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February 2005
Volume 29
Number 1

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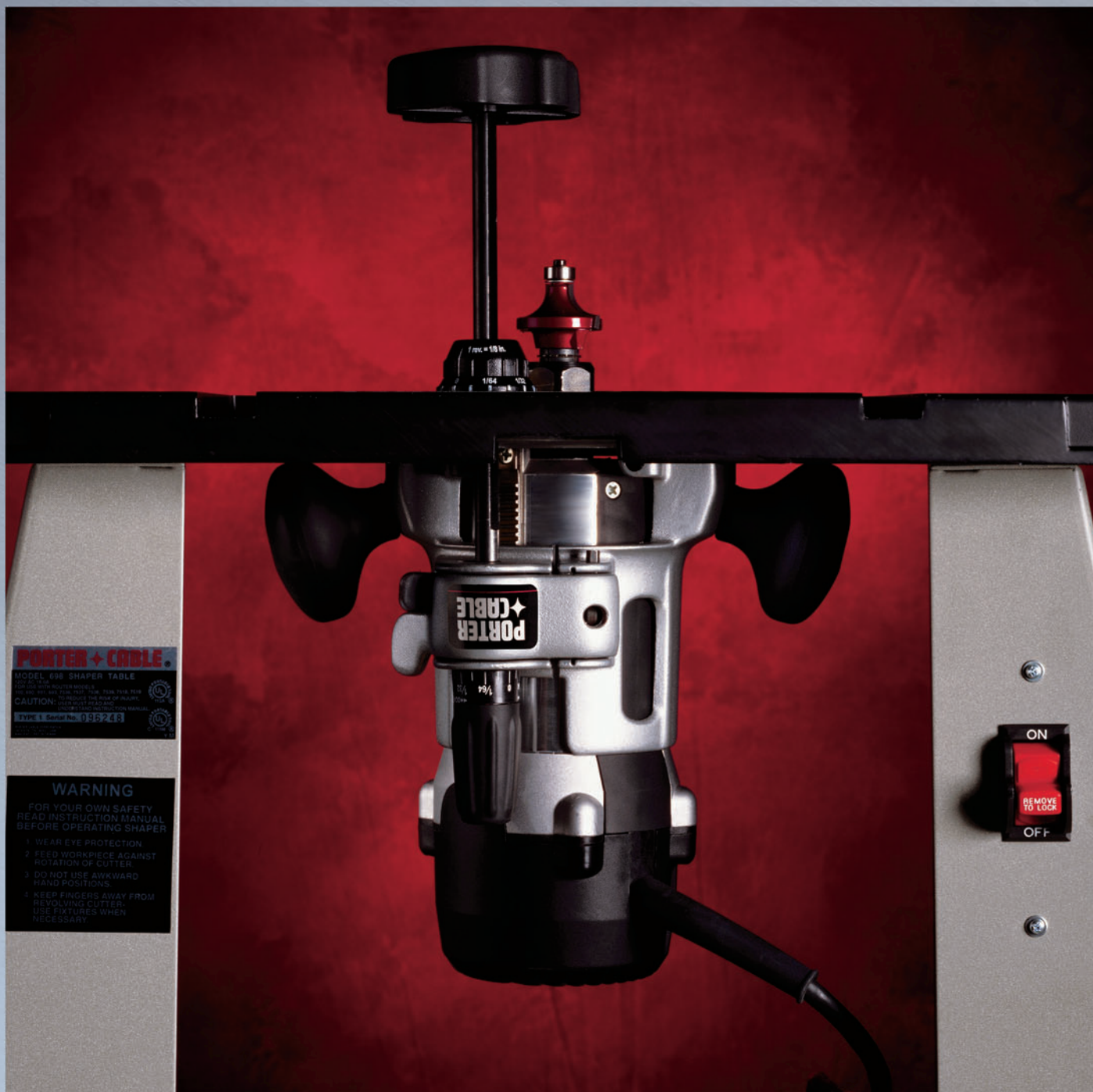
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By Frank Grant

An elegant piece in honor of a musician, this cherry and maple podium features sculptural lines and an opportunity to display your carving skills.

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By Barry Chattell

A simple solution for your shop, inspired by grocery store bins.



50 Arts & Crafts Stereo Cabinet

By Mike McGlynn

From wedged mortises and tenons to biscuits, this project features traditional appeal and modern techniques.



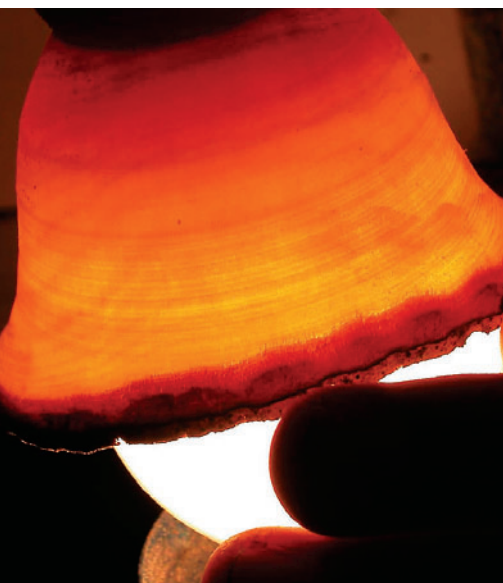
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Delight in the Details

As the pages of the calendar turn to another year, it's as good a time as any to stop and take stock ... or at least start talking about stock. Yes, I'm speaking of lumber here, and encouraging you to do the same. I invited two top studio furnituremakers into our pages this issue, and as the staff here read through and prepared their articles, we were struck by an interesting similarity. Mike McGlynn (*Arts & Crafts Stereo Cabinet, page 50*) and Frank Grant (*Memorial Podium, page 34*)

"The simple thing done right is often the best."

Mike McGlynn

really, really pay attention to the details. Maybe because they're building for clients, they sweat every little aspect of the design, take an amazing amount of time selecting stock and approach subassemblies with a perfectionist's eye for detail. Even their finishing methods will take many woodworkers to unfamiliar ground.

Here's Mike, in this issue, on stock selection: *"I sorted through at least 2,000 board feet of lumber to come up with the stock to make the six main panels of this cabinet. I selected for color, figure and to avoid sapwood on faces that showed."* And how 'bout this, from Frank's article, on design detail:

"I held the center panel proud of the cherry frame by just less than the thickness of the veneer. This helps a person get a fingernail under a piece of sheet music lying on the podium. Not a big deal ... but it does make the stand more pleasant to use." And when it comes to finishing, check out some of Frank's final steps: *"I machine sanded the parts all the way to 220 grit, and hand-sanded again with 220 paper. Then I brushed on a coat of Zinsser's SealCoat™, followed by three coats of a good, oil-based varnish, thinned 60/40 with quality spirits. I applied the finish before assembly ... masking off areas that would need to be glued together ... After assembly, all of the parts were again rubbed out by hand."*

Does all this sound familiar? Not to many of us. Yet, we're the same woodworkers who ooh and aah when we see a piece like Frank's on the cover. As Mike said, "The simple thing done right is often the best."

I would like to encourage each of you to spend some time in Mike's and Frank's articles. Even if you're not planning on building those projects, you'll learn a lot about the processes involved in fine woodworking. As you read, I believe you'll find that each step, approached on its own, is attainable, doable. Sometimes, it just takes someone to talk you through the details.

Larry N. Storker

JANUARY/FEBRUARY 2005

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Woodworker's Journal (ISSN: 0199-1892), is published in February, April, June, August, October and December by Rockler Press Inc., 4365 Willow Dr., Medina, MN 55340.

Periodical postage paid at Medina, Minnesota and additional mailing offices. Postmaster:

Send all address changes to *Woodworker's Journal*, P.O. Box 56585, Boulder, CO 80322-6585. Subscription Rates: One-year, \$19.95

(U.S.); \$25.95 U.S. funds (Canada and other countries). Single copy price, \$5.99 (U.S.);

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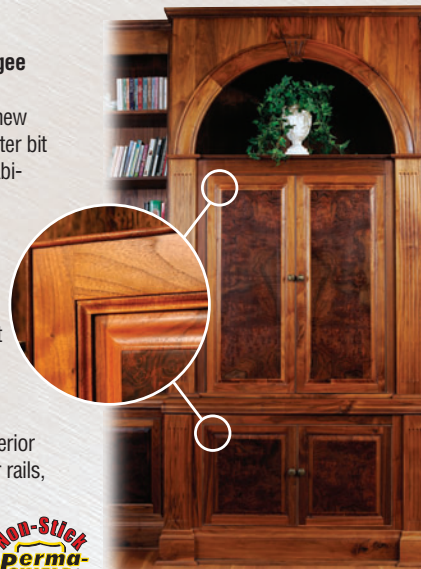
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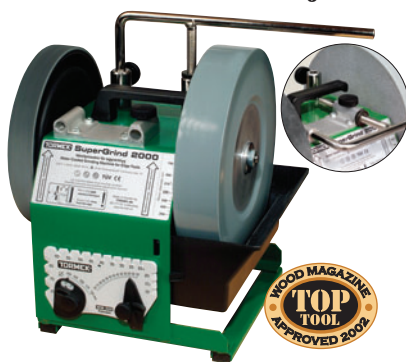
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Plane Sense — Or a Screw Loose?



Plane Sense

I have built cabinets and furniture for almost 30 years and served an apprenticeship with some old, seasoned Scandinavian carpenters (many in their 70s). They taught me many things about how

to care for hand tools. I see on the cover of your magazine (*October 2004*) two men standing next to a bench with a plane sitting on its face. OUCH! I cringe when I see this (and I see it a lot).

The proper way to store this tool is lying on its side; that way you will not chip the blade, or mar the face of the plane.

*Norm Harris
Warroad, Minnesota*

WJ Responds:

I was one of the two men standing next to the bench, and I'm sure I put the plane there. I'm 72 and I've been woodworking since I was 20 — so what?

The plane won't cut the benchtop because it's not being pushed. With the blade set to take a thin shaving, it will barely touch the bench.

Lay it on on edge if you wish, but you then expose the blade and the sole to

having a metal clamp or another tool knock into it and cause damage.

I do so wish we could get beyond this minor detail before I hang up my winding strips.

— Ian Kirby

Ticked About Tank Letter

This is in regards to a letter that Mr. Thomas Coffey wrote ("Letters," *October 2004*) criticizing you for publishing an article about toy tanks ("Shop Talk," *June 2004*). As a child of the Depression, my favorite toy was a wind-up tank. Did that make me a warmonger? Also, I probably got my first .22 caliber rifle somewhere around age eight. Did that make we want to go out and kill somebody?

It is not the toys that you grow up with that influence your life. The good things and proper path are laid out by your parents and other elders. There is no way a child playing with a toy tank or gun automatically becomes a criminal. So go ahead from time to time and include articles pertaining to toys, whether they be wagons or tanks. You certainly are not going to ruin the life of a child.

*Edwin A. Powers
Archer, Florida*

I believe that a child riding in a toy tank is emulating the brave men and women that have sacrificed their blood, sweat, toil, tears and often their lives to win and preserve the freedoms that we as Americans enjoy.

*Clint Ward
Collinsville, Oklahoma*

Have children lost the ability to tell the difference between reality and fantasy, or is it just some of the adults?

*Charles Sharp
Whittier, California*

Tool Safety: Mind Matters

In your *October 2004* issue ("Letters"), Mr. Bernie Maas made a case for legislation requiring SawStop brakes on all table saws. He cited data indicating that the table saw was the most common tool involved in woodworking injuries. Mr. Maas said, "Living in society continually requires compliance with a host of regulations. The cost involved is necessitated by the overall public welfare." Following Mr. Maas's logic, and some will, legislation designating the table saw illegal would be the most effective way to serve the overall public welfare. No thank you.

*Harold Horchover
Trabuco Canyon,
California*



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*Gene Carter
Morgan, Vermont*

It's a Candian Screw, Eh?

In the editorial ("On the Level") for *October 2004*, you introduce Ian Kirby, whom you characterize as, and I quote, "a highly opinionated Englishman." While I would agree that Mr. Kirby is indeed one of the icons of woodworking in North America, I am very disappointed that a man of

his stature and qualifications would make such an error as he did in the *Questions and Answers* column.

It is a matter of historical record that there is no such screw as a Roberts screw. The square drive screw is indeed a Robertson. It was invented by a Canadian named Robertson.

While we tend to forgive our neighbors to the south for insisting on calling it a square drive screw (they are still peeved because he wouldn't sell out to Uncle Henry Ford), I felt that as a "colonial" I just had to take the opportunity to set

someone from the mother country straight (sic). Accuracy is as important in writing as it is in woodworking.

*George Hoskins
Hammonds Plains,
Nova Scotia*

WJ Responds:

Ian did indeed note that Peter Robertson was the first to deviate from the slot method of turning the screw, by inventing the square drive in 1907. This information appeared in the article "The Turning of the Screw," *August 2004*.



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

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Blazing Questions About Blades

produce the same quality of cut as the standard kerf. However, the thinner steel plate used in building the thin blade is a little more susceptible to vibrations generated by motor imbalance or a drive belt. A bad enough vibration will cause the blade to vibrate side to side sympathetically as it spins. A stiffener plate clamped alongside the blade dampens out such vibration.

We do not produce our blades with elaborate laser cuts to dampen vibration because they weaken the blade. If wear and tear cause the blade to lose its flatness, the elaborate cuts make it nearly impossible to straighten.

We do not Teflon®-coat our blades because it flakes off over time, possibly causing an uneven mounting surface near the arbor. A true running blade in a well-aligned machine does not need Teflon® to reduce friction since the steel plate never touches the wood. Only the cutting edges of the carbide teeth make contact.

— Jay Forrest

under 3 HP. A good indicator that a saw is underpowered is if it runs on 120 volts vs. 220 volts.

For maximum stability on a full-powered saw, a full kerf blade is the way to go. However, an underpowered saw cannot operate a full kerf blade at the proper speed.

Freud's Industrial Thin Kerfs are simply thinner versions of our full kerf industrial blades. They use the same grind geometries, carbides, tooth size (other than thickness). Our Industrial thin kerf blades have thicker carbide tips for more resharpenings, and more stability than our standard thin kerf blades.

The advantage to the thin Industrial kerf is it requires less power and conserves material, full kerfs are a little more robust for conditions like ripping at high feed rates with power feeders.

Our trademarked Perma-SHIELD is an anti-friction coating containing an aluminum alloy that is applied to our saw blades. The slick surface reduces the amount of friction between the blade and the material which in turn reduces heat buildup, resin and corrosion. Because the surface of Freud's coated blades are so slick, the pitch and resins cannot bond with the plate. Ideally, everyone *would* buy a coated blade, but it's usually an issue of cost.

— Russell Kohl

continues on page 16...



Q I am confused. Forrest recommends using a stabilized saw blade. Freud says they have "practically eliminated" movements that require a stabilizer.

Freud says their thin kerf blade is a must for underpowered saws. What is an underpowered saw? Why a thin kerf versus regular kerf: what's the advantage or disadvantage? Why wouldn't we all want a coated versus a non-coated blade?

I can't believe I'm the only one confused by all these statements.

Don Price

Malvern, Pennsylvania



A A thin kerf blade in 10" diameter creates a 3/32" kerf, versus 1/8" kerf for a standard blade. That 25 percent thinner kerf is significantly easier to "push through a cut."

All other things being equal, a thin kerf blade will



A Because Freud's blades are laser-cut, we are able to use a much higher grade steel than blades which are die-cut. We then cut anti-vibration slots which allow the blade to run flat and true and keep it from vibrating from side to side.

An "underpowered" saw is typically defined as any saw

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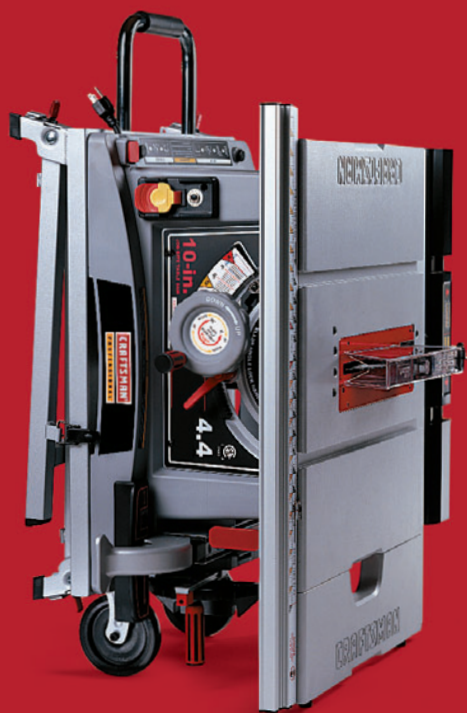
THIS ISSUE'S EXPERTS

Jay Forrest is vice president of Forrest Manufacturing.

Russell Kohl is president and CEO of Freud America.

Bill Hylton is the author of *Woodworking with the Router* from *Reader's Digest*.

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Q I recently purchased a new cutoff blade for my table saw but wasn't happy with the cut. I checked the table saw and found it to be aligned right on. I then checked the new saw blade and found it to have a .009 runout. The replacement I obtained had a .002 runout. What is an acceptable runout for a 10" saw blade?

*Jim Haney
Cornville, Arizona*

A An old wagon nears collapse, a wheel or two wobbling perilously as they slowly turn. That wobbling is runout. As with most machines that have rotating parts, table saws usually have some degree of runout. Excessive runout in a saw can be traced to a poorly machined or worn arbor or arbor bearings, or to the blade.

If you aren't getting smooth, chip-free cuts from your saw, it may be excessive blade runout. But before checking the blade, do as Mr. Haney did. Check the alignment of the saw first. Also, check the arbor's runout with a dial indicator. It shouldn't exceed .002". Only after the machine checks out should you put the dial indicator on the blade.

"The blade must be flat, flat, flat," Aaron Einstein of Amana Tool told me. Blade manufacturers don't typically list runout tolerance among blade stats: .002" is Amana's maximum acceptable tolerance in a 10" blade. If intended for cutting materials with fragile coatings or veneers, that tolerance is halved.

If the blade plate isn't absolutely flat, he explained, the teeth won't follow each other in the same path. The cut finish is diminished, and often surface chipping becomes a problem.

— Bill Hylton



WINNER! For simply sending in his question on saw blades, Don Price of Malvern, Pennsylvania wins a **Hitachi DSI4DMR 14.4-volt Driver Drill**. Each issue we toss new questions into a hat and draw a winner.

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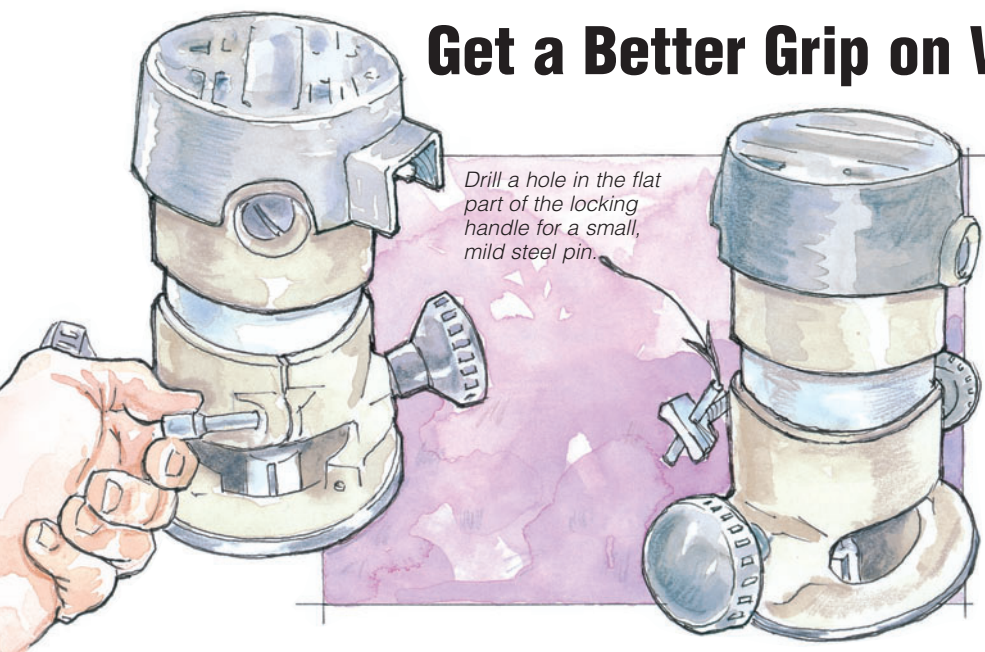
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Router Helper

Tightening the locking ring on routers is hard on the hands — especially when groping around under a router table. I finally removed the clamp and drilled it for a steel pin as shown. A light peening on each end of the pin prevents it slipping out.

*David Allen
Rockford, Illinois*

Padding the Pads

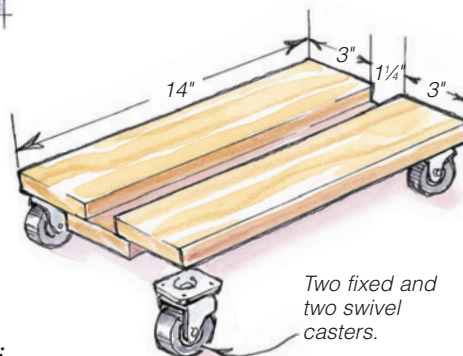
I have some heavy old iron clamps that are liable to scar any surface they touch. To render them harmless I glue thin cardboard to the pads and then to a softwood block. This cardboard “sandwich” makes it easy to remove or replace the pads when necessary.

*Peter Colosi
Sun City West, Arizona*

Improved Dolly

I recently built a dolly for moving sheet goods: it works so well I wonder why I didn’t construct it sooner. I made my dolly from scrap plywood to the dimensions shown below. Two of the casters swivel; the other two are fixed, which makes it easy to navigate the confines of my shop.

*Orval Bruton
Portland, Oregon*



Two fixed and two swivel casters.

**PICK
OF THE
TRICKS**

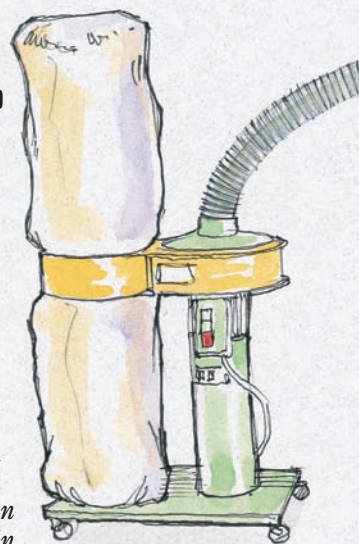
Install two 4" collars in trash can lid.



Two-stage Dust Collector for Under \$20

This pre-separator picks up most of the chips which would otherwise end up in the collector bag. The advantage is that I can wait much longer before emptying the bag — a disagreeable chore. I bought the metal trash can and two 4" collars from a home improvement store. I then cut two holes in the lid with a rotary cutout tool and installed the collars by bending back the tabs on the inside. To seal them I ran a bead of silicone caulk around each one.

*Timbo Hamilton
Knightdale, North Carolina*



Chips that would otherwise end up in the dust collector are trapped in the trash can.

