TIPS • TOOLS • TECHNIQUES

ShopNotes®

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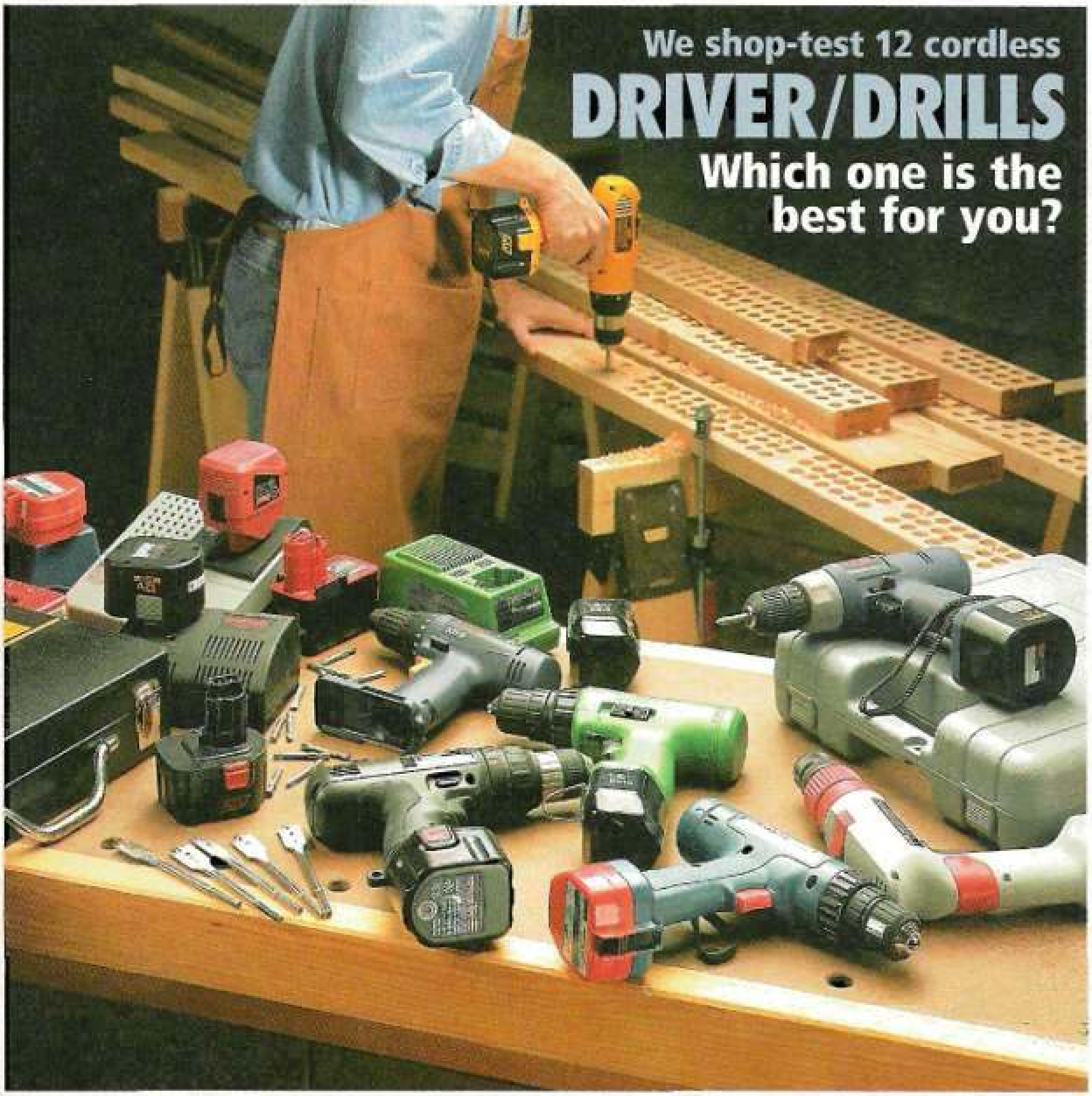

- Finish Storage Cabinet
- Alternate Hardwoods
- Sharpening a Chisel
- Benchtop Tool Stand

ShopNotes

Issue 26 March 1996

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Cutoffs

Kids in a toy store. That's the image that comes to mind after watching the guys "play" with the cordless driver/drills we tested for this issue. I'm not sure whether it's the tool, or the fact that they're the first cordless tools we've looked at.

Regardless of the reason, these drills are like magnets. You just *have* to pick one up and pull the trigger. Flip the forward/reverse switch back and forth. Pull out the battery and snap it back in. And then run the clutch ring through its full range of settings.

Once you check out a dozen drills, it's only natural to make comparisons — and comments. Everything from "I'd never buy that drill" to "the balance on this one is perfect for me."

PERSONAL CHOICE. That brings up a point. There's something very personal about selecting a tool. Sure, you want to find the drill that drives the most screws and drills the most holes. But it also has to feel right in *your* hand. If it doesn't, you'll be dissatisfied with it every time you pick it up.

So even though we ran each of the driver/drills through a rigorous testing procedure (see page 22), *you* still need to pick up a drill and use it. And I mean really use it — take it home and run it through its paces. If you're not *completely* satisfied with it, return it.

Of the twelve cordless driver/drills that we tested, we found some big differences. Priced from $135 to $215, you'd expect each one to be a quality tool. But that wasn't necessarily the case. The old saying "you get what you pay for" doesn't always work. (For more on this, refer to page 20.)

NEW TOOL. But my fascination with tools isn't limited to just woodworking. One of the most powerful and versatile tools I own is my personal computer. It's really amazing what can be accomplished with it. Especially in this day and age of information superhighways and instant access to the World Wide Web.

When I think about the different ways this "tool" can be used, I get excited about the possibilities. I'm also excited to announce that the *August Home* web site is up and running. (A web site is basically an electronic opening that works much like a gate to a backyard.)

This site is on the World Wide Web, and anyone that has access to the Internet and a web browser can visit us. Our URL (web address) is:

http://www.augusthome.com

Once you're in the site, you'll find tips from our two woodworking magazines: *ShopNotes* and *Woodsmith*, special offers from the *WoodsmithShop* catalog and the *Woodsmith Store*, and a list of current *August Home* job openings.

HELP WANTED. As we continue to grow, we're looking for some enthusiastic woodworkers to join our staff.

We need a project designer with proven design and technical drawing experience. And we're also looking for an assistant/associate editor as well as an illustrator.

If you're interested in any of these positions, send a resume and letter highlighting your experience to J.S. Moore, 2200 Grand Ave., Des Moines, IA 50312.

Rick

ISSUE TWENTY-SIX

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Waterstone Basics

Waterstones create a razor-sharp edge in minutes. Here are some tips on selecting and using them.

I've been using waterstones to sharpen my tools for several years. They cut faster, leave a sharper edge, and aren't quite as messy as oilstones. And along the way I've learned a few tricks to get the most out of waterstones, see the opposite page.

SOFTER ABRASIVE. The main difference between waterstones and oilstones is their degree of hardness. The abrasive material of a waterstone is "softer" than that of an oilstone.

So as you're sharpening a tool, the surface of the stone wears away faster, continually exposing a new layer of abrasive particles.

With an oilstone, the hard abrasive particles simply round over. As a result, the stone loses much of its cutting ability. Consequently, waterstones cut faster than oilstones.

An added advantage is that waterstones use water instead of oil to "float" away bits of metal that would otherwise clog up the surface of the stone. So there's no chance of getting oil on your project and ruining the finish.

SELECTING A STONE

Choosing a waterstone can be a bit confusing. For starters, you have to decide between a natural or a man-made (synthetic) stone.

NATURAL. Natural stones are known for producing the finest edge, particularly on the hard steel blades found in many Japanese woodworking tools. But you pay a lot for this extra sharpness — $50 to $175. (Depending on the grit and size of the stone.)

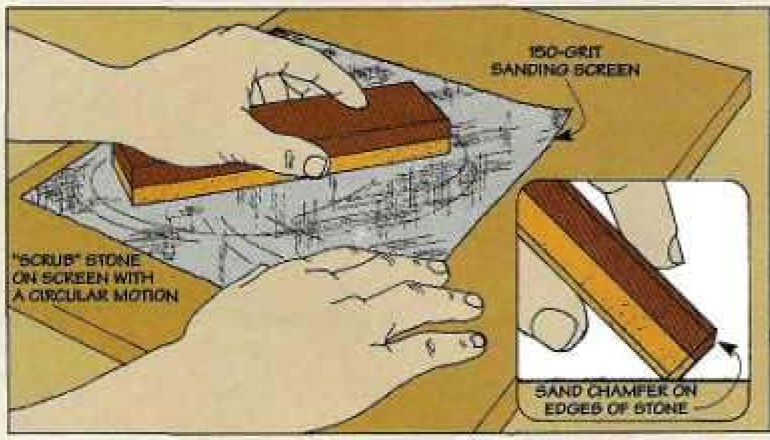
SYNTHETIC. Man-made stones on the other hand, range from $18 to $80. And for most of the sharpening I do, I feel they work just as well as natural stones.

GRITS. Waterstones are available in grits from 80 all the way up to 8000. But this wide scale of grits can be broken down into three ranges: coarse (80 to 400), medium (600 to 2000), and fine stones (3000 to 8000).

For most sharpening, I start with a medium (1000-grit) stone. This grit will quickly sharpen a dull blade or chisel, leaving a smooth, gray surface. Then, I switch to a 6000-grit stone to remove the wire edge and produce a mirror finish.

If you don't already have a waterstone, I'd suggest starting with a combination 1000/6000-grit man-made stone. You'll find these stones in most woodworking catalogs, see Sources list on opposite page.

Truing a Waterstone. *The dark areas and "dished" surface of this stone are indications that it needs flattening.*



Using a Waterstone

The key to using a waterstone is to keep it wet while you're using it. To do this, start by soaking the stone in clean water each time you use it, see top photo at right.

Then while you're sharpening, add more water to the surface as it starts to dry out, see middle photo at right. Note: Don't ever use oil on a waterstone — oil will clog the stone's pores and ruin it.

SLURRY. As you're sharpening, you'll see a muddy sludge or slurry forming on the stone, see top right photo on opposite page. This is just the abrasive material rubbed off from the stone and the metal particles from the tool you're sharpening.

The slurry tends to decrease the cutting ability of the stone, so I usually wipe it off. The only exception is when I'm using a nagura stone, see box below.

FLATTEN STONE. Since waterstones are soft, they tend to wear or dish quickly. For the best sharpening results, you'll need to true or flatten the stone when it starts to hollow out, refer to bottom left photo on opposite page.

To do this, lay a sanding screen (the kind used to smooth drywall joint compound) on a piece of plywood or medium-density fiberboard (MDF). Rub the stone on the screen in a circular, scrubbing motion. When the stone is flat again, the surface will have a uniform color.

Sanding a small (1/8") chamfer on the edges of the stone helps protect them from getting chipped or nicked, refer to inset drawing on opposite page.

SLIPPAGE. You'll need a way to keep the stone from sliding around while you're sharpening. Try placing a damp paper towel under the stone, or see the Sharpening Station on page 6.

STORAGE. If you do a lot of sharpening, store your stones in a water-filled container. This way you won't have to soak the stone each time you want to use it.

Plastic food containers make good storage boxes. The lids fit tightly to keep the water from leaking out, and they come in all sizes, see bottom photo at right. Note: Natural stones will disintegrate if they are stored in water.

If you don't want to store your waterstone in water, try putting it in a resealable plastic bag. The bag helps to retain the moisture in the stone so you won't have to soak it as long the next time you use it.

No matter how you store your waterstone, the important thing is to keep it where it won't freeze.

Even a "dry" waterstone contains enough water to cause it to crack if it freezes.

◄ ***Soak Stone.*** *Put the stone in a container of clean water. It's ready to use when bubbles stop rising to the surface (about five minutes).*

◄ ***Keep Surface Wet.*** *A squirt bottle is a handy way to apply water to the stone when it starts to dry out.*

◄ ***Storage.*** *Add a couple of drops of bleach to keep "scum" from forming on the surface of the water.*

Nagura Stones

When I want the ultimate edge on a tool, I use a *nagura* stone and a 6000 or 8000-grit finishing stone.

A nagura is a small, fine-grained stone. It breaks down the abrasive particles of the waterstone and forms a polishing paste (or slurry). This slurry imparts a mirror-like finish to the blade's surface.

To use a nagura, simply rub it briskly across the surface of a damp waterstone to create a paste. Then, without removing the mixture, continue sharpening your blade.

If the slurry dries out, just add more water and re-apply the nagura stone.

Polishing Paste. *A nagura stone creates a paste that allows you to produce a mirror-like finish.*

Sources

- Japan Woodworker 800-537-7820
- Garrett Wade 800-221-2942
- Woodcraft 800-225-1153
- Trendlines 800-767-9999

SHOP PROJECT

Sharpening Station

This shop-made station is at the heart of a quick, easy sharpening system.

It only takes a few minutes to sharpen a chisel or plane iron. Which is considerably *less* time than it takes to round up my sharpening supplies and clear a place to work.

That's why I built this sharpening station. It keeps my sharpening supplies right at hand when I need them. And by attaching the station to the wall, I can use the top to mount my grinder and as a platform for sharpening tools by hand.

CONTAINER. Another thing that makes the entire sharpening process easier is a plastic container like the kind you see at most discount stores. (I used an 8" x 13½" *Rubbermaid* container that's 3½" deep.)

