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Vol. 18 Issue 103

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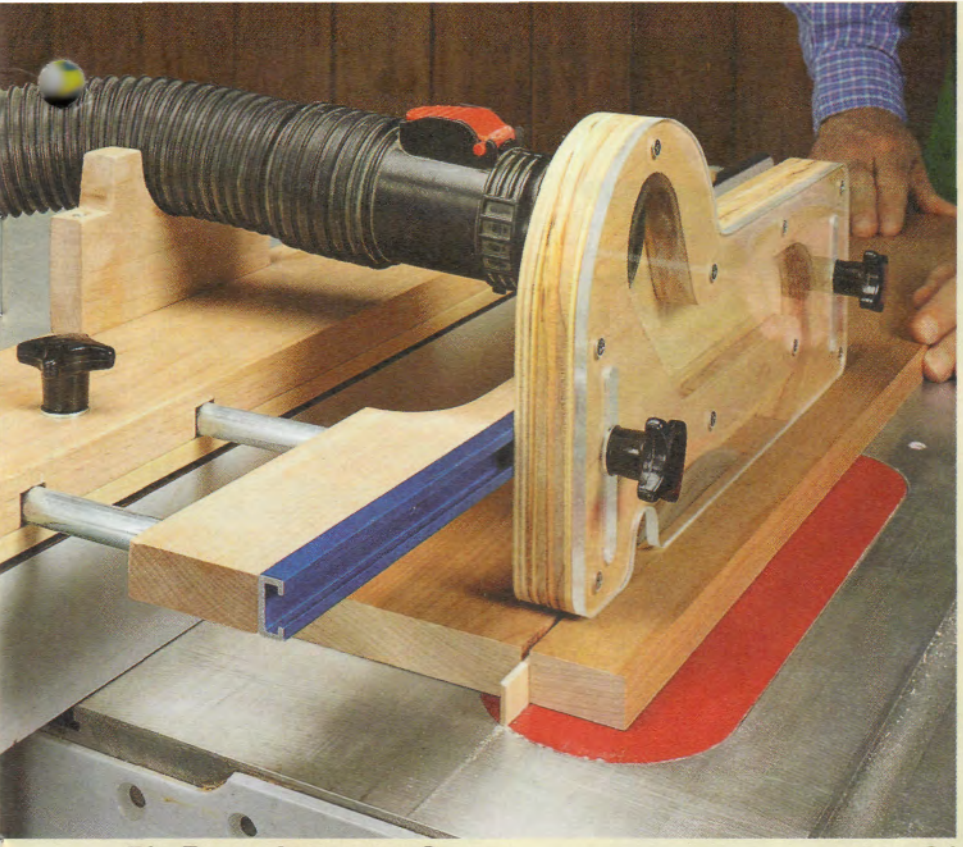

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Cutoffs

Part of the enjoyment I get out of working in the shop is trying out new ideas. And those ideas usually involve some jig or technique to make building a project easier, safer, and more accurate. This issue is filled with articles that meet all those requirements — and then some.

Inside, you'll find several projects that will make the time you spend in the shop more relaxing and enjoyable. It starts with the space-saving sharpening center with its drop-front door. Then, take a look at the mobile sanding station. It's a great way to keep your shop and lungs free from all that sanding dust. And for your table saw, you'll find some handy accessories for your rip fence. They make working at your table saw more accurate and safer.

Speaking of safety, in issue No. 102 we showed a shop-made jig used for bending brass bar stock while heating it with a propane torch. To build our jig, we used galvanized pipe. A concerned reader wrote in to warn us that heating galvanized materials to a high temperature can result in the release of dangerous fumes. While we didn't heat the pipe to a high enough temperature or for long enough to cause a problem, the concern is valid. The simple solution is to use black iron pipe when you build the jig or just make sure you have plenty of ventilation as you heat and bend the brass.

Terry

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This symbol lets you know there's more information available online at ShopNotes.com

from our Readers

Tips for Your Shop

Rotary Tool Support

My rotary tool has been one of my best tool investments. I use it all the time. To keep it within reach, I hang the motor on the simple arm you see in the photos. The arm is easy to build. And at the end of the day, the arm pivots out of the way above the bench (inset photo).

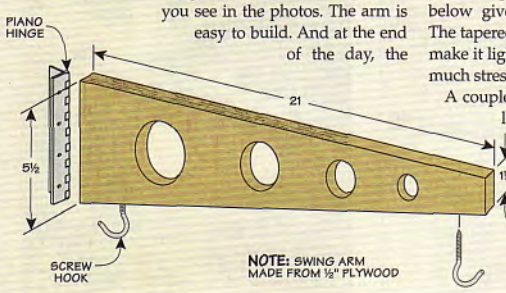
The arm is made from Baltic birch plywood. The drawing below gives you all the details. The tapered shape and large holes make it lighter so it doesn't put so much stress on the hinge.

A couple of small hooks in the lower edge provide a place to hang the tool and keep the power cord from interfering with the task at hand. With all that done, you can fasten the arm to the wall or cabinet above your bench. A short length of piano hinge allows you to swing the arm out of the way.

When you mount the arm to the wall or cabinet, I find it works best to locate it at a height where you can easily reach it from a sitting position on a tall shop stool. This keeps it at hand whether you're standing or sitting at the bench.

As you can see above, this setup works particularly well when I have a flex-shaft installed on the tool. It's a simple solution, but one that works great. I just wish I had thought of it earlier.

Christopher Singleton
Cambridge, Ontario



Shop Vacuum Hose Storage

In my small shop, keeping the hose for my shop vacuum under control has been an issue. It won't stay coiled when I try to store it and it always seems to be underfoot. The wall-mounted rack you see below is my solution.

The rack is made from plywood. The back panel forms the foundation for the curved hose holder and the notched accessory storage shelf down below.

The curved holder is made from two layers of ¾" plywood cut into a large semi-circular shape. A third layer forms the outer face and is larger to create a lip to keep the hose from slipping off.

I added a shelf with notches sized to hold the fittings on my shop vacuum hose. To do this, first drill a hole then remove the waste with a band saw. Finally, I rounded over all the edges and securely mounted the rack to my shop wall, as shown below.

Bob Wey
Westford, Massachusetts

Submit Your Tips Online

If you have an original shop tip, we would like to consider publishing it in one or more of our publications. Just go online to our web site shown on the right. There, you'll be able to upload photos of your tip. Or you can mail your tip to the editorial address shown in the right margin. We will pay up to $200 if we publish your tip.

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SUBMIT A TIP

The Winner!

Congratulations to *Gary Kemper* of Lindale, Texas. His tip (shown on the next page) makes cutting small parts a safer operation. It was selected as winner of the *Bosch Impactor* driver, just like the one you see in the photo at right.

To find out how you could win this driver, check out the information above. Your tip just might be a winner.

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Adjustable Safety Clamp

Cutting short or small parts on the table saw or router table always makes me a little nervous. Push sticks can help, but they don't do much to keep the workpiece in position and under control. The shop-made clamp you see here keeps my hands safely away from the saw blade or router bit.

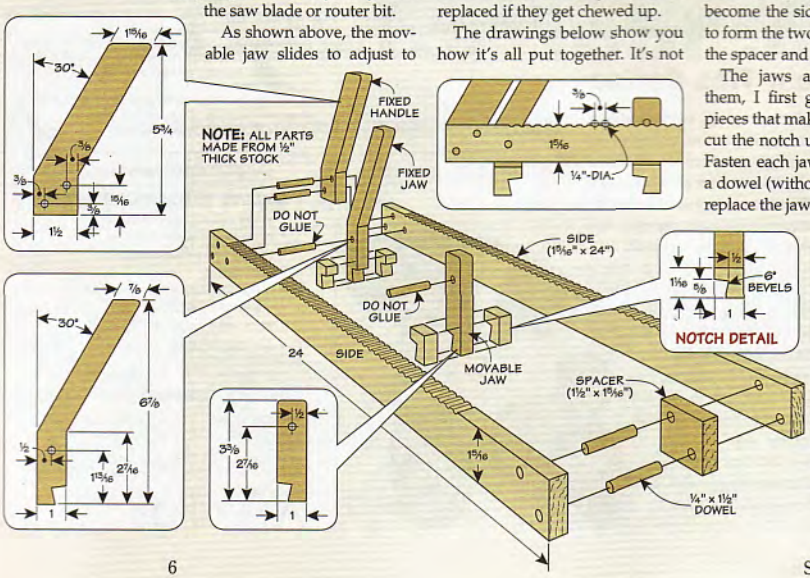
As shown above, the movable jaw slides to adjust to the size of the workpiece. Then as you squeeze the handle, the fixed jaw moves to clamp the workpiece securely. It's all made of wood, so incidental contact with the blade isn't serious. And the jaws can be replaced if they get chewed up.

The drawings below show you how it's all put together. It's not as hard as it looks. Start by drilling holes down the center of an extra-wide (2¾") workpiece that will become the sides. After ripping it to form the two sides, you can add the spacer and fixed handle.

The jaws are next. To make them, I first glued up the three pieces that make up each jaw, then cut the notch using the band saw. Fasten each jaw to the sides with a dowel (without glue) so you can replace the jaws later.

To use the clamp, place it over the workpiece with the fixed jaw against the workpiece. Then, slide the moveable jaw up to the other end of the workpiece. Simply give the handle a tight squeeze and you're good to go.

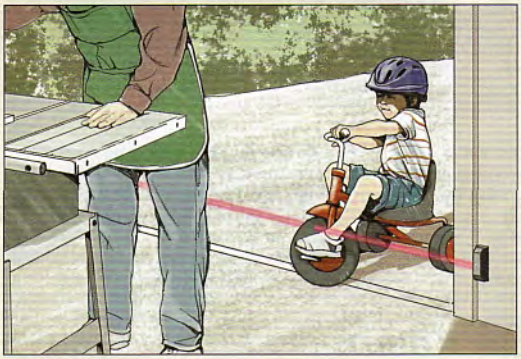
Gary Kemper
Lindale, Texas



Workmate Benchtop Tool

Jim Kennedy of *Longview, Texas* and *Kevin Graham* of *Regina, Saskatchewan* both use their portable *Workmates* to maximize space in their small shops. They've each come up with a different way to secure their benchtop tools on their *Workmates*.

Jim and Kevin both use ¾" plywood for their tool bases. The tool is fastened to the base with bolts. To secure the base to the *Workmate*, Kevin uses a centered cleat on the bottom. The 1½" x 1½" cleat runs along the width of the base on the underside and is clamped between the jaws of his *Workmate*. Jim secures his base by means of large holes that fit over plastic dogs installed on the *Workmate*. By setting the base over the four dogs, he can clamp it securely.



Safe Shop Motion Sensor

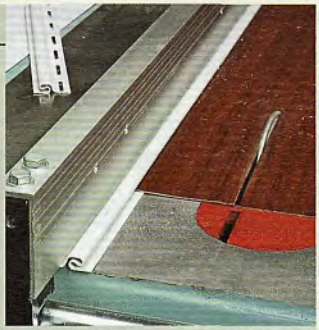
My neighborhood is full of young children and I'm always afraid one of them will wander into my garage shop and get hurt while my back is turned. I found an inexpensive motion detector with built-in audible alarm that helps alert me when someone enters the shop. You can find these online or at electronics stores. Mine uses batteries that should last several years.

I installed the motion detector door chime near the entrance of my garage and turn it on when I work in the shop. Knowing that I'll hear whenever someone walks into my shop, I work with peace of mind even when my back faces the driveway. Safety comes first, whether it's for me or someone else.

Charles Mak
Calgary, Alberta

Quick Tips

▲ **Serge Duclos** *of Delson, Quebec found that a spare drill chuck makes a handy vise for grinding small parts. For a handle, he uses a long bolt threaded into the chuck and covers it with plastic tubing.*



▲ **Frank Gallo** *of New Canaan, CT has a way to keep thin materials from slipping under the rip fence. He uses the joining strip from vinyl siding to provide support for the piece against the fence.*

3 ways to rout Big Holes

Here are some simple techniques for creating large, accurately sized holes anywhere.

Most of us think that making a large-diameter hole is a job for a drill press, right? All you need are an assortment of hole saws, a set of expensive Forstner bits, and perhaps a wing cutter.

But even this approach has limitations. For example, you may not have the right size bit. Or it may be impossible to get the workpiece on the drill press.

When the hole you need to make falls outside that range, or can't be done with a drill press, you need another solution. To get the job done, I still use these tools. But I add in my router to get the results I'm looking for. With a router, some common bits, and a few simple techniques, you can create smooth, large-diameter through holes with ease.

Template Routing

When I need to make a hole in the center of a large workpiece, like the dust port in the sanding center on page 24, a drill press just won't work. One technique I turn to is template routing. A template is used to both lay out and trim the hole to exact size.

The process is simple and starts by creating a template the exact size of the hole. The template can be anything from ¼" hardboard to ¾" MDF. Centerlines on the template help you accurately locate it on the workpiece later.

Then you can drill the hole in the template — for this you *can* use a drill press. I like to use a wing cutter for large holes, as you can see in the photo at right.

With the template in hand, you can take it to the workpiece and lay out the location of the hole. Before reaching for the router, it's a good idea to remove as much of the waste as possible. So I drill a small starter hole and cut out the bulk of the waste with a jig saw. (This is faster than making the hole with the router alone.)

The final step is cleaning up the edge of the hole. To do this, secure the template to the workpiece with double-sided tape, and trim the edge flush to the template with a pattern bit (photo above). The result is a perfectly sized hole that you can locate anywhere.

Make the Template. *Use a wing cutter to create a hole in the template.*

"Drilling" in Steps

I use this next technique when I don't have the exact size bit I need. But, the nice thing is, you can still get the job done with a smaller bit. In this case, you use your router to enlarge the hole.

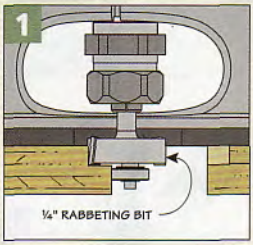
Here's how it works. You begin by creating a starter hole with a Forstner bit or hole saw. Then you can use a rabbeting bit and a pattern bit to increase the hole size.

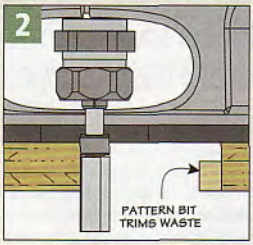
In Figure 1, you can see how a rabbeting bit follows the edge of the starter hole to create a stepped opening. I like to use a ¼" rabbeting bit. (This increases the diameter in ½" increments.)

To complete the hole, you'll switch to a pattern bit. The bearing follows the rabbet and "resizes" the hole, as in Figure 2. (You can continue expanding the hole by repeating the process until you reach the exact size you need.)

It really is a straightforward technique. But you need to know the starter hole size. Here, you need to do a little math. Start with the final size of the hole, then work backward in ½" increments until you come up with a size that matches a bit you have on hand.

Flush Trim. *A pattern bit follows the rabbet to enlarge the hole to final size.*





Custom-Sized Holes

The third technique I like to use to create a hole comes in handy for making even larger openings. For these holes, I turn to a custom-sized trammel. It's basically a simple circle-cutting jig.

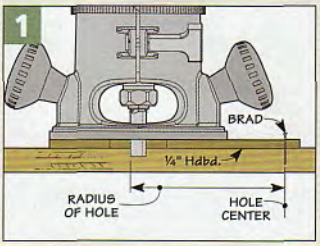
The jig is nothing more than an auxiliary baseplate that attaches to your router with double-sided tape. A brad serves as a pivot pin, as shown in Figure 1.

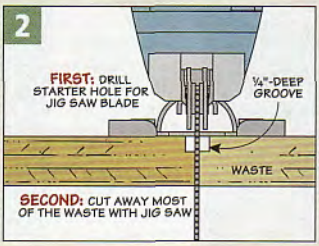
I install a ½"-dia. straight bit in the router to do the cutting. The distance between the pin and the outside edge of the bit should match the desired radius of the hole you need. It's a good idea to make a few test cuts to dial in the set up.

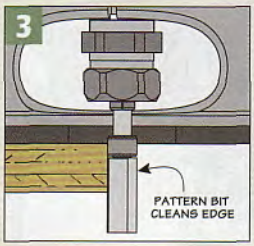
Here's the catch — I don't use the jig to make the entire hole. After drilling a pivot hole at the centerpoint, you can rout a ¼"-deep circular groove, as shown in the photo at right. To turn the groove into a hole, cut away the waste with a jig saw (Figure 2). The groove serves as a track to help you guide the saw.

Cleaning up the hole is simply a matter of installing a pattern bit and routing the edge clean, as you can see in Figure 3.

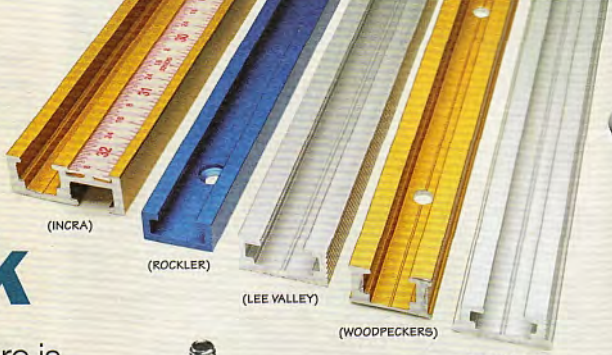
Rout a Groove. *A simple circle-cutting jig is the first step in creating a large hole.*



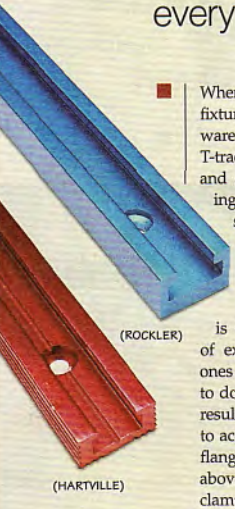




versatile T-Track

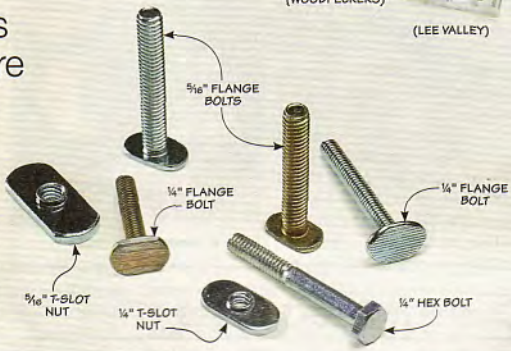


This handy hardware is the solution to safer, more accurate results from every jig you build.



When it comes to building jigs and fixtures, there's one piece of hardware I often turn to. And that's the T-track you see in the photos at left and above. It's the key to building safety and accuracy into any shop-built jig or fixture, like you see in the drill press table in the photo below.

What is T-Track? At its most basic level, T-track is nothing more than a piece of extruded aluminum, like the ones shown at left. What allows it to do its job is the "T" shape that results. The slot allows the T-track to accept a T-slot nut, hex bolt, or flange bolt like the ones you see above. Combine this with a knob, clamp or hold-down, and you can build an adjustable jig or fixture that's safer to use and provides more accurate results.



Choosing T-track. So what do you really need to consider when it comes to selecting and using T-track in your shop?

One of the first things to know about T-track is that besides coming in different lengths (usually 2' to 4'), the overall shape and thickness will vary depending on the manufacturer. (For a number of sources, refer to page 51).

You'll find T-track in a wide range of sizes that vary from 3/8" thick and 3/4" wide, up to 1/2" thick and 2 1/8" wide. So it's important to design your jig or fixture around the T-track. (More on this in a bit.)

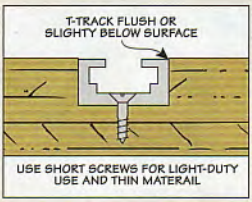
Hardware. Another consideration is the type of hardware the T-track will accept. As I mentioned earlier, the slots in the T-track are designed to accept T-slot nuts, hex bolts, or flange bolts.

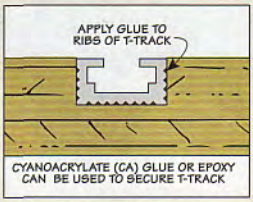
But not all T-track will accept a wide range of hardware. And the types of hardware it will accept often have to be a specific size. Most T-track is designed to either 1/4" or 5/16" standards. This means you can use either a 1/4" flange bolt or hex bolt, but not necessarily the same hardware in 5/16" standard.

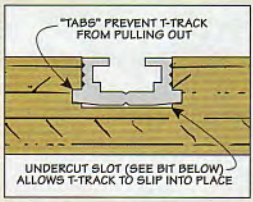
There are a few styles of T-track that will accept a mix, although I've found this type of T-track to be a compromise. And the hardware doesn't always slide or adjust as smoothly as I like. For that reason, I prefer T-track that will accept 5/16" flange bolts. I've found that flange bolts slide more smoothly than hex bolts. And by sticking with a one size, I can use add-on accessories on more than one jig or fixture. (Like the examples shown in the margin on the opposite page.)