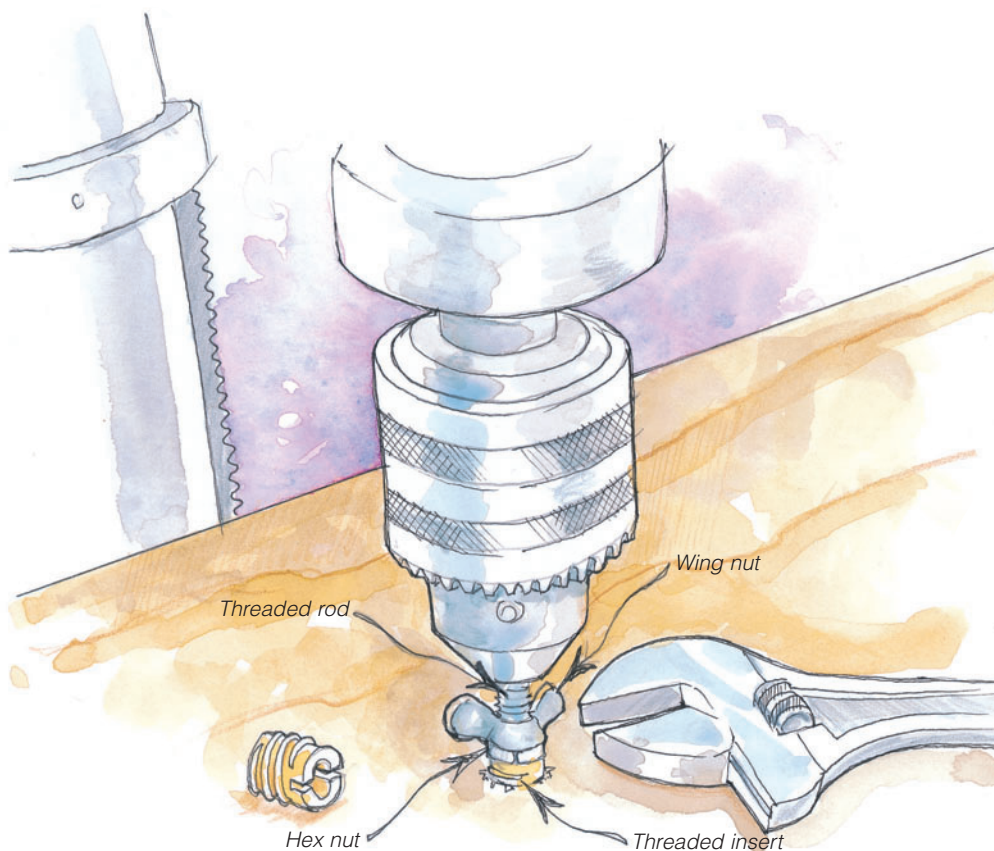
Installing Threaded Inserts

I can't be the only woodworker that has trouble installing threaded inserts — even with the special bits provided. As you can see from the sketch at left, I used my drill press to solve the problem.

I first inserted a length of threaded rod in the drill press, and then added a hex nut, wing nut and finally the threaded insert. Next, I pushed the assembly down as I hand-turned the insert using the wing nut and an adjustable wrench.

Note: There's no need to turn on the drill press.

*Keith Moor
Minneapolis, Minnesota*



continues on page 20 ...

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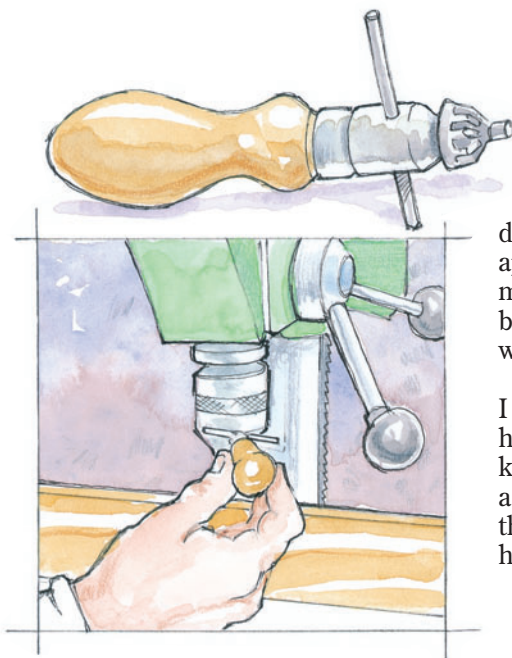


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(Circle No. 6 on PRODUCT INFORMATION form)



Getting a Grip on Chucks

The small chuck keys that come with corded drills and drill presses are too small to apply enough torque and easily misplaced. I solved both problems by mounting the key in a ferruled, wooden file handle as shown.

After removing the cross pin, I drilled a tight-fitting hole in the handle and inserted the chuck key. The final step was to drill a slightly undersized hole for the cross pin and tap into the handle to lock it.

Kenneth Mesger
Milton, Florida



WINNER!

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will also receive a **Drill Doctor DD400PK** for being selected as the "Pick of the Tricks" winner. We pay from \$100 to \$200 for all tricks used. To join in the fun, send us your original, unpublished trick. Please include a photo or drawing if necessary. Submit your Tricks of the Trade to Woodworker's Journal, Dept. T/T, P.O. Box 261, Medina, MN 55340. Or send us an e-mail: tricks@woodworkersjournal.com

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Winning Woodworkers

San Diego's Finest

Awards From the Big Show

Back for its 23rd year in 2004, the San Diego Fine Woodworker Association's exhibition at last summer's San Diego County Fair again brought in quality woodwork from across the nation — and beyond. Over one and a quarter million people attended the fair — many of them, according to show chairman Bob Stevenson, exclusively to see the Design in Wood Exhibition. More than 40 pieces received awards in categories ranging from carving to contemporary furniture, while Association members also presented exhibits to the public, including hand crafting solid oak chairs to be donated to area children's organizations.

If you're interested in the 2005 show — held from June 10 to July 4, with entries due April 29, an online application will be available in March at www.sdfair.com. You can also visit www.sdfwa.org or call Bob Stevenson at 619-422-7338.



They're all winners. Clockwise from top left: Horst Remmling's "Vessel"; Paul Schurch's "Neo-Ribbon Cabinet"; David Mundy's "Hourglass Clock"; Brian Jackson's "Table Lamp with Shade."



Bill Cox's "Kneehole Desk" took home the San Diego Fine Woodworkers' Presidents' Award for professionals. It was entered in the traditional woodworking-furniture category of the show.

Woodworking for Charity

More Travels with LiLi

In a two-day weekend, 11 women gathered at American Sycamore Retreat in Indiana to make things out of wood — and make a contribution to charity. Everything created in the weekend, from its start as boards on a pile to its completion in a finished (stained, varnished, whatever) object was auctioned off with the proceeds donated to the American Cancer Society's college scholarship and camp programs for young cancer survivors.

Among the team "coaches" at this event was *Woodworker's Journal* reporter LiLi Jackson. Working with Gail O'Rourke and Darlene Post, LiLi and her team created an Asian-inspired, lean-to shelving unit out of oak. They drew up the design themselves, cut the boards and built the project — all within the allotted time. "I was amazed at how much we could accomplish in just two days," LiLi said. "Huge things were completely finished. I guess that's what teamwork's all about."

The attendees for the weekend included woodworkers of varying skill levels, from experts among the coaches and others, to beginners like Darlene. One team included mother and daughter cancer survivors. Even those with more developed skills frequently had more expertise in one area



Woodworking for a cause: WJ staffer LiLi Jackson (at right) teamed with Gail O'Rourke and Darlene Post to build furniture that was auctioned in aid of cancer survivors.

than another. "Everybody helped each other out," LiLi said. "If someone didn't know how to do one thing, they'd look for help and somebody would help them out — and vice versa" later on.

The camaraderie also extended beyond the shop floor to the accommodations. Even those not scheduled to stay on American Sycamore's grounds ended up doing so, purchasing air mattresses to donate to the school for future attendees, as the group talked into the night.

"It was great to be with so many women who loved woodworking and cared about the world enough to donate something they worked really hard on and put this great amount of energy into," LiLi said.

For more information about American Sycamore Retreat classes, call 877-845-2666 or go online to visit their web site — www.americansycamoreretreat.com.

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Finished Green Turning

By Steve Blenk

Turning green (or undried) wood is about as much fun as a woodworker can legally have in a workshop.

While most woodworkers are taught to avoid using green (unseasoned) wood, woodturners can grab a block right off the stump and go to town making shavings. Here are some tips to make green wood turning fun, and to ensure that you get the best results from your experiments.

Freshly cut (green) wood with a high moisture content is, by nature, unstable. As it dries, it is prone to warp, check, and generally do things that give woodworkers nightmares. The movement is caused by the cells of the wood changing shape (shrinking) as the moisture leaves. Outer layers often dry faster than the inner ones. This uneven drying creates stresses in the wood, which cause checking. Left to itself, drying is a slow process, with thicker air-dried material often requiring years of seasoning. We kiln dry most lumber these days and, while this speeds the process, it can result in another set of problems. Wood can be “case hardened” (hard dry outside, still wet inside), checked or fractured with “honeycomb cracks” (checking not visible from the outside). It can also be over-kilned to the point it becomes prone to fracture with hidden

While there are plenty of advantages to green turning, it brings its own set of challenges as well.



stresses. The thicker the material, the less effective kiln drying generally becomes. KD wood is no fun to turn, either. It is hard on both the turner and the tools.

There are two ways to approach green wood turning. You can look at it as a step designed to speed the drying of bowl blanks to a finishable form, or you can sculpt complete turnings in the green condition and let nature have her way. You can even give her a prod, as you will see.

First Project: Try Turning a Goblet

A good beginning project for finished green turning is a natural edge goblet turned from end grain. Select a fairly straight branch section about 3 - 4" in dia. and about 10" long. I like fruitwoods like cherry or apple for this, but any reasonably hard wood will work. Mount it between centers with the pith (center wood) mounted off-center so it will not be included in your goblet stem. Turn one end round so you can grab it later with a chuck, and lay out your goblet sections (i.e., rim, stem, base). Leave the bark at the upper edge of the rim area intact. You will quickly discover that green wood turns like butter, giving you wonderful long shavings as you cut. Keep your edges sharp, and try to keep your cuts even. Get as smooth a surface as you can manage now, as the wood will dry to show your tooling marks later.

Switch to a chuck mounting, and begin to hollow your goblet. By working carefully you can produce a very thin wall. This has two advantages. First, it will allow you to use a light to see your wall thickness, as the wet wood is translucent (*see photo, next page*). Second, by removing most of the wood you will eliminate drying problems, as the remaining material will be much less likely to check or crack. Finish cutting and sanding the whole cup area before moving on to the stem, as it will quickly begin to move out of round. Sand with a rough (120) paper, and don't be surprised at how fast it loads up. The heat produced by sanding will begin to dry the surface, and you will then be able to get it fairly smooth with finer papers.

Once your cup is done, move your live center into position to support the turning. You will need to pack some soft material like a rag or foam rubber into the cup to keep the center point from damaging the



Mount a 10" segment of tree limb or trunk between centers. Mount it off-center to avoid making the weaker pith part of your stem. Remember to raise a round nub to grab later in a chuck. Hidden knots or defects can create a problem as you turn.

bottom (*see photo below*).

Now use a small, sharp gouge to turn the stem and base, in that order. Sand the stem carefully! The thin green section will simply twist off if you create too much torque force. This is why you excluded the weaker pith wood in your setup. Finally, cut your base away from beneath, and part the goblet off. As with the cup, try to get the base as thin as you can to prevent checking.

The Gentle Prod ...

You can now either leave the drying process to nature, or you can get creative and pop your goblet into the microwave. (Warning: using the kitchen microwave for this trick is considered grounds for divorce in some states!) Thirty seconds to a minute or so on "high" can produce some startling results, as the thin wood will bend and warp as it heats and quickly loses its remaining moisture. Don't over-do the trick, as the wood will crack, or even begin to smoke and produce a very evil smell almost guaranteed to disturb domestic tranquility! Start with

Woodturning continues on page 26 ...



With the stem and the bowl of the goblet shaped, you can remove the live center (and its padding that prevented scratches). This goblet is almost ready to be parted from the remaining piece of limb.

a short time. I usually submerge the goblet form in something like Danish oil to stabilize it after microwaving.

You can also use this same set of techniques for making small open bowl forms, both end grain and flat grain. Thinner is almost always better, as the wood can move without checking. Experiment with grain alignment for differing results, and rig a bright light by your lathe to help judge wall thickness. A spray bottle of water can also be helpful to slow down deformation while turning.

Green Bowls in the Rough

Rough turning green bowl blanks is a simple process: just mount your material as you would any bowl, and remove the waste down to about 1 - 1½" of thickness of the eventual finished bowl. Be aware that larger blanks may actually spray water as you 'centrifuge' them! I leave a stub tenon on the foot end of each to allow a quick grab with a chuck for remounting to true the rim. Then seal the blank with wax or AnchorSeal® (U.C. Coatings, Buffalo, New York) and toss it on a shelf for six months or so in a fairly warm dry place. You will lose some blanks

to checking (about 15% for me), but you will have cut your drying time by years and will have many more blanks to work with sooner. If you had air dried the blanks you would lose a comparable number. Also, removing green wood from a blank is much easier and faster than turning dry wood. You will be able to rough out a large number of bowls quickly with little effort in green form. After sufficient drying time, (which varies, and will require some experimentation on your part) just remount the rough blank and turn it down to final form.

Some turners have specialized green turning to a high form, using PEG (polyethylene glycol in solution) to treat finished green bowls. The Molthroups, Ed and Phil, are masters. They have achieved remarkable results, especially with very large pieces. Just remember,



Beautiful, natural edged goblets are a great first project if you are interested in trying green turning.



The water-saturated wood transmits light quite well. You can use this fact to help judge the thickness of your goblet walls.



Green turning creates piles and piles of shavings. But be careful: they are wet and can rust your tools and encourage mold growth. Quick cleanup is an essential task for green wood turners.

if you use PEG you must finish with a polyurethane finish, as nothing else will stick to the wood's surface.

If you get hooked on green turning, try reading Michael O'Donnell's book on the subject. He discusses every aspect from harvest and blank alignment to finishing. I just wish he didn't speak metric!

Steve Blenk is a Washington state woodturner who also knows a couple of things about catching salmon.



PRO'S TIP

A Heads-up on Turning Green

Green shavings are WET and will rust your equipment very quickly, so clean up after each session. Green shavings will also encourage the growth of molds and other nasty fungi in your shop, so get them out to the trash before the mushrooms show up. Green turnings, especially thin ones, distort with surprising speed, so don't expect to start one today and finish it tomorrow: do it all in one session. If you must take a break, put a plastic bag on the piece until you return.

— Steve Blenk



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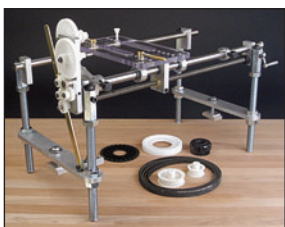
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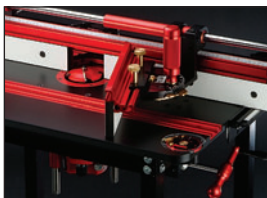


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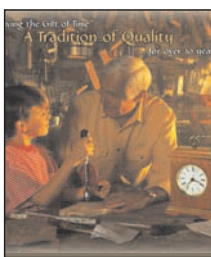


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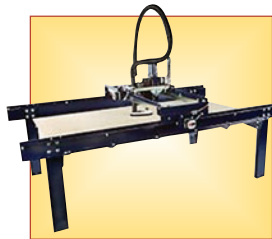
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Ratcheting Your Bit and Brace

What's This?



Herb Rosenthal from New York, New York sent in the tool above. It's 6½" long with a hole in the base. 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: jtakes@woodworkersjournal.com

Backed Into a Corner

The mystery tool [from October 2004 "Stumpers"] is a corner brace. At least that was the local jargon as I was growing up in Franklin County, Tennessee.

I still remember losing a nickel in a wager with an uncle when I was eight years old. The wager was that he could drop an egg and I could not catch it in a bushel basket. Of course, all he had to do was to go hold the egg in the corner of the room. The round basket just wouldn't get into the corner. It was years later that I saw one of these braces in his toolbox and asked what it was. He explained that this brace would bore a hole in the corner where the egg would have fallen.

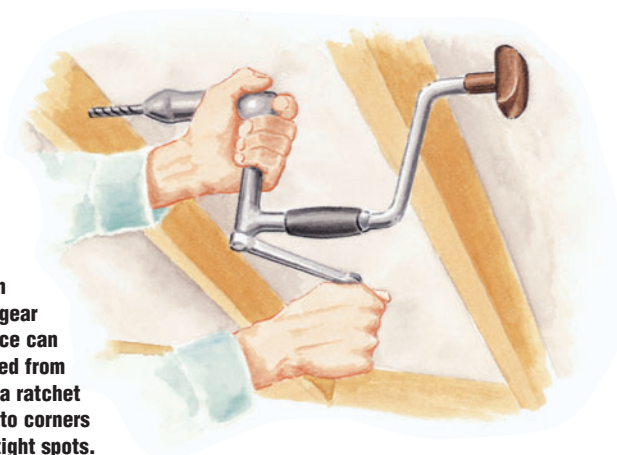
*Oliver Cook
Knoxville, Tennessee*

Corner and Regular Use

Thank you, Oliver, for a story that clearly illustrates the advantages of the tool submitted by **Alan Blotch** of Batavia, Illinois. As **Erwin Zienemendorf** of Appleton, Wisconsin, explained, it "was used as a regular brace but could also be used in tight places where you couldn't swing the brace all the way around." In a way, it's like having all your eggs in one basket.

Don Misenhelter of Iola, Kansas, tells us that the manufacturer of Alan's tool was Lancaster Machine

Patented in 1905, this gear frames brace can be converted from a brace to a ratchet to reach into corners and other tight spots.



& Knife Works (L.M. & K. of Lancaster, New York.), and its patent date was Oct. 10, 1905. Other names for it, notes **Lloyd Regele** of Princeton, Ontario, "are a gear frames brace or a combination ratchet and brace." "It was a favorite tool in the days before power drills," adds **Gerald P. Weiss** of Delray Beach, Florida — particularly among electricians. **John Paul Irwin** of Cedar City, Utah, used to watch them as a kid and told us: "The 'meat grinder' attachment was used when they would drill holes from the crawlway up into the main house between the studs."

For normal drilling, explains electrician **Allen Fredrickson Sr.** of Novelty, Ohio, "the extra crank is removable." In that case, says **John Newman** of Rockledge, Florida, the tool is "a standard bit brace. You

would loosen the chuck by hand (the original 'keyless chuck'), insert the bit and tighten the chuck by hand."

On the other hand, "if the space is too confined for rotation," in the regular manner, says **Bob Combs** of Delphos, Ohio, "the crank handle is set on the square shaft," and the pin lock is pulled out, allowing "the special crank to rotate the auger drill bit."

Rupert Walz of Sebewaing, Michigan, notes that some versions of this brace "had a ratchet so a partial swing could be used in a forward or reverse direction" — and Alan's tool does have this feature.

"This tool" along with the "eggbeater drill," says John Newman, "became the mother of invention that created the electric drill and drill press."

— *Joanna Werch Takes*



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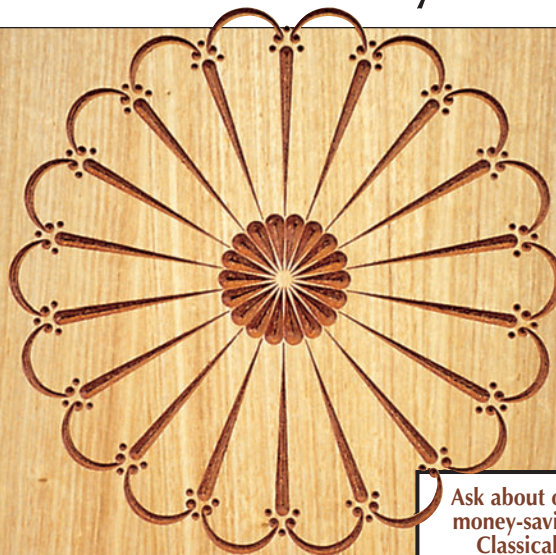
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Texturing Wood for Dramatic Effect

By Linda Haus

Some woodworkers like to sand and finish their projects until they are “as shiny as plastic,” and that’s just fine and dandy. But there are other options to try.

Working the Texture Tradeoff

When I got a look at Frank Grant’s podium in the *Woodworker’s Journal* offices, I was instantly intrigued. Many aspects of the podium were silky smooth with a built-up oil finish, but he contrasted those surfaces with other textures that created shadows and varying levels of depth. These details piqued my curiosity, so I made a trip to his workshop to get the lowdown.

I joined Frank at his shop in the Fourth Street Guild building near the University of Minnesota to talk about his use of texture as a design element: accenting shape and light. It soon became clear that Frank is a teacher as well as a woodworker. (He regularly teaches classes at the Rockler Woodworking & Hardware retail stores in Minneapolis.)

Often, Frank’s inspiration for adding texture is derived from nature. An example in his podium project is the relief carvings on the

faces of the maple panel suspended between the uprights. They depict an image of intersecting sycamore trees Frank saw while he was hiking in Arizona.

Four distinct textures are apparent on the podium. First, there’s the carved panel I just described; second, dimple-carved maple supports, which also have scraped, organically shaped edges. Third comes the ultra-smooth cherry parts; and fourth, there’s a bird’s-eye maple veneered center panel. While it’s as smooth to the touch as the cherry parts, the grain pattern on this panel provides a depth that could easily be called a visual texture. Whew!

Techniques editor Linda Haus gets a lesson in texturing for dramatic effect with podium builder Frank Grant.





Frank offers Linda some pointers as she steps into the arena of dimple carving wood. One surprising detail she learned was that “random” patterns need to be created methodically.



One of the distinct textures on the podium is the scraped edges of the organically shaped supports.



Light-colored, dimple-carved maple beautifully contrasts with the smooth, hand-rubbed finish on the cherry.

Uniformly Random

I asked Frank to teach me how to do a couple of the texturing effects. It was both harder and easier than I thought it would be — give it a try, you’ll see what I mean.

I started out trying to dimple carve a maple accent piece. The technique is simple: use a gouge to randomly place uniformly shaped “dimples.” The most important thing to start out with is a very sharp gouge. Next, avoid creating a non-random pattern. If you are systematically trying to fill in an area, it is easy to begin “scooping out” in straight lines. This will not be as pleasing to the eye. It took me a while, but once I got into a rhythm, the piece started to look pretty good.

I had no trouble scraping the edges of the accent pieces to an attractive texture. Again, the idea is to produce a random but uniform look (kinda like a jazz improv session with a band ...).

By now I was feeling pretty cocky about my texturing skills. Then we moved on to the panel carving.

We used a piece of basswood to get started. Frank sketched a sycamore pattern and then handed me a gouge and mallet. At first, I had some trouble producing a good curl and a controlled cut. But after a bit of coaching and shifting to a tap-tap-tap technique with my mallet, it all came together. Now I need to get back in my own shop and put these tips to work on my own designs.

Smooth or textured ... remember, you have a choice.



Although she’s no stranger to carving wood, our editor mastered several new methods of texturing wood during her short lesson.