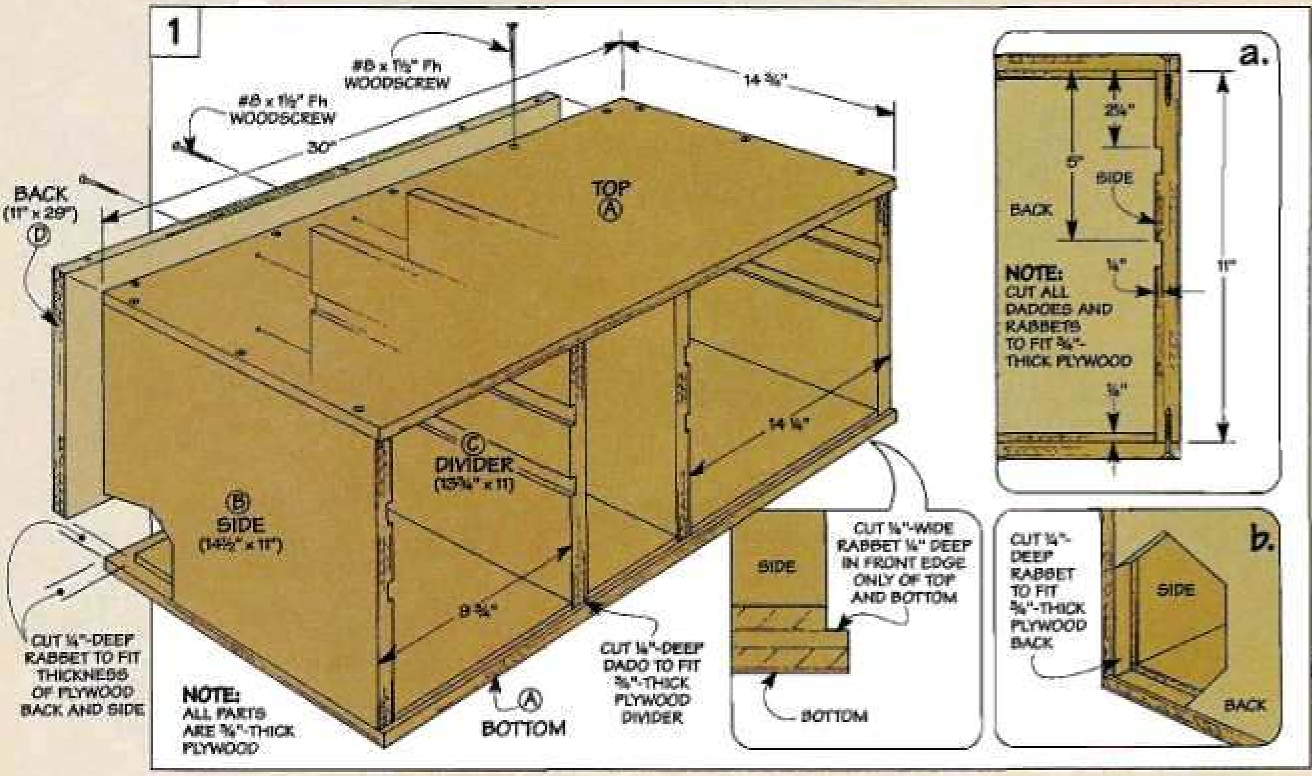
Filling the container with water creates a reservoir for storing my waterstones. And along with a shop-made stone holder, the container keeps the waterstone from slipping around as I sharpen, see box on page 7.

BOX. Basically, the sharpening station is a plywood box with a sliding door and four pull-out shelves for easy access.

After cutting the *top* and *bottom (A)* of the box to size, they're rabbeted on all four edges, see Figs. 1 and 1a. Wide rabbets on both ends and along the back edge will accept the sides and back (added later). And a narrow rabbet in the front edge forms part of the track for the sliding door.

In addition to the rabbets, two dadoes are cut in each of the top and bottom pieces. Later, these dadoes will accept dividers that form individual compartments.

SIDES & DIVIDERS. The top and bottom are held together with two *sides (B)* and a pair of *dividers (C)*. While the height (length) of these pieces is identical (11"),



their width is different.

To provide clearance for the sliding door, the sides are cut to width so they align with the shoulder of the rabbet in front and flush at the back (14½" in my case). But to allow for the back, the dividers are ¾" narrower (13¾").

With the sides and dividers cut to finished size, two dadoes are cut in one face of each piece for the shelves, see Fig. 1a. And the back edge of each side is rabbeted to accept a plywood back, see Fig. 1b.

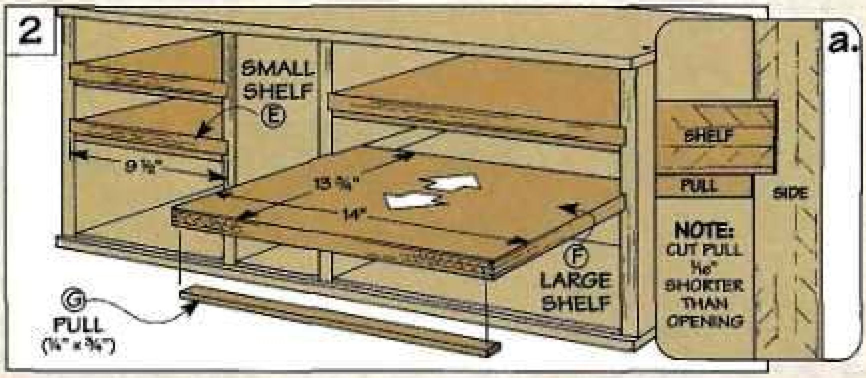
Now you can assemble the box with glue and screws. Then cut the *back (D)* to fit the opening and screw it in place.

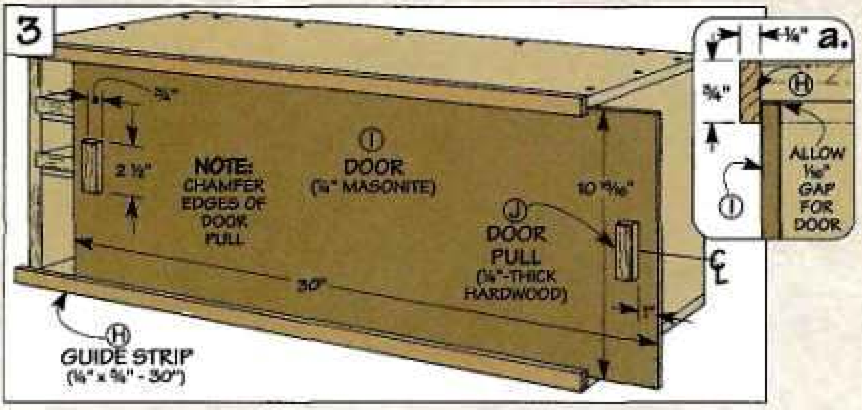
SHELVES. The next step is to add four sliding shelves, see Fig. 2. Two *small shelves (E)* provide storage for the stone holders. And two *large shelves (F)* hold extra grinding wheels.

To make the shelves slide easily (yet still fit snug), I cut them to fit their openings and sanded them lightly until they slipped smoothly in and out. While I was at it, I glued a thin strip of hardwood to the bottom of each shelf to serve as a *pull (G)*, see Fig. 2.

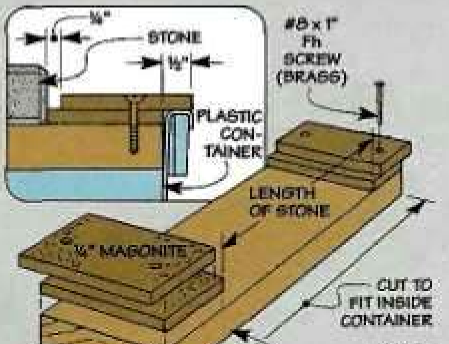
DOOR. With the shelves in place, you're ready to add the door. It's a piece of ¼" Masonite that slides in a track that's formed by gluing a hardwood *guide strip (H)* to the front edges, see Fig. 3a. To keep the *door (I)* from binding, it's cut 1/16" shorter (narrower) than the opening. A couple of thin hardwood strips glued to the door act as *door pulls (J)*.

MOUNTING. All that's left to complete the sharpening station is to mount it to a wall. To support the weight of a grinder (as well as the pressure exerted when sharpening by hand), be sure to attach it securely to the wall. (I attached it to the wall studs with lag screws.)





Stone Holders



Making a holder for each of your sharpening stones solves two problems. It prevents the stone from slipping around. And it keeps the mess to a minimum.

The stone rests on a wood base with two Masonite pieces attached to each end, see drawing. The bottom pieces butt tight against the ends of the stone to keep it from moving. And, to catch the "slurry," the top (offset) pieces support the holder over a plastic container filled with water.

Note: A non-skid shelf liner (available at hardware stores) anchors the container.

▲ *Spanning a plastic container filled with water, a simple holder anchors the sharpening stone.*

Sharpening a Chisel

HOLLOW GRINDING

HONING A BEVEL

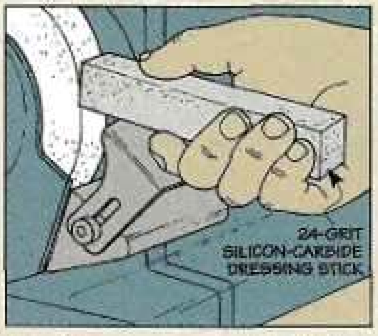
A grinder, a waterstone, and five minutes. That's all it takes to create a razor-sharp edge on a chisel. No big mystery, just a set of simple steps.

GRIND. If a chisel is nicked or the edge isn't square to the sides, I first hollow grind the bevel using a 60-grit aluminum-oxide grinding wheel, see photo above left and the section below.

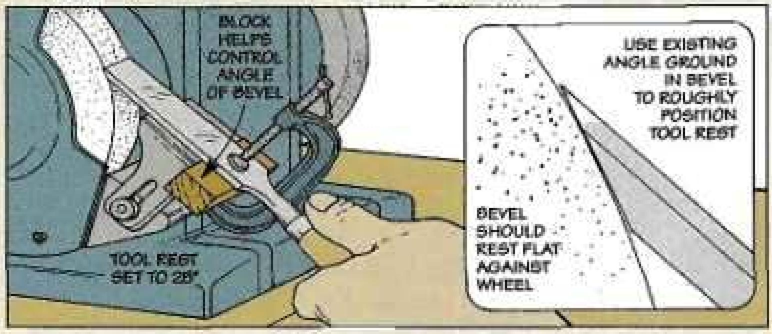
HONE. Then I hone the edge to a mirror finish with a 1000/6000-grit waterstone, see photo above right and the section on the opposite page. (For more on selecting and using waterstones, refer to the article on page 4.)

Hollow Grinding

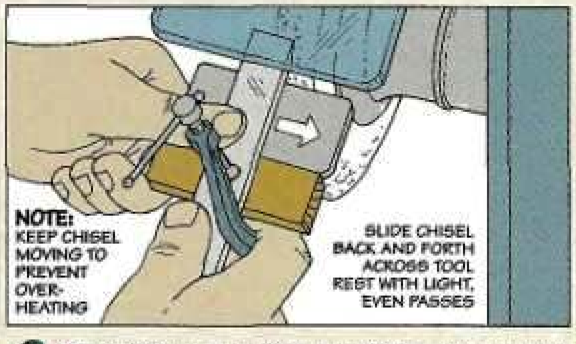
A grinding wheel leaves a slight "hollow" on the edge and reduces the time you'll need to spend honing.



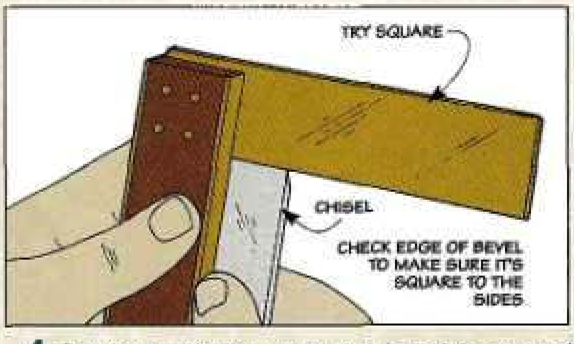
1 *To ensure a smooth, flat hollow ground bevel, first "square up" the wheel with a dressing stick.*



2 *Now position the tool rest to grind a 25° angle, see detail. To help guide the chisel across the wheel and maintain the proper angle, clamp a small block of wood to the base of the chisel.*

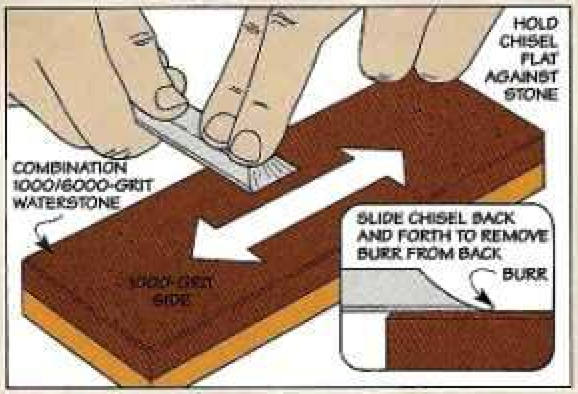


3 *When hollow grinding, take light, even passes and keep the chisel moving. This way the metal can't overheat and ruin the chisel.*

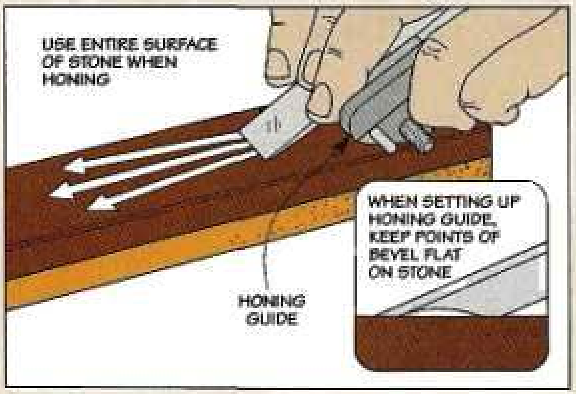


4 *Continue grinding until the bevel is ground smooth. Then check the edge with a try square to make sure it's flat and square to the sides.*

Honing

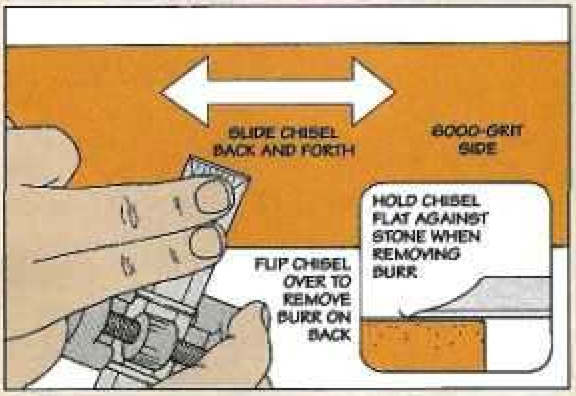


1 To hone the edge, first flatten the back of the chisel using a 1000-grit waterstone. (This will also remove any burr created by a grinding wheel.)

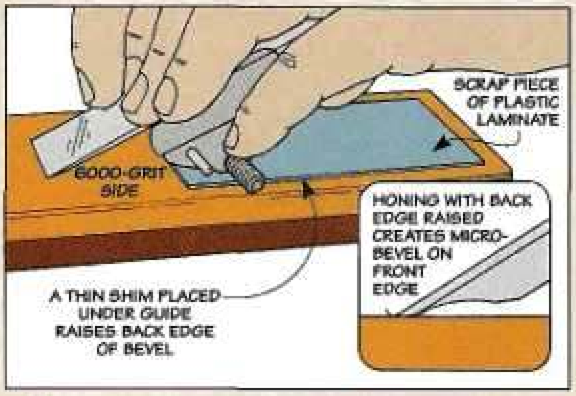


2 Next, with the two points of the grind flat on the stone, use a honing guide (see box below) to maintain the angle as you sharpen the bevel.

