodworkersjournal.com and click on the Quik-Link icon shown at left.**

DEWALT HAS A NEW CHUCK ADAPTER FOR QUICK CONNECTIONS

DeWalt's DW0521 Quick Connect Impact Driver Chuck Adapter allows users to adapt their cordless impact drivers from fastening applications to drilling operations instantly. It incorporates a 3/8" single sleeve, keyless chuck onto a 1/4" quick connect shank that fits right into the chuck of the impact driver, allowing you to attach various sizes and styles of bits (3/8" and below), including twist, paddle, masonry, ship auger and unibits. The unit sells for $29.99. *For more information, call 800-235-2000 or visit* QUIK-LINK.



STANLEY'S DEMOLITION BREAKTHROUGH

The Stanley FatMax Xtreme™ FUBAR™ demolition tool, which stands for "functional utility bar," is a multi-tasking tool that quickly removes dry wall and other sheathing material, splits and cuts building materials or metal strapping and pulls and pries nails and lumber. The extracting claw (opposite the striking face), can grab ahold of dimensional lumber and decking. It sells for $39.97. *For more information, call 800-782-6539 or visit* QUIK-LINK.

LIQUID NAILS INTRODUCES RHINO-ULTRA

Liquid Nails' Rhino Ultra Glue™, a new polyurethane-based bottle glue, bonds stronger, faster and tougher for longer work time, shorter clamp time and better resistance to extreme weather, temperature and impact. The cost is $ 7.96 for 4.5 oz., $13.96 for 8.5 oz. or $3.96 for a 1-oz. tube. *For more information, call 800-634-0015 or visit* QUIK-LINK.

Our 30TH Year

Some Finishes Are Just Fickle

By Michael Dresdner

Q I'm making a flute case for my daughter out of cocobolo and was wondering what kind of finish I should use. I was told that some finishes are not compatible with this wood.

— Christian Bradley
Bellevue, Nebraska

Michael Responds: That's true. Cocobolo is a Dahlbergia, a member of the rosewood family and a group of woods that contain a natural antioxidant. As a result, they interfere with the drying of finishes that cure through oxygen polymerization, including most oil-based finishes. Coatings that cure through solvent evaporation, such as shellac, lacquer and water-based coatings, will all work. Of these, an exterior water-based polyurethane is your best bet.

Were it not for the wood restriction, my first choice for a flute case would have been an exterior oil-based polyurethane. It has the ability to withstand heat, cold, wood movement, water, abrasion and all manner of chemicals. Fortunately, there is a way around the antioxidant problem. Seal the case first with one coat of Zinsser SealCoat™, a dewaxed shellac- based sealer that is compatible under oils and will act as a barrier to the antioxidant. When the SealCoat is dry, apply several coats of exterior oil-based polyurethane.

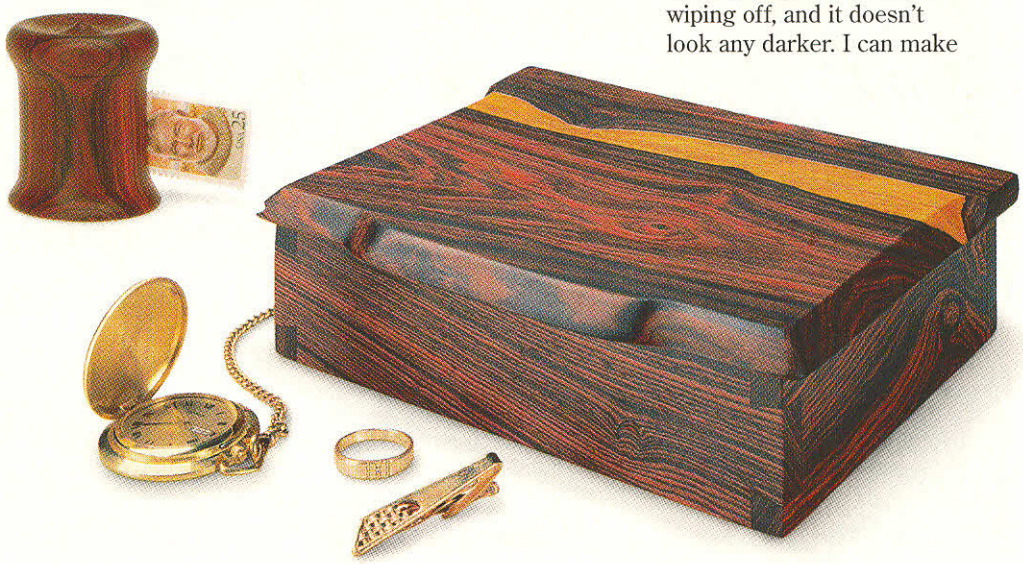
Q What types of cartridges and filters should I be using in my respirator? I use the typical solvents and finishes most woodshops use.