A craftsman with long hair and a beanie is focused on carving a piece of light-colored wood. He is wearing a plaid shirt. The workbench is cluttered with wood shavings and various carving tools, including a mallet and several chisels. The background shows a workshop with more wood and tools.

Memorial

The author was asked to create a music stand to celebrate a family friend's life. Throughout the design and build process, he found himself inspired by his friend's love of forestry. The harmony of maple and cherry, enhanced with carvings inspired by Western sycamores, provides a fitting requiem.

Podium

By Frank Grant

Some woodworking projects are simple, practical: step stools, cutting boards or even larger things like storage cabinets. But even the most common everyday items can have elements of beauty included into their designs with a bit of effort and imagination. When family friend Nancy Ringold asked me to build a music stand as a memorial to her husband Bob, I was determined to infuse the podium with details that would invoke Bob's memory. I have to say, I was pleased with the results. The podium is eminently practical, yet the elements which compose the piece (no pun intended) are carved, shaped and textured to add touches of elegance and beauty.

Wood Selection

Being picky about the wood you will use in a project is so important, in my opinion. You'll be looking at the wood for a long time to come ... and a bad piece of grain or defect of some kind will surely come back to haunt you. So don't give in to temptation and try to save a few pennies on material only to regret it in the long run. In this project, as I do in most of my work, I used the natural colors of more than one wood species to help compose (oops, there's that word again!) the music stand's overall look. Bob and Nancy's tree farm had both cherry and maple trees as part of their "crop," a perfect combination for this project. Curiously, as I moved

forward with the design, I could not get the images of trees out of my mind. As I started sketching out the uprights and top section, I added organically shaped supports and large, gracefully curved feet. The result is a visually balanced podium that looks for all the world like the base of a tree emerging from the ground. Then, when I began considering the large modesty panel suspended between the uprights, I decided to carve a design based on an image of the intersecting trunks of sycamore trees I saw while hiking out West. At last, the components of the design were complete.

Taking it From the Top

Once my drawings were finalized and the wood for the project selected, I started construction by building the top. The top consists of two frames, with the topmost capturing a center panel which is veneered with a lovely piece of bird's-eye maple. (See the *Drawings* on the next page.) One interesting note: I held the center panel proud of the cherry frame by just less than the thickness of the veneer. This detail helps a person get a fingernail under a piece of sheet music lying on the podium. It's not a big deal in the overall design, but it does make the stand more pleasant to use.

I mitered the frames and used biscuits at the joints. The top frame has a housing or groove machined on the inside edges to accept a matching tongue on the perimeter of the panel. I formed all these parts

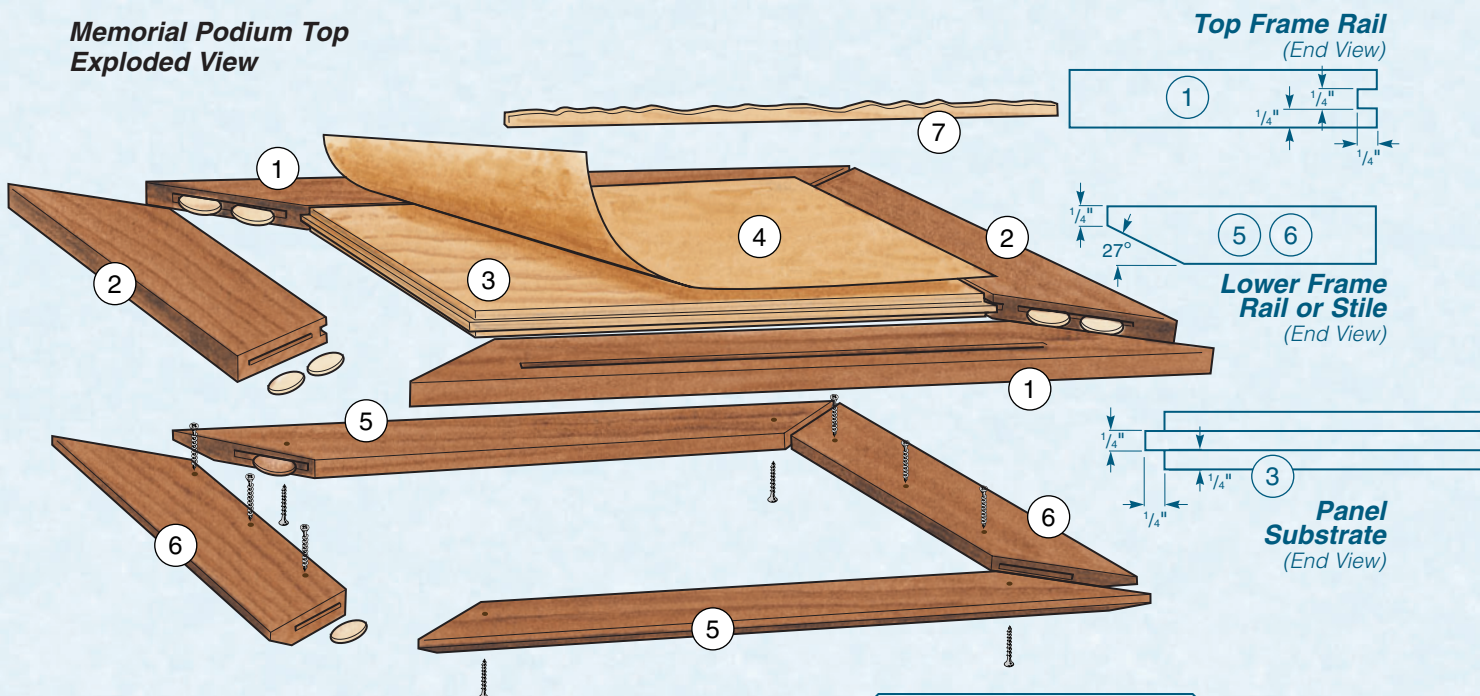
A Woodworker's Tribute

"Music & Trees" is the title of this podium, reflecting two important facets in the life of Bob Ringold. Bob's widow, Nancy, asked Frank to build a music stand in her husband's memory after he passed away in 2002. It's now an important part of the music ministry at the church in Hopkins, Minnesota, where Bob was a choir member. He also sang in a barbershop quartet and in community musicals.

Bob and Nancy were part owners of a tree farm, reflected in the carvings on the podium. Some wood from the tree farm made it into the podium, which helps it further serve as a reminder of Bob. "Everybody thought of him as very gregarious and uplifting to be with," Nancy said.



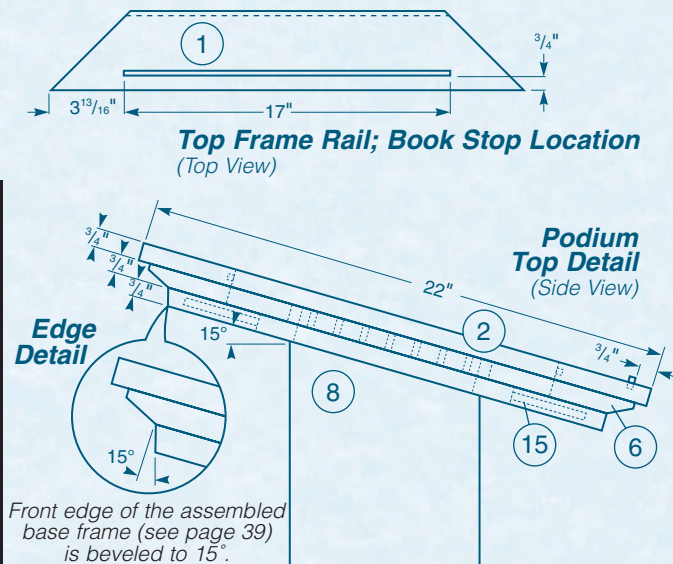
Memorial Podium Top Exploded View



Note that the top frame has two biscuits per miter joint. Care must be taken to avoid exposing the slots. The smaller, lower frame has only one biscuit at each corner.

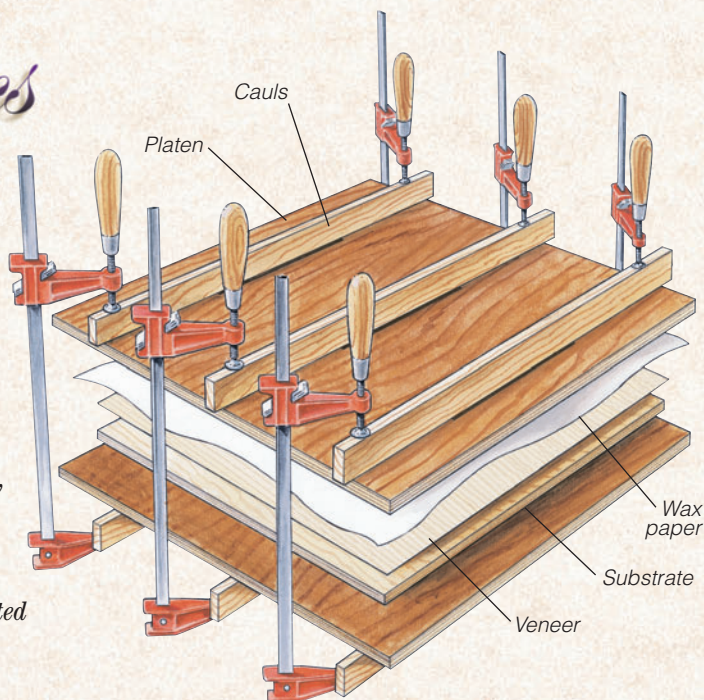
MATERIAL LIST Top

	T x W x L
1 Top Frame Rails (2)	3/4" x 4 1/8" x 24 5/8"
2 Top Frame Stiles (2)	3/4" x 4 1/8" x 22 1/8"
3 Panel Substrate (1)	3/4" x 16" x 18"
4 Veneer (1)	1/16" x 18" x 20"
5 Lower Frame Rails (2)	3/4" x 3 1/4" x 23 5/16"
6 Lower Frame Stiles (2)	3/4" x 3 1/4" x 23 15/16"
7 Book Stop (1)	1/4" x 3/8" x 17"



Veneering Basics

The small bird's-eye maple panel in the center of the top is a great example of how veneer adds a nearly unlimited variety of options to a furnituremaker's bag of tricks. At right is an illustration of a traditional veneering setup. The cauls which stretch across the platens have convex edges, which helps distribute clamping pressure to the center of the panel or substrate being veneered. The platens further help distribute the clamping pressure evenly. In this traditional setup, a layer of wax paper keeps excess glue from bonding the platen to the glue-up. If the platen has a non-adhesive finish (like melamine, for example), you won't need the wax paper. Our author used an even easier setup by putting his substrate on his workbench and making a caul/platen from a piece of melamine. He put glue on the substrate, the veneer on top of that, and then weighted his platen/caul. Simple, yet so effective.



on the table saw and used a biscuit joiner to slot the miters.

The lower frame has a significant chamfer on its bottom aspect. I cut the initial bevel on the table saw and then cleaned it up with a hand plane after the frame subassembly was glued up.

The veneered panel's substrate is made of plywood, and for that reason (and the fact that it is totally capture by the top frame), I did not balance the panel with an additional piece of veneer on its hidden face. The panel is small enough that you can easily "clamp it" on top of your workbench with a same-sized melamine caul (or platen) and some sandbags or other kind of weights. I used regular yellow glue and strongly recommend not using contact cement, even more so on such a small piece.

To complete the top I created a maple book stop with an organically shaped top edge, but stuck up on the other five. I let it into the top by 1/8" and glued it in place. Before I installed it, I scraped its top edge to create a desirable texture. (See the *Techniques* department on page 32 for more information.)

Assembling the frames is pretty straightforward ... after a required test fit of all the parts, grab some glue, a band clamp and a try square to be confident that all is well. Later, you will secure the frames one to the other, but that is after the base is built.

Moving On To the Base

More visible than the top, the base looks easier to make than it actually is. Anchored to the ground by two sizable feet, the uprights (and therefore the podium) are shorter



The author prefers to cut his miters on the table saw. He tests the accuracy of his setup on scrap lumber first.

Double biscuits are used on the top frame at the miters and single biscuits on the lower frame.

than a typical lectern because it is designed to be used by a music director rather than a speaker.

I cut the uprights from a single piece of cherry and set the opposite ends of the original board down into the feet and the middle of the board up into the top. This resulted in the

plowed the grooves (also known as housings) for the decorative braces. I used a router chucked up with a 1/2" straight bit set to 1/4" deep. I guided the router with a clamped-on straightedge. As you can see in the *Drawings* on the page 39, there are six braces per upright.

"... an elephant (or a very large choir member) could sit on the top with no significant damage ..."

figure of the grain in both pieces looking very much like I had book-matched them. It was a lovely bit of serendipity that added significantly to the overall look and feel of the piece.

Next, I laid out and then raised the tenons on the uprights. The upper tenon's shoulder is formed at the 15° at which the top is presented. The end of the tenon is trimmed to match the angle as well. The lower tenon is not angled. I then

Bracing Up

The way this podium is made, I have no doubt it would be plenty sturdy, even without its 12 maple braces. With that said, while a main goal of the braces is their decorative aspect, they do in fact add strength to the whole design. Which means that an elephant (or a very large choir member) could sit on the top of the podium and there would be no significant damage. All of the braces are made in the same manner. Their

Identically Free Formed



When machining the decorative maple braces, the author begins the process while they are still stuck up. He forms the tongues on the back edge of the braces first.



With a straight edge clamped into his tail vise, the author uses a template to trace the organic shape of the brace. This creates uniformity even with the free-formed edge.



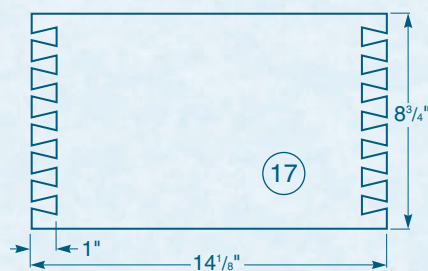
On the band saw, the author scrolls the edge of the brace. After he is done, he will scrape the edge until it's pleasing to the eye and "uniformly textured."

shapes are organic (a term often used when we mean asymmetrical or geometrically unclassified), yet similar. Each has a tongue or long tenon on the edge that joins the uprights, which is formed on the table saw while they are still stuck up. The tongues were machined to match the housings already plowed into the uprights.

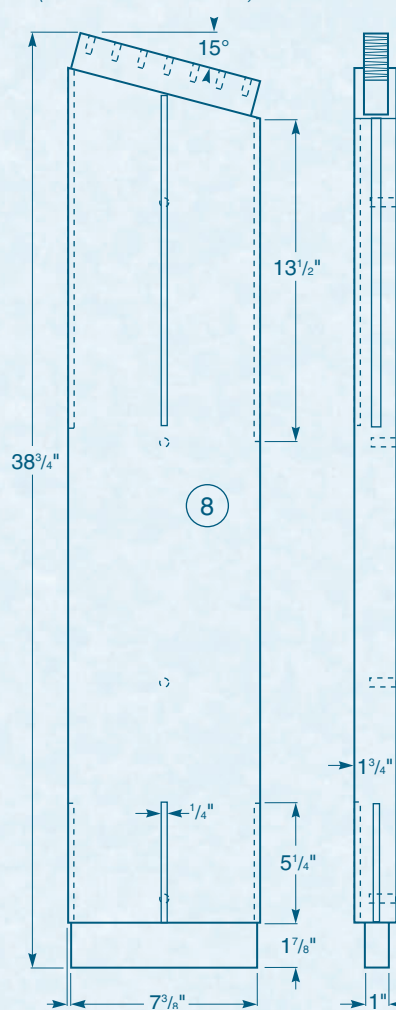
Once I'd formed the tongues (see *photos* at left) I used a series of templates to draw the various shapes onto the brace blanks. After this I stepped over to the band saw to cut out their shapes and then scraped the edges to an appropriate texture. But that did not complete the braces. I wanted to significantly contrast the textures of the various structural elements on the podium. I decided to add the rougher texture to the maple components ... to add a depth that would otherwise be hard to come by ... (which is why I scraped the edges). To further the texturing, I dimple carved (again, see the *Techniques* department on page 32) the faces of each brace. There is no shortcut to this work. You need a sharp gouge and several hours to get it done. I reprised this same technique on a section of the modesty panel I'll talk about later.

If you look at the *Drawing* of the base, you will see that there is a third frame created for this project. Unlike the first two, it is made with mortise and tenon joinery and the stiles have curved edges that reflect the shape of the feet. The stiles have a mortise chopped through their faces to accept the tenons on the top ends of the uprights. I used a mortising machine to create all six mortises on these parts. I formed the tenons on the rails using the table saw. Once this frame fit together properly, I assembled it using glue and a band clamp.

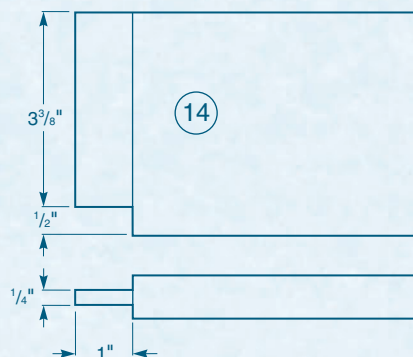
Dovetailed Crosspiece
(Top View)



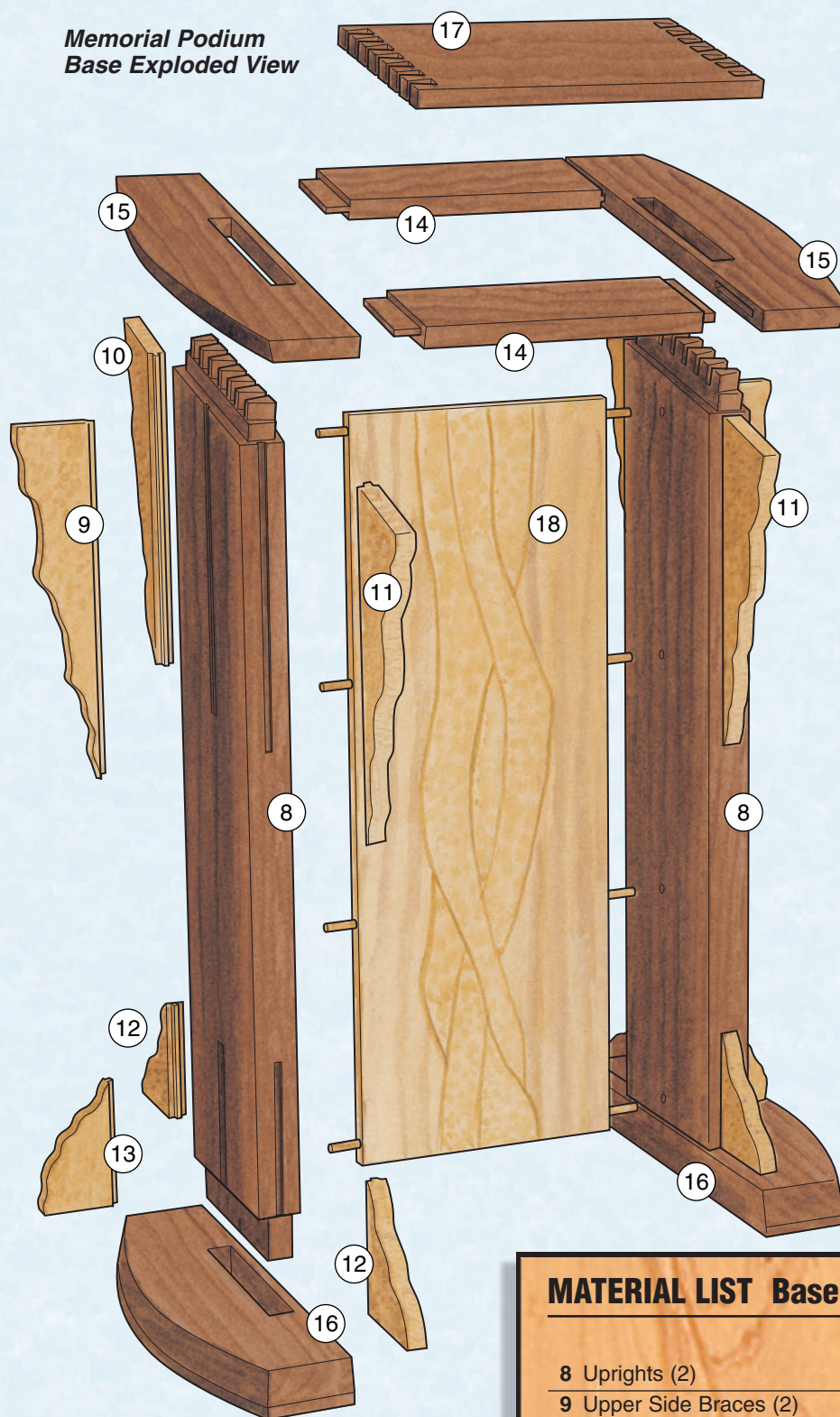
Upright
(Side and Back Views)



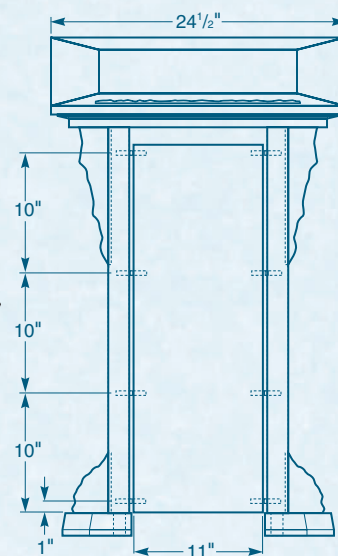
Base Frame Rail
(Top and Side Views)



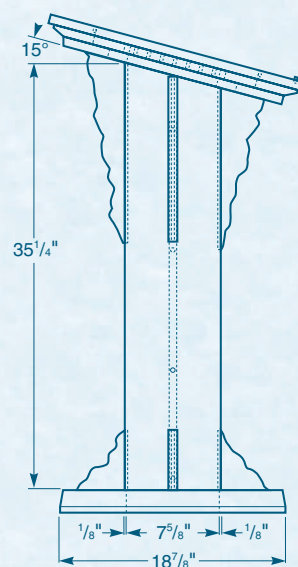
**Memorial Podium
Base Exploded View**



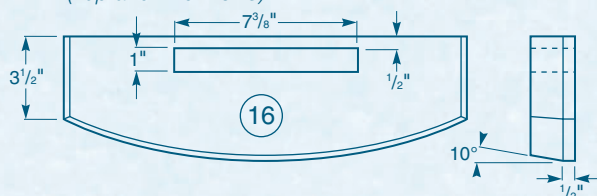
**Memorial Podium
Elevation
(Back View)**



**Memorial Podium
Elevation
(Side View)**



**Foot
(Top and End Views)**



MATERIAL LIST Base

	T x W x L
8 Uprights (2)	1 3/4" x 7 7/8" x 38 3/4"
9 Upper Side Braces (2)	3/4" x 3 1/4" x 14"
10 Upper Front Braces (2)	3/4" x 4 1/8" x 16"
11 Upper Back Braces (2)	3/4" x 3 1/2" x 13 1/2"
12 Lower Front & Back Braces (4)	3/4" x 4" x 5 1/4"
13 Lower Side Braces (2)	3/4" x 3 1/4" x 5 1/4"
14 Base Frame Rails (2)	3/4" x 3 7/8" x 13 1/8"
15 Base Frame Stiles (2)	3/4" x 5" x 19"
16 Feet (2)	1 7/8" x 5 1/4" x 18 7/8"
17 Dovetailed Crosspiece (1)	3/4" x 8 3/4" x 14 1/8"
18 Modesty Panel (1)	5/8" x 11" x 30 5/8"

Builder and teacher Frank Grant demonstrates the first band saw cut to begin making the feet on his commissioned podium.