Honing a hollow ground chisel produces two small "flats" at each end of the bevel.



3 Now switch over to a 6000-grit waterstone to remove the burr created when the edge was honed and to polish the back of the chisel.



4 After the back of the chisel is polished, I hone a micro-bevel on the front edge — it makes a chisel cut better and stay sharp longer.

Honing Guides

When honing a chisel, you could freehand it across a stone. But it wouldn't be long before the angle of the bevel was altered. And this would make it more difficult to get a sharp edge.

To maintain the same angle throughout the life of a chisel and get it as sharp as possible, I recommend using a honing guide, see photo (and Step 2 above).

Honing guides are designed to hold a chisel firmly and securely in place at the angle the bevel was originally ground. Most guides also have some type of roller system that makes it easy to slide a chisel back and forth across the surface of the stone.

There are two basic types of honing guides. The one I prefer is small and compact and rides directly on top of the stone, see photo. The other is larger, a bit more complicated to set up, and requires more room to roll since it rides behind the stone.

Both are available through woodworking mail-order catalogs. Prices range from $10 to $20.

Two Types. *The smaller, more compact Eclipse honing guide (right) rides directly on the waterstone. The General guide (left) rides behind it.*

Shop-Made Knobs

One of the things I like about woodworking is that even a small project can provide a lot of satisfaction. And these shop-made knobs are no exception.

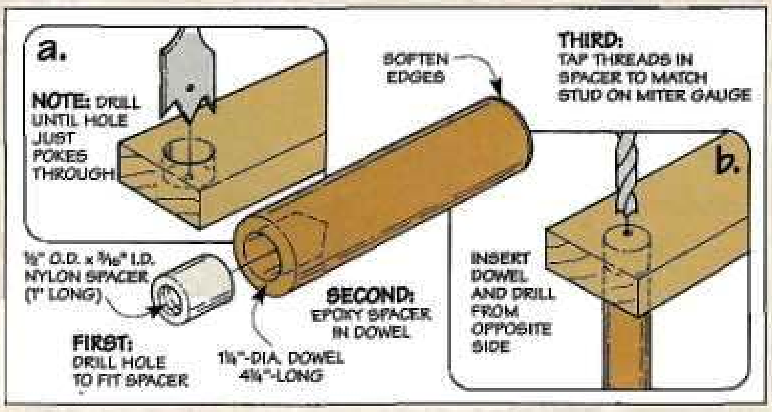
Not just because they give you a chance to rescue a scrap piece that's headed for the trash (or use one that's too valuable to throw away). But because you can customize a shop-made knob to fit any application you need.

APPLICATIONS. For example, you may want to make an improvement on an accessory like a miter gauge, see below. Or use a shop-made knob to tighten a jig, see page 11. For more leverage, you can even make a crank or a handwheel, refer to page 12.

THREADS. Regardless of the purpose, you'll need to use some type of threaded part to attach the knob. This can be as simple as a T-nut. Or you can cut your own threads. (For more on this, refer to the article on page 13.)

Miter Gauge Handle

▲ *This tall dowel provides a more secure grip on the miter gauge than the handle it replaces.*



Besides the fire-engine red paint, there's nothing all that fancy about this miter gauge handle.

Basically, it's just a tall dowel that replaces the short, stubby handle that came with the miter gauge. You'll want to experiment a bit with different size dowels to find the most comfortable grip. (I used a 1¼"-dia. dowel.)

The dowel screws onto the threaded stud of the miter gauge. What makes this work is a nylon insert that's epoxied in the end of the dowel and tapped to the same thread size as the stud, see drawing.

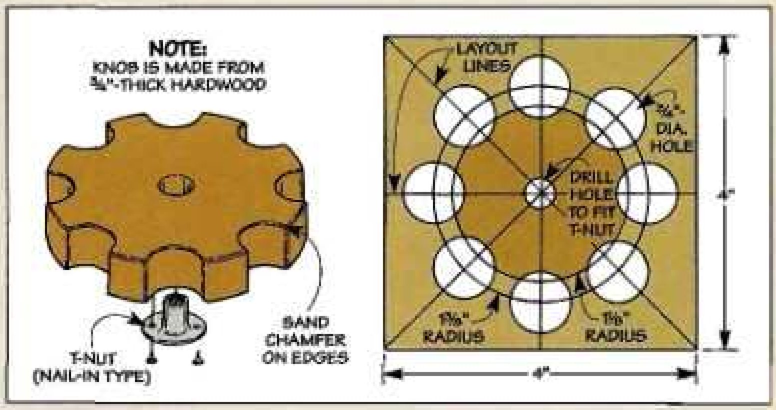
TWO-BIT TRICK. To center the hole for the insert on the end of the dowel, I use a simple "two-bit" trick. Start with one bit that's the same size as the dowel and drill into a scrap until the tip just pokes through, see detail 'a'.

Inserting the dowel in the hole and drilling from the opposite side with a second (smaller) bit creates a centerpoint, see detail 'b'.

Once you locate the centerpoint, it's just a matter of drilling a hole to fit the insert, epoxying it in the dowel, and tapping the threads, refer to page 13.

Star Knob

▲ *The scalloped edges on this star knob make it ideal for applying pressure comfortably.*



To create a better grip, dip a knob into a liquid plastic solution like Plasti-Dip.

When I make a jig, it's a pretty good bet that one of these star knobs will end up on it.

That's because they're large enough to apply plenty of pressure (when locking down a fence for example). And the scalloped edges provide a sure, comfortable grip.

LAYOUT. Laying out one of these knobs is easy. Start with a square blank of ¾"-thick hardwood, see drawing. Then divide it into eight equal parts by drawing layout lines through the centerpoint.

This same centerpoint is used to draw two circles. A small diameter circle marks the outside edge of the knob. And the large one is used to lay out the finger recesses.

RECESSES. The scalloped recesses are formed by drilling holes where the large circle intersects the layout lines (drawn earlier). After cutting the rest of the shape on a band saw (or sabre saw), sand a chamfer on the edges.

T-NUT. To "thread" these knobs, I use an ordinary T-nut. It's epoxied and nailed in a hole that's drilled to fit the T-nut.

Note: To protect the surface of the knob, you can paint it, apply a clear finish, or "dip" it, see margin.

Wing Nut

▲ *Besides providing finger clearance, a shop-made wing nut allows you to exert plenty of torque.*

A shop-made wing nut also comes in handy on many jigs. The large wings make it easy to apply a little more torque than with a star knob. And the taper at the base of the wings provides built-in finger clearance.

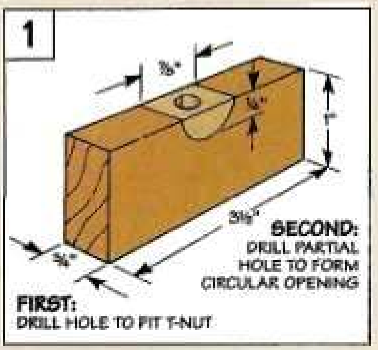
Here again, a scrap of ¾"-thick hardwood is all you need to get started, see Fig. 1. (I used a piece of cocobolo I'd been saving.) And as before, you'll need to drill a hole to fit the T-nut you're using.

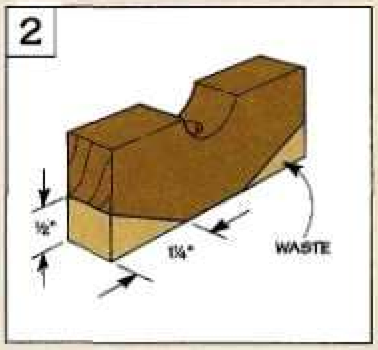
SHAPING. But before installing the T-nut, it's best to cut the wing nut to shape.

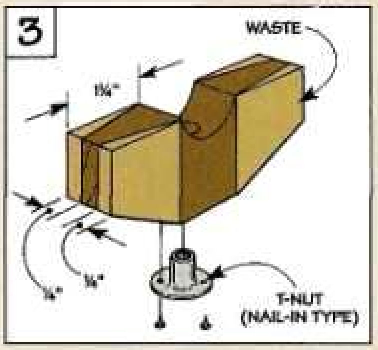
A circular opening is scooped out of the top edge. (I drilled a partial hole with a 1"-Forstner bit.) And the bottom edges and sides are cut at an angle and sanded smooth, see Figs. 2 and 3.

TWO TYPES. After epoxying the T-nut in place, you can either use the wing nut as it is. Or make one with a threaded stud, see margin.

You can make a threaded stud by epoxying a cutoff bolt in the T-nut.

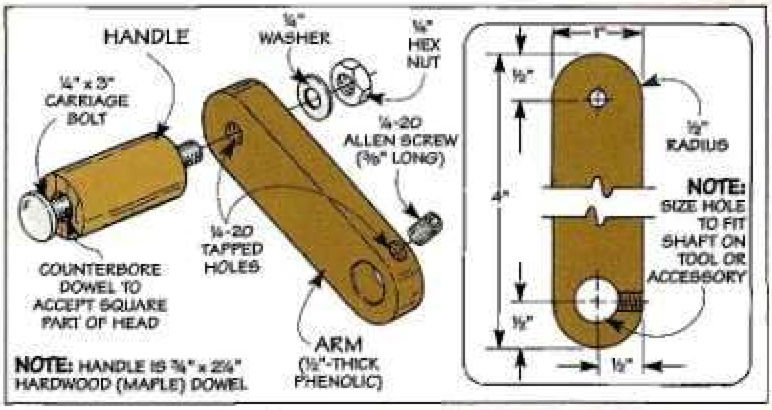


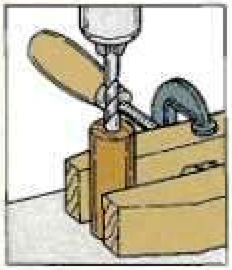




Crank

▲ *This shop-made crank provides plenty of leverage when adjusting tools and accessories.*





To hold a dowel securely when drilling, tighten it in a handscrew that's clamped to the drill press table.

Sometimes a simple knob just doesn't provide enough leverage. So I use a shop-made crank.

It's ideal for adjusting large shop accessories (like raising and lowering an outfeed table). Or as a replacement for a control on a stationary tool, see photo above.

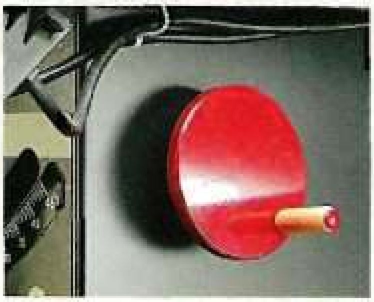
This crank has two parts: an arm that attaches to the shaft of an adjustment mechanism, and a handle to turn the arm, see drawing.

ARM. To make the arm strong (yet still easy to work), I made it from a ½"-thick piece of phenolic, see margin for sources.

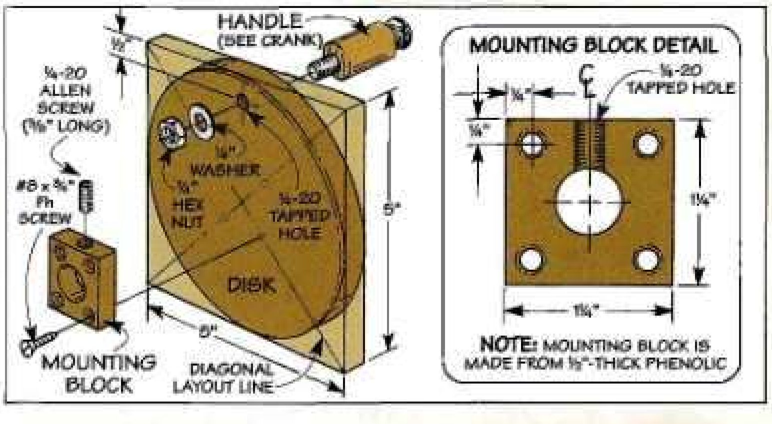
A large hole is drilled in one end to fit the shaft of the adjustment mechanism. To secure the arm to the shaft, you'll also need to drill an intersecting hole that's tapped for an Allen screw. And there's a small hole that's drilled and tapped in the opposite end for the handle.

HANDLE. After cutting a curve on each end, you can add the handle. It's a short dowel that attaches to the arm with a carriage bolt. This bolt passes through a counterbored shank hole in the dowel and threads into the arm. A nut "locks" the bolt in the threaded hole and allows the handle to spin freely.

Handwheel



▲ *A heavy-duty handwheel allows you to apply even more torque quickly and easily.*



Sources

Phenolic is a plastic product that can be cut and worked with carbide-tipped tools. It's available in ½"-thick blanks from:

- *Woodhaven 800-344-6657*
- *WoodsmithShop 800-444-7002*

Although it's shaped differently, this handwheel serves the same basic purpose as the crank. It's just a heavier-duty version.

The handwheel consists of three parts: a disk, a mounting block, and a handle, see drawing.

DISK. The disk starts out as a square blank of ½"-thick phenolic. To center the mounting block later, it's best to lay out two diagonal lines through the centerpoint. Then, after drilling and tapping a hole for the handle, simply cut and sand the disk to shape.

MOUNTING BLOCK. The disk is attached by means of a mounting block. This is a square blank of phenolic with a hole drilled in the center to fit the shaft of the adjustment mechanism, see detail.

As before, an intersecting hole is drilled in the edge and tapped for an Allen screw that secures the mounting block to the shaft. After aligning the corners of the mounting block with the lines drawn earlier, it's screwed in place.

PAINT. To dress up the handwheel, I spray painted the phenolic parts. Then I added a handle (with a clear coat of finish) that's identical to the one on the crank.

Tapping Threads

Occasionally, the threaded part I need to assemble a project just isn't available. Which is exactly what happened with the knobs shown on page 10.

So I use a tap to cut my own threads, see photo at right. This is just a simple tool that's designed to cut threads *inside* a hole.

SIZE. To determine the correct size of tap, you'll need to know two things: the diameter of the bolt (or fastener) that will thread into the hole, and the number of threads per inch. (For example, it may be a 1/4-28 or 5/16-18 tap.)

If the bolt has coarse threads, it's easy to count how many there are per inch. But that makes me cross-eyed if I'm working with fine threads. So I take the bolt to a hardware store, find a nut that fits, and check the bin for the correct size.

PILOT HOLE. Once you've selected the correct size tap, the next step is to drill a pilot hole in your workpiece, see Step 1 below. The idea is to drill a hole that's slightly *smaller* than the diameter of the tap you're using. This leaves enough material so the tap can cut the threads.