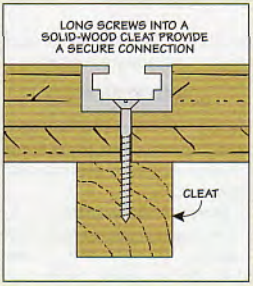
Installing T-track. Once you've chosen your T-track and have it in

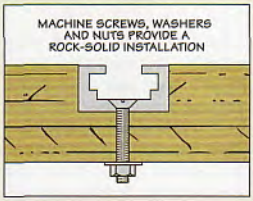
◀ ***Accuracy.*** *The T-track in the table and fence of this drill press makes it a snap to complete a task quickly and accurately.*











► ***Slotting Bit.*** *After cutting the groove, this specialized bit makes quick work of creating the narrow slots for the T-track tabs.*

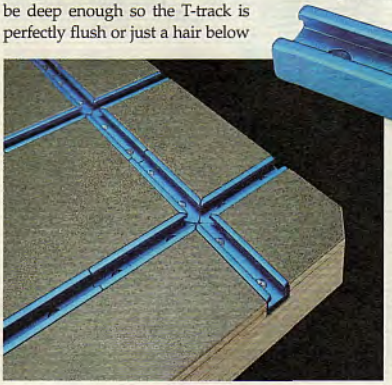
hand, the next thing to decide is how to install it in your jig or fixture. In the drawings above you can see a number of ways to do this.

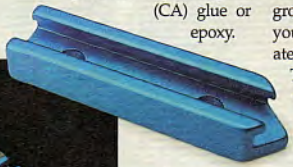
They all start with cutting a dado or groove to match the size of the T-track. Now, you could do this on the router table with a straight bit. But I've found it easier to get a good fit by turning to my table saw and a dado blade.

There are two keys to the fit. The first is cutting the dado or groove wide enough for the T-track to slip into place. And second, it needs to be deep enough so the T-track is perfectly flush or just a hair below the surface. If it sticks up above the surface at all, it can interfere with mating jig pieces or accessories you plan to use.

Avoiding Pullout. If the groove is too deep, you run the risk of the T-track pulling out when you tighten a clamp or other accessory in place. The nice thing is that you can minimize this possibility.

The drawings above show a number of ways to do this. Most of them involve screwing or bolting the T-track in place. But if you look at some of the T-track on the opposite page, you'll notice that several types have flutes along the sides. This allows you to fix the T-track in place with cyanoacrylate (CA) glue or epoxy.





◄ ***Versatility.*** *The handy intersection kits installed in this table allow you to install multiple accessories anywhere on the table.*

Install With Screws. I've found it best to use screws to install T-track. This way, you can modify the jig or fixture at any time if you need to. And you can reuse the T-track in the future. If you do this, I'd recommend installing screws every 4" to 6". For this reason, I prefer T-track without pre-drilled holes.

If you check out the drawing directly above, you'll see a really nice solution to the pull-out problem — the double T-slot track from *Lee Valley*. It's especially handy if you're using T-track in thin material, like a fence or the base for a jig.

It has "tabs" that stick out the sides and fit into an undercut slot along the bottom of the T-track groove. After cutting the groove, you use a special router bit to create the undercut slot (photo above). Then the T-track slips into place with a friction fit.

The basic T-track you see on these pages is the standard for most of the jigs and fixtures you'll find yourself building. And in the photos at left and in the margin, you can see some handy accessories for making even better use of basic T-track.

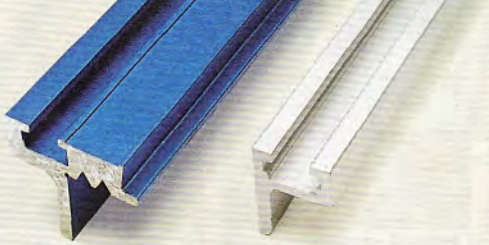
Finally, on the next two pages you'll find some specialized T-track that offers even more versatility when it comes to making shop-built jigs and fixtures.

▲ ***Hold-Down.*** *A commercial hold-down makes it easy to secure a workpiece to this jig.*

▲ ***Quick & Easy.*** *A toggle clamp offers super-fast operation for any jig.*

▲ ***Simple Stop.*** *This small metal "T" locks in place securely to provide a reference stop for repetitive tasks.*

▲ ***Fence Track.*** *A quick way to make a handy shop-built fence is to use fence track. Just cut a hardwood strip to size and then screw the track in place.*



TOP TRAK
(KREG)

T-LOC TRAK
(ROCKLER/BENCH DOG)

The basic versions of T-track on the previous pages are probably all you'll need for the majority of the jigs and fixtures you build in the your shop. But there are a few manufacturers that have taken the T-track concept to new levels.

FENCE TRACK

If you take a look at the photos at the upper right, you can see a different style of T-track. It comes in different lengths (2' to 4') to suit your needs, but it's designed to be surface mounted. To do this, the fence track features a wide flange for securing it to your jig or fixture. This makes the installation a snap and since you're screwing through the flange, you don't have to worry about any fasteners interfering with the accessory installed in the T-track. I like to use this type of track for shop-built fences, like the one you see in the photo at left.

You can use stop blocks on this style of T-track for use with a miter saw fence or the fence on a crosscut sled for your table saw. But if you're using a commercial flip stop in either of those cases, sizing the fence is important. Just be sure that the height of the fence allows the flip stop to rest in the proper position (photo at upper left).

A unique feature of the *Kreg* fence track I really like is the separate flange that extends horizontally off the side. It has a recess that accepts a self-adhesive measuring tape. Combined with a stop, it makes repetitive cuts to an exact length a no-hassle operation.

COMBINATION TRACK

Another specialized version of T-track is combination track. A few versions of this are shown in the margin at left.

T-track & Miter Slot. As its name implies, combination track combines a T-track and a miter slot in the same piece of extrusion. It's a feature you really should look for in a router table. And it's a good idea to consider adding one if you're planning on building your own router table.

Like basic T-track, you'll have to cut a groove in the tabletop to match the width and thickness of the combination track. And just like before, you'll have to securely screw or bolt the track in place.

As you can see in the photos below, the combination track makes it easy to switch back and

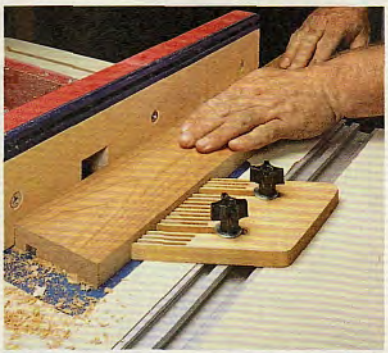
COMBINATION TRACK

(WOOD-PECKERS)

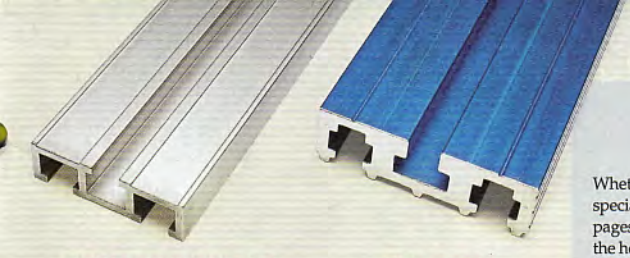
(KREG)

(BENCH DOG)

▲ ***Miter Gauge.*** *The combination track installed in this router table allows you to use any shop-built jig or a standard miter gauge for basic cuts.*



▲ ***Featherboard.*** *With the T-track portion of the combination track, you can quickly and securely attach a featherboard for accurate routing.*



DUAL PURPOSE TRACK
(WOODPECKERS)

KLAMP TRAK
(KREG)

forth between different operations depending on the task at hand. Simply use the miter slot when you need to use a shop-built jig or miter gauge (lower left photo on opposite page). And if the operation calls for a stop block or featherboard, just slide the accessory in place and you're good to go (lower right photo on opposite page).

HEAVY-DUTY TRACK

If the basic T-track, fence track, or combination track aren't stout enough to fill your needs, then check out the heavy-duty versions of T-track shown above.

Heavy & Thick. Not only are these extrusions beefier, they're also thicker (about ¾") than the basic T-track. This does require a deeper groove to accept the track. But it also makes it very easy to "create" a groove by building up the top in multiple layers and wrapping those layers around the track to "bury" it.. Since the track is just under ¾" thick, it will end up just below the surface if you're using ¾"-thick material to make your table or worksurface.

As you can see in the photo below and the box at right, this type of track is great for any application requiring heavy clamping pressure. For this reason, it's important to install heavy-duty track securely to the table.

The recommended method for doing this is to use hex bolts, nuts, and washers that go completely through the table. This minimizes any chance of the track pulling out as you apply pressure.

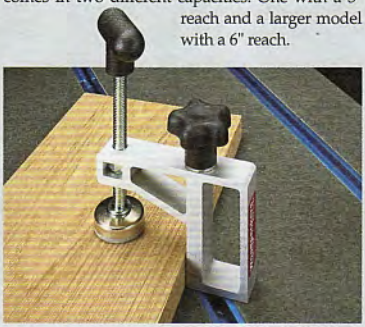
As you can see, there's a version of T-track to suit just about any need you have for building jigs and fixtures. The only problem you may have is determining exactly which one to get. But once you do, you can rest assured that your jig or fixture will do its job.

heavy-duty Clamping

Whether you're using basic T-track or one of the specialized versions of T-track shown on these pages, you may want to consider adding one of the hold-downs shown in the photos below. (Refer to page 51 for information on sources.)

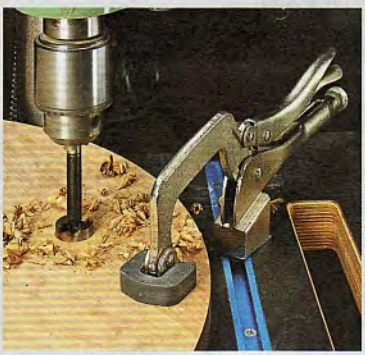
A great way to secure a workpiece to any jig or fixture is the *Universal Track Clamp* from *Woodpeckers*. You can spin the clamp 360° for easy operation and adjustability. It offers a reach of 2" and will accommodate material up to 1½" thick.

The *Bench Klamp* from *Kreg* offers the same 360° clamping capability. And the locking pliers design allows for fine-tuning the clamping pressure to suit the material and task at hand. The *Bench Klamp* comes in two different capacities. One with a 3" reach and a larger model with a 6" reach.



▲ ***Universal Track Clamp.*** *After locking the swiveling clamp to the table in the proper position, simply tighten the knob to secure a workpiece.*

► ***Assembly System.*** *This assembly table features Kreg's Klamp Trak along with handy Klamp Blocks, and a hold-down (for more on this, see the margin).*



▲ ***Bench Klamp.*** *You can adjust the opening of this clamp quickly and easily to match the thickness of your material and then secure it in place.*

Learn the techniques for safer ripping with less waste.

ripping on the Band Saw

The band saw is the tool of choice for making curved cuts and resawing thick stock into thinner pieces. One overlooked use for the band saw is ripping stock to width.

Safety. Why would you consider using your band saw for ripping? For me, the number one reason is safety. There's no spinning blade like there is on your table saw. The cutting action of a band saw blade is downward. This helps hold the workpiece against the table. So you can cut boards you might not be able to cut safely on the table saw (twisted or bowed stock, for instance).

The blade's thin kerf means there's less waste. Its narrow width means little chance of binding. If it does bind, you simply back out of the cut. There's no danger of kickback like you might experience on a table saw.

Precision Cuts. Another reason to use the band saw is that I can make cuts to get the best-looking workpiece from a larger board. The box on the next page illustrates what I'm talking about.

▲ ***Quality of Cut.*** *The blade you use can make a big difference in the smoothness of the cut edge.*

BAND SAW SETUP

Now before you power up your band saw, it's important that you take the time to tune it up. Your saw's manual will help you out with all of these tune-up tasks.

Sharp Blade. The first thing to do is make sure you're using a sharp blade. I use a ½"-wide blade designed for resawing. It does a great job of ripping.

▼ ***Variable Teeth.*** *The variable tooth spacing and unique grind on the Wood Slicer (right) yields a smoother cut than a stock blade.*

Most ½" blades only have three or four teeth per inch, so you won't always get the smoothest cuts, as you can see in the left margin. But a couple of passes with a hand plane or over a jointer are all you need to do to clean up the edges for glue-up or finishing.

For better results, the *Wood Slicer* by *Highland Woodworking* is my first choice (photo below). The unique tooth configuration leaves a smoother surface that requires less clean up later.

Tune-Up. Next, check that the wheels are aligned, the tires are in good shape, and that the guide blocks or bearings are adjusted properly. You'll also want to make sure the blade is tracking on the wheels properly.

Lead Angle. Ideally, as you make a straight cut, the kerf should be parallel to the miter slot. If it's not, you can adjust the rip fence to compensate for this lead angle (sometimes called "drift").

Rip Fence. The rip fence is where you'll focus your attention next. Whether it's a commercial or shop-made fence, the important considerations are that it's square to the table and parallel to the blade's lead angle.

TECHNIQUE

With your saw ready to go, there are a couple of things to keep in mind when you're ripping stock.

Support. The first is to make sure you have some outfeed support for long boards (main photo on opposite page). One of the disadvantages to most band saws is that their tables are relatively small. So having a helping hand will help you control the workpiece as you make the cut.

Feeding the Workpiece. My next piece of advice is to let the blade do the work. What I mean is, don't force the workpiece into the blade. And don't try to cut too slowly. You'll learn how quickly it cuts as you feed a workpiece into the blade. Trying to speed up the cut will not only generate heat that can damage the blade, but can create burn marks that you'll have to clean up later.

Body Position. Finally, position your body so one hand keeps the workpiece against the fence and the other feeds it through the blade. I like to stand off to the side of the saw. You can see how I do this in the main photo on the opposite page. Another option is to use a featherboard to keep the workpiece against the fence.

Freehand Ripping. There's one more thing I want to mention. There may be times when you can't use the rip fence or you choose not to use it, and that's okay. You can get great results by ripping freehand. The trick is to keep a close eye on your layout line and guide the workpiece carefully through the blade as you make the cut.

Once you learn these simple techniques, you'll find that ripping on the band saw is not only easy, but worth the effort.

tips for band saw Ripping

Finding the best pieces to use for your project is one of the challenges of woodworking. Using your band saw to do this makes it a lot easier.

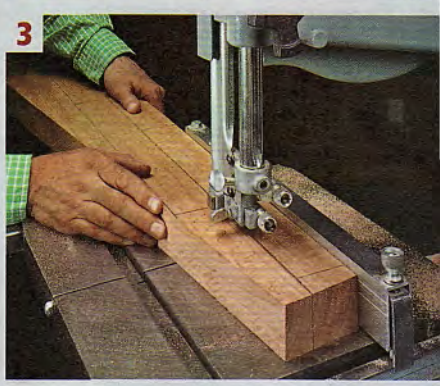
The photos at right show you what I mean. The grain of this board angles off to one side. But for my project, I was looking for straight-grained pieces. Ripping the stock on my table saw would have required some special jigs and generated a lot of waste. But in this case, it's an ideal job for the band saw.

Layout. The key to cutting out the workpieces is in the layout. You can see in photo 1 how I laid out the parts to follow the grain. (I laid them out just a little oversized so I could mill them to final size later.)

First Cut. The first cut on the board has to be done freehand, as you can see in photo 1. There's no straight, parallel edge that matches my layout lines, so I couldn't use a rip fence. Instead, cut close to the waste side of the line and concentrate on making a straight cut. This way, there will be less cleanup to do later.

Joint the Edge. After the first edge is ripped, the next step is to run it across a jointer,as in photo 2. This removes the saw marks and leaves a straight, smooth reference edge. You could also do this with a few swipes of a sharp hand plane.

Use the Fence. Now set up your rip fence for the next cut, as shown in photo 3. As you feed the stock through the blade, keep the reference edge against the fence. Here, it pays to make sure you stay close to the layout line. As you can see in the upper photo, the end result is a workpiece with straight grain on four faces. And that means better-looking projects.



wall-mounted Sharpening Center

Keep sharpening supplies at hand with this easy-to-build cabinet.

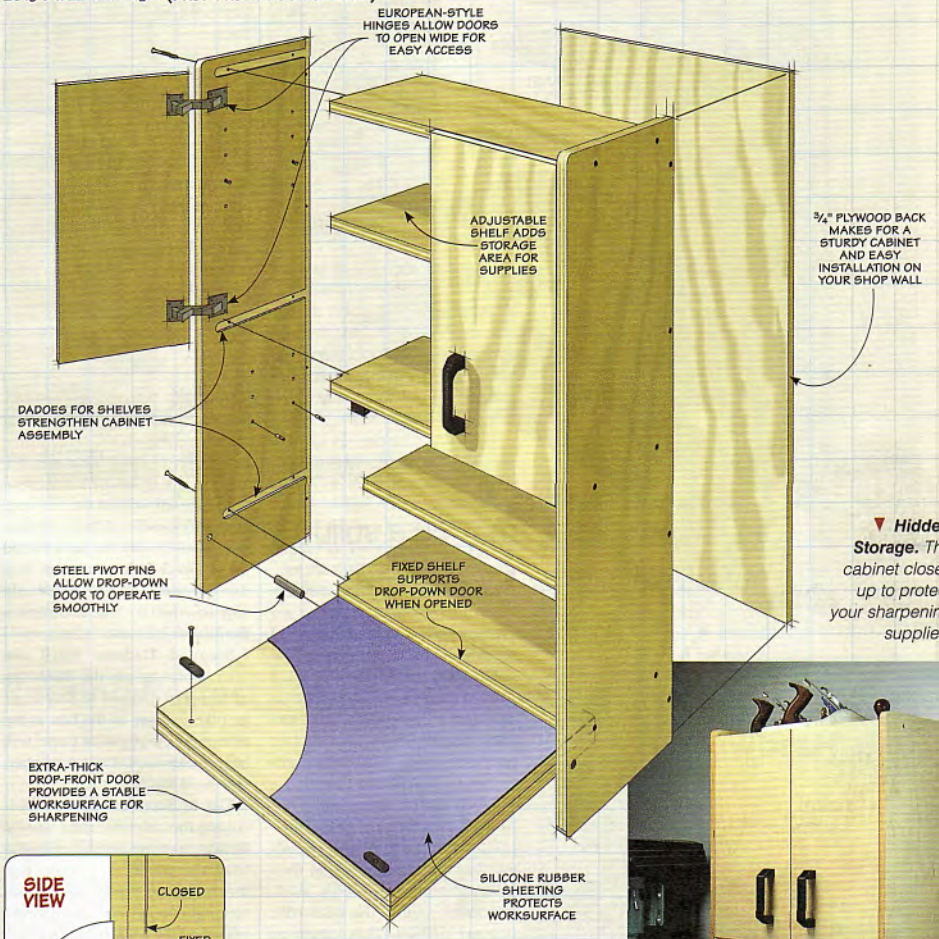
When it comes to sharpening my chisels and plane irons, having a convenient worksurface and handy storage for all my supplies is always a challenge. This sharpening center you see here easily solves these space and storage problems.

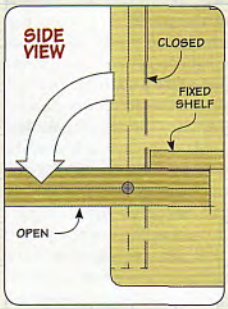
Since the cabinet is mounted to your shop wall, it doesn't take up valuable floor space. The drop-front door provides the strong and stable worksurface you need for all your day-to-day sharpening tasks. The strong plywood construction and simple joinery makes it easy to build. And the best part is, when it's finally mounted on your shop wall, this is one project that will show off its practicality right away.

Exploded View Details

OVERALL DIMENSIONS:
12"D x 22"W x 41½"H (CLOSED)
26⅞"D x 22"W x 41½"H (DROP-FRONT DOOR OPENED)

NOTE: ALL PARTS MADE FROM ¾" PLYWOOD

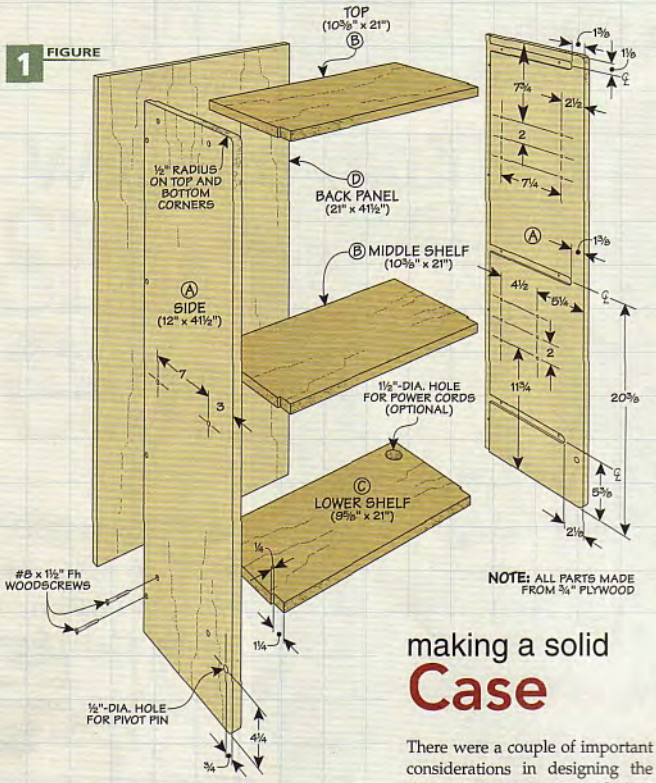


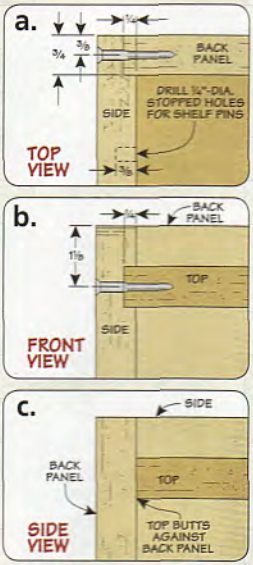


ShopNotes GO ONLINE EXTRAS

To download a cutting diagram and 3-D model of the Sharpening Center, go to: ShopNotes.com

▼ ***Hidden Storage.*** *The cabinet closes up to protect your sharpening supplies.*





Materials & Hardware

CASE

A	Sides (2)	12 x 41½ - ¾ Ply.
B	Top/Middle Shelves (2)	10⅜ x 21 - ¾ Ply.
C	Lower Shelf (1)	9⅝ x 21 - ¾ Ply.
D	Back Panel (1)	21 x 41½ - ¾ Ply.
E	Upper Adj. Shelf (1)	10⅜ x 20⅜ - ¾ Ply.
F	Lower Adj. Shelf (1)	7 x 20⅜ - ¾ Ply.
G	Upper Doors (2)	10⅛ x 20¾ - ¾ Ply.
H	Drop-Front Door (1)	19⅛ x 20⅜ - 1½ Ply.
I	Pivot Pins (2)	½ x 2¾ Steel Rod

- (3) 5¾" Door Pulls
- (6) #12 x 1" Rh Woodscrews
- (2 pr.) 175° Fully Concealed Hinges w/Screws
- (20) #8 x 1½" Fh Woodscrews
- (8) ¼"-dia. Shelf Pins
- (2) Magnetic Catches
- (1) 1/32" x 24" - 24" Silicone Sheet

making a solid Case

There were a couple of important considerations in designing the sharpening center. First of all, I wanted it to be wall-mounted to save space in the shop. And second, the drop-front door had to provide a strong and stable worksurface for sharpening tasks.