Flat Footed

I made the feet from the same stock that I used for the uprights. I laid out their shape (including marking out the mortise positions) and then moved to the band saw. I cut their curved edges with the saw table set at 90°. Then I angled the table to 10°, and formed the chamfer on the three outside edges of each foot. I completed the chamfer with a spokeshave. (See *photos* at right.) Next I chopped the mortises to match the lower tenons on the uprights, using a mortising machine.

Now for the tricky stuff. I dry assembled the uprights into the feet and then carefully slid the base frame in place on the upper tenons. With a tape measure and a large square, I checked to make sure all the components were square and in proper relationship to each other. At this point, I measured to determine the exact size of the dovetailed crosspiece and the modesty panel. I also marked the upper tenons to the exact depth of the dovetails I would be cutting. Then I took the whole thing apart and got busy with the few remaining tasks.

“... a hidden dovetailed cross-piece holds the whole darn thing together ...”

Even though the crosspiece would not be seen, I had already decided to dovetail it in place. The mechanical strength of the joint was my key reason for doing so. And in the unique design of this podium, that crosspiece would not only join the



uprights, but would capture the base frame, to which the upper frames would be secured. In other words, it holds the whole darn thing together!

Once I cut the dovetails to fit, I moved on to the modesty panel. It is suspended on eight dowels. The dowels are glued into the uprights, but on the panel they are just friction fitted. This will allow the panel to move seasonally without disastrous results. I bored the holes into the edges of the panel and used dowel centers to transfer their locations to the uprights.

I bored the matching dowel holes and then carved the modesty panel tree motifs. Both faces of the panel are carved and textured.

Finishing Before Assembling

Once I had finished the carving, I dry assembled the entire podium, braces and all. When I was satisfied that all was well, I completed my final sanding.

I wanted the cherry components of the piece to be ultra-smooth and silky to the touch. This would add to the level of contrast with the textured pieces. I did not want the finish to be high gloss, however.

To achieve these ends, I machine sanded the cherry parts (not so much on the bird's-eye maple



With the saw's table angle to 10°, the author begins to create the chamfer on the podium foot.



Finally, the author cleans up edges of the chamfer with a spokeshave. The large feet provide a solid base and the chamfer helps to minimize the visual impact of the feet.

veneer) all the way to 220 grit, and hand-sanded again with 220 paper. Then I brushed on a coat of Zinsser's SealCoat™, followed by three coats of a good, oil-based varnish, thinned 60/40 with quality spirits. I applied the finish before I assembled the podium, taking care to mask off the areas that would need to be glued together during assembly. A key advantage to prefinishing like this is that you have more control applying the varnish to each surface (no drips) and you can rub out the final finish with a satin wax much more effectively. The drawback, of course, is that you have many opportunities to scratch or mark up your finished pieces as you assemble them (so be careful). When everything was dry, I assembled the podium and further rubbed out any minor blemishes that occurred during the assembly.

Beauty and Brawn

Building commissioned pieces can be one of the most satisfying kinds of woodworking. But it can also be a real challenge. In this case, it could not have worked out better. I was happy because all the elements of the podium worked well together: the artistic and the structural. And Nancy was pleased because it well represented her late husband and would provide a lasting memorial.

Frank Grant is a professional woodworker based in Minneapolis. This is his first article for Woodworker's Journal.



Fourth Street Guild

*Frank Grant
is a member*

*of the Fourth
Street Guild.*

A long time

Minneapolis co-op, it's an institution to be proud of. (Legend has it that this is positively the same Fourth Street Bob Dylan wrote about.) The Guild was founded around 1982 by Tim Johnson, as a place where woodworkers could combine their efforts, ideas, inspiration and, more important, their buying power.

Back in the day, power tools were much more expensive, but woodworkers were just as poor as they are now. Creating a co-op was a great way to share the cost

of everything from rent to stationary power tools. (As well as sharing techniques and advice.) Over the years, more than 60 woodworkers have called the Guild their home. Many have turned up in our pages over the years (both the Journal and in Today's Woodworker, with whom we merged six years ago), including Nina Childs Johnson, Tom Caspar, Tim Johnson, and now, Frank Grant. With a long history and a promising future, the Fourth Street Guild is both a fixture and an inspiration. And with folks like Frank in the mix, we're positive that its future will hold the very best.



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Easy-access Storage Bins



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

By Barry Chattell

It's the little things that will drive you crazy ... especially when you can't find them! Here's an easy-to-make weekend project that will help you organize your screws, plugs, biscuits and assorted sundries in one place.

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Simple Shop Storage Bins

By Barry Chattell

Tired of searching for fasteners or piling boxes of them on a shelf? Still using baby food jars to store nails and screws? Here's an easy-to-build wall system that keeps fasteners and shop sundries organized, visible and at the ready.

I'm an organized fellow and prefer to keep my fasteners and small hardware tidy. But I've never liked the usual options for storage containers. Little glass jars are prone to break, and other types of plastic containers are hard to see into or difficult to open. Then a lightbulb came on when I noticed bulk food bins at the grocery store. I employed the same basic container shape for this wall-mounted storage bin system. It features open, forward-slanting bins with clear plastic fronts. You can use my dimensions or modify the bin sizes to suit your needs.

First, cut six dadoes into your oversized panel. Then rip the four bottom strips off one end and trim the panel to its final size.

Cutting the Back and Bottom Strips

You can build this project from any 5/8"-thick sheet material. Start by cutting a workpiece large enough for the back panel (piece 1) plus the four bottom strips (pieces 2). Use a table saw and dado blade to plow six parallel dadoes into this workpiece, following the locations and dimensions shown in the *Drawings* on the next page. These dadoes form tracks for the bin sides. Rip the four bottom strips off one end, as shown in the *photo* on this page.

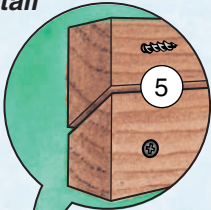


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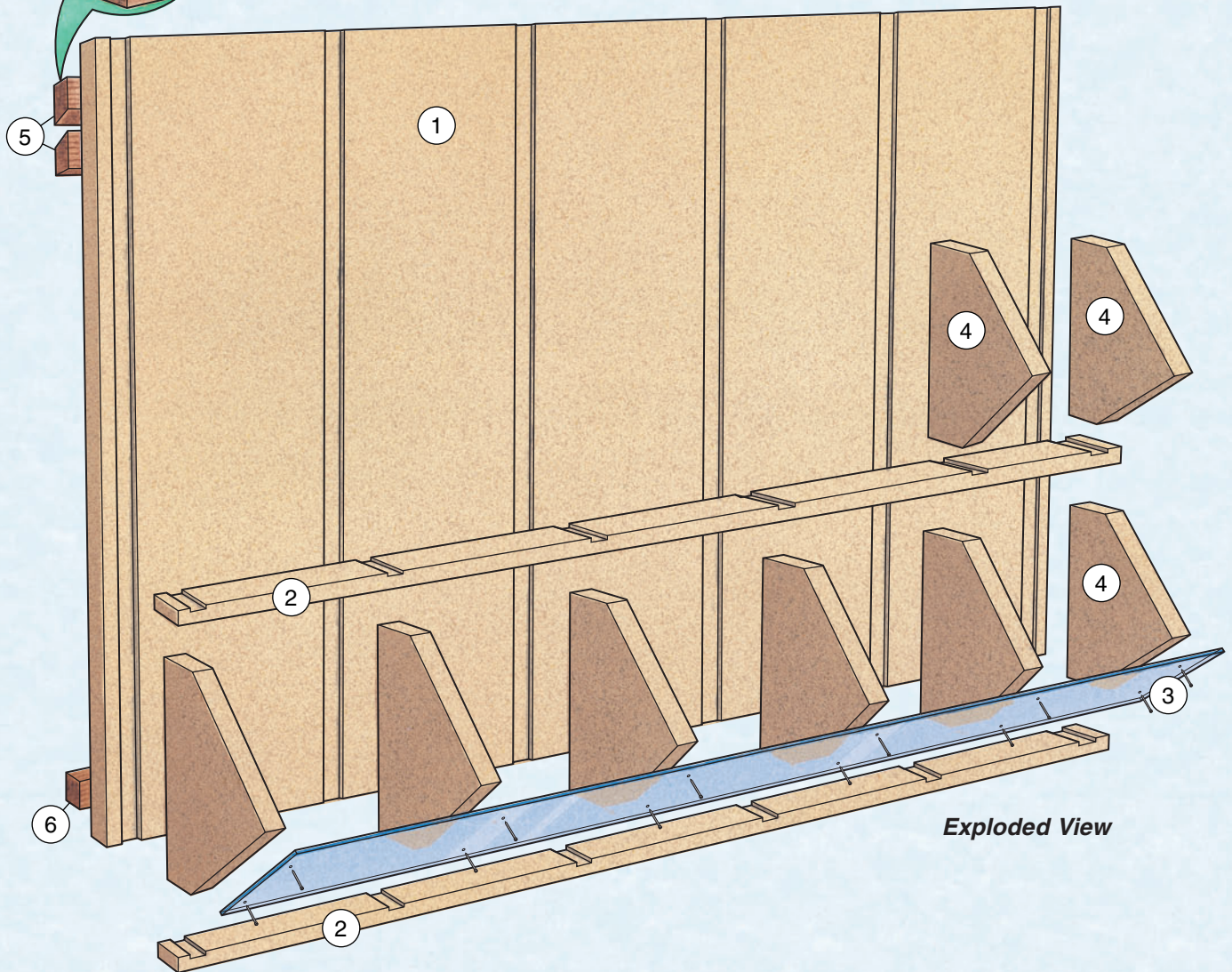
	T x W x L
1 Back* (1)	5/8" x 18 1/2" x 24 3/4"
2 Bottom Strips* (4)	5/8" x 1" x 24 3/4"
3 Plexiglas Bin Fronts (4)	1/8" x 2 7/8" x 23 3/4"
4 Bin Sides (24)	5/8" x 3 3/16" x 4"
5 French Cleats** (2)	3/4" x 2 3/8" x 23 3/4"
6 Spacer Strip (1)	3/4" x 1" x 23 3/4"

*Cut pieces 1 and 2 to size from one larger piece after cutting grooves.
 **Both pieces are cut from one piece of material.

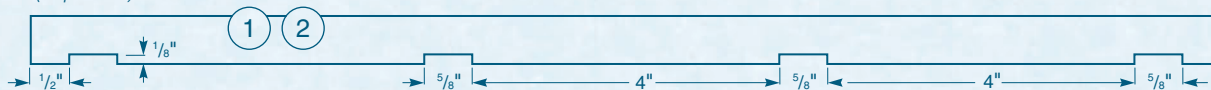
French Cleat Detail



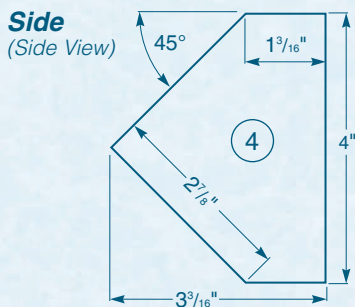
French cleats are a great way to securely hang something on a wall while allowing for easy removal.



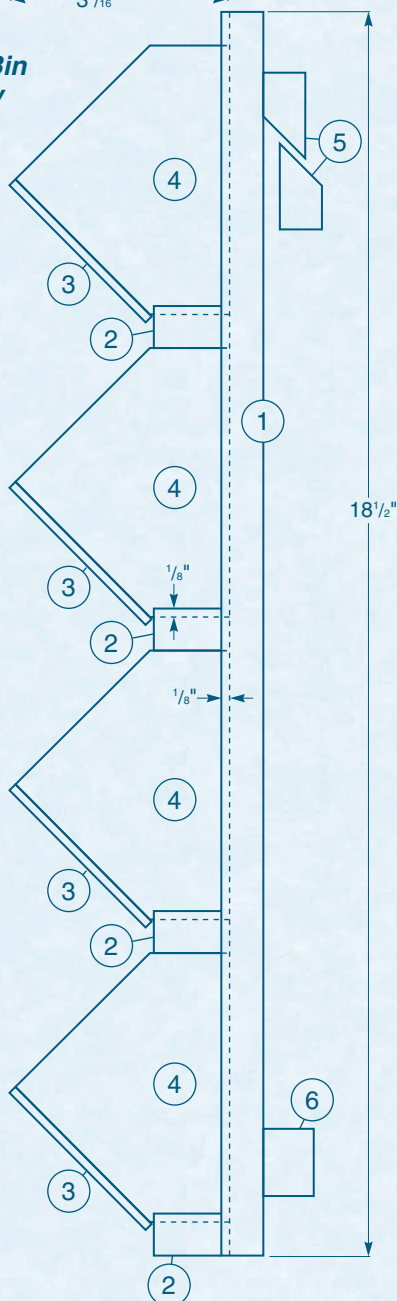
Back and Bottom Strip Groove Layout (Top View)



The Woodworker's Choice



Storage Bin Assembly
(Side View)



This bin storage system can be mounted to the wall permanently with screws or hung on a set of French cleats. If the cleat system is used, a spacer block must be placed at the bottom edge of the back. If the project is screwed to the wall, omit the cleats and spacer (pieces 5 and 6).

Making the Bin Sides

Make the bin sides from lengths of 4" wide material. To begin, swivel your miter saw's blade to 45° and fix a wide stop block to the saw table with double-sided tape. Index the stop block off the blade so you can clip the corners off the ends of the 4" strips and form a point in the middle. The stop block will be cut partially off with the first miter cut, so make it at least 4" wide to preserve some bearing support. To cut the "points," set the strip against the stop block, clip the first corner off, then flip the strip over and trim the second corner off the same end. Turn the strip end for end and trim off the corners on the other end.

Use your table saw and miter gauge to crosscut the pointed ends off the strips, forming two bin sides per strip. Set up these crosscuts so the distance from the tip of the point to the crosscut is $3\frac{3}{16}$ ". Now simply repeat the mitering and crosscutting procedure to make all 24 bins.

Time for Assembly

Assembly is as simple as gluing the first bottom strip flush with the lower edge of the back and then gluing six bin sides in the dadoes. Add another bottom strip and six more bin sides on top of the first. Build up four rows of bins this way.

Use a triple-chip tooth or a plywood-cutting blade in your table saw to cut strips of $\frac{1}{8}$ " thick Plexiglas™ for the bin fronts. I nailed these front strips to the bin sides, but first drill pilot holes through the plastic to keep it from cracking.

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Keep the paper facing on the Plexiglas™ during drilling and cutting to minimize chipping and make it easier to mark your layout lines and centerpoints. Cut it with a fine-tooth saw blade.



Trim the pointed tips of the bin sides with pairs of miter cuts against a stop block. Use long strips of stock to make these cuts safely. Miter cut both ends of each strip, then crosscut the ends free to make two bin sides.

I simply screwed my storage bins to the wall. Or you can mount the unit on French cleats (pieces 5) for easy removal. To make French cleats, bevel-rip a 4" wide piece of wood along its centerline with the blade tilted to 45°. Screw one cleat to the back of the bin system at the top with the beveled edge pointing down, and attach the other cleat to the wall with its bevel up (see the *Drawings*). This allows the two beveled cleats to interlock. Then attach a spacer strip (piece 6) along the bottom edge of the back panel. Now hang the bins and fill 'em up.

The wide stop block is attached with double-sided tape.



A Cherry Arts & Crafts

By Mike McGlynn

In the spirit of the Arts & Crafts movement, furniture should be beautiful, well-made and functional. This custom piece captures all those tenets while using both traditional and state-of-the-art joinery.

My old friends Chuck and Linda Lee have a beautiful Craftsman bungalow in LaCrosse, Wisconsin. For a small Midwestern town, LaCrosse has a surprising number of classic Craftsman and Prairie School houses. I've built a few small pieces of furniture for them in the past and was delighted when they asked for a freestanding book and stereo cabinet. The other pieces I've built for them were traditional, wedged tenon, Craftsman style, all constructed of solid cherry with an oil finish. This piece would follow in the same style.

Selecting Solid Hardwood

Unlike a lot of pieces I build, this cabinet was going to be almost entirely solid wood. The shelves and the back were not. Solid wood construction requires careful wood selection. I sorted through at least 2,000 board feet of lumber to come up with the stock to make the six main panels of this cabinet. I selected for color, figure and to avoid sapwood on faces that showed.

Back in the shop, I roughed out the boards to about 1" over width and 3" overlong and let them sit for a week to adjust to the shop's atmosphere.

My first step in milling the wood was to face joint all the boards flat on one face. This is where careful selection of flat boards will pay off. On a board that is over 70" long it doesn't take much warp before you have a board that ends up too thin at the ends by the time you get one face flat. After flattening I ran the boards through the planer, but left them 1/16" thick. I'd take this off with a wide belt sander after the panels were glued up. If you don't have access to a wide belt sander, take the boards to their final dimension, but your planer needs to be really sharp to avoid chip-out.

I make my panels an inch or two wide and a few inches long so that I can trim them after I'm done sanding them to thickness. This also helps to prevent damaged

edges. I jointed, ripped and jointed all of my boards, then laid them out to biscuit joint. The only caveat here is to make sure the biscuits won't appear when the panels are cut to size. I learned this the hard way when one of

the biscuits appeared on the side of one of the through tenons. Luckily, I was able to patch it with a small Dutchman. Gluing up the panels was a matter of biscuits, Titebond™ and plenty of bar clamps. An advantage of oversized panels is that I don't worry about clamp pads. I always scrape off the squeeze-out before it gets hard. When the panels were dry I took them to a friend's shop to run through a wide belt sander. A word of warning is warranted about using someone else's wide belt sander. Not to look a gift horse in the mouth, but not all wide belt sanders are created equally, and they are certainly not all maintained equally. A good wide belt sander is a great thing, but a bad one can totally ruin your parts. When using an unfamiliar wide belt, start by running a test piece through and make sure it dimensions evenly and doesn't get burned. Never use a grit coarser than 120 for the final pass; 220 is better.

Ultra-accurate Machining

Next, I sanded my panels with a random orbital sander and 220-grit paper, after raising the grain with a damp rag. At this point I cut the end panels and the top and bottom to size. I didn't cut the two dividers to size yet. I'd do that when I could measure their exact size on the project. Theory is one thing; fact is another.

I always joint one edge of the panel, cut the other edge parallel but oversize, cut off both ends, and then joint off the saw-cut edge to size. Cutting the ends first prevents chips at the corners. It's also important to prevent chip-out on the bottom side of the end panels. I have a table saw with a scoring blade, but a piece of blue

McGlynn's Quick-tips

Whenever possible, don't confuse theory and fact: measure the pieces of wood after you've cut them, too.

Blue masking tape is a cool, quick "zero-clearance insert" trick.

Controlled climb-cuts are a great way to avoid catastrophic blowouts.

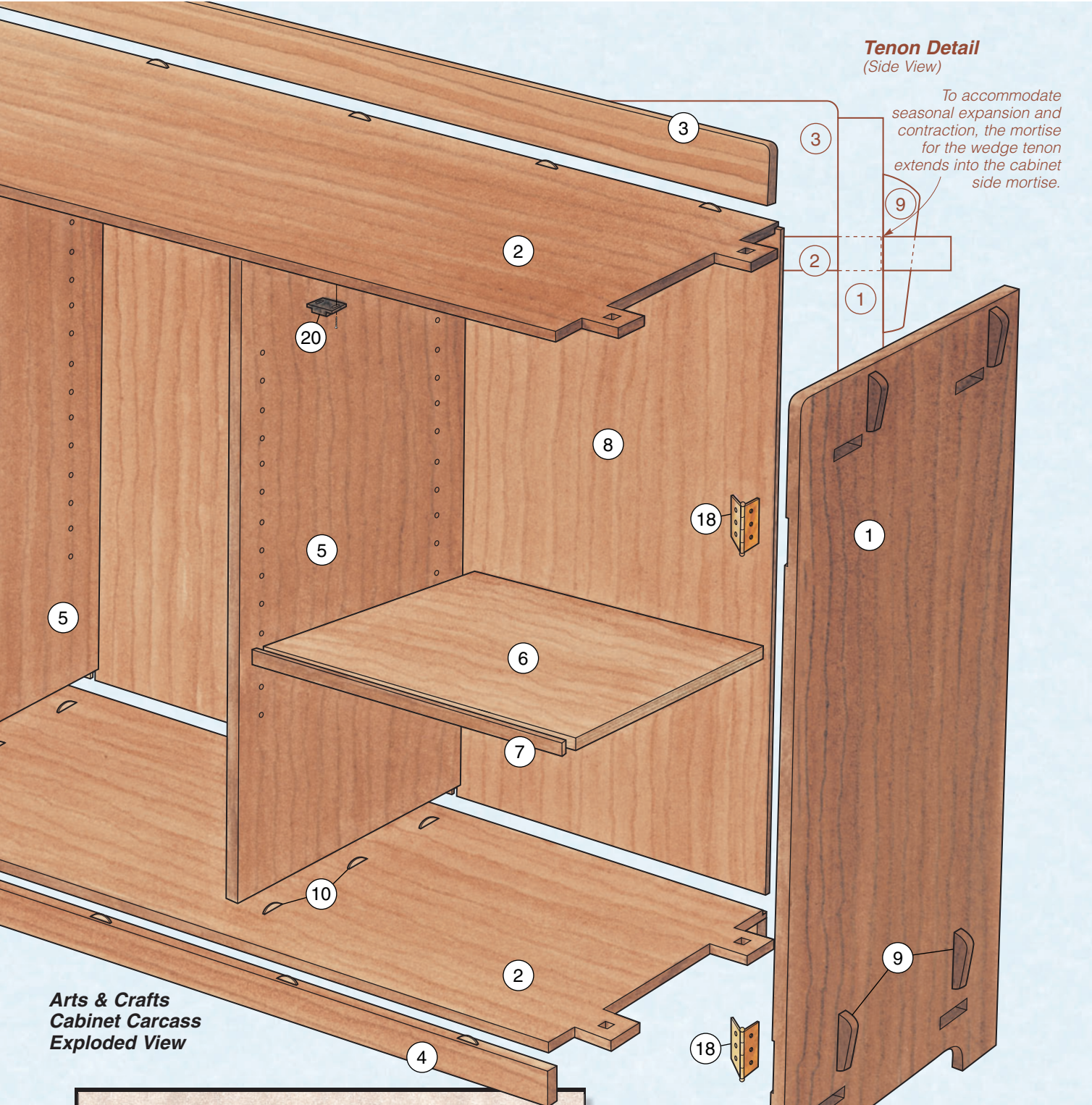
Stereo Cabinet



Joinery: Old and New

The author uses both centuries-old joinery techniques like the wedged mortise and tenon (right) and brand-new joinery such as biscuits and pocket-hole joints (left).