The size of drill bit you need is usually stamped on the tap. This may be a fraction (17/64"), a number (No. 7), or a letter (H). With a fraction, it's easy to find the correct size bit. But a bit with a number or letter may be hard to find.

Fortunately, these specialty bits are within a few thousandths of a fractional drill bit, see margin. And that's close enough for most of the work I do.

▲ *A tap is specially designed to cut threads inside a hole. They're sold individually (like a drill bit) or as part of a tap and die set at most hardware stores.*

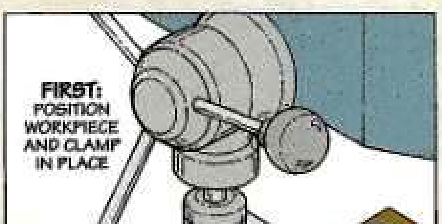
TAP. After drilling a pilot hole, you're ready to tap the threads. To keep from cutting them crooked, the important thing is to get the tap started straight.

The best way I've found to do this is to chuck the tap in the drill press. Then turn the chuck *by hand* as you apply pressure downward, see Step 2. Note: If you're tapping into metal, use oil as a lubricant.

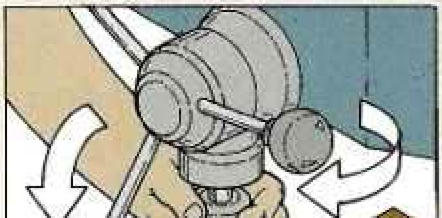
BURR. As the tap cuts, a burr forms that makes it hard to turn the chuck. To clear this burr, back out the tap, see Step 3. Then just repeat the process until you cut the threads all the way through.

Tap Size	Pilot Hole
1/4-20	3/16"*
1/4-28	7/32"*
5/16-18	17/64"
5/16-24	17/64"
3/8-16	5/16"
3/8-24	21/64"

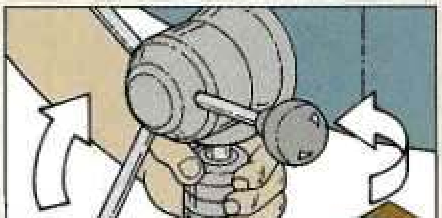
*closest fractional bit



***Step 1.** With the workpiece clamped in place, drill a pilot hole that's sized for the desired tap. (See chart in margin.)*



***Step 2.** After chucking the tap in the drill press, slowly lower it into the pilot hole as you turn the chuck by hand.*



***Step 3.** To clear the burr that forms, back off the tap a bit. Then repeat the process until all the threads are cut.*

Miter Gauge Tips

Here are a few of our favorite tips to help you add precision to your miter gauge cuts.

Squaring a Miter Gauge

■ One of the safest and most accurate ways to check a miter gauge for square is to use a couple of pieces of scrap.

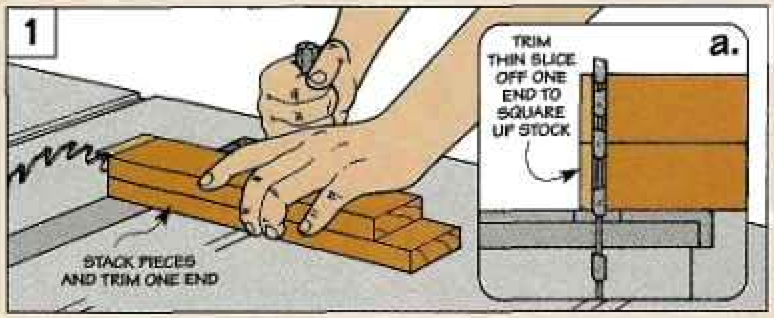
To do this, start with two pieces that are ripped to the same width. Then it's just a matter of stacking them on top of one another and crosscutting a thin slice off of one end using the miter gauge, see Fig. 1.

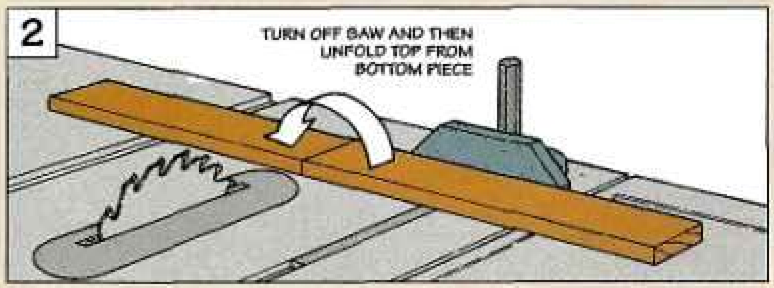
Once you've made the cut, turn off the saw and unfold the top piece from the bottom piece like you'd turn a page in a book, see Fig. 2. To check the miter gauge for square, simply set the pieces on edge and slide the cut ends together, see Fig. 3.

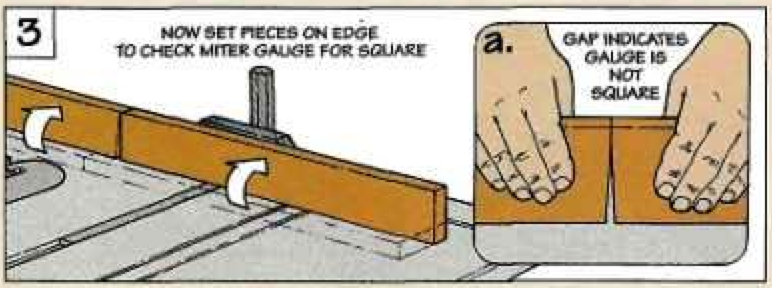
A gap between the two indicates an adjustment is required. If the widest end of the gap is at the bottom, adjust the miter gauge clockwise, see Fig. 3a. If the gap is near the top, adjust the miter gauge counter-clockwise.

Repeat this procedure, trimming off thin slices from the scrap pieces until the ends butt up perfectly square with no gap.

To prevent a workpiece from "creeping" during a cut, attach sandpaper to your auxiliary fence or miter gauge head.





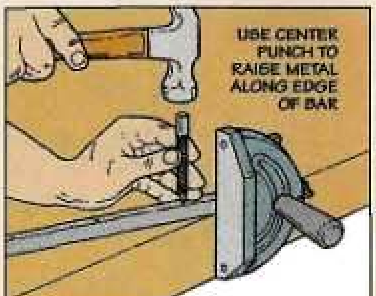


Modifying the Runner

■ Over time, the bar on a miter gauge and the slot it rides in can wear. If there's too much wear, the miter gauge can rattle around in the slot — which can result in inaccurate cuts.

One way to reduce the "play" between the bar and the slot is to "raise" the metal along the edge of the bar with a center punch. A few dimples made by the punch are normally all it takes to make it fit, see drawing. I test the fit of the bar after each dimple until the bar slides smoothly with minimum "play."

If the bar is extremely loose, you might want to consider a more permanent solution, see Tru-Fit Miter Bar System on page 27.



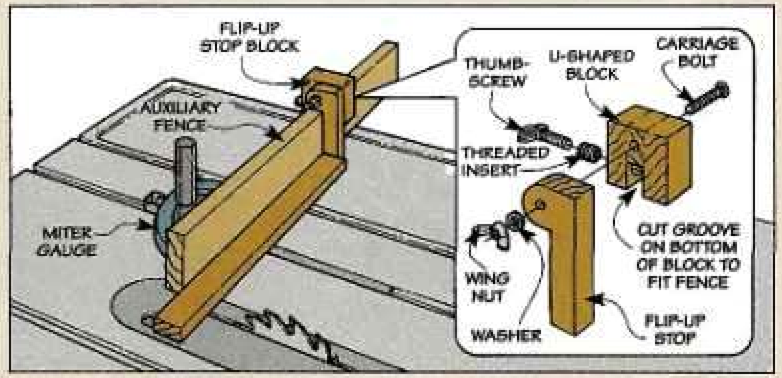
Flip-up Stop Block

■ When crosscutting a workpiece to length, you can cut to a layout line. Or clamp a stop block to the fence to establish the length of the workpiece. Either way works. But when cutting multiple pieces, both methods can be time consuming.

To make quick work of crosscutting multiple workpieces, I attach an adjustable, flip-up stop to the fence, see drawing. With this setup, I make a first cut to establish a square end. Then flip down the stop to quickly cut the piece to exact length.

The stop consists of two main parts: a U-shaped block that fits over the fence, and an L-shaped arm that acts as the stop, see drawing. To lock the block to the fence, a threaded insert and a thumbscrew are installed in the back of the block, see detail.

To make it so the arm can be flipped out of the way after the first cut and down for the finish cut, the arm is attached to the block with a carriage bolt and wing nut.



Set-up Board

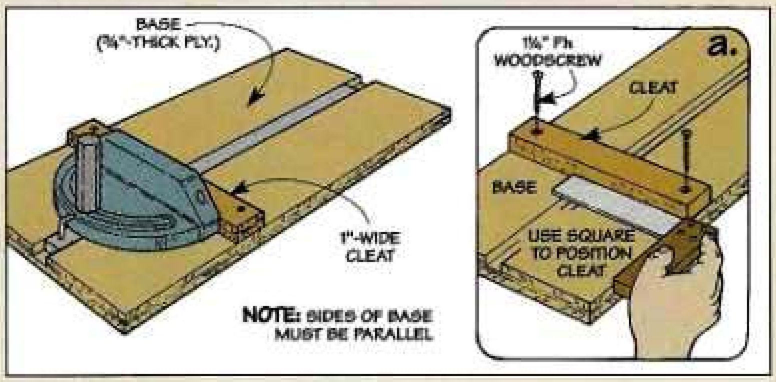
■ If you change the angle of your miter gauge a lot, you know what a hassle it can be getting it back to square. To eliminate this problem, I made a simple set-up board that allows me to quickly and accurately set the miter gauge to 90° in seconds, see drawing.

The set-up board consists of two parts: a base made of ¾"-thick plywood and a 1"-wide cleat, see drawing.

To make the set-up board, you'll first need to square up the sides of the base so they're parallel. Then to hold the bar of the miter gauge, a ⅜"-deep groove is cut down the center of the base, see drawing.

Now the cleat can be attached. To ensure it automatically squares up the head of the miter gauge, the cleat must be screwed in place so it's perpendicular to the groove.

To do this, first screw one end of the cleat to the base. Then use a try square along the edge of the base to position the cleat before securing it in place, see detail.

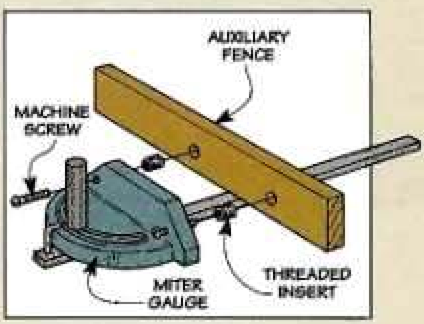


Rather than move the head of the miter gauge to adjust the angle, try shimming your auxiliary fence (or workpiece) with a playing card.

Threaded Inserts

■ Many miter gauges have a pair of holes drilled in the head so you can mount jigs and fixtures to the miter gauge. But after repeated installations, the back of a favorite jig or fixture can become chewed up and difficult, if not impossible, to reinstall — especially if woodscrews are used.

To prevent this from happening, I install threaded inserts in the back of each jig and use machine screws to attach it to the miter gauge, see drawing. Not only does this prevent the back of the jig from getting chewed up, it also makes installation quick and easy. And it ensures that the jig can be reattached the same way each time it's used.



FEATURE PROJECT

Finish Storage Cabinet

This cabinet does more than store your finishes — it's really a finishing workstation.

When Ken (our design director) first showed me this finish storage cabinet, I thought the doors were on wrong. They appeared to open in opposite directions — and they do.

It wasn't until I opened the upper door of the cabinet that I realized what he'd done, see photo A below. Inside the door was a drop-down work table that rests on the bottom door when it's open, see photo at right.

Ken also added two other features I liked. A removable lazy Susan that makes it easy to rotate a project when applying a finish, see photo B. And a set of shelves that rest on adjustable metal shelf standards, see photo C.

CONSTRUCTION. The design of this cabinet is similar to that of a simple bookshelf. The only difference is a set of doors are added to protect supplies from sawdust.

SIDES. To build the cabinet, I began by cutting two *sides (A)* from ¾"-thick plywood, see Fig. 1 on opposite page and the cutting diagram on page 19.

Next, to accommodate a set of metal shelf standards that are added later to support the shelving, two ½"-wide grooves are cut on the inside face of each workpiece, see Fig. 1c.

Then a rabbet is cut at both ends of each side piece to receive a *top* and *bottom (B)*, see Fig. 1. At the same time, a ½"-deep dado is cut in the center to accept a center divider (also added later).

RABBET. Before you can assemble the case, there's one more thing to do. A rabbet for a ¼"-thick plywood back is cut on the inside face of all four workpieces, see Figs. 1 and 1a.

A. Work Table. *This drop-down work table is a convenient place to finish a project where supplies are stored.*

B. Lazy Susan. *When the lazy Susan is not being used with the work table, it stows away inside the cabinet.*

C. Adjustable Shelving. *Metal shelf standards allow you to adjust the shelving for your storage needs.*

BACK. After gluing and screwing the top and bottom to the sides, you're ready to glue and nail the *back (C)* in place, see Fig. 1.