To accomplish these goals, I did two things. I used ¾" Baltic birch plywood for all the parts, including the back (Figure 1). And then I joined the top, middle shelf, and lower shelf to the sides with stopped dadoes. This joinery is plenty strong enough to support the extra-thick, drop-front door. But to make the cabinet even stronger, I used both glue and screws to assemble everything.

CASE CONSTRUCTION

Most of the joinery you'll need to cut will be on the side pieces, so that's where to start. The two sides start as one extra-wide blank. This way, you can lay out and cut all the stopped dadoes at once. And that guarantees they'll be perfectly aligned when it's time to assemble the cabinet later on.

Stopped Dadoes. You'll use your router to cut the three sets of stopped dadoes. A shop-built jig (like you see in the box at the bottom of the opposite page) will help make sure they're aligned and sized correctly.

Cut to Size and Shape. After cutting the sides to size, I used a jig saw to create the radius on the front corners, as you see in Figure 1. Back at the table saw, you can use a dado blade to cut a rabbet along the back edge. This will accommodate the plywood back.

Drilling Operations. With the two side pieces in hand, you'll be spending a little time at the drill press. There are two sets of holes on the inside for the shelf pins. And you can flip the pieces over to drill the countersunk screw holes that will be used for assembly later on. Finally, I stacked the

pieces together to drill the ½"-dia. holes for the pivot pins that hold the drop-front door. To ensure the holes were straight, I used the drill press. This way, the drop-front door will function properly.

Fixed Shelves. The most time-consuming part of the project is done. Now you can move on to making the top and two fixed shelves. The top and middle shelf are the same width. The lower shelf is narrower to provide clearance for the drop front. All you need to do after cutting the pieces to size is cut a notch on each end (Figure 1). These notches "wrap around" the stopped dadoes in the sides to hide the end of the dado.

ASSEMBLY

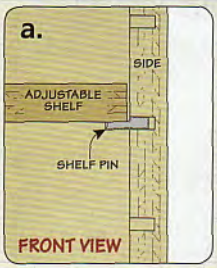
The nice thing about this project is that everything is held together with glue and screws. This means that you only need to clamp the parts while driving the screws, then you can remove the clamps.

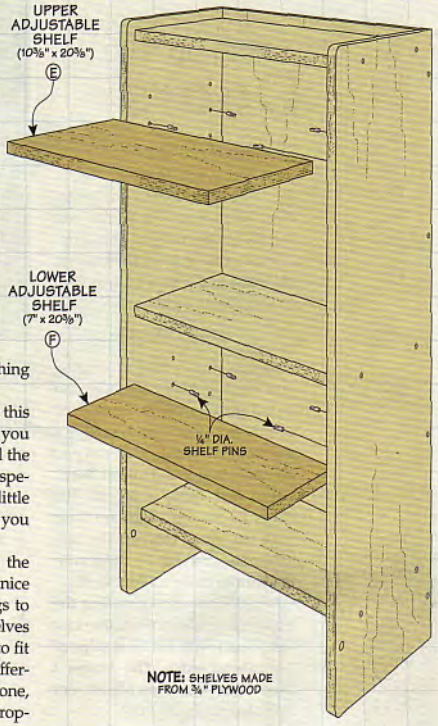
One Side at a Time. On glue-ups like this, I find it easier and less stressful to start with one side. What I mean is, it's easier to assemble the top, middle shelf, and lower shelf to one side piece. Then you can concentrate on attaching the other side piece.

Back Panel. Once you have this much of the case assembled, you can set it on its face and install the back panel. There's nothing special here. Just cut it to size. A little glue and a few screws are all you need for assembly.

Adjustable Shelves. With the back panel in place, you have a nice strong cabinet. The next things to add are the two adjustable shelves (Figure 2). They're cut to size to fit over the shelf pins (note the different shelf widths). With that done, you're ready to make the drop-front and the two upper doors.

FIGURE 2

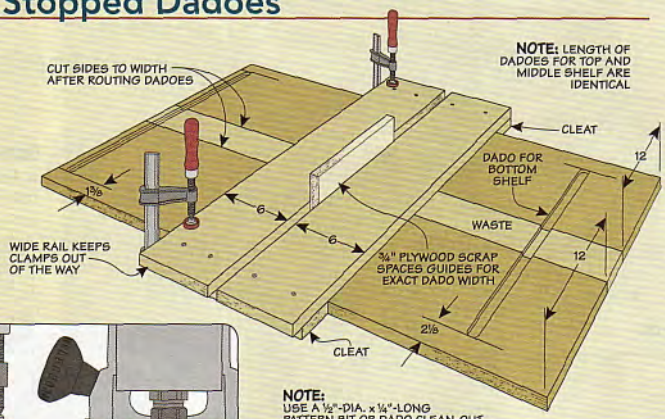


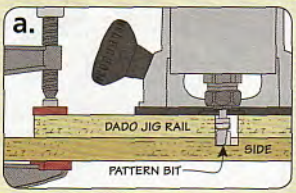


Routing Perfect Stopped Dadoes

The key to routing the stopped dadoes is in the jig you see at right. It helps ensure the dadoes on the side pieces are aligned. And by using a pattern bit, you can make sure the width of the dadoes is an exact fit for the plywood shelves. You can see how to build and use the jig in the drawings at right.

The process is simple. Start with an extra-wide blank then lay out and mark the ends of the dadoes. Use a scrap piece of plywood the same thickness as the shelves as a spacer when fastening the guides to the two cleats. Align the jig to the layout lines, then rout to the end marks you made earlier.





finishing up with

Doors

Now that the basic cabinet is complete, you're ready to add the three doors. The two upper doors are simply cut to size and installed with hinges. The drop-front door is a double-thickness of plywood and pivots on two steel pins (photo at right).

UPPER DOORS

Figure 3 shows you everything you need to know to make and install the two upper doors. Still, as simple as they are, there are a few things to watch out for as you cut them to size and install them.

The first thing is to size the doors so the top edges are flush with the top of cabinet. The bottom edges should be flush with the bottom of the middle shelf.

When it comes to installing the doors, the goal is to make the door faces flush with the front edge of the cabinet sides. The hinges I used allow for some adjustment to make this an easy task.

The other thing I like to do is aim for a 1/16" gap at the sides of doors and an 1/8" gap between them. You might need to shave a little off of the edges or make some adjustments to the hinges to accomplish this.

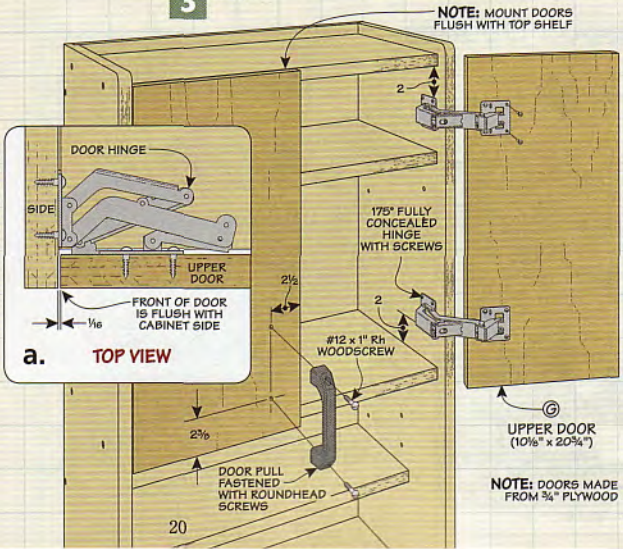
DROP-FRONT DOOR

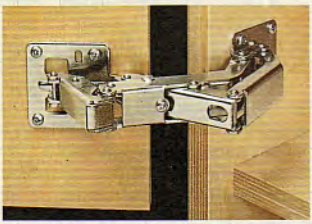
The heart of the workcenter is the drop-front door shown in the photo above. Like the two upper doors, this door is made from 3/4" plywood. The difference is I used two layers of plywood to make a solid worksurface. And it pivots on a couple of sturdy, steel pins. Locating and drilling the holes for the pivot pins will come a little later.

Making the Door. To get started, glue up two oversize pieces of plywood. A few cuts at the table saw are all it takes to square up the door and cut it to final size. Again, shoot for an even gap at the sides that matches the gaps of the two upper doors.

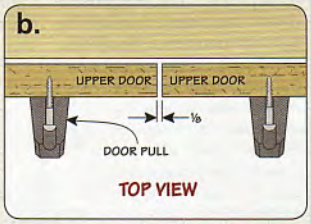
To protect the worksurface from the grit and grime when honing tools, I added a rubber liner, like

FIGURE 3





▲ ***Fully Concealed Hinge.*** *These hinges hold the doors open and out of the way while you tend to your sharpening tasks.*



you see in the photo on the opposite page. Spray adhesive is perfect for fastening it down.

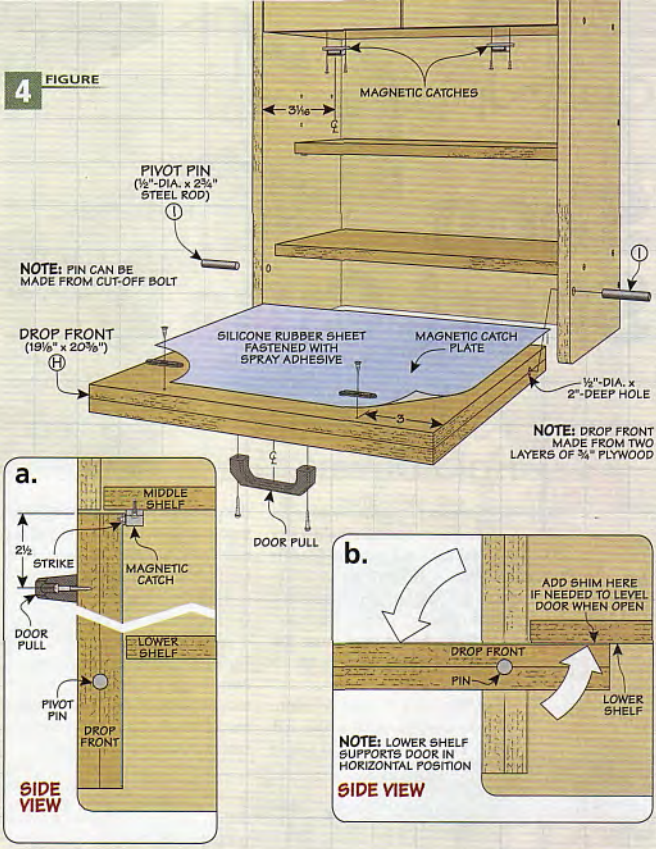
Pivot Pins. The last step to installing the drop-front door is locating and drilling holes for the pivot pins. The box below walks you through the process. The goal is to locate the pins so that the drop-front is level when it's open and is flush with the sides when it's closed. (I only partially inserted the pins so I could remove the door for tweaking the fit.)

Note: If the door doesn't rest at 90°, all you need to do is add a shim on the bottom of the lower shelf. This will bring the door level when opened and the shim will be hidden from view. Then you can fully seat the pins flush with the cabinet sides. Since the pins are friction fit, I didn't need to use epoxy to glue them.

Final Details. All of the hard work is done. Now you just need to add the door pulls and magnetic catches. Then a couple coats of spray lacquer will finish it off.

Finally, the cabinet is ready to install. I located mine over a couple of studs and anchored it with several long screws. With that done, you'll soon find out how convenient it is to have all your sharpening supplies at hand.

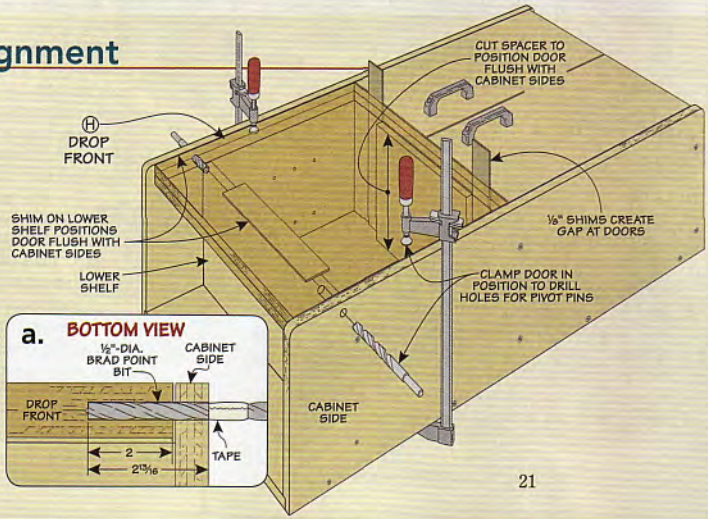
FIGURE 4



Drop-Front Alignment

The process for locating the pivot pins starts with positioning the door flush with the front edge of the cabinet sides. To do this, I used a couple of spacers. First, a thin spacer is located on the front edge of the cabinet bottom, as shown at right. A second, wide spacer is fastened to the underside of the fixed shelf with double-sided tape.

Take a little time here to center the door side-to-side and check for an even gap at the top. Finally, you can carefully drill the holes in the edges of the door, keeping the bit straight as you go.



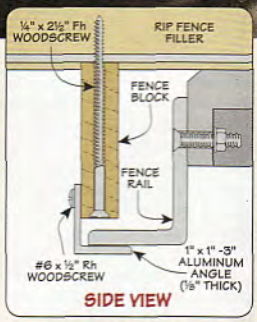
Shop Short Cuts

T-Square Fence Hold-Down

The accessory system on page 34 is a great way to add capability to your table saw. However, if your saw has a Biesemeyer-style rip fence, you may run into one issue. The downward pressure applied by a featherboard may cause the back end of the rip fence to lift up off the saw table.

But there's a simple solution. All you need to do is make and attach the hold-down you see in the photo above. It's nothing more than a catch that wraps around the rear fence support rail, as you can see in the drawing at right.

When making the hold-down, it's important that the fence block is sized accurately. It needs to be wide enough to hold the aluminum angle a hair below the bottom of the fence rail. This way, the modification won't affect the normal movement of the fence.



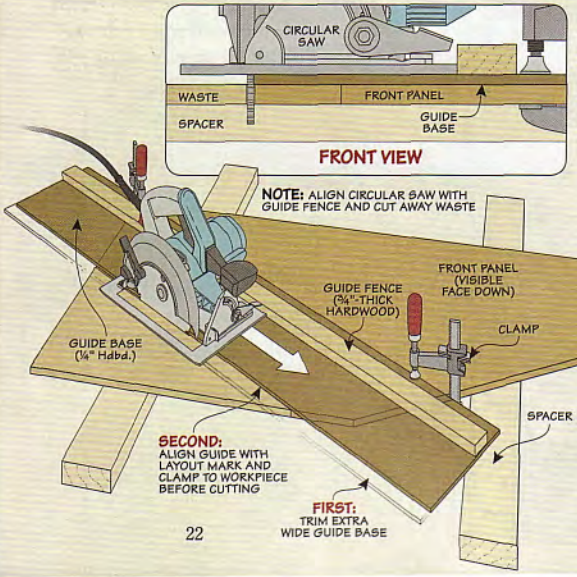
Cutting Long Angles

For the sanding station on page 24, cutting the lower corners off of the front panel increases storage capacity by providing access to the area below the baffles. Creating this opening is simpler than you think. A basic straightedge guide teamed with a circular saw works well for making the long angle cuts.

Cutting Guide. The guide, shown in the drawings at left, allows you to make a straight cut on a large workpiece. Plus, there's an added benefit. After you trim the guide's base with an intial cut, it makes positioning the saw blade exactly on the layout line almost foolproof.

Extra-Wide Base. To build the guide, simply add a hardwood fence to an extra-wide hardboard base. Then, align your circular saw with the fence and cut away the waste.

Using the Guide. To use the guide, just clamp it to the workpiece so the edge aligns with the layout mark and make the cut. Note: When cutting sheet goods with a circular saw, place the visible (good) side down for the cleanest cuts.

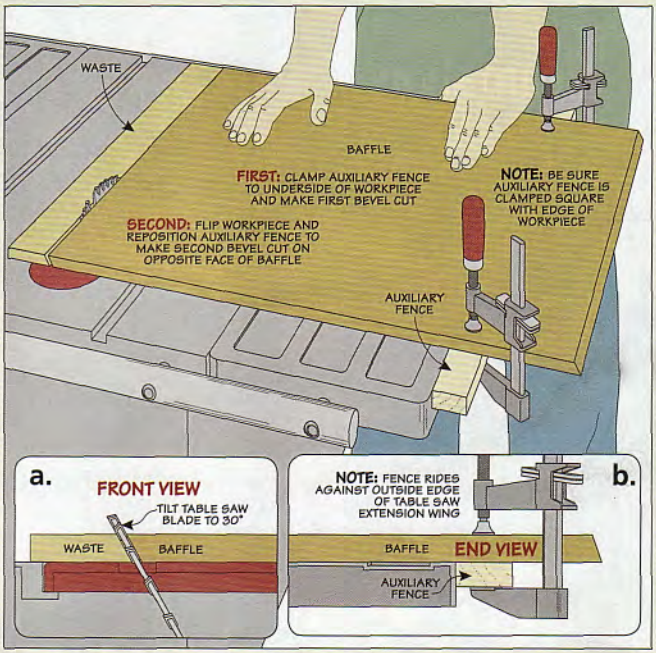


Safe Bevel Cuts

When making long bevel cuts on large panels, there's a risk that the waste piece may become trapped between the fence and under the spinning saw blade. Or you may find that the panel is too large to use the rip fence as a guide. This was the problem I had when cutting the two baffles for the sanding station (page 24).

Auxiliary Fence. To address all of these issues, I use an auxiliary fence to guide the panel through the cut instead of the rip fence. You can see what I mean in the drawing at right. The fence is just a hardwood cleat that I've clamped to the underside of the panel. The auxiliary fence rides against the outside edge of the extension table. Of course, you'll need to make sure the edge of the table saw extension wing is parallel to the blade.

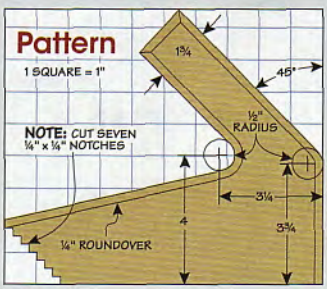
This quick and easy method allows me to make straight bevel cuts on a large workpiece.

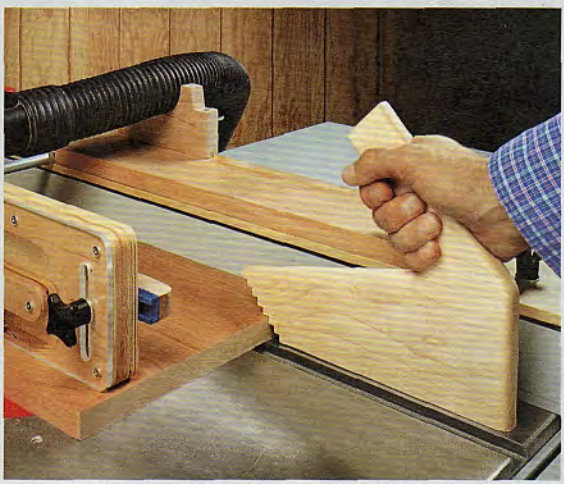


notched Push Block

With the blade cover (page 34) attached to the table saw's rip fence, it can be difficult to push a workpiece completely past the blade. To solve this problem, I made the push block you see in the photo at right.

It's tall enough so your hand clears the platform. And a stair-stepped set of notches on the front makes it easy to control a workpiece of almost any thickness (pattern below).





▲ ***Added Safety.*** *The narrow push block and the blade cover work together to keep your hands safely away from the blade. Notches in the front of the push block give you solid control of a workpiece to push it past the blade.*

dream shop project

mobile Sanding Station

The clouds of dust produced by my sanders make sanding my least favorite task when building a project. Thankfully, this mobile sanding station makes the job a lot less messy.

Designed from the top down to ensure maximum airflow, the worksurface has grates with long, wide slots — a big improvement over the pegboard tops used on many shop-built sanding tables. It also features a 4"-dia. dust port that allows you to hook up to a dust collection system. And a pair of baffles channel the sawdust directly to the dust port. All these great features make it a lot easier to collect dust so it doesn't end up in the air (or in your lungs).