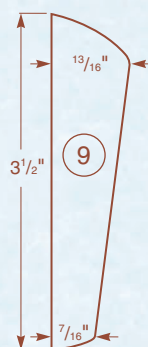


**Arts & Crafts
Cabinet Carcass
Exploded View**

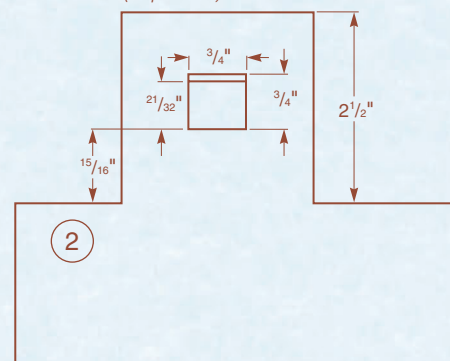
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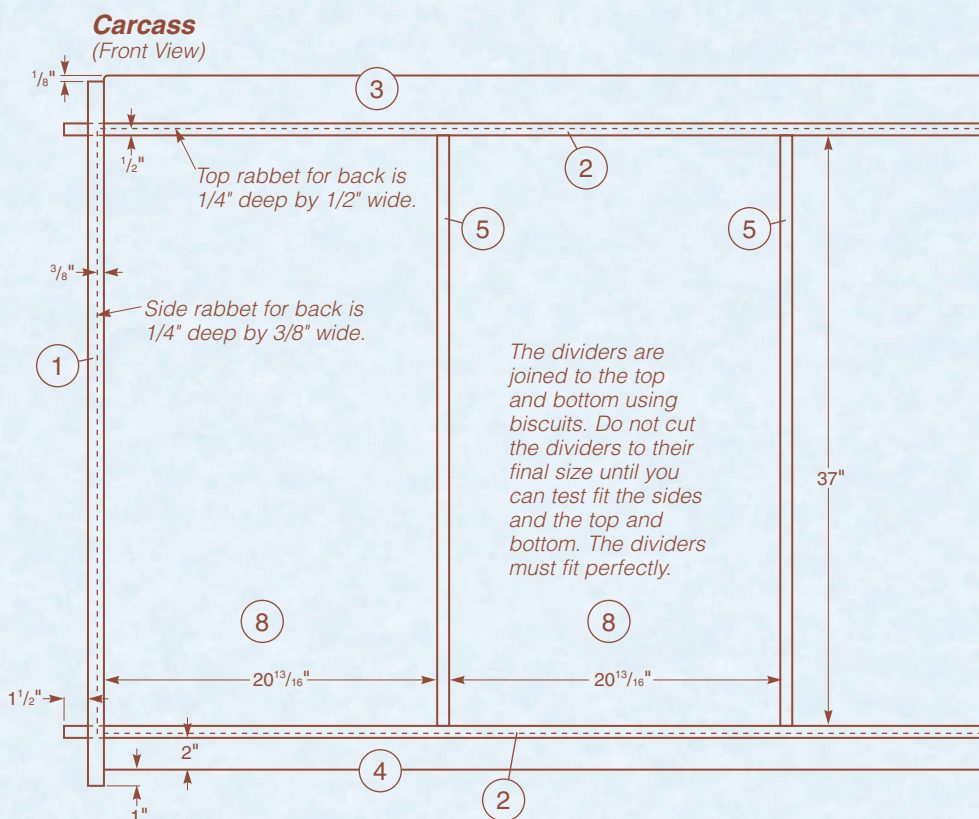
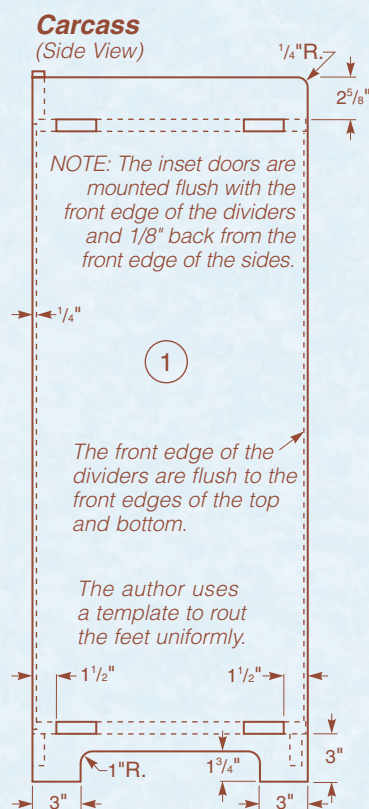
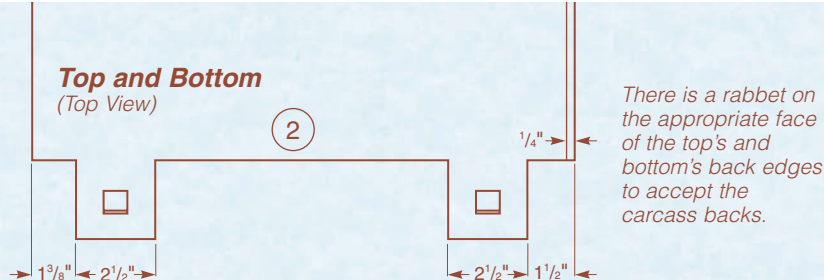
	T x W x L
1 Ends (2)	1" x 17 ¹ / ₄ " x 44 ⁵ / ₈ "
2 Top and Bottom (2)	3/4" x 17 ¹ / ₈ " x 68 ¹⁵ / ₁₆ "
3 Top Rail (1)	3/4" x 3" x 63 ¹⁵ / ₁₆ "
4 Bottom Rail (2)	3/4" x 2" x 63 ¹⁵ / ₁₆ "
5 Dividers (2)	3/4" x 16 ³ / ₄ " x 37"
6 Shelves (12)	3/4" x 15 ¹ / ₂ " x 20 ¹¹ / ₁₆ "
7 Shelf Edges (12)	1/4" x 3/4" x 20 ¹¹ / ₁₆ "
8 Backs (3)	1/4" x 21 ⁹ / ₁₆ " x 38"
9 Wedges (8)	3/4" x 13/16" x 3 ¹ / ₂ "
10 Biscuits (30)	#20

**Wedge
(Side View)**



**Top and Bottom
Tenon Detail
(Top View)**





Tight-Fitting Mortises... There Are No Shortcuts

The most challenging and time-consuming part of this cabinet is cutting and fitting the through tenons and their matching mortises. I cut the tenons first and then sized the mortises to them.

As can be seen from the *photos*, I used a router with a pattern bit and a template to make the tenons. I laid out the tenons with my template, band sawed away most of the waste, clamped the template in place, and routed the tenons to size. It is best to saw away most of the wood and use controlled climb cuts to do this shaping. This prevents the possibility of some catastrophic blowout that will ruin the piece. When I was done routing, I used a very sharp chisel and cleaned out the inside corners left by the router.

Laying out the Mortises

Laying out the mortises is the most precise task on this cabinet. They must be laid out

using a very sharp pencil and a good square. As with the dividers, it's important to use the actual dimensions of the tenons, not the theoretical. It's possible the top and bottom may be a slightly different thickness than what is called for in the plans and, depending on the accuracy of the template, there may be a slight difference in width. To get the best look, the gap between the mortise and the tenon can be only a few thousandths of an inch. After carefully measuring the

thickness of the top and bottom, I laid out the lines on both sides of the end panels. Of course it should go without saying that these lines need to line up exactly with one another. To lay out the mortise sides I laid the top or bottom on the end panel and marked directly off the tenons. Again, I transferred these lines to the other side of the panels. Now it is time for the fun to begin.

McGlynn's Quick-tips

Whenever possible, don't confuse theory and fact: measure the pieces of wood after you've cut them, too.

Blue masking tape is a cool, quick "zero-clearance insert" trick.

Controlled climb-cuts are a great way to avoid catastrophic blowouts.

The Shape of Things to Come ...

the end panel and marked directly off the tenons. A g a i n , I transferred these lines to the other side of the panels. Now it is time for the fun to begin.

Chiseling the mortises requires three things: sharp chisels, steady hands and patience. The first step is to cut out the outline of the mortises. I started by chiseling a cut $1/32$ " inside my layout line. I then lifted that chip out, all the way around. Then I made a second, deeper pass and carefully pared straight down exactly on the layout line. With the inside already relieved, this chip popped straight out with no chance of the chisel drifting outward. Once I had done this procedure on both sides of the panel, I used a $1/2$ " drill to remove the bulk of the waste. By chiseling out both sides first, I prevented any split-out from the drill. I was then left to carefully chisel out the remaining waste. I did this from both sides of the panel. I slightly undercut the walls so there would be less binding when the cabinet was assembled. The interior and exterior faces are where it needs to fit tight. Without fail, there will be some final fitting to get the tenons to slide home with a nice, tight fit. I accomplished this by using a

combination of sanding sticks, files and chisels.

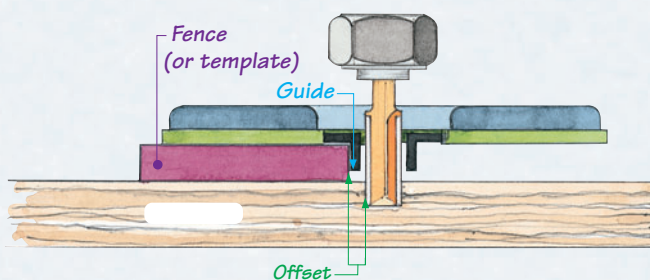
The last step of the mortise and tenon work was to cut the mortises for the wedges. The key to having wedged tenons work well is to make sure that the mortise and the wedge have exactly the same slope to them. This required laying out the sloped mortise on both sides of the tenon. To accomplish this, I laid out the mortise opening on the top side of the tenon and then, using a sliding bevel and combination square, transferred the cut lines down the sides of the tenon and around to the bottom. You will notice in the *Drawing* that the inside face of the mortise is $1/16$ " inside the vertical face of the end panel. This is done so that no matter what the humidity is, the wedge will always seat tight. I cut the mortises out using the same technique that I used to cut the other mortises. Once again, I slightly undercut the angled face of the mortise for a tight fit.

To ensure that the wedges turned out the same, I made a template of $1/4$ " MDF and tested it to fit in the actual assembled mortise. When it fit right, I used the template to lay out my wedges on a strip of wood I milled to the width of the mortise. I found it's easiest

The author chucks a bearing-guided bit into his router. Pattern and template routing are great ways to ensure uniformity of furniture components.



Ian Kirby's Take on Template Routing



The guide collar is, in effect, a much reduced router base. It runs against a template. The guide is the outer surface of the collar. The fence is the template. The offset is the distance from the outside of the guide collar to the bit's cutting circle. If you use a bearing-guided (top or bottom) router bit, there is no offset to accommodate.

With this guide system you can:

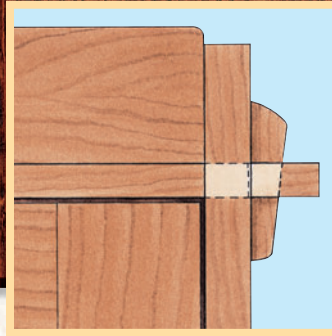
1. Make practically any shape, recess or hole in or through a board.

McGlynn's Quick-tips

Chiseling mortises requires three things: sharp chisels, steady hands and patience.

The key to wedged tenons working well is to make sure the mortise and wedge have exactly the same slope to them.

Make an MDF template of the wedge and fit it to perfectly match the assembled mortises.



job ... the through tenons ... can really bite you at this point. There is a tendency for the end panel face to chip out when the tenons are pushed through. To prevent this, I put a tiny break, no more than 220 sandpaper, on the outside corners of the mortises, and took my time tapping the ends into place. Then I tapped the wedges in to hold the assembly together.

With the carcass together I could measure for the length and width of the dividers. Measure for length at the end panel to prevent errors from subtle warpage of the top and bottom. After measuring, I cut

the dividers to length and width.

While the carcass was still dry-assembled, I cut out and fit the top rail and the two bottom rails. In a bow to modern technology, I double pocket-holed the end of all these rails. The top rail got a subtle little roundover on its top corners, as it's 3/8" taller than the sides. Once I had cut and fit my dividers and rails, I disassembled the cabinet.

The dividers are attached to the top and bottom with a combination of biscuit joints and screws. I carefully laid out the biscuit joints on both the dividers and the top and bottom. I've found that there is no better place to screw up biscuit joints than when joining one panel to the middle of another. It is easy to align the biscuit joiner with the wrong layout line — so take your time. After biscuiting I drilled and countersunk the screw holes in the bottom.

When I finished the joint prep, I rubbed my pieces with a damp cloth to raise the grain and sanded and detailed all of the parts with 220 sandpaper. It's important to keep in mind which edges and where they need to be broken.

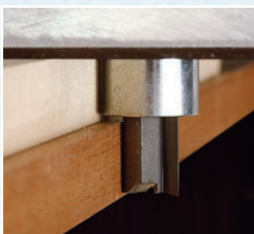
To put the carcass together, I began by attaching the dividers to the bottom using biscuits, glue and screws. Attaching the dividers to the top is a little more difficult since there aren't any screws. I used four bar clamps with Mastodon extenders attached to them. Once the glue cured, I glued the two bottom rails and the top rail into place. Before I attached the end panels, I used a sharp utility knife to cut a glue relief groove into the ends of the top and bottom. I found that it was best to attach one end at a time. To attach the ends, I carefully put glue on the ends of the top and bottom, tapped the end panel into place, drove in the wedges and installed the pocket screws. I then repeated this process with the other end. At last the cabinet was starting to look like something other than a pile of parts.

The top, bottom and ends of the cabinet have a rabbet to accept the three backs. The rabbet is easy to cut on the top and bottom as it goes all the way through. I cut this rabbet with two careful passes on the table saw. The rabbets in the end panels are stopped at both ends. I cut these rabbets on the router table and finished them off with a sharp chisel.

The last steps for the end panels were to profile the feet and round over the upper corner. The feet were easily profiled using a template and router after cutting away most of the waste with a jigsaw. To round the top corner, I laid out a nice radius and rasped and sanded to the line.

At this point, I carefully dry-assembled the ends to the top and bottom. When I say carefully, I REALLY mean it. The very thing that took so much time and skill on this

*From "Seven Ways to Guide your Router"
Woodworker's Journal, December 2003.*



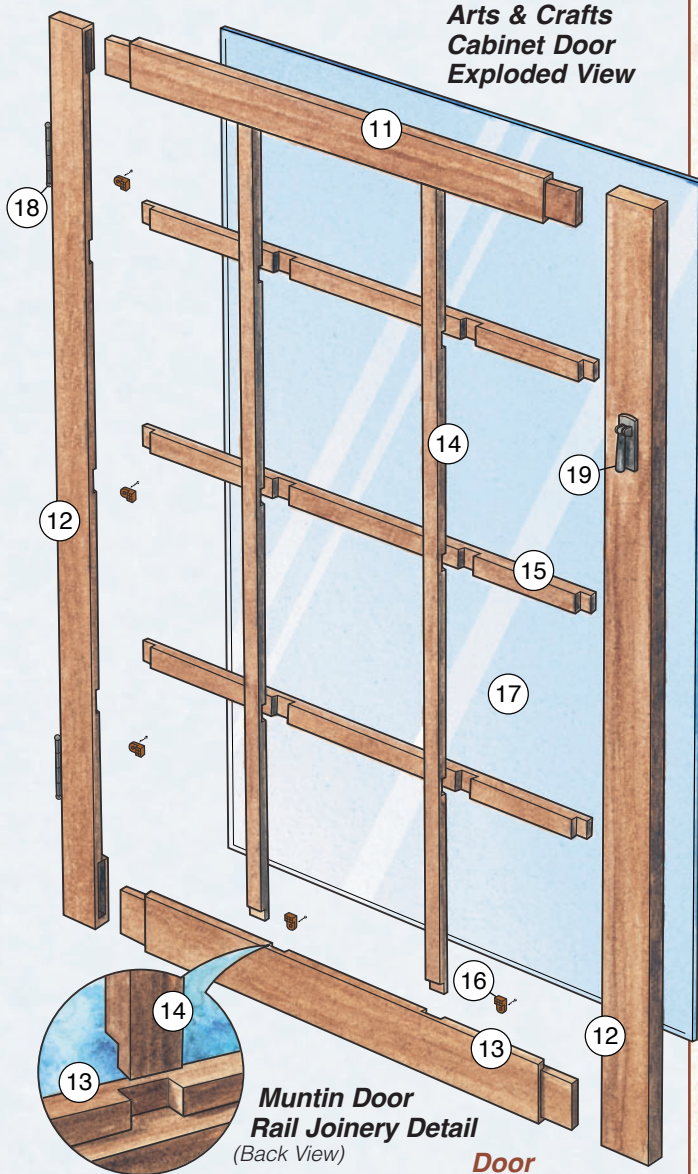
Cut the edge of a board straight.



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

- 2. Cut the edge of a board straight.**
- 3. Make a rabbet or a groove parallel to the edge of the template.**
- 4. Make an inlay and a matching recess in the workpiece. This setup works well for straight cuts. When you use guide collars with a shaped template, the template has to be adjusted to compensate for the offset.**

Arts & Crafts Cabinet Door Exploded View



MATERIAL LIST Door

	T x W x L
11 Top Door Rails (3)	3/4" x 2 1/4" x 18 3/4"
12 Door Stiles (6)	3/4" x 2 1/4" x 36 7/8"
13 Bottom Door Rails (3)	3/4" x 3" x 18 3/4"
14 Long Mullions (6)	5/16" x 1" x 32 5/8"
15 Short Mullions (9)	5/16" x 1" x 17 1/4"
16 Glass Retainers (30)	Rubber
17 Door Glass (3)	1/4" Measure to fit
18 Hinges (6)	Stickley
19 Pulls (3)	Stickley
20 Magnetic Catches (3)	Low profile

Shelf and Door Basics

put glue on the ends of the top and bottom, tapped the end panel into place, drove in the wedges and installed the pocket screws. I then repeated this process with the other end. At last the cabinet was starting to look like something other than a pile of parts.

With the carcass assembled, I drilled the shelf support holes. My usual method is to use a shop-built guide with 1" spacing. It's important to keep in mind that the end panels stick out 1/8" further than the dividers, and that the doors are fully inset. I drilled my front row of holes 1 1/2" behind the front edge of the dividers.

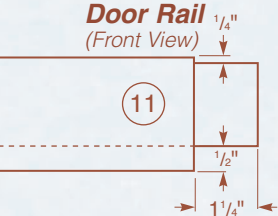
The shelves themselves are made of plain-sliced cherry veneered MDF with a 1/4" solid wood front edge band. To me, it's simply not worth it to invest the time and money into making solid wood shelves when all you really ever see is their front edge.

Making the Doors

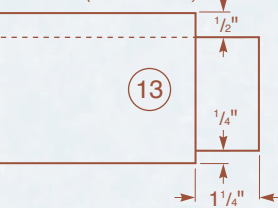
The doors are the last major part of the cabinet. I started the doors by milling all my wood to dimension and then cutting the pieces to length. I built these doors with mortise and tenon joints, but you could choose to use floating tenons. It's important that the joint is quite a bit deeper than the glass rabbet. On these doors the glass rabbet is 1/2" deep from the inside edge, so I made the mortises 1 1/4" deep. As with the back rabbet, it's easier to cut the glass rabbet before the doors are assembled, rather than after. Once the rabbets had been cut I glued up the doors, taking time to make sure that they were square and flat.

The grid, I found, is easiest built as a unit, then installed into the doors. One trick with these grids is to make them out of thicker material — 7/16" thick as opposed to the 5/16" finished thickness — and run them through a wide belt sander after they're assembled. This extra thickness allows the depth of the lap joints to be slightly off and not matter. The lap joints are best cut with a very accurate dado setup. I sanded all the edges of my strips before I started the fitting

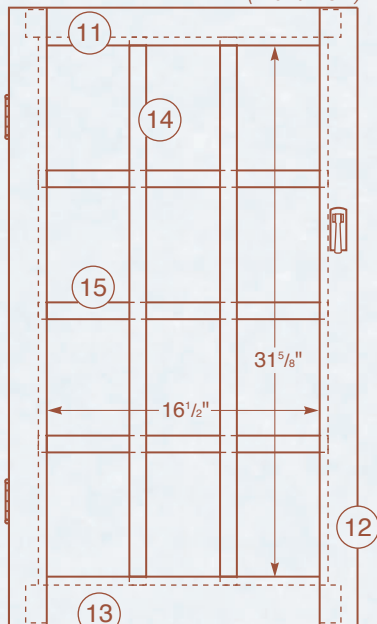
Top Door Rail
(Front View)



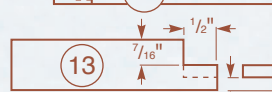
Bottom Door Rail
(Front View)



Door
(Front View)



Door Rail
(Section View)



Muntin
(Side View)

Jigging up to cut the notches on the muntins is one of those repetitive woodworking tasks you want to take your time on. Get it right the first time and the rest of the job will come easily.

process so that the fit didn't change later. Once I had a tight fit on a piece of scrap, I laid out the laps on one each of the horizontal and vertical pieces. Using a stop block on my miter gauge, I then cut all the laps. It's important to keep in mind that the dado goes on the back of the vertical pieces and on the front of the horizontal pieces.

Once the grids were glued up and sanded to thickness, I laid them in the doors, carefully checked for alignment, and used a sharp layout knife to mark the end laps — both on the door and the grid ends. I cut the laps on the frame with two very careful passes on the table saw. The laps on the frame were cut with a trim router mounted on a shop-made base, and chisels. Since I had done this work very methodically and carefully, a perfect, tight fit was obtained. With glue in the mortises, I mounted the grids in the doors. When the glue had cured, I went over everything to make sure all the joints were perfect and flush.

Fitting and hinging the doors was the last stop before finishing. I placed each door in its opening to make sure it was square and that the gap was even. I corrected any problems with a sharp block plane. In keeping with the Craftsman theme, I used Stickley butt hinges. There are two important things to keep in mind when mounting the hinges. The first thing is that the center door is mounted to one of the dividers whose front edge is 1/8" inset from the end panels where the other two doors are mounted. To get the doors to line up, the end panel mortises must be 1/8" deeper, from their front edge, than the mortises in the divider are from their front edge. The second thing to keep in mind, and this is a personal aesthetic opinion, is that for there to be an even gap all the way around, the hinge mortises should be somewhat less than half the depth of the closed hinge. As an example: If the hinge gap is to be 1/16", and the thickness of the closed hinge is 1/8", then the mortise should be 1/32" deep. I cut the mortises on the doors first with a trim router and chisels. I then shimmed the doors in place and marked the carcass mortises directly off the doors. Again, I used the trim router and chisels to cut the mortises. My figuring and marking seemed to have been correct, and the doors mounted up perfectly. When I was satisfied with the fit, I disassembled everything and got ready for finishing.

The first step to finishing was to go over everything and touch up any areas that needed it with 220 sandpaper. To match the other pieces I had made, this cabinet has an oil finish. The oil finish I have been using lately is the



Sam Maloof finish (from Rockler; 800-279-4441). This finish seems to have all the qualities of the old Watco® and Deft® oils, with better build. I applied three coats with a day or so in between, and rubbed out the final two coats with a fine Scotchbrite™ pad.

When the finish was dry, I installed the backs (with the grain running vertically, for best visual effect), put the glass in the doors, installed the door catches the doors and attached the door pulls.