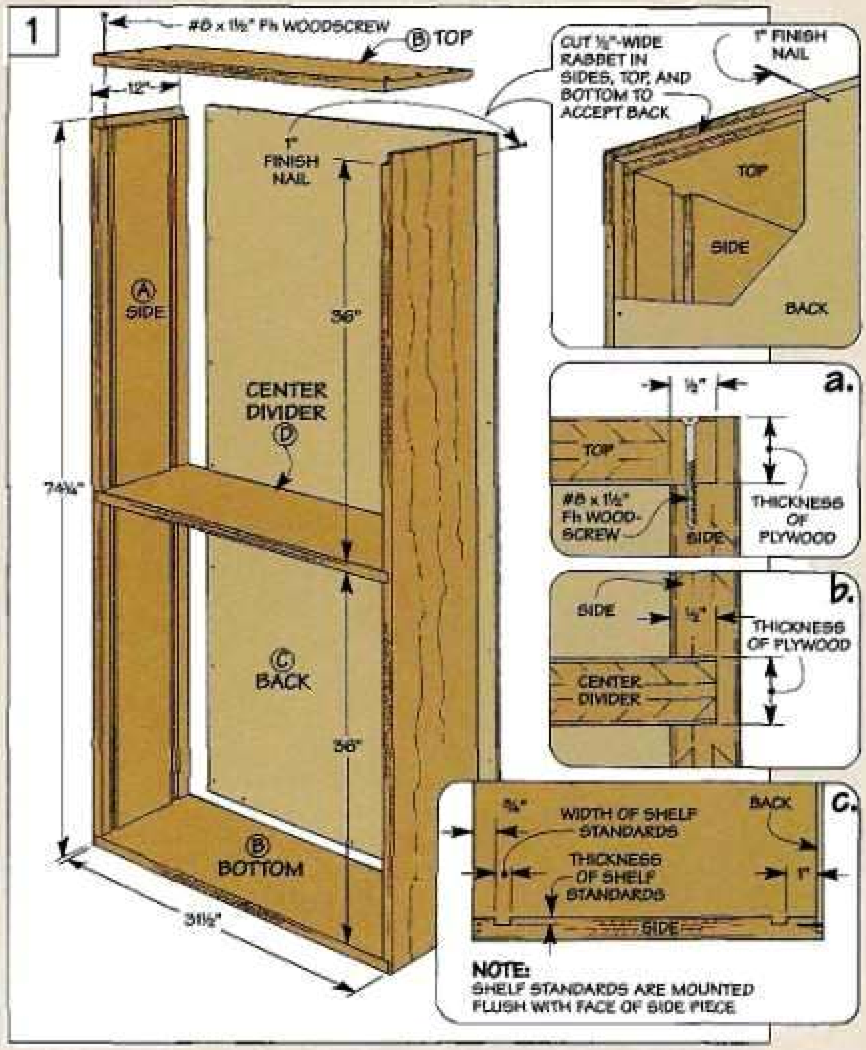
CENTER DIVIDER. Next, to divide the upper and lower sections of the case, I cut a *center divider (D)* to fit between the dadoes cut earlier in the sides, see Fig. 1. When gluing and clamping the divider in place, make sure it's flush with the front of the case.

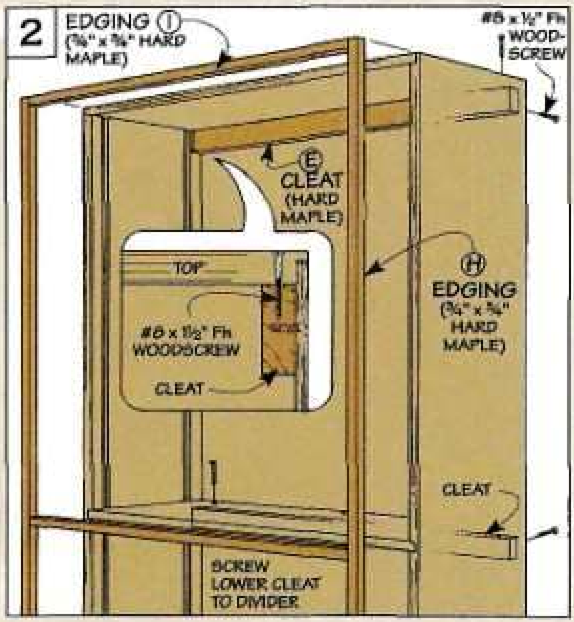
CLEATS. Then to support the weight of the cabinet when it's screwed to the wall, I added a pair of *cleats (E)* that fit between the sides, see Fig. 2. These pieces are glued and screwed to the back, and either the top or center divider, see detail in Fig. 2. With them in place, I installed the shelf standards.

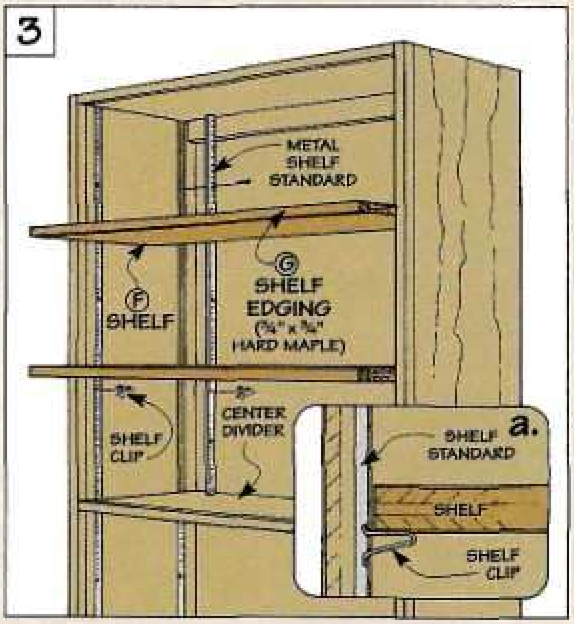
SHELVES. To determine the length of the *shelves (F)*, measure the opening and subtract 1/8". The width of each shelf equals the depth of the case, minus 1 1/4" to allow for a work table added later. (In my case, 10 1/2" x 30 3/8".)

Once they're cut to size, cover the front edge of each shelf with *edging (G)*, see Fig. 3.

EDGING. To complete the case, I covered the exposed plywood edges with *edging (H, I)*, see Fig 2.







Doors

With the case complete, you can turn your attention to the doors.

DOOR PANELS. Like the case, the exposed edges of the plywood doors are covered with hard maple edging. But before cutting the door panels to size, first measure the opening for each door (they should be the same). Then subtract 1½" from each dimension to allow for the maple edging (30½" x 35⅜"), see Fig. 4.

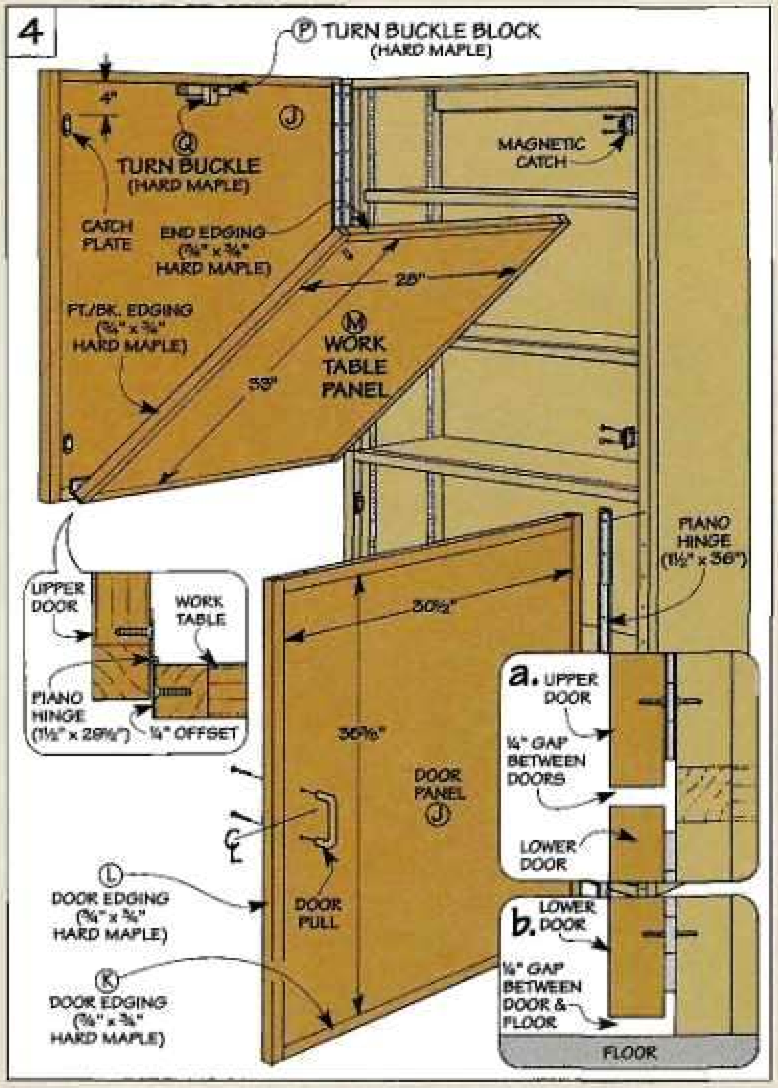
Once you've cut the *panels (J)*, the *edging (K, L)* can be glued in place, see Fig. 4.

MOUNTING DOORS. The lower door is mounted on the right side of the case. But because the lower door is used to support the drop-down work table, the top door is mounted on the left side. To support the weight of each door, piano hinges are used to mount the doors on the case, see Fig. 4.

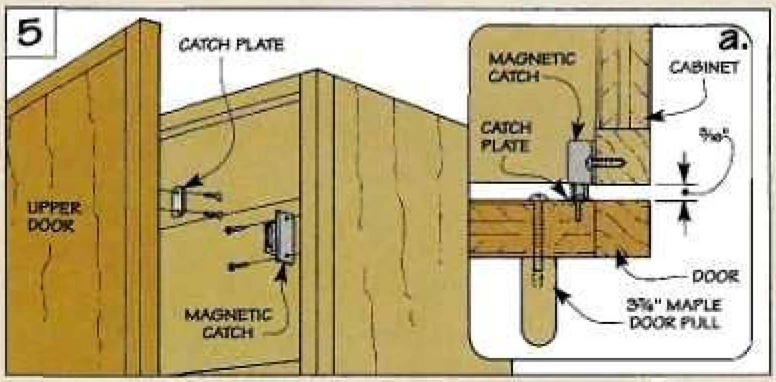
Note: When mounting the lower door, allow for a ¼" gap between the door and the floor, see Fig. 4b. When mounting the upper door, allow for a ¼" gap between the doors, see Fig. 4a.

PULLS & CATCHES. Now door pulls and magnetic catches can be mounted, see Figs. 4 and 5. Mounting these pulls is fairly straightforward. (I used 3¾" maple pulls.)

But when mounting the catches (and plates), it's important to leave a 3/16" gap between each door and the case, see Figs. 5 and 5a. This compensates for the thickness of the hinge and allows air to circulate inside the case.



WORK TABLE. Now you can move on to the drop-down work table that's mounted to the back of the upper door. Like the doors, the work table consists of a plywood *panel (M)* with the exposed edges covered with maple *edging (N, O)*, see Fig. 4. And again, a piano hinge is used to mount the



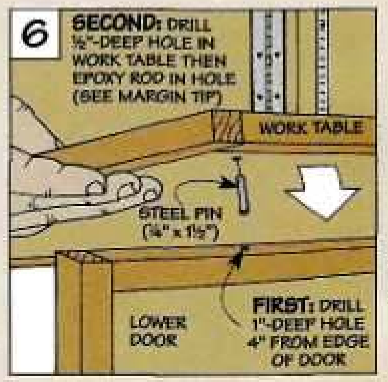
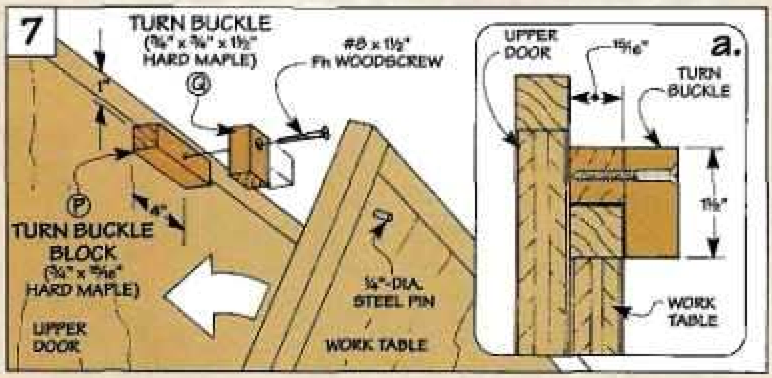


table to the upper door, see Fig. 4.

Next, to lock the table to the lower door, a steel pin is epoxied in a hole that's drilled in the bottom of the work table, see Fig. 6. Then a hole is drilled in the door to receive the pin, see margin tip.

Finally, a *turn buckle block (P)* and *turn buckle (Q)* used to lock the work table to the back of the upper door can be mounted to the door, see Fig. 7.



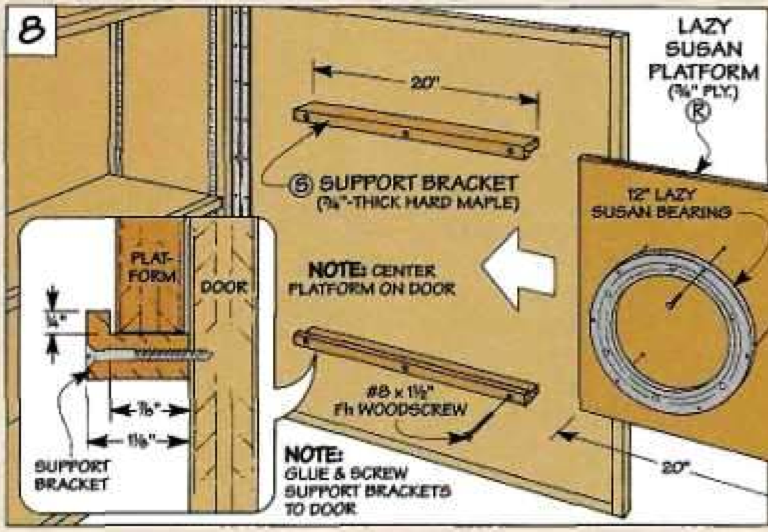
A dowel center makes it easy to locate the hole for the steel pin in the bottom of the work table.

Lazy Susan

At this point, you could use the storage cabinet just as it is. But to make it easier and more efficient to finish all the sides of a project, I built a lazy Susan for the flip-down work table, refer to photo C on page 16.

It consists of a ¾"-thick plywood *platform (R)* that's screwed to a lazy Susan bearing I purchased from a local hardware store (around $20), see Fig. 8.

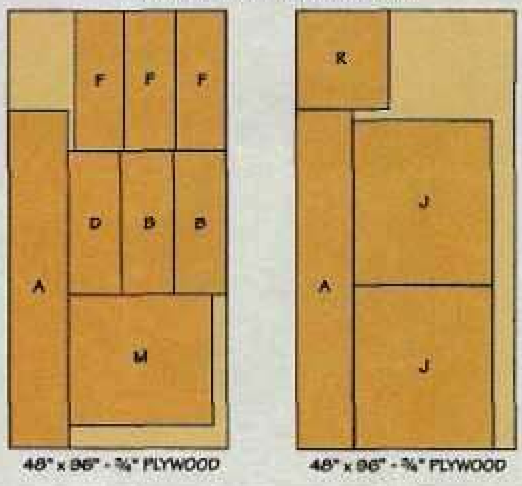
To store the lazy Susan when it's not in use, a pair of L-shaped *support brackets (S)* (hard maple) are glued and screwed to the back of the lower door, see detail.