— Jeff Damon
Wasilla, Alaska

Michael Responds: An "organic vapor cartridge," which is called just that by manufacturers and vendors, will handle the common solvents you are likely to use, but to work well, it must be paired with a pre-filter to stop airborne finish particles and dust. Most companies offer three types of pre-filters, designated "P" for oil-proof, "R" for oil-resistant and "N" for not for oil. If you do not spray oil-based coatings, you may be able to use the slightly cheaper "N" grade, but for wide-spectrum protection, your best bet is a "P"-type pre-filter atop an organic vapor cartridge.

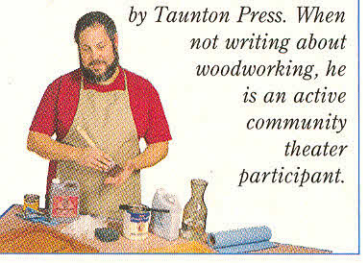
Q I made a coffee table using ash for the top, poplar for the aprons and pine for the legs. I applied Olympic Red Mahogany stain, and it was perfect on the white pine legs and poplar apron, but it is not dark enough on the ash. I've applied three coats, waiting as long as possible before wiping off, and it doesn't look any darker. I can make

Wood species can be a factor when deciding which finish is appropriate. Michael gives our reader the lowdown on finishing cocobolo.



ABOUT MICHAEL DRESDNER

Michael Dresdner *is a nationally known finishing expert and the author of* The New Wood Finishing Book *by Taunton Press. When not writing about woodworking, he is an active community theater participant.*



Contact us by writing to "Finishing Hotline," Woodworker's Journal, 4365 Willow Drive, Medina, MN 55340, by faxing us at (763) 478-8396 or by e-mailing us at: finishing@woodworkersjournal.com Please include your home address, phone number and e-mail address (if you have one) with your question.

Which filters are best for the different solvents used most commonly by woodworkers? If you know how to read them, the answers are printed right on the filters.

it almost dark enough when I apply a generous amount, but I think it's just lying on top. I plan to use oil-based polyurethane for the top coat. Can this piece be saved?

— Allen Freeman
West Boylston, Massachusetts

Michael Responds: You were wise not to heap stain on and try to seal it in, as that can result in the finish delaminating later. As you now know, not all woods take stain the same way, even when they are sanded the same.

continues on page 102 ...

WINNER! *For simply sending in his question on filter cartridges, Jeff Damon of Wasilla Alaska wins an* **Olympic Interior Wood Finishing Kit.** *Each issue we toss new questions into a hat and draw a winner.*

A Case of Blind Faith

By Michael Dresdner

A French polish "mouse."

Someone wrote me this morning about his grandfather, who is a blind woodworker, and it instantly took me back three decades.

At that time, I was doing "in house" touchup work, surely the most ignominious of all finishing jobs. I'd go into a home and spend the better part of a day touching up all the furniture in the house, often under the watchful eye of the owner. For most customers, appearance was everything, so I'd carefully fill dings, match colors, clean surfaces, then restore the sheen and silky feel of the finish with French polish.

> "I may not be able to tell if the colors are right," he chuckled, "but I can assure you I can judge your finishing skills by feeling the surfaces once you are done."

One day, a gent who lived alone hired me to touch up and French-polish all the furniture in his house, a fairly typical request, but when I arrived, I realized this was anything but. It was immediately apparent that he was blind.

Standing there, dumbstruck, I was wondering how this man could possibly know whether I did a good job, the usual hurdle before getting paid, when he interrupted my thoughts. "I know what you are thinking," he offered, and as he continued, it was apparent that he did. "I may not be able to tell if the colors are right," he chuckled, "but I can assure you I can judge your finishing skills by feeling the surfaces once you are done."

Of course, my own personal ethics demanded that all touchup colors be spot on, even though the match might never be seen, and I took extra care with the French polishing as well. When I was done, the old man carefully caressed every surface of every piece, then complimented me effusively on my work.

Somehow, I knew that he'd have "spotted" anything that was not flawless, and his compliments meant more to me than countless kudos from a legion of sighted customers.

When attempting to match a stain color on different wood species, there are some great products that can help you out.

Fortunately, there are two common materials you can use to add extra color after staining: glaze and toner. Glaze is slower-drying stain modified with extra resin and is designed to go in between coats of finish. Toner is simply tinted finish. You can buy either in ready-to-use form, but in this case, you might want to mix your own.

Convert your oil-based stain to glaze by adding about an ounce of boiled linseed oil to a pint of stain. Apply it after your first coat of clear finish. Manipulate the glaze with a dry brush to apply a very thin, even coat of color, and let it dry at least overnight before applying the polyurethane. If you prefer toner, make it by adding up to two ounces of stain to a pint of oil-based polyurethane or varnish. Toner must be applied very evenly or it will show colored lap marks. Whichever route you choose, try it first on scraps of stained, sealed ash, since both techniques require some skill.

There are also two things you could have done to make the ash stain darker. One is to stop sanding at a coarser grit than you used for the pine and poplar. For example, stop sanding the ash at 150-grit, but continue to 220 for the other woods. Second, raise the grain of the ash, and only the ash, prior to staining. Raising the grain leaves the pores of the wood more open, and hence prone to absorb more stain. Clearly, this advice violates the first rule of finishing preparation: Always do the same thing to all parts of a piece. However, there are exceptions to every rule.