To me this cabinet entails all of the things that I love about Craftsman furniture. First, it is a very functional design that serves a purpose without compromise. Second, it has details, such as the wedged tenons, that

Mike McGlynn is a contributing editor to the Woodworker's Journal and a professional furniture maker by trade. He lives in Las Vegas, Nevada.



Bargain Basement Power Tools

By Sandor Nagyszalanczy



It's often said that "you get what you pay for." Following that piece of advice, how good could a \$27 cordless drill possibly be? Or a \$20 belt sander? Or an \$18 biscuit joiner? I'm talking about the ultra-inexpensive portable power tools manufactured in China and sold in home centers, department stores and by Internet tool vendors.

We've all seen plenty of Chinese-made products of impressive quality, from kitchenware to cars to *haute couture*. But how well-made could a circular saw be that's barely the price you'd expect to pay for a good saw blade?

To find out, my assignment was to buy and try a whole shop's worth of Chinese-made portable power tools, ordering all of them on the Internet. Using a variety of vendor web pages,

I purchased 10 tools in all: a plunge router, a jigsaw, a 7¼" circular saw, a 3 x 21" belt sander, a 1/3 sheet orbital sander, a 3/8" corded drill, a biscuit joiner, a 4½" angle grinder and two cordless drill/drivers — 14.4- and 18-volt models. The total price, including shipping, was an unbelievable \$300.84. That's right, 10 portable power tools for a price you'd expect to pay for a single high quality router or belt sander!

Out of The Box

Even with my hopeful nature, I have to admit that my initial expectations for these bargain tools remained pretty low. I figured that at least one of the tools wouldn't run at all, or would self-destruct the first time I tried it. But as I opened the cartons delivered to my doorstep, I was pleasantly surprised. Most of the tools looked pretty good right out of the box: no obviously broken



or bent parts; no missing accessories; no plastic bodies thin as Saran™ Wrap. The tools looked and hefted a lot like the expensive tools I'd been buying all my life, with a nice overall fit and finish. The worst thing seemed to be that (don't laugh) a couple of the power tools smelled really bad. They gave off an acrid odor that was like a cross between burned machine oil and old decaying tires. It made me feel queasy enough that I had to put them outdoors for a few days until their stink subsided.

Further scrutiny revealed small problems with two tools: The circular saw's pressed sheet-metal guard was

catawampus enough to rub against the carbide-tooth blade, as evidenced by a shower of sparks the first time I switched the saw on. After the fireworks, it took only a little bit of metal bending to iron the problem out. There

were also problems with the biscuit joiner's plunging action. At first, the blade seemed misaligned and wouldn't plunge out of the front of the body correctly. Good thing I did a dry run with the power off, as I soon discovered that the blade was completely loose on its arbor. The nice kit it came in did include all the wrenches needed to remove the tool's base plate and re-tighten the blade to put the tool back in action.

Features: Missing and Unexpected

Like "base model" automobiles, which barely come with seats and a steering wheel, I fully expected these bargain-priced models to be "stripped down" power tools, with just the bare essentials — nothing but bodies with motors, cords and on/off switches.

In most cases, though, I was wrong. For example, the Chicago Electric plunge router had variable speed control, a turret depth stop, and built-in arbor lock. Plus, the tool came with a whole slew of extras, including a nice edge guide (that also served as a circle jig). The Coleman 18-volt cordless drill not only came with the expected



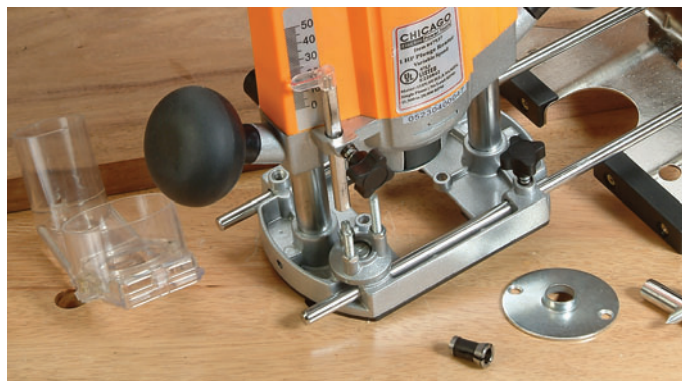
You take the good with the bad: the biscuit joiner's blade was loose on its arbor during a (powerless) dry run, but the kit had wrenches to fix the problem.

battery charger, but a nice swiveling-head worklight that used the same battery pack (alas, no second battery), all packaged in a capacious soft-sided tool bag. The "Pit

Bull" circular saw even sported a real cutting-edge (pun intended) feature: A battery-powered laser that showed the blade's line of cut.

This isn't to say that all the features promised were delivered. All three drills I bought (one corded and two cordless) had keyless chucks which, although easy to use, tended to slip their grip on smooth-shanked bits. The bits would loosen, requiring occasional retightening — a real hassle. To get around this, I switched to drill bits with flatted shanks. Further, both cordless tools came with the most rudimentary chargers imaginable — basically plastic bases that held the batteries, powered by DC current from simple "wall wart" transformers. As you can imagine,

Today's Shop continues on page 60 ...



Not just a "base model," the Chicago Electric router came with a nice edge guide, guide bushing, collets for 1/4" and 8mm shank bits and a dust collection attachment.



The Pit Bull circular saw sported a battery-powered laser that projected a red stripe to show the blade's line of cut — a very useful feature.

they contained no sophisticated electronic circuitry, no charge monitoring or “conditioning cycles” to enhance performance and extend battery life. Plus, these chargers work very slowly, requiring up to five hours for the 14.4-volt Feida’s battery, and a whopping eight hours for the Coleman’s 18-volt pack.

Instructions Available

Encouragingly, all the tools came with manuals of instruction, although in some cases, this consisted of but a single photocopied sheet. The manual for the biscuit joiner was the best in the bunch, with extensive text and illustrations on how to use the tool in a variety of different situations. As true with most tools manufactured abroad, the manual’s texts had been translated (probably from Chinese), often with hilarious results. For example, the section for using a rip guide in the jigsaw’s manual was titled: “The using method for the leading ruler (a seamy thrust plate).” In all fairness, I’ve seen badly translated manuals that came with pricey “top shelf” tools as well.

Putting Tools to Wood

Several of the tools included extra sets of motor brushes. This is probably a good thing, since you’re unlikely to find replacement parts for many of these tools, and it would be a shame to throw the

Today’s Shop continues on page 62 ...



Chicago Electric Router

Purchased from: Harbor Freight (www.harborfreight.com)

Price paid: \$29.99

Size/capacity: 1/4"- or 8 mm-diameter bits

Weight: 6 lbs. 13 oz.

Supplied accessories: Edge guide (with circle trammel point); 1 1/8" O.D. guide bushing; dust collection pickup; 1/4" and 8 mm collets & wrench; extra motor brushes.



One of the “cons” of this router: an awkward on/off switch that was more difficult to lock on than to turn off.

Pros: Nice edge guide and dust pickup. Very smooth plunging action. Plunge lock lever well located for easy operation. Decent 8.5 amp motor. Flat top of motor housing and built-in arbor lock make bit changes convenient. Nice depth setting turret. Variable speed control has extensive range of adjustment: 11,500 to 28,000 rpm. Tool has limited 90-day warranty.

Cons: Lots of motor vibration when router is run at full speed. Scale for depth stop graduated only in millimeters. Odd on/off switch with push button lock was fumbly, more difficult to lock on than turn off. Maximum plunge travel only 1 13/16".

Comments: The compact size of this router — just like popular 1 1/2 or 1 3/4 HP plunge routers, but about 2/3 the size — makes it great for small routing jobs: cutting mortises for hardware and inlays, rounding edges of projects, routing narrow slots, etc. Given the vibration the tool produced, though, it's not a good bet to run it at high speed settings or with large diameter bits.



The Feida — and the other two drills in this article — required the author to switch to drill bits with flattened shanks (three flat areas on the shank, to provide a better grip for the chuck). The keyless chucks kept slipping on smooth-shanked bits.

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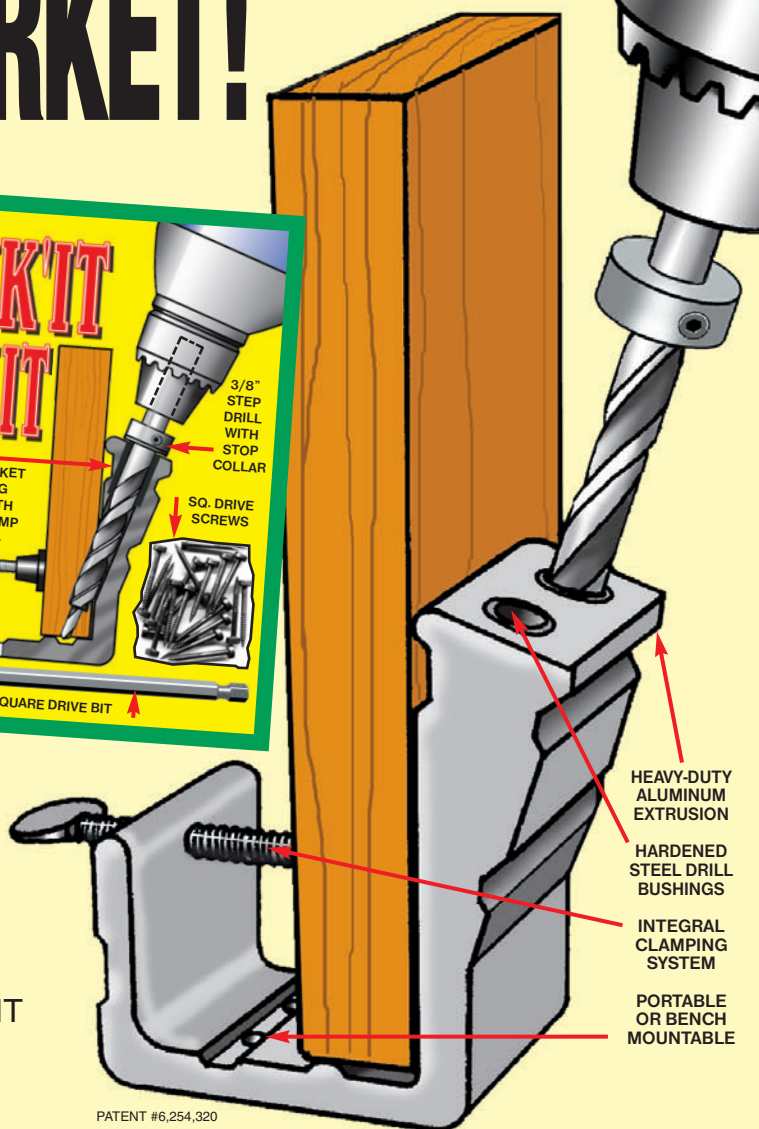
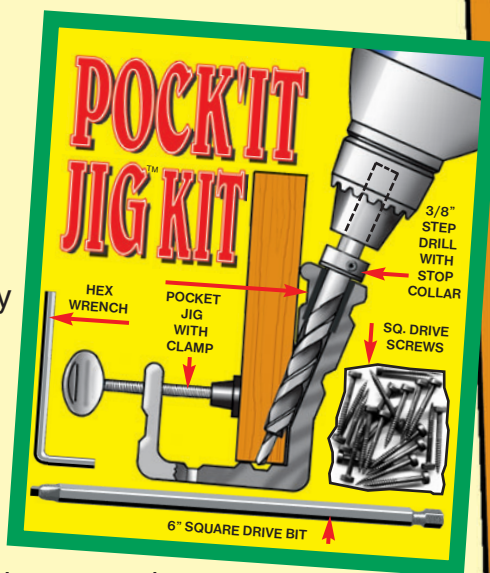
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Finding it hard to keep the American Tool Exchange belt sander flat, the author checked and found that its platen wasn't flat — not a problem with rough sanding jobs, but a bad choice for critical sanding work like veneered doors or panels.

entire tool away due to worn brushes. But I couldn't help but wonder if the extra brushes were a sign that the originals might wear out quickly? Only time and trial could tell.

It was time to put these tools to wood and make a little sawdust. One by one, I switched the tools on and used them to cut, shape, sand, bore or fasten both hard and softwood parts. During my two-week-long test period, I also tried out each tool's included accessories. My observations and impressions about the performance of the individual tools, along with their prices, stats and features, are included in the summaries throughout this article.



Overall, the tools ran just fine — none emitted strange noises, smoke or electrical sparks of any kind. Most exhibited decent motor power, with the exception of the corded and cordless drills, which all performed a bit anemically. The Chicago 3/8" drill's smallish motor was geared for speed, rather than torque — a choice I questioned whenever the drill stalled when

Today's Shop continues on page 66 ...



Nikota Variable Speed Jigsaw

Purchased from: National Industrial Tools Inc. (www.nittools.com)

Price paid: \$27.90 (includes shipping)

Size/capacity: 1 5/8" maximum depth of cut (with supplied blade @ 90°)

Weight: 3 lb. 12 oz. (with blade)

Supplied accessories: Allen wrench (for blade change and tilt setting); wood and metal saw blades.

Pros: 3.5-amp motor provides good cutting power; variable-speed control wheel conveniently located on top/front of handle. Wide two-finger on/off switch comfortable to operate. Clear dust shroud slides up easily for blade changes. On board storage for Allen wrench. Sturdy roller guide provides good blade support.

Cons: Saw lacks an orbital blade setting. Two-Allen-screw blade clamp is simple, but time-consuming to change blade. Tilting base for bevel cuts requires realignment of blade roller guide each time. Has built-in port for connecting dust hose, but no fitting for the twist-on connector.

Comments: Comfortable to use and solid in feel. Certainly a fine saw for light cuts in sheet metal, plywood and thinner hardwoods and softwoods. The lack of orbital motion makes it too tedious to use this saw to cut thicker (1" plus) wood.

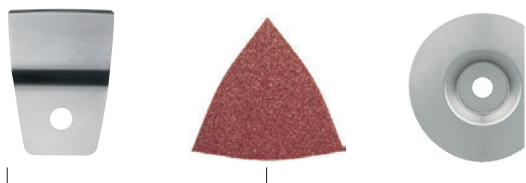
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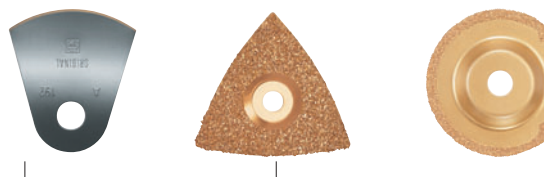
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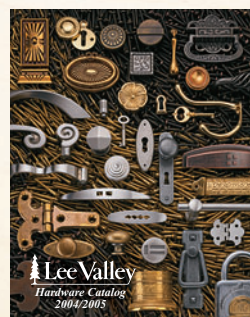


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(Circle No. 75 on PRODUCT INFORMATION form)



Pit Bull Circular Saw

Purchased from: TNG Direct (<http://tngdirect.com>)

Price paid: \$27.99

Size/capacity: 7¼" blade, 2¼" depth of cut (at 90 degrees)

Weight: 9 lbs. 12 oz.

Supplied accessories: 32-tooth carbide-tipped blade; rip guide; blade wrenches; extra motor brushes.

Pros: Battery-powered laser line-of-cut guide. Well-proportioned rear grip and front handle located for a sure grip. Nice oversized button for locking trigger on. A prominent lever on guard makes it easy to retract manually. Vari-torque blade mount prevents kickback if blade hangs up on a knot or nail; 8.7-amp motor offers plenty of power for cutting through 2x construction lumber. Useful rip guide.

Cons: Flimsy sheet-metal blade guard caused sparks from blade; needed rebending! Depth-of-cut locking lever was loose and fiddly. Pressed sheet-metal trunnions don't offer much stability for motor unit.

Comments: The circular saw had plenty of power for crosscutting or ripping 2x construction lumber. The Pit Bull's battery-powered laser line is actually very useful — it was bright enough to see even when working in bright sunlight and, should it come out of whack, it's adjustable.

boring larger holes in thick wood. With the cordless drills, the capacity of the battery packs was questionable: I noticed that they felt considerably lighter than packs of comparable voltage by name-brand manufacturers (DeWalt, Bosch, etc.) — about 25 percent lighter. Less battery weight likely means less current and amp-hour capacity, resulting in less available power and shorter running times.

The performance of some tools was somewhat limited by their economy of design and/or lack of features. For example, the Nikota jigsaw didn't offer orbital blade action (where the blade moves forward slightly on the cut stroke, and slightly back on the return stroke) — the tool's blade simply cycles straight up and down. This not only results in a shorter blade life, but severely reduces the aggressiveness of the cutting action. Thus, the saw was very slow when sawing thick wood, especially when cutting with the grain. The Feida 14.4-volt cordless drill's lack of trigger-controlled variable speed made it less than useful when starting drill bits on sensitive or hard materials and when driving or removing fasteners. The American Tool Exchange belt sander was powerful and sanded aggressively, but I noticed that it was hard to keep flat. A little inspection showed that the sander's platen wasn't flat.

Another problem that I ran into as I used the tools was the unwelcome vibration that three of them produced. The finishing sander's lack of isolation between the motor/pad and body/handle created a fair amount of hand-numbing vibration. Donning a pair of bicycle gloves with gel-filled palms fixed the problem. The corded drill and router both produce enough vibration that I thought it wise to check them for runout (the degree that a tool's shaft or arbor deviates from turning perfectly concentrically). I checked the corded drill first, using a dial indicator that registered nearly 25 thousandths of runout



A check with a dial indicator showed nearly 25 thousandths of an inch of runout at one inch from the chuck on Chicago Electric's drill/driver. Not necessarily a problem with freehand use — it won't affect any but the most precise jobs.



American Tool Exchange Belt Sander

Purchased from: TNG Direct (see page 78)

Price paid: \$19.99

Size/capacity: 3 x 21" belt.

Weight: 6 lbs. 12 oz.

Supplied accessories: 80-grit belt; extra motor brushes.

Pros: Light and compact; easy-to-pull release lever for belt tension. Belt tracks very nicely. Reasonably strong 6.9 amp-motor cooling fan and reasonably effective dust collection. Comfortable rear grip and easy to trigger on/off switch with a lock-on button. Unit came with a good quality sanding belt.

Cons: Platen supporting sanding belt was far from flat, lengthwise. Plastic front roller would probably break if sander was accidentally dropped. Small clearance between sander's body and belt made belt a bit finicky to remove. Small squarish front grip was uncomfortable to grip for long periods of sanding.

Comments: Very compact and handy for a variety of wood sanding chores, including cabinet face frame leveling, removing finishes and smoothing rough surfaces of small parts and panels. Just don't use it for critical flattening jobs. This tool had surprisingly good motor power, and ran cool even during long sanding sessions. The sander's dust collection was reasonably good at capturing the dust the belt produced.

Today's Shop continues on page 68 ...

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(Circle No. 16 on PRODUCT INFORMATION form)



Finishing Sander

Purchased from: TNG Direct

(<http://tngdirect.com>)

Price paid: \$7.99

Size/capacity: 1/3 sheet

Weight: 2 lbs. 8 oz.

Supplied accessories: Dust hose connector.

Pros: Very lightweight; nice rear grip and trigger with lock-on switch. Nice flat platen covered with dense plastic foam. Sandpaper clamps are well designed and easy to use.

Cons: Small motor only rated at 1.2 amps; not much sanding power. Lots of vibration felt in grips during use. Plastic platen is likely breakable if tool is dropped. Sanding pad has a very small orbit, so sanding action isn't very aggressive.

Comments: Although the finishing sander's pad had holes for dust collection and a nice dust hose fitting at the rear of

the body, dust collection was essentially unusable: Sandpaper sheets with holes that matched the pad were not included, and sheets were not available from the web site that sold the tool. Overall, though, this sander is light and easy to use for smoothing all kinds of small wood projects or trim, shelves or small cabinets around the house.

just an inch from the chuck. Since this tool is used freehand, I don't imagine this will affect any but the most precise jobs. The router was another matter. It vibrated so much that I was afraid to use it on any variable speed setting over four or five. Even then, I had to keep my thumb on the plunge locking lever, because it tended to vibrate loose. The dial indicator registered a clearly unacceptable amount of runout: .012" or .013" of an inch right next to the collet.

The Inside Story

To learn a bit more about these tools, and get an idea of how well they might hold up under prolonged use, I took a couple of them apart to examine their construction. What I found generally impressed, but occasionally surprised, me. For example, both the motor fan and armature on the HSC right-angle grinder had been dynamically balanced. The armature shaft and gear train were mounted on ball bearings (I expected to see ultra cheap bronze bushings). On the other hand, the grinder's internal wiring is done with the kind

of thin wire you'd expect to use hooking up speakers rather than power tools. Its on/off switch is a small rocker-type on/off switch rather than the safer kind of paddle switch typically used on more expensive grinders. And, although the plastic bodies of these tools resembled high-impact reinforced plastics used in more expensive name-brand tools, the bargain tool plastic chipped and broke with relative ease. All in all, the construction of these tools seemed perfectly serviceable, but I wouldn't

place any bets on how well these tools would last, especially if run hard or abused in any way.

One concern I had with the cheap tools was for electrical safety. Several manuals said the tools were "double insulated," but as far as I could tell, this only extended to their cords and plugs,

Biscuit Joiner S1M-100

Purchased from: TNG Direct

(<http://tngdirect.com>)

Price paid: \$17.99

Size/capacity: Settings for #0, #10 and #20 biscuits

Weight: 5 lbs. 14 oz.

Supplied accessories: Plastic case, adjustable fence, dust collection bag, assortment of biscuits, glue applicator, height spacers, wrenches, extra motor brushes.



Pros: Tool comes in a nice plastic case that contains all the accessories you need for doing biscuit joinery. Knob that sets plunge depth of blade for different biscuit sizes is easy to use. Very informative manual.

Cons: Adjusting fence with Allen wrench is time-consuming. No decent scale on tool to set fence height with. Lack of anti-slip points or rubber bumpers on front of tool resulted in machine pulling sideways during slot plunging. Decent dust bag, but port connecting it tended to clog with chips. Biscuits that came with unit were pressed from regular cheap plywood and didn't expand when glued.

Comments: The precision of the blade arbor and plunging mechanism aren't as good as more expensive biscuit joiners. However, in practice, this tool is plenty accurate for biscuit work. A decent entry-level kit for getting into biscuit joinery work.

Today's Shop continues on page 70 ...

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Rows of shallow holes drilled by an automated balancing machine indicate a dynamically balanced motor fan and armature on the right-angle grinder: a surprise on a "cheap" tool.

which had polarized prongs (both sanders had a grounded three-prong plug). Only the Chicago Electric router (and the cord for the Chicago Electric drill) had a UL (Underwriter's Laboratories) listing — the usual assurance we woodworker's want that the tool has met an accepted safety standard. For a margin of safety against accidental shock when using these tools outdoors or while standing on a concrete floor, I'd make sure to plug them into an outlet (or power strip) that provides ground-fault-interrupt protection.



Feida 14.4-volt Cordless Drill/driver

Pros: Easy-to-use keyless chuck.

Comfortable handle with textured plastic on the rear of grip.

15-step adjustable clutch, plus clutch off setting, for hole

drilling. Slots for holding two driver bits atop the motor housing.