Materials

A	Sides (2)	12 x 74¼ - ¾ ply.
B	Top/Bottom (2)	12 x 31½ - ¾ ply.
C	Back (1)	31½ x 73¾ - ¼ ply.
D	Center Divider (1)	11¾ x 31½ - ¾ ply.
E	Cleats (2)	¾ x 2 - 30½
F	Shelves (3)	10½ x 30⅜ - ¾ ply.
G	Shelf Edging (3)	¾ x ¾ - 30⅜
H	Vertical Edging (2)	¾ x ¾ - 74¼
I	Horizontal Edging (3)	¾ x ¾ - 30½
J	Door Panels (2)	30½ x 35⅜ - ¾ ply.
K	Horiz. Door Edging (4)	¾ x ¾ - 30½
L	Vert. Door Edging (4)	¾ x ¾ - 36⅞
M	Work Table Panel (1)	28 x 33 - ¾ ply.
N	End Edging (2)	¾ x ¾ - 28
O	Ft./Bk. Edging (2)	¾ x ¾ - 34½
P	Turn Buckle Block (1)	¾ x 15/16 - 4
Q	Turn Buckle (1)	¾ x ¾ - 1½
R	Lazy Susan Platform (1)	20 x 20 - ¾ ply.
S	Support Brackets (2)	¾ x 1⅛ - 20

PLYWOOD CUTTING DIAGRAM



Hardware

- (4) 36" Shelf Stndrds. w/screws
- (12) Shelf Clips
- (2) 1½" x 36" Piano Hinges w/screws
- (2) 3¾" Maple Door Pulls
- (4) Magnetic Door Catches w/plates
- (1) 1½" x 28½" Piano Hng. w/scrws.
- (1) 12" Lazy Susan Bearing w/screws
- (25) #8 x 1½" Fh Woodscrews
- (6) #8 x ½" Fh Woodscrews
- (1) ¼" x 1½" Steel Pin
- (48) 1" Finish Nails

Cordless Driver/Drills

I'll never forget my first cordless drill. It spent most of the time plugged into an electrical wall outlet getting recharged. And even after it was charged, it didn't have the power I needed.

But if the cordless driver/drills that we tested (shown below) are any indication, all that has changed. With more powerful batteries that run longer (and charge faster), they can tackle jobs my old drill just couldn't handle.

While the prices of these drills vary ($134 to $215), their features are basically the same, see margin at left. So we were anxious to see how the price affected their performance. (For more on test procedures and results, see page 22.)

TEAM. Like our other tool reviews, we rounded up a team of three woodworkers to test the drills. Both *Ken* (a professional carpenter) and *Steve* (an advanced woodworker) use cordless drills extensively around the shop and for remodeling work. While *Cary* (a beginning woodworker) uses one mainly to assemble projects.

Because each person has a different type (and amount) of experience, you get a range of viewpoints that's helpful when selecting the drill that's best for you.

How We Selected the Drills

Each cordless driver/drill we tested has:

- Two 12-volt batteries with 1-hour charger
- 3/8" Keyless Chuck
- Two Speed Ranges with Variable Speed
- Adjustable Clutch

▲ *If you're in the market for a cordless driver/drill, there are two body designs to choose from — a T-handle (left) and a pistol grip (right). Either way, these 12-volt models have plenty of power.*

Q: *Not all the drills have the same body design. Is that cosmetic? Or does it really make a difference?*

Steve: There's a definite difference in the feel of the drills. I liked the overall balance of the drills with a T-shaped handle better than the ones with a pistol-grip. (See photo above.) And they're more compact, so it's easier to work in tight spaces.

Cary: At first, I thought the drills with a pistol-grip were a bit nose-heavy. But the balance improved when I wrapped my hand around the end of the body and pulled the trigger with my middle finger. That put all the pressure right in line with the bit which made it easier to drill holes and drive screws.

Q: *Any problems with the batteries or the chargers?*

Steve: One thing that bugged me is the metal clips that hold the batteries in place on some of the drills. (See top photos on next page.) Compared to the batteries

Hitachi DS 10DVA	Makita 6211D	Bosch 3310K	Black & Decker 2872K-2	DeWalt 972	Panasonic EY6100
800-546-1666	800-487-8665	312-286-7330	800-544-6980	800-433-9258	800-338-0552
$169.95	$199.99	$199.00	$199.50	$189.95	$214.95

that just snap in, they're not nearly as quick or convenient.

Cary: And the large clip on the Porter Cable dangles down so low when I change batteries, I can see it accidentally getting bent.

Ken: Another thing about the batteries is they're all "keyed" so they only fit in the chargers one way. Even so, the shape of some of the batteries made it easier to automatically orient them to the charger. (See margin at right.)

Batteries. *A metal clip on the Porter Cable (left), Skil, and Makita holds the batteries securely in place. But it's not as handy as the snap-in batteries on the rest of the drills. (Bosch is shown at right.)*

Unlike the shape of the DeWalt battery (top), the Panasonic (bottom) allows you to quickly orient the battery to the charger.

Q: ***How about the controls like the forward/reverse switch?***

Steve: That's where I noticed a big difference. The forward/reverse switch on the Black and Decker (B&D), Bosch, DeWalt, Ryobi, and Panasonic is on the body of the drill. (See photos below.) So when I need to back out a screw, I flick the switch from side to side almost without thinking about it.

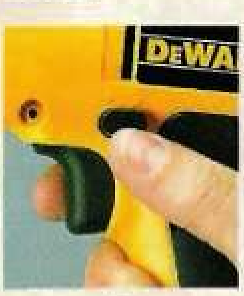
On all the other drills except one, the switch is located directly above the trigger. So I have to shift my grip or use my other hand to operate it.

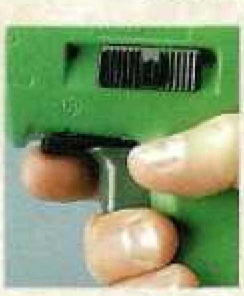
Ken: Still, they're more convenient than the switch on the Makita. Since it's on the *side* of the handle, I thought it would be easy to use with a brush of my thumb. But it's painful to operate. And it's finger torture for a left-hander.

Q: ***Anything about the case that comes with each driver/drill?***

Cary: I'm partial to the heavy-duty metal cases that come with the Milwaukee, Porter Cable, B&D, and DeWalt. (See photo below.)

Even though the molded plastic cases that come with the other drills are probably just as sturdy, the "web" hinge on the Ryobi, Skil, and Hitachi case is bound to break.





Forward/Reverse. *It's easy to operate the forward/reverse switch when it's on the body of the drill (left). But you have to shift your grip when it's above the trigger (center) or on the handle (right).*

Cases. *A metal case with a continuous hinge (like the one that comes with the Milwaukee at left) is sturdier than the Ryobi's plastic case with its "web" hinge (right).*

Ryobi CTH 1202
800-525-2579
$134.00

Milwaukee 0401-1
800-414-6527
$189.99

Porter Cable 853
800-487-8665
$164.95

Sears 27139
800-377-7414
$149.99

Skil HD 2736
312-286-7330
$159.00

Freud EDS 120
800-334-4107
$199.95

Performance

A. Drilling. *To test how much "gas" these drills had, we drilled ¾"-diameter holes in Douglas fir.*

B. Driving. *And we compared their performance when driving 3" deck screws in pressure treated lumber.*

C. Clutch. *Screwing sheetrock to wall studs gave us a feel for how well we could fine tune the clutch.*

Q: *It looks like termites have been at work in the shop. What did you guys do to test these driver/drills?*

Ken: For starters, we drilled ¾"-dia. holes in "two-by" Douglas fir until the batteries ran down. (See photo A above.)

Steve: What we found is the Bosch, Porter Cable, B&D, and DeWalt had the biggest "gas tanks." In fact, they drilled considerably more holes than the Skil, Ryobi, and Panasonic. (See chart below.)

Cary: One thing that surprised me is the drills heated up quite a bit as I was drilling.

Steve: That's pretty normal when you're working a drill hard. And I've actually seen guys burn them up. But that won't happen with the Makita and Sears. They have a built-in switch that cuts off power if they get too hot.

Q: *How did the drills perform when driving screws?*

Cary: They all drove more than enough screws to assemble any project I'd build. (See photo B.)

Ken: But if I'm building a deck, I want a drill that's not going to run out of steam. For example, I'd get a lot more work out of the B&D, Milwaukee, and Porter Cable than the Hitachi. (See chart.)

Steve: What concerns me even more about the Hitachi is the speed switch gets stuck when I set it to low range. And that locks up the drill until I work the switch back and forth a few times.

Q: *How can the Ryobi, Skil, and Panasonic drive so many screws when they drilled the fewest holes?*

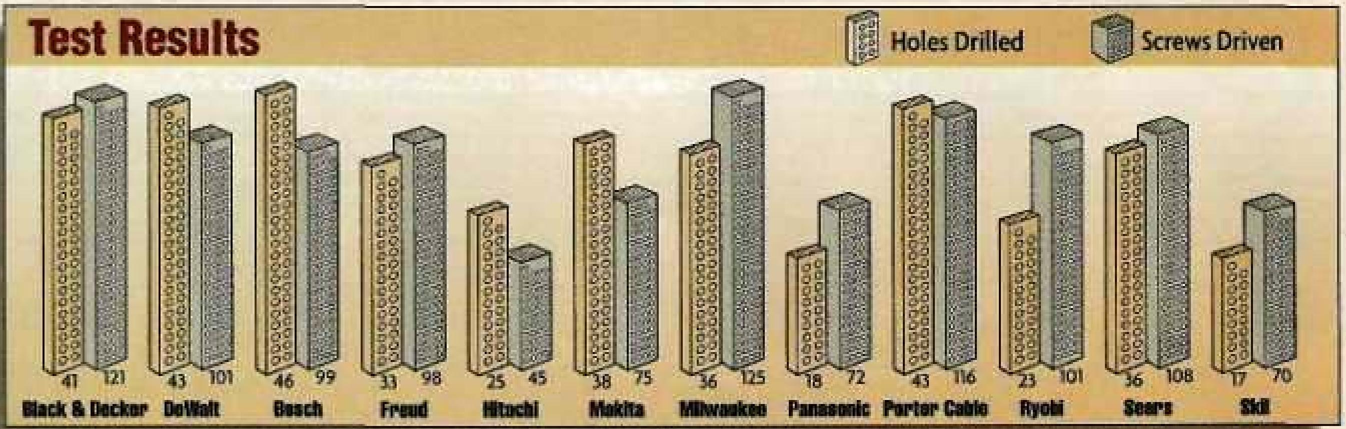
Ken: They develop quite a bit of torque at low speed (the setting we used to drive screws). But that wasn't the case in the high speed (drilling) range. (See photo D and chart on next page).

Cary: How does that explain the results with the Milwaukee? It drove the *most* screws, yet had the *least* amount of torque.

Steve: What happened is we couldn't measure all the available torque. That's because the clutch started to slip — even though we set it to "drill" (where it shouldn't slip). What worries me is that the clutch will eventually slip *all* the time when I'm drilling.

Q: *What about when you're in the "drive" mode. Isn't the clutch supposed to slip?*

Ken: That's right. Once the drill delivers the torque you need to set a screw, the clutch slips and the bit stops turning.



D. Torque. *Finally, we used a torque wrench to measure the torque at high and low speed.*

Hopefully, you can adjust the clutch to set the screw head just below the surface without burying it. (See photo C on page 22.)

Since they have more than twenty clutch settings, that's an easy job for the DeWalt, B&D, and Panasonic. And with fifteen settings, the Bosch is no slouch.

Cary: The other drills only had five clutch settings. And at times, I would have liked to dial the clutch *in between* one of them to find the "perfect" setting.

Ken: That's why I liked the clutch on the B&D. Besides having individual settings, I can regulate the clutch just by changing the amount of pressure I apply. And it's easy to switch from driving to drilling without going through all the clutch settings, see margin.

Q: *What about the chucks?*

Ken: I liked the smooth operation of the metal chuck on the Freud. (See photos below.) And even though it's knurled, the chuck is small and hard to grip. I preferred the large size and rubber grips on the B&D and DeWalt.

Cary: The problem with those chucks is I have to use *two* hands to install a bit. With the Bosch, I can spin the chuck with one hand.

The only other one-handed chuck is the Panasonic. But a ratchet device makes opening and closing the jaws painfully slow.

Q: *Okay, time to make a call. Which drill would you buy? And are there any drills to steer clear of?*

Ken: I'd buy the B&D. And the DeWalt would be a close second. Both drills are solid tools. And they're extremely comfortable to use. But the clutch on the B&D gives it the edge in my book.

One drill I didn't like is the Skil. That's because there's a gap in the handle where the two halves of the plastic housing come together. And when I'm drilling, the housing moves back and forth and grinds on my hand.

Steve: With twelve drills to choose from, this may come as a surprise. But I'd go with the B&D and DeWalt too. They both have all the power I need. And it's like second nature using the well-designed controls.

If I had to pick a drill *not* to buy, it would be the Hitachi. It didn't perform as well as the other drills. And there's quite a bit of gear noise that makes me wonder if something isn't wearing inside.

Cary: I hate to be a spoiler. But both the B&D and the DeWalt are too heavy for me. And I found the clutch on the B&D is a bit touchy to get used to.

So I chose the Bosch. It's lighter, more compact, and has a better overall balance. And I like the one-handed operation of the chuck.

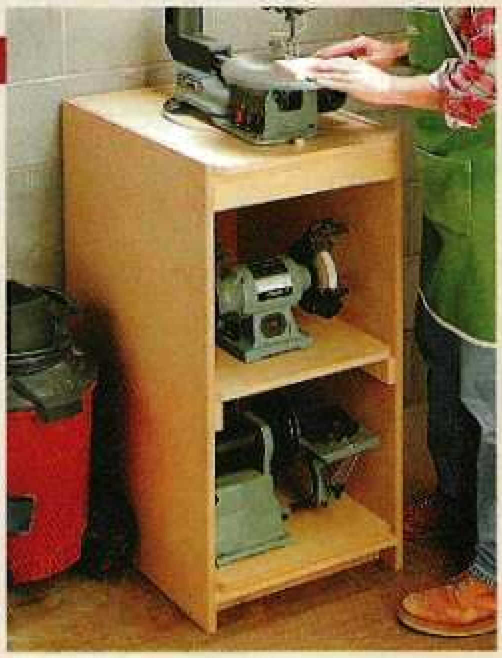
A separate lockout ring on the Black & Decker allows you to switch quickly from "drive" to "drill" mode.