Simple construction, mobililty, and industrial-grade features make this sanding station a dust collection dynamo.

Exploded View Details

OVERALL DIMENSIONS:
26"D x 49"W x 37 3/4"H

NOTE: ALL CASE PARTS AND DRAWER FACES ARE MDF. THE PANEL SUPPORTS AND TOP TRIM ARE "TWO-BY" STOCK. DRAWER PARTS ARE ½" PLYWOOD

TWO PANEL STYLES ARE INTERCHANGEABLE AND USED TO OPTIMIZE AIRFLOW AROUND THE WORKPIECE

SUPPORTS ARE SPACED TO HOLD THE PANELS IN A VARIETY OF POSITIONS TO SUIT YOUR SANDING NEEDS

POWER STRIP PROVIDES QUICK AND EASY HOOK-UP FOR SANDER

STORAGE BIN HOLDS THREE ROLLS OF SANDPAPER (REFER TO PAGE 30 FOR PLANS)

SOLID MDF CONSTRUCTION GOES TOGETHER WITH GLUE AND SCREWS

AIRFLOW CREATED BY BAFFLES EFFICIENTLY CARRIES AWAY SAWDUST

OPEN CUBBY BELOW BAFFLES PROVIDES ADDITIONAL STORAGE SPACE

4" DUST PORT CONNECTS TO DUST COLLECTOR

EDGING PROVIDES CLAMPING EDGE AND CREATES RECESSED POCKET FOR GRATES

EXTRA DEEP DRAWERS MOUNT ON FULL-EXTENSION SLIDES TO PROVIDE LOTS OF EASY-TO-REACH STORAGE

MOBILE SANDING STATION RIDES ON FOUR HEAVY-DUTY LOCKING SWIVEL CASTERS

▼ ***Interchangeable Panels.*** *The sanding station top is designed to hold slotted and solid panels. You can rearrange the panels to optimize airflow to suit your sanding needs.*

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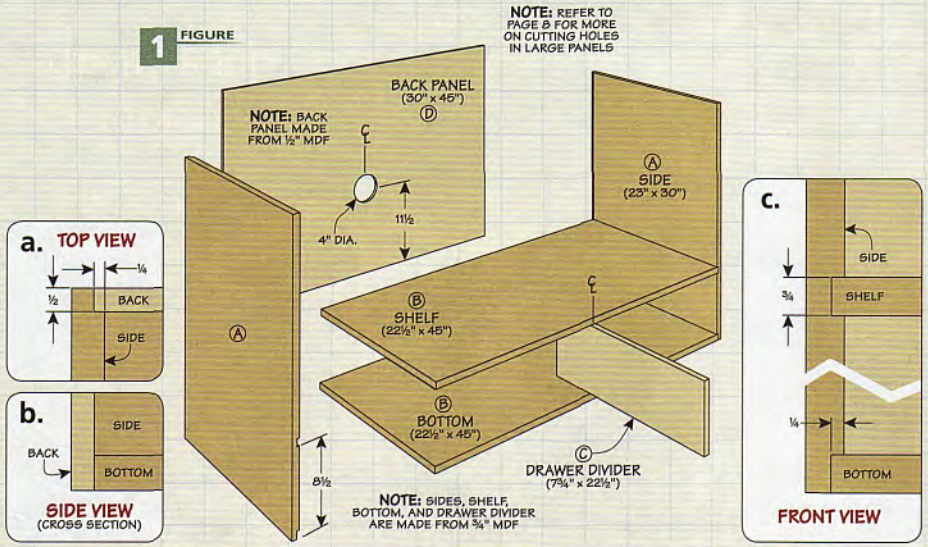
To download a Cutting Diagram of the Mobile Sanding Station, go to: **ShopNotes.com**



a heavy-duty Case

The main purpose of the case is to collect dust as efficiently as possible. Angled baffles direct sawdust down to a dust port which is sized to connect to your dust collection system. Best of all, simple joinery makes it easy to build.

Build the Case. You can start by cutting the sides, shelf, and bottom pieces to size. Then, cut a shallow rabbet at the back edge of each side piece to hold the back panel, as shown in Figure 1a. A rabbet on the bottom inside edge of the sides holds the case bottom. Finally, a dado in each side holds the shelf (Figure 1c). A dado blade sized to match the thickness of the MDF makes quick work of these tasks.

Assembly. With the joinery cuts complete, you can go ahead and assemble the case. I used glue only, then clamped everything together.

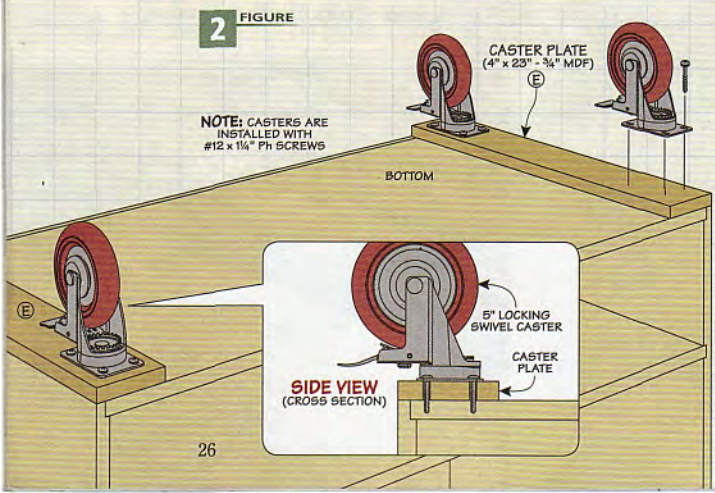
Drawer Divider. To separate the drawers and provide a place to mount the drawer slides, I added a narrow drawer divider. Go ahead and cut the divider to size now.

Carefully lay out the location of the divider, center it on the opening, then glue and clamp it in place (Figure 1). Once the glue has had some time to set up, remove the clamps and move on to the next step, adding the case back.

Case Back. Up to this point, the case construction has been pretty straightforward. Now there's one detail that will take some thought. After you cut the back to size, you'll need to add a large hole for a 4"-dia. dust collection outlet.

Normally, I'd cut a hole this size at the drill press with a circle cutter. But the location of the hole makes this difficult. Instead, I started by making a template with a 4"-dia. hole and used that to locate and lay out the hole on the back.

After removing most of the waste with a jig saw, you can use



the template, a router, and a pattern bit to make short work of cleaning up the edges. (For more on this, turn to the article on page 8.)

Once that's complete, fit the back into the shallow rabbets you made earlier and glue it in place.

Casters. Go ahead and cut the caster plates to size now. Once they're glued to the case bottom, you can add the casters (Figure 2).

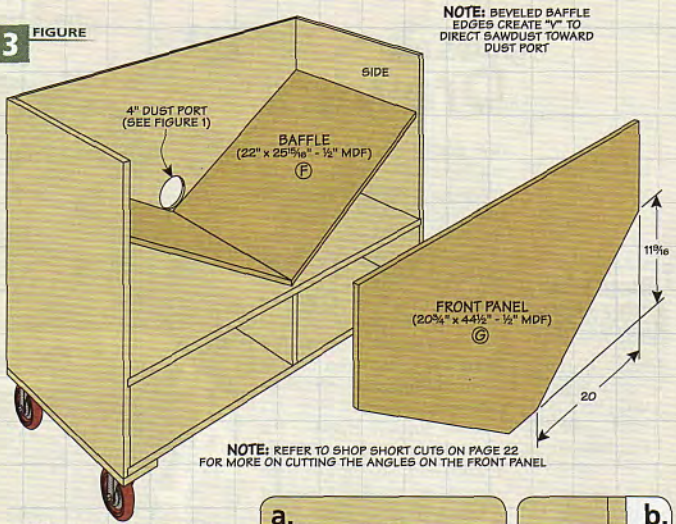
Baffles. At this point, you have the beginnings of a sturdy mobile base. What turns the base into an efficient sanding station though are the angled baffles that direct sawdust down to the dust port.

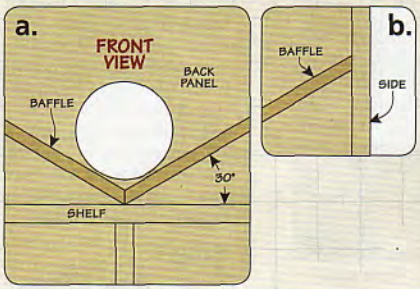
As you can see in Figure 3, the baffles are nothing more than two MDF panels with bevels cut on each end. Installing the baffles this way creates a V-shaped compartment inside the case (Figures 3 and 3a). Start by cutting the baffles to width and rough length. Then you can set your table saw blade to 30° and position the rip fence to cut a bevel on one end of each piece.

Once you've completed the first bevel, simply reset the fence for the correct length, flip the workpiece end-for-end and cut the second bevel on the opposite end. (When making the second cut, you may need to place a piece of ¼" hardboard under the workpiece so that the tip doesn't accidently slip under the fence and jam.)

Note: My table saw blade tilts to the left. If yours is right-tilt, check out Shop Short Cuts on page 23 for an alternate way to cut the bevels.

3 FIGURE





Baffle Assembly. With the bevels cut on the baffles, assembling them is just a matter of gluing the two pieces in place inside the case. To provide a tight seal and improve dust extraction, I added a thick bead of glue to the joint line along the side walls and at the bottom of the "V."

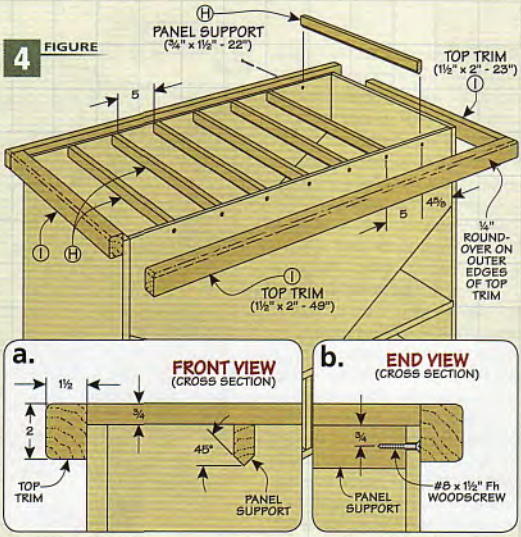
Case Front. Now all that's left to complete the case is to add the front panel (Figure 3). I used a circular saw and straightedge to cut the long angles on the front. You could make the front without the angles, but adding them opens up lots of extra storage space below the baffles. For more on how I did this, refer to Shop Short Cuts on page 22. To complete the case, simply glue the front panel in place.

Materials & Hardware

A	Sides (2)	23 x 30 - ¾ MDF
B	Shelf/Bottom (2)	22½ x 45 - ¾ MDF
C	Drawer Divider (1)	7¾ x 22½ - ¾ MDF
D	Back Panel (1)	30 x 45 - ½ MDF
E	Caster Plates (2)	4 x 23 - ¾ MDF
F	Baffles (2)	22 x 25¹⁵⁄₁₆ - ½ MDF
G	Front Panel (1)	20¾ x 44½ - ½ MDF
H	Panel Supports (7)	¾ x 1½ - 22
I	Top Trim	1½ x 2 - 156 Rgh.
J	Grates/Solid Panels (8)	5¼ x 23 - ¾ MDF
K	Drawer Fronts/Backs (4)	7 x 20⅜ - ½ Ply.
L	Drawer Sides (4)	7 x 21 - ½ Ply.
M	Drawer Bottoms (2)	20½ x 20⅜ - ¼ Hdbd.
N	Drawer False Frts. (2)	7⅝ x 21¾ - ¾ MDF

- (2 pr.) 5" Locking Swivel Casters
- (16) #12 x 1¼" Ph Screws
- (14) #8 x 1½" Fh Woodscrews
- (2 pr.) 20" Full-Extension Drawer Slides w/Screws
- (2) 4" Drawer Pulls w/Screws
- (8) #8 x 1" Fh Woodscrews

grates and Drawers



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For more on routing the slots on the Mobile Sanding Station, go to: ShopNotes.com

Now that the case is complete, you can begin working on the top grate system. It's a lot different than many tops found on other sanding tables. First of all, the top uses two styles of interchangeable panels (slotted and solid) instead of a piece of pegboard. Both types of panel are made from MDF and they're sized to rest on a series of supports. This allows you to reposition them to accommodate the size of the workpiece you're sanding.

Panel Support System. The panel supports are made from ¾"-thick stock. Start by cutting the supports to fit and then add the 45° bevels (Figures 4 and 4a). The bevels are just another simple way to decrease resistance and increase airflow. A table saw works best for cutting all the bevels.

And to be sure they provide solid support while sanding, they're attached to the case front and back with glue and screws, as illustrated in Figures 4 and 4b.

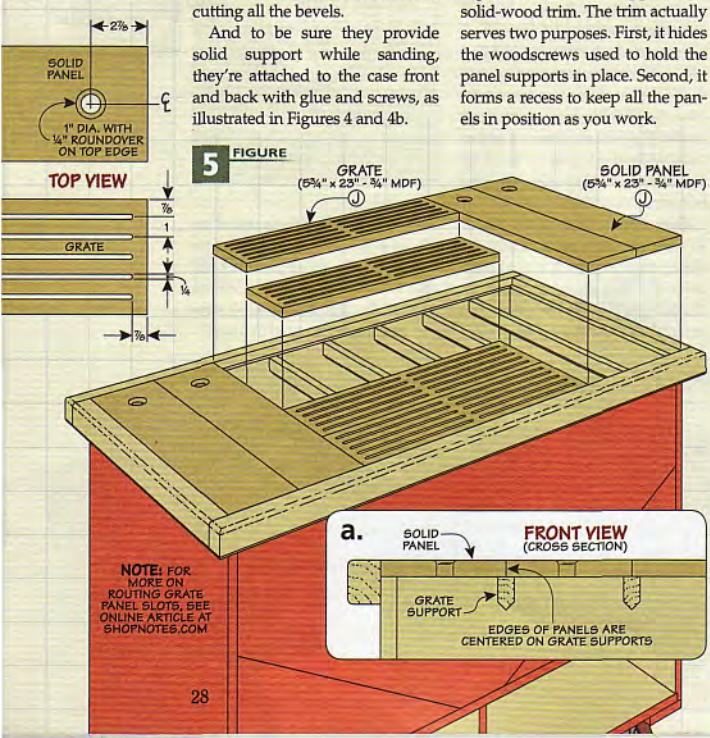
Trim. The top of the sanding station case is wrapped with solid-wood trim. The trim actually serves two purposes. First, it hides the woodscrews used to hold the panel supports in place. Second, it forms a recess to keep all the panels in position as you work.

The trim sits proud of the top of the case by the thickness of the grates (¾") and is glued in place, as shown in Figure 4a. Before you attach the trim though, you'll want to round over the top and bottom "outside" edges.

Panels. With the trim pieces installed, you can start work on the grates and solid panels that fit in between. To provide the airflow necessary to remove the sawdust, I routed a series of slots into four of the panels to form grates, leaving the remaining four panels solid (Figures 5 and 5a). This way, I can reposition the grates to suit the workpiece I'm sanding.

For small workpieces, you can group them all in the middle of the sanding center. Or, move them to the outside to sand long or wide workpieces. And, to make the sanding center even more versatile, I made an additional four solid panels for times when I need a large assembly table. Check out the box on the opposite page for several panel arrangements.

Rout the Slots. Adding the slots is best done on a router table. For a detailed step-by-step process for routing the slots, you'll want to



check out the Online Extra available at *ShopNotes.com*.

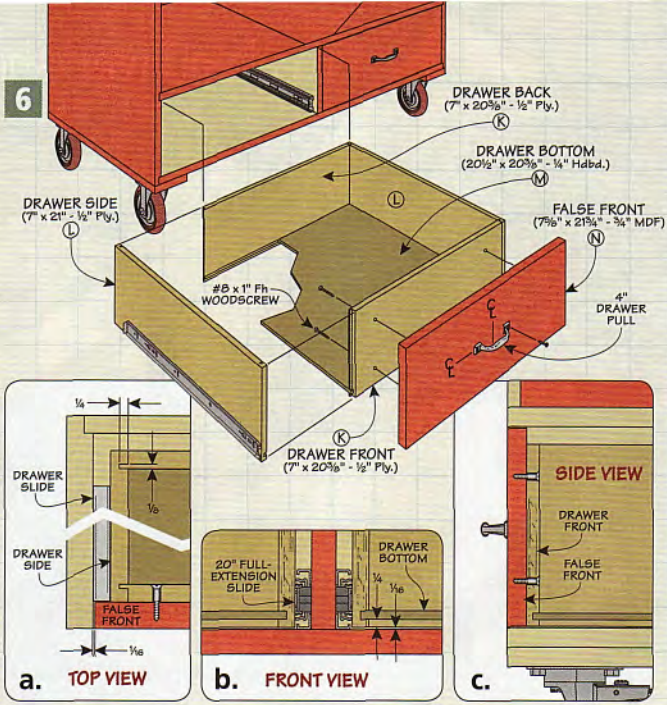
In a nutshell, I used a fence and a ¼"-dia. straight bit to do it. Start with an outside slot, raising the bit a little higher than the thickness of the panel. I also marked start and stop points on the fence and on each grate. This way, I was able to simply lower the workpiece over the bit to cut the slots. And, I routed each slot in a single pass.

With the slots completed, you can add finger holes in the solid panels. I routed a ¼" roundover on each of the finger holes, as in the margin drawings on the opposite page.

Drawers. Now, you can make a couple of drawers for the bottom of the case. Along with the open areas just above the drawers, they provide plenty of storage space for your sanders and supplies.

The drawers are made using simple tongue and dado joinery (refer to the article on page 44). And to provide wide-open access to the large drawers, I added full-extension drawer slides.

As you can see in Figure 6, the drawer slides are attached directly to the case sides and divider. I hid the drawer slides with a false front made from MDF. Finally, I gave the project a couple coats of paint.



Sandpaper Storage. In order to have my most-used grits of sandpaper within reach, I built a portable sandpaper storage box. You can read more about it on page 30.

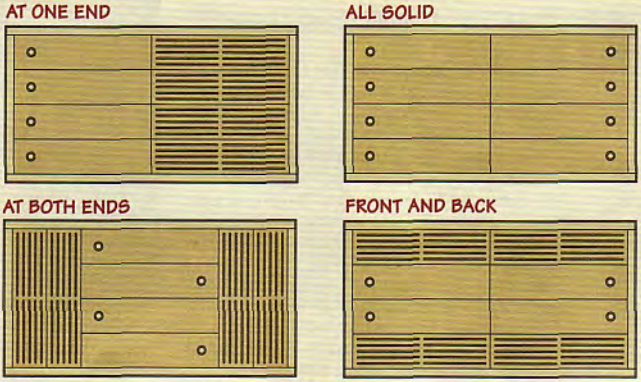
Get Sanding. It's time to get out your sander. The sanding station is so good at capturing sawdust, you'll wonder what took you so long to build one.

Alternate Panel Arrangements

Once you start using the sanding station, you'll soon realize how handy it is to be able to rearrange the panels to collect dust effectively.

By placing the grates all at one end (upper left drawing), or along the edges (two lower drawings), you're able to concentrate the airflow where it's needed most — regardless of the size of the workpiece.

Or, add four more solid panels and turn the sanding station into an assembly table, upper right drawing.



Portable Sandpaper Storage

This handy dispenser keeps all your most commonly used grits of sandpaper within easy reach.

Nothing dampens my enthusiasm for sanding more than having to look high and low for the right sandpaper. That's why I decided to build the portable sandpaper storage box you see in the photos.

The box has three small compartments, sized to hold three rolls of self-adhesive sandpaper. (I like 4½"-wide rolls.) As you can see in the photo at right, the rolls simply drop inside with the loose end facing up. Finger cutouts in the front make it easy to lift the lid and get to the sandpaper.

But there's no reason to remove the sandpaper to tear off a piece. A recessed hacksaw blade attached to the underside of the hinged lid makes this a snap.

Best of all, a pair of cleats make it easy to hang the box anywhere, or take it right to the job at hand.

▲ ***Easy-Access Compartments.*** *Just the right size for a 4½" roll of abrasive, the storage box holds the three grits of sandpaper you use most often.*

This sandpaper storage box is a great accessory to the mobile sanding station on page 24. Simple glued butt joints make building the box easy. And it's made entirely out of ½" plywood.

Construction. Start by cutting the front, back, sides, and dividers to size. As you see in Figure 1, the front and dividers are recessed to support the lid when it's closed. In a minute you'll see why I did this. But, before you glue it all together, make the finger cutouts on the front (Figure 1). I used the drill press and a Forstner bit to drill a hole at the bottom of each cutout and then removed the waste with a jig saw. Once all these pieces are cut to size, go ahead and glue the pieces together to make the box.