Cons: No variable speed control. 500 rpm maximum speed is too slow for many jobs. Chuck tended to lose grip on smooth-shanked bits. Tool comes with only one battery; extra batteries aren't readily available. Unsophisticated charger takes up to five hours to recharge battery.

Comments: This is a nicely proportioned, light and easy to control tool. Although useful for the kinds of light shop drilling jobs you'd normally use a cordless drill for, the Feida's lack of variable speed control significantly limits its usefulness as a driver for setting or removing screws.

Purchased from: Overstock.com (www.overstock.com)

Price paid: \$26.99

Size/capacity: 14.4 volt / 3/8" maximum capacity chuck.

Weight: 3 lbs. 8 oz. (with battery)

Supplied Accessories: Plastic case, charger base & transformer, battery, drill bit set (6), driver tips & holder, two twin-ended driver bits.



Chicago Electric Variable Speed, Reversible Drill

Pros: Easy-to-use keyless chuck. Drill is very compact and reasonably light. Drill's maximum speed of 3,200 rpm is higher than most portable drills. Body grip that's in-line with the chuck offers good control. Reversing lever well located and easy to use. Nice, long (8½") power cord. Tool has limited 90-day warranty.

Cons: High-speed drill has poor power. Chuck was a bit wobbly and tended to lose grip on smooth-shanked bits. Variable speed is set with a small speed change wheel in center of trigger, which was a bit fussy to use. Trigger lock-on button was sticky and hard to operate.

Comments: The compact size and good in-hand feel of this drill make it a good choice for all kinds of around-the-house drilling jobs — putting up curtains, mounting hardware, etc. The variable speed is handy, but the drill's lack of torque makes it a poor choice for drilling larger (3/8"-plus) holes in thick wood or metal.

Purchased from: Harbor Freight (www.harborfreight.com)

Price paid: \$24.99

Size/capacity: 3/8" maximum chuck capacity.

Weight: 2 lbs. 6 oz.

Supplied accessories: None.

Weight: 2 lbs. 6 oz.

Supplied accessories: None.

Today's Shop continues on page 72

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Conclusions & Buying Hints

While I still believe you get what you pay for, the ratio of tool-for-the-buck with the Chinese-made power tools is nothing short of astonishing. Sure, they have shortcomings, but a little tweaking and tuning is a relatively small inconvenience given their rock-bottom prices. Are they as good as power tools made by familiar “name” brands like DeWalt and Bosch? Certainly not, and you’ll be disappointed if you buy these tools with an expectation of high quality and durability.

But inexpensive Chinese power tools certainly have their place. I think they’re a terrific buy for homeowners who sometimes need to buy tools for a single project, or for occasional use around the house. They’d also be a good choice for wannabe woodworkers with light wallets, who don’t want to buy a lot of expensive tools only to find out that woodworking isn’t their cup of tea. Even professionals can make good use of these cheap power tools: One contractor I know says his life is much easier now that he buys them for his crew. He doesn’t have to worry about workers abusing or dropping the tools, and when they stop working, he throws them into the recycling pile and simply buys replacements.

When buying cheap power tools, the bottom line is *caveat emptor* (buyer beware). If you’re really uncertain about them, I suggest you

purchase at your local hardware or home building center or supply store. That way, you can at least examine a tool in person and assess it before you buy. Also, you have a place to return the tool back, in case it breaks or burns out before the store’s return period expires (some tools include warranties, but they are usually quite limited).

If you decide to buy on the Internet, it pays to do a little hunting before placing your order. After receiving the 4.5" angle grinder I bought from *Overstock.com* for \$17.99, I noticed that the tool’s box had “\$5.99” printed on it. Sure enough, after perusing a few web sites, I found essentially the same angle grinder at TNG Direct for only \$9.99. Not only that, but TNG’s grinder came with a slew of wheels and accessories; the *Overstock.com* grinder didn’t include a single wheel! You’ll also want to compare shipping charges before you click “purchase.” For example, *Overstock.com* offered a flat \$2.95 charge for shipping any item, while other sites charged exorbitantly high shipping prices, even for a single tool.

Sandor Nagyszalanczy is a writer, photographer and tool expert whose book, The Homeowner’s Ultimate Tool Guide, is available from Lowe’s Home Centers and the Taunton Press.



Coleman Cordless Drill/driver

Purchased from: Overstock.com (www.overstock.com)

Price paid: \$34.99

Size/capacity: 18 volts/ 3/8" maximum capacity chuck.

Weight: 3 lbs. 15 oz. (with battery)

Supplied accessories: Fabric bag, swivel-head worklight, assortment of drill and driver bits in pouch, charger base and transformer, one battery.

Pros: Easy-to-use keyless chuck. Trigger-controlled variable speed and an easy-to-set 24-step clutch (plus clutch lock for drilling). Battery easy to release from tool. There’s room in the bag that comes with drill for the included worklight, as well as other tools. There’s a clip to hold a driver tip on the tool.

Cons: Maximum speed is slow. Chuck tended to lose grip on smooth-shanked bits. Since there’s only one battery (and spares aren’t easy to come by), you can’t use the drill and worklight at the same time.

Comments: Even though this drill’s slow top speed was annoying when drilling with small diameter bits, it worked quite well as a driver, handling #8, 2" long screws into softwood (albeit driving them slowly). This would be a fine choice for many repair and improvement tasks around the house, or as a second cordless drill in a small shop.



HDC Angle Grinder

Purchased from: Overstock.com (www.overstock.com)

Price paid: \$17.99

Size/capacity: 4 1/2" discs.

Weight: 2 lbs. 13 oz. (without wheel)

Supplied accessories: Wheel-mounting flanges & wrench; extra motor brushes.

Pros: Very light and maneuverable tool. Built-in arbor lock allows single-wrench wheel changes. Sturdy pressed-metal wheel guard firmly attached to body.

Cons: Rear grip and removable side handle are definitely undersized for users with medium- or large-sized hands. Tool didn’t include a grinding or sanding wheel of any kind. Power cord a puny 42" long.

Comments: Traditionally a metalworker’s tool, a small angle grinder can also be fitted with a sanding wheel and coarse-grit disc, transforming it into a terrific woodworking tool for sculpture or rough trimming and shaping jobs.

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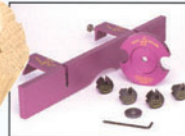
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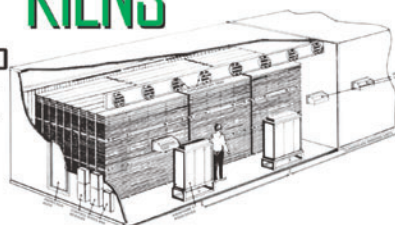
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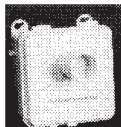
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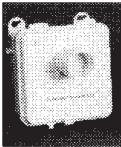
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Impact Drivers: Torque vs. Touch

By Chris Marshall

Loaded with torque and light as a feather, these tiny impact drivers could change the way you install screws.

Impact drivers are the hot new kids in town among cordless fastening tools, and they pack an incredible left hook. If you haven't tried one yet, these mighty mites look like miniature drill/drivers but produce at least twice the torque of comparably sized drills. They sink screws or lag bolts almost effortlessly and weigh a pound or two less than most drill/drivers. Many of the major tool labels now carry impact drivers in 9.6-, 12- and 14.4- volt sizes.

But do we woodworkers need them?

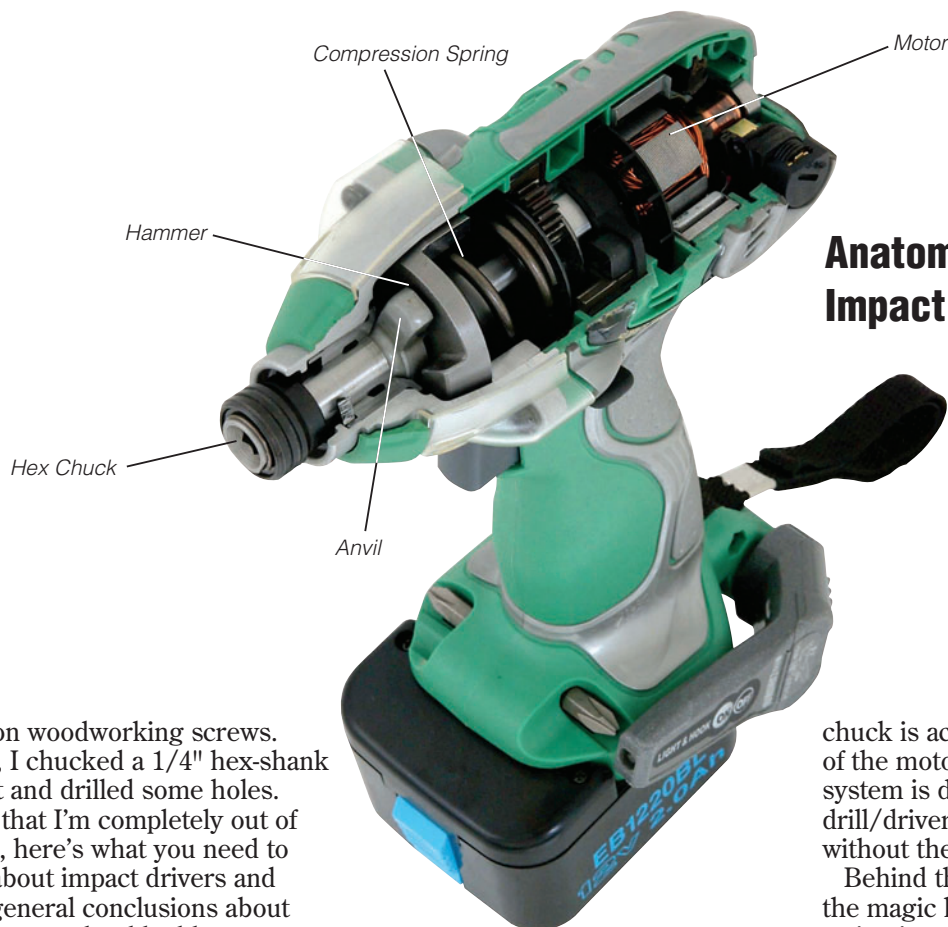
Recently, I set out to find the answer by testing six different 14.4-volt models. I had two goals: Test the tools on some tough driving tasks to see if all the hype about brute strength is true (It is!). To do this, I put each tool to task driving 50, 3" deck screws into doubled-up 2x lumber. Then I sank a dozen 3" lag bolts. I didn't predrill first; just blasted them in.

My second aim was to see if these drivers also have milder manners for common 1x woodworking materials. Here, I drove a handful of 1⁵/₈" deck screws into the

faces and edges of pine, oak, melamine, MDF and plywood. I sank one round of screws into pilot holes, then drove a second round without predrilling to see if the impact action would be beneficial in situations where there's no pilot hole. I also tried them out on an assortment of other



Just when you start to feel the tool twisting your wrist, the impact kicks in like a turbo at more than 50 beats per second and cancels the torque twist.



Anatomy of an Impact Driver

common woodworking screws. Finally, I chucked a 1/4" hex-shank drill bit and drilled some holes.

Now that I'm completely out of screws, here's what you need to know about impact drivers and some general conclusions about whether you should add one to your toolbox.

All New Twists

In case you're unfamiliar with how these tools work, impact drivers have a few things in common with drill/drivers. They have variable speed triggers that make it easier to start screws slowly and carefully. There's a forward/reverse switch above the trigger for removing screws as well as driving them. Both forward and reverse are assisted by impact action, so you can drive large fasteners and remove stubborn ones. Impact drivers are shaped like ordinary drill/drivers with T-style handles, although most are several inches shorter than drills. The shorter length is a real advantage for working in tight spaces.

Pretty much, that's where the similarities end. Instead of a three-jawed chuck, impact drivers have a 1/4" hex chuck with a spring-loaded collar that locks the driver bit in place. Any 1/4" hex shank will fit, whether it's a driver bit or a drill bit. There's no adjustable clutch on an impact driver. The

Impact drivers produce monster torque, thanks to a heavy compression spring that drives a hammer against an anvil. Up to a point, the tool motor does all the work, then the spring engages and the tool turns bionic: a huge advantage for driving long deck screws and lags.



chuck is actually an extension of the motor armature, so the system is direct-drive. Imagine your drill/driver set to driver-only mode, without the slip clutch feature.

Behind the hex chuck is where the magic happens. The impacting action is created by three components: a strong spring, a hammer and an anvil. Up to a point, the tool motor does all the work, spinning about 1,000 rpm faster than a drill. When the motor reaches peak torque output, the compression spring releases, driving the hammer repeatedly around so it strikes the anvil mounted to the chuck shaft. This boosts the rotational force applied to the fastener at more than double the torque of a cordless drill. The impact force is different than a hammer drill that drives the bit forward in a percussive motion.

The effect defies anything you've ever experienced with a conventional drill/driver. Higher rpm sinks screws quickly, and just when you start to feel the tool twisting your wrist, the impact kicks in like a turbo at more than 50 beats per second and cancels the torque twist. It feels like the screw is losing purchase or even breaking, yet the fastener drives right in with minimal arm strain,

Tool Review continues on page 80 ...

TOOL REVIEW

and the screwdriver bit amazingly stays planted on the fastener. Whether you're driving long deck screws or thick-shanked lag bolts, the efficiency of an impact driver is almost like cheating physics.

Without an adjustable clutch or the high/low transmissions of a drill/driver, the internal components of an impact driver take up much less space, which explains the smaller tool size. The spring, hammer and anvil provide such a torque advantage that the motor is actually smaller on an impact driver than a drill, but it produces greater torque. Tool batteries run longer, too, because the motor draws less energy from them to do its work.

Does all this torque break screws? From time to time, yes — especially without drilling countersunk pilot holes first. If you



With impact drivers, there are no chucks to tighten down. Pull a spring-loaded collar around the hex chuck and bits slide in or out.

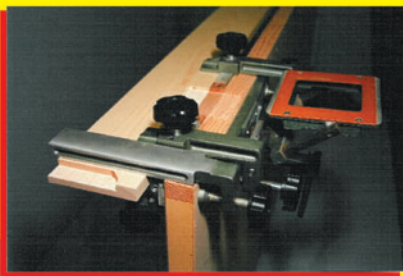
Clearly, one big advantage to impact drivers is their small stature and light weight. Notice the difference in size between an average 14.4-volt impact driver (left) and a 14.4-volt drill/driver (right).



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Impact drivers can be tamed for building casework and other woodworking-specific applications if you go easy on the trigger. But drilling pilot holes is still a good idea, especially on delicate sheet materials or hardwoods.



Impact drivers make easy work of driving torque-demanding fasteners like lag screws. These mighty drivers will sink a lag screw one-handed, with or without drilling a pilot hole.

“feather” the trigger, you can reduce the impact action down to single beats to set the fastener head right where you want it. It’s the tradeoff for having no clutch. Until you get the feel of working the trigger lightly, however, it’s easy to goose the trigger and snap screw heads, or try to seat them in

the wood without a countersink and break them. But finesse with these tools comes quickly.

All these test drivers approach 100 decibels of noise when the impact mechanism is hammering away, so it definitely makes sense to wear hearing protection during prolonged use.

Test Driving

None of the six 14.4-volt test tools were lemons when it came to driving 3" deck screws and lag bolts. Woodworking screws posed no challenge in terms of torque requirements, but they raised other

Tool Review continues on page 82 ...



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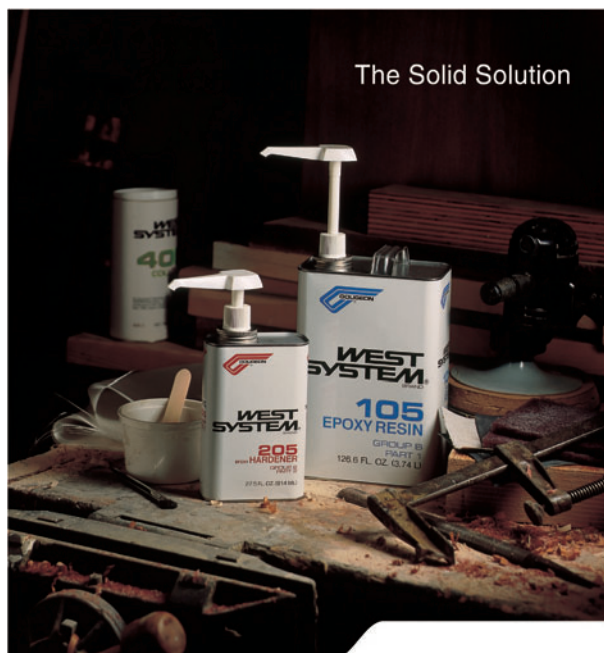


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issues (see “What About Woodworking?,” page 86). Performance was so evenly matched that the differences between these machines have more to do with subtlety and pricing than capability. Each tool comes with two batteries, a one-hour charger and a carry case. Here are the noteworthy highlights of each one.

Bosch 23614 Impactor™

Bosch released its Impactor™ line of impact drivers last summer. The mid-sized 14.4 made a great showing for me. The tool has a wrap-around overmold on the grip that fit my middle-sized hand comfortably, but even smaller hands should find good grip. An overmold wraps around the rear of the motor for better gripping with a second hand. The chuck collar was narrower than others but still easy to grasp for loading bits.

The Impactor spins bits faster than other test tools here, but I didn’t notice an advantage. At 1,150 inch-lbs. of torque and 3,200 impacts per minute, this tool had no trouble sinking fasteners. It’s also the shortest driver at just 6½" from bow to stern. In the heat of the action, the metal nosing got uncomfortably hot and so did the exhaust air coming out of the tool, but the grip stayed cool, and performance didn’t fade in the heat.

This Bosch comes with a pop-up belt clip and an adjustable LED light near the base for working in low light. The 14.4 Impactor seems a good buy at \$240.

Craftsman 11403 EX

At \$120, Craftsman’s EX impact driver has the leanest price tag, and at just 2.5 lbs with battery installed it

has an equally lightweight stature. However, during testing this tool competed with the best of them and held its own on long screws and lag bolts. Its 850 inch-lbs. of torque was adequate for my testing, even though the EX is about 300 inch-lbs. shy of other comparable 14.4 impact drivers. Makes me wonder why you’d need much more for general

driving tasks? I noticed that the impact mechanism kicked in sooner than on other drivers, maybe due to the tool’s lower torque limits, and it lacked spunk at the trigger. Still, the EX was up to task for my tests and also demonstrated good low-speed control for starting screws.

I should note that the first battery on this tool faded during the test,

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Impacts/minute:	3,200
Torque:	1,150 in.-lbs.
Battery Type & Amp-hour Rating:	
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Phone:	877-267-2499
www.boschtools.com	



Bosch’s Impactor™ line of impact drivers includes a 9.6-volt (street price \$180) and a 12-volt (street price \$200) plus the 14.4-volt test tool (street price \$240).

Craftsman 11403 EX

Craftsman 11403 EX
Street Price: \$120
Weight: 2.5 lbs.
No-load Speed: 2,500 rpm
Impacts/minute: 3,000
Torque: 850 in.-lbs.
Battery Type & Amp-hour Rating: NiCd/NA
Phone: 800-932-3188
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but I didn't run the batteries through the recommended four charge/discharge cycles first. It probably would have fared better. The second battery stayed strong.

The EX's modest price tag doesn't buy an overmold on the grip — a nice feature on the other test drivers. You also can't change the motor brushes yourself. But it still has a fixed LED light and wrist strap. All in all, here's a great bargain, especially if the tool can go the distance over time.

DeWalt DW054K-2

During testing, the DeWalt DW054K-2 came out swinging and made easy work of deck screws and lag bolts. The trigger and forward/reverse switch provide

good control, but this one takes more coaxing to run at knuckle-dragging speeds, which made screws a bit harder to start. Once you've got a few threads into the wood, however, this tool's 2,400 rpm will shoot it in with verve and at 3,000 impacts per minute. Like some of the other test drivers, the exhaust air on this DeWalt really cooks after a few minutes of hard use, but you only notice it with a second hand on the motor housing or if you reach for the tool's metal front nosing. Generally, two-handed operation isn't necessary after you get comfortable with the impact action.

Tool Review continues on page 84 ...

Drill/drivers vs. Impact Drivers: Stacking Up the Benefits

When it comes to choosing a drill/driver or an impact driver, each has its merits. Let your project needs, work style and budget choose the better tool for you. Here's a rundown of each tool's strengths:

Drill/drivers:

- Low-speed control
- Superior drilling tool
- Adjustable clutch for seating screwheads
- Generally lower cost
- Minimal vibration during use
- Quieter operation
- Chuck accepts round or hex-shank bits

Impact Drivers:

- Lightweight
- Impact action minimizes stripped screwheads
- Superior driving tool for large fasteners
- Compact size for tight spaces
- Serves as a drill in a pinch
- Long run time between charges
- Quick-release hex chuck



DeWalt DW054K-2

DeWalt applies overmold to the lower grip area that gives fourth and fifth fingers better purchase. Fit, finish and balance of this tool all were first-rate, and it ties Makita for the second shortest driver. DeWalt provides no screw plugs for replacing motor brushes. It lacks a worklight or strap, and its street price places it at the top of the heap at \$436.



DeWalt offers both 9.6- and 18-volt impact drivers as well as the 14.4-volt DW054K-2 I tested (center). The 9.6-volt has a street price of \$342 and the 18-volt sells for \$530.

DeWalt DW054K-2

Street Price: \$436
Weight: 4.1 lbs.
No-load Speed: 2,400 rpm
Impacts/minute: 3,000
Torque: 1,150 in.-lbs.
Battery Type & Amp-hour Rating: NiCd/NA
Phone: 800-433-9258
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Hitachi WH 14DMB

Hitachi's funky color scheme and styling seem a good fit for these radical tools. When put to test, the Hitachi still showed that its true colors are grounded in solid performance. With a top end of 2,600 rpm and delivering 3,000 impacts per minute, the WH 14DMB had power to spare for the tough jobs. Its 2 amp-hour batteries delivered plenty of run time for the full test and more. I really appreciated the plastic front nosing that insulated me from the hot metal underneath. Even the internal fan and venting seemed to do a better job than others at keeping both hands cooler.

The Hitachi has a flared grip and rear overmold that make for good handling, but I found it more difficult to flip the forward/reverse switch with my driving hand. The button is narrow and harder to nudge with the side of a pointer finger.

Otherwise, there's a lot to like about this tool. It comes with a wrist strap and five-position green LED worklight that doubles as a belt clip. At \$299, the Hitachi is priced in the middle of the pack.



Hitachi WH 14DMB

Hitachi WH 14DMB

Street Price: \$299
Weight: 4.2 lbs.
No-load Speed: 2,600 rpm
Impacts/minute: 3,000
Torque: 1,195 in.-lbs.
Battery Type & Amp-hour Rating: NiCd/2
Phone: 800-829-4752
www.hitachi.us

In addition to Hitachi's 14.4-volt WH14DM (far right), the company also manufactures a 9.6- and two 12-volt impact drivers, ranging in price from \$169 to \$249.



Makita 6935FD

If you're a die-hard Makita fan, this impact driver will be a fitting addition to your collection. At 3.7 lbs., only Craftsman makes a lighter tool. Makita packages this impact driver with 2.6 amp-hour, nickel-metal hydride batteries that should provide the longest run times of the test group. It's also nearly the shortest driver at 6 $\frac{3}{8}$ ".