Chucks. *The metal chuck on the Freud (left) operates smoothly. But its small size makes it harder to grasp than the DeWalt (center). With its one-handed operation, the Bosch (right) is the easiest to use.*

FINAL PICKS

	KEN	STEVE	CARY
1st	Black & Decker	Black & Decker	Bosch
2nd	DeWalt	DeWalt	Freud
3rd	Bosch	Bosch	Ryobi

Benchtop Tool Stand



This tool stand provides both a convenient work surface and a place to organize your tools.

Many woodworkers with small shops use benchtop tools to save space. But then they're faced with finding a place to store them when they're not being used. The solution to this storage dilemma is this compact tool stand, see photo. It provides both a convenient work surface *and* a place to organize your tools.

The tool stand is basically an open box with space to hold up to four benchtop tools. The tools are mounted on removable shelves that slip into the stand. When you need to use a tool, just slide it out and set it on top of the stand. A shop-made "pin" locks the shelf and tool in place, see photo on opposite page.

All the parts of the tool stand except for a back that's made of ¼"-thick Masonite are made from about a sheet and a half of ¾"-thick medium-density fiberboard (MDF). MDF is a reasonably priced material that's heavy enough to prevent the stand from "walking" around the shop when a tool is in use.

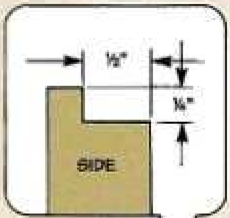
CONSTRUCTION. To begin on the tool stand, start by cutting two *sides (A)* to size, see Fig. 1. Then to provide a recess for a back that's added later, a ¼"-deep rabbet is cut along the back, inside edge of each side, see Fig. 1.

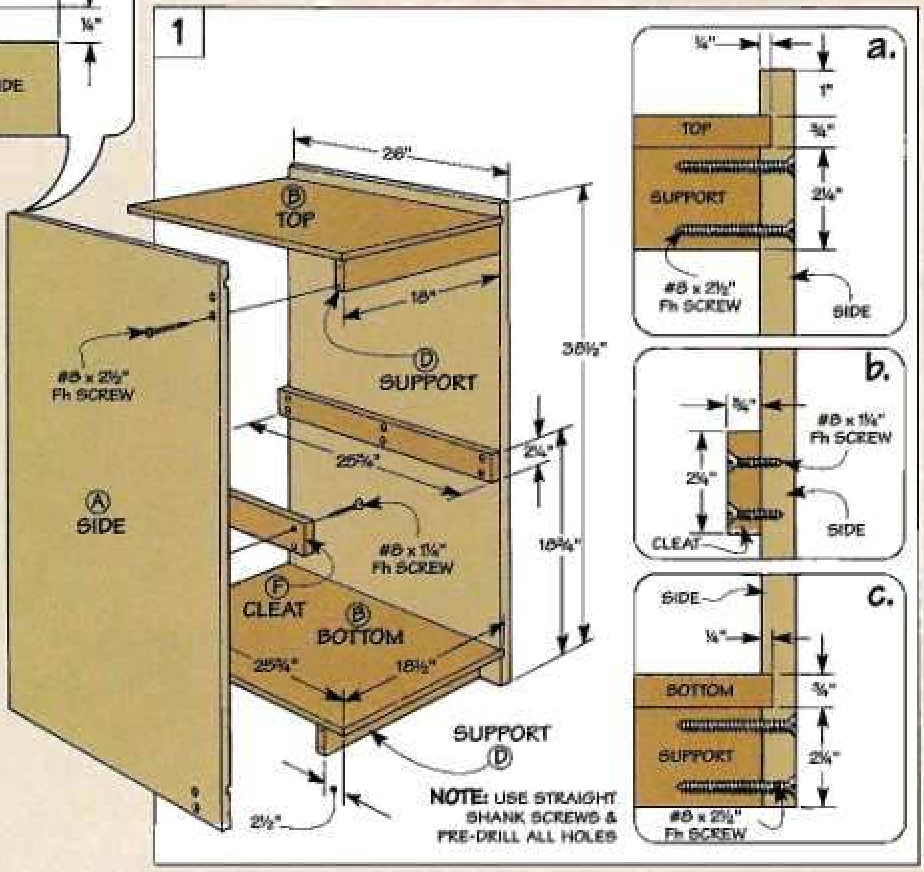
Next, to provide support for a top and bottom that are also added later, a pair of dadoes are cut on the inside face of each side piece, see Figs. 1a and 1c.

TOP & BOTTOM. Now the *top* and *bottom (B)* can be made. To determine their length (depth), measure from the front of each side (A) to the rabbet cut earlier along the back edge. (In my case, they're 25¾" long.) Then glue the top and bottom to the sides.

BACK. To help square up the cabinet and prevent it from racking, a *back (C)* can now be cut to size. To determine its width, measure the distance between the rabbets in the back of the cabinet, see Fig. 2. For the length, just measure the height of one of the side pieces. Then glue and screw the back in place.

SUPPORTS. Next, to help hold the front of the cabinet together and support the top and bottom shelves, two *supports (D)* are cut to fit between the sides and then glued and screwed in place, see Fig. 1. The top support is positioned flush with the front of the cabinet and the top shelf. But to





provide a "toe kick" on the bottom of the cabinet, the bottom support is recessed 2½" from the front.

FILLER STRIP. The next step is to cut and glue in a *filler strip (E)* that fits between the sides, see Fig. 2. It protects the back (C) when a tool is slid onto the top shelf. And it places the tool closer to the front so you won't have to stand against the cabinet when using a tool.

RAILS. To complete the cabinet, two *cleats (F)* are added to support the middle removable shelf, see Fig. 1. They're cut to the same length as the top and bottom shelves (25¾") and are glued and screwed in place.

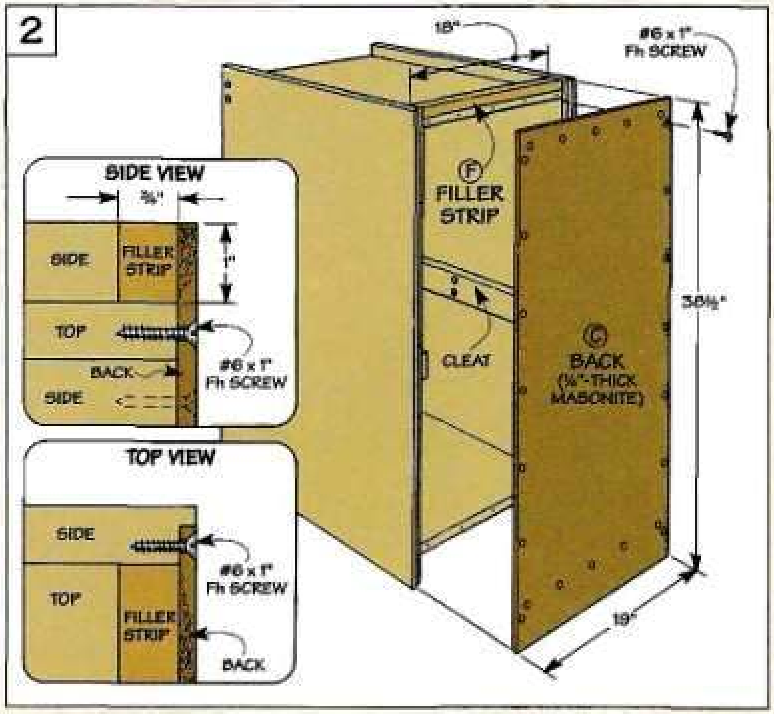
TOOL BASES. Now the cabinet is ready for the removable tool bases. For larger tools, *full-length bases (G)* are cut to fit between the sides of the cabinet and to the same length as the cleats (25¾"), see Fig. 3.

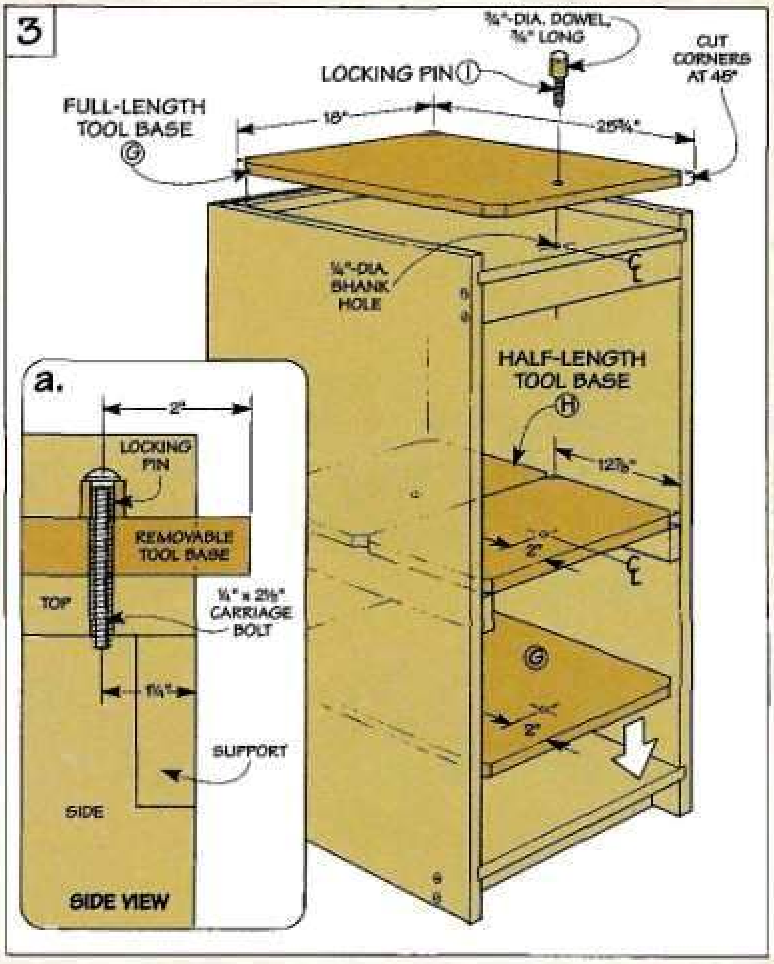
For smaller tools (like a bench grinder), *half-length bases (H)* are cut to the same width, but half the length. Then once they're cut to size, the corners of each base are cut at a 45° angle to eliminate the sharp corners, see Fig. 3.

To lock the bases in place, a hole is drilled for a locking pin (I) that fits through the front of each base and into the *top*, see Fig. 3a. The easiest way to make sure these holes line up is to first position a full-length base on the top. Then drill a hole through the base and the top.

Now use this base as a template for locating and drilling a hole in each of the remaining bases. (Keep the front edges and sides of each base flush as you're drilling the hole.)

PIN. Finally, to complete the tool stand, a *locking pin (I)* can be made from a short length of dowel and a 2½"-long carriage bolt, see Fig 3a. (Refer to the margin tip on page 12 for making the dowel part of the pin.)





This simple shop-made pin prevents the tool being used from vibrating off the stand.

Alternate Hardwoods

Save money on your next project with one of these alternate hardwoods.

White Ash

■ With the cost of oak constantly going up, white ash may be an excellent alternative for your next "oak" project, see photo.

I know a couple of local woodworkers that have switched to white ash because its straight grain makes it easy to work and finish. And once it's stained, most people can't tell it apart from oak.

Another advantage of ash is it's often easy to locate extra-wide boards. (My local lumber dealer tells me it's because there's still a good supply of large ash trees.) And just as important, I usually pay about a dollar or two less per board foot for ash than oak.

To locate white ash in your area, talk with your local hardwood dealer. If he can't help, check with any hardwood sawmill — you can usually find one listed in the yellow pages.

Poplar

■ Consider using poplar for the parts of your next project that will be hidden (like the sides and back of a drawer) or painted.

The reason many woodworkers "hide" poplar is the high occurrence of mineral stains, see photo. And the occasional yellow-green streak.

Stains aside, poplar is one of the least expensive hardwoods around (usually less than $2 a board foot). And it's a lot easier to work than some of the more common hardwoods. (Poplar is available at many lumberyards and hardwood dealers.)

Poplar has a couple advantages over softwoods like pine. It's harder and holds screws better. It also accepts paint well. And you don't have to worry about sealing knots to prevent sap from bleeding and ruining a finish.

Regional Woods

Aspen. *For a general-purpose hardwood, check your nearest home center for aspen. It's pale in color, and usually has extremely clear grain.*

Birch. *If you're having trouble locating hard maple, you might want to consider birch. It's just as hard — but with a slightly darker color.*

Soft Maple. *When appearance is important for less noticeable parts, or when poplar won't do, soft maple is a good choice as a "secondary" wood.*

New Products

Here's a look at three new products that have found a place in our shop.

Adjustable Featherboard

■ I've always been a strong believer in using featherboards. They help prevent kickback while ensuring more accurate results. Unfortunately, most featherboards are difficult to set up and adjust. But that's not the case with this *adjustable featherboard* ($10), see photo above.

What makes this featherboard unique and easy to use are the two "expanding cleats" found on the bottom that are sized to fit the miter gauge slot in most stationary power tools.

To use the featherboard, just slide the cleats in the miter gauge slot. Then position the featherboard until the "fingers" are pressing against the workpiece. A few turns on each knob cause the screws to pull up, which in turn cause the cleats to expand and lock in the slot.

MiterMatic

■ I used to set the head of a miter gauge to 90° with a try square, to 45° with a triangle, and to 22½° and 30° with a bevel gauge and protractor, but not any more — not since discovering this *MiterMatic* setup square, see photo below. (It sells for around $20.)

This setup square allows you to set your miter gauge quickly and accurately to the four most commonly-used angles (22½°, 30°, 45°, and 90°).

The *MiterMatic* is made of a tough, ⅜"-thick acrylic plastic plate. Milled on both sides are precise grooves that correspond to each of the four angles above.

To use the setup square, first locate the correct groove for the angle you're after. Next, place that groove over the miter gauge. Then push the head tight against the square and lock it in place.

One more thing. The corners of the *Mitermatic* are milled to the same angles as the grooves (22½°, 30°, 45°, and 90°). This way you can also use it to accurately set the angle of your table saw blade.

Sources

- *The MiterMatic and the Tru-Fit System are available through:*
  Garrett Wade
  800-221-2942
  Woodhaven
  800-344-6657
- *The Adjustable Featherboard is available through:*
  WoodsmithShop
  800-444-7002
  Woodworker's Supply
  800-645-9292

Tru-Fit Miter Bar System

■ With use, the bar of a miter gauge and the slot it rides in can begin to wear. When this occurs, the bar can rattle around in the slot — which can mean inaccurate cuts and loose-fitting joinery.