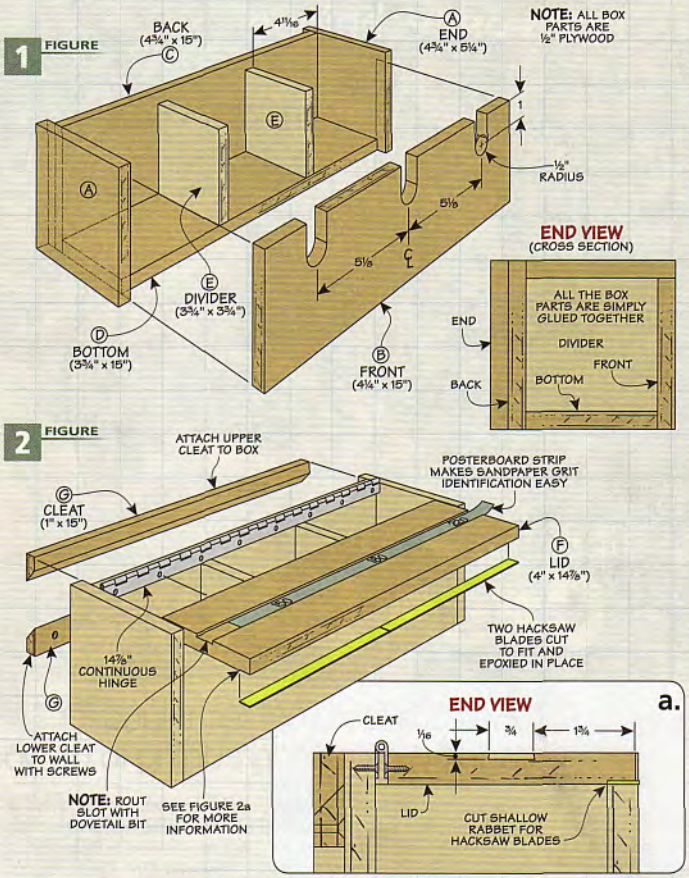
Lid. Now you can cut the lid to size. But before you attach it to the box, there are couple of other things you'll want to do.

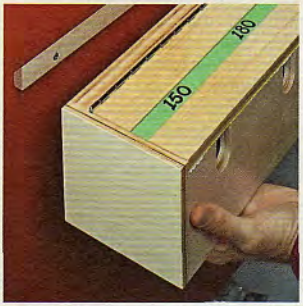
First, rout a centered dovetail-shaped groove in the top of the lid (Figure 2a). This groove holds a posterboard label strip. This way, you'll know exactly what grit sandpaper you're using. A dovetail bit mounted in a router table does a good job of routing the groove.

Switch to a straight bit to rout a shallow rabbet in the front, bottom edge of the lid. This rabbet holds a couple sections of hacksaw blade. Before gluing the blades in place with epoxy, cut off the rounded ends and file them square (Figures 2 and 2a). Now, when you hold the lid down, the serrated blade makes it easy to tear off a piece of sandpaper just the length you need.

Once you've added the blades, attach the lid using a short section of continuous hinge.

Cleats. Finally, mount the box with a couple of plywood cleats. The cleats have beveled edges and are ripped from a single workpiece (Figure 2 and the photo at right). One cleat attaches to the back of the box and the other is screwed in place wherever you need to have sandpaper close at hand.





▲ ***Portable Storage.*** *Hanging the box on a cleat secures it below the work-surface and allows it to be removed.*

Materials & Hardware

A	Ends (2)	4¾ x 5¼ - ½ Ply.
B	Front (1)	4¼ x 15 - ½ Ply.
C	Back (1)	4¾ x 15 - ½ Ply.
D	Bottom (1)	3¾ x 15 - ½ Ply.
E	Dividers (2)	3¾ x 3¾ - ½ Ply.
F	Lid (1)	4 x 14⅞ - ½ Ply.
G	Top/Bottom Cleat (2)	1 x 15 - ½ Ply.

- (2) Hacksaw Blades
- (1) ½" x 14⅞" Continuous Hinge w/Screws
- (2) #6 x 1¼" Fh Woodscrews

tips for seamless Case Edging

Here's a foolproof technique for adding hardwood edging to plywood.

Plywood makes it easy to build great-looking cases in a short time. If there's one drawback to using plywood, it's covering the edges. Most of the time, I use thin strips of hardwood edging. My goal is to have the edging and plywood blend seamlessly. The process sounds simple enough — cut the edging to size, and then glue it to the plywood. Of course, when it gets right down to it, there's more to the process.

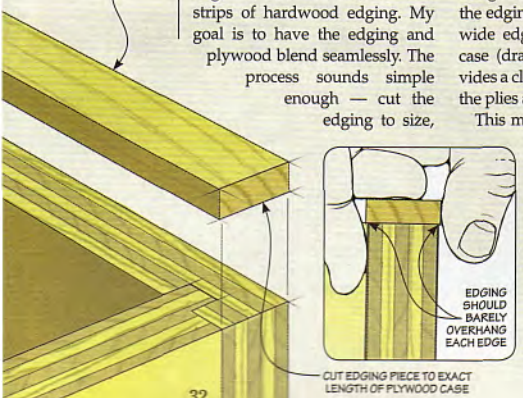
Assemble First. One of the first things to consider is when to apply the edging. I prefer to apply extra-wide edging after gluing up the case (drawings at left). This provides a cleaner look and hides both the plies and any case joinery.

This method isn't without challenges. The individual pieces need to butt tightly together. And it can be tough to trim the edging flush on an assembled case without damaging the plywood veneer. After building a number of plywood cases, I've developed a few tips and tricks for getting great results without spending a lot of time on the process. There's nothing really complicated here. It's a matter of being careful and taking your time.

Case Pieces. Before getting into the edging process, I'd like to talk a bit about the plywood case pieces. For a seamless joint line, you need the edge of the plywood to be perfectly smooth. If you have a top-quality table saw blade, you might get a decent edge. But if an edge is rough, it helps to clean it up by running it across the jointer.

Then, when you assemble the case, concentrate on keeping it square. Besides making a better case, it makes it easier to get tight joint lines on the edging.

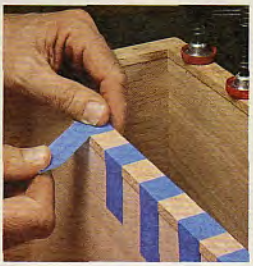
The Edging. Now, you can turn your attention to the edging strips.



For starters, take some time to find boards with grain and color that closely match the plywood.

When converting the boards to individual strips, you have a few goals. The first is the width of the strips. I want them to overhang the plywood a bit on each side. To do this, I plane the edging blanks to be slightly ($\frac{1}{32}$") thicker (wider) than the thickness of the plywood. This makes bringing the edges flush quick and easy later.

Another goal is getting a tight glue joint. Accomplishing this is as simple as a trip to the jointer. Before ripping the first strip, joint one edge of the board. Then after ripping a strip, I go back and joint the freshly cut edge. Repeat this process until you've cut all the edging pieces you need. It's a good idea to mark the jointed edge so you won't get confused, later.

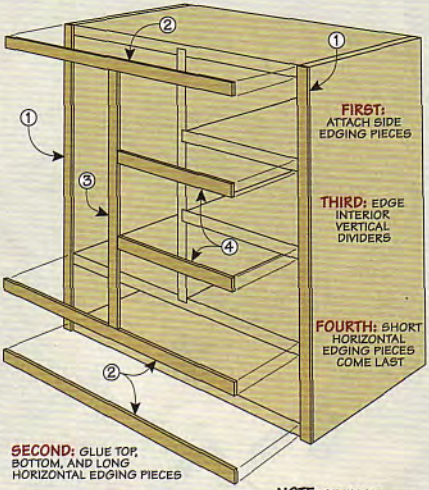


There's one more thing I want to mention about the edging pieces. I cut them $\frac{1}{4}$" thick. This makes them thin enough to blend in with the plywood but sturdy enough to glue in place without distorting.

Glue the Edging. When you're ready to glue the edging in place, it's a good idea to have a plan for how they go on. For a simple case, like the one shown in the photo on the facing page, I start with the outside vertical edges, then move to the horizontal pieces. On more complex cases, I follow the process shown in the drawing at right.

Now, you're ready to spread some glue. (Be sure to apply glue to the jointed face.) Start from one end and clamp the edging in place. Your aim is to have the edging overhang a bit on each side of the plywood. Since it's only slightly wider, there won't be much, and you can feel when the piece is centered.

◀ ***Masking Tape.*** *Apply strips of masking tape to hold edging in place where clamps can't reach.*



Work your way along the case, aligning and clamping as you go. Apply enough clamps to close any gaps. If you can't get clamps in (if the back is installed, for example), you can use strips of masking tape to hold the edging in place, as you can see in the left photo.

Once the glue dries, all that's left to do is bring the edging flush. You can learn a few tips I use for this step in the box below.

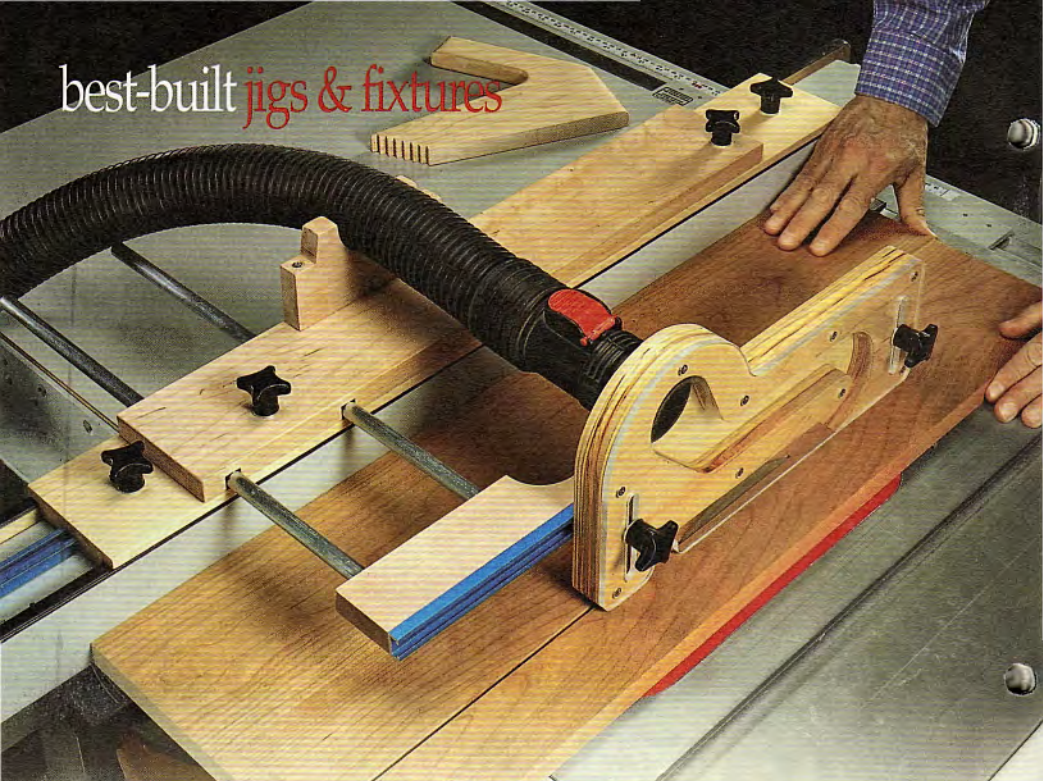
smooth the edging
Trimming Tips

My tool of choice for trimming the edging flush on a case is a power sander. With 120-grit paper, you can get most of the job done in a short amount of time.

I like to start with the outside faces, then move to the inside. Concentrate on keeping the sander level to avoid rounding over the edges. You also want to keep the sander moving to prevent sanding through the plywood veneer.

To clean up the corners and hard to reach spots, I use a combination of a chisel, scraper, and sanding block, as shown below.

▲ ***Quick Results.*** *A power sander with 120-grit paper makes quick work of sanding the edging flush with the plywood case.*



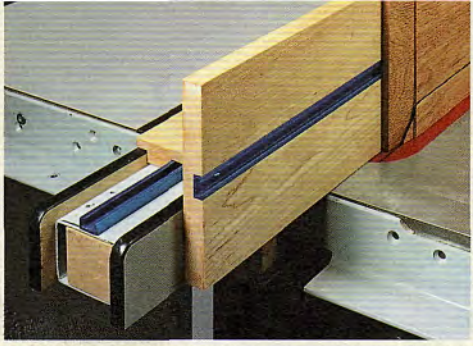
Rip Fence accessory system

Versatile add-ons increase accuracy, improve safety, and help you get more from your table saw.

If you're anything like me, you use your table saw for more tasks than just ripping and crosscutting. That includes cutting rabbets, grooves, dadoes, and raised panels, just to name a few. To do these things well, I often attach some sort of accessory to the rip fence. These cobbled-together solutions work, but there's usually a clamp or two that gets in the way.

The accessory system you see in the photos on the next few pages eliminates this problem. It starts with a platform that attaches to your rip fence. It accepts several handy add-ons. There's a stop for making short crosscuts, a plate for attaching featherboards, and a dual-purpose fence for rabbets and wide workpieces. Finally, there's a dust-collecting blade cover to pull away chips and dust right at the source.

Each accessory attaches quickly — so you're more likely to use it. And you can make the whole set in just a few hours. You'll find it's time well spent.

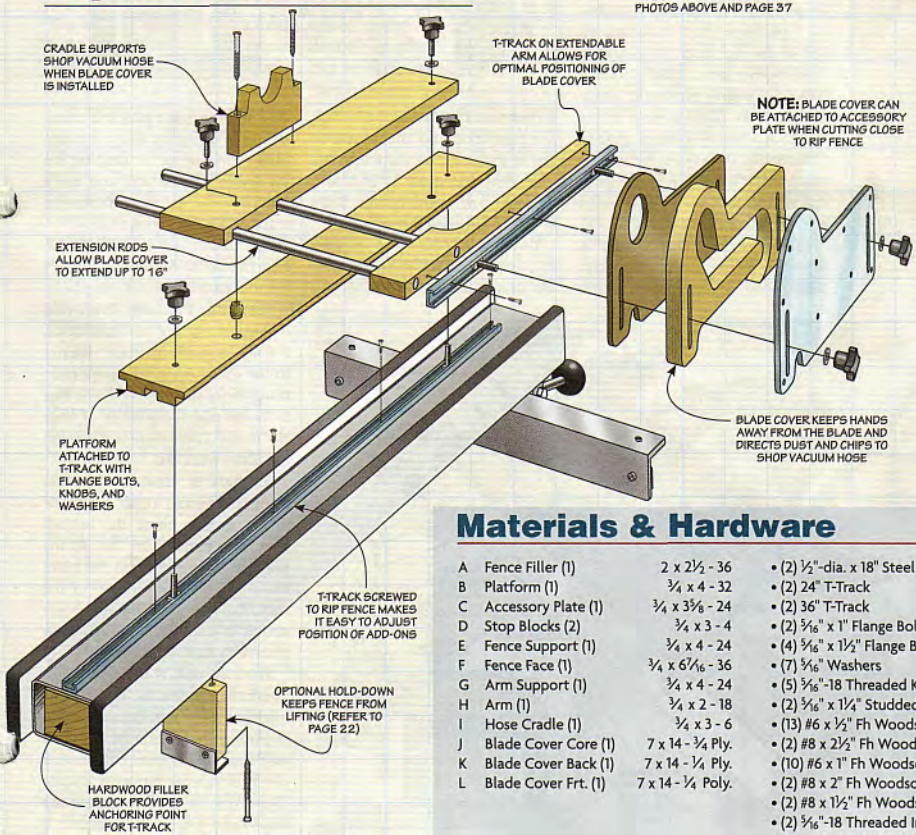


▲ **Tall Fence.** *In a few seconds, you can attach a tall fence to give you greater control when cutting a wide or tall workpiece on edge — like making a raised panel.*

▲ **Featherboards & Hold-Downs.** *Adding featherboards to the rip fence makes it a snap to cut rabbets, dadoes, and grooves to a uniform depth.*

Exploded View Details

NOTE: FOR OTHER HANDY ADD-ONS CHECK OUT THE PHOTOS ABOVE AND PAGE 37



Materials & Hardware

A	Fence Filler (1)	2 x 2½ - 36	• (2) ½"-dia. x 18" Steel Rod
B	Platform (1)	¾ x 4 - 32	• (2) 24" T-Track
C	Accessory Plate (1)	¾ x 3⅜ - 24	• (2) 36" T-Track
D	Stop Blocks (2)	¾ x 3 - 4	• (2) 5/16" x 1" Flange Bolt
E	Fence Support (1)	¾ x 4 - 24	• (4) 5/16" x 1½" Flange Bolt
F	Fence Face (1)	¾ x 6 1/16 - 36	• (7) 5/16" Washers
G	Arm Support (1)	¾ x 4 - 24	• (5) 5/16"-18 Threaded Knob
H	Arm (1)	¾ x 2 - 18	• (2) 5/16" x 1¼" Studded Knob
I	Hose Cradle (1)	¾ x 3 - 6	• (13) #6 x ½" Fh Woodscrews
J	Blade Cover Core (1)	7 x 14 - ¾ Ply.	• (2) #8 x 2½" Fh Woodscrews
K	Blade Cover Back (1)	7 x 14 - ¼ Ply.	• (10) #6 x 1" Fh Woodscrews
L	Blade Cover Frt. (1)	7 x 14 - ¼ Poly.	• (2) #8 x 2" Fh Woodscrews
			• (2) #8 x 1½" Fh Woodscrews
			• (2) 5/16"-18 Threaded Inserts

start with the

Mounting Platform

One of the benefits of this system is that the accessories are easy to attach and remove from the rip fence. But since each add-on is a different size and serves a different purpose, the mounting method is designed to be flexible as well. Note: This system is designed for a T-square-style rip fence.

FIXED ASSEMBLY

In general, each accessory attaches to a platform that's mounted on top of the rip fence. You can see how this works in Figure 1. A set of threaded inserts allows the accessories to be installed with a few twists of a pair of studded knobs.

To make it easy to secure the platform, it locks to a length of T-track. And that's where you start making this accessory system.

Guide Track. The T-track is screwed to the top of the main tube of the rip fence. For a secure connection, I anchored the T-track to a hardwood filler that I cut to fit inside the fence, as shown in the End View in Figure 1. This also means you need to drill a few holes in the rip fence for the screws.

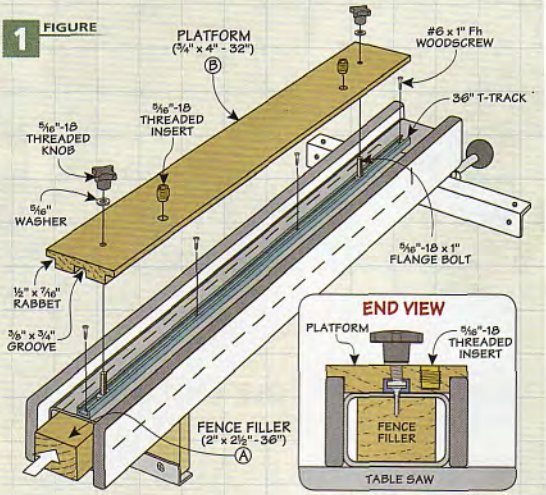
You can do this with a hand drill and a twist bit. But there are a few things to keep in mind as you do this. First, use a punch to create a dimple so the bit won't wander. Then, concentrate on keeping the bit square as you drill and use a light machine oil to draw out the chips and keep the bit cool.

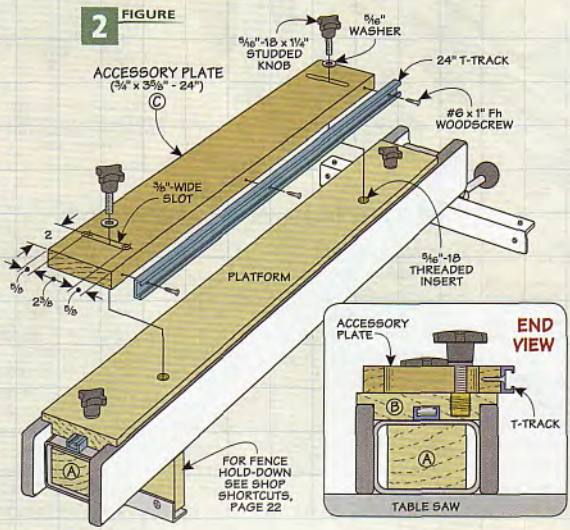
The filler piece is sized for an easy fit into the fence tube. I didn't want to have to pound it in place.

Mounting Platform. To provide a place for adding the accessories, I made a platform that attaches to the guide track. The important thing about sizing this piece is that it should match the width of your rip fence. Then there are several details to work on.

Rabbets & Groove. The first thing to do is cut a pair of rabbets and a groove along the bottom face. The rabbets are cut so the platform nestles around the fence faces and rests on the top of the tube, like you see in the End View above. In a similar fashion, I cut a groove to accept the T-track.

The next task is to some holes. The first pair line up with the T-track and allow the platform to lock in place with flange bolts, washers, and knobs. Another pair in the platform accepts threaded inserts. These will be used to mount the accessories you'll build later on.





This takes care of the "fixed" portion of the accessory system. You can now attach the platform to the T-track and get started on making the accessories.

ACCESSORY PLATE

As I mentioned earlier, it's not easy to clamp some accessories, like a featherboard, to a rip fence. So the first thing I added to the platform was an adjustable accessory plate, as you can see in Figure 2.

The accessory plate is a board with a slot cut in it near each end. The slots allow the plate to be adjusted in and out. Along one edge, there's a length of T-track. This makes it easy to attach a shop-built or commercial featherboard and adjust it so it provides pressure in exactly the right location.

Stop Block. The accessory plate accepts more than just featherboards. One shop-built add-on I made is the stop block shown in the upper right photo. It's used along with the miter gauge and serves as an end stop for crosscutting short pieces from a long blank. This way, when the piece is cut free, it won't bind between the rip fence and blade.

The adjustable stop consists of two identical pieces of hardwood that are screwed together in an "L" shape, as shown in the End View detail above. A knob and flange bolt makes it quick and easy to mount it to the accessory plate.

TALL FENCE

Besides featherboards and stop blocks, another thing I attach to my table saw's rip fence is an auxiliary fence. In the past, I used primarily two kinds of auxiliary fences.