Makita appoints this tool with all the creature comforts: rubber overmolds on the rear side of the flared grip, overmolds on the motor housing, a trigger that offers excellent low-speed control and a forward/reverse switch with a long throw that's easy to reach. The driver has an LED worklight up front and a phosphorus ring around the nosing that glows in the dark. It could make this tool easier to find in the back of a tool cabinet.

In my testing, there were no hiccups with the Makita. Loads of torque here and good control for driving screws or lag bolts with one hand. Given the high performance batteries, sensible standard features and solid performance, this was my favorite impact driver. It's priced just a tad above average at \$270.

Milwaukee 9081-22

Milwaukee's 9081-22 actually produces the lowest torque rating of the test group at 740 inch-lbs., but even this is monster torque compared with the 300 to 400 inch-lbs. produced by typical 14.4-volt drills. It proved to be more than ample for driving long deck screws and lag bolts. The motor peaked sooner than other drivers, causing the impact to kick in early, but the test fasteners still couldn't beat it.

At 4.4 lbs. and 7 $\frac{1}{2}$ " from front to back, this Milwaukee is the largest entry in the test. But if you're used to lifting a full-sized drill/driver, the 9081-22 will still seem like it defies gravity. Milwaukee also outfits this tool with slide-on batteries that can be installed facing forward or backward. In the backward position, the battery provided a nice counterweight that gave the tool particularly good balance.

Tool Review continues on page 86 ...

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- 6 Roundover Bits
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- 1 Plunging Roundover
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TOOL REVIEW

Under the gun, the Milwaukee had milder trigger manners than other drivers and nice low-speed control for starting screws without pilot holes. I also liked the large forward/reverse switch and long-running 2.4 amp-hour batteries. The tool has no worklight. Depending on what you're looking for, you might consider this (relatively) low torque impact driver a great bargain at \$220.

What About Woodworking?

Driving deck screws and lag bolts into thick lumber is a good evaluation of brute strength, but I also wanted to see how these drivers perform on the 1x materials we typically work with: softwood, hardwood and sheet goods. For testing, I used 1⁵/₈" deck screws as the principal fastener. I also tried other commonly used woodworking screws including flathead, auger-tip,

Makita 6935FD

Street Price: \$270
Weight: 3.7 lbs.
No-load Speed: 2,600 rpm
Impacts/minute: 3,200
Torque: 1,240 in.-lbs.
Battery Type & Amp-hour Rating: Ni-MH/2.6
Phone: 800-462-5482
www.makita.com

Makita 6935FD



Makita makes 9.6- and 12-volt impact drivers as well as the 14.4-volt driver in this test. The 9.6-volt (left) sells for \$250, and the 12-volt (center) sells for about \$10 more.

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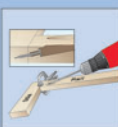
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drywall, solid brass and panhead screws for pocket hole joints. I drove screws into the edges and faces of the test material to simulate building a butt joint.

Generally, those impact drivers with easy-to-feather triggers and good low-speed motor control fared best when driving woodworking screws. Bosch, Makita and Milwaukee offered slightly more control than Craftsman, DeWalt or Hitachi — but all the test tools could drive screws into 1x material at low speeds.

As you might expect, soft brass screws were impossible to drive without first drilling pilot holes, even before the impact action took effect. Lots of stripped heads and broken shanks here. It's the same problem you'll face with drill/drivers, and not a unique malady for impact drivers. Auger tip screws worked better than other screw types without pilot

Milwaukee 9081-22

Street Price: \$220-\$308
Weight: 4.4 lbs.
No-load Speed: 2,600 rpm
Impacts/minute: 3,300
Torque: 740 in.-lbs.
Battery Type & Amp-hour Rating: Ni-Cd/2.4
Phone: 800-729-3878
www.mil-electric-tool.com

holes, but that's primarily a design advantage of the screw, not a special aptitude of the driver.

In my first round of driving short deck screws, I skipped drilling pilot holes, just to see what would happen. The results were consistent with drill/driver performance. On soft pine, I could drive fasteners into the edges with minimal splitting and no fastener breakage. Oak was more of a challenge. Some screws dug in

Tool Review continues on page 88 ...



Milwaukee 9081-22

Currently, Milwaukee offers the 14.4-volt model I tested, plus a massive 18-volt impact wrench/driver that bridge builders must love. The bigger tool is too large for woodworking.

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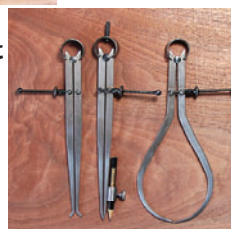
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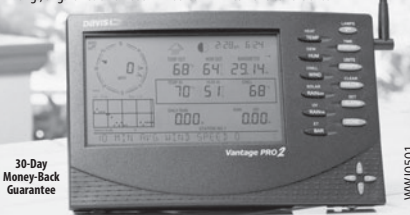
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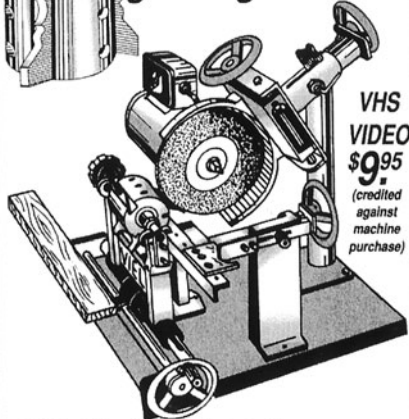
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TOOL REVIEW

without incident, but typically they split the wood or broke under the stress. MDF split repeatedly, and melamine occasionally split. Plywood accepted screws with minimal splitting.

Then I switched to counterbored pilot holes and drove more deck screws. Success improved with all material types, just like it would with drill/drivers. Splitting reduced and so did the incidence of broken screws. Nothing particularly surprising here.

When I sunk fasteners through the thickness of 1x material, it was easy to snap screwheads without counterbores. The impact action also stripped the wood threads easily on MDF, melamine and plywood so the screws just spun in place. A drill will do the same thing without careful trigger control.

Finally, I installed a hex-shank 1/4" twist bit and drilled some holes in 1x material. It didn't take long to learn that these tools don't offer the same degree of precision as drills. The hex shank on an impact driver doesn't grip a drill bit firmly like a three-jawed drill chuck, so the bit wobbles. Can you drill holes with an impact driver? Yes, but not with the same quality, and the higher rpm packed the bit quickly with chips it couldn't clear.

Bottom Line: Don't Lose that Drill

Should you banish your trusty drill/driver to some dark corner of the shop and buy an impact driver to replace it? My vote is no. Impact drivers are wonderful if you need to drive loads of big fasteners in a hurry, especially when you can skip the time and effort of drilling pilot holes. For building projects with thick, soft lumber or where accuracy is less important, impact drivers are more efficient than drill/drivers, and your arm will thank you at the end of the day. Don't build a deck, fence or 2x lumber project without an impact driver to speed things along.

For driving woodworking screws into thin or hard materials where pilot holes are crucial, the playing field levels out between drill/drivers and impact drivers. Either tool will drive screws into pilot holes. The adjustable clutch and precise chuck of a drill/driver still makes it the better choice for fine work, especially for drilling. At least for now, I see impact drivers as supplemental woodworking tools, and drill/drivers definitely still earn their keep in my shop.

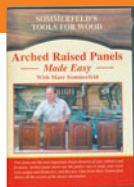
Chris Marshall is a Woodworker's Journal contributing editor.

Panasonic's Hybrid Driver

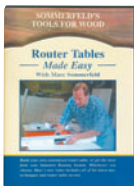
If you can't decide between buying a new drill/driver or impact driver, Panasonic makes a tool that lets you have both. The 15.6-volt Multi Drill and Driver (Model EY6535GQWA) is outfitted with a 1/2" square-drive head. Pop on the quick-release 1/4" hex drive chuck, and the tool will drive screws or lag bolts at 3,300 impacts per minute, using a hammer and anvil mechanism. Or, connect the included 1/2" drill chuck, flip the tool to drilling mode, and it morphs into a drill with 18 clutch settings. The Multi Drill and Driver comes with two 3.5 amp-hour Ni-MH batteries and has a street price of \$299. Panasonic also carries two 12-volt impact drivers. For more information, call 800-338-0552 or visit www.panasonic.com.



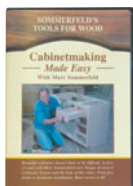
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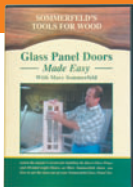
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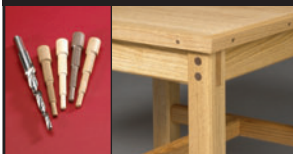
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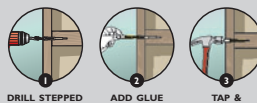
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New Tools Push the Envelope



Triton Unveils World's First Plunge Drill

Triton's research department apparently had a real "aha!" moment. Their new tool is like nothing you've ever seen before. It's a plunge ... drill; featuring an incorporated telescopic plunge mechanism.

The fully retractable plunge base attachment guarantees perpendicular drilling while multi-function attachments allow precise drilling of difficult shapes like dowels. This drill also comes with an adjustable fence for repetitive drilling and equal positioning from an edge. When you want to use it as a conventional drill, simply lock the plunge apparatus out of the way.

Other elements of the Cordless Plunge Drill include 1/2" keyless Jacobs chuck, 24-setting torque clutch and a reversing variable speed trigger with electronic brake. A depth stop (adjustable) provides accurate depth settings.

The 18-volt Cordless Plunge Drill sells for \$289.

For more information, call 888-874-8661 or visit www.tritonwoodworking.com.

RIDGID's Mighty Laminate Trimmer

It might look small, but it's mighty powerful: RIDGID's Model R2400 is a 6 amp, variable speed, Heavy-duty Laminate Trimmer that weighs in at only 3.4 pounds. The permanent magnet motor provides electronic feedback for consistent speed and power at 20,000 to 30,000 rpm, no load. RIDGID spokesperson Jay Gatz says it's "designed to meet the power, durability and accuracy needs of professional woodworkers, installers and remodelers."

The one-handed use tool has a molded grip for comfort and an easy-to-read depth scale with precision thumb-wheel micro-adjust depth settings that can be set during use. A micro-adjust bearing guide and a straight guide aid precision cutting, particularly in cabinet and countertop applications.

The 1/4" collet R2400 comes with the straight and bearing edge guides, guide rods, two collet wrenches and a carrying case — as well as RIDGID's cord package, a 12-foot rubber cord that features a lighted plug with a backlit icon of the tool that indicates when it's "live." The R2400 sells for \$119.

For more information, call 800-474-3443 or visit www.ridgid.com.





Cut and Etch the Designs You Wish

If you have a plunge router — or even a rotary tool — you can now make signs, decorative cutouts and all sorts of other embellishments on your woodworking projects with the SpiroCrafter from Milescraft.

The tool does the cutting and etching for you, with any standard 6" base plunge

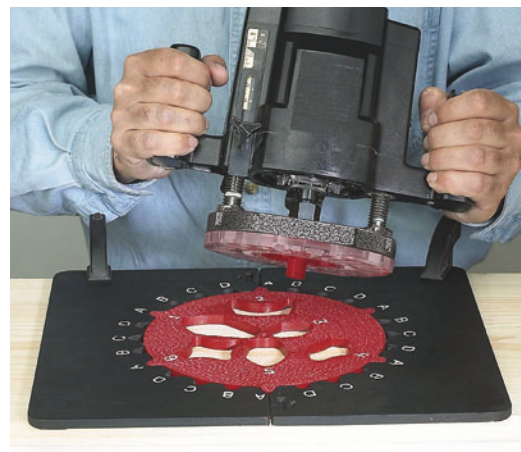
router. (A universal

router base plate is

included in the package.) Two bushings also come in the package, and the plate accepts all TurnLock™ bushings and accessories through a “twist and lock” action. Don’t have a plunge router? No problem; you can turn your rotary tool into a “mini” router with Milescraft’s Plunger™ attachment.

The Milescraft people have included two templates of patterns, cutouts and lacework and a Design Guide. Or, a Pencil Guide allows you to design your own creations before cutting them into your wood. The SpiroCrafter has a street price of \$36.

For more info, call 815-874-2400 or visit www.milescraft.com.



Quiet, for all Applications: Hitachi Router Kit

Premiered on the cover of the November/December 2004 issue of *Woodworker's Journal* — back when that model was the “only one on the planet” — Hitachi’s KM12VC 2¼ HP router kit is now available to woodworkers everywhere.

The 11 amp motor on this router comes with both a fixed and a plunge base, for all varieties of router applications. It’s quiet, too, with a noise level of only 79.5 decibels. The two-stage motor release clamp makes for quick base changes and accurate depth adjustments, while a fine depth adjustment on the plunge base allows for even more precise depth control.

The KM12VC accepts both 1/4" and 1/2" collets, and comes with both chucks, seven template guides, wrenches and a carrying case. It retails for \$199. For more information, visit www.hitachipowertools.com or call 800-706-7337.



Chemical-free Stripping

By Michael Dresdner

Sanding, scraping, heat guns, and ... soda blasting?

Say “refinish furniture,” and smelly, messy chemicals immediately come to mind. However, you don’t need chemicals to remove finish. There are effective physical methods, including heat guns, sanding, scraping, and one you may not have heard about called soda blasting.

Heat Guns

For quickly removing many layers of paint, nothing beats a heat gun. Although they look like handheld hair dryers, commercial heat guns get much hotter; hot enough, in fact, to quickly bubble paint right off the wood.

Pair the heat gun with a putty knife whose corners have been rounded over slightly to prevent them from digging in and leaving gouges in the wood. As the heat softens the paint, simply shovel it off.

Though fast, heat guns often leave small amounts of paint residue. Follow up by sanding, scraping or, if you prefer, a quick

coat of chemical paint remover. Using chemicals to eliminate the remaining residue is vastly easier than stripping a whole finish with them.

Sanding

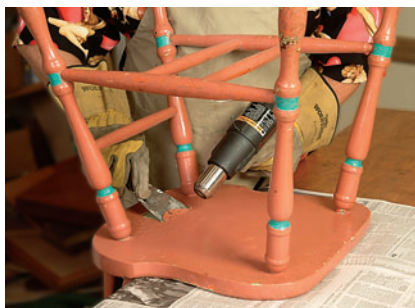
Anyone who has accidentally sanded through a finish knows you can sand off coatings and, if you’re not careful, you’ll remove wood as well. One moment of inattention with a belt sander and you’ll inadvertently redesign the contours of your piece. Orbital, random orbit, and convertible sanders are easier to control, and some even have interchangeable heads for tight corners and shaped moldings. Others offer “permanent” metal backed abrasive sheets that substantially outwear even the toughest sandpaper, and can be scrubbed clean if they clog with paint.

Wheels of sandpaper strips on a mandrel, called “flap sanders,” let you use a drill or die grinder to sand contours more quickly. The newest of these, Roloc™ Bristle discs from 3M, consist of rows of hundreds of flexible vinyl fingers with grit cast right into the plastic. They’ll work on even the most convoluted contours without damaging crisp edges, and keep sanding until the discs are worn to a nub.

Removing a finish?
No need to break out the chemicals. Options like heat guns, sanding, scraping — and even baking soda — are available.

When the baking soda hits the paint, the particle explodes into fine powder. Unlike sand, which must be swept up, and whose dust is dangerous, both the baking soda granules and powder are harmless — except to paint.





Before using a heat gun (top), be sure to round over the edges of your putty knife to prevent gouging. Plowing a cabinet scraper forward removes finish in a very similar manner to the way a hand plane removes wood.

"Tadpoles," wedges, and shaped sanding blocks help you hand sand almost any shape without dulling sharp detail, but be sure to choose the right paper. Look for packages labeled "Paint and Varnish Removal," or papers that say "Won't gum up on latex paints." These special stearated papers are made to sand finish, not wood, and will resist clogging.

Scraping

Tired of using up sandpaper? Consider scrapers. Ship's scrapers are sharp metal plates mounted on a handle, and come in a variety of shapes to fit wood contours. They cut on the pull stroke, like a hoe.

Cabinet scrapers are flat plates of steel with a burr on the edge. Hold the plate vertically with your thumbs pushing against the back so as to deflect it into a slight curve. Start at 90 degrees to the wood, then tip and push forward until you feel the burr bite into the finish. That's the cutting angle. Hold the scraper at that angle and let the burr plow off finish like a mini-plane.

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**Michael, please help
save our marriage!**

My wife and I had a little “dispute” this weekend while finishing a project.

I was applying a liberal coat of poly when my wife chastised me and said, “Two thin coats are better than one.” Being stubborn, I replied, “Yeah, but I’m applying two thick coats.” So which is it, thick or thin? Don’t get me wrong, I know I’m lucky to have a partner who will help me finish my projects!

*Keith Kowalski
Edgewood, New Mexico*



You are luckier that you realize. You also have a wife who happens

to be right, but don’t feel too badly about that. My wife is always right, no matter what the topic. The truth is that

two thin coats are always better than one thick coat, and four thin ones better than two thick ones. There are several reasons for this, and being a guy, you’ll probably need to hear all of them before you accept that she’s right. I know I would. Most important is that thinner coats provide better internal drying, making the finish cure much faster. Most finishes cure by releasing solvent or by taking in oxygen from the air. Both take longer to travel through a thick layer. Put another coat on before this process is finished and getting those bottom layers to cure becomes really difficult, resulting in the possibility of visible shrinkage, sheen drift, press marks, and a longer wait before you can rub the finish. Thinner coats also lay out better, with fewer trapped air bubbles and dust nibs stuck in the coating. It is much easier to apply a thin coat smoothly than a thick one. In the event that something does go wrong and one coat goes south on you, it is far easier to remedy the problem if it is a thin coat. There’s less to remove or sand back, and it will be ready to work on more quickly.

— Michael Dresdner



For simply sending in his question on thick vs. thin coats, Keith Kowalski of Edgewood, New Mexico, wins the **Olympic Interior Wood Finishing Kit** shown at left.

Soda Blasting

The most unusual method of abrading off finish is an odd contraption called a soda blaster. It’s a variation of a sand blaster that uses safe, edible baking soda instead of sand.

Soda blasting was developed during the restoration of the Statue of Liberty, whose delicate copper skin would have been harmed by regular sandblasting. Unlike sand, which must be swept up, and whose dust is dangerous, baking soda is harmless — except to paint.

Though most soda blasters are large industrial units, one company, ACE (888-772-3263; www.ace-sandblasting.com) sells a portable rig that will work with most any compressor big enough to feed an HVLP spray gun. For \$250, it comes ready to use. The baking soda comes in 50-lb. bags from Armex, a division of Arm and Hammer, (800-332-5424; www.armex.com).

Out on my driveway, I donned goggles and a dust mask and put the rig through its paces. I learned to control the flow by reducing the pressure, backing off, and aiming at an oblique angle, much like using a pressure washer. My first attempt cut through lacquer and made a depression in the mahogany below, but I soon had enough control to peel just one coat of paint from a chair painted with several layers.

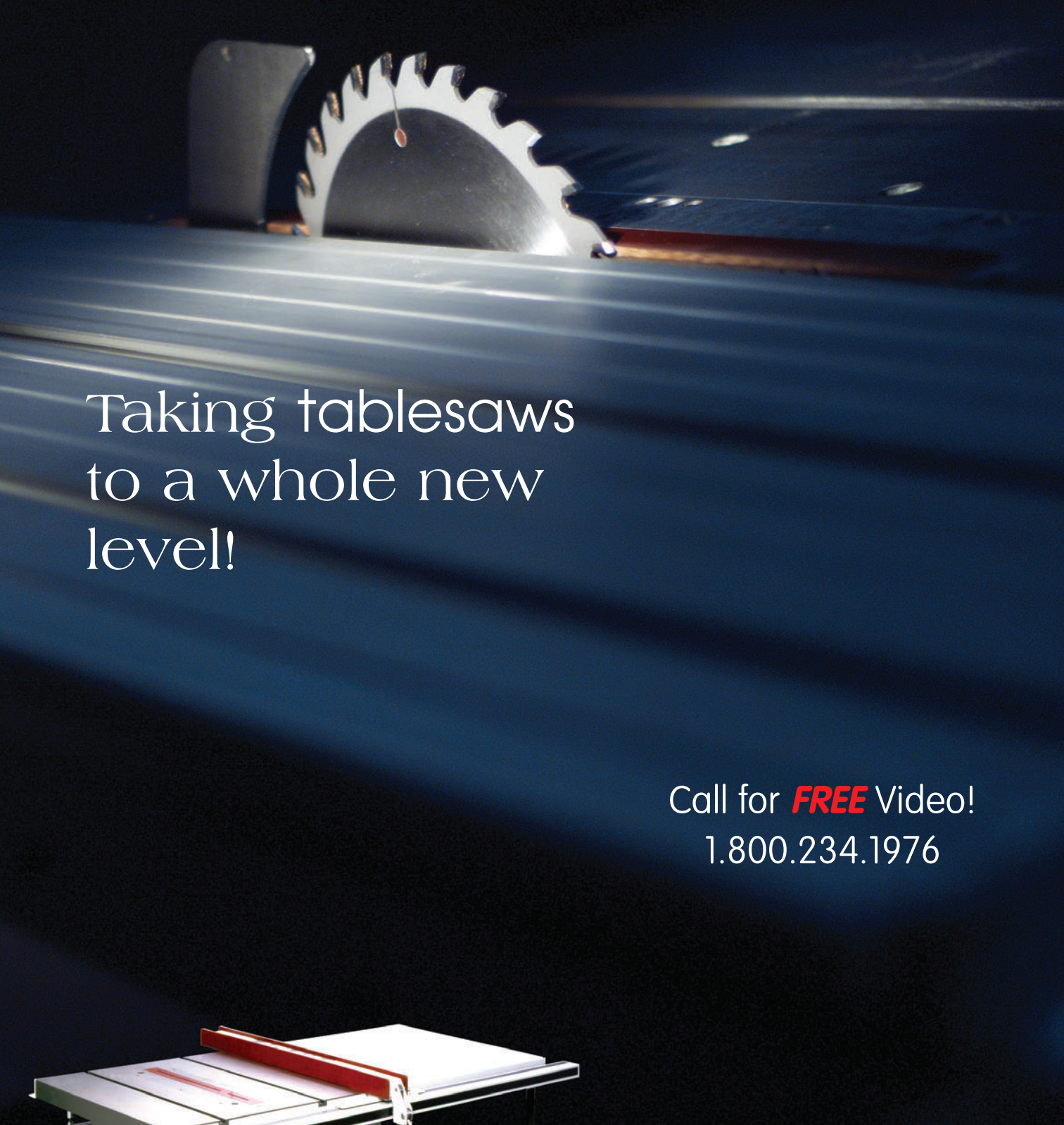
The ultimate test was to partially strip to a sharp, masked line, something impossible with other stripping methods. After a little experimentation, I got a crisp line simply by masking the area I wanted untouched. Conversely, by cranking up the pressure, I was able to strip the toughest powder coating, and quickly add “washboard” erosion to a piece of Douglas fir.

I didn’t bother sweeping up. The next day it rained. The baking soda simply disappeared, and with it, an oil spot left by my daughter’s car.





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A close-up, low-angle shot of a table saw blade. The blade is partially visible, showing its teeth and the metal housing. The background is dark and out of focus, with some light reflecting off the blade's surface.

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