To correct this problem on any tool having a miter gauge, I retrofit the bar with a *Tru-Fit Miter Bar System* (about $15), see photo at right. It consists of five graphite impregnated phenolic plugs, five rubber inserts, five threaded inserts, an Allen wrench, and a special drill bit.

Just drill four or five holes in the edge of the miter gauge bar and insert a phenolic plug, a rubber insert, and a threaded insert in each hole. Then adjust the inserts until your miter gauge fits the slot perfectly.

Shop Solutions

Saw Depth Gauge

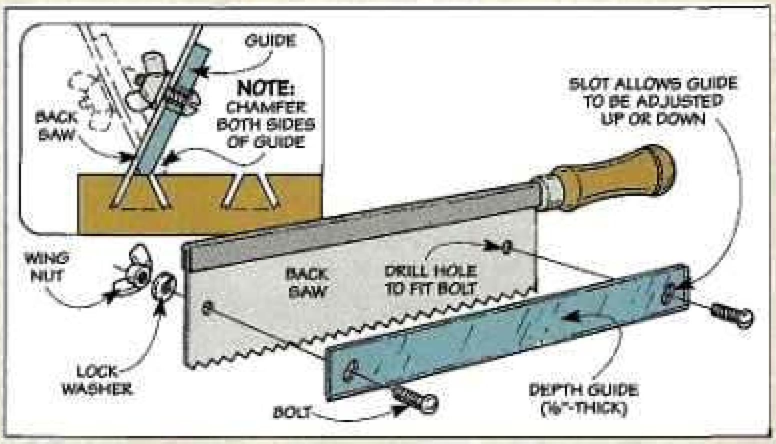
■ I prefer cutting dovetails by hand with a back saw. But even when using layout lines to help me guide the blade of the saw, I have a tendency of cutting too deep. To eliminate this problem and ensure that the pins and tails end up the same length, I attach a depth guide to the side of my saw, see drawing.

The guide is just a narrow piece of ⅛"-thick Plexiglas or Masonite with a pair of slots for small bolts. Two holes drilled in the saw blade align with the slots in the guide so it can be attached with the bolts and wing nuts.

To adjust the depth of cut, just loosen the nuts, slide the guide up or down, and retighten the nuts.

Note: To make sure the saw bottoms out on the same reference point regardless of which side of the dovetail you're cutting, sand or rout a slight chamfer on each side of the guide (along the bottom edge) before attaching it to the saw, see detail.

Michael Dulak
Columbia, Missouri



Drilling Guide

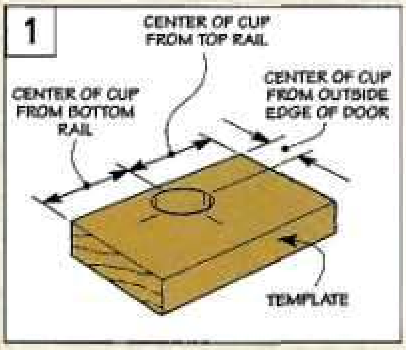
■ On a recent kitchen cabinet project, I used European-style hinges to hang the doors on the cabinets, see photo. To speed up the process for laying out and drilling a round mortise at each end of all the doors, I made a drilling guide to align the fence and a stop on my drill press.

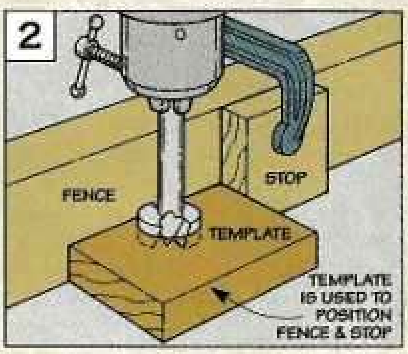
The guide is cut to match the width of the stile of the door. Next, a mortise (the same size as the one required by the cup of the hinge I used for my doors) is drilled in the guide.

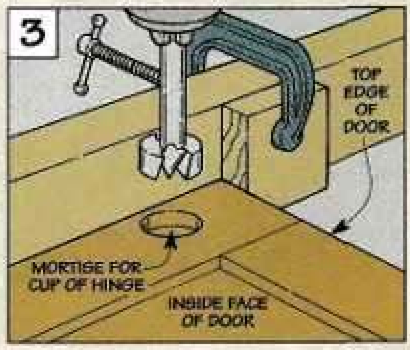
The key to locating the mortise in the jig is to use the dimensions supplied by the hinge manufacturer, see Fig. 1. This way you can use the drilling guide to position both your fence and the stop block, see Fig. 2.

Once everything is aligned, remove the guide and drill a mortise in each door, see Fig. 3. When the first mortise is drilled in each door, position the stop block on the other side of the fence (using the guide) and repeat the process for the remaining mortise.

Irving L. Hanna
Wiscasset, Maine







Router Retrofit

■ On my router, I've always had a difficult time turning the thumb screw that's used to adjust the bit up or down, see left photo. As a matter of fact, one time I even had to use pliers for additional leverage (and ended up cracking the aluminum housing).

So recently, after coming across a push-button rachet lever ($4) in a woodworking mail-order catalog, I decided to remove the thumb screw and replace it with the rachet lever to make it easier to adjust the bit, see right photo.

After the ratchet is adjusted, you can loosen or tighten the housing with a single throw of the lever.

Fred Schmiedel
Baton Rouge, Louisiana

More Leverage. *When adjusting a bit, it's a lot easier "throwing" a ratchet lever (right) than it is turning a thumb screw (left).*

Clamp Tree

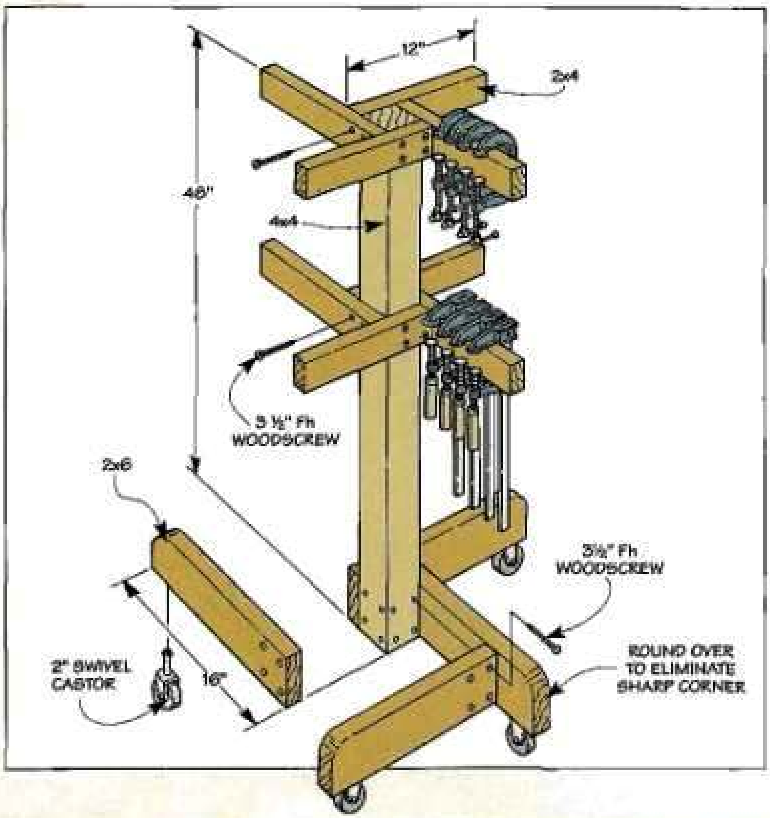
■ I used to store my clamps on a wall in my shop. But as my clamp "collection" grew, I began to run out of wall space. It also got a bit old having to walk across the shop every time I needed a clamp.

So to free up my wall space for other tools and to make it more convenient for me when gluing up a project, I made this roll-around clamp tree, see drawing.

The clamp tree is basically a 4x4 "trunk" with overlapping 2x "branches" screwed to it. There are two tiers of branches spaced to fit the clamps I have.

A third tier of branches located at the bottom of the trunk has a swivel castor installed in the bottom edge to make it easy to roll the tree over to where my project is located. You can even use this third tier to hold additional clamps.

Raymond J. Parsons Jr.
Sanibel Island, Florida



Quick Tips

■ The next time the pad on your palm sander needs to be replaced, try making a new one from a worn out computer mouse pad.

To do this, carefully remove the original pad from your sander and use it as a template. Then clean the bottom of the sander before gluing on the new pad.

Don Devine
Washington, New Jersey

■ As simple as it seems, I place a self-adhesive label on the end of each board in my lumber rack and write on it the length, width, board feet, and specie of the board. Now when I need a particular board, I don't have to sort through the entire stack. Instead, I just check the labels until I find the right board.

R. B. Himes
Vienna, Ohio

Send in Your Solutions

If you'd like to share your original solutions to problems you've faced, send them to: *ShopNotes*, Attn.: Shop Solutions, 2200 Grand Avenue, Des Moines, IA 50312. (Or if it's easier, FAX them to us at: 515-282-6741.)

We'll pay up to $200 depending on the published length. Please include a daytime phone number so we can call you if we have any questions.

Pore Fillers

I've always thought of a "filler" as something you put in a nail hole. But I've also seen it recommended as a first step in applying a finish. What exactly is a pore filler? And when should I use it?

Michael Lyle
Minneapolis, Minnesota

■ What's confusing is the wood putty that's sometimes used to repair a damaged area is often called a filler. But it's not the same thing as a *pore filler*.

Unlike putty, a pore filler is made up of finely ground rock (silica) that's packed into the open pores in the wood. A finish (usually a kind of varnish) binds the filler in the pores. And pigments are added to color the filler.

1 Use a sturdy stick to mix up the thick, goopy pore filler. Since the solids in the pore filler will settle out fairly quickly, stir the can frequently during use.

2 Working in all directions, brush on a thick coat of pore filler. An inexpensive brush with the bristles cut short makes a handy applicator.

3 The rubber "blade" at the base of this plastic spreader "packs" the filler into the pores of the wood. Pulling the spreader across the grain at an angle removes the bulk of the filler.

Why bother messing around with a pore filler in the first place? One reason is it creates a smooth, level foundation for the finish. And another is the colored pores highlight the grain of the wood.

Whether or not you use a pore filler depends on two things: the type of wood you're using, and the "look" of the finish you want.

WOOD. All wood has pores. But some types (like oak, ash, walnut, and mahogany) have much larger pores than others (like cherry or maple). Filling wood with large, open pores makes it quicker and easier to apply certain types of finishes.

FINISH. If you're trying to build up a finish (instead of using a penetrating oil), a pore filler gives you a headstart. So you can begin building the finish with the *first* coat — not after three or four.

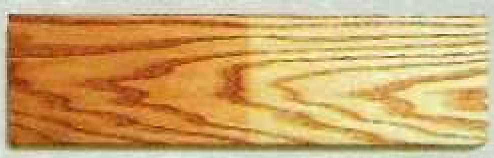
WATER OR OIL. Just like finishes, you can get either water or oil-based pore fillers. And there are tradeoffs when working with one or the other.

The water-based fillers dry quicker (you can apply a finish after two hours). But it's a race to remove the excess filler before it hardens like concrete. So I prefer an oil-based filler. It takes longer to dry. But the extra working time makes it easier to apply.

COLOR. Regardless of the type of pore filler, experimenting with its color can dramatically affect the appearance of a project. To create an accent, I like the pores to be *darker* than the surrounding wood.

There are a couple of ways to get the color you're

Sealer Coat



Whether you seal the wood before filling the pores is really a matter of personal taste.

If you apply a sealer coat (a thinned-down coat of finish), the filler will color only the pores — not the wood. This produces a nice contrast between the pores and the wood, see left-hand side of board.

To create a more uniform look where the pores and wood are the same color, apply filler to the bare wood, see right-hand side of board.

after. You can buy a pore filler that's already tinted. Or start with a neutral or white pore filler and tint it to the desired color yourself, see box below.

STAIN. A colored pore filler will work just like a stain — *if* you apply it directly to the raw wood. If you only want to accent the pores (not color the wood), you'll need to seal the wood first, see box on page 30.

Note: Once it cures, the varnish in the pore filler makes it difficult to stain the wood. So if you plan to color the wood differently than the pores, stain (or dye) it *before* applying the filler.

PREPARATION. Since filler packs every nick (as well as the pores), it's important to prepare the surface carefully. After sanding up through 220-grit sandpaper, be sure to remove the dust from the pores with either a shop vacuum or air compressor.

APPLICATION. Although applying the filler is pretty straightforward (see Steps 1-6), there are several things to keep in mind.

First, it's easy to get carried away and fill an area that's too large to work before it sets up. Even though you can thin pore filler for a longer working time, I concentrate on about a three-foot square area.

Second, don't rush the "dry time" recommended by the manufacturer. Applying the finish before the filler cures can cause the pores to develop a gray color. And the finish may not bond as well.

Third, a single application may not fill all the pores. So you may need to apply additional coats.

SOURCES. Supplies for applying pore fillers are available from the sources below.

- *Homestead Finishing Products (pore filler, pigments, spreader, burlap, cheesecloth) 216-582-8929*
- *Woodworker's Supply (pore filler, pigments, burlap, cheesecloth) 800-645-9292*

4 *When the pore filler takes on a dull, hazy appearance (about five to ten minutes), wipe a piece of burlap across the grain to remove the excess.*

5 *To remove any streaks, use a soft, dry piece of cheesecloth. Wiping gently in the direction of the grain keeps the filler from being pulled back out of the pores.*

6 *After allowing the filler to dry completely, sand the surface lightly in the direction of the grain. (I use 320-grit sandpaper.) If you've stained the project, be careful not to sand through to bare wood.*

Tinting Pore Filler

If a pore filler isn't available in the color you want, it's easy to tint your own.

PIGMENTS. For starters, you'll need some dry, powdered pigments, see photo at right and sources above.

What works best is to add the pigment a little at a time to the amount of pore filler you need. Just make sure to stir the mixture thoroughly. And try the color on a test piece first.

COLOR. To create a traditional look, I color the pores quite a bit darker than the wood, see left-hand side of board. This sets up a nice contrast, even if the wood darkens with age.

For a special effect, the white pores in the center of the board seem to "reverse" the grain. And the red pores on the right might be just the ticket on a project for a child.

Pigments. *To change the color of the pore filler, just add dry, powdered pigments (also called Fresco colors). These pigments can be used with either water or oil-based pore fillers.*

Scenes from the Shop

▲ *Although they pale in comparison to today's cordless variable-speed driver/drills (see page 20), each of these 1950's vintage electric drills provided years of reliable service. The Porter-Cable, Companion (by Sears), and Black & Decker all feature a rugged metal case, a keyed chuck, and a single-speed motor.*