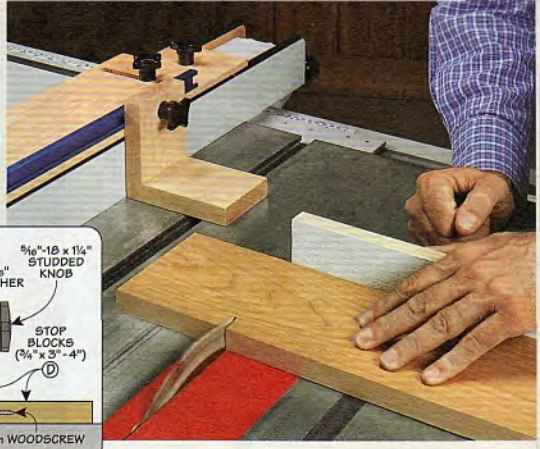
One version was a sacrificial fence for rabbeting. This fence allowed me to "bury" an extra-wide dado blade in the fence.

The other was a tall fence for cutting a workpiece on edge. Here, I just needed a wide bearing surface to provide additional control on a workpiece. I used it for making raised panels, or cutting grooves in the edge of wide pieces. For this rip fence system, I combined the two functions into one accessory.

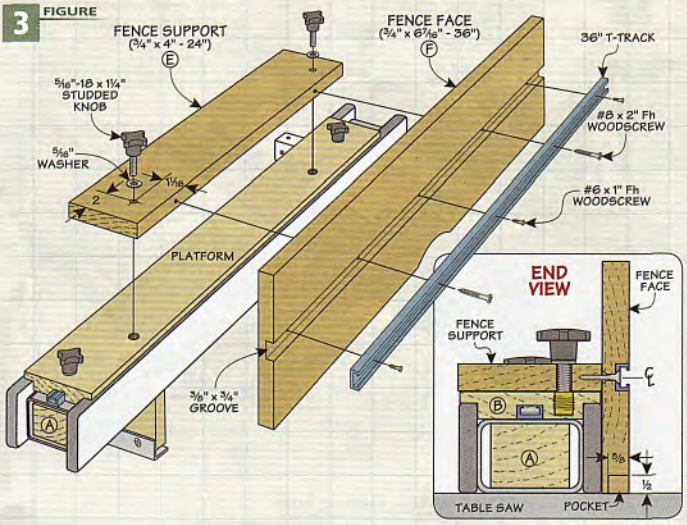
You can see what I'm talking about in Figure 3. It consists of two pieces. A fence support holds the fence to the platform. This piece is screwed to a tall face piece. Along the center of the face, I cut a groove and installed a length of T-track. As before, this makes it easy to attach a featherboard or other type of hold-down.

What makes this fence a two-in-one design is that the fence is reversible. One edge is flat and smooth. The other edge has a pocket for a dado blade.

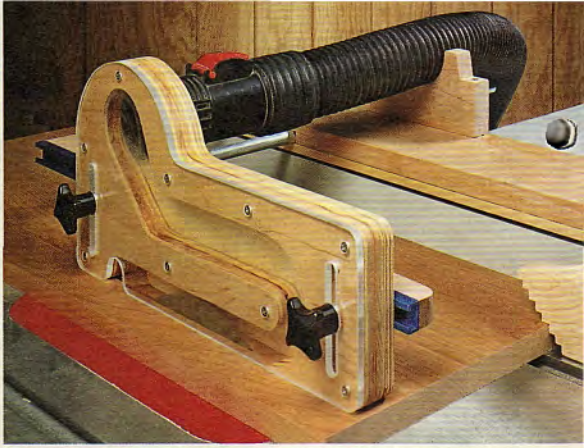
To create the pocket, all you need to do is install a wide dado blade in the table saw. Then lower the blade below the table. Slide the auxiliary fence over the insert plate and turn on the saw. Then slowly raise the blade — about ½"



► **Stop Block.** *Attach this L-shaped stop block to the rip fence system for crosscutting short pieces. Locate the stop ahead of the blade to prevent binding.*



making the Blade Cover



▲ **Dust-Free Cutting.** *This two-in-one blade cover forms a barrier to keep you safe. And it has a built-in port to accept a shop vacuum hose. Adjustment slots let you change the height to match the workpiece.*

The final component of the accessory system is a blade cover. And it has a couple of advantages over the blade guard and splitter assembly that came with your saw.

The main benefit is that this is just a blade cover. So that means you can use it on non-through cuts like dadoes and grooves. Note: Because the blade cover doesn't have a built-in splitter, it's a good idea to use an aftermarket splitter or install one in a shop-made zero-clearance insert plate.

The blade cover has one other important feature I like — built-in dust collection capability. Its design allows you to plug in your shop vacuum and collect dust and chips right at the source.

Mounting Assembly. The blade cover actually consists of two sections. First, there's the mounting assembly that connects the cover to the platform on the rip fence. The other section is the three-piece blade cover assembly.

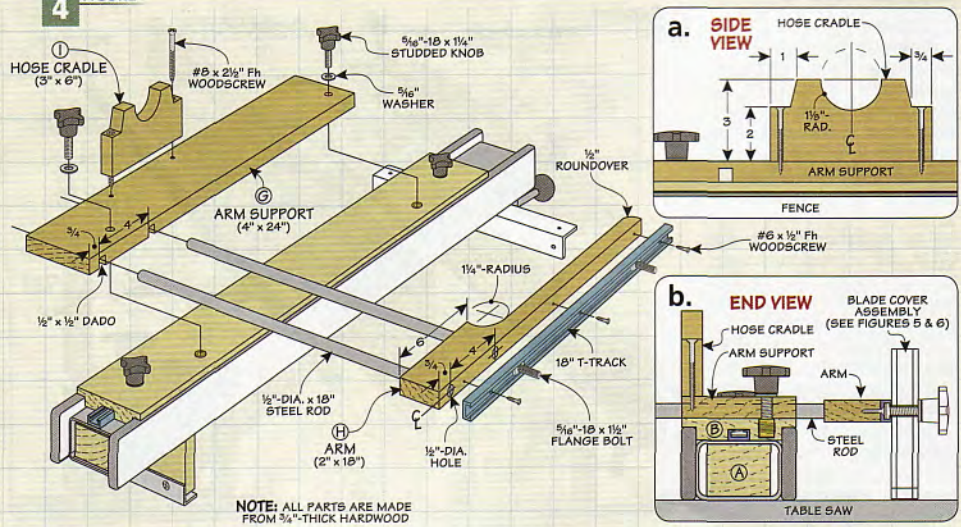
Arm Support. You can see what goes into the mounting assembly in Figure 4. The first piece to make is the arm support. It's similar to the accessory plate and fence support you made earlier. But there are a few key differences.

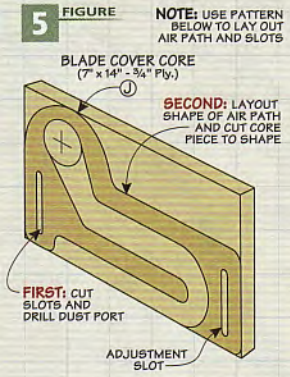
The main difference is the set of dadoes cut on the bottom face. These accept a pair of steel rods. This lets you easily adjust the position of the blade cover. Just be sure to cut the dadoes for a snug fit.

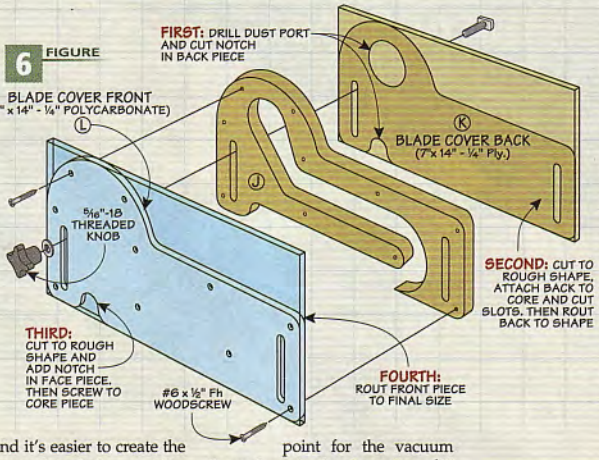
The other difference is the hose cradle attached to the top. As you might guess, it holds the vacuum hose in place when it's plugged into the blade cover.

Arm. Attached to the other end of the steel rods is the final piece

FIGURE 4







of the mounting assembly — the arm. Its curved shape provides clearance when the cover is located close to the rip fence. On the other side, I attached another piece of T-track. This allows you to quickly slide the blade cover on and adjust its position above the blade.

Blade Cover. That brings us to the blade cover assembly. You can see in Figure 6 that it's a sandwich of three layers. Figures 5 and 6 show you the order of construction, so I'll just hit some highlights.

You can start by making the core piece from a ¾" plywood blank. You'll find it's easier to create the adjustment slots before cutting the core to shape. Then lay out the air path using the pattern below.

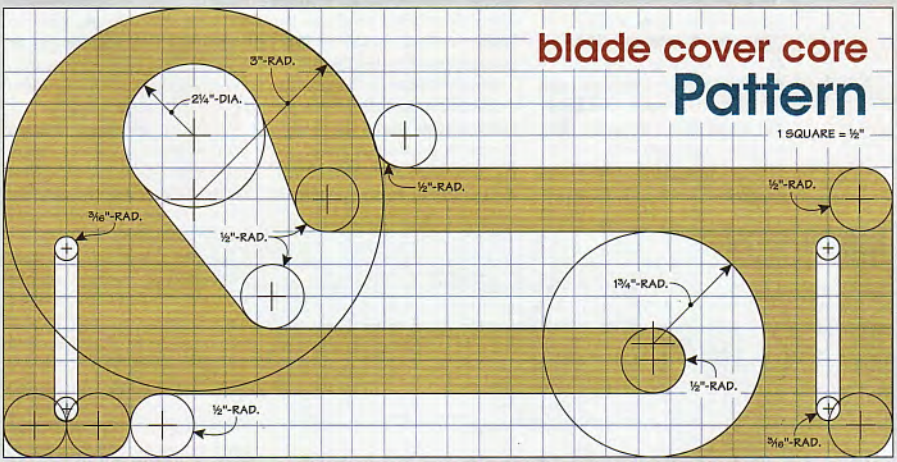
From there, you can cut the core to shape at the band saw. I did use a 2¼"-dia. Forstner bit to drill out the end of the air path where the shop vacuum hose connects. Now, you're ready to make the faces.

Faces. The faces of the blade cover enclose the air path for dust collection and form a physical barrier to keep your hands away from the blade. The back face is made of ¼" plywood for a solid connection point for the vacuum hose. I made the front from ¼" polycarbonate for visibility.

Each face has a notch on the lower edge. This provides adequate airflow for the shop vacuum to be most effective.

To shape the faces, I cut them to rough shape at the band saw. Then, I attached them to the core piece (glue for back, screws for front) and trimmed them with a flush trim bit at the router table.

With these accessories close at hand, you find using your table saw will be easier than ever.



from a materials list to a Cutting Diagram

In my shop, once a design is complete, the next task is creating a cutting diagram from a materials list or list of parts. All it really involves is a few simple sorting and shuffling steps. And it's the process I use on every project I build to get the most from my materials.

List by Thickness. The first step is to separate all the parts by thickness. I make a separate chart for solid-wood parts and below that, another for any sheet stock like plywood, hardboard, or MDF.

If you look at the materials list below, you can see how it's used to create the "thickness chart" at the top of the opposite page.

I use the same letter designations as the materials list and write each one under the appropriate thickness as I work through the list. Be sure to write down the quantity of each part that's required, too. What you'll end up with is a list of parts separated by thickness.

Sort by Width & Length. The next step is to sort the list you just generated by width and length. Start with the thickest pieces and list these from the widest to narrowest. If you have a number of parts the same width, list them from longest to shortest. This step makes it easier to lay out the cutting diagram and group the parts.

Lay Out the Cutting Diagram. The last thing to do is draw the parts on some imaginary boards. (A computer drawing program makes this easy and changes are a snap.) This starts to give me a rough idea of how much material I'm going to need.

How wide you draw each board is up to you, but I find it best to work with ½" increments. Note: For larger projects, you may find it's easier to create separate boards for each thickness.

Start by drawing in the thickest parts along one edge and label them with the part letter. Be sure to draw in the correct quantity. And match the length of the piece with the grain direction of the board. Note: At this point, I don't worry about accounting for saw kerfs.

Continue this for each different thickness until all the parts are

Materials

A	Case Top/Bottom (2)	½ x 8½ - 18⅛	I	Frame Bottom (1)	¾ x 1½ - 12½
B	Case Sides (2)	½ x 8½ - 3⅜	J	Frame Arches (2)	¾ x 3½ - 13½
C	Case Divider (1)	½ x 8¼ - 3⅜	K	Backer Board (1)	10 x 15 - ¼ Ply.
D	Case Back (1)	17⅝ x 3⅜ - ¼ Ply.	L	Drawer Fronts (2)	¾ x 2⅝ - 8¼
E	Top/Btm. Panels (2)	½ x 10 - 19⅝	M	Drawer Backs (2)	½ x 2⅝ - 7¾
F	Molding (1)	⅜ x ⅜ - 120 Rgh.	N	Drawer Sides (4)	½ x 2⅝ - 7⅞
G	Support Arms (2)	¾ x 2⅜ - 11¼	O	Drawer Btms. (2)	7½ x 7¾ - ¼ Ply.
H	Frame Sides (7)	¾ x 1½ - 11	P	Drawer Stops (2)	½ x ⅛ - 8¼

accounted for (or the board fills up). By starting with the largest parts first, you can fit in the smaller parts later and minimize any waste.

The goal here is to separate the imaginary board (or boards) into sections with common cut lines. So when you do begin cutting, it should take only a couple rips and a couple crosscuts to separate the board into more manageable sections. And each section will contain pieces of the same desired thickness. You can see how this works out in the final cutting diagram shown below.

Before You Cut. At this point, you have a "road map" for laying out the workpieces on your actual boards. (I use a piece of white chalk for this.) And keep in mind that the final cutting diagram on the actual boards may not look anything like your imaginary layout (main photo on opposite page).

There are a couple reasons for this. First, you may run into defects in the wood, such as knots, checks, or sapwood. You don't want any of these to show up in your project. So be sure to work around any problems you find.

Another reason to change the layout is to get the best grain match. I do this when I want the grain running continuously around a box or case. It's also the reason I buy extra wood for a project (usually about 20-25% more).

Working the Puzzle. As I work, I look at the shape and size of the pieces on the cutting diagram and then start shifting them around mentally to match the boards I have on hand. And always try to group similar-sized pieces together. This way, you end up with fewer cuts and less waste.

It's also a good idea to oversize the parts a bit to provide extra material for final cleanup later. And no matter what, be sure to account for the width of each saw kerf. It's all too easy to lay out everything and then find that the last couple of cuts result in a few parts being too short or too narrow.

Make the Cuts. Once you have the layout complete, you can cut the board into separate sections that represent pieces of the same thickness or width. After planing any sections needed down to the final thickness, you can cut all the parts from each section to their required sizes.

Sheet Goods. There's one occasion where a cutting diagram comes in especially handy. And that's when a project calls for sheet goods, like plywood or MDF.

The goal here is to minimize waste and the number of cuts. For plywood, that means paying attention to the direction of the grain (top layout drawing at left). But for MDF, simply focus on minimizing any waste. Once that's done, you can follow the cutting diagram exactly.

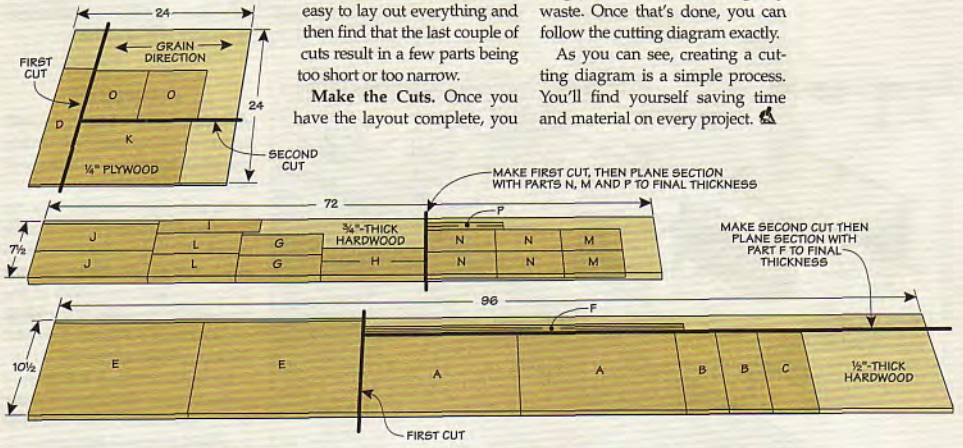
As you can see, creating a cutting diagram is a simple process. You'll find yourself saving time and material on every project.

Thickness Chart

Hardwood			
3/4"	1/2"	3/8"	1/4"
G (2)	A (2)	F (1)	
H (2)	B (2)		
I (1)	C (1)		
J (2)	E (2)		
L (2)	M (2)		
	N (2)		
	P (2)		
Plywood/Hardboard/MDF			
3/4"	1/2"	3/8"	1/4"
			D (1)
			K (1)
			O (2)

Width/Length Chart

Hardwood		Plywood	
J (2)	3/4 x 3 1/2 - 13 1/2	D (1)	17 5/8 x 3 3/16 - 1/4
L (2)	3/4 x 2 5/8 - 8 1/4	K (1)	10 x 15 - 1/4
G (2)	3/4 x 2 3/8 - 11 1/4	O (2)	7 1/2 x 7 3/4 - 1/4
I (1)	3/4 x 1 1/2 - 12 1/2		
H (2)	3/4 x 1 1/2 - 11		
E (2)	1/2 x 10 - 19 5/8		
A (2)	1/2 x 8 1/2 - 18 1/8		
B (2)	1/2 x 8 1/2 - 3 3/16		
C (1)	1/2 x 8 1/4 - 3 3/16		
M (2)	1/2 x 2 5/8 - 7 7/8		
N (4)	1/2 x 2 5/8 - 7 3/4		
P (2)	1/2 x 1/8 - 8 1/4		
F (1)	3/8 x 3/8 - 120		



▲ ***Sorted List.*** *Sort parts by thickness first, then sort each individual thickness by width and length.*

our 5 favorite Push Blocks

Push blocks add safety and improve control. Here are five shop-made push blocks every woodworker should have.

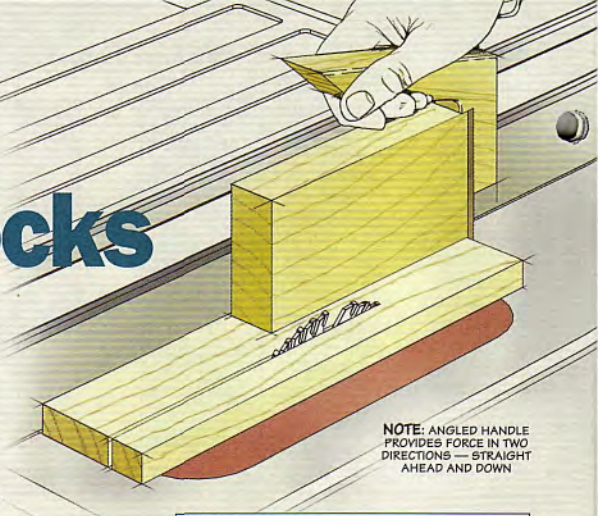


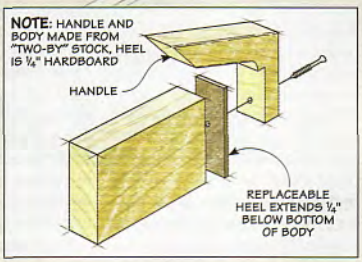
TABLE SAW ►

It's probably the most important safety rule: Keep your fingers away from blades and bits. And push blocks can help out with all tools, starting with the table saw.

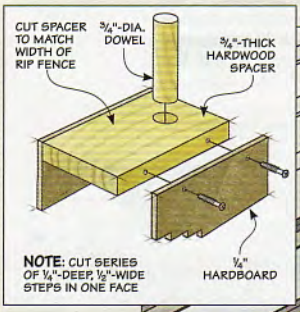
The best thing about the table saw push block shown in the drawings above and at right, is the handle. It's designed to exert forward and downward pressure to push the workpiece through the blade and prevent chattering.

The replaceable body (made from "two-by" stock) rides on edge to put extra inches of solid wood between your fingers and the blade. And the hardboard heel, also replaceable, pushes the workpiece past the blade without any danger of kickback.

To make replacing them easier, I used a screw to attach the handle to the heel and body. This means you'll get double the life from the push block by turning it over once one edge has gotten chewed up.



When you make this push block, take the time to make several extra bodies and heels. This way, you'll always have replacements on hand whenever you need them.



◄ THIN STRIPS

A saddle-style push block will allow you to rip thin pieces safely and consistently at the table saw, as shown in the drawing at left.

This design straddles the rip fence and is made from a couple of pieces of hardboard and a hardwood spacer. (Note: Size the spacer to match the width of the rip fence.) One side of the block has a series of notches that "catch" the end of the workpiece.

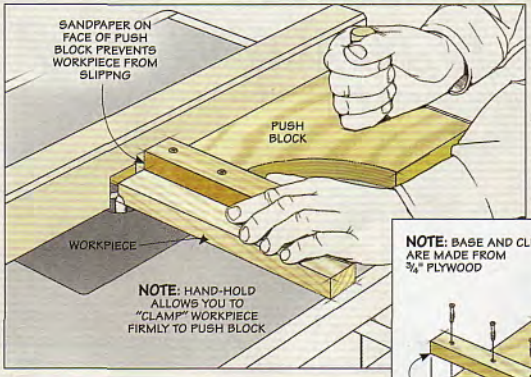
To use it, simply set the rip fence to the width of the piece you want to cut and rip as many strips as you need from a wide board.

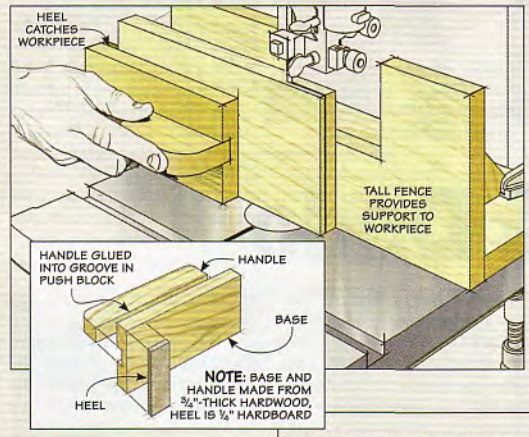
ROUTER TABLE ►

Routing the end grain of a workpiece is always a challenge. To do it easily and safely, you need something to back up the workpiece and keep it square to the bit.

You also want to keep your hands safely away from the router bit. The push block shown in the drawing at right does both jobs.

The push block features a base with a cleat at the front. A dowel serves as a simple handle. And, as you can see in the detail drawing, a cut-out section of the base allows you to securely "clamp" the workpiece to the cleat with your hand.





◄ BAND SAW

If you do a lot of resawing, you know there can be problems when you try to push a tall, narrow workpiece through a band saw blade.

It helps to have a tall fence for the workpiece to rest against. But more importantly, you need a push block, like the one at left.

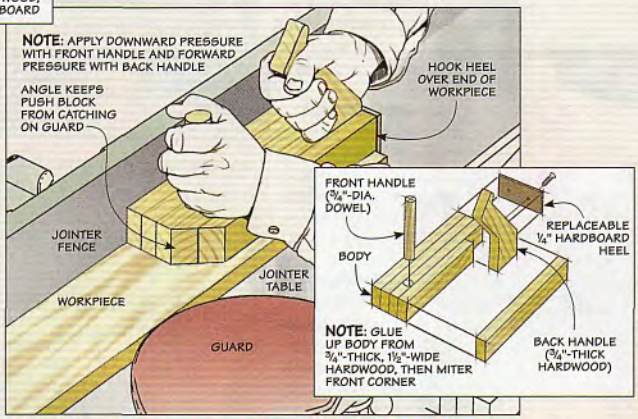
The thin heel on the back of this push block helps you drive the board through the blade as you come to the end of a cut.

JOINTER ►

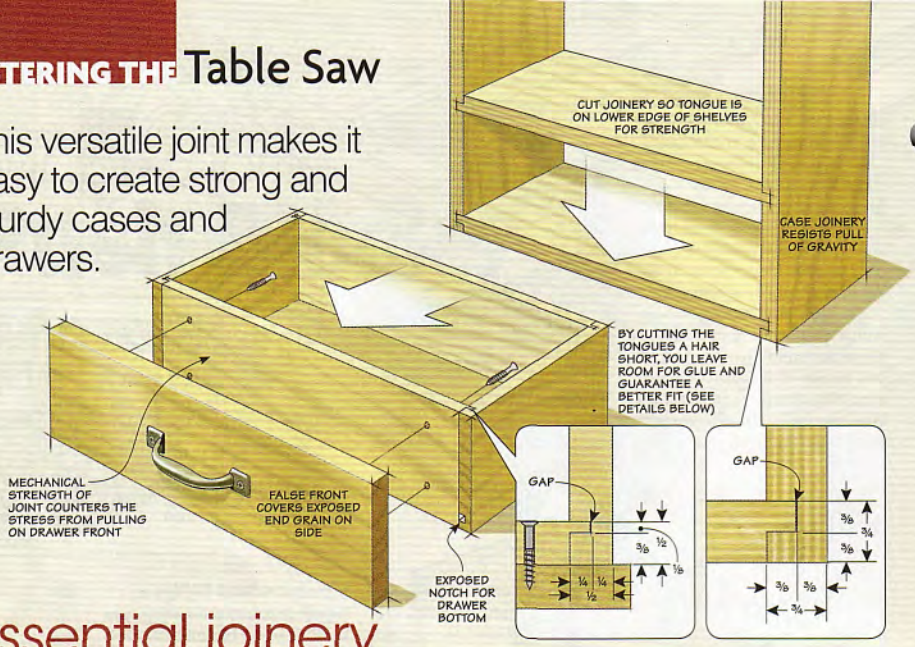
One other tool where I definitely use a push block is a jointer. And the push block at right offers a two-handed solution to controlling a board as you work. This push block lets you apply forward and downward pressure on a board as you run it through a jointer.

The secret is in the handles. The shape and placement of the front and rear handles make it easy to use on both short and long boards.

And best of all, the thickness of the body offers ample protection, keeping your hands safely away from the jointer cutterhead.



This versatile joint makes it easy to create strong and sturdy cases and drawers.



essential joinery

Tongue & Dado

When I'm building a case, I want the joinery to be both strong and easy to make. A good example of this is a tongue and dado joint. It has a few advantages. The interlocking parts make aligning the case pieces during assembly a snap. And it provides a good amount of glue surface for a long-lasting connection.

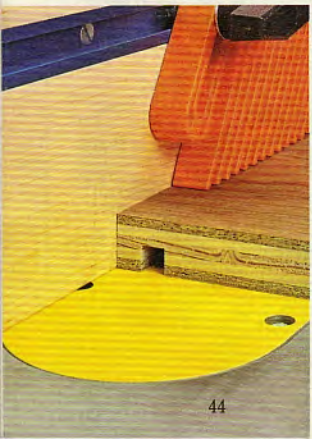
Cases & Drawers. Another benefit of this joint is that, with a few adjustments, it works equally well on both cases and drawers. The drawings above give you a good overview of how the joint works in a case (or drawer).

A dado is cut near each end of the case sides (or drawer sides). Then a mating tongue is cut on the case top, bottom, and shelves (or drawer front and back), as shown in the photos at left. There's a simple reason for this arrangement.

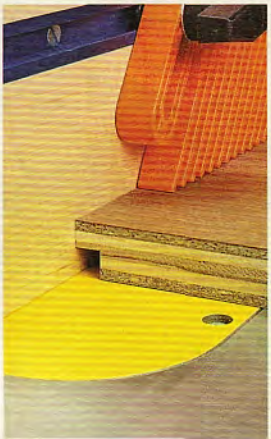
In the wall cabinet shown above, the joinery resists the pull of gravity. In a drawer, the joints need to stand up to the repeated tugging on the drawer front. In both cases, the interlocking nature of a tongue and dado joint fills the bill.

Exposure. But there are a couple drawbacks with this technique. With a plywood case, the top and bottom reveal exposed ends.

In drawers, there are two problems. The front has exposed end grain from the sides. And typically, you see a notch from the groove for the drawer bottom.



◀ ***Dado First.*** *The first half of the joint is a dado cut near each end of the side pieces.*



▶ ***Rabbet to Fit.*** *The other part of the joint is a rabbet that creates a snug-fitting tongue for the dado.*

The obvious solution for a case is to top it with a cap. And for the drawer, to add a false front. Yes, it does add an extra step, but it's worth considering when you're designing a project.

Now that you have a good idea of the basics of a tongue and dado joint, the next step is mastering how to cut it accurately.

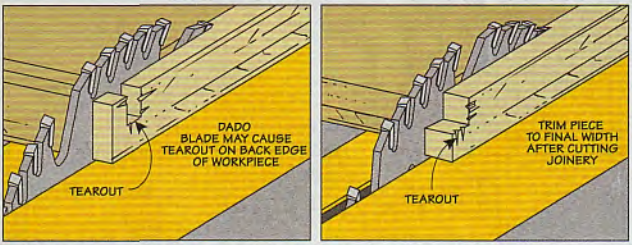
CUTTING THE JOINERY

I have a few goals when creating this joint. First of all, when it's assembled, the ends of the case sides should be flush with the top and bottom. And the two pieces should fit together with hand pressure.

Finally, the tongue should almost, but not quite bottom out in the dado. This provides extra space for glue, but more importantly, it allows the shoulder of the joint to close tightly. All this should add up to a case (or drawer) that's square and rock solid.

Note: For this process, I'll be referring to making a plywood case. You can find out the specific details on making drawers in the box on page 47.

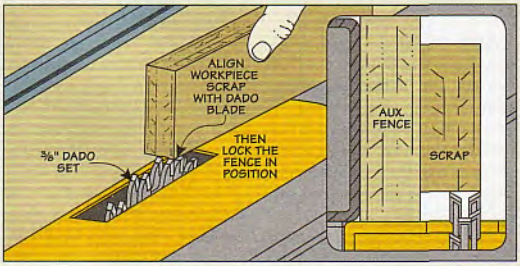
shop tip: Removing Tearout

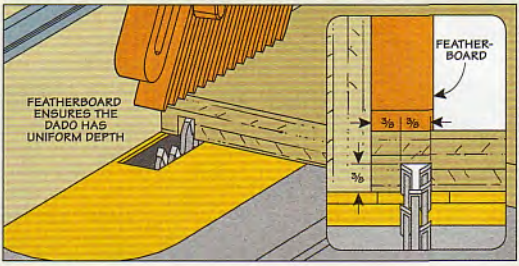


▲ ***Eliminate Tearout.*** *Cutting dadoes and rabbets can lead to tearout on the trailing edge of the workpiece. You can use a backer board to support the edge. But often, I find it's easier to cut the case panels a bit wider than I need. Then when I'm finished cutting the joinery, I can trim the panels to size and cut away the tearout.*

Creating the Dado. Creating a tongue and groove joint can be neatly broken down into two steps — making the dado and then cutting the tongue.

I like to start by cutting the dado. I find it's easier to adjust the thickness of the tongue and sneak up on a good fit than trying to change the width of the dado.





There are three things to consider when cutting the dadoes: location, width, and depth.

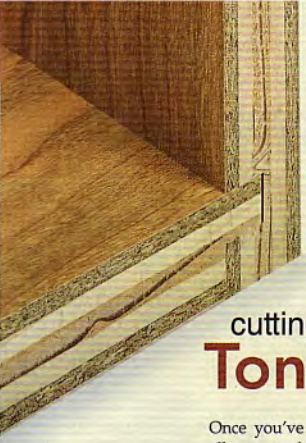
As I mentioned earlier, one of my goals is making sure the assembled joint is flush on the end. So accurately locating the dado in the side is key. Of course, it's a good idea to make a few tests cuts. But to get in the ballpark, I use a mating piece (or cutoff) as a set-up gauge (upper drawing at left).

Width. At first glance, it would seem like any width dado would work. But there's a catch. The dado creates a short grain section that can be easily popped if the joint is stressed. So the idea here is to keep this piece as long (wide) as possible. For ¾" plywood, a ⅜"-wide dado is what I usually choose.

Depth. The last thing to think about is the depth of the dado. You don't want to compromise the strength of the sides, so the dado should be no more than half the thickness of the sides (⅜").

Cutting the Dado. When you're ready to make the cut, you want to make sure the dado is a consistent depth. To do this, I like to attach a featherboard to the rip fence.

One more thing, since this is a crossgrain cut, tearout can be a problem. Check out the box above for an easy way to eliminate it.



◀ **Perfect Fit.** *You know it's right when the joint pulls tight and the ends are flush.*

cutting the Tongue

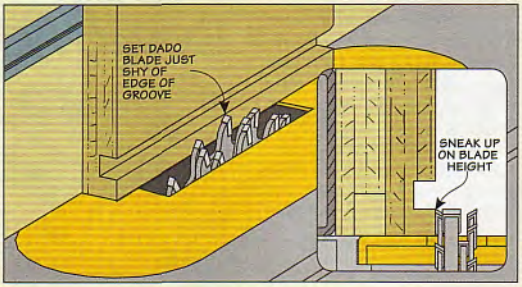
Once you've cut the dadoes on all your workpieces, you can turn your attention to cutting the other half of the joint — the tongue.

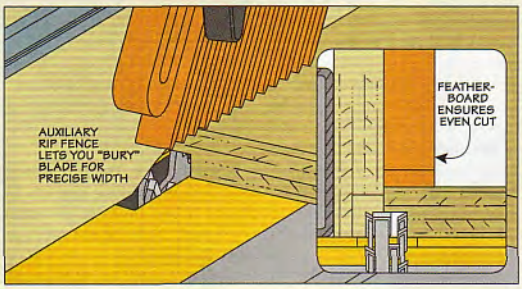
It sounds simple enough, but there's a little more to the process. Remember the goals I mentioned earlier. The tongue should slide easily into the dado, without any slop. And the shoulder of the joint needs to close up tight.

Saw Setup. The first thing you'll need to do is change the setup of the table saw. Start by installing a dado stack that's wider than the final length of the tongue.

Then attach an auxiliary rip fence. This allows you to bury the dado blade in the fence to "dial in" the exact length of the tongue. (You can find plans for an auxiliary fence on page 34.)

Just like when you cut the dadoes, it's a good idea to attach a featherboard to keep the thickness of the tongue consistent.





That takes care of the saw setup. Now you can focus on fine-tuning the saw for the cut. This involves two things — setting the blade height and the width of the cut.

Blade Height. The height of the dado blade should leave a tongue that just fits in the dado. Once again, making some test cuts is the way to go. But you can eyeball the height by using one of the side pieces as a gauge (upper drawing above). Place a side piece on end and raise the blade until it's almost even with lower edge of the dado. This gets you in the ballpark.

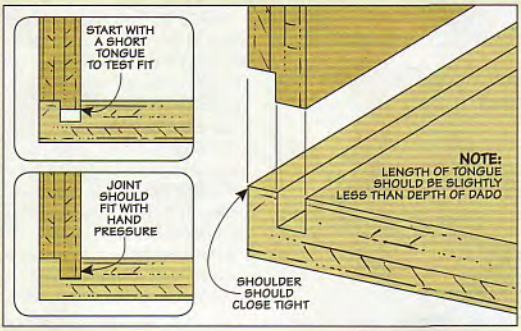
To get the blade height set just right, you'll need to bring in the rip fence. I like to bury most of the blade and make a test cut, as shown in the lower drawing above.

This creates a short tongue. Check the fit of the tongue in one of the dadoes you cut earlier (drawing at left). It will probably be a bit "fat."

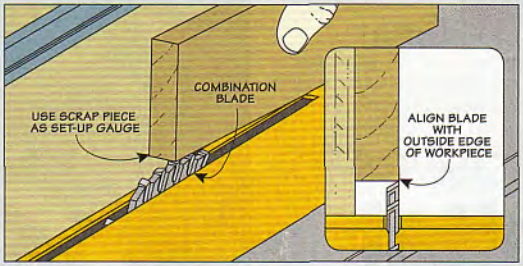
Simply raise the blade a hair and make another cut. Then just repeat this process until you end up with a nice, not-too-tight fit.

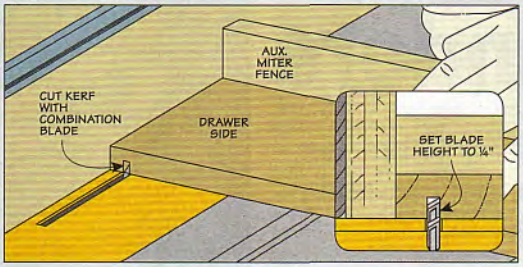
Width. With the blade height set, you can follow a similar process to adjust the width. Bump the rip fence over and make a series of test cuts. Your aim is for the shoulder of the rabbet to pull tight (as in the lower detail at left) and not bottom out in the dado.

Finally, you can cut tongues on all your remaining workpieces. The payoff is a case that assembles easily (photo above) and is strong and sturdy for years of use.



solid-wood Drawers





What makes tongue and dado joinery a favorite is that it's versatile enough for case construction and making easy-to-assemble drawers. After all, drawers are really nothing more than small cases.

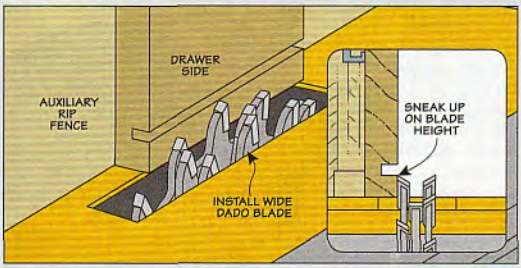
Since drawers are smaller in scale, it makes sense to scale down the joinery, too. Don't get me wrong. The joinery will still be plenty strong. In the example here, the drawer parts are made from ½"-thick hardwood.

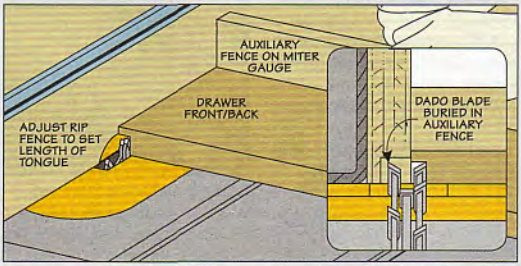
Narrow Dado. Sizing the joinery starts with the dado. Instead of a dado set, I like to use a standard combination blade. Here again, the reason is I want to prevent the short grain section ahead of the kerf from popping off. Using a ⅛"-wide blade leaves this vulnerable section as long (wide) as possible.

Setting up for this cut works about the same as it does for case construction (upper right drawing). First, set the rip fence to align the outer edge of the teeth with the outside face of a scrap piece that matches the thickness of the drawer front or back. Then adjust the blade to a height of a ¼".

Preventing Tearout. When cutting the dadoes, I use the miter gauge fitted with an auxiliary fence to guide the narrow drawer parts across the blade. The auxiliary fence also backs up the cut to prevent tearout, as illustrated in the lower drawing above.

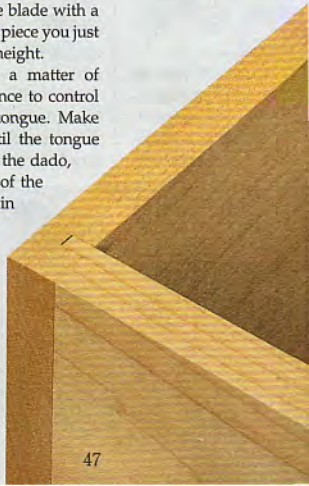
Then as you make the cut, provide firm downward pressure on the workpiece. This keeps the dado a consistent depth.





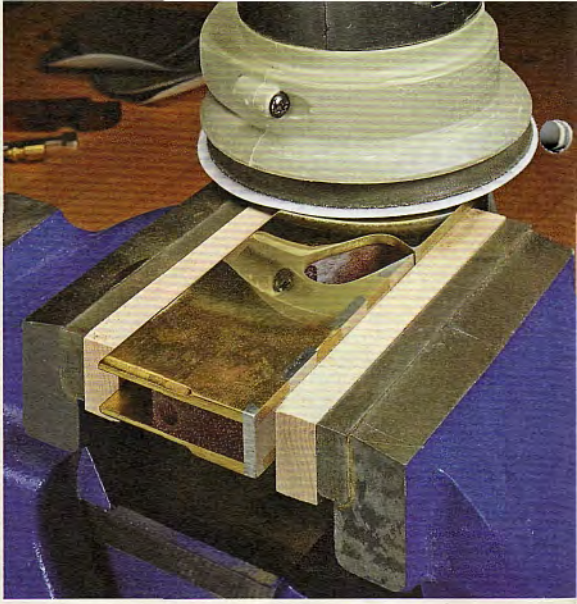
Cutting the Tongue. Setting up for cutting the tongue is shown in the drawing at left. As you can see, I replaced the single blade with a dado blade. Use the piece you just cut to set the blade height.

Now it's simply a matter of adjusting the rip fence to control the length of the tongue. Make a few test cuts until the tongue slides securely into the dado, stopping just short of the bottom, as shown in the photo at right.



► ***Drawer Joint.*** *A single blade kerf provides the anchor point for the tongue in drawer construction.*

abrasives for Orbital Sanders



With the right abrasive, your sander can really make a project shine.

In my shop, it's not unusual for me to be working on projects with both wood and metal components. And when it comes time to smooth and finish the metal parts, conventional sandpaper just doesn't give me the results I'm looking for. Fortunately, there are other types of abrasives that work better and are available in hook-and-loop disks for a random orbit sander (refer to Sources on page 51).

NON-WOVEN MATERIAL

One of my favorite types of abrasives is non-woven material. It's made from a synthetic material and is available in a range of "grits" from coarse to very fine (used mostly for polishing).

▼ ***Rough & Tough.*** *3M's Scotch-Brite surface conditioning disks remove rust, grime, and scratches.*

Rough Duty. There are some "heavy-duty" disks from *3M* that are made specifically for metal (lower left photo). These *Scotch-Brite* disks are more aggresive than your typical disk because there's a coarse abrasive bonded to the non-woven material.

These disks work great to remove light rust or oxidation, dirt, and grime from steel, brass, or aluminum. And they're perfect for the cast-iron surfaces of power tools like my table saw.

Cautions. There are a couple of things to point out about using these *3M* disks. The disk didn't "stick" very well to my sander's pad. It would spin loose from the sander during use. To hold the disk more securely on my sander, I used a replacement pad by *Mirka* (box at bottom of opposite page).

As I said before, the *3M* disks are really aggressive. They'll leave scratches at first. But if you work your way up through the grits, you end up with a nice, clean surface (photo at left).

Finer Disks. After the dirty work is done, you're ready to work toward a more polished finish. For that, I like to use non-woven disks (photo below). They're hard to find, but you can easily cut

▲ ***Finer Finishing.*** *Non-woven pads will polish up wood finishes or bring a shine to metals like brass and aluminum.*

◀ **Versatile.** *Micro-Mesh abrasives work great on bare wood, wood finishes, and metals.*

disks from the 6" x 9" pads available from woodworking suppliers. These disks do a good job of removing fine scratches.

Non-woven disks work equally well on wood finishes or metals, including aluminum and brass. (They aren't meant to be used on bare wood.) Because they fit on my orbital sander, they take the drudgery out of polishing tasks.

ULTRA-FINE ABRASIVES

If it's a mirror finish you're after, you need to use ultra-fine abrasives. That's when I turn to the *Micro-Mesh* disks by *Micro-Surface Finishing Products*. They're available in grits from 1,800 to 12,000 with a range of hole patterns to fit most sanders. You can see a sampling of these disks above (without the holes). They replace steel wool and traditional polishing abrasives like pumice and rottenstone.

Wood or Metal. The nice thing about the *Micro-Mesh* products is their versatility. They work especially well on metal surfaces. Plus, they can by used on bare wood prior to finishing. And they're great for smoothing out a finish between coats and final polishing.

Mighty Fine. The trick to getting a mirror finish on wood or metal is eliminating all the scratches. With any polishing operation, it's important to remove the scratches left by the previous grit. For an ultra-smooth, polished surface like you see on the shoulder plane at right, it doesn't pay to "cut corners" by skipping grits. This results in a lot of frustration and unnecessary effort. But if you take your time and work your way up through finer and finer grits, the results will speak for themselves.

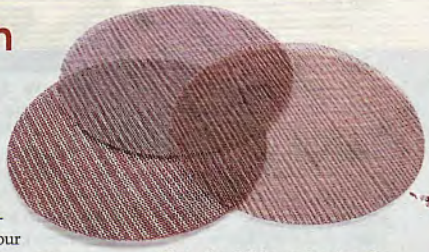
▼ **Final Finish.** *The ultra-fine grits of Micro-Mesh abrasives excel at final polishing.*

Final Finish. Using the right abrasive for the task and material at hand means less elbow grease and a finish you can be proud of. For wood projects, take a look at the box below for a unique abrasive you'll want to add to your shop arsenal.

dust-free sanding with Abranet

When I first used *Mirka's Abranet* abrasives, I couldn't believe what I was seeing — or *wasn't* seeing. There wasn't a cloud of dust filling the air like you would normally see when sanding. And there was virtually no dust left on the workpiece afterwards.

The secret is in the loose, open mesh you see in the disks at right. The abrasive grit (P80 to P800) is bonded to a screen-like material. This has some major benefits. The sanding dust is sucked up through the abrasive more efficiently by your shop vacuum or dust collector. Second, the abrasive lasts longer because it doesn't "load up" with sawdust like traditional paper-backed abrasives.



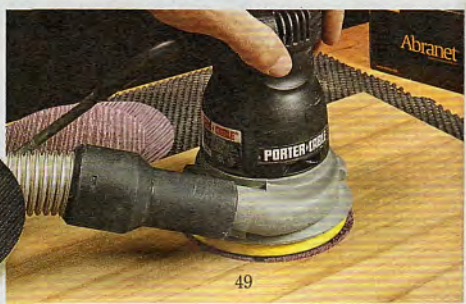
Upgrade. To help with dust extraction, you can purchase a *Mirka* replacement pad for your sander, like you see below. The number of holes and their location means it's designed for maximum dust collection. Of course, it works best when your sander is attached to a shop vacuum or dust collection system.

But that's not all I like about this backup pad. First, you can find one for just about any make and type of sander. It's a direct replacement for the factory pad.

▲ **True Grit.** *Abrasive particles are bonded to a mesh material for long life.*

Plus, the *Mirka* pad grips the disk better than my sander's stock pad. I found that a non-woven abrasive was less likely to come loose during use. Whether or not you use the *Abranet* abrasives, the backup pad is a great upgrade.

► **Better Backup.** *Mirka's backup pads are a great upgrade for better grip and improved dust collection.*



Q&A

questions from
Our Readers

deciding on a Planer or Sander

I have a 12½" thickness planer. Other than the extra width, are there other advantages to using a drum, or thickness sander over a planer?

Jim Liotine
Oklahoma City, Oklahoma

While a thickness planer and drum sander might seem similar in function, they are two distinct tools with differing roles. So even though you have a planer, a drum sander can be a great addition.

Reducing Wood Thickness. If your main goal is to remove a lot of material quickly, then a thickness planer is the tool of choice (upper right photo). It planes wood using a round cutterhead that's equipped with a set of sharp knives.

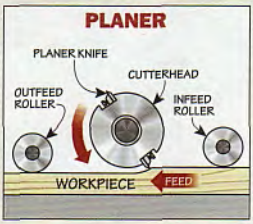
As you feed wood into the planer, these knives can take up to ⅛" off the thickness of a workpiece at a time, depending on the type and width of material (lower left drawing below). While a planer can reduce the thickness of a workpiece quickly, there's a tendency for tearout on some materials, and sometimes a lot of sanding is necessary to achieve a smooth surface.

▲ ***Planer vs. Sander.*** *A planer reduces thickness quickly (upper photo), while a sander is preferred for wider stock (lower photo) or thinner workpieces (inset).*

Flattening & Sanding. A drum sander doesn't have the capability to quickly reduce the thickness like a planer does. Here, a conveyor belt feeds a workpiece under a metal drum wrapped with a sanding strip. So it's best to only take 1/32" to 1/16" off a workpiece at a time. Where a drum sander really shines is in flattening panels and taking care of the initial sanding on most workpieces. It's also a great choice for highly figured woods like curly or bird's-eye maple — materials that often chip out under a planer's knives.

Plus, many drum sanders are open at one side. This makes it easy to increase its overall capacity by running the workpiece through twice, turning it between passes, as in the lower photo above. Finally, working with thin materials is a breeze (inset photo above). In a planer, it's possible for thin materials to break apart.

Deciding. Having both tools is ideal. But if most of your work is thicknessing stock, a thickness planer is the best choice. And then I'd add a drum sander to handle troublesome stock and to make it easy to sand large panels (or any workpiece) flat and smooth.



Sources

Most of the materials and supplies you'll need for the projects are available at hardware stores or home centers. For specific products or hard-to-find items, take a look at the sources listed below. You'll find each part number listed by the company name. See the right margin for contact information.

T-TRACK *(p.10)*

You can order basic T-track (in various lengths) and T-track accessories from most woodworking vendors. For specialty items mentioned in the article, take a look at the list below:

- **Woodpeckers**
  - *Super Track (24")* SPT-24
  - *Super Track (36")* SPT-36
  - *Combo Track (48")* CT48
  - *Dual Purpose Track* ... DPTRACK36
  - *¼" T-Track (36")* T36
  - *Universal Track Clamp* ..... UTC
  - *1" Flip Stop* 13-TTFLIP
  - *T-Track Block* TBLOCK14
  - *¼" T-Track Nut* TNUT14
  - *Incra TT+ Scale* ... TTRACKPLUS
  - *Incra Jig T-Track* ... TTRACKREG
- **Lee Valley**
  - *¼"-20 x 2" T-Bolts* 12K79.72
  - *¼"-20 x 1" T-Bolts* 05J21.15
  - *Double T-Slot (36")* 12K79.44
  - *Slotting Bit* 16J60.80
  - *Kreg Track System* 86N40.20
- **Rockler**
  - *Bench Dog T-Loc Track* 25471
  - *T-Track Intersect. (½")* 32453
  - *T-Track Intersect. (⅜")* 34970
  - *Bench Dog Dual Track* 23880
  - *Cam Clamp* 58244
  - *Kreg Top Trak* 26358
  - *Kreg Bench Clamp Kit* 29974
  - *Kreg Klamp Table* 36078
  - *Kreg Klamp Trak* 39052
- **Amazon.com**
  - *Kreg Combo-Trak* KMS7448
- **Woodsmith Store**
  - *Cam Clamp* 456320
  - *T-Track Intersect. (½")* 456284
  - *Kreg Top Trak* 273734
  - *Kreg Bench Clamp Kit* 618028
  - *Kreg Klamp Table* 618049

SHARPENING STATION *(p.16)*

- **175° Fully Concealed Hinges**
  - *Rockler* 66613
- **Door Pulls**
  - *Reid Supply* DUH-55
- **Silicone Sheet**
  - *McMaster-Carr* 5812T225
- **Dado Cleanout Bit**
  - *Carbide.com* AMA-45460-S
  - *RouterBits.com* 3000
  - *Woodsmith Store* 271694

SANDING CENTER *(p.24)*

- **5" Casters**
  - *Rockler* 31845
  - *Woodsmith Store* 454398
- **20" Drawer Slides**
  - *Rockler* 32508
  - *Woodsmith Store* 455560
- **Dust Hood**
  - *Rockler* 21025

Paint: *Benjamin-Moore Regal Eggshell ("Raspberry Truffle" 2080-10).*

RIP FENCE SYSTEM *(p.36)*

- **Reid Supply**
  - *5/16"-18 Knobs w/Insert* ... RST-94
  - *5/16"-18 Knobs w/1" Stud* .. RST-99

SANDING DISKS *(p.48)*

- **MSC**
  - *Coarse Scotch-Brite* 03363280
  - *Med. Scotch-Brite* 03363355
  - *Fine Scotch-Brite* 03363389
  - *Super-Fine Disks* 00319533
- **Rockler**
  - *Med. Non-Woven Pads* 93451
  - *Fine Non-Woven Pads* 93469
  - *Extra-Fine Pads* 93477
  - *Micro-Mesh* 20106

Mirka Abranet disks and backup pads are available from *Woodcraft.*

MAIL ORDER SOURCES

Woodsmith Store
800-444-7527

Rockler
800-279-4441
rockler.com

Amazon.com

Carbide.com
888-701-9278

Highland Woodworking
800-241-6748
highlandwoodworking.com

Kreg
800-447-8638
kregtool.com

Lee Valley
800-871-8158
leevalley.com

McMaster-Carr
630-600-3600
mcmaster.com

MSC
800-645-7270
mscdirect.com

Reid Supply Company
800-253-0421
reidsupply.com

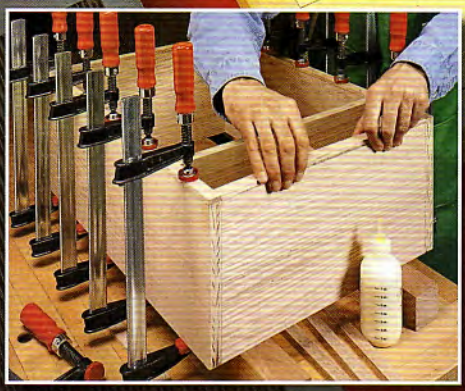
RouterBits.com
800-222-8404

Woodcraft
800-225-1153
woodcraft.com

Woodpeckers
800-752-0725
woodpeck.com

Scenes from the Shop

Hooking up this sanding station to your dust collector will keep your shop virtually dust-free. The interchangeable panels on top allow you to arrange the system for optimal dust collection. Detailed plans start on page 24.



Adding hardwood edging to a case built from plywood covers the plies and gives it a seamless, finished look. Turn to page 32 to learn the tips and techniques for getting perfect results.

ShopNotes

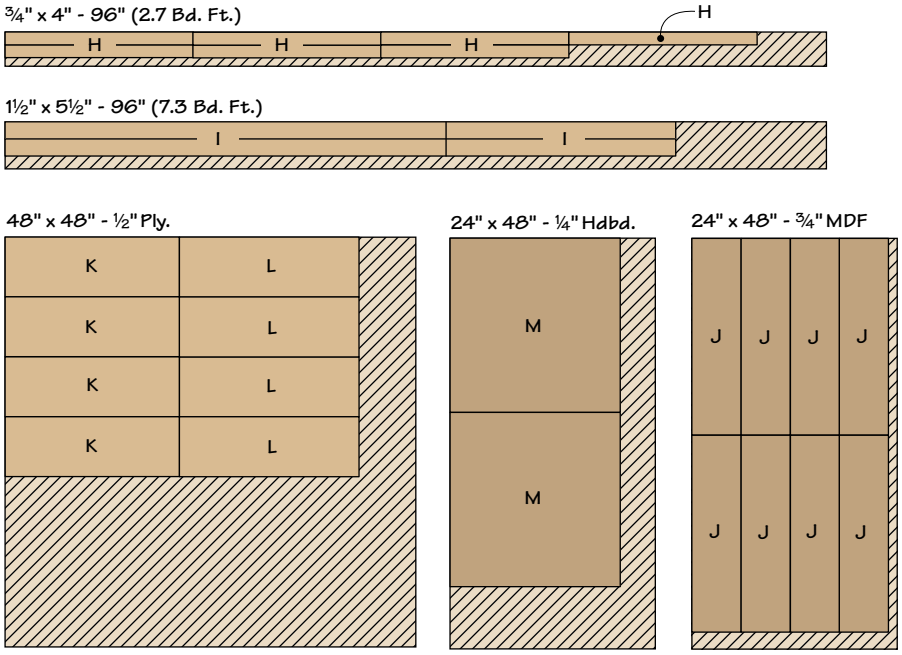
Sanding Station

Materials List

A	Sides (2)	23 x 30 - ¾ MDF
B	Shelf/Bottom (2)	22½ x 45 - ¾ MDF
C	Drawer Divider (1)	7¾ x 22½ - ¾ MDF
D	Back Panel (1)	30 x 45 - ½ MDF
E	Caster Plates (2)	4 x 23 - ¾ MDF
F	Baffles (2)	22 x 25 15/16 - ½ MDF
G	Front Panel (1)	20¾ x 44½ - ½ MDF
H	Panel Supports (7)	¾ x 1½ - 22
I	Top Trim	1½ x 2 - 156 Rgh.
J	Grates/Solid Panels (8)	5¾ x 23 - ¾ MDF
K	Drawer Fronts/Backs (4)	7 x 20⅜ - ½ Ply.
L	Drawer Sides (4)	7 x 21 - ½ Ply.
M	Drawer Bottoms (2)	20½ x 20⅜ - ¼ Hdbd.
N	Drawer False Frts. (2)	7⅝ x 21 ¾ - ¾ MDF

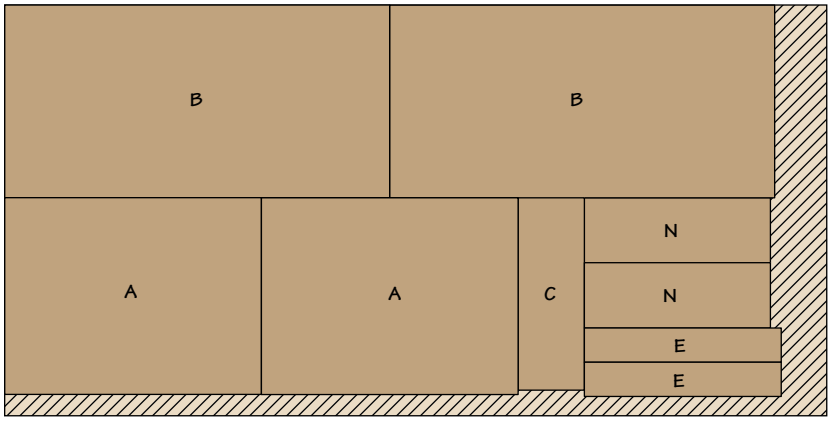
- (2 pr.) 5" Locking Swivel Casters
- (16) #12 x 1¼" Ph Screws
- (14) #8 x 1½" Fh Woodscrews
- (2 pr.) 20" Full-Extension Drawer Slides w/Screws
- (2) 4" Drawer Pulls w/Screws
- (8) #8 x 1" Fh Woodscrews

Cutting Diagram

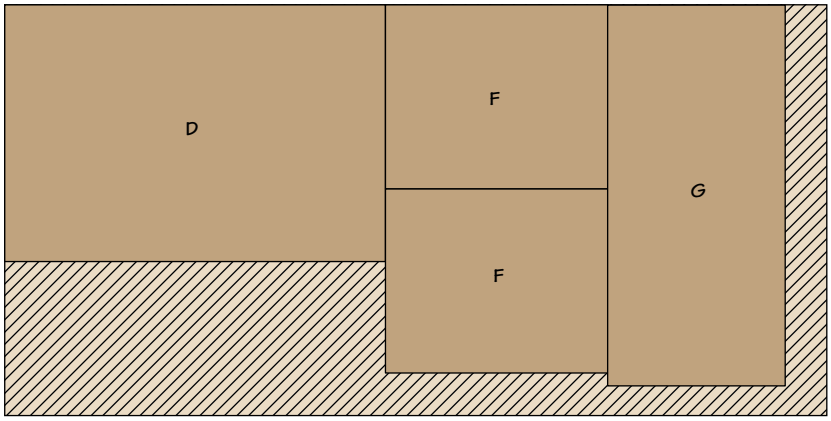


Cutting Diagram (continued)

48" x 96" - ¾" MDF



48" x 96" - ½" MDF



ShopNotes

wall-mounted Sharpening Center

Materials & Hardware

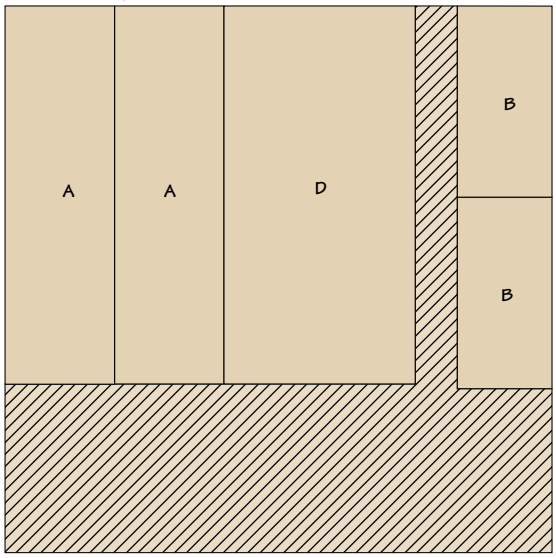
CASE

A	Sides (2)	12 x 41½ - ¾ Ply.
B	Top/Middle Shelf (2)	10⅜ x 21 - ¾ Ply.
C	Lower Shelf (1)	9⅝ x 21 - ¾ Ply.
D	Back Panel (1)	21 x 41½ - ¾ Ply.
E	Upper Adj. Shelf (1)	10⅜ x 20⅜ - ¾ Ply.
F	Lower Adj. Shelf (1)	7 x 20⅜ - ¾ Ply.
G	Upper Doors (2)	10⅛ x 20¾ - ¾ Ply.
H	Drop Front (1)	19⅛ x 20⅜ - 1½ Ply.
I	Pins (2)	½-Dia. x 2¾ Steel Rod

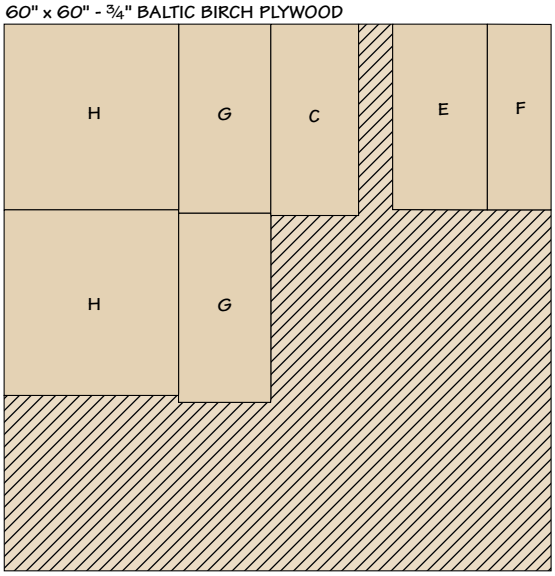
- (3) Door Pulls
- (6) #12 x 1" Rh Woodscrews
- (2 pr.) 175° Fully Concealed Hinges w/Screws
- (20) #8 x 1½" Fh Woodscrews
- (8) ¼"-dia. Shelf Pins
- (2) Magnetic Catches
- (1) 1/32" x 24" x 24" Silicon Sheet

Cutting Diagram

60" x 60" - ¾" BALTIC BIRCH PLYWOOD



60" x 60" - ¾" BALTIC BIRCH PLYWOOD



ShopNotes

routing multiple Slots

Routing accurate slots in the sanding station panels is easy using a straight bit and the router table.

The key to routing accurate slots is to create a series of layout lines on the grates, the fence, and on the router tabletop, as you can see in the drawings below.

Two lines, one on the fence and the other on the router tabletop, indicate the center of the bit. Once you have these lines, setting the fence and routing the slots becomes a piece of cake.

That's because a series of lines on both faces of each grate shows the start and stop points for each set of slots. And, lines marking the center of all the slots on the end grain of the workpiece helps you with setting the fence.

You begin by raising the bit slightly above the top of the grate. Then set the fence to rout the outer row of slots first (main drawing).

To rout the slots, carefully plunge the workpiece over the router bit, using the layout lines as start and stop points, as in the detail drawing below. Rout the first slot, then flip the workpiece end for end, lowering the workpiece one more time to complete the second slot.

It's best to rout the slots on all four workpieces before repositioning the fence for the next set of slots. Make a single pass, then reset the fence and repeat the process for the remaining slots.